St. Paul Avenue and North Street Corridor Traffic Study

Executive Summary

The City of Waukesha is interested in increasing access to businesses located in the "downtown area" by converting North Street and St Paul Avenue from one-way traffic operations to two-way traffic operations. Ayres Associates conducted a study evaluating the feasibility of the conversion, determining lane configurations at each intersection, and expected peak hour traffic operation conditions under the conversion.

Preferred Two-Way Corridor Configuration

The preferred configuration has several key components, and several elements that are more flexible depending on design costs, scheduling, and public involvement.

Key components of the preferred configuration include:

- Full conversion to two-way traffic on all segments of both study corridors;
    - North Street would be converted from one-way to two-way traffic operations between Wisconsin Avenue and Albert Street
    - E St Paul Avenue would be converted from one-way to two-way traffic operations between NW Barstow Street and Albert Street
- A Two-Way Left Turn Lane (TWLTL) would be installed on W St Paul Avenue between Wisconsin Avenue and Madison Street;
- Left turns from Delafield Street onto E North Street will be prohibited due to the skew of Delafield Street;
- A connection will need to be constructed between North Street and St Paul Avenue to encourage traffic diversion. It is expected that a significant amount of existing westbound E North Street traffic will need to divert to westbound St Paul Avenue to provide reasonable levels of service (LOS 'D' or LOS 'E') on both corridors under two-way operation; and
- The only construction required for the conversion will be for the new connection. All other components of the conversion will involve removing and replacing pavement markings, and installing the necessary signage and traffic signal hardware.

Configuration elements that involve some flexibility focus primarily on design alternatives for the connection between North Street and St Paul Avenue:

- Connection could begin east or west of where Pewaukee Road merges with E North Street
- Access to connection from Pewaukee Road could be permitted or prohibited based on design
- Access to St Paul Avenue could be provided at the existing St Paul Avenue intersection with Albert Street, or on Albert Street midblock between E North Street and E St Paul Avenue.

Figure 1 and Figure 2 illustrate the traffic operation patterns under the preferred alternative. All roadway segments east of Albert Street would carry two-way traffic. The two figures show the segments that currently carry two-way traffic with blue arrows, the proposed segments for two-way operations with green arrows, and the segments that would continue to carry one-way traffic with yellow arrows. The segment of W St Paul Avenue that would include a Two-Way-Left-Turn-Lane (TWLTL) is shown in yellow on Figure 1. The new connection between E North Street and E St Paul Avenue is shown with a green one-way arrow in Figure 2.

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AYRES ASSOCIATES

Figure 1: Preferred Two-Way Configuration for West End of Study Area

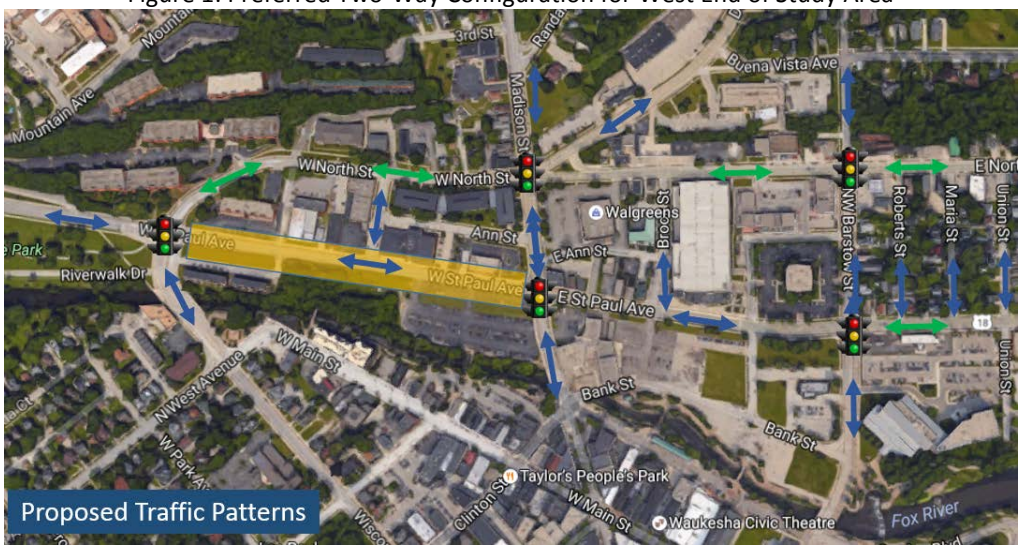
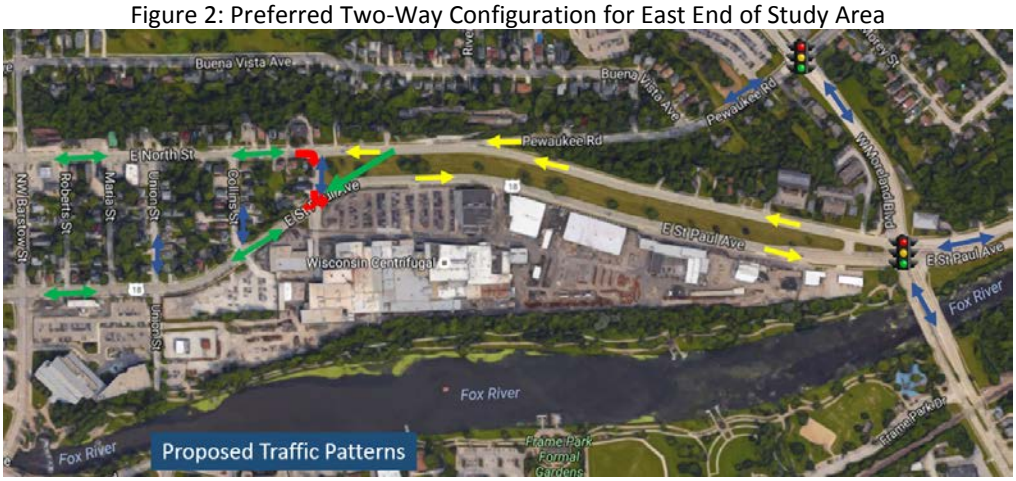


