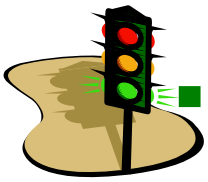


INTRODUCTION

Purpose

The Transportation Section of the Muskegon Master Plan provides an inventory of existing street and transportation factors, a determination of existing and future traffic generators, a determination of road capacities, a discussion of other recent traffic studies, an inventory and discussion of major accident intersections, and a recommendation discussion. The purpose of these subunits is to determine existing traffic conditions within the City of Muskegon, to accurately project future conditions and to provide proper and studied recommendations both for physical improvements and planning and land use control guidance.

Road Transportation System Overview

The City of Muskegon is well served by a series of freeways, state highways, major roads and local roads. Muskegon's primary link to other metropolitan areas in southern Michigan is by Interstate 96 which terminates just south of the City. Access to Downtown Muskegon from I-96 is provided by Seaway Drive (BR-31). I-96 empties onto Seaway which provides the most direct route to the Downtown. Other regional access is provided by four lane limited access (U.S. 31) which is the primary north-south road for communities along the coast of Lake Michigan and by Apple Avenue (M-46), a state highway providing access to townships and communities to the east.

Internally, the City is served by a series of streets that move traffic in general north-south and east-west directions. Streets considered (for the purpose of this study) have been designated as either arterial/major streets or collectors.

The major east-west streets in the City of Muskegon are:

- Sherman;
- Lakeshore;
- Laketon;
- Apple; and
- Marquette.

The major north-south streets in the City of Muskegon are:

- Quarterline;
- Getty;
- Wood;
- Peck;
- Sanford;
- Seaway Drive;
- Henry; and
- McCracken.

Collectors include:

- Lakeshore (west of McCracken);
- Lincoln;
- McGraft Park;
- Glenside; and
- Creston.

Refer to the Traffic Volume map for a depiction of these streets.

Arterial/Major Streets

Arterial/major streets are those which serve longer trips within an urban area, sometimes extending beyond municipal boundaries to connect adjacent population centers, or more heavily traveled major streets. Arterial/major streets are designed for moderate to large traffic volumes traveling at speeds of 35 to 45 mph. Speed limits on major streets outside of the City's boundaries may be higher. Conversely, lower speed limits may be found near schools and as one enters core Downtown locations.

Some access to adjacent development may be permitted from streets of this type, but on-street parking and curb cuts are usually regulated to preserve capacity for vehicle traffic.

Collector Streets

Collector streets are those which provide access and mobility within and between smaller residential, commercial, or industrial areas. Collector streets accommodate lower traffic volumes and utilize speeds of 25 to 35 mph. Access spacings and side streets may be closer together than on major streets, and on-street parking is often permitted.

Local Streets

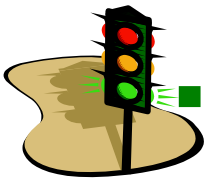
Local streets include the bulk of the City's roadway network. Local streets generally link to collector streets and provide direct access to neighborhoods, individual home sites, and other such properties. Local streets generally accommodate the lowest traffic volumes and typically utilize a 25 mph speed limit. Access spacings are on a parcel basis, via driveways, and side streets tend to be located on a block-by-block basis. Except for winter months, on-street parking is the norm. During winter, on-street parking may be limited to a designated area or during select hours in order to accommodate municipal snow removal.

Commercial Corridors

Many of the City's principal arterial/major streets function as commercial corridors. Of note are Apple Avenue, Laketon Avenue, Sherman Avenue, Getty Street, Peck Street, and Henry Street. In all cases these systems, and commercial development, extend into Muskegon's neighboring municipalities. Table 5.1 provides a categorical breakdown of the business mix per corridor. The table also includes the absolute number of businesses per corridor within the City, as well as the number for the associated Metro Area.

Of the six corridors, Apple, Sherman , and Peck experience relatively high concentrations of individual, or focused, uses.

Apple Avenue



Business	Apple	Laketon	Sherman	Getty	Peck	Henry
Industrial	3.4	6.0	10.0	17.6	---	6.4
Institutional/Churches	3.4	6.0	---	3.7	---	---
Office/Service	63.8[a]	37.0	64.5[b]	18.4	88.5[b]	4.3
Restaurant/Lounge/Bar	5.2	15.0	6.4	5.1	---	10.6
Retail	17.2	21.0	10.9	16.9	9.8	53.2
Vehicular Repair	6.9	11.0	2.7	18.4	---	10.6
Vehicular Sales	---	3.0	---	14.7	---	10.6
Other	---	1.0	5.5	5.2	1.7	4.3
Number of Businesses per Corridor - City Portion	58	100	110	59	61	47
Number of Businesses per Corridor outside City Portion	231	11	108	77	58	91

Notes: [a]Concentration of legal offices/attorneys, at eastern end.
[b]Concentration of medical services. In certain instances, more than one business may be located at the same address. For instance, a group of (independent) physicians may share a single building complex. For purposes of the above chart, each physician has been counted as a business.

Table 5.1 **Business Type as a Percent of Total Businesses per Corridor**

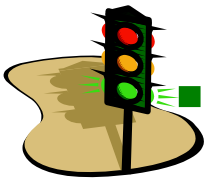
The westerly portion of Apple Avenue, near the Muskegon City Hall and Muskegon county Building, has a concentration of professional offices devoted to legal services. This is to be expected given the proximity of the governmental centers and courts. The second highest category is retail development. Much of that development is located within close proximity to the eastern end of Apple, near the U.S. 31 highway. Business development within these two extremes is relatively modest. The corridor continues to maintain a large percentage of single family residential development.

