Downtown Neenah Transportation/Parking Study
Final Summary Report

Neenah
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Prepared by: Ayres Associates

AYRES

April 13, 2021

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Introduction

This report provides a summary of a set of five Technical Memorandums that describe traffic analyses requested by the City of Neenah conducted by Ayres Associates. The following four Technical Memorandums relate to different elements of the downtown Neenah transportation system:

1. Downtown Neenah Street Network Plan
2. Intersection Control Evaluation: Main Street and Torrey Street
3. Hewitt Parking Structure Traffic Analysis
4. Blue Parking Structure Traffic Analysis

The 5th Technical Memorandum included in this summary involves a traffic operation analysis for a potential future roundabout at the Green Bay Road intersection with Main Street.

Throughout this summary report there are references to intersection Level of Service. Intersection operation is quantified by Level of Service (LOS) categories. These LOS categories have been defined by the National Academy of Sciences Transportation Research Board and have been adopted by federal, state and local municipalities to analyze intersection operation. Level of Service (LOS) 'D', as defined in the Highway Capacity Manual 6th Edition (HCM), is normally used as the threshold for acceptable peak hour intersection operation in built out urban areas. Traffic operation at LOS 'E' and 'F' represent long traffic delays exceeding 50 seconds with volumes nearing capacity and potentially extreme congestion/gridlock conditions.

For information purposes, it is noted that traffic data used in the five study analyses were collected before the COVID 19 Pandemic affected the economy and transportation mobility. Experience has shown that past events which affected the economy do not have a long-term impact on 20-year traffic projections.

1. Downtown Neenah Street Network Plan

The purpose of the Wisconsin Avenue Traffic Analysis is to develop a downtown street improvement plan that:

- Reduce 'through' traffic and trucking on Wisconsin Avenue between Main Street and Commercial Street
- Improve pedestrian and driver comfort on Wisconsin Avenue
- Minimize travel delay on alternative Wisconsin Avenue routes
- Develop guidance for the western Main Street approach to downtown that encourages "through' traffic to use other downtown streets

The study included the creation of a Citizen Steering Committee, collection of existing traffic information, projections of year 2040 traffic patterns, development and operational analysis of alternative 'through' traffic routes and recommendation of traffic improvements necessary to create an effective 'through' traffic route alternative to Wisconsin Avenue.

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Citizen Steering Committee

The purpose of the Citizen Steering Committee was to represent downtown businesses that could be impacted by changes in future traffic patterns. The Citizen Steering Committee assisted in identifying alternative 'through' traffic routes, alternative route performance measures, and reviews of alternative route performance. The Steering Committee included

representatives of the City Council, the Chamber of Commerce – Forward Neenah, Inc, the East Central Wisconsin Regional Planning Commission and City of Neenah Planning and Engineering staff.

The six alternative route performance measures identified by the Committee and their level of importance ranking are listed in Table 1. It was recognized by the Citizen Steering Committee that a reduction in traffic volume on Wisconsin Avenue will improve pedestrian and driver comfort on Wisconsin Avenue, but that any traffic reduction should be balanced with the needs of Wisconsin Avenue business exposure to potential customers.

Table 1: Wisconsin Avenue Traffic Performance Criteria

	Level of Importance	
Performance Criteria	**Average Rating**	**Comparative Ranking**
• Reduce travel times on 'cut-through' route	1.6	1
• Minimize traffic delays on 'cut-through' traffic route	2.8	2
• Reduce 'cut-through' traffic on Main/Wisconsin route	3.2	3
• Minimize intersection backups on 'cut-through' traffic route	4.1	4
• Minimize project costs	4.6	5
• Minimize right-of-way impacts	6.0	6

1.0 = most important to 10.0 = least important

Alternate Routes

The Citizen Steering Committee identified the following three alternate 'through' traffic routes listed in Table 2.

Table 2: Alternate 'Through Traffic Routes

Alterative Routes	Length (ft.)
1. Columbian Avenue/Commercial Street	2,345
2. Doty Avenue/Commercial Street	2,325
3. US 41/Winneconne/Commercial	9,800

For reference purposes the existing Main Street/Wisconsin Avenue route has a length of 2,130 feet. As shown on Table 2, Alternative Route 3 is significantly longer than the other routes, 9,800 feet compared to the approximate 2,300 feet length of the Wisconsin Avenue and Routes 1-2.

Figures 1 and 2 illustrate the four routes identified on Table 2.

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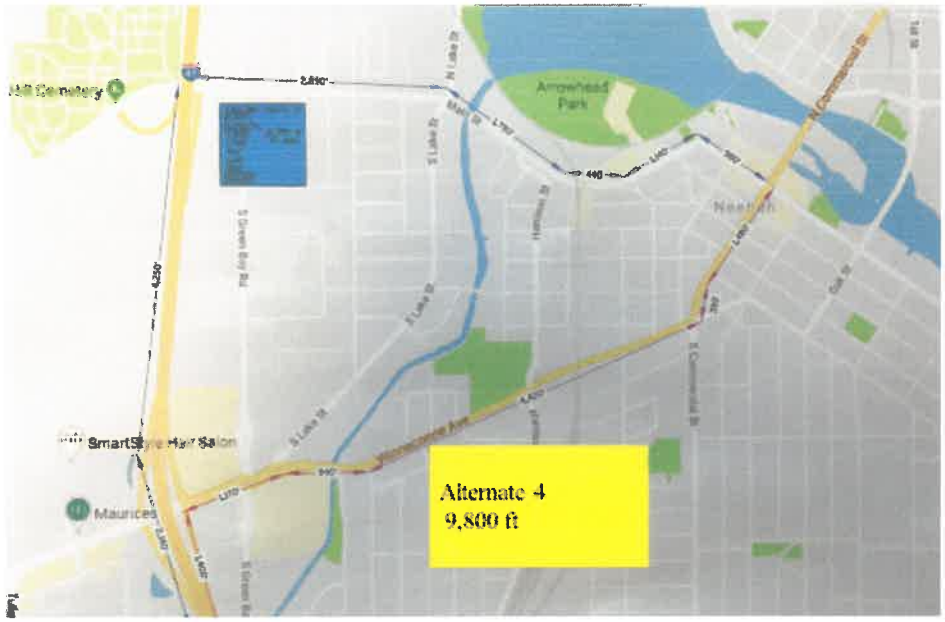
Figure 1: Alternate Study Routes 1 – 3

