Traffic Engineering Division
David C. Dryer, City Traffic Engineer

215 Martin Luther King, Jr. Boulevard
P.O. Box 2986
Madison, Wisconsin 53701-2986
(Phone) 608 266 4761
(TTY) 608 267 9623
(FAX) 608 267-1158

SUMMARY OF STAFF RECOMMENDATIONS
To PEDESTRIAN/BICYCLE/MOTOR VEHICLE COMMISSION

November 25, 2008

1. Old Sauk Road Road and Westfield Road: Recommend maintaining current stop sign control.

2. Cottage Grove & Thompson: Recommend maintaining current stop sign control.

3. Monona Drive, Panther Trail and Tompkins Drive: Recommend maintaining current stop sign control.

4. Marshall, Ridge, & University: Recommend maintaining current stop sign control.
We continue to work with Shorewood Hills to improve pedestrian crossing conditions at Marshall/Ridge and University Bay/Farley intersections as part of improvements required for the Village of Shorewood Hills proposed 800 University Bay Redevelopment project.

5. Aberg/HWY 30 Ramps and East Washington Avenue: Recommend installing traffic signal control during next year's East Washington Avenue Reconstruction Project.

6. Brooks Street and Johnson Street: Recommend installing traffic signal control as part of the University Avenue repaving project to accommodate traffic detoured by the closing of Park Street, University Avenue to Johnson Street. The signal control will then remain, which will be helpful for all modes of traffic crossing or entering Johnson Street from Brooks Street. This signal will not impact Johnson Street platoons.

2008 TRAFFIC SIGNAL PRIORITY LIST
SPECIAL STUDIES FOR PBMVC SELECT INTERSECTIONS

Actions completed to date

1. **Old Sauk Road & Westfield Road**
   Collected 24 hour automatic machine counts.

2. **Cottage Grove & Thompson**
   Collected 24 hour automatic hose counts.

3. **Monona Drive, Panther Trail & Tompkins Drive**
   Collected 24 hour automatic hose counts.

4. **Marshall, Ridge, & University**
   Reviewed yearly hose count data collected on University Avenue.
   Reviewed Draft Marshall Court Traffic Study for Village of Shorewood Hills.

TRAFFIC SIGNAL PRIORITY LIST COMMENTARY

Old Sauk Road & Westfield Road

The Old Sauk-Westfield intersection is located on Old Sauk Road approximately 1600 feet west of the signalized intersection at Gammon Road and approximately 2,900 feet east of the signalized intersection at High Point Road.

Recent manual and automatic hose counts show that this intersection is 23% short of meeting the adopted minimum numerical volume for traffic signals.

A delay study performed previously in 2006 during the peak p.m. traffic period showed that the actual delay to motorists on Westfield is 80% short of meeting the minimum delay criteria for traffic signals. The highest 15-minute delay period was found to be from 5:15 – 5:30 p.m. during which time the average delay to motorists on the southbound approach was found to be 44 seconds per vehicle. Delay during this same period was measured at 43 seconds per vehicle in 2003. Average delays recorded during all other time intervals were significantly less.

The crash history for the past five years, 2003 thru 2007, shows there have been an average of 1.2 crashes per year (of crash types considered correctable by traffic signals). A traffic signal is not expected to improve upon this low number of crashes.

If this intersection is to become signalized, the intersection needs to be modified via remarking to provide left-turn lanes for both eastbound and westbound Old Sauk Road, and will require widening the east side of Old Sauk Road in order to maintain bike lanes. The eastbound Bike and Right Turn Only lane designation between Westfield and Gammon Road would need to be removed.

Cottage Grove & Thompson

The Cottage Grove-Thompson intersection is located on Cottage Grove Road approximately 600 feet west of the bridge over Interstate Highway 90. It is approximately 4,400 east of the signalized intersection at Acewood Blvd. and approximately 5,300 west of the signalized intersection at Sprecher Road. The Cottage Grove-Thompson intersection forms a “T” intersection, with Cottage Grove having the right-of-way and Thompson Road being stop controlled.