Sherman Boulevard

Sherman Boulevard possesses a high concentration of medical service uses, generally in close proximity to Mercy Hospital. These include physician offices centered about the hospital campus. Uses along the remainder of the system are generally mixed throughout, except for the most westerly stretch where residential development is found. With the exception of Apple Avenue, Sherman possesses the highest number of businesses within the Metro area. The recent construction of a large retail shopping complex on Sherman, east of U.S. 31, resulted in increased traffic volumes for Sherman. As development around that complex continues, Sherman is likely to experience additional traffic.

Peck Street

Due to the presence of Hackley Hospital, Peck Street experiences heavy concentrations of medical service uses. These include physician offices and various health agencies. Other corridor uses include legal services, mortuary services, and small pockets of retail. Although 61 businesses exist along the corridor, many



are housed in larger, well-maintained, older homes. As such, the corridor exhibits a residential character.

Getty Street

Once a street comprised of many homes, Getty Street has become a collection of industrial, automotive, and retail uses. Throughout its length (including those areas beyond Muskegon's borders), Getty has approximately 25 vehicular repair/body shops, 20 used car dealerships, and 29 industrial establishments. Interspersed among these are retail and service uses and a declining number of homes. Much of the corridor has developed in full strip commercial fashion. Modifying that is not practical at this time, nor in the foreseeable future.

Laketon Avenue

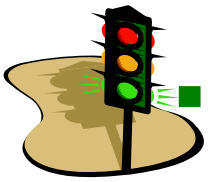
With the exception of those areas lacking sufficient lot depth to construct modern commercial facilities (e.g., former Grand Trunk Railroad/CSX right-of-way) and the large enclaves of active industrial property, Laketon Avenue has also developed in strip commercial fashion. As with Getty, reversing that trend would be difficult.

Several Laketon Avenue business and property owners have recently voiced a desire to form a task force to investigate ways to beautify Laketon and strengthen its image as a prime, and highly attractive corridor. Efforts are underway to initiate that effort. In addition to possible task force improvements, the City is currently implementing a bikeway/trail beautification project along the north side of Laketon, between Getty and Hoyt. This is the first of several bikeway construction phases. The project is being funded, in part, by the State of Michigan.

Henry Street

Henry Street has a rather large retail component, however, over the past decade this system has experienced some modification in use and demand. Once considered the prime commercial corridor, Henry Street has not been able to maintain pace with some of the newer retail areas occurring along Harvey Street (Norton Shores/Fruitport Township) and U.S. 31/Sherman (City of Muskegon and Fruitport Township). Notwithstanding the above, Henry Street does possess a strong retail base. We recommend that the existing base be strengthened by orienting future development to retail, restaurant, and consumer service (e.g., banks, credit unions, hair salons, etc.) uses. Wholesale operations, manufacturing, vehicular repair, assembly halls, storage, and other such uses should be discouraged.

As future development occurs along the above road systems, we recommend that greater attention be given to streetscape and overall site design efforts. To ensure that this happens, the City Zoning Ordinance should include detailed standards for site landscaping, signage, lighting, access, and buffering protection for residential home sites lying contiguous to commercial and industrial development. One of the major problems with development occurring along each of the corridors is a failure to require adequate buffering between commercial uses and adjoining residential homes.



Existing Traffic Counts

Shown on the Traffic Volume map are the most recent traffic counts taken within the City for major streets. Traffic counts were taken between the years 1988 and 1995 by either the Michigan Department of Transportation or the City of Muskegon. The data identifies primary travel patterns within the City, using comparable benchmarks.

Traffic counts are reported using the Annual Average Daily Traffic (AADT) count. The AADT is a derived number in that it is a computation obtained from a sample count.

For a true annual daily average, a count of vehicles would have to be taken for 365 days and the total divided by 365. Since this is relatively difficult, costly, and time consuming, the AADT is usually based on counts of 24, 48, or 72 hours and up to a week with the result factored, or multiplied, by the known variations between the days in the week and the months in the year. The result then is a close approximation to the real number.

Traffic count patterns obtained over several years when utilized with land use and other data, can be effective tools in determining a roadway corridor's suitability for development. In addition, traffic counts are useful for determining priority of needs in funding highway improvements, measuring the adequacy of existing roadways, evaluating accident data, judging the necessity for traffic control devices, and planning operational improvements.

Traffic Count Projections

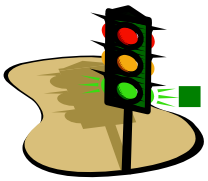
An inventory of the major and selected collector streets has been prepared using AADT data and identifying the year from which the data originates. Projections to AADT were then performed based on varied non-compounded growth factors per year and compiled in five-year increments to the year 2020.

In reviewing the AADT data, the year 1988 provided a good deal of measurements, that were often repeated in the year 1993 or 1995. The year 1995 is used to project growth rates, verses earlier periods. Recent census data supports that Muskegon County is just starting to grow, and it is anticipated that traffic data adjusted from 1995 counts will give supportable volumes.

Growth Areas

Growth factors were applied based on the likelihood that the following major developments will occur during the time period of the present to the year 2020.

