Draft Wauwatosa School Safety Study

- **Eisenhower Elementary**
- **West High School**
- **Whitman Middle School**
- **Madison Elementary School**

Prepared for:

City of Wauwatosa and Wauwatosa School District

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1. Executive Summary

The purpose of this report is to identify short-term and long-term recommendations to improve school traffic and pedestrian safety at Eisenhower Elementary, West High School, Whitman Middle School and Madison Elementary. Eisenhower Elementary, West High School and Whitman Middle School are all located on Center Street in Wauwatosa between 117th Street and the Union Pacific Railroad tracks. Madison Elementary School is located on the southeast corner at the intersection of 100th Street and Glendale Avenue.

This report contains study background information, traffic crash data, traffic operating conditions and traffic observations that have been summarized for each of the four schools. Based on the analysis, a set of recommendations were prepared to improve traffic operating conditions and pedestrian safety. A set of short-term low cost recommendations have been identified, which include updated signing, pavement markings, corner concrete pedestrian pads and parking restrictions. Long-term recommendations have also been identified, which include construction of new sidewalks, student drop-off/pick-up areas, median pedestrian refuge islands and driveway re-alignment.

According to the Safe Routes to School Program, in order for a school safety study to be beneficial the following three components need to be incorporated into the plan or set of recommendations:

1. Engineering
2. Enforcement
3. Education

Engineering is a broad concept that is used to describe the design, implementation, operation and maintenance of traffic control devices or physical measures, including low-cost as well as high-cost capital measures.

Enforcement strategies are to deter unsafe behaviors of drivers, pedestrians and bicyclists and to encourage all road users to obey traffic laws and share the road safely.

Education on traffic and pedestrian safety should include a wide range of audiences which include children, parents, drivers and neighbors. Educating all audiences about pedestrian, bicyclist and traffic safety and creating awareness will create a safer environment for all users.

This report is focused on the engineering aspect of school traffic and pedestrian safety.

2. Existing Conditions

This section of the school safety report includes background information for each of the four schools included in this study, existing site information, traffic crash analysis, traffic volumes, traffic operating conditions and traffic/pedestrian observations at each school.

2.1 School Information

Eisenhower Elementary, Whitman Middle School and West High School:

Elsenhower Elementary, West High School and Whitman Middle School are all located on Center Street between 117th Street and the Union Pacific Railroad bridge. Eisenhower Elementary is located between 117th Street and 115th Street, West High School is located between 115th Street and 113th Street and Whitman Middle School is located between 112th Street and the Union Pacific Railroad tracks. An aerial photo of the school locations is shown in Figure 1.

Figure 1: Elsenhower Elementary, West High School and Whitman Middle School Aerial

A parking lot is located between Eisenhower Elementary and West High School. The parking lot is used for both parking and student drop-off and pick-up. School buses also line up in the drop-off/pick-up lane located on the east side of Elsenhower Elementary. Students, faculty and staff are allowed to use the parking lot. Students must purchase a parking permit for $20.00/school year ($10.00/semester) to park in the lot with first priority given to seniors, then juniors and then sophomores. There are approximately 340 parking spaces in the lot which is typically full on school days. The parking lot is set up so that the outer-loop operates as a one-way system entering from the east driveway and looping around past the high school, elementary school and to the west driveway exit, the parking aisles operate with two-way traffic flow. Student drop-off and pick-up areas are located in the outer lane of the outer-loop along the high school and elementary school entrance sidewalks. The eastern driveway operates with two-way traffic flow. The west driveway is an exit only (right-out or left-out) and is off-set about 50-feet east of the 116th Street intersection. The high school has a small parking lot located on the east side of the school which is primarily used for visitors and maintenance staff. Both Eisenhower Elementary and West High School have sidewalk connections to a sidewalk on the north side of Center Street.

Eisenhower Elementary school parents have been provided the following procedural expectations from the Wauwatosa School District when dropping off or picking up their children:

1. Do not stop to pick-up or drop-off children in the two moving traffic lanes directly in front of the school building on Center Street.
2. Do not park in the moving traffic lanes, designated crosswalks or at the end of the parking rows in the parking lot.
3. Use the crosswalks when crossing the parking lot to enter and exit the building.
4. Parents who need to enter the building or meet their child should park in the parking lot.
5. Cars are not to be left unattended at the curb along Center Street, this area is designated for drop-off and pick-up only.

Whitman Middle school has one parking lot which is located adjacent to the west side of the school. There are about 170 parking stalls in the lot. There are two driveways, the east driveway operates as two-way and the west driveway is a right-turn only exit. The parking lot is dedicated for faculty and staff use but some parents have also been observed using the parking lot as a student drop-off and pick-up area. The school parking lot is located at an elevation significantly lower than that of Center Street which creates steep grades on each driveway. School entrances have sidewalk connections to the sidewalk on the north side of Center Street.

Whitman Middle School also has a designated school drop-off and pick-up bay on Center Street for westbound vehicles. The drop-off/pick-up bay is about 350-feet long and is located between the main school entrance and the Union Pacific Railroad tracks.

Existing 2011 – 2012 and proposed 2012-2013 school start/dismissal times and school enrollments are listed below in Table 1 and Table 2:

Table 1: Center Street Schools Existing Start/Dismissal Times and Enrollment

Existing Start/Dismissal Times for 2011-2012 School Year				
School	Mon, Tues, Thurs, Fri		Wednesday	Enrollment
	Start	Dismissal	Dismissal	
Eisenhower Elementary	8:03 AM	3:00 PM	2:00 PM	434
Eisenhower - AM Kindergarden	8:03 AM	10:37 AM	10:37 AM	
Eisenhower - PM Kindergarden	12:17 PM	3:00 PM	2:00 PM	
Whitman Middle School	8:05 AM	3:20 AM	2:20 PM	674
West High School	8:00 AM	3:07 PM	2:07 PM	1,018

Table 2: Center Street Schools Proposed Start/Dismissal Times

Proposed Start/Dismissal Times for 2012-2013 School Year			
School	Mon, Tues, Thurs, Fri		Wednesday
	Start	Dismissal	Dismissal
Eisenhower Elementary	8:20 AM	3:20 PM	2:20 PM
Eisenhower - AM Kindergarden	8:20 AM	10:55 AM	10:55 AM
Eisenhower - PM Kindergarden	12:30 PM	3:20 PM	2:20 PM
Whitman Middle School	8:10 AM	3:30 PM	2:30 PM
West High School	8:00 AM	3:10 PM	2:10 PM

Students at Eisenhower Elementary school are not allowed to enter the building until the bell rings, students at Whitman Middle School are allowed to enter the building 5-minutes before the bell rings and students at West High School are allowed to enter building anytime after 6:45 AM.

Milwaukee County Transit as well as private bus companies provides limited transportation service to and from Eisenhower Elementary, West High School and Whitman Middle School. Milwaukee County Transit has 4 bus stops along Center Street which are at the following locations:

1. North side of Center Street near 116th Street
2. North side of Center Street in front of West High School near 114th Street
3. North side of Center Street in front of Whitman Middle School
4. South Side of Center Street across from Whitman Middle School

Eisenhower Elementary has about 6 buses that service the school, 2 full size buses and 3 – 4 small size buses. West High School has about 6 buses as well which include 1 full size bus and 5 small size buses. Bus information for Whitman Middle School was not available.

Madison Elementary School:

Madison Elementary School is also a part of the Wauwatosa School District which is located on the southeast corner of 100th Street and Glendale Avenue on the north side of Wauwatosa. An aerial photo of the school site is shown in Figure 2.

Figure 2: Madison Elementary School Aerial

A small school parking lot is located on the east side of the school off of Glendale Avenue. The parking lot consists of about 30 parking stalls with two driveways that operate as two-way. The parking lot is primarily used for faculty and staff but several parents also use this area as a student drop-off/pick-up area. The Milwaukee County parks system has a parking lot directly to

the east of the school which can be used during school start and dismissal times. On-street parking restrictions located around Madison Elementary are as follows:

- No parking in the bus stop zone on Glendale Avenue in front of the school.
- No parking at all on the east side of 100th Street between Ruby Avenue and Glendale Avenue, these spaces are used for student drop-off and pick-up to avoid blocking traffic on 100th Street
- No parking on the south side of Glendale Avenue, these spaces are used for short-term student drop-off and pick-up to avoid blocking traffic on Glendale Avenue.
- The north side of Glendale Avenue is used for faculty and staff parking.

Parents have been informed that parking citations will be issued by the Wauwatosa Police Department if these restrictions are violated. Parents will also be cited if they are caught making illegal u-turns and double or triple parking while dropping off or picking up their children.

Currently parents are advised to park in the following locations:

1. The Milwaukee County Park parking lot located to the east of Madison Elementary School.
2. West Side of 100th Street
3. North of Glendale Avenue on both the east and west sides of 100th Street
4. Ruby Avenue
5. South of Ruby Avenue on 100th Street

Existing and proposed school start/dismissal times and school enrollment are listed below in Table 3 and 4:

Table 3: Madison Elementary School Existing Start/Dismissal Times and Enrollment

Existing Start/Dismissal Times for 2011-2012 School Year				
School	Mon, Tues, Thurs, Fri		Wednesday	Enrollment
	Start	Dismissal	Dismissal	
Madison Elementary	8:23 AM	3:20 PM	2:20 PM	363
Madison - AM Kindergarden	8:23 AM	10:58 AM	10:58 AM	
Madison - PM Kindergarden	12:33 PM	3:20 PM	2:20 PM	

Table 4: Madison Elementary School Proposed Start/Dismissal Times

Proposed Start/Dismissal Times for 2012-2013 School Year			
School	Mon, Tues, Thurs, Fri		Wednesday
	Start	Dismissal	Dismissal
Madison Elementary	8:20 AM	3:20 PM	2:20 PM
Madison - AM Kindergarden	8:20 AM	10:55 AM	10:55 AM
Madison - PM Kindergarden	12:30 PM	3:20 PM	2:20 PM

Students at Madison Elementary school are not allowed to enter the building until the bell rings and they must enter the school at assigned class room door locations.

Milwaukee County Transit as well as private bus companies provides transportation service to and from Madison Elementary School. Milwaukee County Transit has 2 bus stops along 100th Street which are at the following locations:

1. Intersection of 100th Street and Glendale Avenue on the southeast corner
2. Intersection of 100th Street and Glendale Avenue on the northwest corner

Bus information for Madison Elementary School was not available, but it was observed that about 2-3 small sizes buses are provided for transportation.

Crossing Guard Requirements/Roles

Under preparation – information not available at this time

2.2 Existing School Site Plans

Eisenhower Elementary, Whitman Middle School and West High School:

Eisenhower Elementary and West High School are located on Center Street along the west side of US 45 with Whitman Middle School located on the east side of US 45. The typical street cross-section from 117th Street to about 112th Street is 50-feet wide with sidewalks located on the north side. After 112th Street the roadway starts to taper down to a width of 25-feet because of the Union Pacific Railroad tracks located to the east. Sidewalks are not provided on the south side of Center Street anywhere in the school area, but concrete pedestrian staging pads are provided at the intersection of Center Street and 116th Street and a short segment of sidewalk is provided at the bottom of the steps to 111th Street.

School zone and regulatory signs are posted along Center Street in the vicinity of the elementary, middle and high schools. The existing signs that are currently posted include the following:

- No U-Turn: R3-4
- No Parking: R7-1, R2-2
- End School Zone: S5-2
- School Advance Crossing: S1-1
- School Speed Limit Assembly: S4-3P, R2-1, S4-29
- Stop Sign: R1-1

The Center Street schools existing site plan is attached in **Appendix A**.

Madison Elementary School

Madison Elementary School is located at the intersection of 100th Street and Glendale Avenue in the southeast quadrant. The typical street cross-section on Glendale Avenue from 100th Street to the east is about 36-feet wide with sidewalks provided on the south side of the street. The typical street cross-section on 100th Street is about 40-feet wide with sidewalk located on the east side of the street. Concrete pedestrian staging pads are provided at the intersection of 100th Street and Glendale Avenue on the southwest corner and southeast corner with a sidewalk extension provided on the northeast corner. Crosswalks are provided on the east approach and the south approach at the intersection of 100th Street and Glendale Avenue. Crosswalks are not provided at the intersection of 100th Street and Ruby Avenue.

School zone and regulatory signs are posted along 100th Street and Glendale Avenue in the vicinity of Madison Elementary School. The signs that are currently posted include the following:

- No U-Turn: R3-4
- No Parking: R7-1, R2-2
- End School Zone: S5-2
- School Advance Crossing: S1-1
- School Speed Limit Assembly: S4-3P, R2-1, S4-29
- Stop Sign: R1-1

An overhead stop sign with blinking LED lights is located on both the north and south approaches of 100th Street at its intersection with Glendale Avenue. The sign flashes all day long, every day of the week. Two LED blinker 'School Advance' signs are also located on 100th Street in advance of the school zone (north and south of the school) that flash only during the school day.

The Madison Elementary School existing site plan is attached in **Appendix A**.

2.3 Traffic Crash Summary

Eisenhower Elementary, Whitman Middle School and West High School

A total of 11 traffic crashes were reported along the segment of Center Street between St. Joseph School (west of Eisenhower Elementary) and Whitman Middle School during the 3-year time period from 2009 to 2011. All 11 crashes were 'property damage only', no pedestrian crashes were reported. Five of the 11 crashes occurred in 2009, 5 crashes occurred in 2010 and 1 crash occurred in 2011. Three of the reported crashes occurred at the intersection of 116th Street and Center Street, 2 occurred at the intersection of 115th Street and Center Street and 1 occurred at the intersection of 113th Street and Center. The other 5 crashes occurred along Center Street. Two crashes were reported between Eisenhower Elementary and West High School, 2 were reported between West High School and Whitman Middle School and 1 was reported near Whitman Middle School. Four of the crashes occurred between 7:30 AM and 8:30 AM, 2 occurred between 2:30 PM and 3:30 PM and the rest occurred while school was in session or after school hours. Table 5 shows the crash type and crash severity. Detailed crash data information is attached in **Appendix B**.

Table 5: Center Street Crash Summary Statistics

Year	Crash Type					Crash Severity			
	Left-Turn	Right-Angle	Rear-End	Side-Swipe Same	Fixed	PDO	Injury	Fatal	Total
2009	1	2	0	2	0	5	0	0	5
2010	1	2	0	1	1	5	0	0	5
2011	0	0	1	0	0	1	0	0	1
Total	2	4	1	3	1	11	0	0	11

A crash between a vehicle and a 5-year old girl occurred in June 2011 just before 8:00 AM on Center Street near 116th Street in front of Eisenhower Elementary School, *according to 620 WTMJ News* Radio (http://www.620wtmj.com/news/local/122940363.html). The girl ran in front

of her family into the roadway and was struck by a westbound vehicle reportedly traveling at a slow pace.

Based on the above crash history there does not appear to be a collision pattern at any specific locations that could be ameliorated with safety counter measures. Both the short and long-term recommendations should serve to improve traffic and pedestrian safety along Center Street.

Madison Elementary School

A total of 3 crashes were reported in the vicinity of Madison Elementary School during the 3-year time period from 2009 to 2011. One crash occurred in 2009 at the intersection of 100th Street and Glendale Avenue, one crash occurred in 2010 at the intersection of 100th Street and Ruby Avenue and one crash occurred in 2011 on 100th Street south of Glendale Avenue. Two of the three crashes reported were 'property damage only' crashes and one was reported as hit & run with 'property damage only' and no pedestrian crashes were reported. The reported crashes occurred at 7:48 AM, 2:32 PM and 4:30 PM. Table 6 shows the crash type and crash severity. Detailed crash data information is attached in **Appendix B**.

Table 6: Madison Elementary School Crash Summary Statistics

Year	Crash Type		Crash Severity			
	Right Angle	Side Swipe Same	PDO	Injury	Fatal	Total
2009	0	1	1	0	0	1
2010	1	0	1	0	0	1
2011	0	1	1	0	0	1
Total	1	2	3	0	0	3

2.4 Traffic and Pedestrian Volume

Eisenhower Elementary, Whitman Middle School and West High School

Traffic and pedestrian counts were collected during the week of March 19, 2012 during the morning peak hour from 7:30 AM to 8:30 AM and during the afternoon peak hour from 2:45 PM to 3:45 PM at the following intersections:

- Center Street and 116th Street
- Center Street and Eisenhower Elementary School West Driveway
- Center Street and 115th Street/West High School Driveway
- Center Street and 114th Street
- Center Street and 113th Street
- Center Street and 112th Street/Whitman Middle School West Driveway
- Center Street and Whitman Middle School East Driveway
- 111th Street Cul-de-sac

Traffic and pedestrian counts were not collected on Wednesday afternoons during school early dismissal times. The weather conditions during the count periods were reported to be sunny with temperatures ranging from 50 degrees to 65 degrees with no rain occurring during the counts.

