
Section 2 EXISTING (2006) CONDITIONS

This section provides a description of the existing transportation system in the study area and a comprehensive analysis of existing traffic operations and crash history. The study area includes 4 Mile Road from Fruit Ridge Avenue to M-37 in Kent County.

2.1 Study Area

The study area includes the following primary facilities:

4 Mile Road is an east-west undivided county primary road in Kent County. The road parallels I-96 in the northwest Grand Rapids metropolitan area for several miles, extending from Ottawa County (as Hayes Street) and terminating at West River Drive in Alpine Township in Kent County. The road is a two-lane undivided road west of Cordes Avenue and a five-lane undivided road east of Cordes Avenue to M-37. 4 Mile Road provides the border between Alpine Township to the north and the City of Walker to the south. The speed limit of 4 Mile Road varies with a 55 mph limit west of Peach Ridge Avenue and from approximately Baumhoff Avenue to Cordes Avenue. The speed limit is 45 mph elsewhere within the study area. The Average Daily Traffic (ADT) of 4 Mile Road varies with volumes as high as 15,000 vehicles per day near M-37 and as low as 5,500 vehicles per day near Fruit Ridge Avenue.

Fruit Ridge Avenue is a north-south undivided county primary road and is the westerly limit of the study area. Fruit Ridge Avenue is a four-lane road south of 4 Mile Road and a two-lane road north of 4 Mile Road. Fruit Ridge Avenue begins at 3 Mile Road in the city of Walker and extends northward for 18 miles into northern Tyrone Township in northwest Kent County. Fruit Ridge Avenue interchanges with I-96 just north of 3 Mile Road, approximately 4,000 feet south of 4 Mile Road. The speed limit of Fruit Ridge Avenue is 45 mph south of 4 Mile Road and 55 mph north of 4 Mile Road. The ADT of Fruit Ridge Avenue is approximately 14,000 vehicles per day south of 4 Mile Road and approximately 8,000 vehicles per day north of 4 Mile Road. The intersection of 4 Mile Road and Fruit Ridge Avenue is under traffic signal control.

Hendershot Avenue is a north-south undivided local county road, running from 4 Mile Road to 6 Mile Road in Alpine Township. Two driveways along Hendershot Avenue just north of 4 Mile Road provide the primary access to Kenowa Hills High School. The road is a 3-lane cross-section north of 4 Mile Road, reducing to a two-lane road north of the middle school. The speed limit of Hendershot Avenue is 30 mph. The ADT of Hendershot Avenue is approximately 2,500 vehicles per day. The Hendershot Avenue approach to 4 Mile Road is under STOP-sign control.

Peach Ridge Avenue is a north-south two-lane undivided local road, running from 3 Mile Road in the city of Walker to 6 Mile Road in Alpine Township. Peach Ridge Avenue passes over I-96 between 3 Mile Road and 4 Mile Road. The speed limit of Peach Ridge Avenue is 55 mph with an ADT of approximately 1,000 vehicles per day north of 4 Mile Road. The Peach Ridge Avenue approaches to 4 Mile Road are under STOP-sign control.

Walker Avenue is a north-south two-lane undivided local road in the study area. Walker Avenue runs from 7th Street just east of Alpine Avenue in the city of Grand Rapids to 6 Mile Road in Alpine Township. The road is under the jurisdiction of the city of Walker from approximately one mile south of Waldorf Street to 4 Mile Road. The speed limit of Walker Avenue is 35 mph south of 4 Mile Road and 55 mph north of 4 Mile Road. Walker Avenue interchanges with I-96 approximately one-half mile south of 4 Mile Road. The ADT of Walker Avenue is approximately 11,000 vehicles per day south of 4 Mile Road and approximately 4,000 vehicles per day north of 4 Mile Road. The intersection of 4 Mile Road and Walker Avenue is under 4-way STOP sign control.