Figure 2: Alternate Study Route 4



Existing Traffic

Data was collected on existing and year 2040 daily traffic volume projections, traffic speeds and intersection operation along each alternative route to identify 'through' traffic impacts that may be expected for each route. Figure 3 identifies existing daily traffic volumes on each route.

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Figure 3: 2019 Average Annual Daily Traffic

Source: Wisconsin Department of Transportation

Traffic Volumes: As shown on Figure 3, the study segment of Wisconsin Avenue carries 9,600 vehicles per day (vpd) while the segment of Main Street south of Wisconsin Avenue carries 11,000 vpd. In comparison, Route 2 (Columbian Avenue carries a high of 2,900 vpd. It is noted that the Wisconsin Department of Transportation (WisDOT) does not count traffic volumes on Doty Avenue. As also shown on Figure 3, the study segment of Commercial Street carries a high of 14,400 vpd south of Wisconsin Avenue.

The majority of study intersections experienced peak morning and evening truck percentages in the range of 1% to 5%, except for southbound Church Street at Wisconsin Avenue (10%), and eastbound/westbound traffic on Doty Avenue at its intersection with Main Street (29% during the morning and 9% during the evening peak hour, respectively).

Traffic Speeds: A critical factor in driver route selection involves the amount of time it takes to travel between their trip origin and destination. The majority of drivers will typically choose the shortest travel time route to their destination compared to the shortest distance route. For that reason, a travel time/speed study was conducted on each alternative route as part of this study. Figure 4 shows the average travel speeds measured along each study route street segment.

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Figure 4: Existing Alternative Route Traffic Speeds (mph)

As shown on Figure 4, average traffic speeds on each study route ranged between 5 mph to 18 mph except for the segment of Main Street between Torrey Street and Wisconsin Avenue with average speeds of 28 mph to 29 mph.

Analysis of the speed data shown on Figure 4 provides travel time information on the driver route choice selection process with a comparison of average travel time for each route between the Main Street intersection with Columbian Avenue and the Wisconsin Avenue intersection with Commercial Street.

Table 3: Alternative Route Travel Time Summary

	Alternative Route	Travel Time
1.	Main Street/Wisconsin Avenue	126 seconds
2.	Columbian Avenue/Commercial Street	146 seconds
3.	Doty Avenue/Commercial Street	163 seconds
4.	US 41/Winneconne/Commercial	
	a. Option A – US 41/Main/Wisconsin	167 seconds
	b. Option B – US 41/Winneconne/Commercial	264 seconds

The travel time data shown on Table 4 partially explains why the Main/Wisconsin route carries more traffic than Columbian Avenue or Doty Avenue between the Torrey Street and Wisconsin Avenue intersections by providing the shortest travel time. Although the difference in travel time between Route 1 and Route 2, Main/Wisconsin Avenue and Columbian Avenue/Commercial Street, is only 24 seconds, drivers are well aware of the difference. This travel time attraction to Main Street and Wisconsin Avenue is reinforced by the fact that drivers can travel at 28 mph to 29 mph on Main Street as shown on Figure 4. In combination, these two travel factors provide drivers with a shorter/faster, more convenient travel experience.

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Existing Condition Conclusions

From the existing traffic data described above, it is concluded that:

1. There is a need to reduce travel speeds on the segment of Main Street between Torrey Street and Wisconsin Avenue (traffic taming).
2. There is a need to reduce westbound Torrey Street traffic delays at Main Street (traffic signals or roundabout).
3. There is a need to reduce eastbound/westbound traffic delays at the Columbian Avenue intersections with Church Street. (Stop sign removal or traffic signals).
4. There is a need to reduce traffic delays along Commercial Street between Columbian Avenue and Wisconsin Avenue (signal timing/intersection operation).
5. For the Doty Avenue route to function as a 'through' traffic route, eastbound traffic delays need to be reduced at the Doty Avenue approaches to the Commercial Street intersection (install traffic signal at Doty Avenue/Commercial Street intersection along with signal coordination and timing/design at the Wisconsin Avenue intersection) and the westbound Doty Avenue approach to Main Street (construct a roundabout).

Alternate Traffic Route Improvement Evaluation

Three alternative traffic routes were analyzed with assistance of the East Central Wisconsin Regional Planning Commission for comparison to the existing Wisconsin Avenue route. These routes included:

1. Traffic Taming of Main Street between Torrey Street and Wisconsin Avenue
2. Columbian Avenue and Commercial Street
3. Doty Avenue and Commercial Street
4. US 41, Winneconne and Commercial Street

The 4th route, USH 41, Winneconne and Commercial Street, was dropped from further analysis due to it longer travel times and information from the East Central Wisconsin Planning Commission that the majority of traffic using the study segment of Wisconsin Avenue had trip origins or destinations located north of downtown.