The traffic and pedestrian counts taken at the 111th Street cul-de-sac were used to determine the number of parents that use this location as a drop-off/pick-up area for their children. On

111th Street during the morning peak hour a total of 48 vehicles were counted, 73 pedestrians and 2 bicyclists. During the afternoon peak hour a total of 39 vehicles were counted, 89 pedestrians and 1 bicyclist.

Refer to **Appendix C** for traffic and pedestrian volume data along Center Street in the study area.

Madison Elementary School

Traffic and pedestrian counts were collected during the week of March 26, 2012 on a Tuesday, Wednesday or Thursday during the morning peak hour from 7:45 AM to 8:45 AM and during the afternoon peak hour from 3:00 PM to 4:00 PM at the following intersections:

- 100th Street and Ruby Avenue
- 110th Street and Glendale Avenue
- Glendale Avenue and Madison Elementary School West Driveway
- Glendale Avenue and Madison Elementary School East Driveway

Traffic and pedestrian counts were not collected on Wednesday afternoons during the early dismissal times. The weather conditions during the count periods were reported to be sunny with temperatures ranging from 50 degrees to 65 degrees with no rain occurring during the counts.

Refer to **Appendix D** for traffic and pedestrian volume data at Madison Elementary School.

2.5 Traffic Operating Conditions

Level of Service Description

Existing intersection traffic operational analyses was conducted with Synchro 8.0 using the *2010 Highway Capacity Methodologies* for Center Street from 116th Street to the Whitman Middle School East Driveway based on Level of Service (LOS) and delay.

Level of Service (LOS) and delay are two measures of effectiveness used to analyze intersection operation. This analysis uses the *2010 Highway Capacity Manual* (HCM) for guidance on reporting LOS and delay for the study intersections. The following is a description of the HCM LOS definitions:

Table 7: Level of Service (LOS) Description

Level of Service (LOS)				
ALPHA LOS	NUMERIC LOS	SIGNALIZED DELAY (seconds/vehicle)	UNSIGNALIZED DELAY (seconds/vehicle)	DESCRIPTION
A	1.01 to 2.00	< 10	< 10	No Congestion, Minimal Delay
B	2.01 to 3.00	> 10 to 20	> 10 to 15	No Congestion
C	3.01 to 4.00	> 20 to 35	> 15 to 25	Minimal Congestion
D	4.01 to 5.00	> 35 to 55	> 25 to 35	Moderate Congestion
E	5.01 to 6.00	> 55 to 80	> 35 to 50	Severe Congestion
F	> 6.00	> 80	> 50	Extreme Congestion

LOS is a numeric ranking with a LOS 'A' requiring minimal driver interaction. This allows speed and vehicle path decisions to be unaffected by other roadway users resulting in no congestion and minimal delays. The LOS 'F' requires constant driver interaction. Under LOS 'F' operation vehicle speeds and paths are totally dictated by interaction with other drivers resulting in high congestion levels and delays.

It is noted that LOS is quantified for traffic operation over a 1-hour time period. The LOS calculation has been adjusted to reflect the 15-minute peaking activity occurring during school start and dismissal, but still represents an average 1-hour condition.

Center Street Traffic Operating Conditions

Traffic at the intersection of Center Street and 116th Street operates at LOS 'C' or better during both the morning and afternoon peak hours except for the eastbound movements which operate at LOS 'E' during the morning peak hour and the westbound movements which operate at LOS 'D' during the afternoon peak hour.

All traffic movements at the intersection of Center Street and Eisenhower Elementary School west driveway operate at LOS 'C' or better during both the morning and afternoon peak hours.

Traffic at the intersection of Center Street and 115th Street operates at LOS 'B' or higher during the morning peak hour except for the northbound and southbound movements which operate at LOS 'F'. During the afternoon peak hour traffic operates at LOS 'C' or better except for the southbound movement which operates at LOS 'D'.

All traffic movements at the intersection of Center Street and 114th Street operate at LOS 'C' or better during both the morning and afternoon peak hours.

All traffic movements at the intersection of Center Street and 112th Street/Whitman Middle School west driveway operate at LOS 'C' or better during both the morning and afternoon peak hours.

All movements at the intersection of Center Street and Whitman Middle School east driveway operate at LOS 'B' or better during both the morning and afternoon peak hours except the southbound movements during the morning peak hour which operate at LOS 'D'.

Traffic along Center Street peaked for about 15 – 20 minutes during school start and dismissal time periods causing higher levels of congestion. A total of 785 vehicles were counted during the morning peak hour with 305 of them observed during the highest 15-minute time period. In comparison, a total of 610 vehicles were counted during the afternoon peak hour with 205 of them observed during the highest 15-minute time period. During this time it appeared that vehicles were forced to travel under the posted 20 mile per hour (mph) school zone speed limit due to the high volume of pedestrians and vehicles.

Occasionally, traffic would back-up between intersections as a result of the crossing guards stopping traffic to allow students to the cross the street. Vehicles on the side streets appeared to have difficulty making left and right turns onto Center Street. Once school started traffic dissipated and there was very little traffic observed. The same occurred during the afternoon school dismissal when all students had been picked up and traffic volumes dissipated.

Table 8 summarizes the traffic operating conditions on Center Street between 116th Street and the Whitman Middle School East Driveway. HCS worksheets are attached in **Appendix E.**

It is noted that intersection capacity improvements might improve traffic flow conditions but could increase traffic speeds and adversely impact safety along Center Street.

Table 8: Center Street 2012 Existing Traffic Operating Conditions

2012 Existing Operating Conditions														
			Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
116th Street and Center Street														
All-Way Stop Control	AM	LOS	C			C			B			—		
		Queue (ft)	150			225			75			—		
		Delay (s)	18			22.4			13.3			—		
	PM	LOS	E			D			B			—		
		Queue (ft)	1025			375			25			---		
		Delay (s)	40.8			28.6			11.8			---		
Eisenhower Elementary School West Driveway and Center Street														
Two-Way Stop Control	AM	LOS	A			A			---			C		B
		Queue (ft)	25			25			---			50		25
		Delay (s)	0			0			---			20.7		11.2
	PM	LOS	A			A			---			C		B
		Queue (ft)	25			25			---			25		50
		Delay (s)	0			0			---			15.9		12.3
115th Street/West Highschool Driveway and Center Street														
Two-Way Stop Control	AM	LOS	B			A			F			F		
		Queue (ft)	50			25			175			350		
		Delay (s)	10.27			7.96			156			156		
	PM	LOS	A			A			C			D		
		Queue (ft)	25			25			25			100		
		Delay (s)	8.346			7.923			17.6			30.1		
114th Street and Center Street														
All-Way Stop Control	AM	LOS	B			C			B			---		
		Queue (ft)	100			225			75			---		
		Delay (s)	14.7			21.5			12.9			---		
	PM	LOS	B			B			A			---		
		Queue (ft)	75			75			25			---		
		Delay (s)	11			11.7			9.2			---		
113th Street and Center Street														
Two-Way Stop Control	AM	LOS	A			A			B			—		
		Queue (ft)	25			25			25			---		
		Delay (s)	0			8.72			13.8			—		
	PM	LOS	A			A			B			—		
		Queue (ft)	25			25			25			—		
		Delay (s)	0			8.69			14.9			---		
112th Street/Whitman Middle School West Driveway and Center Street														
Two-Way Stop Control	AM	LOS	A			A			A			C		
		Queue (ft)	25			25			25			25		
		Delay (s)	0			8.77			0			15.2		
	PM	LOS	A			A			A			A		
		Queue (ft)	25			25			25			25		
		Delay (s)	0			8.2			0			0		
Whitman Middle School East Driveway and Center Street														
Two-Way Stop Control	AM	LOS	A			A			—			D		
		Queue (ft)	25			25			—			25		
		Delay (s)	9.43			0			—			25.2		
	PM	LOS	A			A			—			B		
		Queue (ft)	25			25			—			25		
		Delay (s)	8.33			0			—			13.8		

Madison Elementary School Traffic Operating Conditions

The following summarizes the Level of Service operation during school start and dismissal time periods at selected intersections along 100th Street and Glendale Avenue in the vicinity of Madison Elementary School

All movements at the intersection of 100th Street and Ruby Avenue, 100th Street and Glendale Avenue, Glendale Avenue and Eisenhower Elementary School West and East Driveways operate at LOS 'B' or better during both the morning and afternoon peak hours, as shown in Table 9. HCS worksheets are attached in **Appendix F.**

Table 9: 100th Street and Glendale Avenue 2012 Traffic Operating Conditions

2012 Existing Operating Conditions														
			Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
100th Street and Ruby Avenue														
All-Way Stop Control	AM	LOS		B			A			B			B	
		Queue (ft)		25			25			100			75	
		Delay (s)		10.2			9.3			13.3			12.5	
	PM	LOS		A			A			A			A	
		Queue (ft)		25			25			50			25	
		Delay (s)		8.2			8.1			9.4			8.9	
100th Street and Glendale Avenue														
All-Way Stop Control	AM	LOS		A			A			B			B	
		Queue (ft)		25			25			75			50	
		Delay (s)		9.2			10			11.6			10.7	
	PM	LOS		A			A			A			A	
		Queue (ft)		25			25			50			25	
		Delay (s)		8			8.3			8.8			9.1	
Eisenhower Elementary West Driveway and Glendale Avenue														
Two-Way Stop Control	AM	LOS		A			A			B			—	
		Queue (ft)		25			25			25			—	
		Delay (s)		0			0			10.6			—	
	PM	LOS		A			A			B			—	
		Queue (ft)		25			25			25			—	
		Delay (s)		0			0			10			—	
Eisenhower Elementary East Driveway and Glendale Avenue														
Two-Way Stop Control	AM	LOS		A			A			A			—	
		Queue (ft)		25			25			25			—	
		Delay (s)		0			0			9.3			—	
	PM	LOS		A			A			A			—	
		Queue (ft)		25			25			25			—	
		Delay (s)		0			0			9.4			—	

Overall, traffic operates at acceptable levels of service during the morning and afternoon peak hours along 100th Street, Glendale Avenue and Ruby Avenue. Prior to school start and dismissal, similar to Center Street, traffic was observed to peak for about 15 – 20 minutes. A total of 450 vehicles were counted during the morning peak hour with 190 of them observed during the highest 15-minute time period. In comparison, a total of 390 vehicles were counted during the afternoon peak hour with 125 of them observed during the highest 15-minute time period. The high volume of vehicles did not cause a lot of delay to motorists. Occasionally, the

northbound movement at the intersection of 100th Street and Glendale Avenue would back up as a result of students crossing the street.

Observations of traffic on 100th Street did not appear to indicate excessive traffic speeding during school start and dismissal time periods.

2.6 Traffic and Pedestrian Observations and Photos

Traffic and pedestrian operating conditions were observed during the morning and afternoon peak periods before school started and when school was released along Center Street at Eisenhower Elementary, West High School and Whitman Middle School and along 100th Street at Madison Elementary School.

Center Street Observations – Eisenhower Elementary, West High School, Whitman Middle School

- Eastbound traffic on Center Street backs up to HWY 100. The southbound right turn lane on HWY 100 also backs up during the morning peak hour from vehicles turning onto Center Street causing grid lock in the businesses circulation roadway system.
- Parents cut-through local businesses located in the northwest quadrant of the intersection of HWY 100 and Center Street to avoid the long southbound right-turn back up.
- Parents drop their children off at multiple locations along Center Street including in the middle lane at stop signs to let their child out into a moving traffic lane.
- Many Eisenhower Elementary school parents park their vehicles on both sides of Center Street and wait either on the playground or in their vehicles until the children are allowed inside the school.
- Sidewalks are not provided along the south side of Center Street.
- Elementary school parents park on 116th Street and 117th Street
- Many parents and children crossed Center Street at 117th Street.
- The playground between Center Street and Eisenhower School is enclosed by a fence (recently added)
- Concrete corner pedestrian pads for children to wait on before crossing the street are only provided at the intersections of Center Street with 116th Street and the Whitman Middle School east crosswalk. A sidewalk waiting area is provided between the two crosswalks in front of Whitman Middle School. (111th Street cul-de-sac crossing)
- Crosswalks are located at 116th Street (West, South and East approach), 114th Street (West Approach) and Whitman Middle School. The crosswalk pavement markings do not appear to be wide enough to accommodate the volume of pedestrians using them.
- Traffic is very congested during school start and dismissal times for about 15 – 20 minutes between 117th Street to HWY 100.
- Parents make U-turns on Center Street even though 'No U-Turn' signs are posted.
- If traffic allows, parents will attempt make a left turn from the Whitman Middle School west driveway (right-turn only) ignoring the 'No Left Turn' sign.
- Many students cross mid-block along Center Street.
- Crossing guards are located at 116th Street, 114th Street and at the Whitman Middle School main entrance.
- City bus stops are located in front of Whitman Middle School on both the north and south sides of Center Street, one in front of West High School on the north side of the street and one in front of Eisenhower Elementary on the south side of the street.

- A separated westbound student pick-up and drop-off bay approximately 350-feet long is located on the north side of Center Street in front of Whitman Middle School.
- A pedestrian crossing sign at 112th Street facing eastbound traffic is currently partially obstructed by tree branches.
- Street centerline orange traffic cones are provided at crosswalks where crossing guards are located.

Figures 3 through 20 are pictures taken of traffic and pedestrian activity during the morning peak hour along Center Street.

Figure 3: West High School Crossing Guard

Figure 4: Queuing Eastbound at West High School

Figure 5: Students and Parents Crossing at 117th Street

Figure 6: Students and Parents waiting in Roadway at 116th Street

Figure 7: Queuing Westbound near West High School

Figure 8: Whitman Middle School Students

Figure 9: Queuing and Parking along Center Street at Whitman Middle School Looking East

Figure 10: Queuing and Parking on Center Street near West High School Looking West

Figure 11: Student exiting vehicle in live traffic lane on 114th Street

Figure 12: Students Crossing 114th Street

Figure 13: Students **Waiting on Grass (no concrete pad)**

Figure 14: Queuing and Parking along Center Street near Eisenhower Elementary Looking West

Figure 15: Eisenhower Student Drop-Off/Pick-Up Area

Figure 16: Queuing and Parking on Center Street near Eisenhower Elementary Looking West

Figure 17: Double Parking on Center Street near Eisenhower Elementary

Figure 18: Parent and Child crossing Center Street at 117th Street

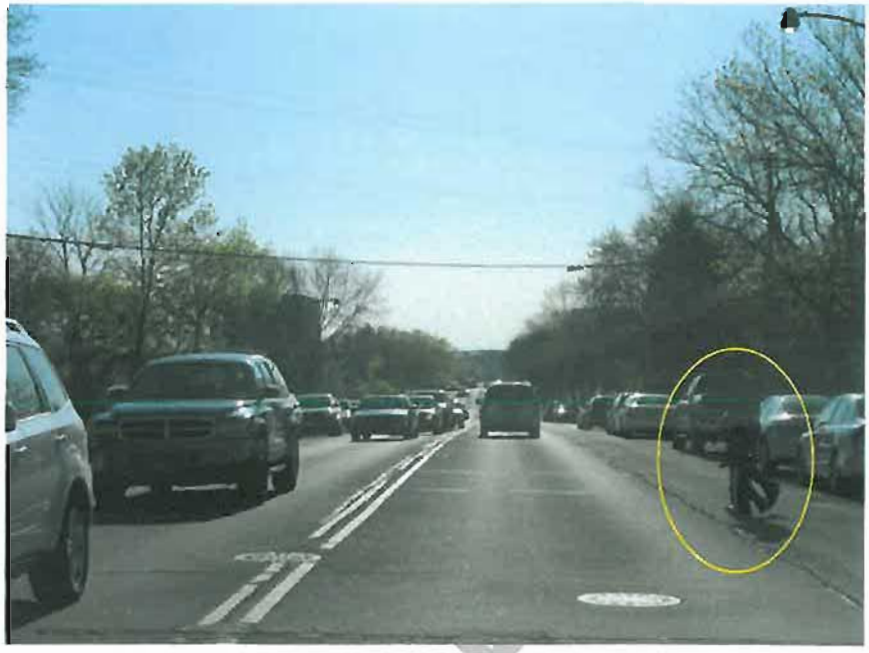


Figure 19: On-Street Parking on 116th Street

Figure 20: On-Street Parking on 117th Street

100th Street Observations – Madison Elementary School

- Parents drop-off/pick-up their children on both 100th Street and Glendale Avenue.
- Teachers and staff members park along the north side of Glendale Avenue or in the parking lot located to the east of the school.
- Parents double park northbound on 100th Street, just south of Glendale Avenue, to drop their children off.
- Crossing guards are located at the intersections of 100th Street with Glendale Avenue and Ruby Avenue. Students were observed crossing the east approach.
- Children are expected to wait outside on the playground until the bell rings. The students line up outside of their respective door when the bell rings and then they enter the building.
- Traffic will sometimes back up on northbound 100th Street from Glendale Avenue south to Ruby Avenue.
- Both parents and children cross mid-block on 100th Street.
- Sidewalks are located on the east side of 100th Street, on the north and south side of Glendale Avenue east of 100th Street. The sidewalk located on the north side is not located directly next to 100th Street, it is offset and has access to the Milwaukee County Park located to the east.
- Concrete corner pedestrian pads are located in the northeast, southeast and southwest corners at the intersection of 100th Street and Glendale Avenue.
- Sidewalk extensions are located at the intersection of 100th Street and Ruby on the northwest, northeast and southeast corners.