Baumhoff Avenue is a north-south two-lane undivided local county road, running from 4 Mile Road to M-37 in Sparta Township. The speed limit of Baumhoff Avenue is 55 mph. The ADT of Baumhoff Avenue is approximately 1,250 vehicles per day. The Baumhoff Avenue approach to 4 Mile Road is under STOP-sign control.

Bristol Avenue is a north-south two-lane undivided local road, running from just north of Leonard Street in the city of Grand Rapids to 8 Mile Road in Alpine Township. Bristol Avenue passes beneath I-96 and is under the jurisdiction of Walker Avenue from approximately one mile south of Waldorf Street to 4 Mile Road. The speed limit of Bristol Avenue is 35 mph south of 4 Mile Road and 55 mph north of 4 Mile Road. The ADT of Bristol Avenue is approximately 5,000 vehicles per day south of 4 Mile Road and approximately 1,000 vehicles per day north of 4 Mile Road. The Bristol Avenue approaches to 4 Mile Road are slightly offset, with each Bristol Avenue approach operating under STOP-sign control.

Cordes Avenue is a north-south two-lane undivided local county road, running from 4 Mile Road to Alpine Church Road in Alpine Township. The speed limit of Cordes Avenue is 55 mph north of 4 Mile Road. The ADT of Cordes Avenue is approximately 1,000 vehicles per day north of 4 Mile Road. The Cordes Avenue approach to 4 Mile Road is under STOP-sign control.

Alpine Avenue (M-37) is a north-south five-lane undivided state trunkline route and is the easterly limit of the study area. The trunkline designation of Alpine Avenue (as M-37) begins at 3 Mile Road in the city of Walker and runs to Traverse City. M-37 interchanges with I-96 just north of 3 Mile Road. The speed limit of M-37 is 45 mph south of 4 Mile Road and 50 mph north of 4 Mile Road. The ADT of M-37 is approximately 50,000 vehicles per day south of 4 Mile Road and approximately 45,000 vehicles per day north of 4 Mile Road. The intersection of 4 Mile Road and M-37 is under traffic signal control.

Northridge Drive is an east-west two-lane city street in the city of Walker, running from a point west of Peach Ridge Avenue to Walker Avenue and providing access to numerous commercial and industrial properties.

The existing laneage configurations and speed limits for each of the above corridors is depicted in **Figure 2-1** at the end of this section of the report.

2.2 Existing Conditions (2006) Capacity Analysis

Peak-hour traffic counts were collected by URS in February 2006 and verified against daily and peak-hour traffic counts provided by the Grand Valley Metro Council (GVMC). The existing (2006) peak-hour traffic volumes for the study area are depicted in **Figure 2-2**.

The methods of the 2000 Highway Capacity Manual were used to perform a capacity analysis at the various intersections along 4 Mile Road from Fruit Ridge Avenue to M-37 and along Walker Avenue from 4 Mile Road to I-96. The analysis included all signalized and unsignalized intersections within this study area.

Conventional analysis of signalized and unsignalized intersections involves the determination of a "Level of Service" (LOS). Levels of Service range from "A" to "F", similar to an alphabetic grading system, with each level describing a different set of operational characteristics. LOS "A" describes operational performance under light traffic volumes and with minimal delay at intersections. LOS "F" describes a high degree of congestion with extensive delays and long vehicular queues. LOS "C" or "D" is considered acceptable peak-hour traffic operations for intersections in suburban communities according to the American Association of State Highway and Transportation Officials (AASHTO).

The Level of Service criteria defined by the HCM is described in **Table 2-1** on the next page for signalized intersections and unsignalized intersections. As shown in Table 2-1, control delay is the performance measure used to define the limits of each Level-of-Service at signalized and unsignalized intersections. Control delay includes all delay caused by traffic control (signal or STOP-sign), including deceleration delay, time spent waiting at the traffic signal or STOP sign, and acceleration delay.