Recent manual and automatic hose counts show that this intersection is 23% short of meeting the adopted minimum numerical volume for traffic signals.

The intersection crash rate is favorable. A total of six crashes have been reported during the past three years.

Staff recommends maintaining the current stop sign control. We will continue to monitor the Cottage Grove-Thompson intersection to assess changing conditions.

Monona Drive, Panther Trail & Tompkins Drive

Both Panther Trail & Tompkins Drive intersect Monona Drive (CTH BB) at “T” intersections, with Monona Drive having the right-of-way and Panther/Tompkins stop sign controlled. Tompkins is located in the City of Madison 150 feet south of Panther Trail, 480 feet north of Owens Road, and 1,300 feet north of Frostwoods Road. Panther Trail is located in the City of Monona 1,150 feet south of the signalized intersection at PflaumRoad/Nichols Road. The Monona-Owens intersection, in the City of Monona, is proposed to be signalized as part of their Monona Drive reconstruction project next year.

Recent manual and automatic hose counts show that this intersection is 62% short of meeting the adopted minimum numerical volume for traffic signals.

The crash history for the past five years, 2003 thru 2007, shows there have been an average of 0.6 crashes per year (of crash types considered correctable by traffic signals). A traffic signal would not be expected to improve the safety record of the intersection.

Two-way progressive flow between traffic signals at the Panther/Tompkins intersection pair and the planned traffic signal at Owens Road would not be possible due to the short distance separating these intersections.

Staff recommends maintaining the current stop sign control.

Marshall, Ridge, & University

This intersection is located on University Avenue 1,345 feet to the east of the signalized Hill-Shorewood-University intersection and 1,430 feet to the west of the signalized Farley-University Bay-University intersection. University Avenue is a primary arterial serving the region and downtown Madison. It carries about 57,000 vehicles per average weekday. Property to the north of University Avenue is within the Village of Shorewood Hills and south of University Avenue is within the City of Madison. The north leg of the intersection is Marshall Court, a private drive, which serves as an entrance to the University Station shopping plaza. Access to this area is also provided from the signalized intersection at University Bay Drive, via Marshall Court. Access via a pedestrian/bike path to the Shorewood tennis courts and swimming pool is available from Marshall Court. An eastbound bus stop is located just east of Ridge Street and a westbound bus stop is located just east of Marshall Court. The south leg of the intersection is Ridge Street that provides access to a residential neighborhood area. A zebra crosswalk is provided for the east leg crosswalk and a standard marked crosswalk is provided for crossing the west leg. Medians separating the eastbound and westbound lanes provide a narrow refuge area for pedestrians crossing University Avenue. Two advance pedestrian crossing signs are placed in both the eastbound and westbound approaches to the intersection to alert vehicle operators to pedestrian crossings. Adequate sight distance is available for pedestrians/motorists in spite of the University Avenue curve and hill to the west and bushes in the median east of the intersection. Left turns from Marshall Court are prohibited during 7-9 a.m. and 4-6 p.m. Sidewalks are provided continuously between the signalized intersections at Farley Street and Hill Street along the south side of University Avenue but not along the north side of University Avenue. A railroad corridor runs parallel to the north side of University Avenue. After completing a thorough review of the intersection, staff findings are:

1. None of the criteria for signal installation are met. While a signal at this location would provide a reliable means for pedestrians and motorists to cross University Avenue, it would significantly impact and further congest University Avenue. As a result, rear-end crashes are expected to increase as well as increased traffic on parallel local residential streets like Kendall, Regent, and Bluff Streets as some drivers seek less congested routes.

2. Most pedestrians crossing University Avenue are adults and experience less delay than they would with a signalized intersection. With or without a signal, this intersection will not be appropriate for elementary school-age children to cross without adult assistance.

3. Widening the median island and eliminating outbound U-turns and outbound left-turns will help pedestrians in their crossing.