Figures 21 through 24 are pictures taken of traffic and pedestrian operations during the morning peak hour in the vicinity of Madison Elementary School.

Figure 21: Queuing and Parking on 100th Street South of Glendale Avenue Looking Northbound

Figure 22: Looking south on 100th Street from Glendale Avenue

Figure 23: On-Street Staff Parking on Glendale Avenue, East of 100th Street Looking West

Figure 24: Children Lining Up at their Respective Door before School on South Side of School

3. Recommendations

A series of short-term and long-term recommendations have been identified to improve safety and traffic operation in the school study areas. Short-term recommendations have been

identified, which include updated school zone signing and pavement markings. Signing and pavement markings are relatively inexpensive and can make a big difference without a lot of resources needed to fund them. Long-term recommendations have been identified, which include construction of new sidewalks, drop-off/pick-up areas, roadway median islands and driveway re-alignment.

3.1 Center Street Short Term Recommendations

A set of short-term lower-cost recommendations have been identified to improve safety along Center Street during school start and dismissal time periods. The following is a list of short-term lower-cost safety improvement recommendations:

- Orange crosswalk street centerline cones should placed on both approaches to an intersection used for school crosswalks
- High-Visibility Crosswalk Pavement Markings should be used with 'Continental' Design
- Corner Concrete Pedestrian Safety Pads should be constructed at all crosswalk locations
- ADA Curb Ramps at all crosswalk, pedestrian safety pads
- ADA Detectable Warning Surfaces (truncated domes) at all crosswalk and driveway sidewalk crossings
- No Parking Restrictions during school on Center Street
- 10-minute parking restrictions on the north side of Center Street for drop-off/pick-up during school days
- Flashing LED Time of Day School Zone Signs
- Updated School Signing Plan

Orange centerline street cones should be placed on both approaches at the crossing guard crosswalk locations along Center Street at 116th Street, 114th Street and the Whitman Middle School main entrance. The use of orange cones has been shown to calm traffic speeds and inform drivers where to expect pedestrians.

Installing high-visibility 'continental' design crosswalk pavement markings provides adequate space for pedestrians to cross the roadway, to guide pedestrians to a safe crossing as well as alert motorists to expect pedestrian activity at a specific location. The minimum width for a crosswalk is 6-feet, but since these crosswalks are located within a school zone the widths should be increased to 8-feet to accommodate the high volume of pedestrians that walk in groups as they cross the street. It is recommended that the high-visibility 'continental' design crosswalk markings be installed at the following 6 locations:

- Intersection of Center Street and 116th Street on the west, south and east Approach
- Intersection of Center Street and 114th Street on the west approach
- Whitman Middle School Main Crossing on Center Street (crossing guard location)
- 111th Street Crossing on Center Street

Figure 25: High-Visibility 'Continental' Crosswalk

A corner concrete pedestrian safety pad is often referred to as a waiting area where pedestrians can stage before crossing the street without having to stand in the street or on landscaping, snow, dirt or mud. Corner pads provide a separation between moving traffic and pedestrians and bicyclists. The concrete pedestrian pads need to be constructed large enough to accommodate pedestrian surge patterns. It is recommended that corner concrete pedestrian pads be constructed at the following locations:

- Intersection of Center Street and 117th Street on the southwest and southeast corners.
- Intersection of Center Street and 115th Street on the southwest and southeast corners.
- Intersection of Center Street and 114th Street on the southwest and southeast corners.
- Intersection of Center Street and 112th Street on the southeast corner.

Curb wheel chair ramps should be constructed at all existing sidewalks with pedestrian crossings on the north side of Center Street to be compliant with the American with Disabilities Act (ADA). Since the corner concrete pedestrian safety pads have limited space, it is not recommended that curb ramps be constructed on them until sidewalks have been constructed in the future. Curb ramps should be constructed at the following 3 locations:

- Intersection of Center Street and 116th Street at the sidewalk extension located in the northwest corner.
- Whitman Middle School Main Crossing on Center Street (both north and south sides of Center Street)
- 111th Street Crossing on Center Street (both north and south sides of street)

As part of the curb ramp construction each location should also include detectable warning surfaces (truncated domes). The ramps should be constructed at all new and existing curb ramps to be compliant with the ADA. Installing detectable warning surfaces creates a safer environment for pedestrians with disabilities. Detectable warning surfaces should be installed at the following 16 locations:

- Intersection of Center Street and 116th Street at the sidewalk extension located in the northwest and northeast corners.
- Intersection of Center Street and 114th Street at the sidewalk extension located in the northwest corner.
- Intersection of Center Street and 113th Street on the northwest and southwest corners.
- Whitman Middle School Main Crossing on Center Street (both north and south sides of Center Street)
- 111th Street Crossing on Center Street (both north and south sides of street)

- Eisenhower Elementary (2), West High School (2) and Whitman Middle School Driveways (4)

Figure 26: ADA Curb Ramp and Detectable Warning Surface (Truncated Domes)

School hour parking restrictions should be enforced to improve pedestrian safety conditions by decreasing the amount of mid-block pedestrian crossings. 'No Parking' signs should be installed during school hours on the south side of Center Street within the school zone. No parking should be from 7:00 AM to 4:00 PM on school days. 'Student drop-off/pick-up 10 min limit on school days' signage should be added along the north side of Center Street to allow parents to drop-off/pick-up their children, but not to park there for long time periods or leave their cars unattended. On-street parking should also be restricted within 20 feet (30 feet recommended) of all intersections and crosswalks to improve visibility for both motorists and pedestrians.

Flashing LED Time of Day School Zone Signs should be included on the 20 mph school speed limit zone signs along Center Street to enhance traffic and pedestrian safety.

An updated school zone signing plan compliant with the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* has been designed to improve pedestrian safety and traffic operation along Center Street. A detailed signing plan has been attached in **Appendix J** and the following is a list of the proposed signs included in the plan:

- Advance School Crossing
  - Place Before School Zone: S1-1 and S4-3P
  - Place Prior to Crosswalks: S1-1 and W16-9P
  - Place at Crossing: S1-1 and W16-7P

- Speed Limit (School Use)
  - Place throughout school zone: S4-3P, R2-1 and S4-2P

- In-Street Pedestrian Crossing
  - Place at uncontrolled intersections: R1-6b and S4-3P

R1-6b

S4-3P

- No U-Turn
  - Place throughout school zone: R3-4

R3-4

- No Parking
  - Place 'No Parking' signs from here to corner for bus stops, crosswalks and intersections: R7-1
  - Place 'No Parking' signs during school start and dismissal times: R7-3 (School Days 7:00 AM to 4:00 PM)
  - Place drop-off/pick-up 10 min limit parking signs

An exhibit of the Center Street short-term recommendations are attached in **Appendix G**.

3.2 Center Street Long-Term Recommendations

A set of long-term recommendations have been identified to improve school traffic and pedestrian safety along Center Street during school start and dismissal time periods. The following is a list of long-term recommendations:

- Construct Median Pedestrian Refuge Islands
- Construct Student Drop-Off/Pick-Up Bay in front of Eisenhower Elementary School
- Construct sidewalks along cross streets
- Construct sidewalks along south side of Center Street
- Re-Align driveway Intersection at 116th/Eisenhower Elementary driveway
- Eliminate eastern 111th Street crosswalk on Center Street with construction of a wider sidewalk, retaining wall and railing along Center Street to direct students to crossing guard protected crosswalk.

Construction of median pedestrian refuge islands at designated crossings will narrow the travel lane width on Center Street for pedestrian crossings as well as provide a simplified crossing by breaking the crossing into two stages. These medians are considered to be more effective than the use of orange cones and provide a refuge area for pedestrians as they cross the street. Center islands should be constructed at the following existing designated crosswalk locations on Center Street:

- 116th Street Crosswalks on Center Street
- 114th Street Crosswalk on Center Street
- Whitman Middle School Main Entrance Crosswalk on Center Street

Construct a student drop-off/pick-up bay on the north side of Center Street in front of Eisenhower Elementary School. This will remove stopped vehicles from the traffic flow on Center Street and provide a safer location for student drop-off/pick-up activity.

Connectivity of sidewalks located near schools improves pedestrian safety. It is recommended that sidewalks be constructed on the following cross streets: 117th Street, 116th Street, 114th Street and 112th Street, to provide a safe walking area for students. It is also recommended that sidewalks be constructed on the south side of Center Street from 124th Street to HWY 100 to provide a safe walking area away from live traffic (sidewalk is already provided on the north side of the street). The construction of sidewalks also has the potential to increase walking and biking to and from school. It will give parents the reassurance that students are provided an alternative to walking in the same lane as moving traffic.

The intersection of Center Street with 116th Street and the offset Eisenhower Elementary west driveway should be re-aligned. The driveway should be reconstructed to the west to line up directly with 116th Street. This will improve traffic operating conditions at this intersection and better control pedestrian traffic safety conflicts.

It is recommended that the 111th Street Crossing located just to the east of the Whitman Middle School main crossing be eliminated, forcing students to cross with the crossing guard. To encourage students to use the crossing guard protected crosswalk at the western main crossing, the sidewalk should be widened and a railing barrier should be installed along the sidewalk on Center Street to restrict students from crossing at mid-block. In order to widen the sidewalk, a retaining wall would need to be constructed along the south side of the sidewalk.

A summary of the long-term recommendations on Center Street are attached in **Appendix H.**

3.3 Madison Elementary School Short-Term Recommendations

Madison Elementary School Short-Term Recommendations

A set of short-term, low-cost recommendations have also been identified in the vicinity of Madison Elementary School to improve safety in the school area. The following is a list of short-term low-cost recommendations:

- Orange crosswalk street centerline cones should placed on both approaches to an intersection used for school crosswalks
- High-Visibility Crosswalk Pavement Markings should be used with 'Continental' Design
- ADA Detectable Warning Surfaces (truncated domes) at all crosswalk and driveway sidewalk crossings
- 'No Parking' Restrictions on the west side of 100th Street
- 10 minute parking restrictions on the north side of Center Street for drop-off/pick-up during school days
- Re-assign classroom entrance doors
- Updated School Signing Plan (similar to Center Street Signing)

Orange centerline street cones should be placed at the crossing guard crosswalk at the intersections of 100th Street with Glendale Avenue and Ruby Avenue. The use of orange cones has been shown to calm traffic speeds and inform drivers where to expect pedestrians.

Installing wider high-visibility 'continental' design crosswalk pavement markings provides adequate space for pedestrians to cross the roadway, to guide pedestrians to a safe crossing as well as alert motorists to expect pedestrian activity at a specific location. The minimum width for a crosswalk is 6-feet, but since these crosswalks are located within a school zone the widths should be increased to 8-feet wide to accommodate the high volume of pedestrians that walk in groups as they cross the street. It is recommended that high-visibility crosswalk markings with the 'continental' design be installed at the intersection of 100th Street and Glendale Avenue on the south and east approaches and at the intersection of 100th Street with Ruby Avenue on the north and east approaches.

Detectable warning surfaces (truncated domes) should be constructed at all existing curb ramps to be compliant with ADA requirements. Installing detectable warning surfaces creates a safer environment for pedestrians with disabilities. Detectable warning surfaces should be installed at the following 5 locations:

- Intersection of 100th Street and Glendale Avenue on the southwest, southeast and northeast corners.
- Intersection of 100th Street and Ruby Avenue on the southeast and northeast corners.

School hour parking restrictions on the west side of 100th Street should be enforced to improve pedestrian safety conditions by decreasing the amount of mid-block crossings. 'No Parking' signs should be installed on the west side of 100th Street between Glendale Avenue and Ruby Avenue during school hours. The parent newsletter parking information should be provided to parents each school year should be updated to say 'no parking' on the west side of 100th Street. No parking should be from 7:00 AM to 4:00 PM on school days. 'Student drop-off/pick-up 10 min

limit on school days' signage should be added along the east side of 100th Street between Glendale Avenue and Ruby Avenue to allow parents to drop-off/pick-up their children, but not to park there for long time periods or leave their cars unattended. On-street parking should be restricted within 20 feet (30 feet recommended) of all intersections and crosswalks to improve visibility for both motorists and pedestrians.

Flashing LED Time of Day School Zone Signs should be included on the 20 mph school speed limit zone signs along Center Street to enhance traffic and pedestrian safety.

Classroom entrance doors should also be assigned to the north side of the school. Re-assigning some classroom entrance doors to the north side of the school should reduce traffic and pedestrian conflicts on 100th Street.

An updated school zone signing plan compliant with the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* has been designed to improve pedestrian safety and traffic operations. A detailed signing plan has been attached in **Appendix K** and the following is a list of the proposed signs included in the plan:

- Advance School Crossing
  - Place Before School Zone: S1-1 and S4-3P
  - Place Prior to Crosswalks: S1-1 and W16-9P
  - Place at Crossing: S1-1 and W16-7P

- Speed Limit (School Use)
  - Place throughout school zone: S4-3P, R2-1 and S4-2P

- End School Zone
  - Place on 100th Street north and south of school zone: S5-2

- No U-Turn
  - Place throughout school zone: R3-4

- No Parking
  - Place 'No Parking' signs from here to corner for bus stops, crosswalks and intersections: R7-1
  - Place 'No Parking' signs during school start and dismissal times: R7-3 (School Days 7:00 AM to 4:00 PM)
  - Place drop-off/pick-up 10 min limit parking signs

A summary of the Madison Elementary School short-term improvements is attached in **Appendix I.**

3.4 Madison Elementary School Long-Term Recommendations

Madison Elementary School Long -Term Recommendations

It is recommended that median pedestrian refuge islands be constructed along 100th Street at Glendale Avenue and Ruby Avenue to provide a safer crossing for pedestrians.

3.3 Proposed School Signing Plan

An updated school signing plan has been designed for both the Center Street schools as well as for Madison Elementary School. The signing plans have been designed to be consistent between each study area to develop a base standard for other schools in Wauwatosa. The proposed signing plan is compliant with the 2009 MUTCD and is attached in **Appendix J and K**. The plan utilizes some of the existing signs and also recommends new signs to improve pedestrian safety and traffic operation.

5. Conclusion

This report reviewed traffic and pedestrian safety at Eisenhower Elementary School, West High School, Whitman Middle School and Madison Elementary School in the City of Wauwatosa. Eisenhower Elementary, West High School and Whitman Middle School are located along Center Street between 117th Street and the Union Pacific Railroad Tracks. Madison Elementary

School is located at the intersection of 100th Street and Glendale Avenue on the southeast corner.

Background information and existing school site plans were reviewed along with the traffic crash data that was provided by the City of Wauwatosa. According to the 3-year traffic crash history from January 1, 2009 to December 31, 2011, a total of 11 'property damage only' crashes were reported on Center Street and a total of 3 'property damage only' crashes were reported in the vicinity of Madison Elementary School. On average, less than 4 crashes occurred per year on Center Street and 1 crash occurred per year near Madison Elementary School. None of the crashes reported involved pedestrians.

Traffic and pedestrian counts were taken at the following intersections on Center Street to determine the traffic operating conditions during the morning and afternoon peak hours:

- 116th Street
- Eisenhower Elementary School West Driveway
- 115th Street/West High School Driveway
- 114th Street
- 113th Street
- 112th Street/Whitman Middle School West Driveway
- Whitman Middle School East Driveway
- 111th Street Cul-de-sac

Traffic and pedestrian counts were also taken at the following intersections during the morning and afternoon peak hours:

- 100th Street and Ruby Avenue
- 110th Street and Glendale Avenue
- Glendale Avenue and Madison Elementary School West Driveway
- Glendale Avenue and Madison Elementary School East Driveway

All traffic movements at the Center Street intersections operate at LOS 'D' or better during both the morning and afternoon peak hour, expect for the following movements:

- Eastbound movements at the intersection of Center Street and 116th Street during the afternoon peak hour.
- Northbound and southbound movements at the intersection of Center Street and 115th Street/West High School Driveway.