Main Street Traffic Taming: A set of traffic taming incentives are shown on Figure 5, to manage traffic speed on the study segment of Main Street between Torrey Street and Wisconsin Avenue. As previously reported, this segment of Main Street is currently operating with average speeds between 28 to 29 mph.

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Figure 5: Main Street Traffic Taming Measures

The traffic taming measures shown on Figure 5 involve reducing the number of through traffic lanes from four lanes to two lanes, construction of a raised median with landscaping and left turn lanes, construction of a corner bump-out on the northeast corner of the Main Street intersection with Torrey Street and on-street parking along the south side on Main Street. Construction of a Wisconsin Avenue raised crosswalk at the existing midblock pedestrian crosswalk west of Commercial Street will further tame traffic and increase pedestrian safety.

According to data published by the US Department of Transportation, the traffic taming measures described for Main Street have been shown to operate with minimal congestion with volumes between 17,000 to 21,000 vpd. Under existing conditions, Wisconsin Avenue carries 9,600 vpd. With Main Street traffic taming, Wisconsin Avenue traffic is projected to decrease to 7,700 vpd, a reduction in 'through' traffic of 20 percent. The redistribution of Wisconsin Avenue traffic results in increasing Columbian Avenue traffic from 2,600 vpd to 4,500 vpd.

Doty Avenue Roundabout: An alternative to taming traffic speeds on Main Street is to reduce Doty Avenue westbound traffic delays at its intersections with Main Street and eastbound delays at its intersection with Commercial Street. This can typically be accomplished by replacing the Stop sign controls on Doty Avenue with traffic signals or roundabout control. The installation of a traffic signal is not expected to satisfy the Warrants for Traffic Signal installation contained in the State and National criteria set forth in the Uniform Manual on Traffic Control Devices (MUTCD). Construction of a roundabout at the Main Street intersection with Doty Avenue is not considered a feasible option to reduce westbound traffic delays on Doty Avenue.

Traffic levels on Wisconsin Avenue are expected to be reduced from 9,600 vpd to 9,400 vpd, a reduction of only 2 percent with traffic redistribution increases on Doty Avenue from 1,400 vpd to 1,600 vpd. The Doty Avenue route also experiences eastbound delays at its Stop sign controlled intersection with Commercial Street. The installation of traffic signal or roundabout improvements at the Doty Avenue intersection with Commercial Street are not considered a potential travel time enhancement due to the short Commercial Street spacing (290 feet)

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between Doty Avenue and Columbian Street to the south and the 320 foot spacing between Doty Avenue and Wisconsin Avenue to the north. Under either option, the need to maintain

traffic progression along Commercial Street, which currently carries 14,400 vpd, is expected to be jeopardized.

Columbian Avenue/Torrey Street Roundabout: The third option considered to redistribute 'through' traffic on Wisconsin Avenue involved the installation of traffic signals or a roundabout control at the Main Street intersection with Columbian Avenue/Torrey Street. An Intersection Control Evaluation (ICE) study conducted for the Main Street intersection with Columbian Avenue/Torrey Street concluded that the installation of traffic signals in 2020 or in the Year 2040 would be expected to satisfy the Warrants for Traffic Signal installation contained in the State and National criteria contained in the Uniform Manual on Traffic Control Devices (MUTCD).

Construction of a roundabout at the Main Street intersection with Columbian Avenue/Torrey Street was also considered as a feasible option to reduce extensive westbound traffic delays on Torrey Street. Construction of a roundabout at the Main Street intersection with Columbian Avenue/Torrey Street is expected to reduce Wisconsin Avenue traffic from 9,600 vpd to 8,800 vpd, a reduction of 8 percent with Columbian Avenue traffic increasing from 2,600 vpd to 3,400 vpd.

Alternate Route Traffic Impact: Table 5 summarizes potential traffic redistribution impacts that may occur with implementation of travel time management measures on the east-west downtown study street network.

Table 5: Comparison of Alternative Route Traffic Impacts

Traffic Distribution Alternatives	Wisconsin	Doty	Columbian	Total
• Roundabout at Main/Torrey	8,800	1,400	3,400	13,600
• Roundabout at Main/Doty	9,400	1,600	2,600	13,600
• Main Street Traffic Taming	7,700	1,400	4,500	13,600

Note: Based on Adjusted Projections from ECWRPC Transportation Demand Model

The comparative summary of traffic redistribution results shown on Table 5 indicates the most effective alternative to reduce 'through' traffic on Wisconsin Avenue involves implementation of traffic taming actions on the segment of Main Street between Torrey Street and Wisconsin

Avenue. Construction of a roundabout at the Torrey Street/Main Street intersection is needed to effectively create a convenient route for redistributed traffic on Columbian Avenue. It is not expected to create an additive reduction in Wisconsin Avenue traffic redistribution.

Alternate Route Performance Evaluation

Table 6 summarizes the effectiveness of each alternate route ability to satisfy performance criteria established by the Citizen Steering Committee. Each alternative route was rated based on their qualitative ability to satisfy each performance criteria. The ratings range from 'effectively' satisfying to 'not effectively' satisfying each criterion.

