DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

BIG BOY RESTAURANT

RI/RO if connection made to south

LIQUOR STORE

MICHELSON

ORCHARDVIEW

GRACE

BOLYARD LUMBER

DISCOUNT TIRE AUTO SVC

POTENTIAL FUTURE CONCEPTS

Above average crash rate, many left turns

Long-term, evaluate various concepts to coordinate, reduce turning movement conflicts, especially left turns (medians, channelization). New interchange configuration (such as SPUI or roundabouts) may allow a signal between South and freeway ramps for signalized left turns.

BP GAS

EASTLAWN

ROCHESTER

WINDOWS + DOOR SALES

MEDICAL OFFICE

HALEY STONE

PUBLIC STORM-WATER FACILITY

VETERINARIAN

CITY OF ROCHESTER HILLS

CITY OF TROY

SOUTH

GAS

OFFICE

PETRAZELLO'S BANQUET CENTER

VENUS

SOLOMON

AMBERWOOD

PAINT CREEK

CASWELL TOWN CENTER

RED RUN

EDGEWATER

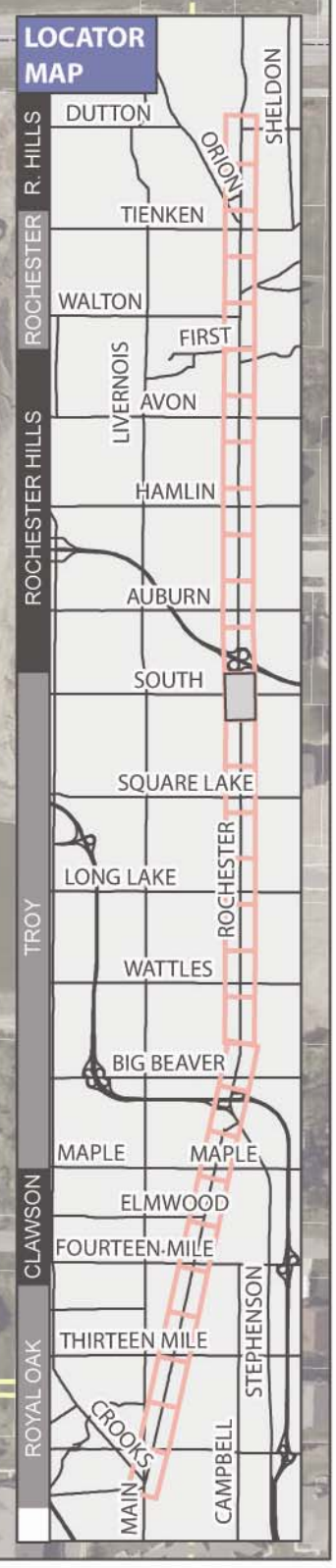
NINO SALVAGGIO MARKET

HARTWIG

SANDALWOOD

DRAFT 12/22/2010

LOCATOR MAP



LEGEND

CORRIDOR RECOMMENDATIONS

- Channelize driveway/access (right-in/right-out only unless specified)
- Generalized new curb
- Close driveway/access
- Sidewalk gap
- Connect adjacent parking areas/alley/service drive
- Add/extend service drive/alley

TRANSPORTATION NOTES & DATA

- Critical crash intersection
- Posted speed limit (45)
- Critical crash segment
- Existing alley/service drive
- Signalized intersection
- Existing regional pathway

PROJECT TEAM

SEMCOG, MDOT, LSL Planning, Inc. Community Planning Consultants, PB 125 YEARS

MAP NUMBER

18 OF 30

Rochester Road Access Management Plan

FINAL DRAFT

September 27, 2011

Prepared for:

Southeast Michigan Council of Governments (SEMCOG)

With Assistance from:

Michigan Department of Transportation (MDOT)

Road Commission for Oakland County (RCOC)

Prepared by:

LSL Planning, Inc.

PB

This Plan was prepared in cooperation with representatives from each city or agency affected by the recommendations contained herein. With their assistance, this Plan provides the most accurate and thorough recommendations possible. The authors of this document wish to thank the following contributors:

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Chapter 1:

Introduction

First recognized as a key state trunkline in the 1930s, Rochester Road spans a variety of communities and development patterns as it connects Downtown Royal Oak with northern Oakland County. Rochester Road is classified as a major thoroughfare that helps move significant traffic, goods, pedestrians and bicyclists through Oakland County, and provides access to adjacent and nearby businesses and neighborhoods.

Density patterns, land use, and development trends within this 15-mile study corridor represent several eras of growth and a variety of local development patterns ranging from downtown environments, to stretches with homes and smaller commercial uses, to suburban highway-oriented development. Traffic volumes and conditions also vary along the corridor. A proliferation of access points, especially around signalized intersections, contributes to congestion and crash concentrations. These conditions are exacerbated during peak travel times, as Rochester Road provides a key north/south link between employment centers and businesses with residential areas along the corridor.

Access management…

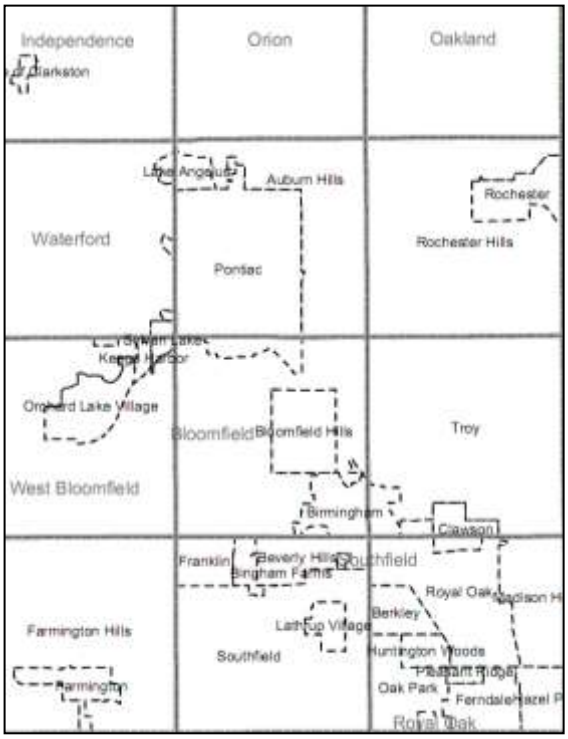
…involves maximizing the existing street capacity and improving the corridor for transit, bicyclists, and pedestrians by reducing or limiting the number of access points, carefully placing and spacing access points (commercial driveways), and other enhancements.

Study Area

The limits of the study corridor begin at Main Street in Royal Oak, where it diverges northeast through the City of Clawson until it meets with Stephenson Highway in the City of Troy. From there, Stephenson Highway becomes Rochester Road as it proceeds north and crosses I-75, then M-59 where it officially becomes M-150 in the City of Rochester Hills, before terminating at Mead Road.

The study area for this project extends 660 feet east and west of the centerline of Rochester Road, located in southeast Oakland County, Michigan. The study focuses on access to non-residential frontage properties. As discussed in this report, this portion of Rochester Road is referred to as the “Rochester Road Corridor” or “Rochester Road.”

The entire study corridor was once part of the Michigan highway called M-150, and it extended to the southern County line where it terminated at 8 Mile Road (M-102). A primary function of the road was to facilitate north/south travel. After construction of the I-75 freeway, M-150 no longer served as the primary north-south route as it once had, and portions of M-150 were removed from the state highway system and returned back to local control. Presently, M-150 officially begins at M-59 and ends at Tienken Road. Remaining portions of the corridor are referred to simply as Rochester Road.



Communities in Southeast Oakland County, Michigan

In total, the Rochester Road corridor is approximately 15 miles long, traverses five cities, and falls under the jurisdiction of two additional road agencies. The Michigan Department of Transportation maintains portions of the corridor located between M-59 and Tienken Road (what is presently known as M-150). The cities of Troy and Royal Oak maintain those portions located within their boundaries and the Road Commission for Oakland County maintains the remainder. Due to the multiple jurisdictions along Rochester Road, regulating access and development can sometimes be complicated. One of the purposes of this study is to help coordinate access decisions to ensure consistent application of access management within all affected communities.

Project Need

Segments of Rochester Road, especially along portions located north of I-75, experience periodic congestion and a relatively high number of crashes. Data and observations indicate that vehicles entering and exiting the roadway at cross streets and individual driveways contribute significantly to these problems. Managing access along the corridor can reduce crash potential and congestion because it considers the number, placement, and design of access points (intersecting streets and commercial driveways) in the context of the overall roadway, not just on each individual site.

The primary purpose of this project is to assess access conditions along the corridor and recommend changes that will improve safety and efficiency of travel.

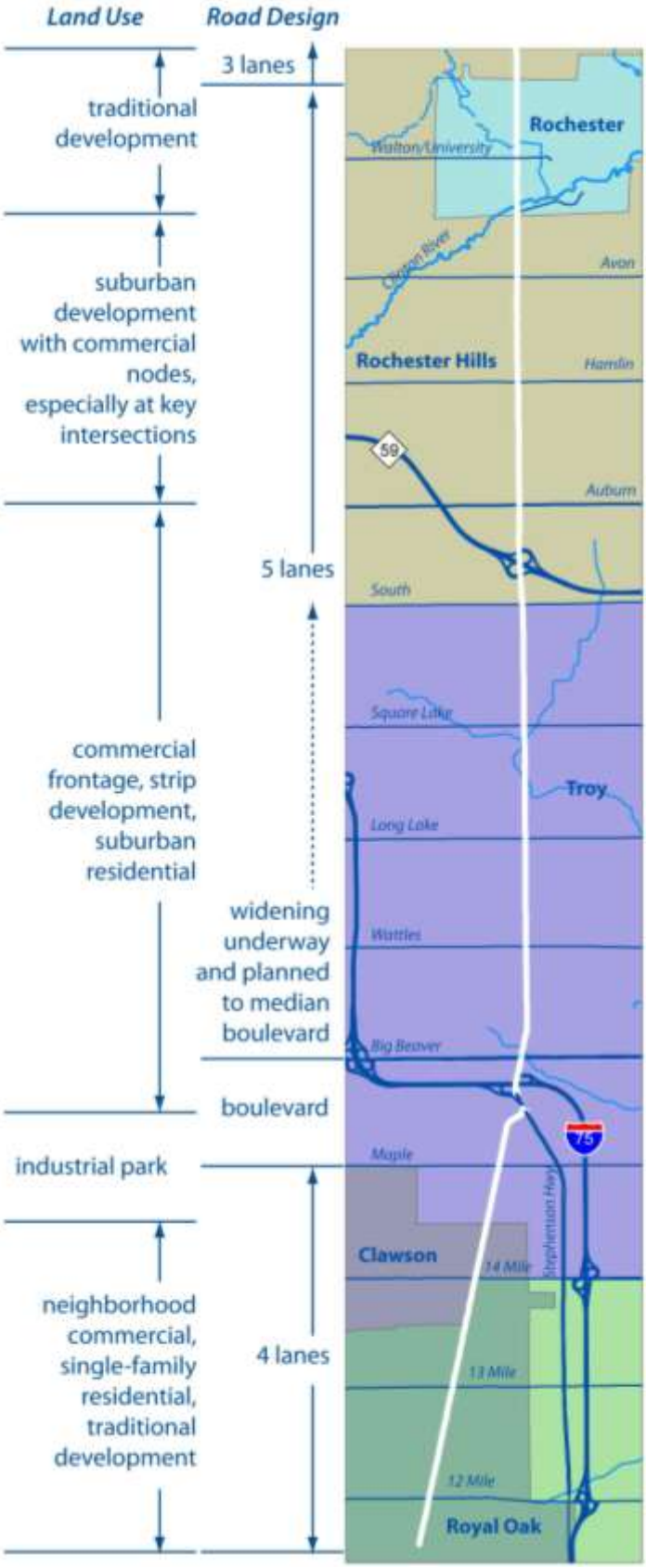
The primary purpose of this project is to assess access conditions along the corridor and recommend changes that will improve safety and efficiency of travel. However, applying access management has other secondary benefits, including higher pedestrian comfort and safety, improved biking environments, improved economic vibrancy, and increased opportunity to “green” the corridor. Recommendations to achieve these benefits are provided throughout this Plan.

Overview of Corridor Conditions

The Rochester Road corridor is generally a four lane road, with a center left turn lane for segments north of I-75. A small segment at the north end of the corridor, north of Cross Creek Drive, is three lanes, and another segment, south of I-75 is constructed as a divided road with a center median. The median was extended north to Wattles Road in 2010. Remaining portions of the corridor in Troy are also planned for a median in the future.

The character of land use is generally segmented by the I-75 freeway, which crosses the corridor in Troy, just south of Big Beaver Road. Areas south contain small-lot, traditional single-family neighborhoods with scattered pockets of neighborhood retail, while areas north maintain a more suburban commercial character with larger retailers and national chains dominating the commercial areas, and more modern multiple-family developments scattered throughout. Exceptions to this pattern exist just south of I-75, where approximately one mile of the corridor contains industrial development, and in the City of Rochester, where the corridor serves as Main Street through the city's Downtown.

More detailed discussion of the land use, access and crash conditions of each segment of the corridor is included in each local chapter.

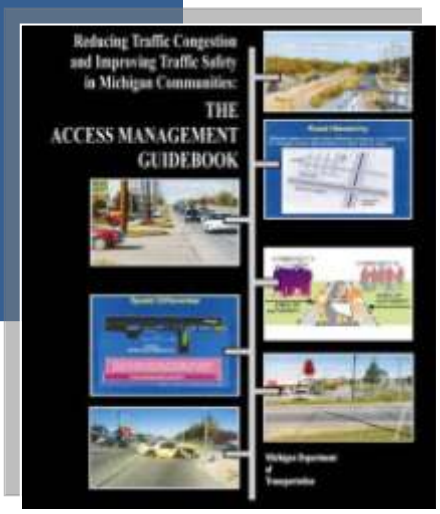


Preparation of this Plan

The recommendations in this Plan were developed from a site-by-site review of the corridor that considered access, crash data, site design, land use (existing and planned), zoning, and topography. They consider the standards contained in the MDOT Access Management Guidebook, other publications and research supporting access management from around the country. The cache of research available on access management, which is summarized in the MDOT Guidebook, forms a solid base for recommendations to reduce the number of driveways and promote the benefits of access management.

Basis For Recommendations:

- *MDOT's Access Management Guidebook*
- *TRB Manual on Access Management*
- *Nationwide Studies, Research & Publications*
- *Site-by-Site Evaluation*
- *Crash Data Analysis*
- *Land Use & Zoning*
- *Existing Road Profile*
- *Topography*



The MDOT Access Management Guidebook was a reference for recommendations in this Plan.

To synchronize input from each city and the various agencies, a Steering Committee was established to oversee development and administration of the Plan. The Committee consisted of representatives from each city, MDOT, the Southeast Michigan Council of Government (SEMCOG) and Oakland County. This group acted as the technical review and coordinating group and facilitated communication with city officials and the public.

Development of this Plan also considered input from the public. A series of meetings with the public and individual local communities and agencies were conducted throughout the process. The key public meeting was a public open house held at Troy Community Center on January 10, 2011, where draft recommendations were displayed for review and comment. The meeting began with presentations on the benefits of improved access management. Drafts of the plan recommendations and concepts for select intersections were displayed in an "open house" setting. Comments by the public, local officials, and the MDOT staff were considered and many were incorporated into the final recommendations.

Corridor Analysis

Crash Analysis

A crash rate is a calculation that considers the number of crashes related to the volume of traffic. For purposes of evaluation, crashes along the corridor were classified as "intersection" crashes and "link" crashes. To evaluate the "link" crashes, Rochester Road was divided into segments between each signalized intersection. Crashes within 250 feet of a signalized intersection were considered to be "intersection" crashes.

Crash rates for intersections along Rochester Road were compared to SEMCOG's crash rates for the southeast Michigan region from the past three years. SEMCOG classifies intersections with relatively high crash as "critical." Figure 1-1 presents SEMCOG's critical crash rate threshold, by average daily traffic entering the intersection. Those exceeding the thresholds on Rochester Road include the following:

- Big Beaver Road in Troy
- Wattles Road in Troy
- Auburn Road in Rochester Hills
- Hamlin Road in Rochester Hills
- Avon Road in Rochester Hills
- Tienken Road in Rochester Hills
- Nawakwa Road in Rochester Hills

Figure 1-1: SEMCOG Regional Critical Crash Rate for Signalized Intersection

Average Daily Traffic	Critical Crash Rate
1-10,000	8.88
10,001-20,000	2.70
20,001-30,000	2.13
30,001-40,000	1.75
40,001-50,000	1.60
50,001-60,000	1.61
60,001-70,000	1.43
70,001-80,000	1.19

SEMCOG Regional Critical Crash Rate for Unsignalized Intersection

Average Daily Traffic	Critical Crash Rate
1-10,000	4.02
10,001-20,000	1.38
20,001-30,000	0.86
30,001-40,000	0.70
40,001-50,000	0.54
50,001-60,000	0.46
Over 60,000	0.26

Crash types at these intersections are discussed in their respective report sections.

Figure 1-2: Critical Crash Rates for Rochester Road Links

Average Daily Traffic	< 35,000	35,000+
Number of Links	16	19
Number of Crashes	318	875
Average Crash Frequency	20	46
Critical Crash Rate	2.55	4.04

Unlike intersections, SEMCOG has not compared crash rates for links, so critical crash rates were established specifically for Rochester Road, based on available SEMCOG crash data for the entire roadway. Figure 1-2 presents the established critical link crash rates for Rochester Road. They are classified for segments with high and low traffic volumes, because it was found that critical crash rates differed significantly depending on traffic volume. Furthermore, crashes are more likely to occur in areas with higher traffic volumes.