All traffic movements on 100th Street and Glendale Avenue all operate at LOS 'B' or better during both the morning and afternoon peak hours.

Traffic and pedestrian observations were taken during school start and dismissal time periods and a set of short-term and long-term recommendations were developed to improve traffic and pedestrian safety in the vicinity of the schools. The short-term recommendations included centerline cones, crosswalk pavement markings, corner concrete pedestrian safety pads, ADA curb ramps, ADA detectable warning surfaces, parking restrictions, flashing LED time of day school zone signs and an updated school signing plan. The long-term recommendations included median pedestrian refuge islands, student drop-off/pick-up bay, sidewalks, re-

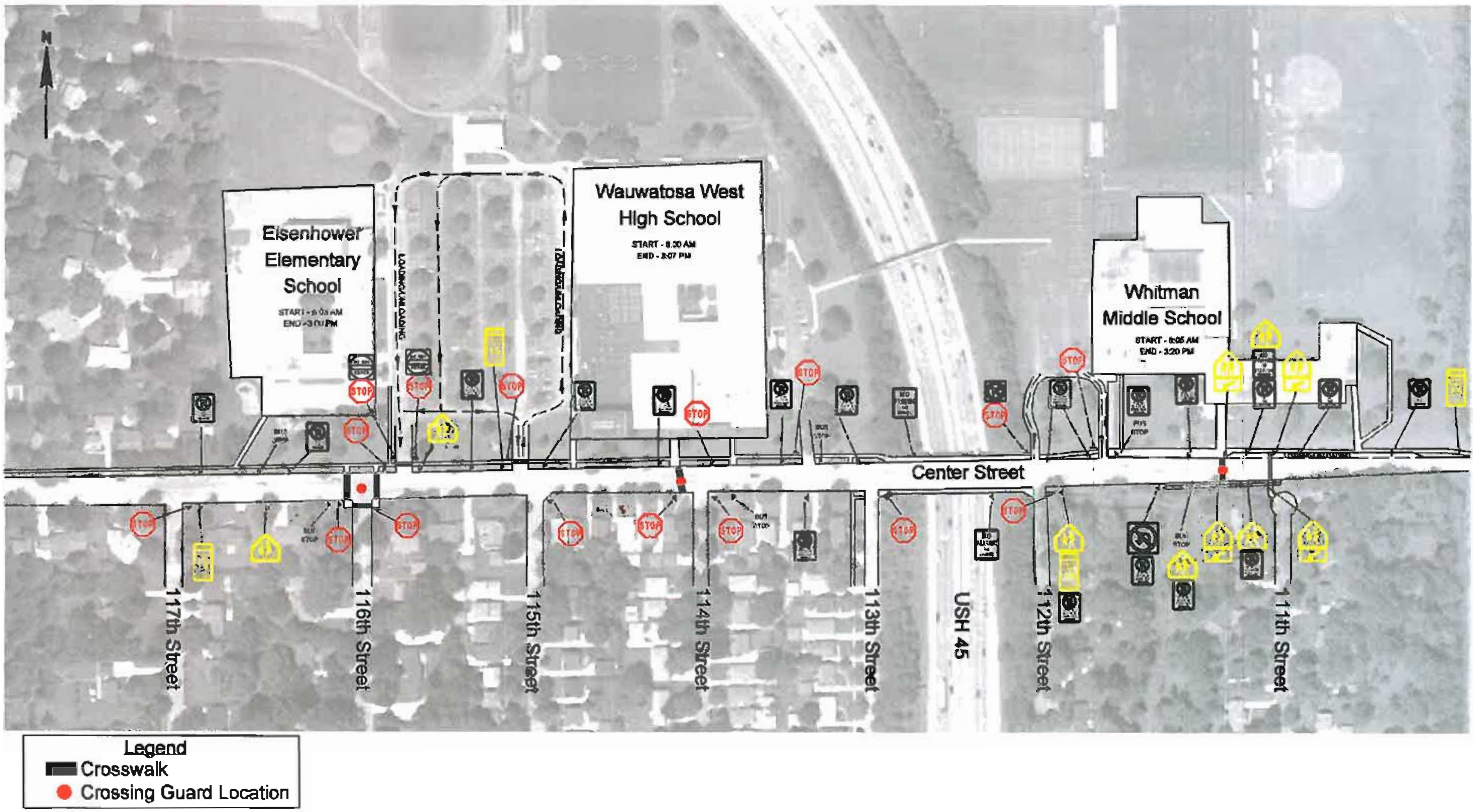
alignment of Eisenhower Elementary west driveway and eliminating 111th Street crosswalk/crossing.

These short-term and long-term recommendations should improve existing traffic and pedestrian safety conditions along Center Street and in the vicinity of Madison Elementary School.

Appendix A

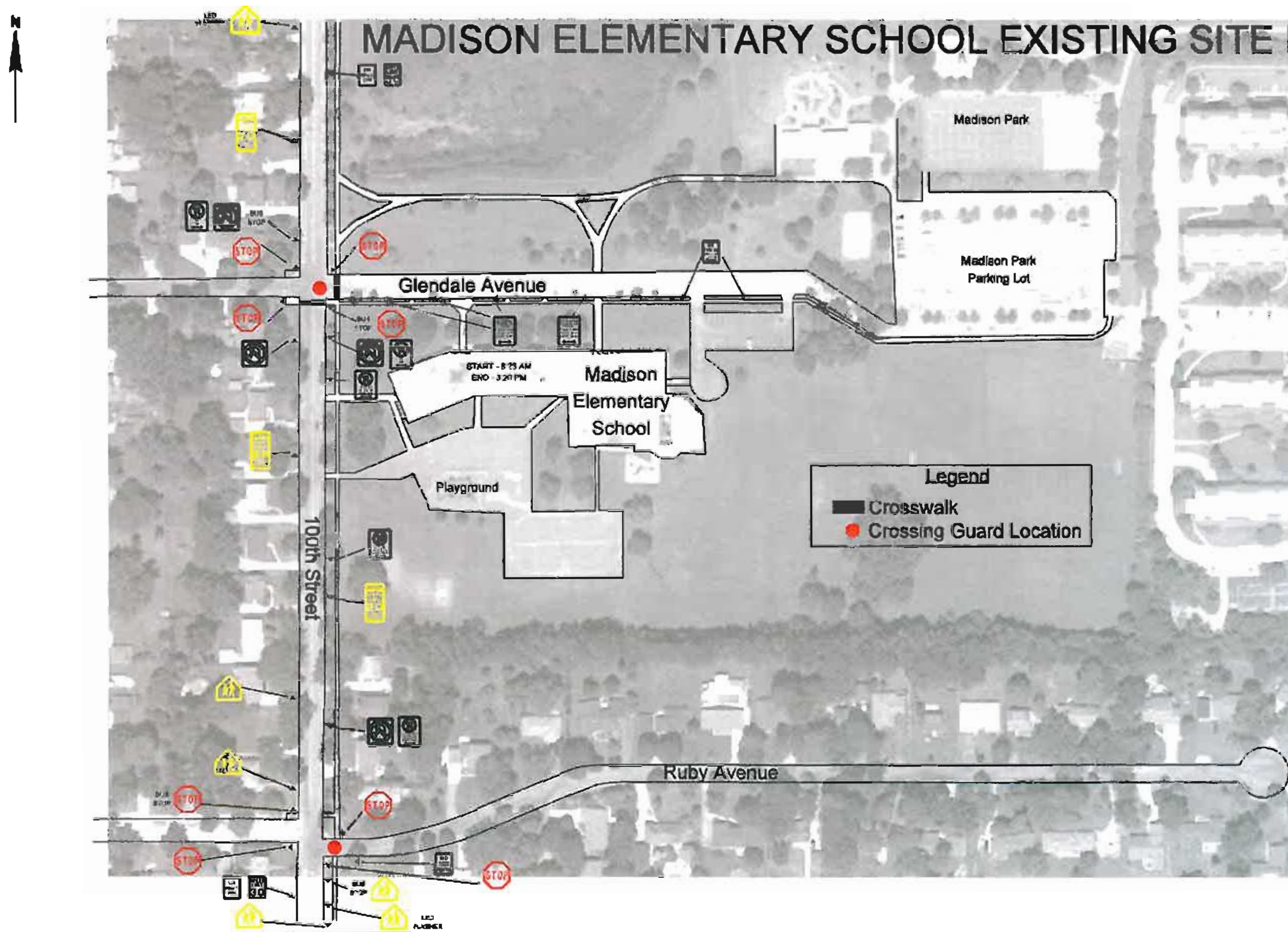
Existing School Site/Signing Plans

CENTER STREET SCHOOLS EXISTING SITE LAYOUT



PROJECT NO:49-0008.00	HWY:Center Street	COUNTY:Milwaukee	Wauwatosa School Saftey Study	SHEET	E

MADISON ELEMENTARY SCHOOL EXISTING SITE LAYOUT



PROJECT NO: 49-0008.00	HWY: Glendale Avenue	COUNTY: Milwaukee	Wauwatosa School Saftey Study - Madison Elementary	SHEET	E

FILE NAME : ..designfile.. PLOT DATE : ..plottingdate.. PLOT BY : ..plotuser.. PLOT NAME : PLOT SCALE : ..plotscale.. WISDOT/CADDS SHEET 42

Appendix B

Traffic Crash Summary and Diagrams

2

ACCIDENT SUMMARY

PD 11
INJ 0
FATAL 0
TOTAL 11

2009
2010
2011

SYMBOLS	TYPES OF COLLISIONS	SHOW FOR EACH ACCIDENT
MOVING VEHICLE	REAR END	1. DATE AND TIME
BACKING VEHICLE	HEAD ON	2. WEATHER AND ROAD SURFACE - IF UNUSUAL CONDITION EXISTED
NON-INVOLVED VEHICLE	SIDE SWIPE	3. NITE - IF BETWEEN DUSK AND DAWN
PARKED VEHICLE	OUT OF CONTROL	
FIXED OBJECT	LEFT TURN	
FATAL ACCIDENT	RIGHT ANGLE	
INJ INJURY ACCIDENT		

SEGMENT CENTER STREET FROM 124TH STREET TO HWY 100
PERIOD 3 YEARS FROM JANUARY 1, 2009 TO DECEMBER 31, 2011
CITY/VILLAGE, TOWN CITY OF WAUWATOSA PREPARED BY: ERIN SCHOON
COUNTY MILWAUKEE DATE PREPARED : 04/20/2012

1. 03/13/2009 7 AM PDO
2. 06/26/2009 11 AM PDO
3. 7/22/2009 12 PM PDO
4. 09/09/2009 4 PM PDO
5. 12/31/2009 8 AM PDO
6. 01/14/2010 5 PM PDO
7. 02/08/2010 7 AM PDO
8. 02/24/2010 4 PM PDO
9. 03/03/2010 9 AM PDO
10. 10/15/2010 3 PM PDO
11. 02/07/2011 8 AM PDO

PROJECT NO: 49-0008.00	HWY: Center Street	COUNTY: Milwaukee	Wauwatosa School Saftey Study	SHEET	E

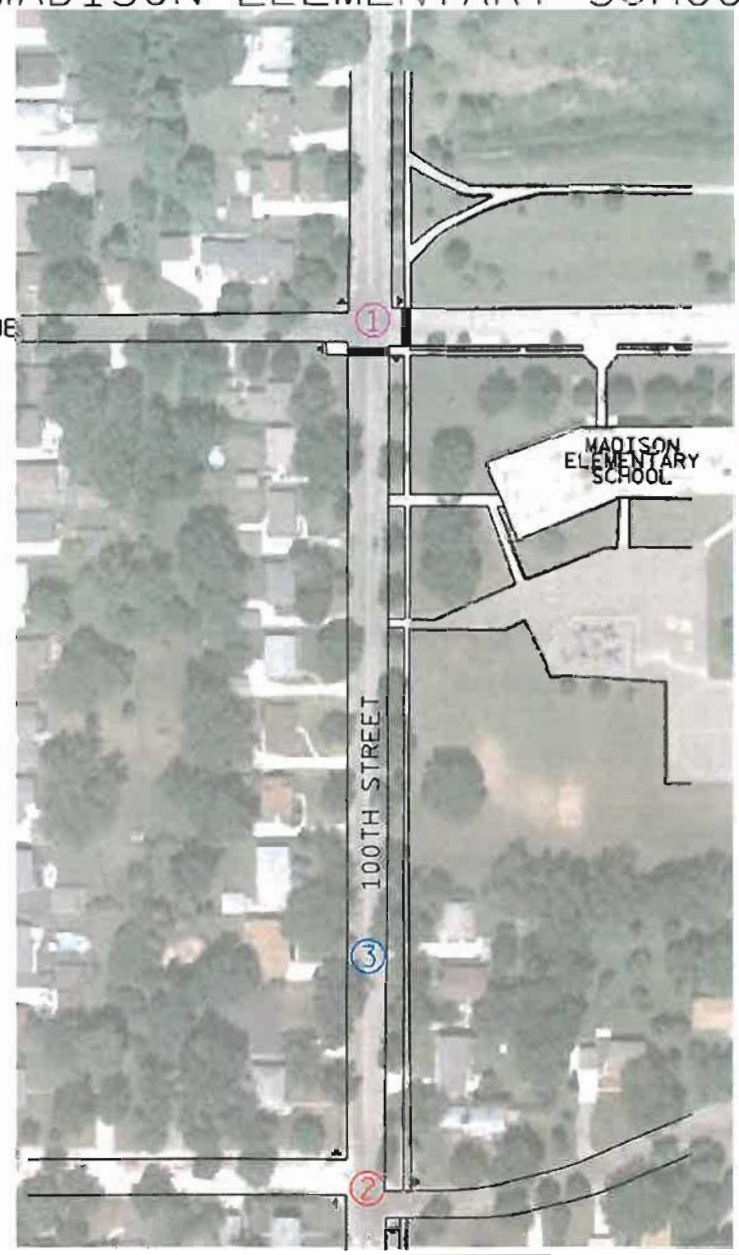
FILE NAME : ...designfile.... PLOT DATE : ...plotdate... PLOT BY : ...plotuser... PLOT NAME : PLOT SCALE : ...plotscale... WISDOT/CADDS SHEET 42

2

APPENDIX D-1
SEGMENT COLLISION DIAGRAM
MADISON ELEMENTARY SCHOOL

N

INDICATE NORTH BY ARROW



① 06/22/2009 4 PM PDO

② 05/10/2010 7 AM PDO

③ 11/09/2011 2 PM PDO

2009
2010
2011

ACCIDENT SUMMARY

PD	3
INJ	0
FATAL	0
TOTAL	3

SYMBOLS	TYPES OF COLLISIONS	SHOW FOR EACH ACCIDENT
MOVING VEHICLE	REAR END	1. DATE AND TIME
BACKING VEHICLE	HEAD ON	2. WEATHER AND ROAD SURFACE - IF UNUSUAL CONDITION EXISTED
NON-INVOLVED VEHICLE	SIDE SWIPE	3. NITE - IF BETWEEN DUSK AND DAWN
PARKED VEHICLE	OUT OF CONTROL	
FIXED OBJECT	LEFT TURN	
FATAL ACCIDENT	RIGHT ANGLE	
INJ INJURY ACCIDENT		