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Table 6: Alternate Route Performance Summary

Performance Criteria	Traffic Taming	Doty Rdbt	Torrey Rdbt
1. Reduce Travel Time On Alternate Routes	⊘	⊘	●
2. Minimize Alternate Route Delays	⊘	○	●
3. Reduce 'Through' Traffic on Wisconsin Avenue	●	⊘	○
4. Minimize Alternate Route Intersection Queuing	⊘	○	○
5. Minimize Implementation Costs	○	○	○
6. Minimize Right-Of- Way Impacts	●	⊘	⊘

Note: ● Effective ○ Partially Effective ⊘ Not Effective

As shown on Table 6, Main Street traffic taming provides the most effective action to reduce 'through' traffic on the study segment of Wisconsin Avenue. In addition, construction of a Columbian Avenue/Torrey Street/Main Street roundabout provides the most effective ability to reduce travel time and alternate route traffic delays. Table 6 also indicates that construction of a roundabout at the Doty Avenue/Main Street intersection is the least effective in reducing alternate route travel time, reducing 'through' traffic on Wisconsin Avenue, and minimizing Main Street right-of-way impacts. Each alternative involves construction costs for a traffic taming

median or for a new roundabout which have not been estimated as part of this study. Construction of a roundabout at Doty Street or Torrey Street may require new right-of-way along the west side on Main Street.

Based on the ability to satisfy the alternate route performance criteria, it is concluded that implementation of Main Street traffic taming measures along with construction of a Columbian Avenue/Torrey Street/Main Street roundabout has the synergistic effect of reducing 'through' traffic on the study segment of Wisconsin Avenue while providing an attractive route with minimal traffic delays and reduced travel times for " traffic redistribution from Wisconsin Avenue. Construction of a roundabout at the Torrey Street/Main Street intersection has the additional benefit of creating a gateway entrance to the downtown Neenah business district.

Recommendation

Based on results of the study Performance Criteria evaluation, the ability to redistribute approximately 20 percent of the 'through' traffic on Wisconsin Avenue to the Columbian Avenue/Commercial Street route, and the reduction in year 2040 failing traffic movements at the study intersections it is recommended to implement traffic taming on Main Street, change the existing midblock Wisconsin Avenue crosswalk west of Commercial Street to a 'raised' crosswalk, and construct a roundabout at the Columbian Avenue/Torrey Street intersection with Main Street.

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2. Intersection Control Evaluation: Main Street and Torrey Street

The feasibility of constructing a roundabout at the intersection of Main Street and Torrey Street was analyzed with the following traffic control alternatives: 1) existing Stop sign control; 2) traffic signal control; and 3) roundabout control. The analysis studied morning and evening peak hour traffic operation for the years 2020 and 2040 under normal background traffic growth, as well as, with Main Street traffic taming projections recommended in the Wisconsin Avenue Traffic Analysis study.

Traffic Summary

1. In 2019 Main Street carried 13,400 vpd south of Torrey Street and 9,600 vpd north of Torrey Street. Torrey Street carried 2,500 vpd west of Church Street.
2. It is projected that traffic volumes on the downtown Neenah street network may increase at an annual rate of 0.5% per year.
3. It is projected by the East Central Wisconsin Regional Planning Commission with the implementation of Main Street traffic taming improvements and reduced Torrey Street traffic delays at its intersection with Main Street that traffic volumes on the segment of Main Street north of Torrey Street and on Wisconsin Avenue west of Commercial Street is expected to distribute 20% of its volume to the Torrey Street/Columbian Avenue route.

Intersection Control Evaluation

- **Stop Sign Control:** The existing Stop sign control at the Main Street intersection with Torrey Street currently operates with the northbound approach of Torrey Street at LOS 'F'. This LOS through the year 2040 will result in a maximum queuing of 250 feet with average peak hour vehicle delays exceeding 200 seconds. With traffic pattern changes attributed to Main Street traffic taming it is projected that the Torrey Street intersection approach will continue to operate at LOS 'F' with increased vehicle delays exceeding 800 seconds and queues exceeding 1,000 feet. Therefore, this intersection control option is not considered a viable solution for continued intersection operation.

- **Traffic Signal Control:** In order to consider installing traffic signals at an intersection it is required that traffic volumes must exceed volume thresholds documented in the USDOT Manual on Uniform Traffic Control Devices (MUTCD). Without implementation of Main Street traffic taming improvements, the Main Street intersection with Torrey Street does not satisfy the MUTCD Warrants for the Installation of Traffic Signals through the Year 2040.

  With the projected traffic redistribution to the Torrey Street/Columbian Avenue route attributed to the implementation of Main Street traffic taming improvements, the Main Street intersection with Torrey Street is expected to satisfy the traffic signal installation Warrants during the Years 2020 through 2040. Therefore, the installation of traffic signals at the intersection is considered a viable solution for improved intersection operation.

  Operation of a traffic signalized intersection results in all peak hour traffic movements operating at LOS 'D' or better. Even though average vehicle delays are not expected to exceed 50 seconds, maximum westbound queues on Torrey Street may approach 350 feet by the year 2040.

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- **Roundabout Control**: Unlike the installation of traffic signal warrants, roundabouts are not required to satisfy volume warrants to operate safely. This study analyzes two different roundabout design options.

    - **Single Lane Roundabout**: Figure 6 shows the conceptual design for a single lane roundabout at the Torrey Street intersection with Main Street.