The established crash rates in Figure 1-2 were then compared to rates for each link along the corridor. Crash types along critical crash links were evaluated to identify access-related patterns to the crashes. Figure 1-3 summarizes the results for all the links along Rochester Road. It reveals the following 13 links that met the critical crash criteria:

- 14 Mile to Goodale
- Goodale to Gable/Rankin
- Stephenson Highway to I-75 NB Ramp
- I-75 Ramp to Big Beaver
- Charrington to Troywood/Bishop
- Troywood/Bishop to Wattles
- South Boulevard to M-59 Eastbound Ramp
- M-59 Eastbound Ramp to M-59 WB Ramp
- Nawakwa to Meijer
- Meijer to Auburn
- Auburn to Wabash
- University to Albertson/Romeo
- Woodward to Tienken

Figure 1-3: Crash Rates

Community	Limits	Length (ft)	ADT	Frequency	Rate
Royal Oak	Main/Catalpa/Crooks to 12 Mile	1,408	10,600	0	0.00
	12 Mile to Girard	2,957	13,700	14	1.67
	Girard to 13 Mile	1,529	13,000	5	1.21
Clawson / Royal Oak	13 Mile to 14 Mile	4,860	20,100	46	2.27
Clawson	14 Mile to Goodale	1,133	14,500	14	4.10
	Goodale to Gable/Rankin	1,246	15,100	27	6.90
Troy	Gable/Rankin to Maple	1,663	14,300	7	1.42
	Maple to Stephenson	2,560	14,500	14	1.82
	Stephenson to Crossover S of Sylvia	1,263	17,900	6	1.28
	Stephenson to I-75 NB Ramp	2,202	25,500	72	6.17
	I-75 Ramp to Big Beaver	307	43,900	19	6.79
	Big Beaver to Crossover N. of Big Beaver	103	27,900	0	0.00
	Crossover N. of Big Beaver to Charrington	979	47,800	24	2.48
	Charrington to Troywood/Bishop	1,136	43,500	43	4.20
	Troywood/Bishop to Wattles	1,122	39,200	44	4.82
	Wattles to Eckford/Shallowdale	2,300	38,400	42	2.30
	Eckford/Shallowdale to Long Lake	1,807	38,400	31	2.16
	Long Lake to Player	3,028	36,800	32	1.38
	Player to Square Lake	1,406	36,200	9	0.85
	Square Lake to De Etta	2,711	36,600	37	1.80
	De Etta to South	2,140	37,100	45	2.73
Rochester Hills	South to M-59 EB Ramp	826	42,200	39	5.40
	M-59 EB Ramp to M-59 WB Ramp	790	49,300	54	6.69
	Nawakwa to Meijer	306	50,000	20	6.31
	Meijer to Auburn	463	46,900	60	13.34
	Auburn to Wabash	1,851	47,000	98	5.38
	Wabash to Hamlin	3,070	47,900	65	2.13
	Hamlin to Avon	4,573	45,400	141	3.28
	Avon to Diversion	2,213	46,200	61	2.88
Rochester	Diversion to 2nd	1,135	41,000	11	1.14
	University to Albertson/Romeo	818	31,900	16	2.96
	Albertson/Romeo to Woodward	627	30,700	9	2.25
	Woodward to Tienken	1,931	31,700	35	2.76
Rochester Hills	Tienken to Orion	1,440	24,600	25	3.41

Two segments, 12 Mile Road to Goodale Road, and Stephenson Highway to Big Beaver Road, were identified by representatives from the participating communities as needing further study. At these

locations, field visits were performed and traffic counts were obtained from the Road Commission for Oakland County (RCOC). Additional traffic counts were taken at some locations during the morning, afternoon, and evening peak periods (7-9 a.m., 11 a.m.-1 p.m. and 4-6 p.m.). Existing signal timings were obtained from the RCOC.

Assessment of crash types along the links was performed qualitatively. The link crash rates, number of crashes, and crash type percentages are presented by community in the following chapters. Where applicable, discussion of possible causes for these crash patterns, as well as mitigation suggestions is provided.

Intersection Operational Analysis

Intersection capacity analysis is the traditional form of measuring operational performance, as intersections control the flow of most roadways. Intersection capacity is a function of a calculated delay experienced by the average vehicle due to the intersection control. Intersection delay can then be equated to level of service (LOS), which is an intuitive scale of "grades" from A to F that measure how a roadway is operating. The level of service is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. These variables are summarized and provided as grades for signalized intersections in the *2000 Highway Capacity Manual, Special Report 209,* which are shown in Figure 1-4.

Figure 1-4:
Level of Service for Signalized Intersections Based on Control Delay

Level of Service	Description	Average Control Delay Per Vehicle (seconds) [1]
A	Operations with very low control delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low control delay occurring with good progression and/or short cycle lengths.	> 10.0 and ≤ 20.0
C	Operations with average control delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 and ≤ 35.0
D	Operations with longer control delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios[2]. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 and ≤ 55.0
E	Operations with high control delay values indicating poor progression, long cycle lengths, and high V/C ratios[2]. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 and ≤ 80.0
F	Operation with control delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0

Notes:

[1] Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Control delay for signalized intersections may also be referred to as signal delay.

[2] A common measurement is the volume-to-capacity ratio. A V/C ratio exceeding 1.0 means the intersection is over capacity, which is usually considered as a LOS E. These methods of measuring intersection performance usually produce similar results, but not always. For example, it is possible to have LOS E and not have the V/C = 1.0. This is because delay is based on control delay. Long delays with lower V/C ratios can exist if cycle lengths are long, a lane group is disadvantaged by the signal timing, or the signal progression is poor. The reverse is also possible, a saturated lane group (V/C > 1.0) may have short delays if the cycle length is short and/or the signal progression is good.

Source: 2000 Highway Capacity Manual, Special Report 209

Measures of delay and levels of service for this study were evaluated using a microsimulation model (Synchro/SimTraffic) that used peak hour traffic movements and signal timing. The existing conditions AM and PM peak hour models were calibrated within SimTraffic to help ensure the model reflected actual traffic conditions.

Typically, municipalities and road agencies prefer a LOS D or better for each approach at an intersection. Any movement at the intersection (e.g. through, left-turn, or right-turns from any leg of the intersection) rated below a D was evaluated to identify changes that could improve the level of service. These changes, often called "mitigation measures," included adjusting signal timings at a minimum and then geometric conditions were modified to improve operations and/or safety.

Driveway Density

The MDOT Access Management Guidebook recommends spacing between access points, based on the posted speed limits. Few segments along the corridor currently conform to these recommendations. For each segment, actual access density (or number of access points per mile), were compared to the MDOT spacing standards. Key findings of this evaluation are listed below, with detailed density information shown in Figure 1-5:

1. Driveway frequency along the corridor is 1.45 times higher than that suggested by the MDOT spacing standards.
2. In total, this plan recommends a 14% reduction in the number of existing driveways. If fully implemented, the corridor will actually fall below MDOT's recommended density, meaning there will be fewer driveways than would be acceptable according to MDOT standards.
3. If all of the proposed driveways are gradually removed, it can result in elimination of approximately 48,525 square feet (or 1.1 acres) of impervious coverage/pavement.

Figure 1-5:
Rochester Road Driveway Density and Impervious Coverage

Community	Segment	Existing Access	Access Density (# of access / mile)		Proposed to be Removed	Removed Access Area
			Existing Density	MDOT Standard[1]		
Royal Oak	Main to 12 Mile	13	20.9	18.6	2	100
	12 Mile to Detroit	19	30.5	21.2	0	-
	Detroit to 13 Mile	48	62.0	23.6	6	3,000
	13 Mile to Whitcomb	48	53.4	25.0	2	250
	Whitcomb to 14 Mile (east side)	19	34.6	9.3	2	-
Clawson	Whitcomb to 14 Mile (west side)	28	50.8	9.3	6	750
	14 Mile to Elmwood	59	100.2	29.0	10	1,250
Troy	Elmwood to Maple	35	57.2	23.3	4	2,000
	Maple to Stephenson Hwy	40	54.5	25.3	10	5,000
	Stephenson Hwy to Big Beaver	25	26.9	15.7	0	-
	Big Beaver to Trombley	38	58.7	14.9	3	1,875
	Trombley to Wattles	41	68.2	15.9	8	5,000
	Wattles to Shallowdale	17	20.8	16.0	1	750
	Shallowdale to Long Lake	28	48.1	13.8	11	8,250
	Long Lake to Kindercare Drive	17	24.9	15.8	3	1,875
	Kindercare Drive to Square Lake	13	17.8	15.2	0	-
	Square Lake to Marengo	13	15.8	15.3	6	2,250
	Marengo to South Blvd.	26	29.9	18.2	1	500
Rochester Hills	South Blvd. to WB M-59 off-ramp	18	28.2	15.0	3	2,250
	M-59 Ramp to Auburn	26	51.0	9.6	5	2,750
	Auburn to Regal	24	38.4	12.7	4	2,000
	Regal to Hamlin	20	20.9	13.4	0	-
	Hamlin to 22½ Mile	13	19.5	11.9	1	375
	22½ Mile to Avon	17	29.1	10.4	1	300
	Avon to South St.	36	50.4	17.9	7	5,250
Rochester	South St. to University	22	24.3	40.1	2	-
	University to Woodward Ave.	44	75.2	38.9	8	2,000
	Woodward Ave. to North	15	37.1	10.5	0	-
Rochester Hills	North to Tienken	6	27.7	9.3	0	-
	Tienken to Cross Creek	11	18.1	11.5	3	750
	Cross Creek to Mead	5	5.1	13.8	0	-
		784	38.9	540.3	109	48,525

Footnotes:

[1] MDOT standard shown is for spacing on one side of the road. In order to compare to the total count, which includes both sides of the road, the MDOT standard result was multiplied by two, except for the segments between Whitcomb and 14 Mile, which were counted for each side, since the RO/Clawson boundary is Rochester Road in this segment.

[2] 4-way intersections were counted as 2 access (one on east side, one on west) and T-intersections were counted as 1 access.

[3] Existing streets includes those at the break point. Where the break point was at an intersection, the number of access (see footnote 2) were added to the segment adjacent and to the south. For example, the first segment (Main Street to 12 Mile) ends at 12 Mile, so 2 additional accesses were added to the existing streets count. The 12 Mile to Detroit segment will therefore not include access counted for 12 Mile.

Improving the Corridor

Access management is a key tool in reducing congestion, preventing crashes and preserving road capacity. While these benefits are most obvious to motorists, access management can also improve conditions for those walking and biking. Access management can support local non-motorized policies by reducing driveways and improving the safety of sidewalk crossings. Businesses, especially those along congested segments, can also benefit since access to their establishments can be safer and more convenient for customers. Some locations may also benefit from the additional parking spaces that could be claimed in place of driveways that have been removed due to closure or consolidation.

This Plan includes a set of general guidelines for managing access along the corridor, as well as a set of site-specific maps that show existing conditions and recommendations for improvement. *Chapter 2: Access Management Guidelines* discusses in detail the benefits that can be achieved through proper planning and management, and the guidelines for access changes.

Walking and biking systems depend on many factors, most importantly, the extent of attractions within walking distance (approximately ¼ to ½ mile) and the pedestrian environment. Factors such as the width and condition, provision of bike lanes or routes along nearby local streets, the ease of road crossings, and maintenance of sidewalks influence the number of pedestrians and bicyclists.

Guidelines for improving walking and biking systems, stormwater systems, and transit access are provided in *Chapter 3: Corridor Improvement Guidelines*.

Benefits of Access Management:

- ***SAFETY*** *– reduces crashes*
- ***CAPACITY*** *– improves traffic flow*
- ***WALKABILITY/TRANSIT*** *– reduces conflicts*
- ***AESTHETICS*** *– increases landscaped areas*
- ***BUSINESS VITALITY*** *– improves customer ingress/egress*
- ***PRESERVE INVESTMENT*** *– very cost effective*

Plan Implementation

Successful implementation of plan recommendations will require continued coordination between the cities, Road Commission for Oakland County, MDOT, SEMCOG and other quasi-public organizations like downtown development authorities (DDA). Therefore this access management program fosters a collaborative approach so the various groups can work together to achieve the same goals.

To implement the recommendations for Rochester Road, each city is advised to amend its master plan to incorporate the contents of this

Plan. Each city was provided with a plan document for this purpose that contains consistent guidelines for access management and other corridor improvements, along with a local chapter that discusses the conditions and recommendations specific to each city. If full integration of this Plan is not possible or desired, the local master plan should at least be revised to include a basic discussion of access management, its benefits, and ways the community plans to implement it. This will provide the required legal framework upon which each city can adopt specific zoning regulations.

The key regulatory tool to implement access management is a zoning overlay ordinance. A model ordinance was provided to each city for their use and integration into their own zoning ordinance. It was crafted using MDOT's spacing guidelines, but includes the appropriate amount of flexibility needed to respond to existing conditions or unusual situations in the future.

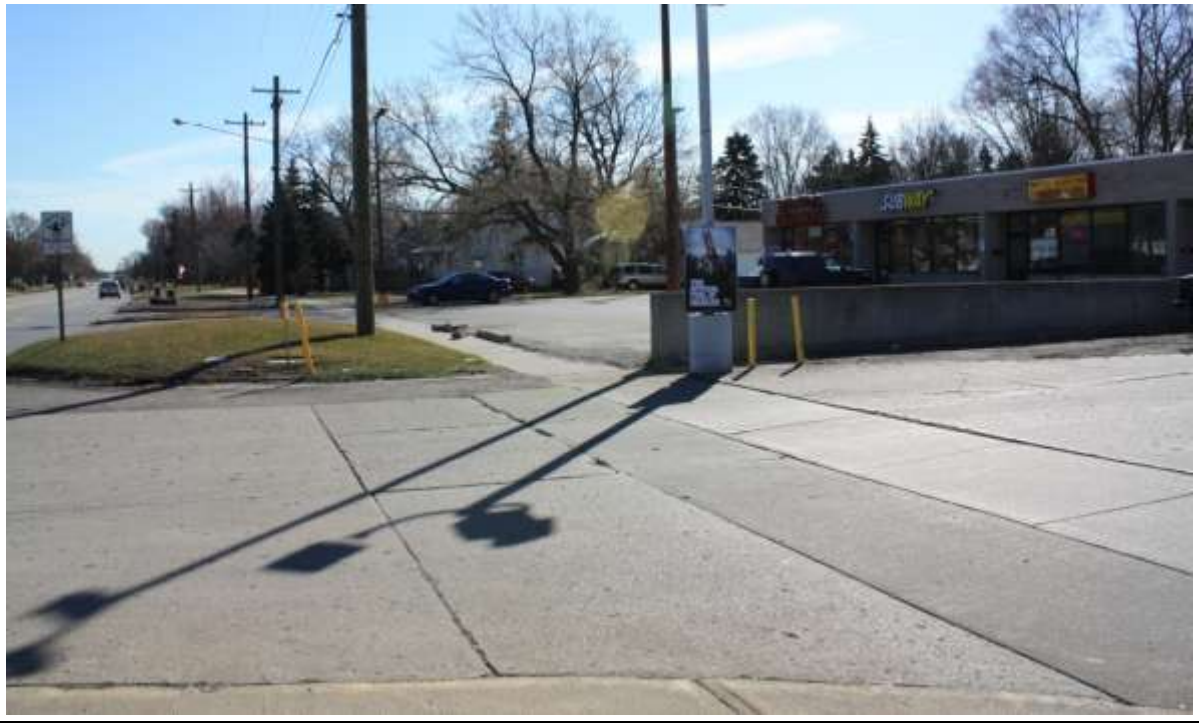
Chapter 2:

Access Management Guidelines

Rochester Road in Oakland County holds an important transportation function, but due in part to a proliferation of driveways and access points, experiences periodic congestion, and some locations along the corridor experience relatively high crash rates. This Access Management Plan was created to help identify areas of concern along the corridor, and recommend changes to improve them.

Numerous studies in Michigan and nationwide have shown that a proliferation of driveways or an uncontrolled driveway environment can increase the number and severity of crashes, reduce roadway capacity, and create a need for more costly improvements in the future. Access management can also restore capacity that is lost due to frequent flow interruptions for turns into and out of poorly spaced driveways.

In the State of Michigan, access management has been in practice for over two decades. In 1999, MDOT commissioned a task force to research, discuss, and organize best practices on access management, and officially adopted a statewide guide, known as The Access Management Guidebook, in 2001. That document and its foundation in significant national research and statistics form the basis for this plan's standards and recommendations.



What is Access Management?

Access Management is a series of techniques and standards used to maximize existing street capacity and minimize the potential for crashes. Studies show reducing or limiting the number of access points, carefully placing, spacing and design of access points can help achieve safer environments and preserve efficient traffic flow.

Access management techniques are used to improve transportation operations and increase safety while maintaining reasonable access to properties. In some cases, access may be provided through shared or indirect means, but in every case, reasonable access is always maintained.

Access Management can also improve the corridor for bicyclists and pedestrians by reducing and limiting the number of potential conflict points along the corridor. Proper placement and design of access points can help improve visibility of pedestrians and bicyclists and reduce the risk involved in crossing multiple driveways and intersections.

Benefits of Access Management:

By considering the relationship between access points along a roadway, all road users and property owners stand to benefit. National experience and case studies of other corridors have shown that access management can result in 25-50 percent reductions in access-related crashes (*Access Management Manual, Transportation Research Board*), but can also have secondary benefits on non-motorized and transit environments while providing improved business environments and opportunities for inter-agency coordination.

- Decreased potential for and severity of crashes by reducing conflict points.
- Restored efficiency of travel by eliminating access points that cause traffic disruptions and delays.
- Boosts local property values and increase the vitality of adjacent businesses by reducing congestion and improving business visibility.
- Improved air quality through reduced braking and accelerating, eliminating unnecessary vehicle idling, and promoting alternative travel options.
- Enhanced access to and from businesses, both in terms of safety and convenience.
- Less need for costly road widening or other major improvements by maximizing the efficiency and volume of traffic.

Benefits of this Planning Effort

While application of access management can provide the above benefits, merits of the planning *process* are often overlooked. Bringing communities together into a joint planning effort increases opportunities for information sharing and cross-education. It is also helpful in educating the public, especially those directly impacted by the plan's recommendations. This planning effort can help to:

- Provide information on the benefits of access management and the various implementation techniques to assist local and county officials in their planning efforts.
- Promote continued coordination and communication among SEMCOG, MDOT, Oakland County, local governments and the public during the development review process.
- Inform property owners, business operators, potential developers, and the general public about access management, its benefits, the rationale for recommendations, and how they will be applied over time.
- Provide guidance for future development reviews through advance planning, clear and consistent protocol and early coordination with local communities and business owners.
- Inform communities and property owners access management can support other corridor goals for safety, aesthetics, and enhanced walking, biking, transit, and green infrastructure.

INFORM

COMMUNICATE

EDUCATE

GUIDE

COORDINATE

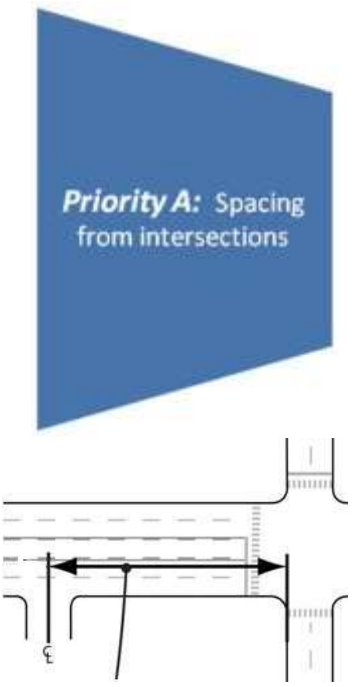
Access Management Principles

To achieve the benefits of access management, this Plan was developed using the following principles:

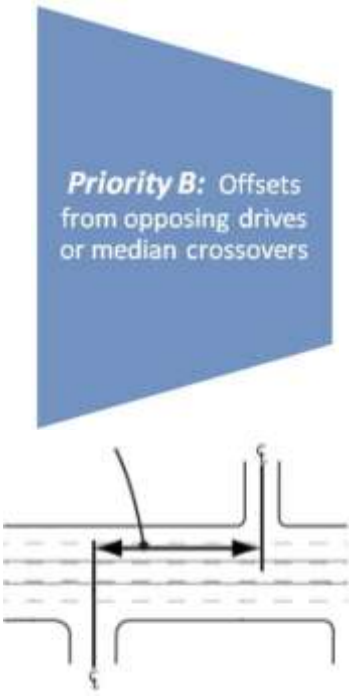
- **Design for efficient access.** Identify driveway design criteria that promoting safe and efficient ingress and egress at driveways, while considering the interaction with pedestrians and bicyclists.
- **Separate the conflict areas.** Reduce the number of driveways, increase the spacing between driveways and between driveways and intersections, and reduce the number of poorly aligned driveways.