TABLE 2-1
PEAK-HOUR LEVEL-OF-SERVICE RANGES
HIGHWAY CAPACITY MANUAL (2000)

Level of Service	Signalized Intersections	Unsignalized Intersections
	Control Delay (sec/veh)	Control Delay (sec/veh)
A	≤10	≤10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	>80	>50

Source: 2000 Highway Capacity Manual

The existing (2006) peak-hour Levels of Service for the signalized intersections within the project limits are depicted in **Table 2-2**. As shown in Table 2-2, each of the signalized intersections operates at an acceptable Level of Service (i.e. LOS "D" or better) during existing (2006) peak hours.

TABLE 2-2
EXISTING (2006) PEAK-HOUR LEVELS OF SERVICE
SIGNALIZED INTERSECTIONS

Signalized Intersection	AM-Peak Hour		PM-Peak Hour	
	Level of Service	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)
4 Mile Road / Fruit Ridge Avenue	B	14.7	A	9.8
4 Mile Road / M-37	D	41.1	D	49.2
I-96 WB Ramp / Walker Avenue*	B	12.3	A	8.5

* - assumes completion of I-96 reconstruction project in 2006.

Source: URS Corporation, November 2006

Movement-by-movement Levels of Service are shown in Figure 2-2 for each signalized and unsignalized intersection in the study area. As depicted in Figure 2-2 and **Table 2-3** below, seven lane groups operate at Level of Service "E" or "F". Capacity analysis worksheets for all existing (2006) intersection analyses are included in **Appendix A** of this report.

TABLE 2-3
EXISTING (2006) PEAK HOUR MOVEMENTS AT LEVEL OF SERVICE "E" OR "F"
SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

Intersection	Movement	Peak	Volume	Level of Service	95% Queue Length (feet)	Traffic Control
4 Mile Road / M-37	SB Thru	AM	1,465	E	608	Signal
	NB Thru	PM	1,850	E	913	
	NB-to-WB Left	PM	140	E	221	
4 Mile Road / Walker Avenue	NB-to-WB Left	PM	230	F	*	4-Way STOP
	NB Thru/Right	PM	475	F	*	
EB I-96 Off-ramp / Walker Avenue	EB-to-NB Left	AM	35	E	101	2-Way STOP
	EB-to-SB Right	AM	160	E	101	

* - HCS analysis does not provide queue length

Source: URS Corporation, November 2006

The queues in Table 2-3 were not provided for the 4 Mile Road/Walker Avenue intersection, however, field observations indicate queues of several vehicles on the northbound approach during existing afternoon peak hours.

2.3 Traffic Crash Analysis

Traffic crash data along 4 Mile Road was supplied by the Kent County Road Commission for the most recent three-year period (January 1, 2002 to December 31, 2004). The number of crashes and rate of crashes was determined for each intersection along 4 Mile Road from Fruit Ridge Avenue to M-37. The results are depicted in **Table 2-4**.

TABLE 2-4
CRASH ANALYSIS SUMMARY (2002-2004)

Intersection	Traffic Control	Number of Crashes					Total Entering ADT*	Actual Crash Rate**	Average Crash Rate***
		2002	2003	2004	Total	Crashes per year			
Fruit Ridge Avenue	Signal	11	7	8	26	8.7	16,300	1.46	1.70
Hendershot Avenue	2-way STOP	3	4	0	7	2.3	8,000	0.80	2.15
Peach Ridge Ave	2-way STOP	1	1	2	4	1.3	7,100	0.52	2.15
Walker Avenue	4-way STOP	7	4	7	18	6.0	14,900	1.11	0.68
Baumhoff Avenue	2-way STOP	1	2	0	3	1.0	7,600	0.36	2.15
Bristol Ave (North)	2-way STOP	3	3	7	13	4.3	7,500	1.59	2.15
Bristol Ave (South)	2-way STOP	3	2	8	13	4.3	10,100	1.18	0.68
Cordes Avenue	2-way STOP	3	2	3	8	2.7	11,700	0.62	0.68
M-37	Signal	53	58	65	176	58.7	46,800	3.43	1.14
TOTAL		85	83	100					

* - Entering ADT calculated as 10 times the afternoon peak-hour entering volume

Source: Kent County Road Commission

** - Actual number of crashes per MEV (million-entering vehicles)

*** - Average rate of crashes for similar intersections (crashes per MEV)

Note: Shade and bolded values indicate higher-than-average crash rates as compared to crash studies conducted by SEMCOG.

