CITY OF MADISON
INTER-DEPARTMENTAL
CORRESPONDENCE

DATE: January 22, 2016

TO: Pedestrian/Bicycle/MV Commission

FROM: DDryer, P.E., CAPP City Traffic Engineer and Parking Manager

SUBJECT: **After-Crash Analysis Staff Report**

At a previous Commission meeting a request was made to review actions that are taken following fatal traffic crashes. The question specifically pertained to what does Staff do and consider when reviewing a fatal crash. Attached you will find a flow chart which generally identifies the major considerations made when reviewing crashes. Also provided is an example of actions undertaken related to a fatal crash that occurred at Ridge Street and University Avenue.

The above referenced crash resulted in a fatality. There were no impaired operators involved. The crash involved a youth bicycling northbound into the intersection and being struck by an eastbound motorist. The crash as investigated and determined by MPD is described as "bicyclist disregard of traffic signals" with the bicyclist entering the street while facing a red traffic signal.

BACKGROUND CONDITIONS

University Avenue is a 6 lane divided Primary Arterial Street, with a posted 35 MPH speed limit serving the wider Dane County region. University Avenue is divided by direction with a 16-foot-wide median refuge island separating eastbound and westbound traffic.

Ridge St. is a local street with two traffic lanes and parking, and provides access to predominantly residential land uses south of University Ave. Access is provided to the north of the intersection via Marshall Court, and is under the jurisdiction of the Village of Shorewood Hills. Marshall Court provides access to businesses and health care facilities sited along University Avenue. Marshall Court also provides access via a pedestrian and bicycle path to Post Farm Park, which includes the Shorewood Hills pool and tennis courts. The path also connects Marshall Court to streets within the Village of Shorewood Hills generally.

University Avenue carries approximately 57,000 vehicles per average weekday. Ridge Street serves approximately 1,200 vehicles per day. Ridge St. at University Ave. is also a well used crossing point for pedestrians and bicyclists to and from the University Station shopping center as well as Metro bus stops on each side of University Ave.

Weather and lighting were not factors. The intersection sight lines to the traffic control signals were reviewed as part of the after analysis of the crash and were found to be unimpeded and meeting Federal and State design requirements.

Photo 1

Looking north towards University Avenue from Ridge St. Signal indications are Red

Photo 2

Looking north towards University Avenue from Ridge St. Signal indications are Green, pedestrians and bicyclists crossing in west crosswalk.

Photo 3

Looking East towards Ridge St. approx. 170 West of Stop Bar Signal indications are Green

Crash History: Crash totals were reviewed for the 5 year period 2010 to 2014, with 2014 being the last full year of available data. Crashes are summarized below.

Year	Direction	Rear-End	Side-Swipe	Turning	Run-Off	Bike	Ped	***TOTAL***
2014	Eastbound	3	--	--	1	--	--	***4***
	Westbound	0	--	--	--	--	--	***0***
	TOTAL	3			1			***4***
2013	Eastbound	2	--	--	--	--	--	***2***
	Westbound	2	--	--	--	--	--	***2***
	TOTAL	4						***4***
2012	Eastbound	--	1	--	1	--	--	***2***
	Westbound	3	--	--	--	--	--	***3***
	TOTAL	3	1		1			***5***
2011	Eastbound	2	--	--	--	1	--	***3***
	Westbound	4	--	--	--	--	--	***4***
	TOTAL	6				1		***7***
2010	Eastbound	1	--	2	--	--	--	***3***
	Westbound	4	--	2	--	--	--	***6***
	TOTAL	5		4				***9***

Source: WISDOT MV4000s

The predominant traffic crash type occurring at and near the intersection is rear-end crashes. Rear-end crashes are generally the most prevalent crash type on congested urban arterial streets and often related to signalized intersections. There was one bicycle involved incident with a bicyclist crossing University Ave SB to the east and outside of the intersection and striking the side of an eastbound motor vehicle. The bicyclist then fled the crash site.