- **Remove turning vehicles or queues from through lanes.** Reduce both the frequency and severity of conflicts by providing separate paths and storage areas for turning vehicles and queues.
- **Limit the types of conflicts.** Reduce the frequency of conflicts or reduce the area of conflict at some or all driveways by limiting or preventing certain kinds of maneuvers.
- **Provide reasonable access.** Recognize that property owners have an inherent right to access public roadways, although reasonable access may be indirect in some instances.

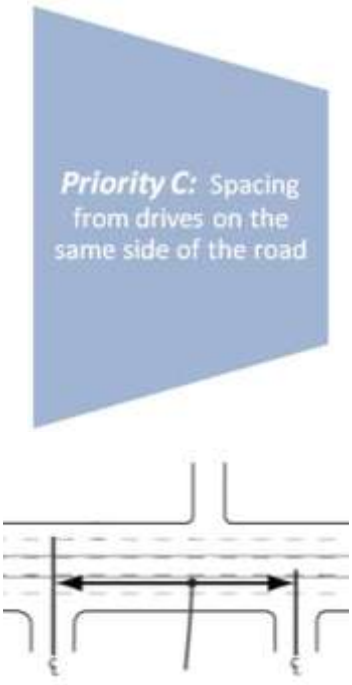
Access recommendations are not made according to a static set of standards. Rather, they are made by considering the context of the site, volume of traffic using each access point, existence of support facilities (such as shared drives, side access, etc.), interface with walking, biking and transit systems, and proximity to other nearby access points. Often, these existing conditions can prevent full compliance with ideal access standards, so it is important to know which are most critical to implementation. Where this occurs, other alternatives such as shared access, service drives and traffic signals should be considered to improve access conditions. To identify the best recommendation for each situation, access recommendations should be made using the following priorities:



Spacing from intersections, most importantly from signalized intersections. Where possible, driveways should be avoided within the operational area of the intersection.



Offsets from driveways and median crossovers on the opposite side of the road should be sufficient to prevent left-turn conflicts.



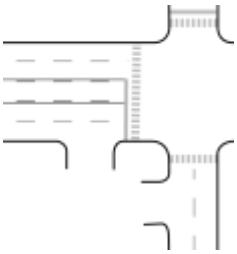
Spacing from driveways on the same side of the road should be based on the posted speed areas, and where ideal spacing cannot be achieved, as far apart as possible.

Access Tools and Techniques

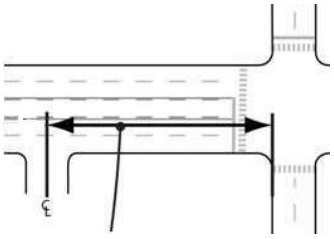
Access management can be accomplished through a variety of techniques, both physical and regulatory. Recommendations for each city in the study area, and site-specific recommendations that show existing and potential new access are provided in the local chapters of this Plan. Recommendations and regulations are based on the following techniques:

- **Driveway Spacing from Intersections.** Driveways need to be spaced far enough from intersections, especially signalized intersections, to reduce crash potential between traffic entering or exiting a driveway and intersection traffic. Standards take into account the type of roadways involved, type of intersection control, and type of access requested (full- or partial-movement). For state trunklines with speed limits of 30 or more miles per hour, full movement driveways should typically be at least 230 feet away from a signalized intersection (460 feet in 40 mph zones) and 115 to 230 feet away from unsignalized intersections.

Don't:
the driveways shown here are likely to cause conflicts with activity at the intersection

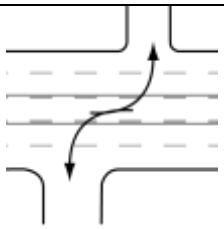


Do:
Keep driveways away from the "operational area" of the intersection, where possible.

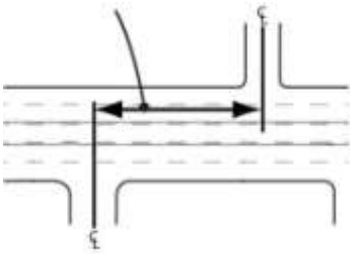


- **Driveway Alignment and Offsets Relative to Other Driveways.** One problem with two-way left-turn lanes is the potential for opposing autos to prevent the other from safely completing their maneuver due to "left turn lock up," as shown. To help prevent this situation, driveways should be aligned with those across the street or offset a sufficient distance to reduce left-turn turning movement conflicts. Minimum offsets on the corridor should be determined by posted speed limits and range from 255 feet in 25-mile per hour zones to 750 feet in 50 mile per hour zones.

Don't:
Opposing drivers turning left into these driveways are likely to conflict, causing "left-turn lock up"



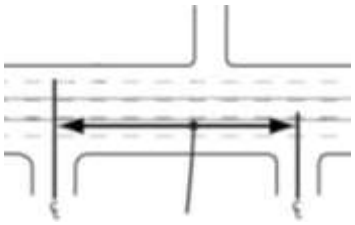
Do:
Allow adequate room for both vehicles to safely enter the left-turn lane before completing their turn



- **Driveway Spacing from Other Driveways.** Optimum driveway spacing simplifies driving by reducing the amount of information to which a driver must react. Adequate spacing between adjacent driveways and between driveways and intersections can reduce confusion that otherwise requires drivers to watch for ingress and egress traffic at several points simultaneously while controlling their vehicle and monitoring other traffic ahead and behind them. Reducing the amount of information related to selecting an access point and avoiding conflicting turns and traffic provides greater opportunity to see and safely react to automobiles in the street and pedestrians and bicyclists on sidewalks.

Don't:
Driveways that are spaced too closely can create congestion, confusion and clutter along the roadway

Do:
Separate driveways and strategically place them to prevent backups and remove conflict points



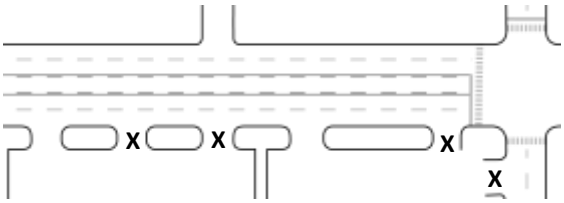
Recommended MDOT Spacing Standards:

Generally, higher posted speed limits demand greater driveway spacing. Spacing standards recommended for this corridor are based upon MDOT guidelines for minimum distances between driveways, measured centerline to centerline. The posted speed limits in spring 2010 for the corridor are illustrated on the recommendations maps. While these recommended spacing guidelines will be difficult to achieve along Rochester Road, where existing lot widths and driveway locations are likely to prevent compliance, they do provide a good benchmark for review. Realistically, each city should strive to achieve greater compliance with these recommendations.

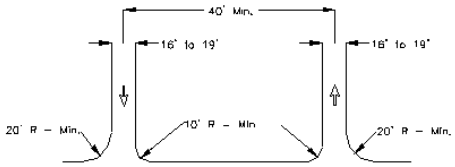
Posted Speed (mph)	MDOT Spacing (in feet)
25	130
30	185
35	245
40	300
45	350
50 +	455

- **Number of Access Points.** The number of access points to a development should be limited to one where possible. Every effort should be made to limit the number of driveways and encourage access from side streets, service drives, frontage roads, shared parking areas, and shared driveways. Certain developments generate enough traffic to consider allowing more than one driveway and larger parcels with frontages that are wide enough to meet spacing standards may also warrant an additional driveway. These possibilities need to be considered when crafting zoning regulations, to ensure reasonable application of this standard.

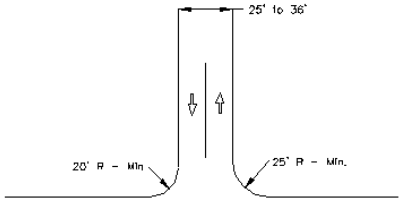
Do:
Seek removal of driveways that do not meet the MDOT spacing standards, or that are not necessary for reasonable access



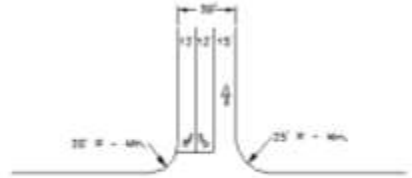
- **Access Design.** The geometric design of access points, including the width, throat, radius, and pavement type, should meet relevant standards wherever possible to promote smooth transition between Rochester Road, cross streets, and private driveways.



DETAIL A: TYPICAL ONE-WAY PAIR DRIVEWAY CONFIGURATION



DETAIL B: TYPICAL TWO-WAY DRIVEWAY ONE ENTRANCE LANE, ONE EXIT LANE

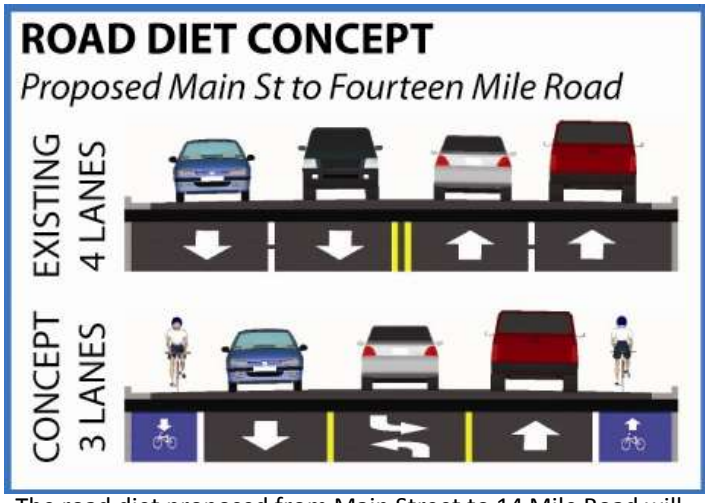


DETAIL C: TYPICAL TWO-WAY DRIVEWAY ONE ENTRANCE LANE, TWO EXIT LANES

- **Road Design.** Historically, congestion issues were often addressed through widening the road or intersection. While this is still appropriate in some cases, other less extensive physical changes can also be made to improve access conditions.

  Installation of center medians or channelized driveways can be used to create "right-in/right-out" driveways, immediately eliminating half the potential conflict points. A segment of Rochester Road in Troy was reconstructed into a divided road with center median in 2010. Among the benefits of this type of median is an improvement to traffic flow and safety. Studies consistently show a median can improve capacity by 10% to 25% and reduce crashes by 25% to 50%. Intersection redesign is another more costly approach, but where warranted, can be necessary to address a safety concern.

  A less costly road redesign option is to convert a four-lane road to a three-lane road, sometimes called a "road diet." This Plan proposes such a change in Royal Oak, where the four existing vehicle lanes would be replaced by three vehicle lanes and bike lanes on both sides. The road diet allows for addition of a center left-turn lane, and can sometimes be implemented with simple striping changes.

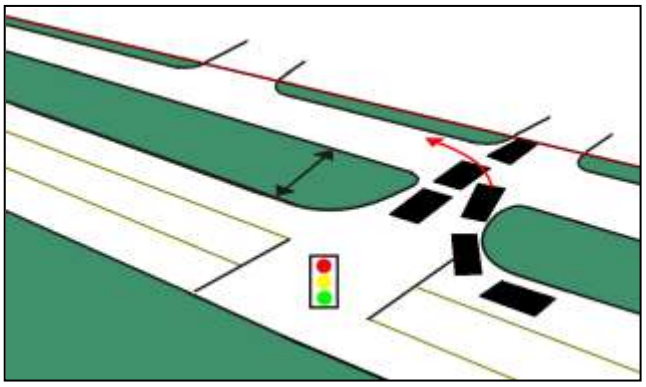


The road diet proposed from Main Street to 14 Mile Road will improve the biking environment by providing dedicated, on-street bike lanes in lieu of unnecessary vehicle lanes

- **Shared Driveways and Cross-Access.** Sharing or joint use of a driveway by two or more property owners should be encouraged. This will require a written easement for access and maintenance from all affected property owners before or during the site plan approval process. Where future shared access is desired, the developer should construct a

'stub' drive up to the property line (with access easement) or initiate a floating cross-access easement that will be reciprocated by adjacent development in the future to facilitate an easy connection when opportunities arise on adjacent property.

- **Alleys and Service Drives.** Frontage drives, rear service drives, and shared access can be used to minimize the number of driveways, while preserving property owner rights to reasonable access. Such facilities provide customers with access to multiple sites without the need to re-enter the main roadway. In areas within one eighth of a mile of existing or future signal locations, access to individual properties should be provided via these shared or indirect access methods first, rather than by direct roadway connections. Use of these secondary access opportunities helps disburse traffic and alleviate congestion at direct driveway locations. Any new service drives should be constructed to public roadway standards in regard to cross section (i.e. 22-30 feet wide), materials, design, and alignment. Use of service drives should be encouraged, and incentives enacted, where they can:



  1. Provide through connections between side streets
  2. Relieve a congestion or safety condition
  3. Serve numerous properties
  4. Benefit the general public to an extent that their use provides a greater service to the community than to the individual property owner

- **Internal Sidewalk Connections to Public System.** Clearly marked internal sidewalks and paths should be included in site design. Walkways need to be located in convenient, visible locations to encourage use, but also should be clearly separated or protected from driveway and internal circulation lanes. This is especially important for segments of the corridor with higher sidewalk traffic.

Local Plan Adoption

Achieving improved access is accomplished through dedication to access management and persistent implementation. This responsibility is shared by both the regulating road agencies (MDOT and OCRC) and each city. It is imperative that local officials understand the basis for, benefits of and procedural demands of access management. Equally important is the need to coordinate driveway permit and engineering reviews. In addition to recommendations in *Chapter 5: Implementation*, the following actions are suggested to support this Plan and ensure its implementation:

- Incorporate this Plan into city master plans.
- Adopt ordinances that provide for consistent application of standards.
- In advance of development or redevelopment, consider places where pre-planning of driveway locations, service drives or other alternatives can help with access.
- Continue to coordinate with MDOT, Oakland County and SEMCOG on improvements along the corridor.
- Maintain contact with SEMCOG to identify locations where low-impact development or improved stormwater management techniques can be applied.
- Continue to discuss implementation approaches, including future corridor improvement authorities, special assessment districts or subarea planning, with other stakeholders along the corridor.
- Regularly meet to review and, if necessary, update this Plan as conditions change. A steering committee was developed as part of this process, which could continue to meet for this purpose after this project is complete.

Chapter 3:

Corridor Improvement Guidelines

Non-Motorized and Low Impact Design

The focus of this Access Management Plan is addressing access-related issues along the Rochester Road corridor. However, when access points are removed or redesigned, new opportunities emerge to improve the corridor in other ways. Improving driveway location and design can improve the environment not only for motorists, but also for pedestrians, bicyclists, and transit riders. The following sections outline site and access design considerations that can improve walking, biking and transit environments, and explains how use of green infrastructure and low-impact development (LID) concepts can enhance the corridor as well.

Rochester Road has historically been planned to accommodate motorized traffic, but it also serves pedestrians and bicyclists. Access management is one tool with the potential to improve the safety and flow of traffic from all modes. By reducing the number of and improving the design of driveways, the interface between motorists and pedestrians and bicyclists is safer and less frequent. This approach of considering the function of the whole corridor and all who use it for transportation purposes is referred to as "Complete Streets."

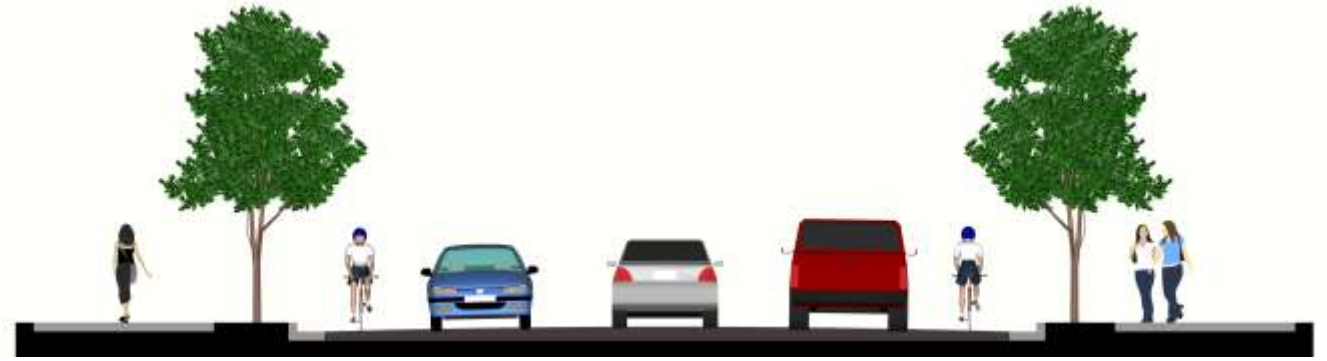
> ***Complete Streets are…***
>
> **…** designed and operated to enable ***safe access for all users.*** Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street.
>
> - *National Complete Streets Coalition*

Recent amendments to the Michigan Planning Enabling Act (MPEA) and the State Trunkline Highway System Act (Act 51) show the State's support of Complete Streets policies, as summarized below:

- The MPEA was amended to provide for the inclusion of Complete Streets: "*A system of transportation to lessen congestion on streets and provide for safe and efficient movement of people and goods by motor vehicles, bicycles, pedestrians, and other legal users*." This amendment requires local master plans to include a comprehensive transportation component that addresses all modes of transportation, and requires communities to work together, and with appropriate road agencies, toward local complete streets policies.
- Act 51 was amended to mandate the creation of a State Advisory Council that will adopt a state-wide policy. It also requires state departments of transportation to

provide technical knowledge and assistance to local communities, and demands best practices be used when planning improvements to the state's transportation system.

The Rochester Road Access Management Plan seeks to advance the concept of Complete Streets by integrating non-motorized data, including bike routes, regional trails, and sidewalk locations, into the project maps, and by identifying gaps in the existing sidewalk or pathway systems. In addition, many of the proposed access recommendations will have secondary benefits to the non-motorized environments, such as fewer driveway crossings, better visibility to motorists, and safer road and driveway crossings.