As depicted in Table 2-4, three intersections have crash rates greater than the average crash rate for intersections with similar volumes. It should be noted that only limited data exists regarding the rate of crashes at intersections. The average crash rate data was supplied by the Southeast Michigan Council of Governments (SEMCOG), which is the Metropolitan Planning Organization (MPO) for the metropolitan Detroit area.

A more detailed breakdown of crashes was completed for the three intersections depicted in Table 2-4 that had a crash rate greater than the SEMCOG average. A breakdown by crash type is depicted in **Table 2-5** on the next page in order to determine if there is any pattern of crashes which may be contributing to crash experience.

As shown in Table 2-5, the Walker Avenue intersection experienced a total of 18 crashes in the three-year period from 2002-2004. A total of ten (10) of the crashes were rear-end crashes. Considering that the intersection is under 4-way STOP control, the rear-end crash experience may be a result of congestion at the intersection as motorists fail to stop in time at an unexpected queue. Rear-end crash experience may also be due to the intersection skew as the northbound and southbound legs are not at 90-degree angles with 4 Mile Road. Realignment of the intersection and construction of dedicated left-turn bays would assist in reducing crash experience at Walker Avenue.

The south leg of Bristol Avenue is offset from the north leg of Bristol Avenue by approximately 100 feet. The south leg carries a higher volume of traffic than the north leg (245 vehicles approaching 4 Mile Road during the afternoon

peak hour compared to 40 vehicles for the north leg). Table 2-5 does not reveal a pattern of crashes at the south leg of Bristol Avenue, but the intersection skew may be a contributing factor to crash experience.

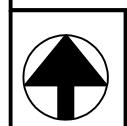
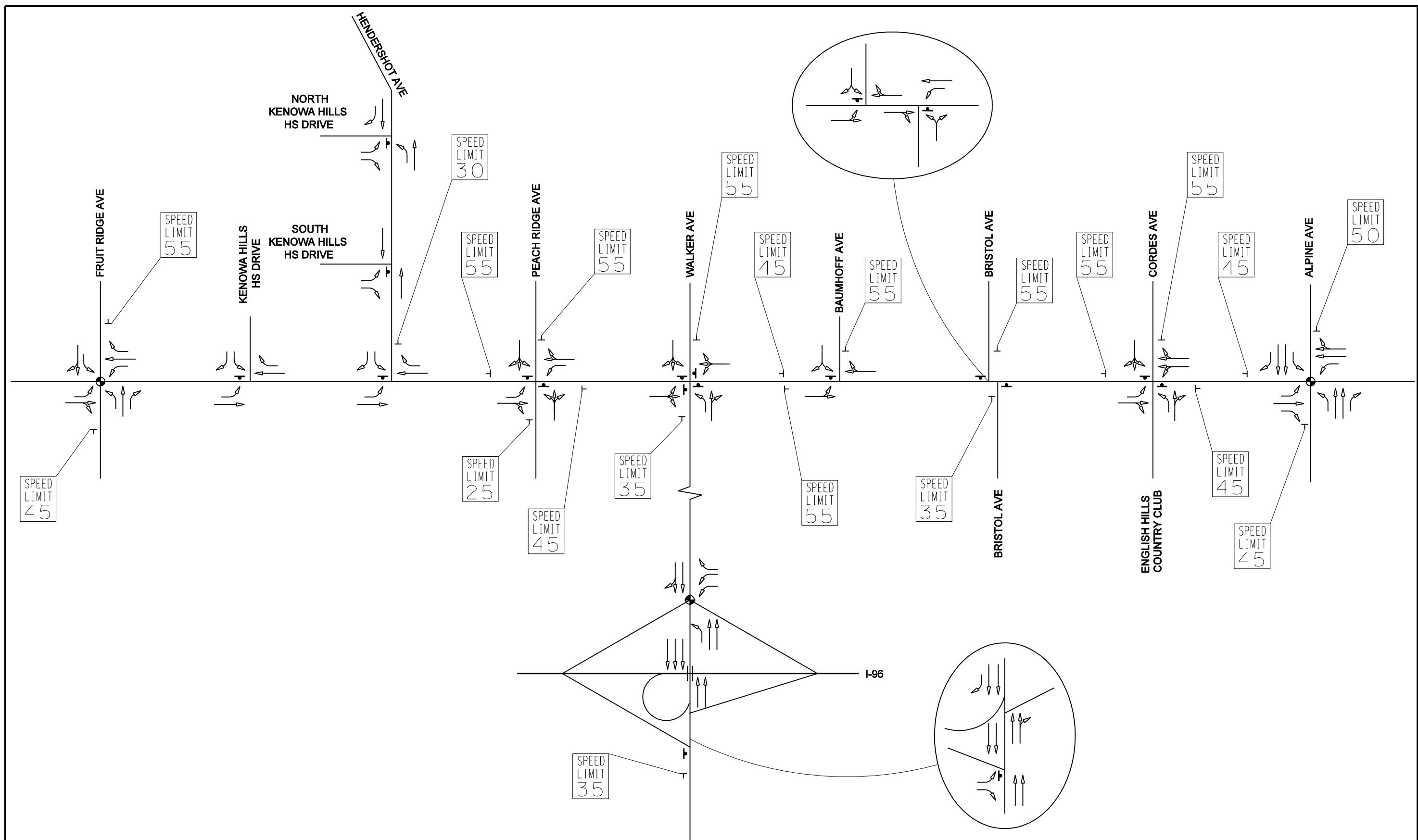
TABLE 2-5
CRASH TYPE SUMMARY (2002-2004)
INTERSECTIONS WITH HIGHER-THAN-AVERAGE CRASH RATES