SEGMENT 100TH STREET FROM COURTLAND AVENUE TO RUBY AVENUE

PERIOD 3 YEARS : FROM JANUARY 1, 2009 TO DECEMBER 31, 2011

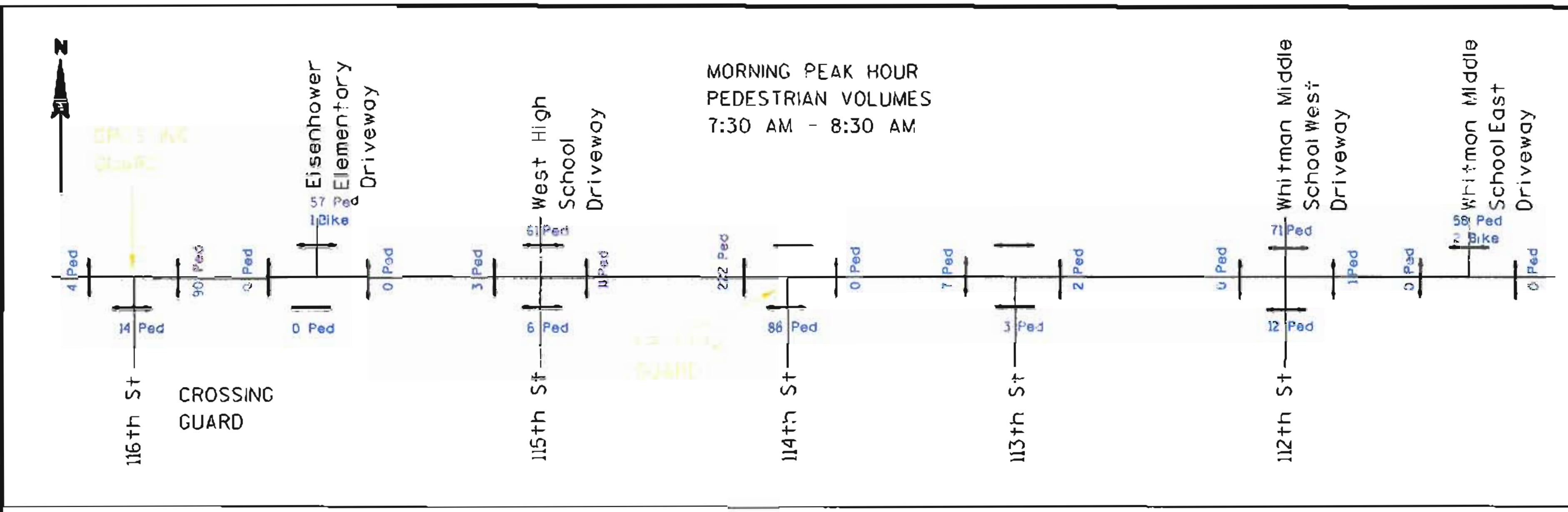
CITY/VILLAGE/ TOWN CITY OF WAUWATOSA PREPARED BY: ERIN SCHOON

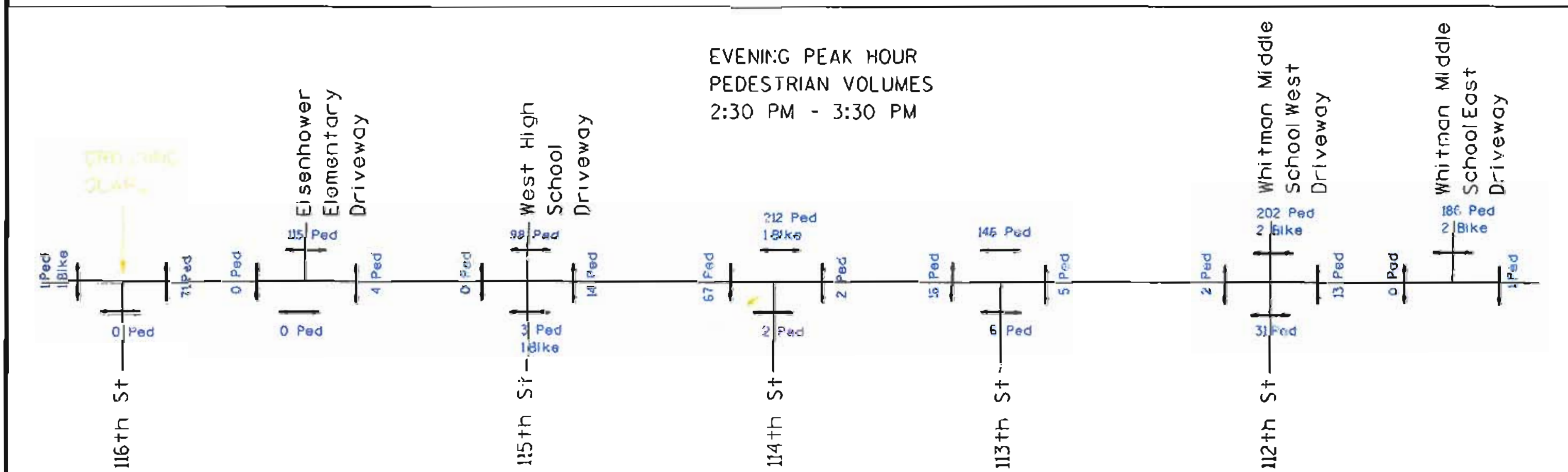
COUNTY MILWAUKEE DATE PREPARED : 04/20/2012

Appendix C

Center Street Traffic and Pedestrian Volume Data

N
116th Street
(AWSC)
115th Street
(TWSC)
114th Street
(AWSC)
113th Street
(TWSC)
112th Street
(TWSC)
Eisenhower Elementary
Driveway (TWSC)
West High School
Driveway
Whitman Middle School
West Driveway
Whitman Middle School
East Driveway (TWSC)
LEGEND
XX MORNING PEAK HOUR
(XX) EVENING PEAK HOUR
(TWSC) TWO-WAY STOP CONTROL
(AWSC) ALL-WAY STOP CONTROL
EXISTING TRAFFIC VOLUMES - YEAR 2012
PROJECT NO: 49-0008.00
ROAD: CENTER STREET
COUNTY: MILWAUKEE
SHEET
E



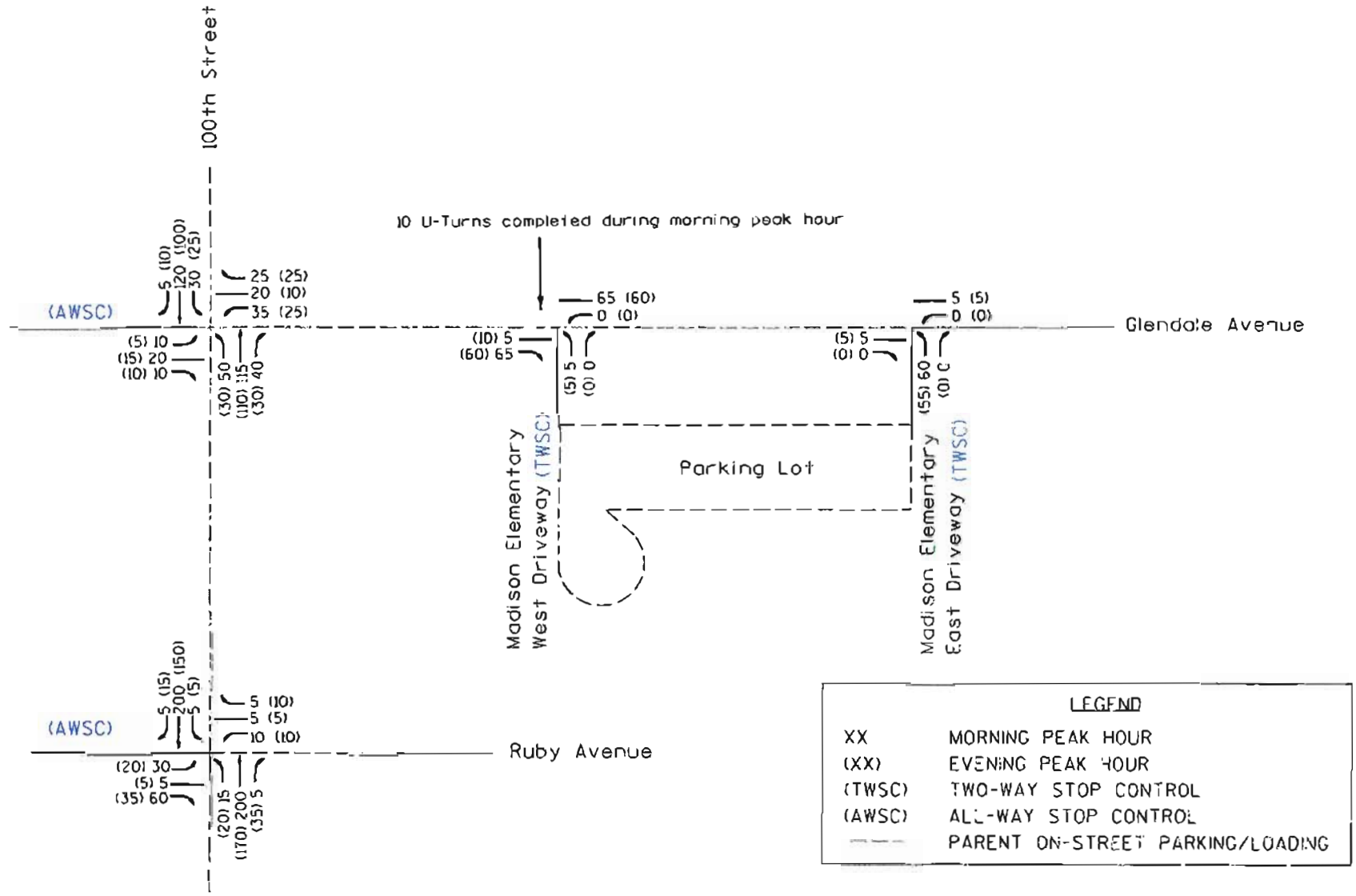


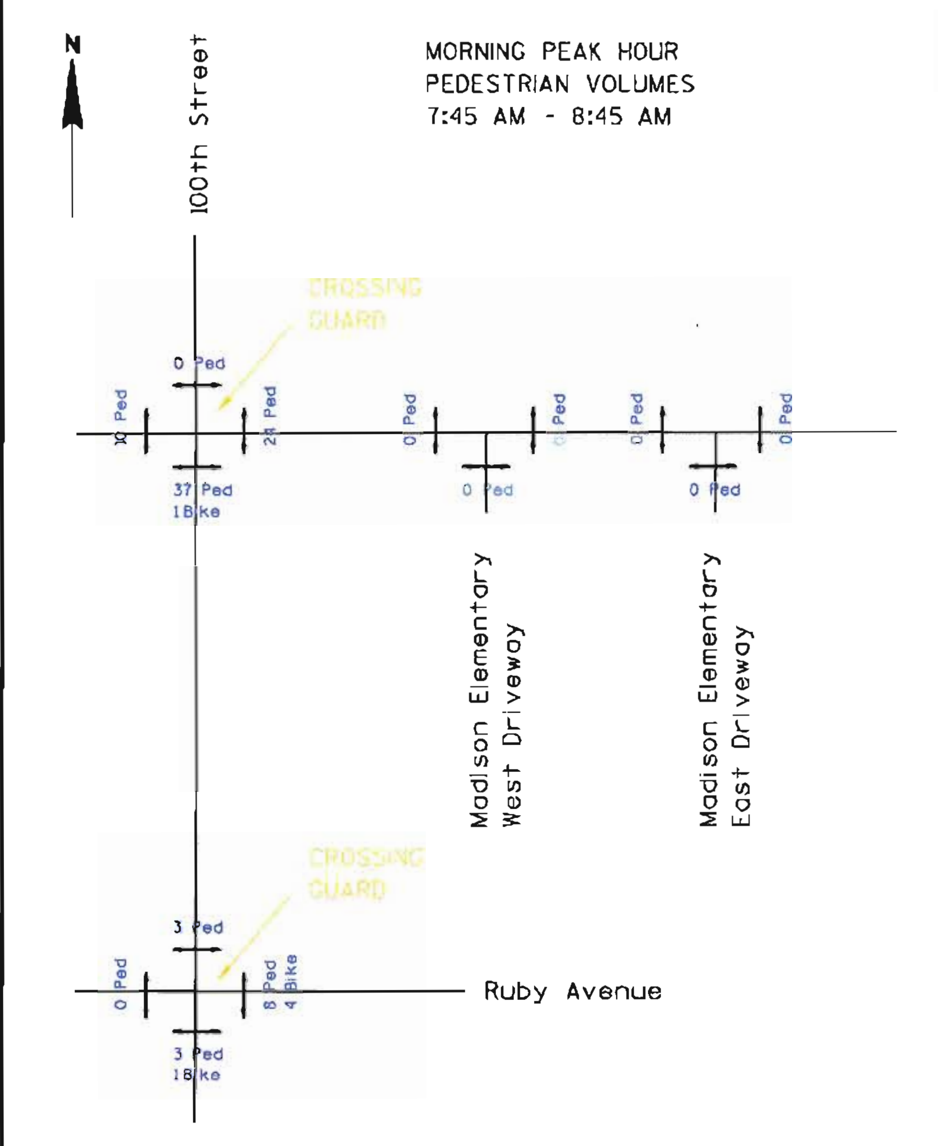
PROJECT NO: 49-008.00 | ROAD: CENTER STREET | COUNTY: MILWAUKEE | EXISTING PEDESTRIAN VOLUMES - YEAR 2012 | SHEET | E

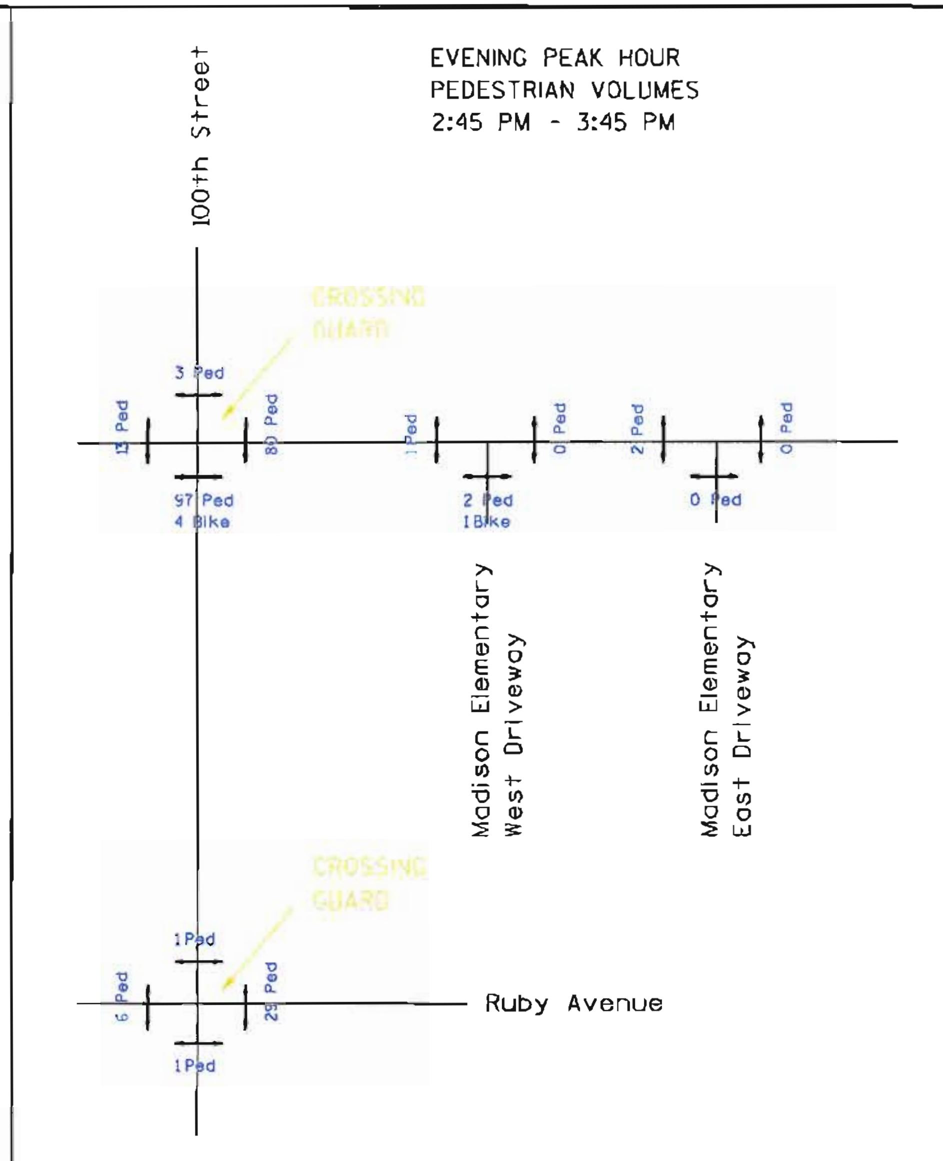
FILE NAME : .... PLOT DATE : .... PLOT BY : .... PLOT NAME : PLOT SCALE : .... WISDOT/CADDS SHEET 42