Figure 6: Single Lane Roundabout Design at Torrey Street/Main Street Intersection

With and without the implementation of Main Street traffic taming improvements, construction of a single lane roundabout is expected to result in the southbound approach of Main Street operating at LOS 'C' in the year 2020. However, by the year 2040, operation of the southbound approach of Main Street without Main Street traffic taming is expected to worsen to LOS 'E' and with traffic taming is expected to operate at LOS 'F'. Therefore, a single lane roundabout is not considered a viable traffic operation improvement.

- **Dual Southbound Lane Roundabout**: Figure 7 shows the conceptual design for a dual southbound lane roundabout at the Torrey Street intersection with Main Street.

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Figure 7: Dual Southbound Lane Roundabout Design at Torrey Street/Main Street Intersection

Construction of a dual southbound lane roundabout, without implementation of Main Street traffic taming improvements in the year 2020 is expected to operate with all approaches at LOS 'A' except for the northbound approach which would operate at LOS 'B'. With Main Street traffic taming in 2020, all roundabout approaches are expected to remain at LOS 'A' operation. In the Year 2040, without traffic taming improvements all roundabout movements are expected to operate at LOS 'A' except for the northbound through movement which would operate at LOS 'C'. With traffic taming implementation, all roundabout traffic movements are expected to operate at LOS 'A' except for the northbound through movement which would operate at LOS 'B' or better in the Year 2040.

Conclusions

Based on the detailed analysis of intersection control device findings, it is recommended to construct a dual southbound lane roundabout at the Main Street intersection with Torrey Street. Construction of a roundabout is compatible with future Main Street traffic taming improvements and has the added benefit of creating a 'gateway' entrance to downtown Neenah. It is recognized that this roundabout design can impact existing Main Street right-of-way and potential future development sites adjacent to the Torrey Street intersection.

Detailed roundabout design will be required to identify right-of-way impacts, safe Main Street driver sight distance requirements, utility impacts and implementation cost estimates.

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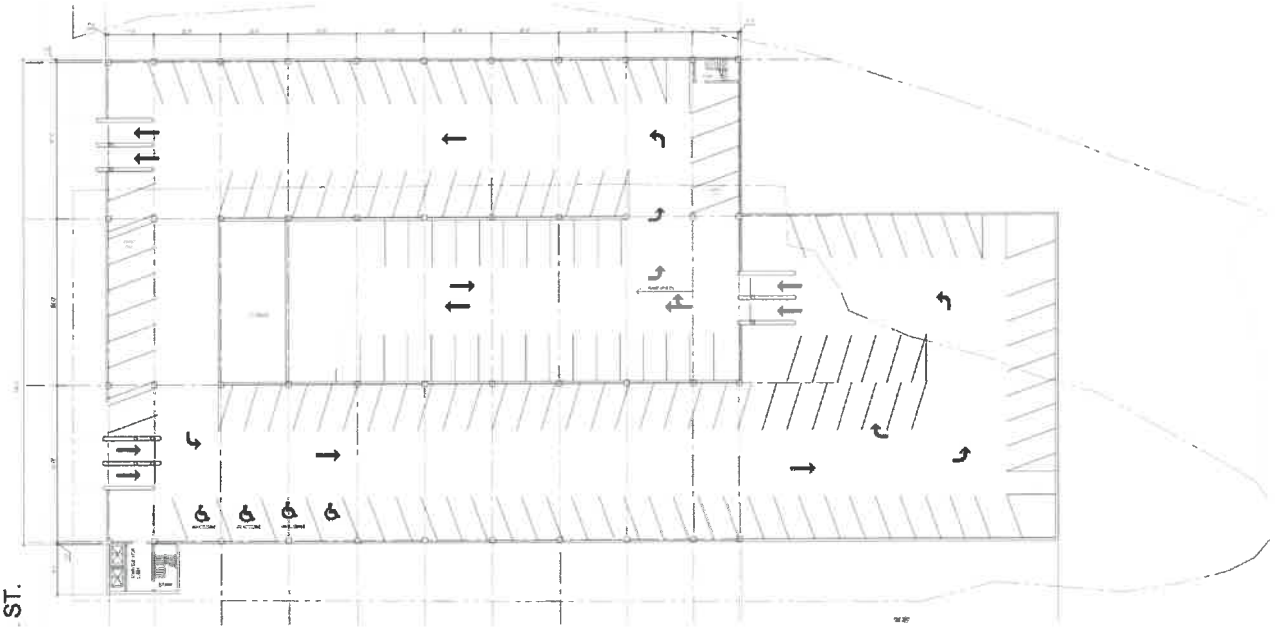
3.Hewitt Lot Parking Structure Traffic Analysis

This study analyzes the feasibility of constructing a 600-space parking structure at the existing 152 space Hewitt surface parking lot location. The analysis looks at year 2020 and 2040 Commercial Street traffic operation between the Columbian Avenue and Wisconsin Avenue intersections under existing surface parking lot conditions and the traffic impact of two alternative parking structure designs.

Design Alternatives

Two parking structure design alternatives were developed as a replacement for the Hewitt surface parking lot. The first alternative involves a concept design with parking access limited to Commercial Street, similar to existing conditions. A Traffic Engineering Study was conducted for this alternative to determine if traffic signal installation at the structure driveway is warranted and thier impact to improve structure driveway operation. The second alternative maintains access to Commercial Street in addition to including construction of a new roadway bridge connection to Wisconsin Avenue through the Neenah Centers parking lot. Both of these designs require filling in the canal area north of the Hewitt parking lot. Figure 8 shows the ground level parking structure configuration for the single access design alternative.