Complete Streets accommodate all users…

Wide Paths:	On-Street Bike Lanes:	Travel Lanes:	On-Street Parking:	On-Street Bike Lanes:	Wide Paths:
▪ Pedestrians ▪ Recreational users	▪ Bicyclists	▪ Motorists	▪ Business customers	▪ Bicyclists	▪ Pedestrians ▪ Recreational users

Non-Motorized Travel

Pedestrians and bicyclists (referred to as "non-motorized users") are the most vulnerable travelers. To be most effective when planning corridor features, the pedestrian and bicyclist must be considered a priority. By encouraging fewer access points and proper spacing and design, access management can improve the non-motorized environment. Improved driveway design (e.g. geometric, materials) can improve visibility of pedestrians and bicyclists for autos.

Pedestrian and bicycle travel along corridors with a proliferation of access points can be dangerous for several reasons:

- More driveway crossings means pedestrians face interaction with v ehicles more often, increasing the likelihood of a vehicle-to-pedestrian crash.
- More driveways often includes more signs and clutter within the right-of-way, which can be distracting to motorists and can block views of pedestrians and bicyclists.
- Driveways designed without proper curb radii, throat depth, and other design factors can reduce visibility, reaction times and hamper circulation. Access management supports driveway designs that intuitively cause motorists to drive with caution.

Existing Trail and Sidewalk Systems

Three regional trail systems converge just east of the study corridor in the City of Rochester. The Paint Creek Trail originates in Lake Orion and continues southeast to Rochester, and the Clinton River Trail generally follows the Clinton River, beginning at Opdyke Road and running northeast. East of Rochester, the trail enters Macomb County as the Macomb-Orchard Trail and continues northeast to the City of Richmond. Rochester Road is located near the point where these trails connect, and as such has the potential to connect numerous residents in the five cities involved in this effort with these regional trails. Therefore, as development progresses along the corridor, wider sidewalks and multi-use pathways should be encouraged to provide more residents with access to these regional assets.

Sidewalk gaps exist in various locations along the corridor, most commonly in the northern end where vacant development sites exist and the system has not been completed. These locations are noted on the site-specific recommendation maps so each community is well-aware of deficiencies in the system before development proposals are submitted for review. More detailed discussion of walking and biking systems is also included in the segment-by-segment descriptions in each local chapter.

Non-Motorized Design Guidelines

Designing any non-motorized system requires careful planning that considers safety, efficiency, convenience and costs versus benefits. It is important to provide clearly delineated pedestrian areas both along the corridor and connecting to private commercial developments. Non-motorized improvements should focus on linking the planned regional trails and improving safety and convenience for transit users and walkers or bikers traveling in high-use areas. Specific recommendations for each community are provided in the individual chapters.

In general, when planning for future non-motorized systems, communities should follow the guidelines listed below.

- **Access Design.** The geometric design of access points, including the width, throat, radius, and pavement type, should all include consideration of the interaction with off-street non-motorized users. Excessively wide driveways with little or no separation from off-street parking areas and broad, sweeping driveway curbs provide an unprotected non-motorized environment that lacks clear definition for turning movements and increases the amount of time a pedestrian or bicyclist is exposed to traffic. Driveways should include a clear-vision zone at the entrance, free of visual obstructions like shrubs, signs, utility boxes, or other barriers so oncoming traffic can clearly see pedestrians entering the driveway.

- **Delineate Driveway Crossings.** Sidewalk crossings of driveways should be clearly delineated. For higher volume areas (traffic or pedestrian) the crossing could be striped or constructed of durable contrasting material. Textured or colored concrete are good options since they can withstand vehicular weight while attracting the attention of motorists. Maintenance of crosswalk markings should be made a condition of site plans, just like maintenance of parking lot striping.

Example of how driveway design can draw attention to pedestrians in the crosswalk

- **Mid-block Non-Motorized Crossings.** When convenient, pedestrians will cross in the safest location. Preferably these are at signalized intersections, but pedestrians are more likely to cross in unsignalized locations when crossings are spaced more than ½ mile apart.

  While there is not much potential to see new signals in the more urban, developed communities in the southern end of the corridor, new design technologies and advanced traffic signals may be used to facilitate mid-block crossings in suburban settings. These options can help safely move pedestrians near school sites, key destinations or other locations, with minimal impacts to higher speed automobile traffic.

- **Accommodate Bicyclists.** Non-motorized systems must also accommodate bicycle activity. Amenities like bicycle storage, staging areas, and rest spots should be included in community-wide non- motorized systems. In some locations along the corridor, existing 4-lane roads can be re-striped to include bike lanes without

widening the actual road. Such a "road diet" is recommended in areas where motorized and non-motorized traffic volumes suggest fewer travel lanes and more bicycle facilities are needed, such as the segment in Royal Oak between Main Street and 14 Mile Road. Guidelines for road diets are provided in Chapter 2: Access Guidelines.

Example of on-street bike lane on suburban arterial road

Low Impact Development (LID) and Green Infrastructure

Stormwater management has historically been addressed from an engineering standpoint, to manage the quantity of runoff and prevent flooding. Stormwater runoff, especially in the more established urban areas of the corridor has historically been directed to privately-owned and municipally-owned detention or retention ponds with little regard for the volume, flow and especially the quality of the water. These stormwater systems are expensive to build and maintain. Techniques to lessen the volume and speed of runoff, and improving the quality of water that enters municipal stormwater systems can help reduce the need for costly improvements in the future.

Example of how the curb lawn can be used to capture runoff while "greening the corridor"

In the last decade or so, increased focus has been given to the quality of stormwater runoff. Best practices encourage application of "green infrastructure" techniques or low impact development (LID), which use a basic principle modeled after nature: manage rainfall by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Instead of conveying, managing and treating stormwater in large, costly, end-of-pipe facilities often located in drainage areas, LID addresses stormwater through smaller, more cost-effective landscape features.

Incorporating green infrastructure and LID with access management improvements provides numerous benefits to property owners, regulatory agencies and the general public:

- Reduces the volume and improves the quality of stormwater runoff
- Provides storage areas to minimize flash flooding
- Reduces municipal infrastructure and utility maintenance costs (e.g., streets, curbs, gutters, storm sewers)
- Increases energy and cost savings for heating, cooling, and irrigation
- Protects community character and aesthetics
- Reduces salt usage and snow removal on paved surfaces

- Protects and restores water quality in rivers and lakes and groundwater supplies
- Improves air quality

Low Impact Development Guidelines

Because application of low-impact design will vary from site to site depending on soil conditions, existing drainage and stormwater systems, this Plan provides a policy framework for use of LID techniques. They should be considered as part of the menu of other potential improvements when there is a change to a site plan or a proposed new development to determine if there are ways to better address stormwater runoff.

Download SEMCOG's Low Impact Development Manual for Michigan at http://www.semcog.org/LowImpactDevelopment.aspx

Low-impact design is encouraged wherever it can be applied along the corridor, but it is specifically warranted in areas where vegetation may be installed in lieu of impervious surfaces (i.e. pavement). In all situations, a clear understanding of the regulatory authorities that may require review, approval and permitting for green infrastructure techniques is necessary. For more detailed design criteria, please review SEMCOG's Low Impact Development Manual (*A Design Guide for Implementation and Reviewers*).

- **Bioretention (Rain Gardens) & Bioswales** should be considered in areas between the new or existing sidewalk where driveways are removed and in areas where a road median is installed or redesigned. Plant species should be salt tolerant, provide aesthetic benefits and be low maintenance.
- **Native Street Tree Planters** are recommended where earth is disturbed due to the removal or relocation of a driveway or median crossover. Maximizing exposed soil around the tree will facilitate water infiltration; however, tree grates and planter options can be applied in more urban or high pedestrian traffic areas. Street tree species should be varied to minimize the potential of invasive threats.
- **Porous Pavement** may be considered instead of impervious applications (i.e. asphalt or concrete) in parking areas or the road gutter. To function properly, porous pavement requires adequate subsurface soil conditions, overflow connection to a storm sewer or other final discharge location and routine vacuum maintenance. Porous pavement should not be installed in areas where there is a potential for soil contamination.

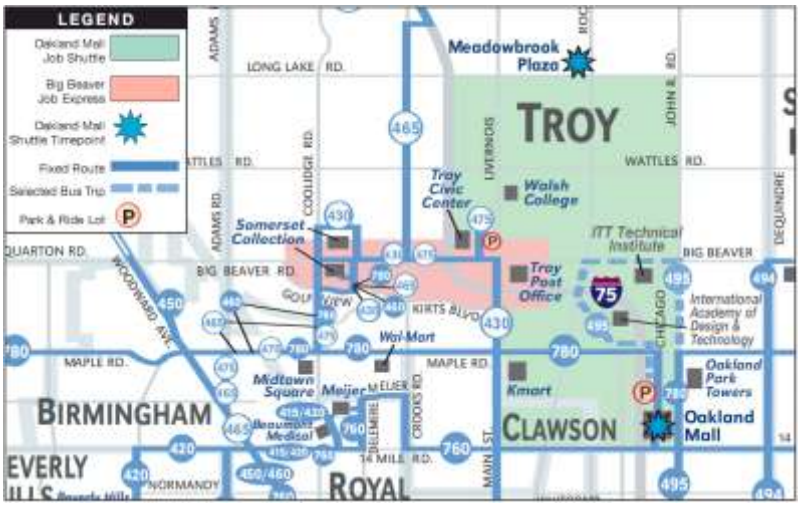
- **Installation of landscaped islands within parking areas** can help provide additional "green" areas that serve various functions. Landscaped islands sometimes act as pedestrian refuge areas for those entering or exiting a store. They also provide planting areas for trees and other native vegetation, which can help reduce temperatures, water usage, and maintenance costs.

Transit

Fixed Line, Connector, Paratransit and Community Partnership bus service is provided to Oakland County residents by SMART (Suburban Mobility Authority for Regional Transportation).

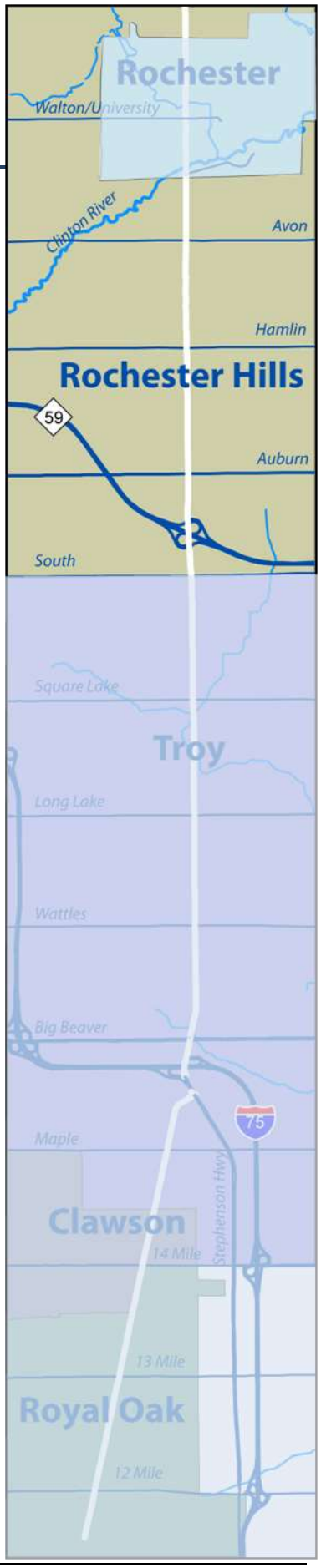
SMART began providing transit service to Wayne, Oakland and Macomb Counties in 1967. It has provided paratransit service to residents since 1994. What began as a modest service has become a necessity for those whose disabilities prevent them from using the fixed line service. Weekday curb-to-curb connector service is available to senior and handicap residents upon 24 hour advance notice.

SMART does not offer fixed line service on Rochester Road, but the #430 (Main Street - Big Beaver) and #760 (13 Mile/14 Mile Crosstown) lines offer service in the vicinity. The Oakland Mall Job Shuttle is also available for commuters, due to the location of various educational institutions and key regional employers in the area. Because there is no fixed line service on Rochester Road, there are no bus stops located in the study corridor. Where these transit lines run proximate to the study corridor, they are noted on the site-specific community maps. Where possible, communities should encourage sidewalk connections to these routes, but fixed route transit service it is not anticipated for this corridor, and improvements are likely to be minimal.



Chapter 4:

Rochester Hills



Introduction

Rochester Road maintains the suburban character established in Troy at it continues north into Rochester Hills. The corridor is characterized by larger national retailers on larger commercial sites, which generally tend to attract more traffic and potential safety and congestion problems.

Data and observations indicate that vehicles entering and exiting the roadway at cross streets and individual driveways can create potential for crashes and congestion. Managing access along the corridor can reduce these effects because it considers the number, placement, and design of access points (intersecting streets and commercial driveways) in the context of the overall roadway, not just on each individual site.

Analysis of Rochester Road begins with broad evaluation of local planning policies and regulations along the corridor, then proceeds with analysis of existing conditions including posted speed limits, traffic volumes, crash locations and concentrations, driveway locations and non-motorized conditions. These analyses, when combined with on-site reviews and discussions with local officials, create the basis for access recommendations for the segments of Rochester Road, and individual sites within the city of Rochester Hills, which are found at the end of this Chapter.

Local Considerations

Lot Sizes and Development Pattern

The City of Rochester Hills is largely built, but there are some vacant sites with the potential to attract even more traffic to the corridor. Recently, the City has recognized certain traffic problems that have resulted as development has progressed along the corridor. It is now focused on improving existing condition as new development and redevelopment occurs.

Road Jurisdiction

Most of the corridor in Rochester Hills, falls under MDOT's jurisdiction, but in some locations, it is regulated by the Road Commission for Oakland County. Specifically, those portions of the corridor located south of M-59 and north of Tienken fall under the County's jurisdiction.

Local Planning Policy

The City of Rochester Hills has both a Master Land Use Plan and Master Thoroughfare Plan, both of which are relevant to Rochester Road. Master Land Use Plan provides general goals for the city's retail and commercial areas, as well as for local transportation systems.

Master Land Use Plan

The Master Land Use Plan recognizes the generally built-out character of the community, and stresses that future land use decisions should focus on redevelopment opportunities while recognizing opportunities for improvement of existing conditions within the City.

Relevant goal and objective statements from the city's plans include:

- *Retail/Service*

  Goal: Redevelop existing retail areas and corridors with appropriately sited and attractively designed retail, service, and entertainment establishments.

  Objectives:

  - Concentrate commercial development in nodes as opposed to strips along the major corridors.
  - Encourage the use of innovative storm water management and efficient building and site development techniques to improve the environment in commercial developments.

- *Transportation*

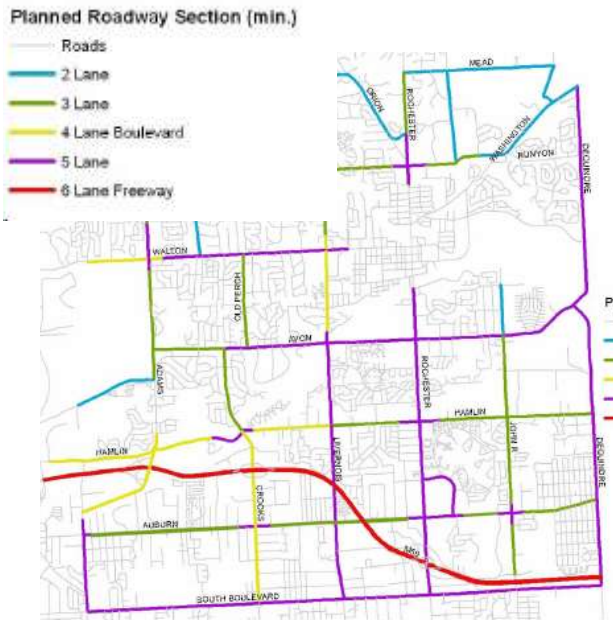
  Goal: Encourage an efficient and safe multi-modal transportation network that facilitates economic growth while integrating various modes of transportation to ensure a higher quality of life for the residents of the community.

  Objectives:

  - Pursue strategies that will require the use of accepted traffic calming and access management techniques.
  - Promote public education about roadway planning and decision making.
  - Provide a safe, efficient non-motorized pathway system that provides links to various land uses throughout the City.
  - Require transportation infrastructure decisions that support and encourage the land use recommendations of the Master Land Use Plan.
  - Explore innovative traffic designs as an alternative to adding additional lanes.
  - Provide flexible engineering design standards.

Master Thoroughfare Plan

The city's Master Thoroughfare Plan analyzed three road segments on Rochester Road that experienced significant crashes. Basic concerns and countermeasures proposed in the Plan are summarized below:



Planned Roadways
Source: Rochester Hills Master Thoroughfare Plan

- *Rochester Road from South to Auburn.* Rear-end and angle crashes are most likely caused due 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. Countermeasures included:
  - 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.

- A safety audit and time of return analysis on Rochester Road should be conducted by MDOT.

- *Rochester Road from Auburn to Hamlin*. Sixty percent of the crashes in this segment were reported as unable to stop, 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. The proposed countermeasure here is the application of access management techniques including closure and consolidation of driveways, additional continuous-right-turn lanes, and additional channelization along with capacity improvements.

- *Rochester Road from Hamlin to Avon.* 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. Countermeasures included:

  - 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.

Local Zoning

Land in Rochester Hills is zoned a mixture of commercial, multiple-family residential, office and industrial. Much of the commercial development is concentrated into nodes at key intersections.

Changes in use to a more intense one, and building expansions over 10% in Rochester Hills is subject to review, either by the Planning and Development Director, or by the full Planning Commission. Therefore, as such requests are submitted, the City will have an opportunity to either encourage access improvements, or require them if they are needed to accommodate the changes proposed in the application.

The zoning ordinance does not currently regulate access to sites on Rochester Road, but could be inserted in the City's Off-Street Parking Design Standards.

Transportation Analysis

Traffic Conditions

Rochester Road between South Boulevard and Diversion Street and from Woodward Avenue to Orion Road is two lanes in each direction with a center left turn lane (see the City of Rochester chapter for information about Rochester Road between Diversion Street and Woodward Avenue). From Orion Road to Mead Road, Rochester Road is one lane in each direction with a center left turn lane. The Average Daily Traffic (ADT) along Rochester Road's south section ranges from approximately 42,200 vehicles to 50,000 vehicles per day. The north section has less traffic with approximately 17,500 vehicles to 31,700 vehicles per day. Figure 4-1 illustrates the ADT along Rochester Road in Rochester Hills. The speed limit along Rochester Road is 50 mph south of Avon Road, and 45 mph between Avon Road and Diversion Street. The speed limit north of the City of Rochester is 45 mph.