4. A sidewalk on the north side of University between Marshall Court and University Bay will improve opportunities for pedestrians wishing to reach the Marshall Court area. Such an improvement would be in the jurisdiction of the Village of Shorewood Hills and may require cooperation from the owner of the railroad corridor if highway right-of-way is not adequate for the sidewalk.

Crash History

A total of 33 crashes were reported during the six-year period 2002-2007. One of the 33 crashes involved a pedestrian. Twenty-seven or 82% of the 33 reported crashes were types not considered to be correctable by traffic signals such as crashes involving eastbound/westbound left-turning vehicles with opposing westbound/eastbound through vehicles. During this same six-year period, 68 crashes were reported at the nearby signalized Campus-Farley-University Bay intersection. The most recent reported pedestrian crash occurred in 2007 and involved a northbound right-turn motorist not yielding to a westbound pedestrian on rollerblades in the south crosswalk. The next most recent reported pedestrian crash occurred December 1991. The most recent reported crashes involving a bicyclist occurred on 5/30/07 and on 6/16/98, both with a Ridge Street right-turning motorist failing to yield to a westbound bicyclist in the south-leg crosswalk. Neither of these pedestrian or bicycle crashes would likely have been prevented with traffic signal control.

Field Data Collected

Extensive pedestrian and vehicular traffic data was collected in 1998 during the a.m., p.m. and midday traffic peak periods. Traffic hose counts on University Avenue between Franklin and Farley shown in Table-2 indicate that vehicular traffic volumes on University have remained fairly constant, therefore the gap study findings in 1998 remain valid. Spot checks were also conducted during both the a.m. and p.m. peak periods this year to verify that the 1998 pedestrian volumes crossing University as well as vehicle volumes on Marshall and Ridge have also remained steady. The 1998 data collected included manual

counts of vehicles and pedestrians, a vehicle delay study of the southbound approach, and a vehicle gap study utilizing video recording equipment. The volume of pedestrians crossing University Avenue was observed to be highest between 4-5 p.m., 9/17/98, at which time 39 pedestrians/bicyclists crossed University at or near the intersection. About 85% of the pedestrians crossing University Avenue used the zebra striped crosswalk.

Table-1

Annual Vehicular Traffic Counts on University Avenue Between Franklin and Farley

Year	1997	1999	2001	2003	2005	2008
Average Workday Traffic Volume (Vehicles per day)	52,100	51,400	55,500	53,000	51,300	52,600

Staff observed that pedestrians were using the available gaps to cross without excessive delay even during rush hours. Results of the gap study are summarized in Tables 2 through 5.

Application of Traffic Signal Criteria

None of the minimum threshold criteria for signals are met at this intersection. Recent hose counts and manual observations confirm that current traffic volumes on the Marshall and Ridge approaches appear consistent with past counts, and that the intersection remains at 38% below the minimum threshold for the Minimum Vehicular Volume criteria. The 1998 peak hourly pedestrian volume observed crossing University was 39, which was 79% short of the 190 pedestrians per one hour minimum threshold required by the Minimum Pedestrian Volume criteria.

Table-2
Pedestrian Crossing Observations: 7:30-8:00 am

Lanes Crossed	Average Number of Available Gaps Per Hour Based on Observations Recorded 7:30-8:00 am 8/18/98 For the Following Gap Sizes						Median Gap Size Accepted by Observed Pedestrians (Sec)
	7 sec	8 sec	9 sec	10 sec	11 sec	12 sec	
WB Univ. Lanes	262	214	185	155	137	122	7.65
EB Univ Lanes	96	73	48	34	31	27	8.4

Note: A traffic signal would provide 31 crossing opportunities per hour.