Figure 8: Hewitt Parking Structure Single Access Design Alternative



This design is comprised of 5 levels of parking totaling 578 parking spaces. A 6-level parking structure would increase the amount of parking to 628 spaces. The entrance and exit drives, similar to operation of the existing surface lot, are separated to minimize traffic conflicts on Commercial Street.

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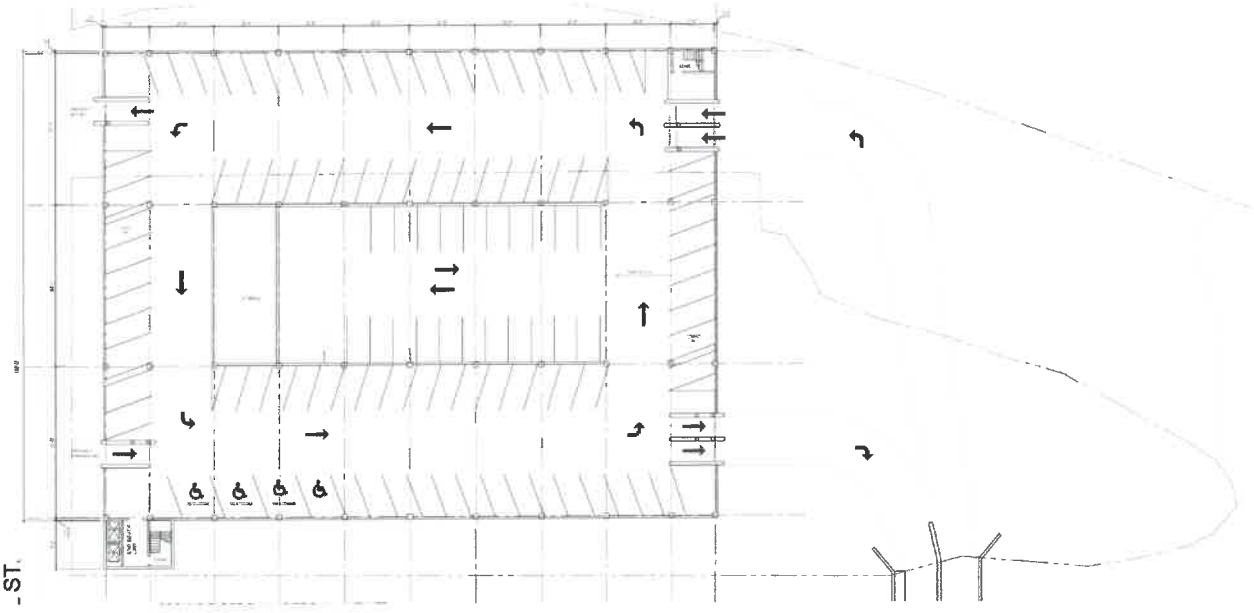
Figure 9 shows the ground level parking structure configuration for the two access parking structure design alternative.

Figure 9: Hewitt Parking Structure Two Access Design Alternative



Under this design, the structure is comprised of 5 levels providing a total of 630 parking spaces. The two access design structure includes separated access drives on Commercial Street as well as a new traffic access bridge connection to Wisconsin Avenue through the Neenah Centers parking lot.

Existing Hewitt Surface Parking Lot Operation

a. Year 2020: Operation of all Commercial Street study intersection approaches are at LOS 'D' or better except for the Stop sign controlled east/west Doty Avenue approaches to Commercial Street which operate at LOS 'E' during the evening peak hour. The southbound Commercial Street approach to Wisconsin Avenue operates with a 425-foot to 475-foot long maximum queue periodically blocking the parking lot entrance which is located 400 feet north of Wisconsin Avenue.

b. Year 2040: By the year 2040, Commercial Street southbound approach queueing to Wisconsin Avenue increases to a maximum of 550 feet operating at LOS 'E' during the morning peak hour.

Conclusion: The Commercial Street study intersections with the existing Hewitt surface parking lot operate with minimal LOS concerns, except for queuing on the north and southbound approaches on Commercial Street at its intersection with Wisconsin Avenue which operates at saturated traffic levels. Maximum southbound queueing from Wisconsin Avenue can block access to the Hewitt parking lot driveways.

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Single Access Parking Structure

a. Year 2020: With a single access parking structure that has separated dual lane entrance and exit driveways on Commercial Street, the left turn parking lot exit movement during the evening peak hour is expected to operate at LOS 'F' with a 600-foot queue inside the structure. The other predominant operation condition involves the Wisconsin Avenue southbound queue at the Wisconsin Avenue intersection which is expected to extend 575 feet along Commercial Street.

b. Year 2040: By the year 2040, with a 578-space parking structure, it is expected that the Wisconsin Avenue east and west approaches to Commercial Street will operate at LOS 'E' during the evening peak hour with the southbound queue on Wisconsin Avenue increasing to 650 feet. The parking structure left turn lane exit movement will continue to operate at LOS 'F during the evening peak with the queue length extending 675 feet.

c. At the request of City staff, a downsized, 3 level parking structure with 298 spaces was analyzed with year 2040 traffic volumes. That analysis indicates during the morning peak hour the westbound through movement is expected to operate at LOS 'E' with the southbound through/right turn operating at LOS 'F' with a 575-foot maximum queue. During the evening peak hour, the eastbound left turn and the westbound right turn are expected to operate at LOS 'E.