Figure 4-1: Rochester Road Average Daily Traffic (ADT) in Rochester Hills

Segment	ADT
South Boulevard to M-59 EB Ramp	42,200
M-59 EB Ramp to M-59 WB Ramp	49,300
Nawakwa Road to Meijer Drive	50,000
Meijer Drive to Auburn Road	47,000
Auburn Road to Wabash Road	47,400
Wabash Road to Hamlin Road	47,900
Hamlin Road to Avon Road	45,400
Avon Road to Diversion Street	46,200
Woodward Avenue to Tienken Road	31,700
Tienken Road to Orion Road	24,600
Orion Road to Mead Road	17,500

Non-Motorized Conditions

A combination of sidewalks and multi-use pathways exist along most of the corridor in Rochester Hills, but are missing on vacant sites and those developed prior to current sidewalk requirements. They form of development in Rochester Hills is such that Rochester Road has become a thoroughfare for vehicular traffic. As a result, it is not as often used for non-motorized purposes. However, to facilitate such movements, the City does require wider pathways that are separate from the vehicle portion of the roadway. This provides the needed separation from the higher-speed motorized traffic that can help improve a pedestrians' actual or perceived level of safety.

The analysis conducted revealed two more significant gaps in the non-motorized system, which are also noted as priority segments in the City's Master Thoroughfare Plan:

- Both sides at the M-59 ramps
- East side between Hamlin and Eddington

Driveway Density

Analysis of driveway density, or the number of access points per mile, can help identify concentrations of driveways that may contribute to unsafe conditions or congestion. Areas with higher concentrations are more likely to create frequent disruptions to traffic flow in the right lane, and less likely to attract non-motorized traffic. Understanding the average dimensions and area of driveways also provides an idea of the amount of land they occupy – land that, if the driveway were removed, could otherwise be used for stormwater detention or corridor greening efforts.

Ideally, access along Rochester Road would adhere to MDOT's suggested spacing requirements, but in Clawson, existing lot sizes, driveway locations, frequency of access and truck traffic patterns sometimes dictate specific access locations that cannot be modified. Understanding the existing built, urban nature of development in Clawson prevents full conformance with the MDOT access standards, this Plan focuses more on achieving greater conformance with the spacing requirements, while still maintaining reasonable access to private property.

Figure 4-2 shows the number of existing access points (streets and driveways) on both sides of the road in Rochester Hills. The current driveway density (number of access points per mile) is approximately 1.4 times higher than the MDOT standard. Of the existing 176 access points, 14% are proposed to be closed or consolidated. If all of the driveway closures proposed in this Plan are implemented, the remaining driveway density would meet the MDOT's spacing standards.

Figure 4-2: Existing and Resulting Access Points

	Density		# of Access Points		
Segment	Length[1] (ft)	Access /mi.	Existing	Remove	Keep
South to WB M-59 ramp	2,617	28.2	18	3	11
M-59 Ramp to Auburn	2,173	51.0	26	5	16
Auburn to Regal	2,888	38.4	24	4	17
Regal to Hamlin	3,038	20.9	20	0	12
Hamlin to 22½ Mile	2,707	19.5	13	1	9
22½ Mile to Avon	2,355	29.1	17	1	12
Avon to South St.	3,141	50.4	36	7	23
North to Tienken	1,145	27.7	6	0	6
Tienken to Cross Creek	2,623	18.1	11	3	6
Cross Creek to Mead	3,134	5.1	5	0	3
	25,821	28.4	176	24	115

[1] Segment lengths are approximate.

Crash Segment Analysis

Eleven segments of Rochester Road in Rochester Hills were evaluated for crash frequency and crash rate (Figure 4-3).

Figure 4-3: Link Crash Characteristics

Link Location	Crash Rate	Crash Type								Total
		Single Vehicle	Head-On/ Head-On Left	Angle	Rear-End	Sideswipe Same	Sideswipe Opposite	Driveway	Other	
South Blvd. to M-59 EB Ramp	5.40	1 / 3%	4 / 10%	4 / 10%	28 / 72%	0 / 0%	1 / 3%	1 / 3%	0 / 0%	39
M-59 EB Ramp to M-59 WB Ramp	6.69	5 / 9%	2 / 4%	4 / 7%	34 / 63%	8 / 15%	1 / 2%	0 / 0%	0 / 0%	54
Nawakwa Road to Meijer	6.31	2 / 10%	1 / 5%	1 / 5%	14 / 70%	1 / 5%	0 / 0%	1 / 5%	0 / 0%	20
Meijer to Auburn	13.34	1 / 2%	6 / 10%	14 / 23%	23 / 38%	2 / 3%	1 / 2%	11 / 18%	2 / 3%	60
Auburn to Wabash	5.38	0 / 0%	6 / 6%	11 / 11%	54 / 55%	11 / 11%	5 / 5%	8 / 8%	3 / 3%	98
Wabash to Hamlin	2.13	2 / 3%	8 / 12%	2 / 3%	44 / 68%	2 / 3%	1 / 2%	4 / 6%	2 / 3%	65
Hamlin to Avon	3.28	13 / 9%	9 / 6%	16 / 11%	68 / 48%	17 / 12%	5 / 4%	11 / 8%	2 / 1%	141
Avon to Diversion	2.88	6 / 10%	5 / 8%	3 / 5%	28 / 46%	6 / 10%	0 / 0%	13 / 21%	0 / 0%	61
Woodward Avenue to Tienken	2.76	2 / 6%	2 / 6%	4 / 11%	15 / 43%	8 / 23%	1 / 3%	3 / 9%	0 / 0%	35
Tienken to Orion	3.41	5 / 20%	0 / 0%	2 / 8%	10 / 40%	2 / 8%	0 / 0%	4 / 16%	2 / 8%	25
Orion to Mead	2.31	19 / 68%	2 / 7%	2 / 7%	2 / 7%	1 / 4%	1 / 4%	0 / 0%	1 / 4%	28

 # / #% = Number of Crashes / Percentages of Crashes

The crash analysis indicated six segments in Rochester Hills with rates above the critical crash rate threshold:

- **South Boulevard to M-59 Eastbound Ramp.** This had the 7th highest crash rate of the 35 segments evaluated along Rochester Road. There were a total of 39 crashes on this segment between 2007 and 2009 (Figure 4-4). These included, 28 rear-end crashes, four angle crashes, and one driveway related crash. According to the UD-10, the four angle crashes all involved vehicles turning into or out of driveways or unsignalized intersections. Twelve of the crashes on the segment were clustered around the unsignalized intersection at Eastlawn Drive; there were seven rear-end crashes, two head-on left turn crashes, two angle crashes, and one driveway related crash at this intersection. It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

Figure 4-4: Crashes between South Blvd. and M-59 EB Ramp

- **M-59 Eastbound Ramp to M-59 Westbound Ramp.** This segment had a crash rate of 6.69; this was the fourth highest crash rate of the 35 segments evaluated along Rochester Road. There were a total of 54 crashes on the 790 foot long segment between 2007 and 2009 (Figure 4-5). The short length of the segment contributed to the high crash rate. Of the 54 crashes, there were 34 rear-end crashes and eight sideswipe-same crashes. According to the UD-10, the rear-end crashes were related to congestion and queuing at either of the signalized ramps.

Figure 4-5: Crashes between M-59 Eastbound & Westbound Ramps

- **Nawakwa Road to Meijer Drive.** This segment had the 5th highest crash rate of the 35 segments evaluated along Rochester Road with a rate of 6.31. There were a total of 20 crashes on the approximately 300-foot segment between 2007 and 2009 (Figure 4-6). Fourteen of the 20 crashes were rear-end crashes; based on the UD-10 reports these were all related to queuing and congestion at the traffic signals at Meijer Drive and M-59 Westbound Ramp. Eight of these rear-end crashes were clustered just south of Hickory Lawn Road. There was one crash coded as driveway related.

Figure 4-6: Crashes between Nawakwa & Meijer

- **Meijer Drive to Auburn Road.** This segment had a crash rate of 13.34. This was the highest crash rate of the 35 segments evaluated along Rochester Road. There were a total of 60 crashes on the approximately 460-foot segment between 2007 and 2009 (Figure 4-7). These included 23 rear-end crashes, 14 angle crashes, and 11 driveway related crashes. Most of the driveway related crashes were clustered between 300 and 450 feet south of Auburn Road in an area with a number of closely spaced driveways. According to the UD-10 reports, the majority of the angle crashes on the segment involved vehicles turning into or out of driveways in this area. The UD-10 report narratives indicated that crashes commonly occurred when vehicles in the two through lanes queuing for the signal at Auburn Road stopped to allow other vehicles to turn into or out of driveways near the intersection. Drivers opting to take advantage of this courtesy were not able to see vehicles in the right turn lane or center turn lane and would occasionally be involved in a crash with a vehicle in one of these lanes.

  It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

Figure 4-7: Crashes between Meijer & Auburn

- **Auburn Road to Wabash Road** This segment had the 8th highest crash rate of the 35 segments evaluated along Rochester Road with a rate of 5.38. There were a total of 98 crashes on this segment between 2007 and 2009, including 54 rear-end crashes, 11 side-swipe same crashes, 11 angle crashes, and 8 driveway related crashes (Figure 4-8). Six of the driveway related crashes were clustered at the south end of the segment, near Auburn Road. Two of the driveway related crashes occurred 500 feet south of Wabash Road. Based on the UD-10 reports, each of the angle crashes involved vehicles that were turning into or out of driveways along the segment. It is recommended that some of these driveways be

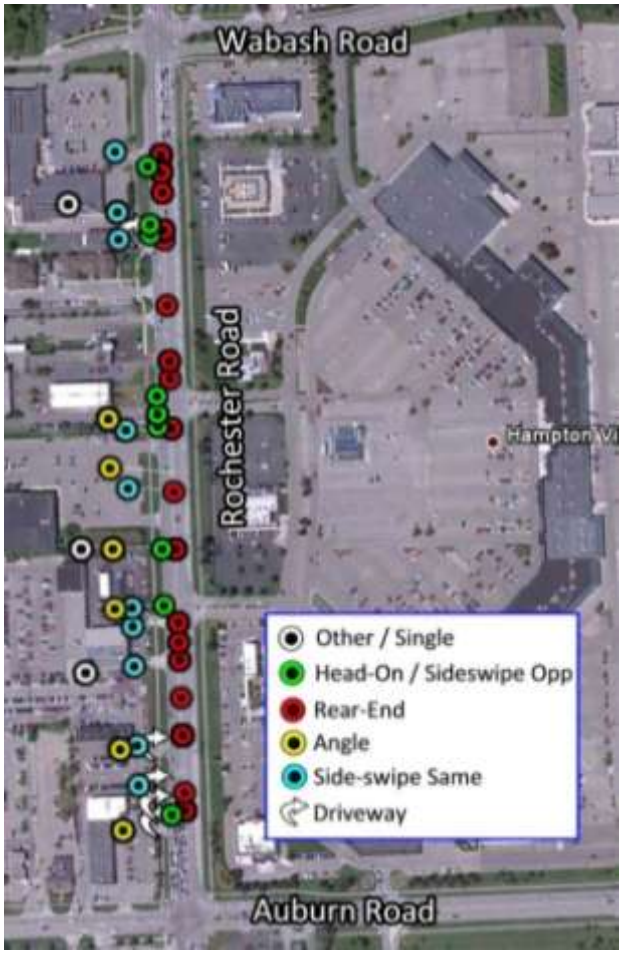


Figure 4-8: Crashes between Auburn & Wabash

combined or eliminated to reduce the number of points of conflict in this area.

- **Woodward Avenue to Tienken Road.** This segment had the 16th highest crash rate of the 35 segments evaluated along Rochester Road. This segment's 2.76 crash rate was the lowest crash rate that still exceeded the critical crash threshold. There were a total of 35 crashes on this segment between 2007 and 2009, including 15 rear-end crashes, eight sideswipe-same crashes and three driveway related crashes (Figure 4-9). The three driveway related crashes were all at the northern end of the segment, between 300 and 500 feet of the intersection of Rochester Road and Tienken Road. Of the eight sideswipe same crashes, six were located in the northern section of the segment. Out of these six, five involved northbound vehicles suggesting that the crashes may be related to the operation of the intersection of Rochester Road and Tienken Road. There were also small clusters of crashes near the unsignalized intersections of Rochester Road and Northwood Avenue and Rochester Road and Ferndale Avenue. It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

Figure 4-9: Crashes between Woodward & Tienken

Intersection Analysis

Intersection crash rates were also calculated and compared to the SEMCOG critical crash rates for signalized intersections in the Detroit metropolitan area. Figure 4-10 illustrates the crash types at each signalized intersection in this area. Four of these intersections exceeded the critical rate for intersections with similar ADT:

- Auburn Road
- Hamlin Road
- Avon Road
- Tienken Road

The unsignalized intersection of Rochester Road and Nawakwa Road was compared to the SEMCOG critical crash rates for unsignalized

intersections in the Detroit metropolitan area and was found to exceed the critical rate for intersections with similar ADT:

Figure 4-10: Intersection Crash Characteristics

Intersection	Crash Rate	Crash Type								Total
		Single Vehicle	Head-On/ Head-On Left	Angle	Rear-End	Sideswipe Same	Sideswipe Opposite	Driveway	Other	
South Boulevard	1.53	3 / 4%	5 / 6%	10 / 12%	42 / 51%	6 / 7%	1 / 1%	14 / 17%	1 / 1%	**82**
M-59 EB Ramp	0.54	2 / 6%	2 / 6%	5 / 15%	17 / 52%	2 / 6%	1 / 3%	4 / 12%	0 / 0%	**33**
M-59 WB Ramp	0.77	1 / 2%	3 / 7%	3 / 7%	28 / 62%	6 / 13%	2 / 4%	2 / 4%	0 / 0%	**45**
Nawakwa Road*	1.08	1 / 2%	7 / 14%	13 / 27%	15 / 31%	4 / 8%	0 / 0%	9 / 18%	0 / 0%	**49**
Meijer Drive	0.42	0 / 0%	1 / 5%	1 / 5%	13 / 59%	1 / 5%	1 / 5%	4 / 18%	1 / 5%	**22**
Auburn Road	2.27	6 / 4%	4 / 3%	18 / 12%	75 / 49%	12 / 8%	8 / 5%	26 / 17%	4 / 3%	**153**
Wabash Road	1.01	1 / 2%	1 / 2%	8 / 13%	40 / 65%	6 / 10%	0 / 0%	4 / 6%	2 / 3%	**62**
Hamlin Road	1.46	2 / 2%	5 / 5%	9 / 9%	60 / 59%	6 / 6%	2 / 2%	11 / 11%	6 / 6%	**101**
Avon Road	2.09	4 / 3%	3 / 2%	19 / 13%	86 / 59%	6 / 4%	3 / 2%	21 / 14%	3 / 2%	**145**
Diversion Street	0.45	2 / 8%	1 / 4%	5 / 20%	14 / 56%	0 / 0%	1 / 4%	2 / 8%	0 / 0%	**25**
Tienken Road	2.23	4 / 3%	7 / 5%	17 / 13%	73 / 56%	7 / 5%	3 / 2%	12 / 9%	8 / 6%	**131**
Orion Road	0.88	7 / 26%	1 / 4%	6 / 22%	11 / 41%	2 / 7%	0 / 0%	0 / 0%	0 / 0%	**27**
Mead Road	0.71	7 / 50%	0 / 0%	0 / 0%	5 / 36%	0 / 0%	0 / 0%	2 / 14%	0 / 0%	**14**

 # / #% = Number of Crashes / Percentages of Crashes

**Unsignalized Intersection*

There were 49 crashes at the unsignalized intersection of Rochester Road and Nawakwa Road (Figure 4-11). The predominant crash types were rear-end crashes (31%), angle crashes (27%), and driveway related crashes (18%). Based on the UD-10 reports, the majority of the angle and driveway related crashes and two of the head-on left turn crashes involved northbound vehicles turning left onto Nawakwa Road. According to the crash report narratives, vehicles in the two southbound through lanes that are stopped in the queue for the signal at the M-59 westbound ramp would leave space for vehicles to turn onto Nawakwa Road. Drivers intending to use the M-59 westbound on ramp, would pass the stopped vehicles on the right and collide with the left turning vehicle. One possible mitigation measure for this issue is to shorten the southbound right turn lane leading to the on ramp such that the taper for this lane begins after Nawakwa Road.

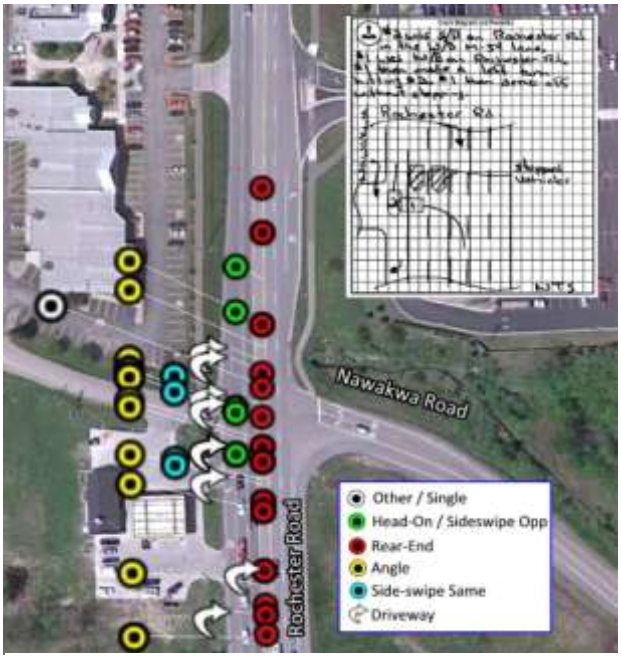


Figure 4-11: Crashes at Nawakwa Road

There were 153 crashes at the signalized intersection of Rochester Road and Auburn Road (Figure 4-12). The predominant crash types were rear-end crashes (49%), driveway related crashes (17%), and angle crashes (12%). The combined percentage of rear-end and sideswipe same crashes is higher than the regional average for signalized intersections with similar ADT (52.3%). Some potential mitigation measures for intersection rear-end crashes are retiming the traffic signal to provide better progression or upgrading the signal configuration from a diagonal span wire to a box-span to improve signal visibility.

Figure 4-12: Crashes at Auburn Road

There were 26 driveway related crashes within 250 feet of this intersection, including 12 on the south leg, six on the north leg, five on the west leg, and two on the east leg. On the south leg of the intersection, driveway related crashes were clustered around the two gas station driveways on the west side of the intersection. On the north leg of the intersection, driveway related crashes were clustered around the strip mall driveway on the west side of the road. In addition, based on the UD-10 reports, all of the angle crashes that occurred outside the immediate intersection were attributed to vehicles turning into or out of driveways. It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

There were 101 crashes at the signalized intersection of Rochester Road and Hamlin Road (Figure 4-13). The predominant crash types were rear-end crashes (59%), driveway related crashes (11%), and angle crashes (9%). The combined percentage of rear-end and sideswipe same crashes is higher than the regional average for signalized intersections with similar ADT (52.3%). Some potential mitigation measures for intersection rear-end crashes are retiming the traffic signal to provide better progression or upgrading the signal configuration from a diagonal span wire to a box-span to improve

Figure 4-13: Crashes at Hamlin Road

signal visibility.