- Continued commercial developments along Sherman east of U.S. 31, the Westshore Plaza.
- Commercial developments along Sherman west of U.S. 31 and Getty.
- Proposed industrial park south of Laketon between Getty and U.S. 31.
- Growth of Muskegon Charter Township, Egelston Township, and other communities east of U.S. 31 affecting Apple, Marquette, and Laketon.
- Proposed commercial development at



Sherman and Getty.

- Potential development south of Sherman at Lake Michigan.
- Continued development of Harbour Towne and undeveloped property to the west on Sand Products land.
- Large potential to significantly develop the Downtown area, lakeshore, and properties to the north of Downtown.
- Potential to develop large for industrial properties along Lakeshore and Seaway Drives, north and south of Downtown.

Projections of AADT are contained in Table 5.2.

Table 5.2 — **Existing AADT Along Major and Collector Streets Projections of Growth to the Year 2020**

Street	From - To	Growth Factor	Existing AADT	Year	Projected AADT 2000	2005	2010	2015	2020
Sherman	East of U.S. 31	1	12,025	93	12,815-13,425	13,456-14,768	14,129-16,244	14,835-17,869	15,577-19,656
	31 to Getty	1	17,826	93	18,717-19,609	19,653-21,569	20,636-23,726	21,668-26,099	22,751-28,709
	Seaway to Henry	1	22,211	92	23,322-24,432	24,487-26,875	25,712-29,562	26,998-32,519	28,347-35,771
	Henry to Glenside	2	11,033	93	11,033-11,585	11,033-12,164	11,033-12,772	11,033-13,411	11,033-14,081
	Glenside to McCracken	2	19,618	93	19,618-20,599	19,618-21,629	19,618-22,710	19,618-23,846	19,618-25,038
	McCracken to Lincoln	2	9,602	91	9,602-10,082	9,602-10,586	9,602-11,116	9,602-11,671	9,602-12,254
	Lincoln to Westerly	2	8,890	93	8,890-9,335	8,890-9,801	8,890-10,291	8,890-10,806	8,890-11,346
Laketon	Sheridan to U.S. 31	1	15,207 - 14,028	92-95	15,967-16,728	16,766-18,400	17,604-20,241	18,484-22,265	19,408-24,491
	U.S. 31 to Getty	2	23,468	93	23,468-24,641	23,468-25,873	23,468-27,167	23,468-28,525	23,468-29,952
	Getty to Wood	2	24,111	93	24,111-25,317	24,111-26,582	24,111-27,911	24,111-29,307	24,111-30,772
	Wood to Peck	2	25,428	94	25,428-26,699	25,428-28,034	25,428-29,436	25,428-30,908	25,428-32,453
	Peck to Seaway	2	20,835	93	20,835-21,879	20,835-22,970	20,835-24,119	20,835-25,325	20,835-26,591
	Seaway to Henry	2	18,798	93	18,798-19,738	18,798-20,725	18,798-21,761	18,798-22,849	18,798-23,911
	Henry to Lakeshore	2	14,835	89	14,835-15,577	14,835-16,356	14,835-17,173	14,835-18,032	14,835-18,934
Apple	Quarterline to U.S. 31	2	32,780	88	32,780-34,419	32,780-36,140	32,780-37,947	32,780-39,844	32,780-41,837
	U.S. 31 to Creston	2	24,700	88	24,700-25,935	24,700-27,232	24,700-28,593	24,700-30,023	24,700-31,524
	Creston to Getty	2	16,600 - 16,000	88-95	16,600-17,430	16,600-18,302	16,600-19,217	16,600-20,177	16,600-21,186
	Getty to Wood	2	14,000	88	14,000-14,700	14,000-15,435	14,000-16,207	14,000-17,017	14,000-17,868
	Wood to Muskegon	2	12,600	88	12,600-13,230	12,600-13,892	12,600-14,586	12,600-15,315	12,600-16,081
Marquette	Quarterline to U.S. 31	1	6,555	93	6,883-7,571	7,227-8,328	7,588-9,161	7,968-10,077	8,366-11,085

Table 5.2 — **Existing AADT Along Major and Collector Streets Projections of Growth to the Year 2020**

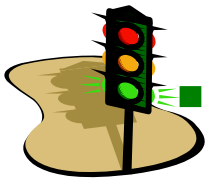
Street	From - To	Growth Factor	Existing AADT	Year	Projected AADT 2000	2005	2010	2015	2020
	Getty to Wood	1	3,850	93	4,043-4,447	4,245-4,892	4,457-5,381	4,680-5,919	4914-6,511
	Wood to Seaway	1	5,601	92	5,881-6,61	6,175-6,777	6,484-7,455	6,808-8,200	7,148-9,020
Lakeshore	Northeasterly of Laketon	1	2,978	92	3,127-3,276	3,283-3,604	3,447-3,964	3,620-4,360	3,801-4,796
	Laketon to McCracken	1	10,456	92	10,979-11,502	11,528-12,652	12,104-13,917	12,709-15,309	13,345-16,839
	McCracken to Cottage Grove	1	9,800	88	10,290-10,780	10,805-11,858	11,345-13,044	11,912-14,348	12,508-15,783
	Cottage Grove to Edgewater	1	7,723	93	8,109-8,495	8,515-9,345	8,940-10,279	9,387-11,307	9,857-12,438
Quarterline	North of Marquette	1	5,194	93	5,454-5,713	5,726-6,285	6,013-6,913	6,313-7,605	6,629-8,365
	South of Marquette	1	7,437	92	7,809-8,181	8,199-8,999	8,609-9,899	9,070-10,889	9,492-11,977
Creston	Apple to Laketon	2	7,765	93	7,765-8,153	7,765-8561	7,765-8,989	7,765-9,438	7,765-9,910
Getty	Access Highway to Marquette	2	4,202	93	4,202--4,412	4,202- 4,633	4,202- 4,864	4,202- 5,108	4,202- 5,363
	Marquette to Apple	2	8,108	95	8,108-8,513	8,108-8,939	8,108-9386	8,108-9,855	8,108-10,348
	Apple to Laketon	1	11,709 - 11,629	91-93	12,294-12,880	12,909-14,168	13,555-15,585	14,232-17,143	14,944-18,857
	Laketon to Sherman	2	20,893	93	20,893-21,938	20,893-23,034	20,893-24,106	20,893-25,396	20,893-26,665
Wood	Apple to Laketon	1	3,981	93	4,180-4,379	4,389-4,817	4,609-5,299	4,839-5,229	5,081-6,411
	Laketon to South	2	6,083	93	6,083-6,387	6,083-6,707	6,083-7,042	6,083-7,394	6,083-7,764