Conclusion: A Stop sign controlled single access 578-space parking structure design is not recommended at the Hewitt surface parking lot location due to its year 2040 traffic impact involving 575-foot to 650-foot southbound queues on Commercial Street and LOS 'E' operation during the morning peak hour at the Wisconsin Avenue intersection. It is also concluded that a downsized 3-level parking structure will create congestion and queuing issues at the Commercial Street intersection with Wisconsin Avenue.

Traffic Signal Engineering Study

Due to the negative traffic impacts of a Stop sign controlled parking structure driveway on Commercial Street peak hour operation, a Traffic Signal Engineering Study analyzed the feasibility of signalizing the driveway for both a 3-level, 298 space and a 5-level, 578 space Hewitt parking structure. The analysis focused on year 2040 traffic conditions. There are two requirements of an engineering study to determine if the installation of traffic signals at the Hewitt parking structure driveway provides a safe, operational improvement on Commercial Street:

- Do traffic signals satisfy the Warrants for traffic signal installation published in the *Manual on Uniform Traffic Control Devices*?
- Do traffic signals provide satisfactory peak hour Level of Service operation?

Year 2040 traffic conditions with a 298-space or a 578-space parking structure satisfies the Peak Hour Traffic Signal Warrant for consideration of installing traffic signals at the structure driveway intersection with Commercial Street.

The traffic operation analysis indicates that a 298-space parking structure will operate with reduced impacts on Commercial Street study intersection Level of Service operation and parking structure exiting delays during evening peak traffic periods compared to a larger 578-

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space structure. The City of Neenah will need to consider the probability of a 578-space parking structure experiencing capacity operation on a weekly basis by the year 2040 to determine the most cost-effective infrastructure parking structure size improvement to meet the needs of the Downtown central business district.

Conclusion: Based on the analyses of Commercial Street traffic impacts, Year 2040 peak hour operation at its intersections with a Hewitt parking structure driveway and with Wisconsin Avenue, it is concluded that a traffic-signal controlled driveway is warranted. Without a signalized parking structure driveway, Commercial Street may be expected to experience failing peak hour operating conditions along with extensive evening peak hour delays exiting the parking structure driveway. This conclusion is supported by simulation modeling of the segment of Commercial Street between the parking structure driveway and Wisconsin Avenue. According to the evaluation criteria for the Peak Hour Warrant in the *Manual on Uniform Traffic Control Devices,* it is recommended that the traffic signal should be operated on 'Yellow Flashing' mode during non-peak hour time periods.

Two Access Parking Structure

a. Year 2020: It is expected that structure operation will be restricted to right turn exiting and entering only traffic to minimize traffic conflicts on Commercial Street. This restriction requires southbound traffic on Commercial Street using the parking structure to continue past the structure driveways to turn left at Wisconsin Avenue to use the second access driveway connected to the Neenah Center parking lot. Likewise, traffic exiting the parking structure desiring to travel southbound on Commercial Street will be required to use the Neenah Center parking lot connection to Wisconsin Avenue to proceed to make a westbound left turn at the Commercial Street intersection with Wisconsin Avenue.

   Under this design, the structure driveway on Commercial Street and on Wisconsin Avenue should operate at LOS 'C' or better. During the morning peak hour, the westbound 'through' movement on Wisconsin Avenue is expected to operate at LOS 'E' with a maximum 300-foot queue with the southbound Wisconsin Avenue left turn on Commercial Street operating at LOS 'F with a maximum 525-foot queue extending past the Commercial Street structure driveways.

b. Year 2040: By the year 2040 evening peak hour, the Wisconsin Avenue intersection with Commercial Street is expected to operate with the following traffic movements at LOS 'F": eastbound left turn with a 400-foot queue; westbound 'through' with a 650-foot queue; northbound shared through/right turn lane with an 850-foot queue; and the southbound left turn lane with a 150 queue. The southbound shared through/right turn lane at Wisconsin Avenue, although operating at LOS 'E', would experience a 425-foot maximum queue. Similar LOS 'E' and 'F' operating conditions are expected during the morning peak hour.

Conclusion: A two access parking structure design is not recommended at the Hewitt surface parking lot site as it requires restricting Commercial Street accessibility to right turn in and out movements to minimize traffic conflicts along Commercial Street. This will require vehicles desiring to make left turns to enter or exit the parking structure on Commercial Street to utilize the second structure driveway connection on Wisconsin Avenue. The traffic impact on the Commercial Street intersection with Wisconsin Avenue is expected to result in overall operation

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at LOS 'E' during the morning and LOS 'F' operation during the evening peak periods in the year 2020 and LOS'F' during the morning and evening peak hours in the year 2040.

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4. Blue Parking Structure Traffic Analysis

This study analyses the feasibility of constructing a 600-space parking structure to replace the existing 123 space Blue Lot surface parking lot. This analysis looks at the 2020 and 2040 years for selected downtown intersection traffic operation under existing surface parking lot conditions and the traffic impact of a new parking structure. The 2020 analysis involves a comparison of 2020 existing conditions to 2020 conditions with traffic from a new parking structure. The 2040 analysis involves a comparison of 2040 background traffic growth to 2040 conditions that includes traffic from a new parking structure in addition to traffic generated by potential new Main Street developments identified by the City of Neenah.

The Blue parking lot is located west of Church Street between Columbia and Doty Avenues. Blue lot access is limited to driveways located on Brien Street, which serves as a local street connection between Columbian and Doty Avenue as shown on Figure 10.