Table-3
Pedestrian Crossing Observations: 11:30 am - 1:30 pm

Lanes Crossed	Average Number of Available Gaps Per Hour Based on Observations Recorded 11:30 am -1:30 pm 8/18/98 For the Following Gap Sizes						Median Gap Size Accepted by Observed Pedestrians (Sec)
	7 sec	8 sec	9 sec	10 sec	11 sec	12 sec	
WB Univ. Lanes	172	136	108	88	72	60	11.2
EB Univ Lanes	161	118	95	76	62	47	8.0

Note: A traffic signal would provide 42 crossing opportunities per hour.

Table-4
Pedestrian Crossing Observations: 4-6 pm

Lanes Crossed	Average Number of Gaps Per Hour Available Based on Observations Recorded 4-6 pm 9/17/98 For the Following Gap Sizes						Median Gap Size Accepted by Observed Pedestrians (Sec)
	7 sec	8 sec	9 sec	10 sec	11 sec	12 sec	
WB Univ. Lanes	74	55	39	31	22	15	7.2
EB Univ Lanes	137	107	84	69	57	50	9.9

Note: A traffic signal would provide 36 crossing opportunities per hour.

Table-5
Effect of Traffic Signal on Delay Time for Pedestrians Crossing University Avenue

Time of Day	Total Pedestrian Delay Time* (Seconds) of pedestrians crossing EB and WB lanes	
	Average Delay of Observed Pedestrians	Average Delay Expected With a Traffic Signal
7:30-8:00 am	25.9	47.9
11:30 am-1:30 pm	28.6	33.1
4:00-6:00 pm	26.9	40.5

*Observed total pedestrian delay time consists of time waiting on curb plus time waiting in median.

Signal Coordination

A signal at Marshall-Ridge would fit poorly within the existing signal system on University Avenue. The eastbound and westbound platoons arrive at the Marshall-Ridge intersection at different points in time during the signal cycles. A time-space diagram demonstrating this effect is displayed in Figure-1.

Computer modeling was used to simulate the p.m. peak hour with a traffic signal installed at the Marshall-Ridge intersection. A time-space diagram demonstrating this model is shown on Figure-2. Note from this figure, that while progression is maintained for the heavier outbound traffic flow (approximately 2,900 westbound vehicles per hour), the presence of a new signal at Marshall-Ridge will result in significant delay to inbound drivers (approximately 1,900 eastbound vehicles per hour), causing nearly all inbound traffic to have to stop first at Marshall-Ridge and then stop again at Farley-University Bay. Rear-end collisions are expected to increase due to the increased stops as well as the road curvature on the eastbound approach to Marshall-Ridge, which reduces motorists' sight distance to see the expected queue of stopped vehicles east of the Marshall-Ridge intersection. Eastbound traffic approaching both the Ridge and the University Bay intersections will be encouraged to increase speed or race to the light since the green light will end as the front part of a platoon of vehicles arrives. As a result, red light running is expected to be a problem.

The effect a traffic signal at Marshall-Ridge would have on left-turning movements from University is not directly shown on Figures 1 and 2. Gaps which were available in the westbound flow of traffic on Figure-1 for the eastbound to northbound turning motorists would no longer be available for these motorists on Figure-2. Addition of a left-turn arrow phase for this movement would further degrade outbound progression.