Traffic Signal: The intersection of Ridge St. and University Ave. was signalized in 2010 under a joint project between the Village of Shorewood Hills and the City of Madison. The intersection is a hybrid design which provides a two-stage signalized pedestrian crossing with a 16-foot-wide center refuge island and a green left-turn arrow for eastbound left turns to Marshall Court. Pedestrian signals are provided on all marked crosswalks across University Ave, and pedestrian countdown timers are provided in the pedestrian signal heads. Motorized vehicular traffic is not allowed to cross University Avenue between Ridge Street and Marshall Court. Left turns from Ridge St. onto University Ave. and from Marshall Court onto University Ave. are prohibited and prevented by the median island.

This treatment provides positive motor vehicle traffic control while providing time for pedestrians and bicyclists to cross the Avenue in two stages--first to the central refuge island, then to the other side of University Ave. The two stage crossing provides service for pedestrians and bicyclists—while reducing the likelihood of crashes along University Ave. and at the same time, does not cause congestion so severe as to be an incentive to divert drivers to other nearby parallel residential streets.

Pedestrian actuated signals, like the hybrid signal at Ridge St. and University Ave. allow pedestrians to cross each section of the street separately and have been used in the United States for many years and in similar forms in Canada.

Studies analyzed as part of an analysis for improving Pedestrian Safety done by the Transportation Research Board (2006), indicates signals similar to Ridge and University overall result in 17 percent reduction in total crashes (motor vehicle-motor vehicle and motor vehicle-pedestrian). That author concluded that pedestrian safety is significantly improved with the design.

A before-and-after motorist compliance and vehicle-pedestrian conflicts study was done at intersections similar to Ridge and University [CUTR 2000 (14)] and found that after installation of the half-signal and other treatments, motorists yielding to pedestrians increased from 3 to 100 percent. Motor vehicle-pedestrian conflicts decreased from 4 to 0 percent.

The Ridge/University “partial” signal treatment and operation have been found in numerous studies to be an overall effective and safe treatment.

University Avenue Corridor Study: The City of Madison, the Village of Shorewood Hills and the University of Wisconsin undertook a joint study of the University Ave. area including the intersection of Ridge St. and University Ave. Since the intersection had been converted to signalized control in 2010, no additional treatments were recommended by the consultant. The consultant did however recommend that an additional intersection within the corridor be considered for treatment similar to Ridge and University – see recommendation number 6 of the *Conclusions and Possible Next Steps.*

1.07 CONCLUSIONS AND POSSIBLE NEXT STEPS

The Study Area including the Village of Shorewood Hills, the Greater Regent Neighborhood, and the west campus of the UW is a desirable place to live and work. It is anticipated that development and redevelopment in the Study Area will continue to increase the demand for transportation for the foreseeable future as residences, jobs, and services continue to be added. This growth is part of local plans and is a healthy prospect for the City, Village, and University. Some of the natural amenities that contribute to livability in the area such as Lakes Mendota and Wingra, the UW Arboretum, and the parks and golf courses on the near west side also create transportation challenges.

Mobility along University Avenue is important to the success of area businesses and the UW. Significant motor vehicle capacity expansion (constructing an eight-lane corridor or extending Campus Drive to the west by adding grade separations and interchanges) would have significant impacts and costs both physically and in terms of livability. Therefore, the study team settled on an overall goal for the corridor that focuses on improving conditions for pedestrian, bicycle, and transit travel while minimizing negative impacts on motor vehicle travel.

The study team believes the recommendations are achievable and when taken together will communicate and enhance the multimodal nature of the corridor. The primary next steps in implementing the recommendations include the following:

1. Continue to advocate for a Regional Transportation Authority (RTA) with state lawmakers to advance enhanced (preferably exclusive right of way) transit serving the Study Corridor.

2. Consider investigating the creation of an Intergovernmental Commission if RTA legislation is unlikely in the Nearer Term.

3. Implement a means to incentivize participation in regional Travel Demand Management solutions.

4. Considering the importance of efficient travel in the Study Area, make improvements to east-west and north-south bicycle connections a high priority when selecting which future projects areawide should be implemented.