Figure 2: Preferred Two-Way Configuration for East End of Study Area



As shown in the two figures, W North Street would be converted from one-way to two-way traffic operations between Wisconsin Avenue and Albert Street. E St Paul Avenue would be converted from one-way to two-way traffic operations between NW Barstow Street and Albert Street. Both E North Street and E St Paul Avenue would continue to operate as one-way between Albert Street and W Moreland Boulevard. The new connection between E North Street and E St Paul Avenue would operate one-way westbound and would connect with E St Paul Avenue or Albert Street. Finally, the segment of W St Paul Avenue between Wisconsin Avenue and Madison Street would include a TWLTL.

Analysis of Operations

Traffic patterns at each intersection were analyzed using computational procedures to identify the quality of the traffic flow, known as Level of Service (LOS). The measures that define LOS reflect vehicle delays and service reliability quality of the performance, and are ranked using letters 'A' through 'F', with 'A' being the best and 'F' being the worst, similar to academic grading.

However, LOS 'A' is not necessarily a desirable goal as it implies either significant excess (unused) lane capacity or very low traffic/travel demand. Generally speaking, low demand in an urban business district area, such as Waukesha's North Street/St Paul Avenue corridor, is not desirable. Urban areas more

typically adopt standards varying between 'C' and 'E', depending on the area's size and characteristics. A LOS 'F' condition means travel demand exceeds capacity and the roadway is operating in oversaturated conditions, or another undesirable condition exists. However, oversaturated conditions may only arise for a 15-minute or 1-hour period.

The new connection between E North Street and St Paul Avenue is necessary to divert traffic from North Street to St Paul Avenue. The need for diversion was determined while examining the traffic flows along North Street and St Paul Avenue, in order to achieve reasonable traffic operation conditions in terms of vehicle delays and queuing during the evening peak hour at the intersection of Delafield Street/Madison Street/North Street. The traffic volumes during the evening peak hour are the highest of the day and as such, the evening peak hour was the primary focus of the analysis.

The critical intersection along the corridor was identified as Delafield Street/Madison Street/North Street. This intersection is controlled by a traffic signal and has five approaches. As previously mentioned, left turns from Delafield onto North Street would be prohibited due to the intersection geometry. Eliminating this movement is also expected to improve traffic operation conditions.

The analysis also examined the operations at the other intersections controlled by traffic signals. In general, the quality of the traffic flow during the evening peak hour at each of these intersections would result in the values shown in Table 1.

Table 1: PM Peak Hour Intersection LOS under Two-Way Operation

Intersection	FINAL
North/St Paul/Wisconsin	B
Madison/North/Delafield	E
Madison/St Paul	E
Barstow/North	B
Barstow/St Paul	C

Conclusions

The goal of the conversion is to provide complete two-way operation on both study segments between Wisconsin Avenue and Albert Street, to increase accessibility for downtown area businesses. The conversion would be implemented primarily through new pavement markings, signage, and traffic signal hardware. Construction would be required for the new connection between E North Street and E St Paul Avenue to accommodate the traffic diversion necessary to maintain reasonable levels of service. Regardless of the diversion that occurs between North Street and St Paul Avenue, it is expected that certain movements will experience low levels of service, potentially LOS 'E' or 'F', during the evening peak hour. These movements are expected to operate acceptably during the non-peak hours, and the benefits to improving access for local residents and businesses outweigh the poor peak hour operations. Additionally, the poor operations could encourage traffic using the corridors as an arterial to travel from the south side of Waukesha to and from I-94 to divert to other routes around the city. This would decrease the daily and peak hour volumes on the corridor, which could impact the expected operations.