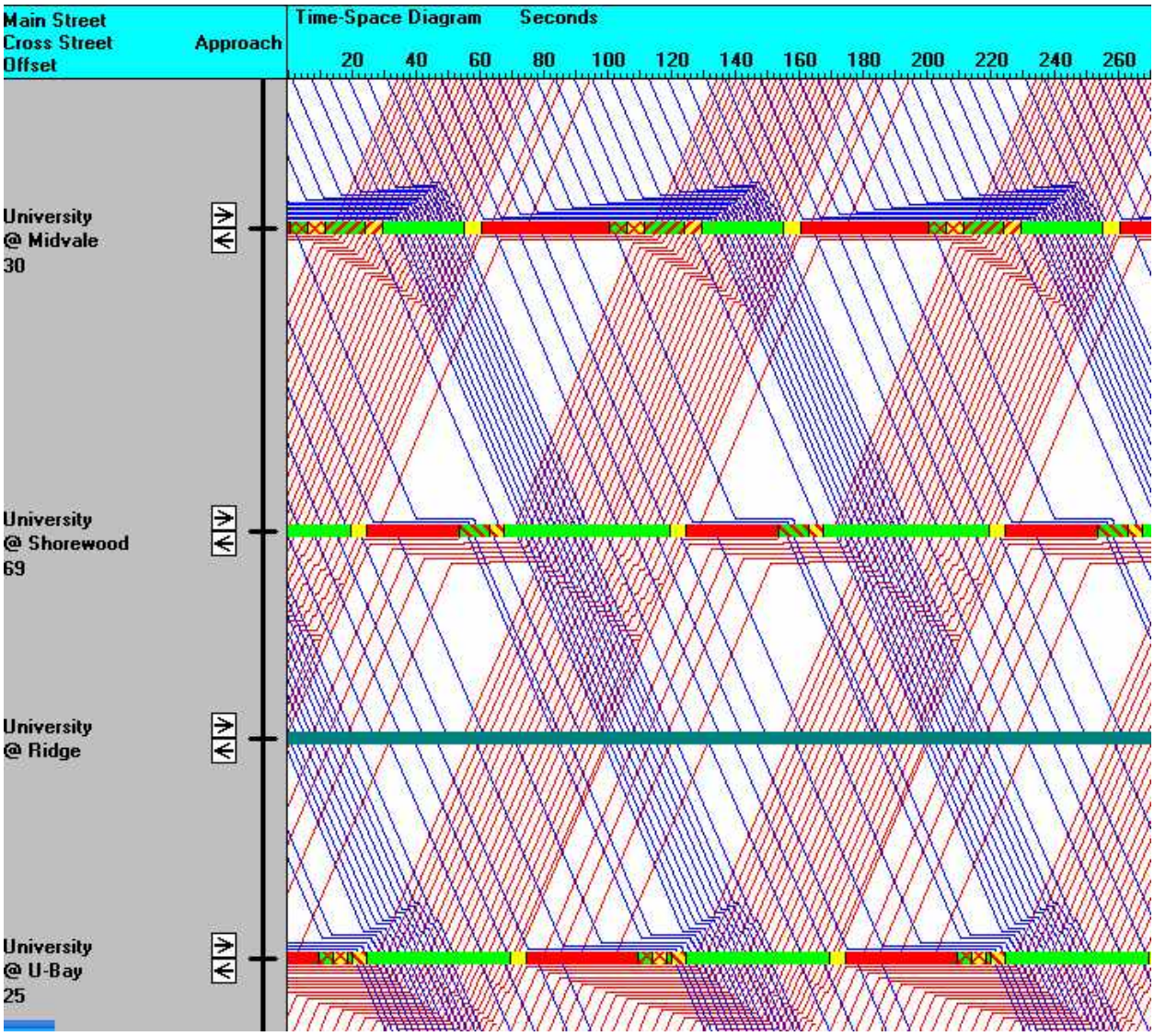

Figure-1: Time-Space Diagram showing existing PM peak traffic progression, i.e. No Signal at Ridge.