5. Continue to require improvements that balance bicycle, pedestrian, transit, and motor vehicle needs as part of the development/redevelopment review and approval process.

6. Implement the access modifications proposed in this report (partial signals) and do not allow new full-access signals along the Study Corridor.

The full Strand Engineering report can be found here:
http://www.cityofmadison.com/trafficengineering/nearWestTransportationStudy.cfm

MODIFICATIONS

City Traffic staff reviewed the intersection and identified several short and long-term potential modifications for consideration.

Short-Term Modifications: Short-term modifications were identified that may be expected to improve the corridor and/or reinforce the presence and operation of the traffic signal.

1. Ridge St. approaches the signalized intersection with University Ave. on a slight downgrade. Sidewalk is available on Ridge St. at University Ave. but does not extend the full length of Ridge St. up to Harvey St. A marked, standard crosswalk is provided across Ridge St. A more visible crosswalk treatment was considered and a continental cross-walk added.

2. To encourage bicyclists to cross University Ave. and to use the signalized crosswalk, it is recommended that parking be restricted - approximately the first two parking spaces south on the eastside of Ridge Street; at the same time, a curb ramp has been added from the sidewalk to the street. Pavement markings will be added when warm weather returns. This modification will align bicyclists more directly with the signalized crosswalk across University Ave. and allow bicyclists access to the pedestrian push button to stop University Ave traffic and bring up the walk cycle.

3. Traffic signal heads are provided and sited consistent with State and Federal requirements. To provide higher or better visibility of the signal heads as northbound Ridge Street users approach the intersection, an additional signal head was installed overhead on the mast arm. Signal back-plates were also added.

4. The median mounted pedestrian signal heads were replaced with larger 18 inch pedestrian signal heads. This increases their visibility.

5. Pedestrian push button locations were also reviewed. Both push buttons in the SE and SW corner on Ridge St will be relocated to more accessible locations. The median mounted ped guidance signing will also be modified to be more visible.

6. Bicycle connections have always been an important consideration for the City, the Village and Near Westside Neighborhoods. Currently, the UW's bike path on the north side of University Ave. ends at University Bay Drive. The Village of Shorewood Hills reports that they expect to secure the property necessary to extend this path west to Marshall Court shortly, and construction of the path is a high priority for the Village. This path will provide a needed connection for bicycle and pedestrian mobility in the area, while also providing access to alternate crossing points along University Avenue.

Long-Term Modifications: Longer-term capital construction projects were considered and reviewed for feasibility. While more detailed engineering work is required to determine specific impacts, costs and usage, City and TE Staff were able to provide some preliminary information.

1. City staff reviewed the potential of installing a Ped/Bike tunnel under University Ave. Going under University Ave. would be a significant challenge, and particularly problematic due to the deep excavation required. This is because a large storm sewer box culvert runs under and parallel to University Ave. and drains the University Avenue basin, which is prone to flooding.

2. City staff reviewed the potential of going over University Ave. Grade separation is an option the Council may wish to consider, and it may be more feasible to go over University Avenue than under.