There were 11 driveway related crashes within 250 feet of the intersection, including four on the south leg, three on the west leg, two on the east leg and two coded as occurring in the intersection. On the south leg of the intersection, driveway related crashes were clustered around the two gas station driveways on the west side of the intersection. On the west leg of the intersection, driveway related crashes were clustered around the same gas station and the Walgreens driveway. In addition, based on the UD-10 reports, all of the angle crashes that occurred outside the immediate intersection were attributed to vehicles turning into or out of driveways. It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

There were 145 crashes at the signalized intersection of Rochester Road and Avon Road (Figure 4-14). The predominant crash types were rear-end crashes (59%), driveway related crashes (14%), and angle crashes (13%). The combined percentage of rear-end and sideswipe same crashes is higher than the regional average for signalized intersections with similar ADT (52.3%). Potential mitigation measures for intersection rear-end crashes include retiming the traffic signal to provide better progression or upgrading the signal configuration from a diagonal span wire to a box-span to improve signal visibility.

Figure 4-14: Crashes at Avon Road

There were 21 driveway related crashes within 250 feet of the intersection, including five on the south leg, nine on the west leg, four on the north leg, two on the east leg and one coded as occurring in the intersection. On the south leg of the intersection, driveway related crashes were clustered around the two gas station driveways on the west side of the intersection. On the west leg of the intersection, driveway related crashes were clustered around the same gas station and the credit union driveway. Similarly, the crashes on the north and east legs of the intersection were clustered around the gas station on the northeast corner. In addition, based on the UD-10 reports, all of the angle crashes that occurred outside the immediate intersection were attributed to vehicles turning into or out of driveways. It is recommended that some of these driveways be

combined or eliminated to reduce the number of points of conflict in this area.

There were 131 crashes at the signalized intersection of Rochester Road and Tienken Road (Figure 4-15). The predominant crash types were rear-end crashes (56%), angle crashes (13%), and driveway related crashes (9%). The combined percentage of rear-end and sideswipe same crashes is higher than the regional average for signalized intersections with similar ADT (50.5%). A potential mitigation measure for intersection rear-end crashes is retiming the traffic signal to provide better progression.

Figure 4-15: Crashes at Tienken Road

There were 12 driveway related crashes within 250 feet of this intersection, including seven on the north leg, two on the west leg, one on the east leg, and one on the south leg. On the north leg, driveway related crashes were clustered around the gas station driveway. The analysis indicated no pattern to driveway related crashes on the other legs. In addition, based on the UD-10 reports, all of the angle crashes that occurred outside the immediate intersection were attributed to vehicles turning into or out of driveways. It is recommended that some of these driveways be combined or eliminated to reduce the number of points of conflict in this area.

Recommendations

After considering the analysis above, discussions with city staff and officials, meetings with road agency staff, and input offered from property owners and the general public, the following recommendations are offered for Rochester Hills:

Corridor Recommendations for Rochester Hills

Safety improvements can be realized by implementing the general recommendations of this plan. *Chapter 2: Access Management Guidelines* describes the general standards that should be applied along the entire length of the study corridor, and *Chapter 3: Corridor Improvement Guidelines* includes other general recommendations for non-motorized systems and greening of the corridor. General recommendations that apply to the entire corridor in Rochester Hills include:

Access

Maps 18 through 25 and 28 to 30 illustrate specific recommendations for the corridor through Rochester Hills, including suggestions for driveway closings, shared and cross-access locations, proper alignments and alternative access opportunities. These recommendations are based on state and national research, a thorough review of the existing conditions along the corridor, and the extensive experience and expertise of the Plan team with access management implementation across the state.

Because the recommendations are based on the existing conditions at the time this plan was developed, a significant change in conditions on a site should prompt a thorough consideration of any proposed project in the context of the policies, standards, and goals of this plan. The city, County, MDOT, SEMCOG and members of the Steering Committee will play an important role in reviewing development proposals along this corridor to promote the most efficient, and safe configuration of access.

Walking and Biking

As noted in the analysis section of this Chapter, there are two locations where significant gaps in the sidewalk and pathway system exist. The first is located near the M-59 interchange, which currently does not attract significant non-motorized traffic. However, achieving improved accessibility and mobility requires an interconnected network, so it is important to remember that, while pedestrians and bicyclists may not

show high use of particular segments of the corridor for recreation, they may need to traverse that segment to arrive at their end destination. Providing safe non-motorized crossings at M-59 will be more challenging, so it is recommended the City work with regional non-motorized agencies, the county and MDOT on pathway plans in this location.

Low Impact Development

It has been shown that implementing access management policies can improve other corridor conditions. As the science of planning for access evolves and improves, additional benefits are continually being identified. One such benefit is the potential to "green" the corridor. Every driveway that is removed as a result of access management presents an opportunity to replace hard surfaces like asphalt or concrete with pervious surfaces like grass, rain gardens or detention.

The average driveway in Rochester Hills occupies approximately 465 square feet, which when multiplied by the number of to be removed, equals a total of 13,675 square feet of impervious surface that can be removed and reclaimed as green space.

Recommendations for Specific Corridor Segments

Broad recommendations that apply to the entire corridor are discussed above, and in more detail in the preceding chapters, but are only a small part of the larger access management program. Improved safety and traffic operations will most likely come as a result of small improvements and gradual changes to individual access points made over time. The maps provided for Rochester Hills illustrate the changes for each property along the corridor, so the city can implement access changes on site-by-site basis. To help explain the mapped recommendations, the corridor was broken into half-mile segments; specific recommendations that apply to that segment are described below.

South Blvd. to WB M-59 off-ramp

- **Existing Conditions:** South Boulevard is Rochester Hills' southern boundary with the City of Troy. As noted, Rochester Road from South through M-59 is a critical crash segment. Land uses have developed very piecemeal over time, with few access connections. Residential side streets on the east side contribute to the high number of access points. In the long term, Troy has discussed extending a 4- or 6-lane boulevard to South Blvd. A total reconstruction and redesign of the interchange would be required to accommodate/extend a boulevard into Rochester Hills.

- **Recommendations:** *(see Maps 18 and 19 of the Site-Specific Recommendation Maps)* Reconstruction of the road with a median design, as discussed above, would have the greatest potential to improve access conditions in the long-term, the access and non-motorized standards in Chapters 2 and 3 should be applied in the meantime, in addition to the following:
    - *East Side Driveways.* The recommendations include closing two of the four drives on the east side between Eastlawn and Michelson, using new cross access connections to provide options.
    - *West Side Future Access.* Although there are only three active access points on the west side, the two at the north are very closely spaced and have poor offsets with opposing drives. In addition, the undeveloped property in the middle will need additional access to the future, either through shared connections or direct access. The recommendations show channelizing the Big Boy driveway (which is very close to the ramp signal and has significant crash data) and connecting to the lumber yard to the south.
    - *In-street techniques.* If a wide median were extended up to South Boulevard in Troy, right of way and development constraints on the northeast corner would need to be addressed. One other concept would be a narrow median with direct left turns along this short stretch to limit left turns in and out of driveways. This concept would require continuous cross connections and cross access easements to ensure convenient access to all businesses.
    - *Sidewalk Gaps.* Connecting the significant sidewalk gap on the west side will be required by City regulations when the vacant parcel develops. Of greater importance is connecting the sidewalks across the freeway interchange to provide safe access for pedestrians and bicyclists seeking to cross.

Recommended Access Improvements between South and M-59 ramps

M-59 Ramp to Auburn

- **Existing Conditions:** This segment of the corridor include national and regional retailers, including Meijer and Lowes, in addition to various fast-food restaurants and service establishments that have

located near the intersection. There are no non-motorized facilities across the interchange with M-59.

All the segments of Rochester Road from South Blvd (Map 18) north all the way to Barclay (Map 21) were observed to have critical crash rates. In addition, the unsignalized intersection with Nawakwa is a critical crash intersection. The configuration of the interchange (with ramp signals at the far north and south ends of the interchange) pushes intersection related crashes and delay out toward local streets and driveways on either side of the interchange, limiting options to reduce crashes.

Example of Existing Access Management Application: Channelization of Access to Meijer shopping center

- **Recommendations:** *(see Maps 19 and 20 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, in addition to the following:
  - *M-59 Interchange.* A redesigned interchange configuration would provide opportunities for a number of benefits to the area, including reduced crash potential, less delay, and provision of non-motorized facilities. Given the current right-of-way, any of the following interchange designs should be strongly considered next reconstruction cycle:
    - Single Point Urban Interchange (SPUI) would move all the signalized movements to the middle of the bridge.
    - Diverging Diamond Interchange would switch traffic directions across the bridge to allow for safer and more efficient left turns, with a non-motorized corridor down the middle of the bridge away from any turns.
    - Extend a wide median (two bridges instead of one) across with indirect left turns (as was just done at Adams/Squirrel Roads to the west).
  - *Nawakwa.* The crash reports at this intersection showed a number of crashes where the traffic accessing he ramp hit a vehicle trying to cross stopped through lanes to westbound Nawakwa (see earlier in this chapter for additional maps and analysis). The map (see Figure 4-16) shows closing the north driveway to the gas station and shifting the start of the taper for the right lane to just south of Nawakwa.

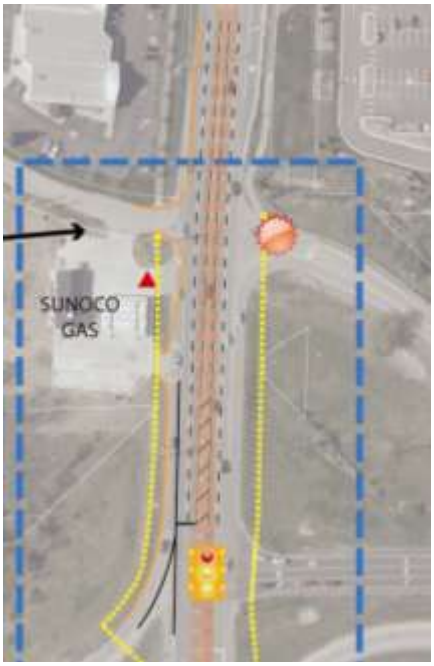


Figure 4-16: Recommendations at Nawakwa

  - *West side of Rochester.* South of Auburn Road is a high concentration of access points to businesses on the west side.

While the intersection, access, and signal in front of Meijer/Alex's Restaurant was recently reconfigured, forging access connections in the front and/or rear of the six businesses would provide access options and potentially an alternate route to Auburn Road. In the future, opportunities to extend a new road or other access drive to connect Hickory Lawn through Alex's to the signal would also improve access for the neighborhood and traffic on Rochester Road.

Auburn to Regal

- **Existing Conditions:** This segment also contains several large and national retailers, restaurants, and some office uses at the northern end. A wider 10'+ path extends from the M-59 interchange to Barclay, where it narrows on the east side.

  All the segments of Rochester Road from South Blvd (Map 18) north all the way to Barclay (Map 21) were observed to have critical crash rates. In addition, the signalized intersection with Auburn is a critical crash intersection. There is a high concentration of driveways along Auburn Road just west of Rochester Road.

- **Recommendations:** *(see Maps 20 and 21 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, in addition to the following:

  - *Rear Access Connections.* Auburn Road west of Rochester should consolidate drives and connect access with adjacent properties.
  - *Shopping Center Circulation.* The shopping center on the east side should consider changes to internal circulation to improve wayfinding and clear access options. The southernmost drive currently has a high number of crashes associated with left turns in and out of the center and should be channelized.

Figure 4-17: Recommendations for shopping center access

Regal to Hamlin

- **Existing Conditions:** The corridor is more residential in nature through this segment, with frequent residential side street access on the west side and multiple-family residential development on

the east. While there is some vacant land along Rochester Road, it is not zoned for non-residential use.

- **Recommendations:** *(see Maps 21 and 22 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, however, as noted, most of the potential development sites in this segment are not zoned for more intense uses. Any requests for non-residential development would require rezoning, and possibly a revision to the city's Master Plan. Access should be coordinated with any such efforts, and where possible, be made a condition of any future development approvals. If/when properties are redeveloped with higher intensity uses, the existing driveways/curb cuts should be removed or made temporary until service drives and access connections can be completed.

Hamlin to 22½ Mile

- **Existing Conditions:** Aside from some general commercial and retail uses located at the intersection at Hamlin, most of this segment is residential in nature. The character here is more suburban, as opposed to the more traditional, grid-street patterns seen south of Hamlin. Access is therefore directed to a few key residential access points. A large area of undeveloped land on the east side is part of an approved PUD plan, which has established limited access and internal circulation roughly illustrated on Map 23. A wide path on west side narrows at Hamlin and there are no sidewalks on Rochester or Hamlin at northeast corner and extending up over ½ mile the north on the east side.

Figure 4-18: Bordine's Access Recommendations

- **Recommendations:** *(see Maps 22 and 23 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, in addition to the following:
  - *Bordine's.* Bordine's Nursery, located on the northeast corner of Hamiln Road, has preliminary plans for future infill and/or redevelopment that include consolidating the access along Rochester Road to one new access. The new access would be aligned with the access on the opposing side of the street, and would likely restrict left turns out of the site, just as the opposing driveway does (see Figure 4-18).

- *PUD Plan.* The PUD Plan for future access on east side uses Eddington & potential realignment to meet Drexelgate with mini roundabouts and internal streets/access to connect the property.

22½ Mile to South St.

- **Existing Conditions:** North of the intersection of Meadowfield/Yorktowne, the corridor resumes a commercial character, with large department stores, retail plazas, and auto dealerships. The intersection with Avon is a critical crash intersection. The gas stations on opposing corners both have 4 access points; the bordering properties on the northeast corner also have poor circulation and no cross access. These conditions can add to unsafe conditions at the intersection. Farther north, access to the fast food restaurants and fitness center on the west side, north of the South Hill Plaza, is very congested, with 5 access points located within a span of 300 feet. South Street is just north of the Rochester Hills City boundary with the City of Rochester.
- **Recommendations:** *(see Maps 23 through 25 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, in addition to the following (see Figure 4-19):
  - *Avon Intersection.* The northeast corner at Avon has the potential to redevelop. Plans for future shared and consolidated access should be implemented if/when this area redevelops.
  - *Cross-Access Connections.* Look for cross connections/consolidations from the McDonalds all the way north to South St as redevelopment/development occurs.

Figure 4-19: Recommendations at Avon Road

South Street to North Street

SEE THE CITY OF ROCHESTER CHAPTER FOR DISCUSSION OF RECOMMENDATIONS ILLUSTRATED ON MAPS 25 THROUGH 28.

North to Orion Road

- **Existing Conditions:** Development north of the City of Rochester begins to decrease in density and intensity. The intersection at Tienken contains many large retailers and traffic generating

commercial uses, but areas north of this commercial node are more residential, beginning the transition to a more scenic and rural character that extends north to the Village of Leonard. Tienken was designated a high crash intersection based on the data collected for this Plan, but the intersection has since been widened to include dual left-turn lanes on all legs of the intersection. The Village of Lake Orion, located to the northwest at the terminus of Orion Road, attracts a lot of traffic, which results in lower volumes on Rochester Road north of Orion Road.

- Current sidewalk gap on east side from City Limits to City Walk development.
- Intersection with Tienken is a critical crash intersection. However, improvements including dual left turn lanes in all legs have been completed since the dates of the crash data.

City Walk Entrance

- **Recommendations:** *(see Maps 28 and 29 of the Site-Specific Recommendation Maps)* The access and non-motorized standards in Chapters 2 and 3 should be applied, in addition to the following:
  - Channelize gas station drives onto Rochester Road on northwest and southwest corners to prevent conflict with left turn queues.
  - Realign the north side driveway into the mixed use industrial office development to align with the City Walk development driveway.
  - Connected, coordinated internal access if/when the vacant north portion of the industrial site develops. One full access across from the bank and a second across from the medical center should be the maximum.

Orion Road to Mead

- **Existing Conditions:** Traffic volumes drop significantly in this segment, due to the low density and intensity of development. Land uses include low density single family residential and open space, so there are no commercial driveways. Land at the City's north end is zoned for single-family residential, and there are no current plans to change to more intense use.
- **Recommendations:** *(see Maps 29 and 30 of the Site-Specific Recommendation Maps)* Where needed, future street connections

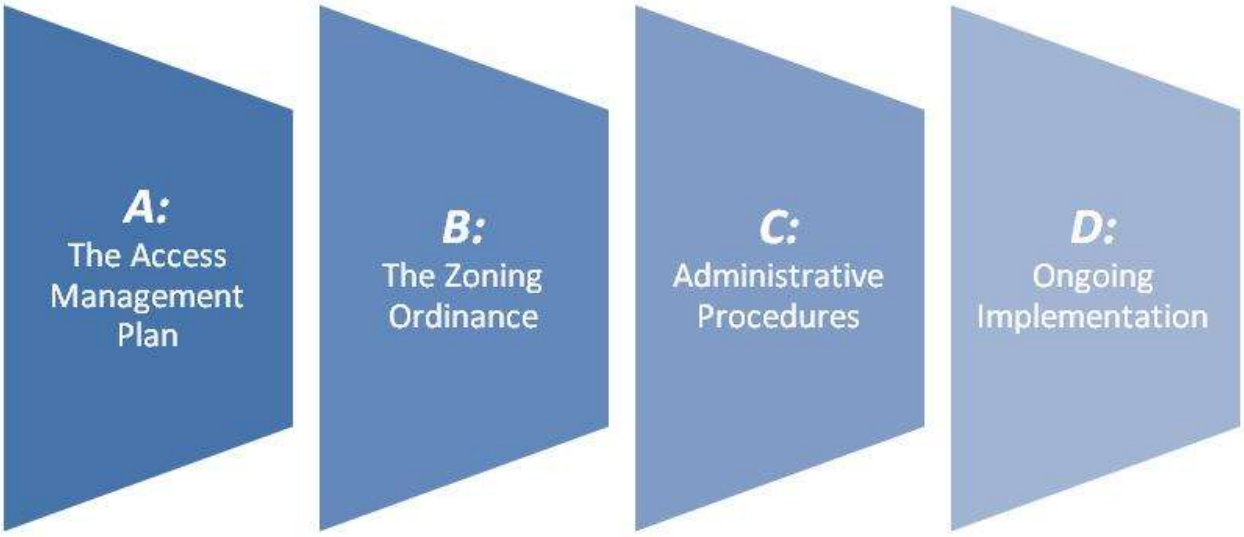
should provide the best site distance and either direct alignment or proper offset with streets on the opposing side of Rochester Road. If future plans call for more intense uses, the City should identify the appropriate driveway locations to ensure safe visibility, proper spacing, and good internal access.