Table 5.2 — **Existing AADT Along Major and Collector Streets Projections of Growth to the Year 2020**

Street	From - To	Growth Factor	Existing AADT		Year	Projected AADT 2000	2005	2010	2015	2020
Peck	North of Laketon	2		6,865	94	6,865-7,208	6,865-7,569	6,865-7,947	6,865-8,344	6,865-8,762
	South of Laketon	2		6,243	92	6,243-6,555	6,243-6,883	6,243-7,227	6,243-7,588	6,243-7,968
Sanford	North of Laketon	2		5,048	94	5,048-5,300	5,048-5,565	5,048-5,844	5,048-6,136	5,048-6,443
	South of Laketon	2		6,028	93	6,028-6,329	6,028-6,646	6,028-6,978	6,028-7,327	6,028-7,693
Seaway	Marquette to Eastern	1	Both Ways	22,700	88	23,835-24,970	25,027-27,467	26,279-30,214	27,592-33,235	28,970-36,559
	Webster - Terrace to Washington	3	One Way	13,903	95	8,650	9,083	9,537	10,013	10,514
	Muskegon - Terrace to Washington	3	One Way	13,606	95	8,250	8,663	9,096	9,550	10,028
	Washington to Laketon	1	Both Ways	28,800	88	30,240-31,680	31,752-34848	33,370-38,333	35,007-42,166	36,757-46,383
	Laketon to Sherman	1	Both Ways	32,800	88	34,440-36,080	36,162-39,688	37,970-43,657	39,867-48,022	41,862-52,824
Henry	Laketon to Sherman	2		11,557	92-93	11,557-12,135	11,557-12,742	11,557-13,379	11,557-14,048	11,557-14,750
Barclay	Laketon to Sherman	2		5,706	93	5,706-5,991	5,706-6,291	5,706-6,605	5,706-6,936	5,706--7,282
Glenside	McGraft Park to Sherman	2		3,401	93	3,401-3,571	3,401--3,750	3,401-3,937	3,401-4,134	3,401--4,341
McGraft Park	Lakeside to Glenside	2		6,012	93	6,012-6,313	6,012--6,628	6,012-6,960	6,012-7,308	6,012-7,673
McCracken	Lakeshore to Sherman	2		3,105	93	3,105-3,260	3,105-3,423	3,105-3,594	3,105-3,774	3,105-3,963

Table 5.2									Existing AADT Along Major and Collector Streets Projections of Growth to the Year 2020
			Existing		Projected AADT				
Street	**From - To**	**Growth Factor**	**AADT**	**Year**	**2000**	**2005**	**2010**	**2015**	**2020**
Lincoln	Lakeshore to Sherman	2	4,165	93	4,165-4,373	4,165--4,592	4,165-4,822	4,165-5,063	4,165-5,316

Growth Factors:
1: 1% - 2% non-compounded growth per year
2: 0% - 1% non-compounded growth per year
3: Readjusted based on Shoreline Drive Traffic Impact Analysis then grown at a rate of 1% per year after 2000



In general, traffic moving east and west travels Apple, Laketon, and Sherman roads, using Henry, Getty and Seaway Drive to travel north and south. The east-west roads are heavily traveled, at or near their design capacity (see below), and future potential developments are expected to have major effects on these roads, as they are adjacent to or directly downstream of future development.

Capacity

To understand the effects of increased traffic, using the growth assumptions previously defined, roadway volumes were compared to existing capacity.

The capacity of a roadway includes several considerations. A field survey was accomplished to identify number of traffic lanes available, posted speed limits, and general street classifications. Capacities were then completed assuming a Level of Service (LOS) of no worse than C with appropriate generalized signal attributes corresponding with LOS C. Level of Service may be ranked from A to F with A representing the highest level of efficiency pursuant to movement, safety, and the like. Level F represents a high degree of inefficiency resulting from congestion, high accident rates, and the like. Level of Service C represents an acceptable level of roadway efficiency and is generally used for planning purposes. In some instances, Level of Service D is used when determining acceptable levels of efficiency. For purposes of this analysis, the higher efficiencies supported by LOS C were used. Computations were carried out in conformance with reference materials as per H.C.M. (Highway Capacity Manual) 1994, and results indicated as "Existing Capacity" in Table 5.3.