Appendix D

Madison Elementary Traffic and Pedestrian Volume Data


N
100th Street
10 U-Turns completed during morning peak hour
(AWSC)
5 (10)
120 (100)
30 (25)
25 (25)
20 (10)
35 (25)
(5) 10
(15) 20
(10) 10
(30) 50
(110) 115
(30) 40
65 (60)
0 (0)
(10) 5
(60) 65
(5) 5
(0) 0
5 (5)
0 (0)
(5) 5
(0) 0
(55) 60
(0) 0
Glendale Avenue
Madison Elementary
West Driveway (TWSC)
Parking Lot
Madison Elementary
East Driveway (TWSC)
(AWSC)
5 (15)
200 (150)
5 (5)
5 (10)
5 (5)
10 (10)
(20) 30
(5) 5
(35) 60
(20) 15
(170) 200
(35) 5
Ruby Avenue
LEGEND
XX MORNING PEAK HOUR
(XX) EVENING PEAK HOUR
(TWSC) TWO-WAY STOP CONTROL
(AWSC) ALL-WAY STOP CONTROL
PARENT ON-STREET PARKING/LOADING
PROJECT NO: 49-0008.00
ROAD: GLENDALE AVENUE
COUNTY: MILWAUKEE
EXISTING TRAFFIC VOLUMES - YEAR 2012
SHEET
E





PROJECT NO: 49-008.00	ROAD: 100TH STREET	COUNTY: MILWAUKEE	EXISTING PEDESTRIAN VOLUMES - YEAR 2012	SHEET	E

FILE NAME : .... PLOT DATE : .... PLOT BY : .... PLOT NAME : PLOT SCALE : .... WISDOT/CADDS SHEET 42

Appendix E

Center Street Traffic Capacity Analysis

Intersection	
Intersection Delay (sec/veh)	18.7
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	230	25	75	205	40	120
Peak Hour Factor	0.59	0.59	0.59	0.59	0.59	0.59
Heavy Vehicles(%)	1	0	8	2	0	3
Movement Flow Rate	390	42	127	347	68	203
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	18	22.4	13.3
HCM LOS	C	C	B

Lane	NBLn1	EBLn1	WBLn1
Volume Left (%)	25%	0%	27%
Volume Thru (%)	0%	90%	73%
Volume Right (%)	75%	10%	0%
Sign Control	Stop	Stop	Stop
Traffic Volume by Lane	160	255	280
Left Turning Volume	0	230	205
Through Volume	120	25	0
Right Turning Volume	40	0	75
Lane Flow Rate	271	432	475
Geometry Group	1	1	1
Degree of Utilization, X	0.437	0.65	0.733
Departure Headway, Hd	5.803	5.412	5.564
Convergence(Y/N)	Yes	Yes	Yes
Capacity	618	666	650
Service Time	3.867	3.466	3.617
HCM Lane V/C Ratio	0.439	0.649	0.731
HCM Control Delay	13.3	18	22.4
HCM Lane LOS	B	C	C
HCM 95th Percentile Queue	2.3	5.6	8.2

Intersection	
Intersection Delay (sec/veh):	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Volume (vph)	0	350	185	0	60	95
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade (%)		0%	0%		0%	
Peak Hour Factor	0.62	0.62	0.62	0.62	0.62	0.62
Heavy Vehicles(%)	0	1	1	0	2	4
Movement Flow Rate	0	565	298	0	97	153
Number of Lanes	0	1	1	0	1	1

Major/Minor	Major 1		Major 2			
Conflicting Flow Rate - All	-	0	0	-	863	298
Stage 1	-	0	0	-	298	0
Stage 2	-	0	0	-	565	0
Follow-up Headway	-	-	0	-	3.518	3.336
Pot Capacity-1 Maneuver	-	-	-	-	325	737
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	569	-
Mov Capacity-1 Maneuver	-	-	-	-	325	737
Mov Capacity-2 Maneuver	-	-	-	-	325	-
Stage 1	-	-	-	-	#0	-
Stage 2	-	-	-	-	#0	-

Approach	EB	WB	SB
HCM Control Delay (s)	0	0	14.877
HCM LOS	A	A	B

Lane	EBT	WBT	SBLn1	SBLn2
Capacity (vph)			325	737
HCM Control Delay (s)	-	-	20.7	11.2
HCM Lane V/C Ratio	0	0	0.298	0.208
HCM Lane LOS	-	-	C	B
HCM 95th Percentile Queue (veh)	0	0	1.22	0.779

Intersection	
Intersection Delay (sec/veh):	105.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	210	175	25	20	140	205	0	40	25	25	5	45
Conflicting Peds.(#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade (%)		0%			0%			0%			0%	
Peak Hour Factor	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Heavy Vehicles(%)	1	2	0	0	3	2	0	0	0	0	14	2
Movement Flow Rate	339	282	40	32	226	331	0	65	40	40	8	73
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 1		
Conflicting Flow Rate - All	556	0	0	323	0	0	-	1601	302	1488	1456	391
Stage 1	0	0	0	0	0	0	-	980	0	456	456	0
Stage 2	0	0	0	0	0	0	-	621	0	1032	1000	0
Follow-up Headway	2.209	-	-	2.2	0	0	-	4	3.3	3.5	4.126	3.318
Pot Capacity-1 Maneuver	1020	-	-	1250	-	-	-	107	742	103	122	658
Stage 1	-	-	-	-	-	-	-	331	-	588	548	-
Stage 2	-	-	-	-	-	-	-	482	-	284	306	-
Mov Capacity-1 Maneuver	1020	-	-	1250	-	-	-	69.6	742	# 14.2	79.4	658
Mov Capacity-2 Maneuver	-	-	-	-	-	-	-	69.6	-	# 14.2	79.4	-
Stage 1	-	-	-	-	-	-	-	221.1	-	588	533.8	-
Stage 2	-	-	-	-	-	-	-	469.5	-	127.1	204.4	-

Approach	EB	WB	NB	SB
HCM Control Delay (s)	5.3	0.4	156	$ 1124.8
HCM LOS	A	A	F	F

Lane	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (vph)	107							40
HCM Control Delay (s)	156	10.274	0	-	7.956	0	-	$ 156
HCM Lane VC Ratio	0.98	0.332	-	-	0.026	-	-	3.024
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th Percentile Queue (veh)	6.137	1.466	-	-	0.079	-	-	13.485

Intersection	
Intersection Delay (sec/veh)	17.4
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	195	30	25	290	75	80
Peak Hour Factor	0.62	0.62	0.62	0.62	0.62	0.62
Heavy Vehicles(%)	4	2	0	2	0	1
Movement Flow Rate	315	48	40	468	121	129
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	14.7	21.5	12.9
HCM LOS	B	C	B

Lane	NBLn1	EBLn1	WBLn1
Volume Left (%)	48%	0%	8%
Volume Thru (%)	0%	87%	92%
Volume Right (%)	52%	13%	0%
Sign Control	Stop	Stop	Stop
Traffic Volume by Lane	155	225	315
Left Turning Volume	0	195	290
Through Volume	80	30	0
Right Turning Volume	75	0	25
Lane Flow Rate	250	363	508
Geometry Group	1	1	1
Degree of Utilization, X	0.407	0.543	0.737
Departure Headway, Hd	5.856	5.386	5.223
Convergence(Y/N)	Yes	Yes	Yes
Capacity	613	668	691
Service Time	3.909	3.432	3.265
HCM Lane V/C Ratio	0.408	0.543	0.735
HCM Control Delay	12.9	14.7	21.5
HCM Lane LOS	B	B	C
HCM 95th Percentile Queue	2.1	3.6	8.4

Intersection	
Intersection Delay (sec/veh):	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	245	30	70	310	5	70
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.59	0.59	0.59	0.59	0.59	0.59
Heavy Vehicles(%)	2	0	4	3	0	0
Movement Flow Rate	415	51	119	525	8	119
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	0	466	0	1204	441
Stage 1	0	0	0	0	8.27878359069335E-313	
Stage 2	0	0	0	0	4.88059031926953E-313	
Follow-up Headway	-	-	2.236	0	3.5	3.3
Pot Capacity-1 Maneuver	-	-	1086	-	205	621
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	464	-
Mov Capacity-1 Maneuver	-	-	1086	-	182.7	621
Mov Capacity-2 Maneuver	-	-	-	-	182.7	-
Stage 1	-	-	-	-	#0	-
Stage 2	-	-	-	-	413.4	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	1.6	13.8
HCM LOS	A	A	B

Lane	NBLn1	EBT	EBR	WBL	WBT
Capacity (vph)	535				
HCM Control Delay (s)	13.8	-	-	8.721	0
HCM Lane V/C Ratio	0.238	0	-	0.109	-
HCM Lane LOS	B	-	-	A	-
HCM 95th Percentile Queue (veh)	0.918	0	-	0.367	-

Intersection	
Intersection Delay (sec/veh):	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	0	300	15	30	350	0	10	0	50	0	2	20
Conflicting Peds.(#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade (%)		0%			0%			0%			0%	
Peak Hour Factor	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Heavy Vehicles(%)	0	1	0	0	3	0	0	0	4	0	0	6
Movement Flow Rate	0	545	27	55	636	0	18	0	91	0	4	36
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 1		
Conflicting Flow Rate - All	-	0	0	573	0	-	1324	1304	559	-	1318	636
Stage 1	-	0	0	0	0	-	559	559	0	-	745	0
Stage 2	-	0	0	0	0	-	765	745	0	-	573	0
Follow-up Headway	-	-	-	2.2	0	-	3.5	4	3.336	-	4	3.354
Pot Capacity-1 Maneuver	-	-	-	1010	-	-	134	162	525	-	159	470
Stage 1	-	-	-	-	-	-	517	514	-	-	424	-
Stage 2	-	-	-	-	-	-	399	424	-	-	507	-
Mov Capacity-1 Maneuver	-	-	-	1010	-	-	-	153.3	525	-	150.4	470
Mov Capacity-2 Maneuver	-	-	-	-	-	-	-	153.3	-	-	150.4	-
Stage 1	-	-	-	-	-	-	517	0	-	-	401.1	-
Stage 2	-	-	-	-	-	-	345.1	401.1	-	-	# 0	-

Approach	EB	WB	NB	SB
HCM Control Delay (s)	0	0.7	-	15.2
HCM LOS	A	A	-	C

Lane	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (vph)	-					394
HCM Control Delay (s)	-	-	-	8.768	0	15.2
HCM Lane VC Ratio	-	0	-	0.054	-	0.102
HCM Lane LOS	-	-	-	A	-	C
HCM 95th Percentile Queue (veh)	-	0	-	0.171	-	0.336

Intersection	
Intersection Delay (sec/veh):	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Volume (vph)	40	310	370	30	10	10
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade (%)		0%	0%		0%	
Peak Hour Factor	0.55	0.55	0.55	0.55	0.55	0.55
Heavy Vehicles(%)	0	1	1	3	0	0
Movement Flow Rate	73	564	673	55	18	18
Number of Lanes	0	1	1	0	1	0

Major/Minor		Major 1	Major 2			
Conflicting Flow Rate - All	727	0	0	0	1409	700
Stage 1	[illegible]386E-322		0	0	700	0
Stage 2	[illegible]575E161		0	0	709	0
Follow-up Headway	2.2	-	0	0	3.5	3.3
Pot Capacity-1 Maneuver	886	-	-	-	154	442
Stage 1	-	-	-	-	496	-
Stage 2	-	-	-	-	491	-
Mov Capacity-1 Maneuver	886	-	-	-	141.4	442
Mov Capacity-2 Maneuver	-	-	-	-	141.4	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	450.7	-

Approach	EB	WB	SB
HCM Control Delay (s)	1.1	0	25.2
HCM LOS	A	A	D

Lane	EBL	EBT		WBT	WBR	SBLn1
Capacity (vph)						214
HCM Control Delay (s)	9.426	0	-	-	-	25.2
HCM Lane VC Ratio	0.082	-	0	0	-	0.17
HCM Lane LOS	A	-	-	-	-	D
HCM 95th Percentile Queue (veh)	0.268	-	0	0	-	0.598

Intersection	
Intersection Delay (sec/veh)	33.4
Intersection LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	160	350	105	295	40	65
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles(%)	1	0	5	1	0	1
Movement Flow Rate	222	486	146	410	56	90
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	40.8	29.6	11.8
HCM LOS	E	D	B

Lane	NBLn1	EBLn1	WBLn1
Volume Left (%)	38%	0%	26%
Volume Thru (%)	0%	31%	74%
Volume Right (%)	62%	69%	0%
Sign Control	Stop	Stop	Stop
Traffic Volume by Lane	105	510	400
Left Turning Volume	0	160	295
Through Volume	65	350	0
Right Turning Volume	40	0	105
Lane Flow Rate	146	708	556
Geometry Group	1	1	1
Degree of Utilization, X	0.262	0.937	0.833
Departure Headway, Hd	6.456	4.761	5.397
Convergence(Y/N)	Yes	Yes	Yes
Capacity	554	758	672
Service Time	4.52	2.803	3.441
HCM Lane V/C Ratio	0.264	0.934	0.827
HCM Control Delay	11.8	40.8	29.6
HCM Lane LOS	B	E	D
HCM 95th Percentile Queue	1.1	40.1	14.7

Intersection	
Intersection Delay (sec/veh):	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Volume (vph)	0	225	255	0	65	145
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade (%)		0%	0%		0%	
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles(%)	0	1	1	0	5	1
Movement Flow Rate	0	312	354	0	90	201
Number of Lanes	0	1	1	0	1	1

Major/Minor	Major 1		Major 2			
Conflicting Flow Rate - All	-	0	0	-	667	354
Stage 1	-	0	0	-	354	0
Stage 2	-	0	0	-	313	0
Follow-up Headway	-	-	0	-	3.545	3.309
Pot Capacity-1 Maneuver	-	-	-	-	419	693
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	735	-
Mov Capacity-1 Maneuver	-	-	-	-	419	693
Mov Capacity-2 Maneuver	-	-	-	-	419	-
Stage 1	-	-	-	-	#0	-
Stage 2	-	-	-	-	#0	-

Approach	EB	WB	SB
HCM Control Delay (s)	0	0	13.414
HCM LOS	A	A	B

Lane	EBT	WBT	SBLn1	SBLn2
Capacity (vph)			419	693
HCM Control Delay (s)	-	-	15.9	12.3
HCM Lane V/C Ratio	0	0	0.215	0.291
HCM Lane LOS	-	-	C	B
HCM 95th Percentile Queue (veh)	0	0	0.808	1.205

Intersection	
Intersection Delay (sec/veh):	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	85	175	30	10	205	100	5	15	10	90	15	45
Conflicting Peds.(#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade (%)		0%			0%			0%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles(%)	1	2	0	14	1	3	33	0	0	0	0	0
Movement Flow Rate	106	219	38	12	256	125	6	19	12	112	19	56
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 1		
Conflicting Flow Rate - All	381	0	0	256	0	0	831	856	238	810	813	319
Stage 1	0	0	0	0	0	0	450	450	0	344	344	0
Stage 2	0	0	0	0	0	0	381	406	0	466	469	0
Follow-up Headway	2.209	-	-	2.326	0	0	3.797	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1182	-	-	1244	-	-	256	297	806	301	315	728
Stage 1	-	-	-	-	-	-	533	575	-	676	640	-
Stage 2	-	-	-	-	-	-	583	601	-	581	564	-
Mov Capacity-1 Maneuver	1182	-	-	1244	-	-	207.5	267.6	806	259.4	283.8	728
Mov Capacity-2 Maneuver	-	-	-	-	-	-	207.5	267.6	-	259.4	283.8	-
Stage 1	-	-	-	-	-	-	533	523.3	-	676	633.6	-
Stage 2	-	-	-	-	-	-	516.8	595	-	501.9	513.2	-

Approach	EB	WB	NB	SB
HCM Control Delay (s)	2.4	0.3	17.6	30.1
HCM LOS	A	A	C	D

Lane	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (vph)	324							325
HCM Control Delay (s)	17.6	8.346	0	-	7.923	0	-	30.1
HCM Lane V/C Ratio	0.116	0.09	-	-	0.01	-	-	0.577
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th Percentile Queue (veh)	0.388	0.296	-	-	0.03	-	-	3.413

Intersection	
Intersection Delay (sec/veh)	11.1
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	250	25	25	280	35	35
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles(%)	2	0	0	3	3	6
Movement Flow Rate	312	31	31	350	44	44
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	11	11.7	9.2
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	WBLn1
Volume Left (%)	50%	0%	8%
Volume Thru (%)	0%	91%	92%
Volume Right (%)	50%	9%	0%
Sign Control	Stop	Stop	Stop
Traffic Volume by Lane	70	275	305
Left Turning Volume	0	250	280
Through Volume	35	25	0
Right Turning Volume	35	0	25
Lane Flow Rate	88	344	381
Geometry Group	1	1	1
Degree of Utilization, X	0.129	0.432	0.478
Departure Headway, Hd	5.322	4.522	4.518
Convergence(Y/N)	Yes	Yes	Yes
Capacity	670	794	797
Service Time	3.385	2.558	2.554
HCM Lane V/C Ratio	0.131	0.433	0.478
HCM Control Delay	9.2	11	11.7
HCM Lane LOS	A	B	B
HCM 95th Percentile Queue	0.4	2.3	2.7