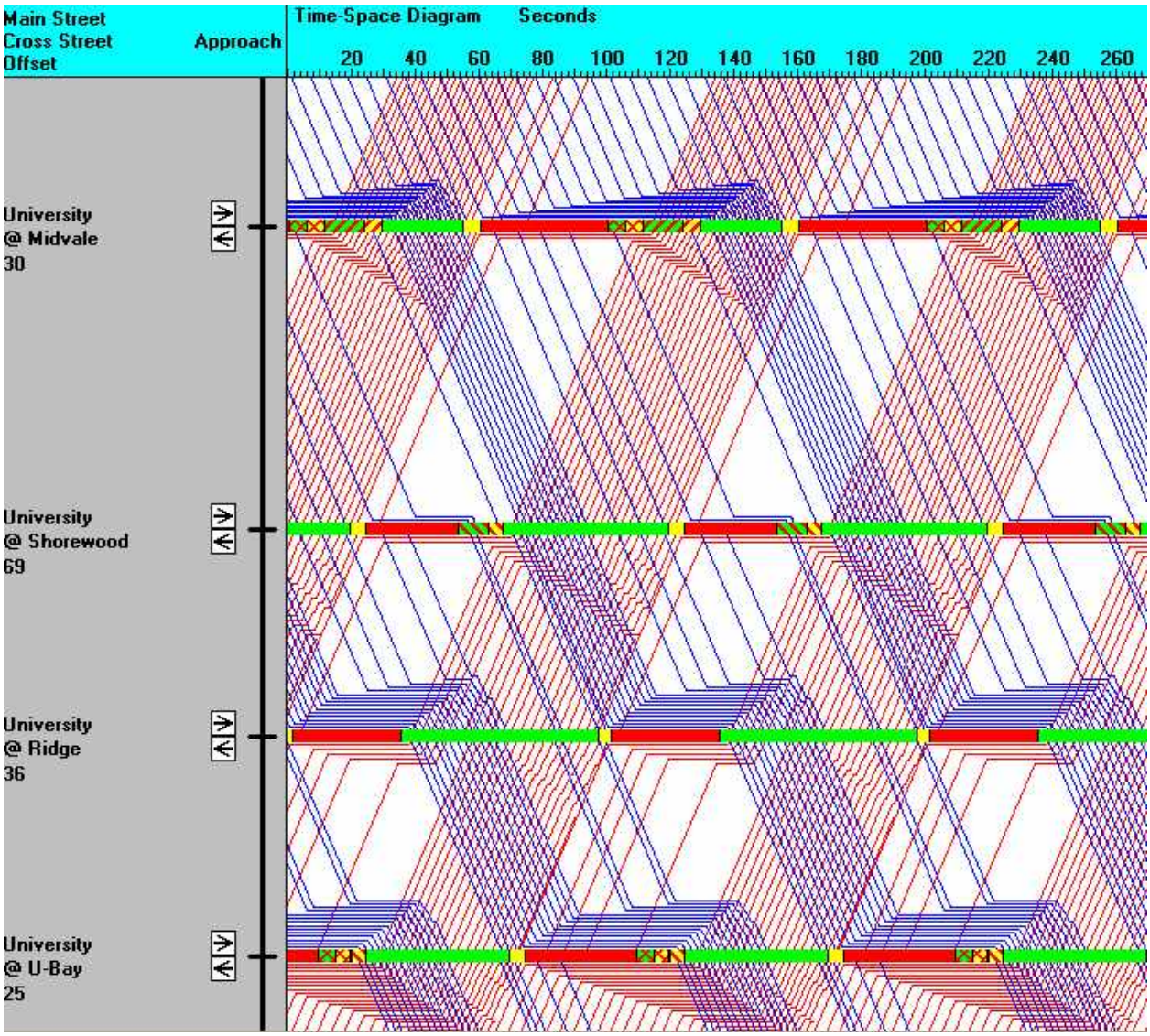

Figure-2: Time-Space Diagram showing PM peak traffic progression with a traffic signal at Ridge

In summary, the effects of placing a traffic signal at the Marshall-Ridge-University intersection are:

1. Provide a defined point in time for pedestrians and motorists to cross University Avenue at the Marshall-Ridge intersection.
2. Increased occurrences of rear-end crashes due to increased vehicle stops as well as the road curvature on the eastbound approach to Marshall-Ridge, which reduces motorists' sight distance to see the expected queue of stopped vehicles east of the Marshall-Ridge intersection.
3. Increased occurrences of run-red crashes, typically angle type crashes which are more likely to involve an injury.
4. Increase vehicular congestion and delay on University Avenue resulting in increased fuel consumption and auto exhaust emissions.

Recommendations

Retain the present two-way stop sign control.