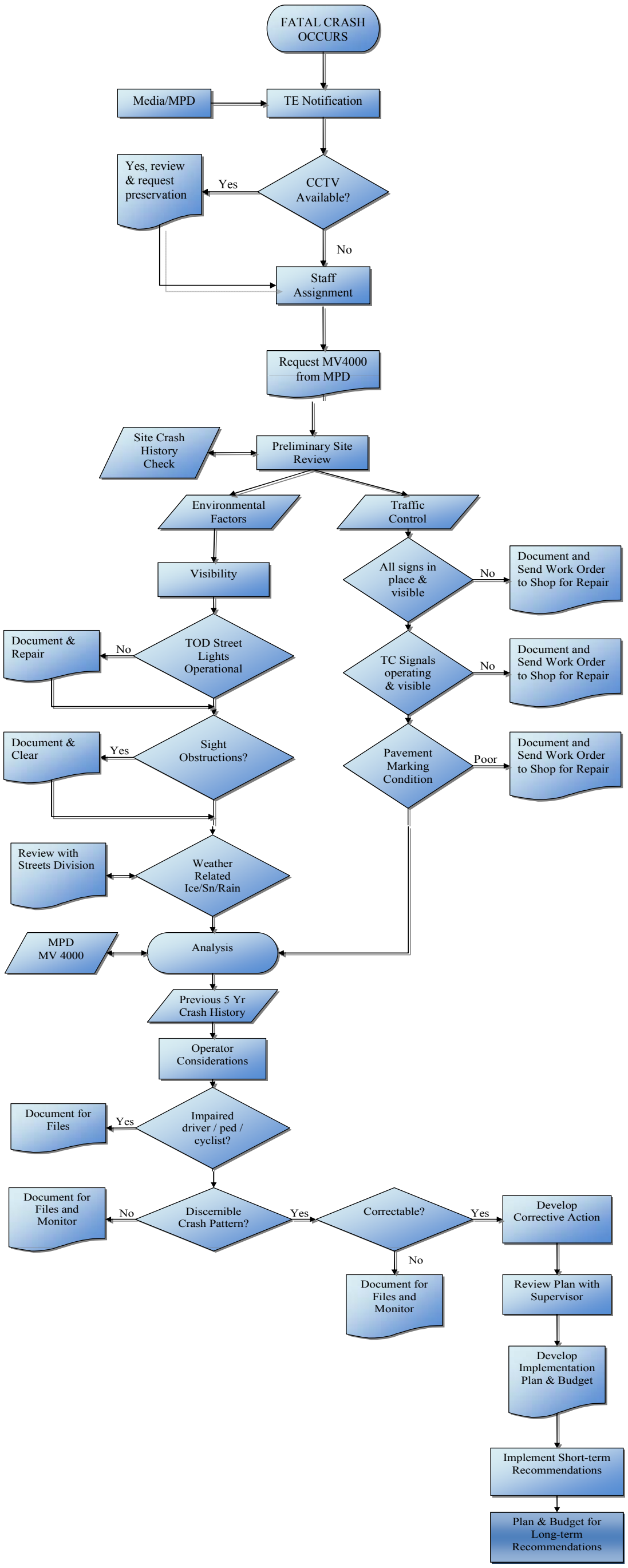
However there are challenges and considerations to be made with an overpass.

A pedestrian and bicyclist overpass would need to rise to a point about 23 feet above the railroad tracks. With the depth of structure added, we would expect the surface of the walkway above the track to be approximately 25 feet higher than the grade of the track. At an ADA maximum allowable 5 percent grade, the overpass would require an approximate 500 foot long ramp on each of the approaches at Ridge St. and at Marshall Ct. This would require loop ramps and the purchase of properties upon which to land them. The total distance to cross University Ave. on the overpass would require pedestrians and cyclists to travel approximately 1000 feet further and incur a 25 foot climb. Policy makers would need to consider how the overpass would be utilized given the extra length of travel. Estimates of cost have not been determined.

3. Ridge St. is an unimproved street with a rural cross-section--no curb, gutter or sidewalk. Ridge St. is approximately 36 feet wide with parking permitted on both sides. Pavement width varies due to the worn edge of pavement.

   Sidewalk is only provided along the Ridge St. frontage of the properties which front University Ave., and extends about 50-70 feet south from University Ave. This leaves the remaining length of Ridge Street – to its intersection with Harvey St. with no sidewalk. This provides no space for pedestrians, and requires them to walk in the street; it also does not provide any accommodation for bicyclists who may wish to ride off street. A worn path exists on the eastside of the street where the sidewalk ends and where people transition to the street. A recommendation for consideration is the removal of parking and the reconstruction of the street to provide sidewalks on both sides and marked bike facilities. This change may be more intuitive in aligning bicyclists to cross University Ave. using the cross-walks.

Fatal Crash Review/Process



Source:City of Madison, Traffic Engineering Division January 2016