Intersection	
Intersection Delay (sec/veh):	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	275	10	30	300	5	35
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.52	0.52	0.52	0.52	0.52	0.52
Heavy Vehicles(%)	2	0	0	1	0	0
Movement Flow Rate	529	19	58	577	10	67
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	0	548	0	1230	538
Stage 1	0	0	0	0	538	0
Stage 2	0	0	0	0	692	0
Follow-up Headway	-	-	2.2	0	3.5	3.3
Pot Capacity-1 Maneuver	-	-	1031	-	198	547
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	500	-
Mov Capacity-1 Maneuver	-	-	1031	-	186.9	547
Mov Capacity-2 Maneuver	-	-	-	-	186.9	-
Stage 1	-	-	-	-	#0	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	0.8	14.9
HCM LOS	A	A	B

Lane	NBLn1	EBT	EBR	WBL	WBT
Capacity (vph)	441				
HCM Control Delay (s)	14.9	-	-	8.699	0
HCM Lane VC Ratio	0.174	-	-	0.056	-
HCM Lane LOS	B	-	-	A	-
HCM 95th Percentile Queue (veh)	0.625	0	-	0.178	-

Intersection	
Intersection Delay (sec/veh):	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	0	280	25	25	280	0	5	0	0	5	5	45
Conflicting Peds.(#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade (%)		0%			0%			0%			0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles(%)	0	2	0	0	4	0	0	0	3	50	0	2
Movement Flow Rate	0	378	34	34	378	0	7	0	0	7	7	61
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 1		
Conflicting Flow Rate - All	-	0	0	412	0	-	875	841	-	841	858	378
Stage 1	-	0	0	0	0	-	395	395	-	446	446	0
Stage 2	-	0	0	0	0	-	480	446	-	395	412	0
Follow-up Headway	-	-	-	2.2	0	-	3.5	4	-	3.95	4	3.318
Pot Capacity-1 Maneuver	-	-	-	1157	-	-	272	303	-	236	297	669
Stage 1	-	-	-	-	-	-	634	608	-	509	577	-
Stage 2	-	-	-	-	-	-	571	577	-	544	598	-
Mov Capacity-1 Maneuver	-	-	-	1157	-	-	-	294.2	-	-	288.4	669
Mov Capacity-2 Maneuver	-	-	-	-	-	-	-	294.2	-	-	288.4	-
Stage 1	-	-	-	-	-	-	634	0	-	509	560.3	-
Stage 2	-	-	-	-	-	-	498	560.3	-	544	# 0	-

Approach	EB	WB	NB	SB
HCM Control Delay (s)	0	0.7	-	-
HCM LOS	A	A	-	-

Lane	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (vph)	-					-
HCM Control Delay (s)	-	-	-	8.205	0	-
HCM Lane VC Ratio	-	0	-	0.029	-	-
HCM Lane LOS	-	-	-	A	-	-
HCM 95th Percentile Queue (veh)	-	0	-	0.09	-	-

Intersection	
Intersection Delay (sec/veh):	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Volume (vph)	30	260	285	35	15	20
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade (%)		0%	0%		0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles(%)	3	2	3	0	0	0
Movement Flow Rate	41	351	385	47	20	27
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow Rate - All	432	0	0	0	841	409
Stage 1	0	0	0	0	409	0
Stage 2	0	0	0	0	432	0
Follow-up Headway	2.227	-	0	0	3.5	3.3
Pot Capacity-1 Maneuver	1123	-	-	-	338	647
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	659	-
Mov Capacity-1 Maneuver	1123	-	-	-	325.8	647
Mov Capacity-2 Maneuver	-	-	-	-	325.8	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	635.3	-

Approach	EB	WB	SB
HCM Control Delay (s)	0.9	0	13.8
HCM LOS	A	A	B

Lane	EBL	EBT	WBT	WBR	SBLn1
Capacity (vph)					455
HCM Control Delay (s)	8.326	0	-	-	13.8
HCM Lane VC Ratio	0.036	-	0	-	0.104
HCM Lane LOS	A	-	-	-	B
HCM 95th Percentile Queue (veh)	0.112	-	0	-	0.346

Appendix F

Madison Elementary School Traffic Capacity Analysis

Intersection	
Intersection Delay (sec/veh)	10.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	10	20	10	35	20	25	50	115	40	30	120	5
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Heavy Vehicles(%)	0	5	0	10	5	4	2	6	7	4	15	0
Movement Flow Rate	17	33	17	58	33	42	83	192	67	50	200	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.2	10	11.6	10.7
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Volume Left (%)	24%	25%	44%	19%
Volume Thru (%)	56%	50%	25%	77%
Volume Right (%)	20%	25%	31%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Volume by Lane	205	40	80	155
Left Turning Volume	115	20	20	120
Through Volume	40	10	25	5
Right Turning Volume	50	10	35	30
Lane Flow Rate	342	67	133	258
Geometry Group	1	1	1	1
Degree of Utilization, X	0.448	0.102	0.206	0.354
Departure Headway, Hd	4.72	5.53	5.567	4.928
Convergence(Y/N)	Yes	Yes	Yes	Yes
Capacity	755	651	648	721
Service Time	2.804	3.536	3.57	3.02
HCM Lane V/C Ratio	0.453	0.103	0.205	0.358
HCM Control Delay	11.6	9.2	10	10.7
HCM Lane LOS	B	A	A	B
HCM 95th Percentile Queue	2.4	0.3	0.8	1.6

Intersection	
Intersection Delay (sec/veh):	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	5	65	0	65	5	0
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.45	0.45	0.45	0.45	0.45	0.45
Heavy Vehicles(%)	0	0	0	4	60	0
Movement Flow Rate	11	144	0	144	11	0
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	0	-	0	227	-
Stage 1	0	0	-	0	83	-
Stage 2	0	0	-	0	144	-
Follow-up Headway	-	-	-	0	4.04	-
Pot Capacity-1 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	813	-
Stage 2	-	-	-	-	759	-
Mov Capacity-1 Maneuver	-	-	-	-	649	-
Mov Capacity-2 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	# 0	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	0	10.6
HCM LOS	A	A	B

Lane	NBLn1	EBT	EBR	WBT
Capacity (vph)	649			
HCM Control Delay (s)	10.6	-	-	-
HCM Lane V/C Ratio	0.017	0	-	0
HCM Lane LOS	B	-	-	-
HCM 95th Percentile Queue (veh)	0.052	0	-	0

Intersection	
Intersection Delay (sec/veh):	.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	5	0	0	5	60	0
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.39	0.39	0.39	0.39	0.39	0.39
Heavy Vehicles(%)	0	0	0	0	4	0
Movement Flow Rate	13	0	0	13	154	0
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	-	-	0	26	-
Stage 1	0	-	-	0	13	-
Stage 2	0	-	-	0	13	-
Follow-up Headway	-	-	-	0	3.536	-
Pot Capacity-1 Maneuver	-	-	-	-	984	-
Stage 1	-	-	-	-	1005	-
Stage 2	-	-	-	-	1005	-
Mov Capacity-1 Maneuver	-	-	-	-	984	-
Mov Capacity-2 Maneuver	-	-	-	-	984	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	# 0	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	0	9.3
HCM LOS	A	A	A

Lane	NBLn1	EBT	WBT
Capacity (vph)	984		
HCM Control Delay (s)	9.3	-	-
HCM Lane V/C Ratio	0.156	0	0
HCM Lane LOS	A	-	-
HCM 95th Percentile Queue (veh)	0.553	0	0

Intersection	
Intersection Delay (sec/veh)	12.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	30	5	60	10	5	5	15	200	5	5	200	5
Peak Hour Factor	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Heavy Vehicles(%)	0	0	0	0	0	0	7	5	0	0	6	0
Movement Flow Rate	51	8	102	17	8	8	25	339	8	8	339	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	9.3	13.3	12.5
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Volume Left (%)	7%	32%	50%	2%
Volume Thru (%)	91%	5%	25%	95%
Volume Right (%)	2%	63%	25%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Volume by Lane	220	95	20	210
Left Turning Volume	200	5	5	200
Through Volume	5	60	5	5
Right Turning Volume	15	30	10	5
Lane Flow Rate	373	161	34	356
Geometry Group	1	1	1	1
Degree of Utilization, X	0.514	0.243	0.056	0.481
Departure Headway, Hd	5.066	5.441	5.986	4.969
Convergence(Y/N)	Yes	Yes	Yes	Yes
Capacity	716	663	601	730
Service Time	3.066	3.442	3.994	2.969
HCM Lane V/C Ratio	0.521	0.243	0.057	0.488
HCM Control Delay	13.3	10.2	9.3	12.5
HCM Lane LOS	B	B	A	B
HCM 95th Percentile Queue	3.2	1	0.2	2.8

Intersection	
Intersection Delay (sec/veh)	8.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	5	15	10	25	10	25	30	110	30	25	100	10
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles(%)	0	0	0	3	7	0	0	5	0	16	6	0
Movement Flow Rate	6	19	13	32	13	32	38	141	38	32	128	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8	8.3	8.8	9.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Volume Left (%)	18%	17%	42%	19%
Volume Thru (%)	65%	50%	17%	74%
Volume Right (%)	18%	33%	42%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Volume by Lane	170	30	60	135
Left Turning Volume	110	15	10	100
Through Volume	30	10	25	10
Right Turning Volume	30	5	25	25
Lane Flow Rate	218	38	77	173
Geometry Group	1	1	1	1
Degree of Utilization, X	0.261	0.05	0.101	0.225
Departure Headway, Hd	4.304	4.72	4.719	4.672
Convergence(Y/N)	Yes	Yes	Yes	Yes
Capacity	835	758	759	770
Service Time	2.325	2.755	2.75	2.694
HCM Lane V/C Ratio	0.261	0.05	0.101	0.225
HCM Control Delay	8.8	8	8.3	9.1
HCM Lane LOS	A	A	A	A
HCM 95th Percentile Queue	1.1	0.2	0.3	0.9

Intersection	
Intersection Delay (sec/veh):	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	10	60	0	60	5	0
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.38	0.38	0.38	0.38	0.38	0.38
Heavy Vehicles(%)	13	5	0	4	0	0
Movement Flow Rate	26	158	0	158	13	0
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	0	-	0	263	-
Stage 1	0	0	-	0	105	-
Stage 2	0	0	-	0	158	-
Follow-up Headway	-	-	-	0	3.5	-
Pot Capacity-1 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	924	-
Stage 2	-	-	-	-	875	-
Mov Capacity-1 Maneuver	-	-	-	-	730	-
Mov Capacity-2 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	# 0	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	0	10
HCM LOS	A	A	B

Lane	NBLn1	EBT	EBR	WBT
Capacity (vph)	730			
HCM Control Delay (s)	10	-	-	-
HCM Lane V/C Ratio	0.018	0	-	0
HCM Lane LOS	B	-	-	-
HCM 95th Percentile Queue (veh)	0.055	0	-	0

Intersection	
Intersection Delay (sec/veh):	8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Volume (vph)	5	0	0	5	55	0
Conflicting Peds.(#/hr)	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
Right Turn Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade (%)	0%			0%	0%	
Peak Hour Factor	0.35	0.35	0.35	0.35	0.35	0.35
Heavy Vehicles(%)	0	0	0	0	4	0
Movement Flow Rate	14	0	0	14	157	0
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow Rate - All	0	-	-	0	28	-
Stage 1	0	-	-	0	14	-
Stage 2	0	-	-	0	14	-
Follow-up Headway	-	-	-	0	3.536	-
Pot Capacity-1 Maneuver	-	-	-	-	982	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	1004	-
Mov Capacity-1 Maneuver	-	-	-	-	982	-
Mov Capacity-2 Maneuver	-	-	-	-	982	-
Stage 1	-	-	-	-	# 0	-
Stage 2	-	-	-	-	# 0	-

Approach	EB	WB	NB
HCM Control Delay (s)	0	0	9.4
HCM LOS	A	A	A

Lane	NBLn1	EBT	WBT
Capacity (vph)	982		
HCM Control Delay (s)	9.4	-	-
HCM Lane VC Ratio	0.16	0	0
HCM Lane LOS	A	-	-
HCM 95th Percentile Queue (veh)	0.568	0	0

Intersection	
Intersection Delay (sec/veh)	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	20	5	35	10	5	10	20	170	35	5	150	15
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles(%)	0	25	0	0	0	0	0	2	0	0	3	0
Movement Flow Rate	24	6	43	12	6	12	24	207	43	6	183	18
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

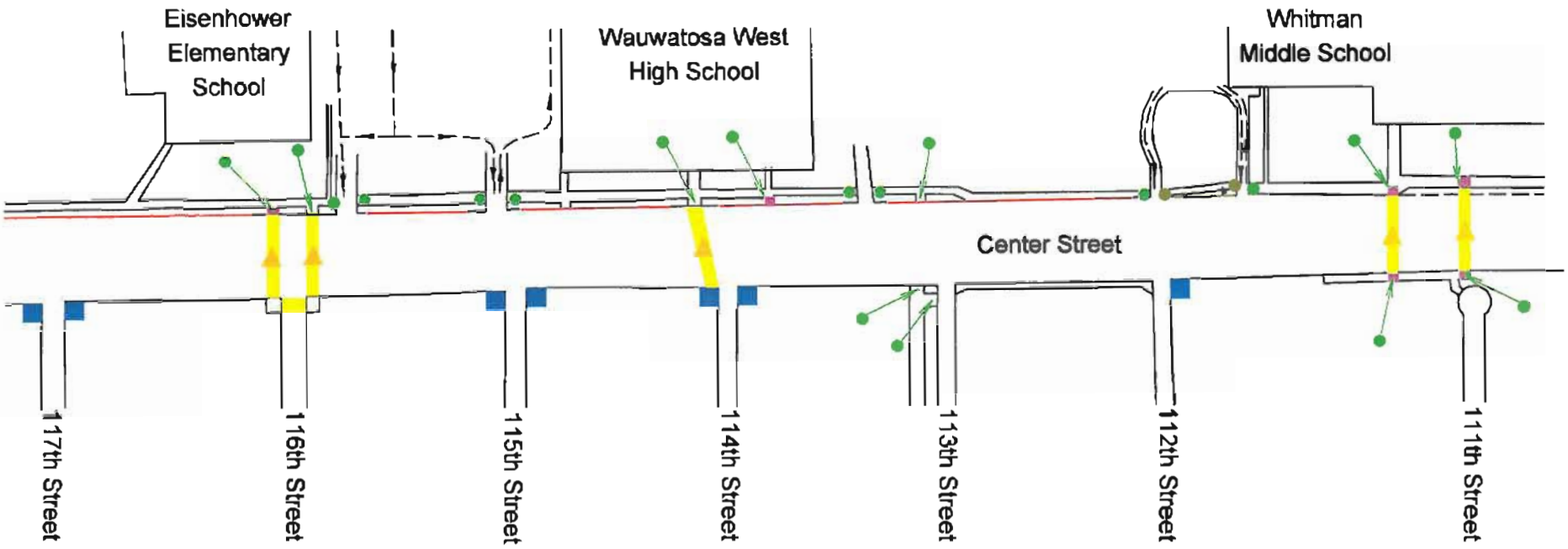
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	8.1	9.4	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Volume Left (%)	9%	33%	40%	3%
Volume Thru (%)	76%	8%	20%	88%
Volume Right (%)	16%	58%	40%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Volume by Lane	225	60	25	170
Left Turning Volume	170	5	5	150
Through Volume	35	35	10	15
Right Turning Volume	20	20	10	5
Lane Flow Rate	274	73	30	207
Geometry Group	1	1	1	1
Degree of Utilization, X	0.327	0.096	0.041	0.253
Departure Headway, Hd	4.292	4.705	4.888	4.386
Convergence(Y/N)	Yes	Yes	Yes	Yes
Capacity	837	760	731	819
Service Time	2.317	2.741	2.93	2.411
HCM Lane V/C Ratio	0.327	0.096	0.041	0.253
HCM Control Delay	9.4	8.2	8.1	8.9
HCM Lane LOS	A	A	A	A
HCM 95th Percentile Queue	1.5	0.3	0.1	1