Table 5.3 Projected Traffic Volume and Capacity

Street	From - To	Year 2020 Volumes	Existing Capacity	Deficiency
Sherman	East of U.S. 31	15,577-19,656	23,740	
	31 to Getty	22,271-28,709	23,740	4,969
	Seaway to Henry	28,347-35,771	20,950	7,397-14,821
	Henry to Glenside	11,033-14,081	22,350	
	Glenside to McCracken	19,618-25,038	22,350	
	McCracken to Lincoln	9,602-12,254	22,350	
	Lincoln to Westerly	8,890-11,346	10,415	
Laketon	Sheridan to U.S. 31	19,408-24,491	22,344	2,936-7,147
	U.S. 31 to Getty	23,468-29,952	23,344	128-7,608
	Getty to Wood	24,111-30,772	20,950	3,161-9,822
	Wood to Peck	25,428-32,453	20,950	4,478-11,503

Table 5.3		Projected Traffic Volume and Capacity		
Street	**From - To**	**Year 2020 Volumes**	**Existing Capacity**	**Deficiency**
	Peck to Seaway	20,835-26,591	20,950	5,641
	Seaway to Henry	18,798-23,911	20,950	2,961
	Henry to Lakeshore	14,835-18,934	20,950	
Apple	Quarterline to U.S. 31	32,780-41,837	23,740	9,040-18,097
	U.S. 31 to Creston	24,700-31,524	20,950	3,750-10,574
	Creston to Getty	16,600-21,186	20,950	
	Getty to Wood	14,000-17,868	20,950	
	Wood to Muskegon	12,600-16,081	20,950	
Marquette	Quarterline to U.S. 31	8,366-11,085	18,820	
	Getty to Wood	4,914-6,511	18,820	
	Wood to Seaway	7,148-9,020	18,820	
Lakeshore	Northeasterly of Laketon	3,801-4,796	10,470	
	Laketon to McCracken	13,345-16,839	10,470	2,875-6,369
	McCracken to Cottage Grove	12,508-15,783	10,470	2,038-5,313
	Cottage Grove to Edgewater	9,857-12,438	10,470	1,968
Quarterline	North of Marquette	6,629-8,365	11,170	
	South of Marquette	9,492-11,977	22,350	
U.S. 31	Between Marquette and Apple		55,000	
	North of Sherman		55,000	
Creston	Apple to Laketon	7,765-9,910	10,475	
Getty	Access Highway to Marquette	4,202-5,363	11,170	
	Marquette to Apple	8,108-10,348	10,475	
	Apple to Laketon	11,709-18,857	20,954	
	Laketon to Sherman	20,893-26,665	20,954	5,711

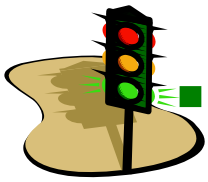
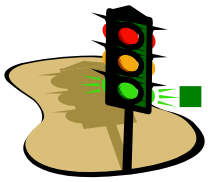


Table 5.3		Projected Traffic Volume and Capacity		
Street	**From - To**	**Year 2020 Volumes**	**Existing Capacity**	**Deficiency**
Wood	Apple to Laketon	5,081-6,411	10,475	
	Laketon to South	6,083-7,764	11,025	
Peck	North of Laketon	6,865-8,762	11,025	
	South of Laketon	6,243-7,968	11,025	
Sanford	North of Laketon	5,048-6,443	11,025	
	South of Laketon	6,028-7,693	11,025	
Seaway	Marquette to Eastern	28,972-36,559	49,980	
	Webster - Terrace to Washington	10,514	23,520	
	Muskegon - Terrace to Washington	10,028	23,520	
	Washington to Laketon	36,757-46-383	47,040	
	Laketon to Sherman	41,862-52,824	47,040	5,784
Henry	Laketon to Sherman	11,557-14,750	20,950	
Barclay	Laketon to Sherman	5,706-7,282	10,475	
Glenside	McGraft Park to Sherman	3,401-4,341	8,820	
McGraft Park	Lakeside to Glenside	6,012-7,673	8,820	
McCracken	Lakeshore to Sherman	3,105-3,963	8,820	
Lincoln	Lakeshore to Sherman	4,165-5,316	8,820	



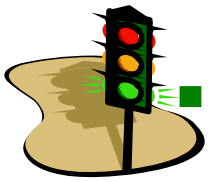
Frequency of Accidents

Accidents at intersections have been compiled for the five-year period between June of 1990 through December of 1995. The results are through the Michigan Accident Locations Index (MALI) system and were provided by the Muskegon County Road Commission. Intersections that experienced 40 or more accidents during the five-year period were plotted on the attached map. Also reported was Property Damage Only (PDO) accidents and Injury Accidents. The top intersection/accident locations by number were ranked. Table 5.4 indicates the number of accidents during the five-year study period, the combined AADT of the two intersection streets, the intensity rate of accidents per 1,000,000 vehicles and the rank based on the intensity of accidents.