Intersection	Traffic Control	Crash Type						Total Crashes	Total Injuries
		Rear-End	Angle	Head-On LT	Side Swipe	Fixed Object	Other		
Walker Avenue	4-way STOP	10	4	0	0	1	3	18	5
Bristol Ave (South)	2-way STOP	3	3	0	1	3	3	13	4
M-37	Signal	78	41	19	17	6	15	176	41

Note: No fatalities occurred at the above intersections for the three-year study period.

Source: Kent County Road Commission

The M-37 intersection is by far the most congested intersection along the 4 Mile Road corridor, serving almost 50,000 vehicles per day. The intersection is controlled by a traffic signal, which contributes to the rear-end crash experience (approximately 44% of all crashes at M-37). Of greater concern is the 41 angle crashes and 19 head-on left-turn crashes at M-37, which account for a combined 32 % of all crashes. Angle and head-on left-turn crashes are inherently more dangerous. Angle and head-on left-turn crashes increase as an intersection becomes more and more congested and are the primary reason why the M-37 intersection experiences a higher-than-average rate of crashes. Increasing the all-red clearance times for the various phase splits would reduce efficiency but increase safety at M-37.



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- TRAFFIC SIGNAL
■ - STOP SIGN

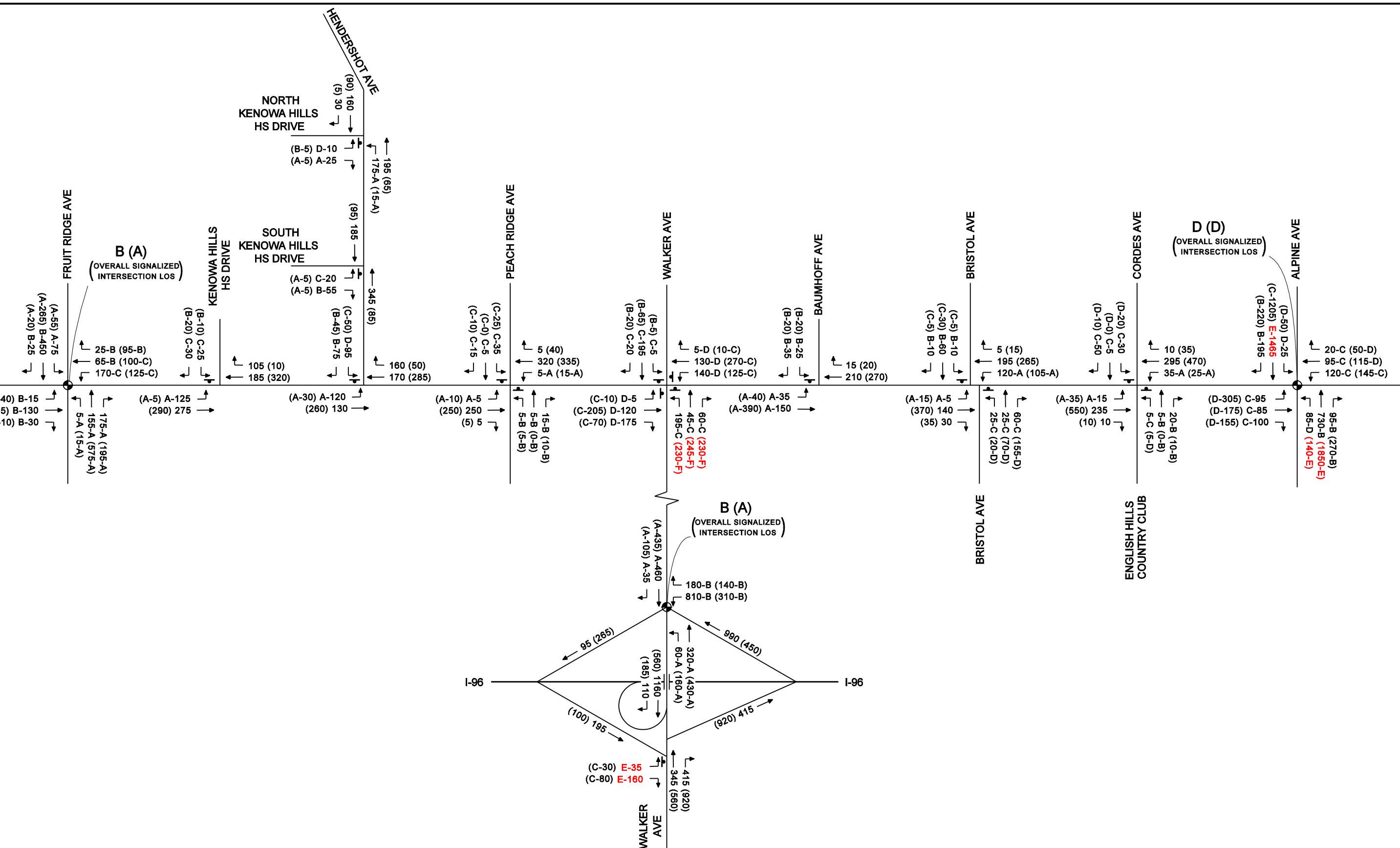
→ - LANE CONFIGURATION



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4 MILE ROAD CORRIDOR STUDY
EXISTING TRAFFIC OPERATIONS

**FIGURE
2-1**



LEGEND

 - TRAFFIC SIGNAL	XXX - AM TRAFFIC VOLUME	 - AM LEVEL OF SERVICE
 - STOP SIGN	(XXX) - PM TRAFFIC VOLUME	 - PM LEVEL OF SERVICE
 - LANE MOVEMENT		

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4 MILE ROAD CORRIDOR STUDY

**EXISTING (2006) PEAK-HOUR
VOLUMES AND LEVELS OF SERVICE**

4 MILE ROAD CORRIDOR STUDY

EXISTING (2006) PEAK-HOUR VOLUMES AND LEVELS OF SERVICE

FIGURE 2-2