Chapter 5:

Implementation

How to Use the Access Management Plan

The access management program for Rochester Road includes four components:

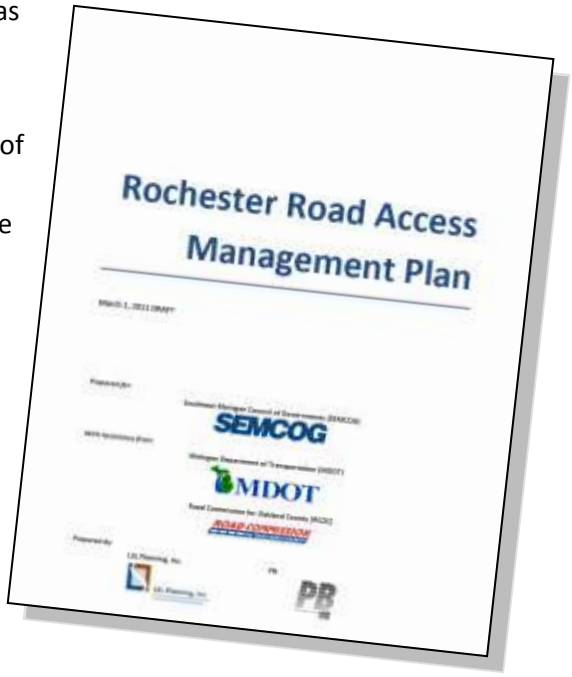


A.	*B.*	*C.*	*D.*
An access management improvement plan with guidelines and site-specific recommendations that should be adopted as part of each city's master plan.	Access management regulations with standards and administrative procedures that should be incorporated into each city's zoning ordinance.	A recommended administrative protocol for implementation of the plan and ordinance.	Continued inter-agency communication and coordination in transportation and land use along the corridor.

Component A: The Access Management Plan

The preceding chapters of this Plan discuss overall guidelines for access, non-motorized and green infrastructure changes along Rochester Road. Those chapters are consistent for each community because the basis and standards for them are the same for all communities. However, because site conditions and character vary by community, Chapter 4 is crafted for the individual cities, and includes an inventory of existing conditions, analysis, and recommendations, and concludes with illustrative maps that illustrate changes.

The recommendations in this Plan were based on access management studies, traffic conditions, and analysis conducted in 2010/2011. The Plan is intended to be implemented as opportunities arise, and is flexible so it will be useful for many years, but can be adapted as conditions change.



While the basic access management principles in Chapter 2 should always be applied, precise locations and configurations of driveways and service roads illustrated on the maps may need to be modified as development plans come into focus and more detailed site information is known.

To provide a legal basis for requiring access design in site plan review, each community should incorporate the Rochester Road Access Management Plan into their local Master Plan either in total or by reference. The guidelines in each city's Plan and subsequently revised city Master Plans provide the basis for local zoning ordinances that will implement them. A model ordinance, discussed below, was provided to each city that can be used for this purpose.

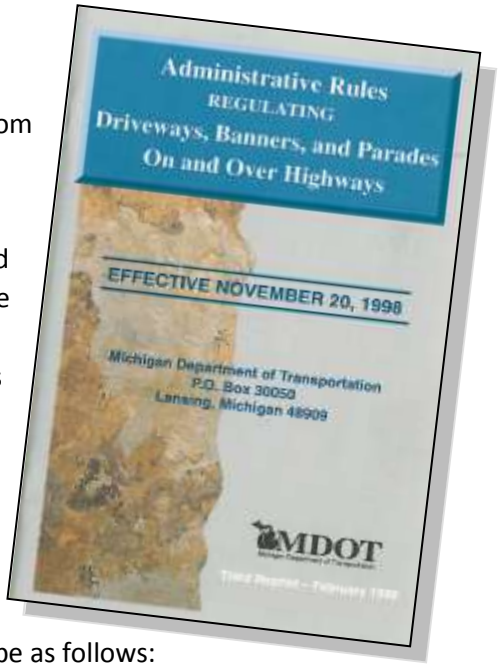
Each local community should continue to update access recommendations as part of their five-year community Master Plan review. This ensures recommendations in the Plan remain relevant, reflect current conditions and policy, and respond to changes in access along the corridor. Communities should continually work with county and regional agencies to further regional pathway initiatives, and should maintain relationships with regional transit agencies in order to ensure future plan updates reflect their efforts and progress toward improved service.

Component B: The Zoning Ordinance

B:
The Zoning Ordinance

A model access management ordinance was developed for the corridor that can be used by each community. The ordinance is based on the standards in MDOT's Access Management Guidebook, which were crafted after over 20 years of study and implementation in numerous communities.

The intent of the regulations is to provide a means to review access to sites when development applications have the potential to change traffic or parking patterns. Triggers for review are provided in the model zoning ordinance, and include review of building or parking expansions, increases in parking demand or traffic that will be generated, etc. For segments under MDOT or RCOC's jurisdiction, final access decisions will also require endorsement or approval from that road agency. Reviews at the city level should be processed according to existing site plan review procedures.



Most often, the recommendations in this Plan will be implemented as private development applications are submitted for review. The goal is to achieve gradual compliance with the standards in the Plan, so some consideration for each city's nonconforming policies is needed to ensure that reasonable changes are being required in response to the potential impact. Because of the developed nature of some communities within the study corridor, it is difficult to implement the optimal access spacing standards recommended by MDOT. In many cases, not all standards can be met, and when reviewing such, the hierarchy of standards, which is discussed further in *Chapter 2: Access Guidelines*, should be as follows:

1. Maximize spacing from signalized intersections
2. Directly align driveways, or provide sufficient offset from, access and median crossovers located across the street
3. Maximize spacing from other driveways on the same side of the street
4. Where minimum spacing and offsets are not practical, access should be located to maximize the spacing. In some cases, a shared access system should be considered

The model zoning amendment provided grants officials and decision makers the ability to approve modifications of the spacing and dimensional requirements on a case-by-case basis. Modifications may be granted by the Planning Commission during site plan review, by the Zoning Board of Appeals as a formal variance, or by local official charged with administration of the ordinance, as determined by each city. Standards for review of modifications are provided in the model ordinance to guide decision makers and ensure that deviations from the access management ordinance are applied as consistently as possible.

Component C: Administrative Procedures

C:
Administrative Procedures

Development decisions along different segments of the corridor fall under the purview of different agencies. In all cases, the city has jurisdiction over land use planning, zoning, site plan and subdivision reviews outside the corridor right-of-way. For some segments, as shown in Chapter 1, MDOT or the Road Commission has jurisdiction to review access permits and changes within the right-of-way.

The ideal access environment considers a variety of conditions, which can make administration of rigid standards difficult. The zoning ordinance model provided includes the needed flexibility to implement access changes in a way that responds to existing conditions and limitations. When doing so, it is also important to consider administrative procedures and sight distance, driveway design, permitting and other requirements of other road agencies. It is sometimes helpful to confer with other community or road agency officials when making access decisions.

Reviewing access along Rochester Road will require coordination between each local city and the Road Commission for Oakland County (RCOC) and the Michigan Department of Transportation (MDOT). Each local city can influence future access through the development review process, and early coordination between cities and road agencies can alleviate conflicting reviews later in the process.

Figure 5.1
Rochester Road Jurisdiction Map

Source: SEMCOG

The recommended process occurs in three stages:

1 Stage One: Submittal

The development review process begins with a submittal from an applicant to revise the use or development on a property. Applications are submitted to city staff according to each local city's ordinance requirements. If the application involves changes to access, the applicant must also receive permits from the RCOC or MDOT, depending upon the appropriate road jurisdiction (see Figure 5.1).

Larger development projects within a quarter mile of a city boundary should be sent to the adjacent city for review and comment. Special attention should be given to the interaction of access points and non-motorized facilities around these transition areas.

Stage Two: City and Road Agency Review

Once received, applications are processed according to local procedures. The suggested process includes feedback loops between the planning commissions and agencies as modifications are made to access and circulation.

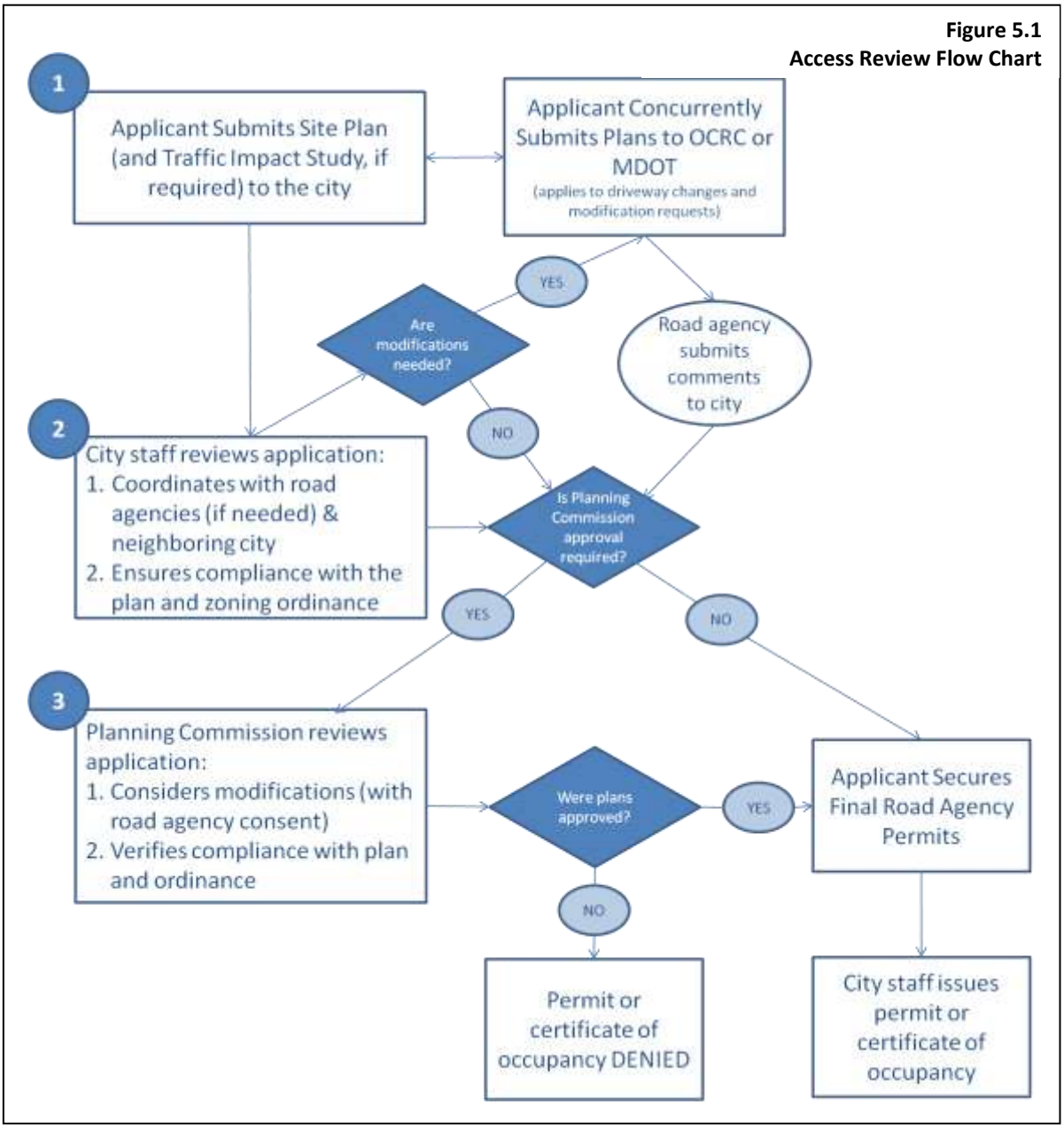
Developing a partnership between MDOT, RCOC, local communities and private property owners is essential to accommodating planned development along the corridor. Figure 5.2 shows the suggested flow of development reviews that fall under the scope of this Plan.

Stage Three: Action and Permitting

After all communities and road agencies have reviewed the application according to local ordinances and policies, the applicant will secure final approval for driveway permits, land use permits and building permits.

Sometimes, access approvals will require execution of documents and deposit of financial guarantees to ensure future cross-access or service drive connections. Locations for shared access connections should be shown on the site plan and proper access agreements, easements, and guarantees executed that ensure construction in the future, indicating those responsible for initial construction costs and on-going maintenance. If cross-access is not feasible due to off-site conditions, temporary access may be approved. The site plan should note the temporary driveway and the terms under which it will be removed. Most often, it will be removed by the private property owner upon availability of an alternative or shared access system in the future, so provision for its removal should also be secured.

Figure 5.1
Access Review Flow Chart



Component D: Ongoing Implementation

While some of the recommendations in this Plan can be directly implemented, many are long-term initiatives that will require an on-going partnership and commitment between the local communities and road agencies. Projects like this one facilitate development of a Steering Committee of local officials and staff involved in access decisions along the corridor. In many cases, these committees continue to meet regularly to discuss implementation challenges and successes, and coordinate future Plan updates or multi-jurisdictional projects. These meetings provide a forum to discuss long-term corridor planning, large-scale corridor construction and improvement projects, and other issues affecting more than one community along the corridor.

Implementation of the Plan's recommendations through site plan and development review, as discussed above, is one way to achieve the benefits of access management. However, the process is expected to be gradual, taking a number of years to achieve. There may be other opportunities that can accelerate implementation of the recommendations, which are described further below, that include:

Proposed Downtown Rochester Streetscaping
Source: Downtown Rochester DDA

- **Road Reconstruction or Resurfacing Projects.** Access management can be implemented with streetscape plans or road resurfacing or reconstruction projects. The design process for such projects should include time for coordination meetings with private property owners to discuss changes along their frontage. Often, the road agency can absorb the cost of driveway closures that are coordinated within the larger project. In fact, this approach is more cost-effective than reconstructing each individual driveway. During the design process, the focus should be on modifying or removing access points that have the potential to contribute to congestion or crash potential, especially those near intersections and high-crash areas.

- **Local or County Funding Sources.** Implementation of many of the Plan's recommended improvements will depend on available funding. In some cases, the costs of the improvements will be borne by the property owner as part of changes to private property. In others, grants or other transportation funds may be earmarked for access changes along Rochester Road. Still in other cases, a local Downtown Development Authority (DDA) or Corridor Improvement Authority may seek to fund improvements that further their plans and goals.

The city of Rochester has the only active DDA on the corridor. It spans from the southern city boundary, north to Woodward Avenue (see map, right). The Downtown Rochester DDA was formed in 1982 to promote, organize and assist local businesses. Its Site Development Committee oversees physical improvements along the corridor, and is currently working on streetscaping, Paint Creek and Clinton River Bridge pedestrian improvements, alley redesign, and reconstruction of Rochester Road (known locally as Main Street) in 2012.

Main Street Reconstruction Project (2012)
Source: Downtown Rochester DDA

The underlying benefits of access management can be realized on other major roads, and some communities choose to expand the scope of this effort to apply to other roads. While the access management ordinance provided is written to apply only to Rochester Road, it can be expanded to include other roads. When developing city-wide access management regulations, communities should confer with MDOT to discuss appropriate spacing requirements or standards that should apply to different roads with different conditions and character.

Access management can incorporate non-motorized and low impact design elements to improve the potential positive impacts of investment along the corridor. As access improvements are made over time, simultaneous review of non-motorized and stormwater systems is also needed to capitalize on opportunities to enhance the overall corridor and provide a catalyst for future improvements and economic growth.

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

HICKORY LAWN

SHADYWOOD

RETAIL/OFFICE STRIP

LOWES

SUNOCO GAS

SENIOR LIVING

NAWAKWA

CHERRY

ORCHARDVIEW

ROCHESTER

Crash reports showed that many of the crashes at Nawakwa involved northbound Rochester traffic turning left onto Nawakwa, with the collisions occuring as the right lane (which continues on as a free-flow freeway ramp) was flowing by stopped through lanes. Recommend closing north of two gas station driveways and moving the start of the right lane taper from just north to just south of Nawakwa.

INTERCHANGE AREA CONCEPTS

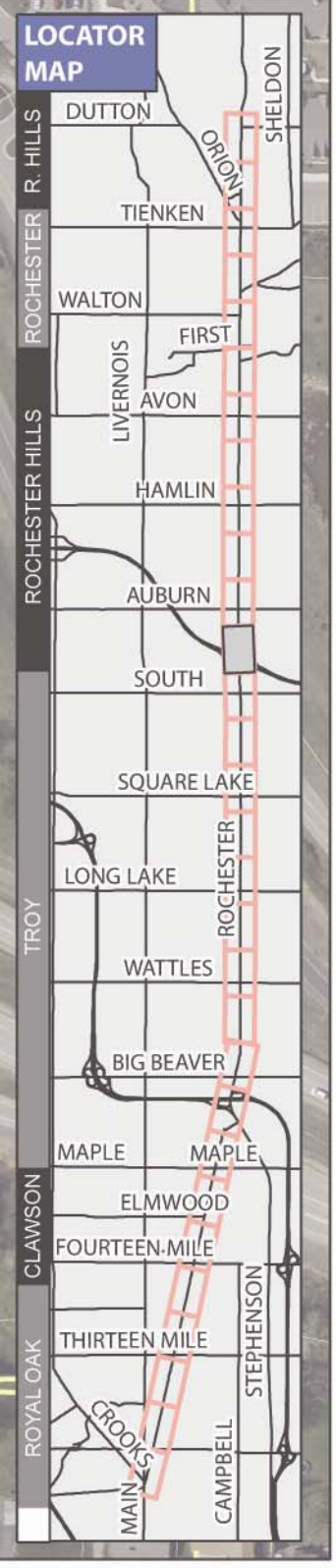
Long-term: redesign during reconstruction

Current issues:
Need for better non-motorized facilities/crossing
Critical/high crashes South to Auburn
Critical intersection at unsignalized Nawakwa

Potential concepts:
-Single Point Urban Interchange (SPUI) - would allow for signal at Nawakwa
-Diverging Diamond Interchange
-Extend wide median across interchange with indirect left turns

See Plan text for in-depth analysis

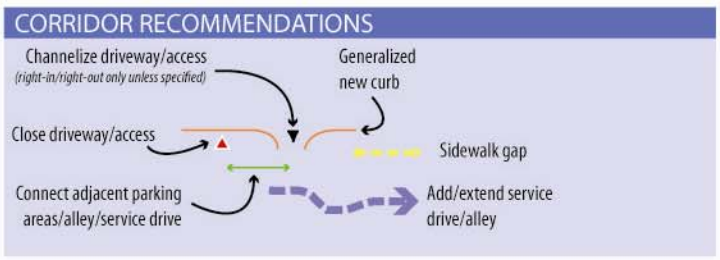
LOCATOR MAP



DRAFT 12/22/2010

LEGEND

CORRIDOR RECOMMENDATIONS



TRANSPORTATION NOTES & DATA

- Critical crash intersection
- Critical crash segment
- Signalized intersection
- Posted speed limit (45)
- Existing alley/service drive
- Existing regional pathway

PROJECT TEAM

SEMCOG
MDOT
LSL Planning, Inc. — Community Planning Consultants
PB 125 YEARS

MAP NUMBER

19 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

JAX CAR WASH

BELLE TIRE AUTO SVC

BARNES AND NOBLE BOOKSTORE

HUNTINGTON FORD AUTO DEALER

RESTAU-RANT

RENTAL CAR

RED WAGON LIQUOR STORE

HAMPTON CORNERS STRIP RETAIL

AUTO DEALER VACANT

CITGO GAS

POOLS A GO-GO

WENDY'S FAST FOOD

LENS CRAFTERS

ALEX'S RESTAURANT

HICKORY LAWN

AUBURN

CHILI'S RESTAURANT

EMAGINE THEATERS

RED LOBSTER

DSW SHOE WAREHOUSE

TACO BELL FAST FOOD

TARGET

FAMOUS DAVES RESTAURANT

RI RO

PENZOIL AUTO SVC

VERIZON WIRELESS

MEIJER

Property owner should consider improvements to circulation to ease access to/from busi-nesses and reduce crash potential on and adja-cent to the property.