1990-1995 Number of Accidents	Location	Combined AADT	Rate Accidents/ 1,000,000	Rank Accidents/ 1,000,000
120	Henry-Sherman	33,768	1.960	4
92	Getty-Laketon	45,004	1.120	13
76	Northbound Seaway-Laketon	36,935	1.127	12
72	Getty-Apple	28,309	1.389	9
69	Peck-Laketon	31,671	1.193	10
66	Henry-Laketon	30,355	1.191	11
64	Third-Muskegon	15,903	2.222	2
62	First-Muskegon	22,242	1.538	6
61	Third-Webster	16,200	2.08	3
60	Fourth-Muskegon	*	*	*
58	Creston-Apple	32,465	0.980	15
57	Southbound Seaway-Sherman	38,311	0.810	17
54	Marquette-Muskegon	16,951	1.500	7
52	Quarterline-Marquette	11,749	2.330	1
50	Wood-Laketon	31,511	0.869	16
48	Southbound Seaway-Laketon	33,198	0.792	18
46	McCracken-Sherman	22,723	1.110	14
46	Wood-Apple	17,981	1.402	8
45	Sanford-Laketon	31,456	0.783	19
40	Sherman-Lincoln	13,767	1.592	5

Table 5.4 **Ranked Intersection Accidents**

* AADT data not available for Fourth Street.



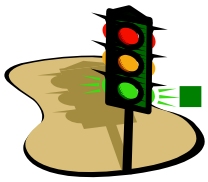
The results of ranking the intensity of accidents indicates a high rate of accidents at the Quarterline-Marquette intersection and at the First, Third, and Fourth street intersections with Muskegon and Webster streets. As might be expected, the busy east-west streets (Sherman, Laketon, and Apple) and their intersections with the north-south streets (Seaway, Getty, and Henry) provided 38 percent of the accidents reported in Table 5.4. A large number of accidents is indicative of, among other factors, congested roadways.

Shoreline Drive

The City of Muskegon has initiated the Shoreline Drive street project in Downtown Muskegon. This project involves taking a part of Terrace Street along the lakeshore and creating a new extension which would efficiently connect with Seaway Drive north and south of the Downtown. This project is designed to open up the Downtown waterfront area for more development opportunity through improved access. This project also improves access routes through the Downtown in general. The Shoreline Drive project due to its efficient connection with Seaway provides a continuous access route along the Muskegon Lake shoreline from the west end of the City all the way to U.S. 31. This project also offers access options to Seaway Drive traffic entering Downtown from the south. With the completion of Shoreline Drive such traffic wishing to pass through Downtown will have the option to use Muskegon Street which is a one-way street passing through the heart of Downtown, or pick up Shoreline Drive which will provide an alternative route through Downtown along the lakeshore.

The Shoreline Drive project while presenting opportunities for enhanced development of the Downtown waterfront, also may present challenges if it becomes the preferred "through" route for Downtown. Part of the strategy for revitalizing and redeveloping Muskegon's Downtown involves creating a synergy between existing Downtown anchors such as the mall and new development or redevelopment along the waterfront. This synergy or "cross traffic" is expected in large part to be of a pedestrian nature. If Shoreline Drive is to have high traffic volumes it may frustrate easy and safe access between uses on both sides of the street. If high volumes do occur on new Shoreline Drive, design alternatives for creating safe pedestrian crossings may become more complex and result in higher costs.

The City through physical design, one or two-way designation, and traffic control devices has the opportunity to influence which street becomes the preferred route through Downtown. Until the Shoreline Drive project was initiated the one-way pair of Muskegon and Webster Streets has served as the primary through route. Due to years of operation as the primary route and as a one-way system many design and business locations decisions have been made. Design issues may involve driveway design and on-site circulation. Business location decisions may have been made based on past and current traffic volumes. Any decision relating to changes in the one-way system or changes to traffic control devices to create a preferred route should take into account the impact to current businesses as well as planned future uses.

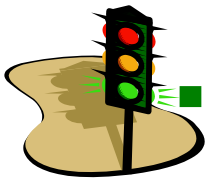


As a part of design of the second and final phase of Shoreline Drive, a traffic impact analysis was prepared by the traffic consulting firm of Ed Swanson & Associates to determine Shoreline's impact on Muskegon and Webster streets. Currently, these two one-way streets carry between 13,900 to 13,600 vehicles per day. The Swanson impact study attached as Figure 4.1 indicates that Webster would carry 8,650 AADT and Muskegon would carry 8,250 AADT. This volume of traffic was then projected to the year 2020 and it is seen that these volumes are handled by a two or three lane roadway configuration.

We recommend that the status of Muskegon and Webster Streets not be changed until one to two years after the opening of Shoreline Drive. This time frame would allow for a reasonable period to assess the change in travel patterns produced by Shoreline Drive, and we recommend that Shoreline Drive be designated the business route at the earliest opportunity. If a two lane cross section is used later on Muskegon and Wester Streets, the unused width (20-22 feet) can be used for either parking, greenspace, or enhanced pedestrian travel, depending on neighborhood priorities. From a safety standpoint it would be better to not have on-street parking, although such parking might result in reduced speeds. Whatever safety benefit is derived from the lower speeds would be outweighed by the lack of clear vision for drivers to see other vehicles and especially pedestrians. It is anticipated that short turning lanes could be provided at intersections as appropriate.

Although the Shoreline Drive Project presents some new challenges and decisions regarding the routing of traffic, it will along with other activities as recommended in the "Downtown/Lakeshore Redevelopment Plan" increase opportunity for opening up the Downtown waterfront for new development and redevelopment efforts. As proposed in the Downtown/Lakeshore Redevelopment Plan there are proposed five new project focus areas including: Public Recreation District; Maritime Market Place; Marina/Restaurant/Office District; Lakeshore PUD; and Enterprise Center. Each of these districts are proposed for intensive uses in the areas of recreation (public and private), commercial business, residential development, and industry. Details on the uses being proposed are included in the Downtown Plan, however, it is important to note in this plan the significance of the Shoreline Drive project in increasing the likelihood that these proposed projects will become a reality. The Shoreline Drive project adds the asset of "easy accessibility" to the already existing assets of Muskegon Lake frontage and adjacent activity centers such as the Muskegon Mall, Holiday Inn, Frauenthal Theater, and Walker Arena.