Appendix G

Center Street Short-Term Recommendations

CENTER STREET SCHOOLS
SHORT-TERM SAFETY RECOMMENDATIONS

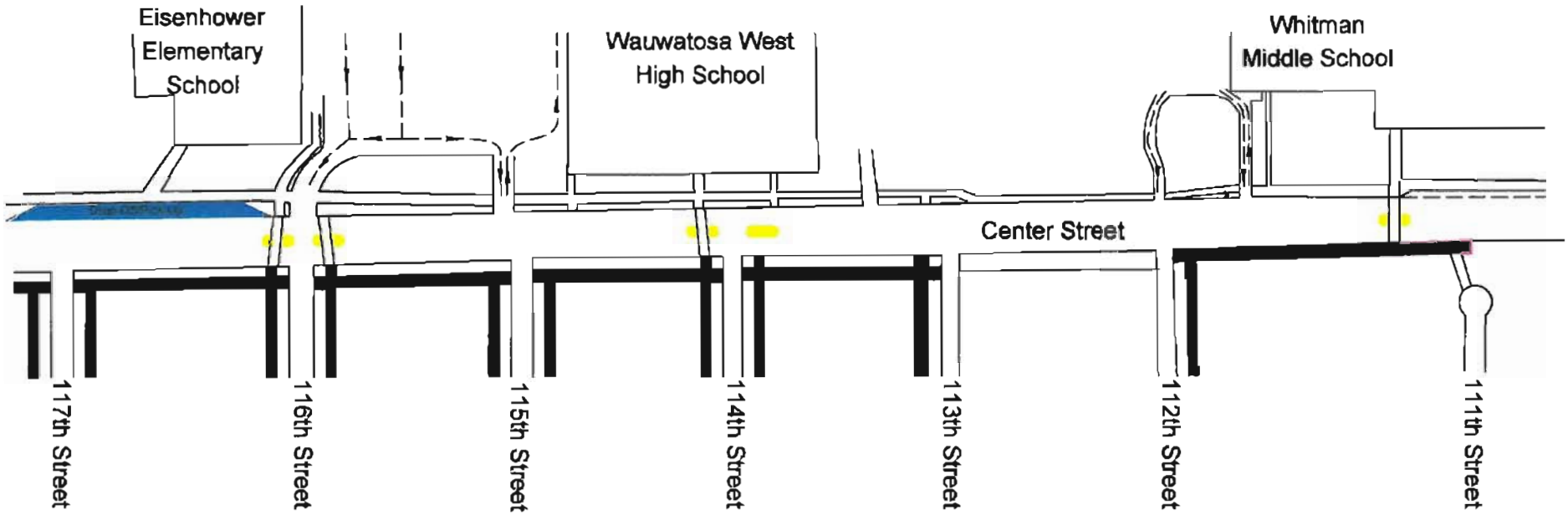


PROJECT NO: 49-0008.00	HWY: Center Street	COUNTY: Milwaukee	Wauwatosa School Safety Study	SHEET	E

Appendix H

Center Street Schools Long-Term Recommendations

CENTER STREET SCHOOLS
LONG -TERM SAFETY RECOMMENDATIONS



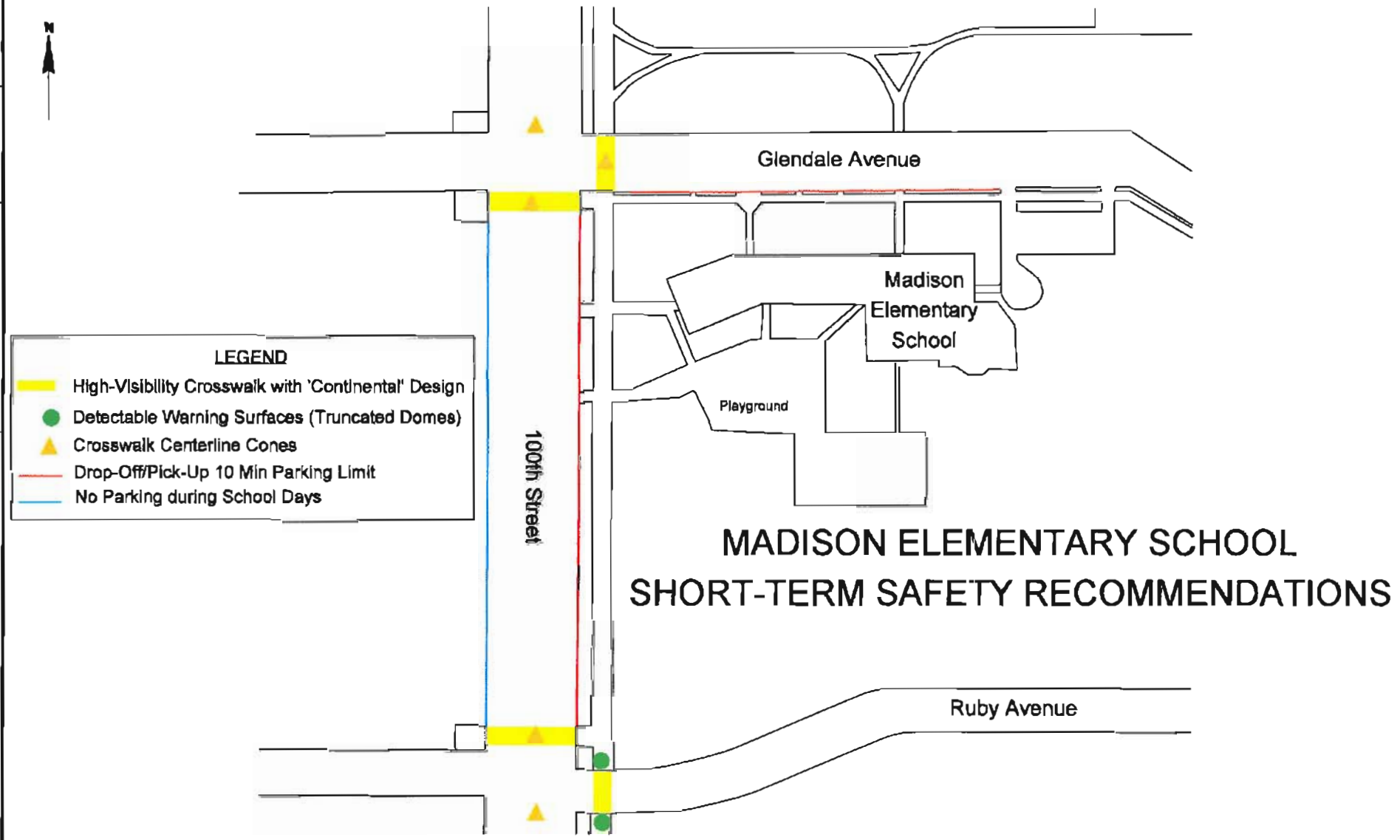
LEGEND

- Median Pedestrian Refuge Island
- Drop-Off/Pick-Up Bay
- Sidewalk
- Install Railing/Wider Sidewalk/Retaining Wall

PROJECT NO: 49-0008.00	HWY: Center Street	COUNTY: Milwaukee	Wauwatosa School Safety Study	SHEET	E

Appendix I

Madison Elementary School Short-Term Recommendations



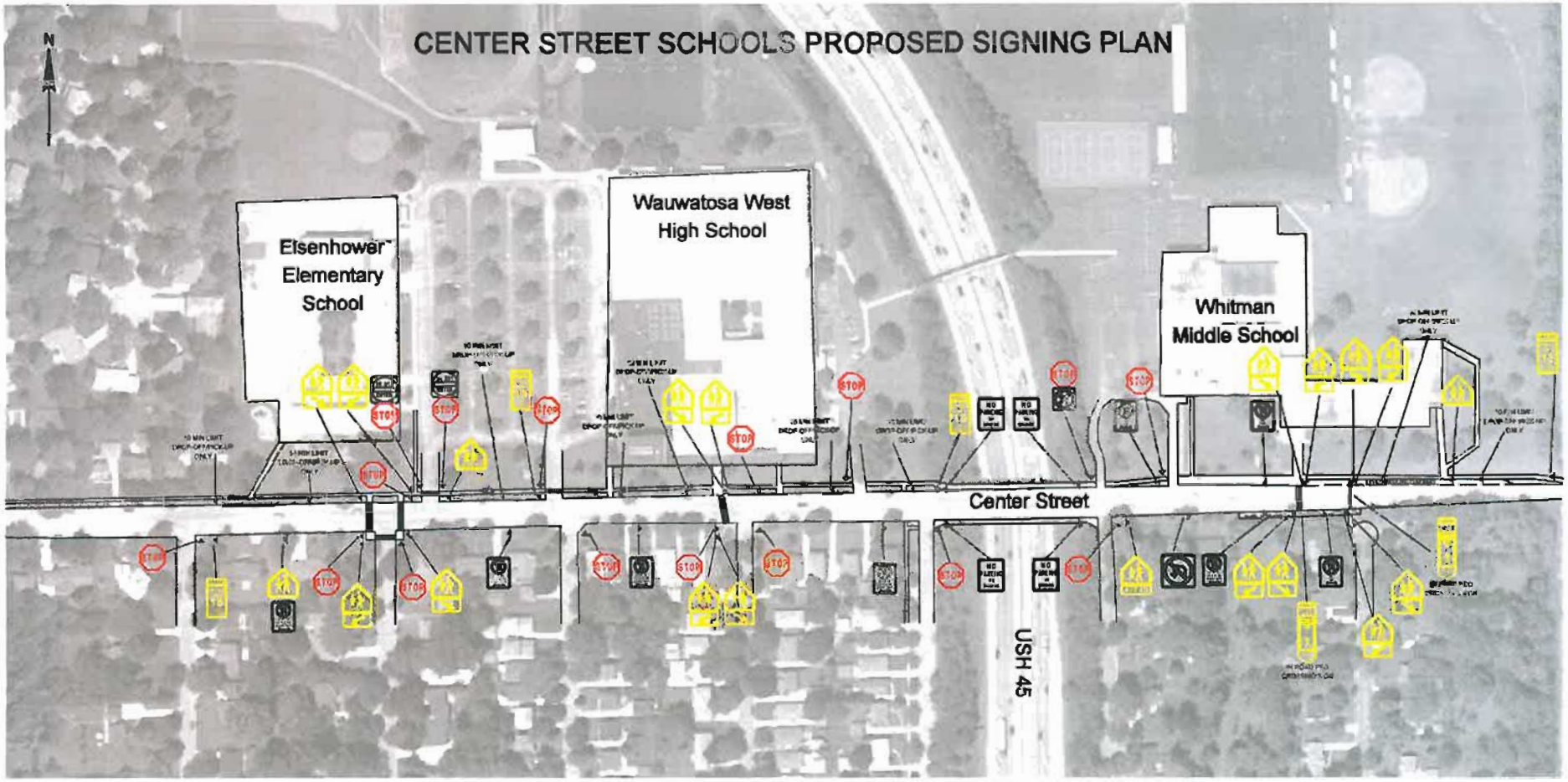
MADISON ELEMENTARY SCHOOL
SHORT-TERM SAFETY RECOMMENDATIONS

PROJECT NO: 49-0008.00	HWY: Glendale Avenue	COUNTY: Milwaukee	Wauwatosa School Safety Study - Madison Elementary	SHEET	E

Appendix J

Center Street Proposed Signing Plan

CENTER STREET SCHOOLS PROPOSED SIGNING PLAN



S1-1
36" X 36"

S4-51
24" X 48"

S4-2
24" X 12"

S4-52
12" X 42"

W16-9P
24" X 8"

W16-7L/R
24" X 12"

R3-18
24" X 24"

R7-2A
12" X 18"

R7-2A
12" X 18"

R8-52
24" X 30"

PROJECT NO: 49-0008.00	HWY: Center Street	COUNTY: Milwaukee	Wauwatosa School Saftey Study	SHEET	E

FILE NAME : ...

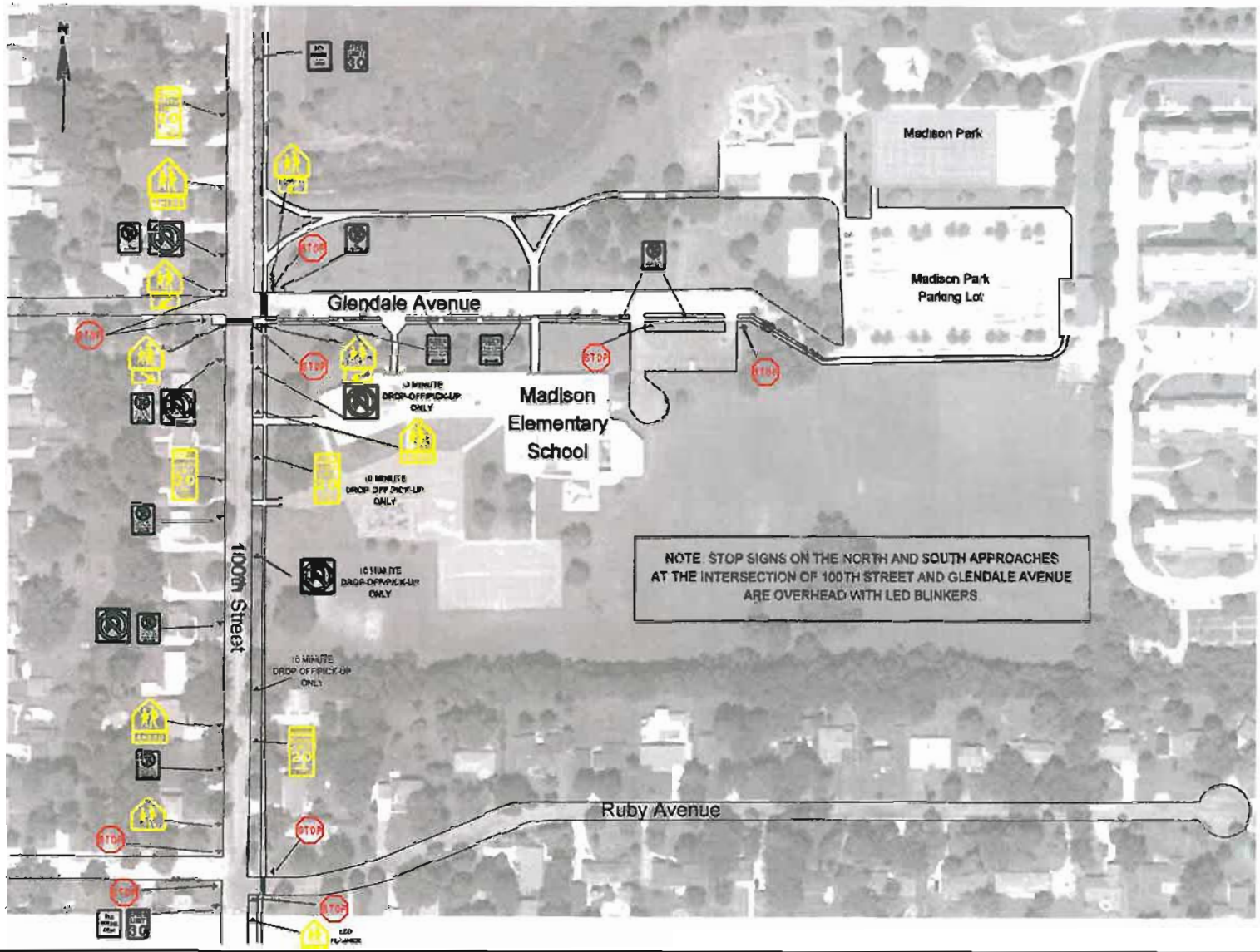
PLOT DATE : ... PLOT BY : ... PLOT NAME :

PLOT SCALE : ...

WISDOT/CADDS SHEET 42

Appendix K

Madison Elementary School Proposed Signing Plan



PROPOSED MADISON SCHOOL SIGNING PLAN

S1-1
36" X 36"

AHEAD
W16-9P
24" X 8"

SCHOOL SPEED LIMIT 20 WHEN CHILDREN ARE PRESENT
S4-51
24" X 48"

SPEED LIMIT 30
R2-1
24" X 30"

END SCHOOL ZONE
S5-2
24" X 30"

R3-18
24" X 24"

W16-7L
24" X 12"

STOP
R1-1
30" X 30"

R7-2A
12" X 18"

R7-2A
12" X 18"

PROJECT NO: 49-0008.00	HWY: Glendale Avenue	COUNTY: Milwaukee	Wauwatosa School Safety Study - Madison Elementary	SHEET	E

FILE NAME : ...
PLOT DATE : ... PLOT BY : ... PLOT NAME :
PLOT SCALE : ... WISDOT/CADDS SHEET 42