Right In/Right Out only via channelization

When combined / widened access to east is secured, west outbound drive shuold be closed and/or connected to rental car to west.

Narrow and define access

Combine two into one shared

Consolidate drives to one new access that aligns with access across Auburn.

Future parking area and connec-tion to Meijer parking would allow closure of Rochester access.

LOCATOR MAP

ROCHESTER HILLS: R. HILLS, ROCHESTER, ROCHESTER HILLS

TROY

CLAWSON

ROYAL OAK

DUTTON, SHELDON, ORION, TIENKEN, WALTON, FIRST, LIVERNOIS, AVON, HAMLIN, AUBURN, SOUTH, SQUARE LAKE, ROCHESTER, LONG LAKE, WATTLES, BIG BEAVER, MAPLE, MAPLE, ELMWOOD, FOURTEEN MILE, THIRTEEN MILE, STEPHENSON, CROOKS, MAIN, CAMPBELL

DRAFT 12/22/2010

LEGEND

CORRIDOR RECOMMENDATIONS

- Channelize driveway/access (right-in/right-out only unless specified)
- Generalized new curb
- Close driveway/access
- Sidewalk gap
- Connect adjacent parking areas/alley/service drive
- Add/extend service drive/alley

TRANSPORTATION NOTES & DATA

- Critical crash intersection
- Posted speed limit (SPEED LIMIT 45)
- Critical crash segment
- Existing alley/service drive
- Signalized intersection
- Existing regional pathway

PROJECT TEAM: SEMCOG, MDOT, LSL Planning, Inc. Community Planning Consultants, PB 125 YEARS

MAP NUMBER 20 OF 30

DRAFT RECOMMENDATIONS

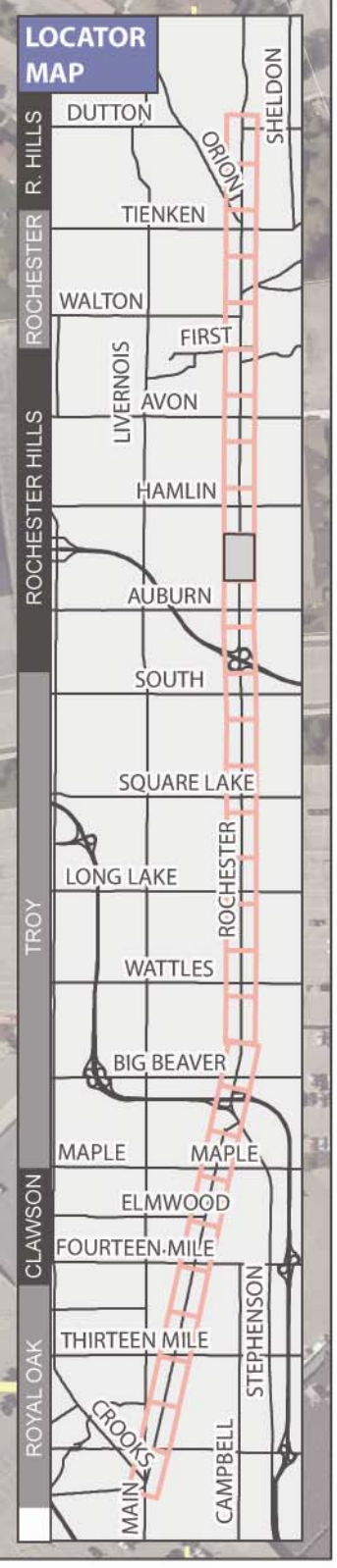
Rochester Road Access Management Plan

0 100 200 400 Feet

If/when single family properties are redeveloped as higher intensity uses, existing drives should be closed or made temporary access until service drives and access connections can be completed to one or two new access points.

PLAZA
MONTMORENCY
STARK
VILLAGE
HAMPTON
TIMBERVIEW
REGAL
OFFICE
BANK
CHARTER ONE BANK
BARCLAY
WABASH
HAWTHORNE HOME APPLIANCE
RETAIL STRIP
RETAIL STRIP

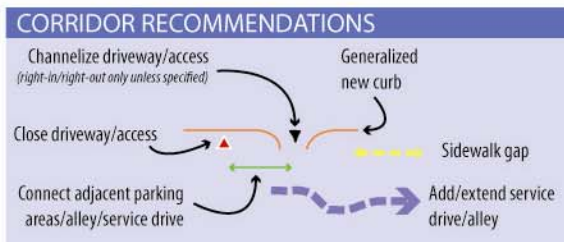
LOCATOR MAP



DRAFT 12/22/2010

LEGEND

CORRIDOR RECOMMENDATIONS



TRANSPORTATION NOTES & DATA

- Critical crash intersection
- Critical crash segment
- Signalized intersection
- Posted speed limit (SPEED LIMIT 45)
- Existing alley/service drive
- Existing regional pathway

PROJECT TEAM

SEMCOG
MDOT
LSL Planning, Inc. — Community Planning Consultants
PB 125 YEARS

MAP NUMBER

21 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

MEDICAL OFFICE

WORLD OF FLOORS

RETAIL STRIP

RAM'S HORN RESTAURANT

BORDINE'S NURSERY

Future development / reconfiguration could include consolidating drives into one new one aligned with drive across the street

Future development will access via existing access

HAMLIN

BP GAS

CVS PHARMACY

WALGREENS PHARMACY

PNC BANK

JOANN FABRICS

BED BATH & BEYOND

PLAZA

BOYKEN

WINDSOR

KALHAVEN

If/when properties are redeveloped as higher intensity uses, existing drives should be closed or made temporary access until service drives and access connections can be completed to connect to one or two new access points.

LOCATOR MAP

DUTTON, SHELDON, ORIONT, TIENKEN, WALTON, FIRST, AVON, LIVERNOIS, HAMLIN, AUBURN, SOUTH, SQUARE LAKE, ROCHESTER, LONG LAKE, WATTLES, BIG BEAVER, MAPLE, ELMWOOD, FOURTEEN MILE, THIRTEEN MILE, STEPHENSON, CROOKS, MAIN, CAMPBELL

R. HILLS | ROCHESTER | ROCHESTER HILLS | TROY | CLAWSON | ROYAL OAK

DRAFT 12/22/2010

LEGEND

CORRIDOR RECOMMENDATIONS

- Channelize driveway/access (right-in/right-out only unless specified)
- Generalized new curb
- Close driveway/access
- Sidewalk gap
- Connect adjacent parking areas/alley/service drive
- Add/extend service drive/alley

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PROJECT TEAM

SEMCOG, MDOT, LSL Planning, Inc. Community Planning Consultants, PB 125 YEARS

MAP NUMBER

22 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

BANK OF AMERICA
PIER ONE
CHRYSLER JEEP AUTO DEALER
GROSVENOR
YORKTOWNE
MEADOWFIELD
MEADOWLANE
MEADOWWOOD
OFFICE
FIFTH THIRD BANK
COLONY
GLEN MEADOW
EDDINGTON
WINDRIFT
DREXELGATE
HILLSIDE
SANDALWOOD
FARNBOROUGH

As PUD area develops, access limited to realigned Eddington and new access at Sandalwood, served by internal drive/street and potential mini-roundabouts. Potential future signal at realigned roads if warrants are met in the future.

LOCATOR MAP

DUTTON
SHELDON
ORION
R. HILLS
TIENKEN
ROCHESTER
WALTON
FIRST
LIVERNOIS
AVON
ROCHESTER HILLS
HAMLIN
AUBURN
SOUTH
SQUARE LAKE
ROCHESTER
LONG LAKE
N
WATTLES
TROY
BIG BEAVER
MAPLE
MAPLE
ELMWOOD
CLAWSON
FOURTEEN MILE
THIRTEEN MILE
STEPHENSON
ROYAL OAK
CROOKS
MAIN
CAMPBELL

DRAFT 12/22/2010

LEGEND

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PROJECT TEAM

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23 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

ARBY'S

LIFETIME FITNESS ENTRANCE

MCDONALDS FAST FOOD

LIFETIME FITNESS

SOUTH HILL PLAZA RETAIL STRIP

RI RO

TOYOTA / VW AUTO DEALER

DALTON

RI RO

SHELTON AUTO DEALER

New access to align with Dunkin Donuts

DEMOLISHED STRUCTURE

Future development of corner property(ies) should consolidate drives, share access.

SANYO MACHINE CORP

SHELL GAS

N

AVON

GENESYS CREDIT UNION

SPEEDWAY GAS

SEARS ESSENTIALS

BURGER KING FAST FOOD

MICHIGAN LEADER DOGS FOR THE BLIND

BORDERS BOOKSTORE

MARSHALL'S

LINCOLN AUTO DEALER

RETAIL STRIP

LOCATOR MAP

R. HILLS
ROCHESTER
ROCHESTER HILLS
TROY
CLAWSON
ROYAL OAK

DUTTON
ORION
SHELDON
TIENKEN
WALTON
FIRST
LIVERNOIS
AVON
HAMLIN
AUBURN
SOUTH
SQUARE LAKE
ROCHESTER
LONG LAKE
WATTLES
BIG BEAVER
MAPLE
MAPLE
ELMWOOD
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DRAFT 12/22/2010

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DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

MILL

OFFICE BUILDING

CLINTON RIVER TRAIL TRAILHEAD

CAMPBELL

HIEL

DIVERSION

OFFICE BUILDING

DANCE STUDIO OFFICE

SOUTH

CONCRETE PLANT

CITY OF ROCHESTER

CITY OF ROCHESTER HILLS

SCUBA SHOP

AAA AUTO INS

Evaluate potentially adding left-turn phase to Rochester Road.

VACANT GAS

Vacant gas station should look for opportunities to connect to south/share access and close/channelize one or both existing drives.

CHILDRESS

Left-turn lock-up and site distance at this offset increases crash potential. Channelize Childress.

ENID

CLOVERPORT

MERCEDES-BENZ AUTO DEALER

Potential future access drives/parking conncetions to provide shared access system.

KFC FAST FOOD

RESTAURANT

BILL FOX CHEVY AUTO DEALER

LAW OFFICE

MIDAS AUTO SVC

ARBY'S FAST FOOD

ARLINGTON

TOYOTA / VW AUTO DEALER

LOCATOR MAP

DUTTON, ORION, SHELDON, R. HILLS, TIENKEN, ROCHESTER, WALTON, FIRST, LIVERNOIS, AVON, ROCHESTER HILLS, HAMLIN, AUBURN, 59, SOUTH, SQUARE LAKE, ROCHESTER, LONG LAKE, TROY, WATTLES, BIG BEAVER, MAPLE, MAPLE, CLAWSON, ELMWOOD, FOURTEEN MILE, THIRTEEN MILE, STEPHENSON, ROYAL OAK, CROOKS, MAIN, CAMPBELL

DRAFT 12/22/2010

LEGEND

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PROJECT TEAM

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25 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

10 ACRE DEVELOPMENT SITE

OLD ORION

BANK OF AMERICA

ROCHESTER

STARBUCKS COFFEE

PAPA JOE'S MARKET

RITE AID PHARMACY

MIXED INDUSTRIAL / OFFICE / RETAIL

Reconstruct driveway 100' west to align with opposing driveway.

TCF BANK

LINO'S ITALIAN RESTAURANT

SPEEDWAY GAS

Intersection has been widened to have dual left-turns on all legs since crash data was collected

TIENKEN

TIENKEN

GAS

WALGREENS

HOLLYWOOD MARKET

CITY WALK RETAIL CENTER

NORTH HILL RETAIL CENTER

CENTRAL COMMUNITY BANK

BANK

REITMAN

TCBY

PINE

WALTONWOOD SINGH SENIOR LIVING

WINRY

NORTH

CITY OF ROCHESTER HILLS
CITY OF ROCHESTER

NORTHWOOD

PINE

MAYWOOD

GLENDALE

DRAFT 12/22/2010

LOCATOR MAP

R. HILLS | ROCHESTER | ROCHESTER HILLS | TROY | CLAWSON | ROYAL OAK

DUTTON, ORION, SHELDON, TIENKEN, WALTON, FIRST, LIVERNOIS, AVON, HAMLIN, AUBURN, SOUTH, SQUARE LAKE, ROCHESTER, LONG LAKE, WATTLES, BIG BEAVER, MAPLE, MAPLE, ELMWOOD, FOURTEEN MILE, THIRTEEN MILE, STEPHENSON, CROOKS, MAIN, CAMPBELL

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PROJECT TEAM

SEMCOG, MDOT, LSL Planning, Inc. Community Planning Consultants, PB 125 YEARS

MAP NUMBER

28 OF 30

DRAFT RECOMMENDATIONS

Rochester Road Access Management Plan

0 100 200 400 Feet

TREE TOP

CROSS CREEK

CHATHAM

HARWICH

ORION

VISTAVIEW

MCGREGOR

Connect access with property to south and share one new drivway aligned with medical center drive.

BEAUMONT MEDICAL CENTER

ROCHESTER

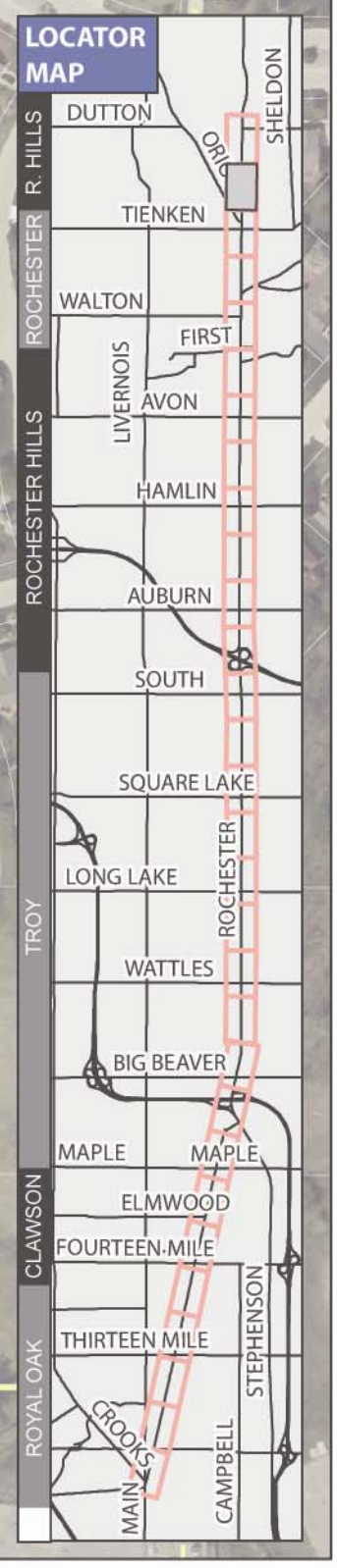
ANN MARIA

OLD ORION

10 ACRE DEVELOPMENT SITE

DRAFT 12/22/2010

LOCATOR MAP



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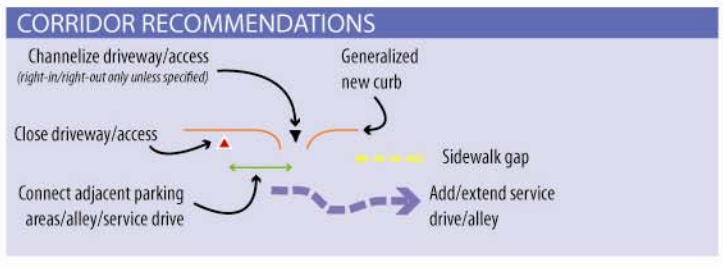

TRANSPORTATION NOTES & DATA

LEGEND

PROJECT TEAM

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MAP NUMBER

29 OF 30

DRAFT RECOMMENDATIONS

Rochester Road
Access Management Plan

0 100 200 400 Feet

BEECHVIEW

MEAD

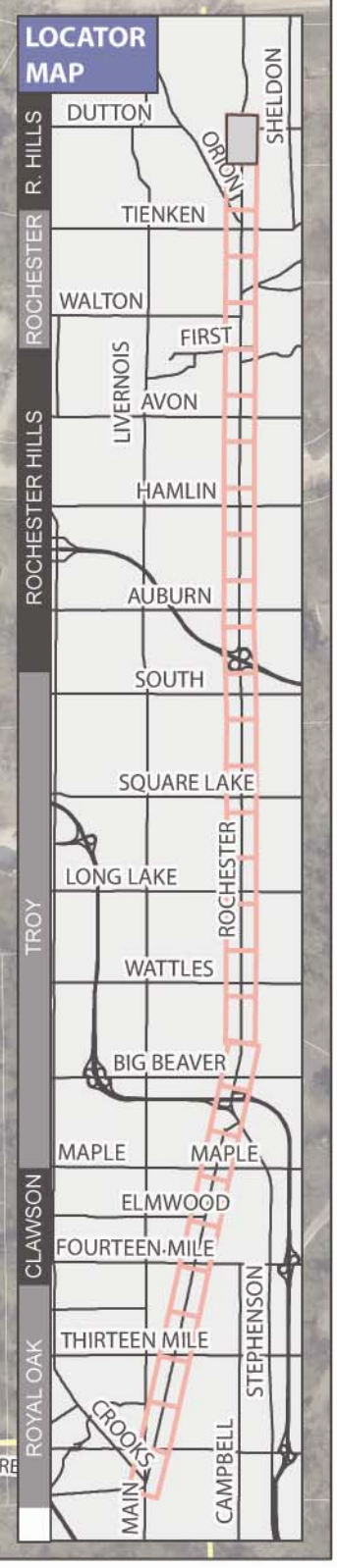
OAKLANE

Share access/align with opposing drives when-ever possible.

ROCHESTER

WIMBERLY

PERRYDALE



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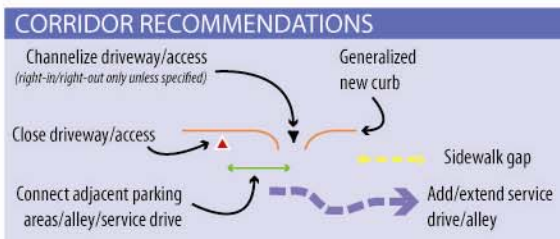
LEGEND

CORRIDOR RECOMMENDATIONS



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30 OF 30