The Shoreline Drive project can be considered successful to the degree that it will improve traffic accessibility to the point at which Downtown waterfront property is perceived to be marketable for the uses proposed. If the City chooses to make improvements to promote Shoreline Drive as the primary "through" route (i.e. minimizing traffic signals, and maximizing the progression of traffic), that would not be objectionable as long as safe and easy pedestrian crossings can be designed into the project.



We recommend that for a period of one year the City open Shoreline Drive with the signals and timing set to establish a somewhat equal traffic distribution between the one-way pair and Shoreline. This will provide a period of time in which the City can assess both the positive and negative impacts to business and traffic along both routes. Then following such an assessment, the decision can be made to undertake further improvements to promote the routes based on an existing database.

Shoreline Drive and Pedestrian Access.

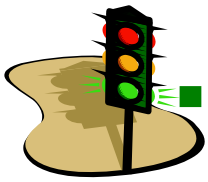
The planned realignment of Terrace at Shoreline, as discussed in the Downtown Plan, may be the best opportunity for developing a good visual and functional connection for pedestrians between the Downtown and the waterfront. The design of this realignment should include strong pedestrian connections consistent with a pedestrian activity pathway. A strong connection would include a wide walk, preferably 10-12 feet, and located so heavy pedestrian usage does not significantly interfere with the operation of the Downtown vehicular loop or unnecessarily with Shoreline Drive.

If the Shoreline pedestrian/bicycle crossing at Third and Terrace are not constructed/reconstructed to be more user friendly, isolation may be a problem. This may especially be a concern if MDOT takes over Shoreline as the business route after fixing Muskegon/Webster and turning them back over to the City. MDOT will likely be much more concerned with a smooth vehicular operation than accommodating pedestrian needs. Overhead crossings may be a solution but would still result in somewhat of an isolated environment, and reduce synergy between uses as discussed above. MDOT has worked with other communities to accomplish access to Downtown destinations and we believe that the loop system will unify the Downtown, not only to vehicular traffic but to pedestrians as well.

Public Transit

Public transit within the Muskegon Metropolitan Area is provided primarily by Muskegon Area Transits System (MATS), which has been operated by Muskegon County since 1974. MATS provides regular fixed route service on six routes, six days a week and on three trolley routes operating only in the summer. MATS also operates a demand-responsive "Go Bus" service for seniors and handicapped persons. The fixed route service operates Monday through Friday between 7:00 a.m. and 6:00 p.m. and on Saturday between 10:00 a.m. and 6:00 p.m. Four of the six routes operate on a 30 minute headway and the remaining two have one hour headways. All routes have a one hour headway on Saturday. There are two buses on each of the routes having a 30 minute headway and one bus on each of the routes having a one hour headway. All routes but one meet Downtown for transfers. It is believed that MATS is currently meeting public transit needs and has the ability to respond to increased or changes in demand.

The City of Muskegon provides demand-responsive "Senior Taxi" service to City residents who are 65 years old or older. The service operates Monday through Saturday from 8:00 a.m. to 4:00 p.m.



RECOMMENDATIONS

Specifics

- Designate Laketon as the principal east and west route. Construct to five lanes wide with right turn lanes, install state-of-the-art signals, timed to route traffic on Laketon, and implement access controls. Preserve the ability to utilize the abandoned railroad right-of-way to expand Laketon to a six lane road with boulevard. Establish setbacks for new construction to anticipate a six lane road - see proposed recommended cross-section (see Figure 7.2)

- Extend Henry north of Laketon as a commercial corridor and as a direct connection to Downtown, through Western.

- Designate Muskegon and Webster as three lanes wide Downtown and two lanes wide with left turn lanes in the historic district, south of Downtown. Streetscape the historic district in a turn of the century mode.

- Implement access control on Apple, Henry, Getty, and Sherman.

- Encourage access to the Downtown through the north and south connections with Seaway at U.S. 31 and I-96.

- Encourage Shoreline as the principal route to Downtown with strong access controls, collector routes, timed signals, and year round landscape.

- Study with MDOT the feasibility of an additional ramp at Marquette to serve the growing area around Muskegon Community College.

- Implement the Downtown loop to provide for a unifying effect for the Downtown area - widen Houston to three lanes.

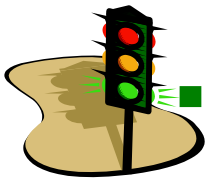
Access Management

Definition and Importance of Access Management

Access management is defined as "a process that provides or manages access to land development (driveways and street intersections) while simultaneously preserving the flow of the traffic on the surrounding road system in terms of safety, capacity and speed." Achieving this goal requires a careful balancing act in the application of access design standards and regulations.

Access management is most important along collector streets, major streets, and highway/freeway systems. In particular it is important for commercial areas found along these types of streets. Too many driveways can confuse drivers, who become uncertain as to when turns into or out of driveways will be made. Too many driveways result in a large number of turning movements and conflict points, increasing the potential for traffic accidents. In addition when there are no turn lanes, each turning vehicle slows traffic and reduces the carrying capacity of the road.

The principal design techniques used in access management focus on the control



and regulation of the spacing and design of: driveways and streets; medians and median openings; traffic signals; and freeway interchanges.

Benefits of Access Management.

The benefits of a good access management program include:

- Reduce Crashes and Crash Potential
- Preserve Roadway Capacity and the Useful Life of Roads
- Decrease Travel Time and Congestion
- Improve Access to Properties
- Coordinate Land Use and Transportation Decisions
- Improve Air Quality
- Maintain Travel Efficiency
- Increased Economic Development Potential

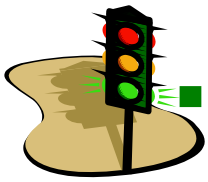
Basic Principles of Access Management.

Six basic principles are used to achieve the benefits of access management. They include:

- Limit the number of conflict points
- Separate conflict points
- Separate turning volumes from through movements
- Locate traffic signals to facilitate traffic movement
- Maintain a hierarchy of roadways by function
- Limit direct access on higher speed roads

A discussion of each of these principles is given below:

- Limit the number of conflict points: When the number of potential conflict points between turning vehicles increases, so do the opportunities for traffic crashes. Intersections typically have the most points of potential conflict. This is certainly confirmed by the accident data contained earlier in this section.
- Good access management can reduce conflict points. Medians eliminate many conflict points by limiting opportunities for left turns. Directional median openings can also safely provide for controlled access with few conflict points. When medians are used, nearly every driveway becomes right-in and right-out only with just two conflict points.
- Separate Conflict Points: Traffic conflicts can also be reduced by separating conflict points. Effective ways include establishing minimum distances between intersections, intersections and driveways, and between driveways. These minimum distances give motorists longer reaction time and improve safety.



- Street intersections should be spaced a minimum of 300 feet apart, closest right-of-way line to closest right-of-way line.

- Restricted access driveways (right-in, right-out) should be maintained a minimum of 100 feet from any street intersection (closest right-of-way line to centerline of driveway).

Posted Speed	Distance Between Driveways
25 mph	145 feet
30 mph	185 feet
35 mph	245 feet
40 mph	300 feet
45 mph	350 feet

Table 5.5 **Speed and Recommended Driveway Distances**

- Full movement driveways should be maintained a minimum of 125 feet from a local or collector street intersection, and 250 feet if adjacent to a major street intersection (closest right-of-way line to centerline of driveway).

- Distance between driveways (measured centerline to centerline) should be based on the posted speed for the street involved. The following distances are recommended:

- Driveways which are on opposite sides of the street should be directly aligned when feasible, and offset a minimum of 150 feet when not possible.

- The above standards should be considered general guidelines. Slight increases or decreases to these standards may be found to be acceptable or even desirable when weighing safety considerations against site constraints. We do not recommend incorporating these standards into a regulatory document without a final review and recommendation by a traffic engineer.

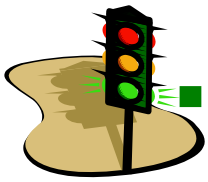
- Other separation strategies include use of a frontage road whereby one access point can serve several businesses, and use of joint access driveways whereby two businesses use the same driveway.

Separate Turning Volumes From Through Movements

Vehicles typically slow before turning. When turning vehicles are removed from the main flow of traffic, traffic speed is better maintained. In addition to maintaining speed, roadway capacity is preserved and accident potential is reduced. The differences in speed between through vehicles and turning vehicles is also reduced, which also creates safer driving conditions. Separate right and left turn lanes, carefully spaced median openings, and frontage roads are access management design tools that serve this purpose.

Locate Traffic Signals To Facilitate Traffic Movement

When a major street has poorly spaced and uncoordinated signals, traffic safety, road capacity and traffic speed can be severely hampered. Distances of one-half mile or more between signals are desirable. Good access management includes evaluating signal spacing and developing a program to maintain or change spacing or signal



progression to achieve safety, travel speed and capacity objectives.

Establish a Street Classifications System

It is important for a City to establish a street classification system which establishes a function for each street. For the City of Muskegon we have assigned each of the City's streets into the categories of local, collector, and major streets. Each of these classifications has a function as described above. Access management standards consistent with street function protects investments in existing streets, businesses, and residential areas. More access control measures are needed as one moves up through the classification system from local street to major street.

For Muskegon, access controls are most important for major streets, and particularly for commercial areas along major streets. Focus areas for access management in Muskegon include:

- Sherman Boulevard (Black Creek to Getty)
- Sherman Boulevard (Seaway Drive to McCracken)
- Laketon Avenue (U.S. 31 to Getty)
- Laketon Avenue (Seaway Drive to Barclay)
- Apple Avenue (East City limit to Getty)
- Getty Street (South City limit to Apple Avenue)
- Peck (South City limit to Downtown)
- Seaway Drive (in its entirety)
- Henry (South City limit to Laketon)

While the access control along the above street segments will be the most effective, appropriate access controls should be put into effect for all City streets.

Limit Direct Access on Higher Speed Streets

The greatest benefit of access management is preserving the functional integrity of high speed, high capacity streets. This benefit is achieved by limiting direct access to these streets. By permitting access only at signalized intersections or other public streets along the street (rather than at each abutting property) the public investment in the street is best preserved. Fewer street widenings will be needed in the future, traffic speeds will be maintained, and crashes will be reduced.