Figure 10: Existing Blue Surface Parking Lot

Parking Structure Design

Figure 11 shows the ground level parking configuration for a Blue lot parking structure. The parking structure requires vacation of portions of Brien Street.

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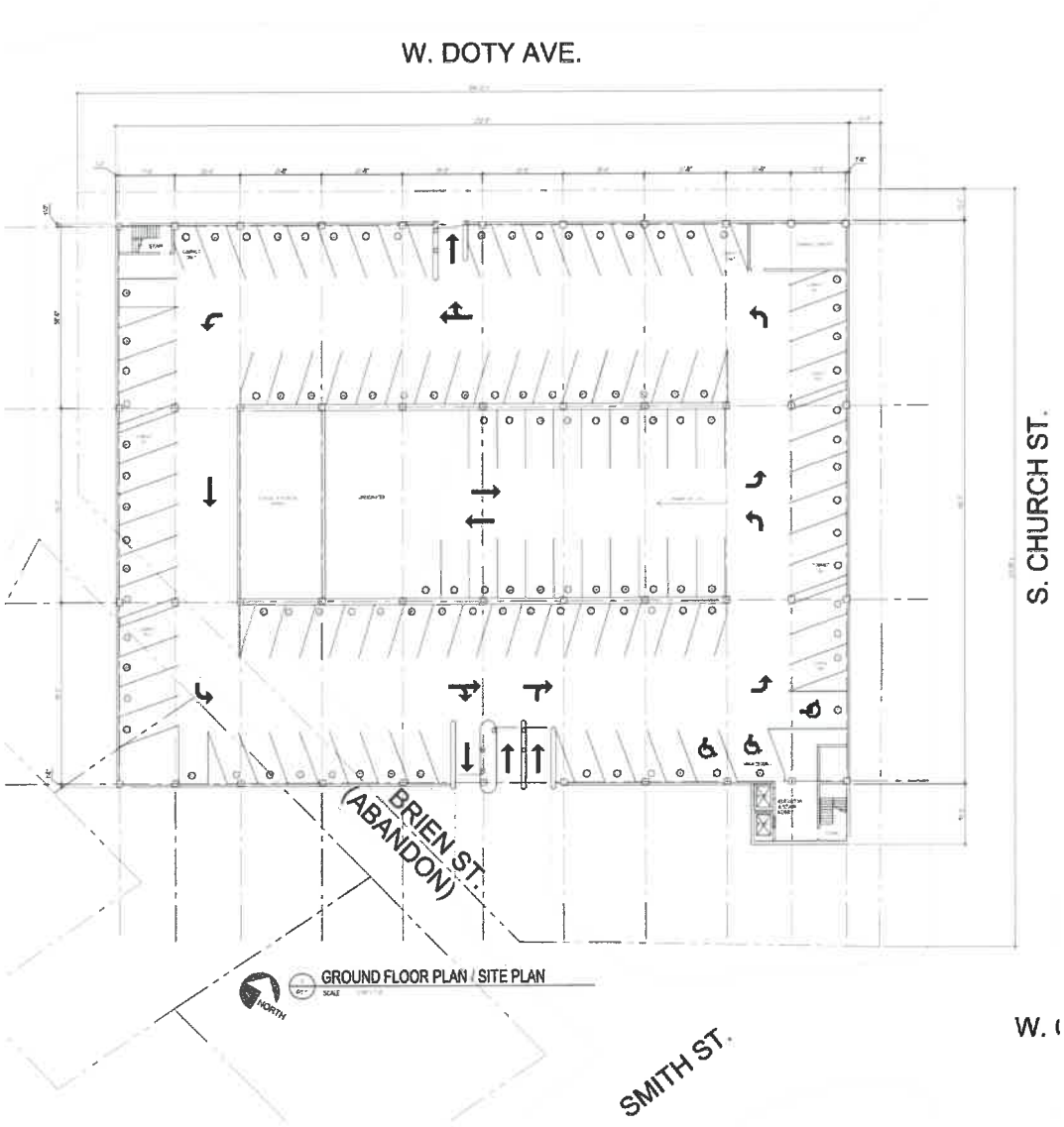
Figure 11: Blue Lot Parking Structure Design



Under this design, the structure contains 5 parking levels with a total of 600 parking spaces. The primary structure entrance and exit driveway is located on a short Brien Street connection to Smith Street/Columbian Avenue. An additional 'exit only' driveway is located on Doty Avenue. The Doty Avenue driveway is part of the structure design to minimize queuing backups inside the structure when cars are exiting during the evening peak traffic hour.

Figure 12 illustrates a rendering for a potential parking structure facade. It is noted the location of the structure elevator/stairwell can also be located on the northeast corner near the Doty Avenue intersection with Church Street.

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Figure 12: Blue Parking Structure Rendering

The Year 2040 peak hour traffic analysis assumes that existing year 2020 background traffic on the downtown street network grows at a rate of 0.5% per year. The Year 2040 traffic volumes also assumes several potential new developments will be constructed consistent with City land use plans. Figure 13 shows the location of the future development sites.

Figure 13: Potential Main Street Downtown Development Sites

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Table 7 summarizes the peak hour trips that may be generated by these potential downtown developments located along Main Street. The trip estimates are based on data published in the Institute of Transportation (ITE) *Trip Generation Manual*, 10th edition.

Table 7: Peak Hour Trip Generation of Potential New Main Street Development

Land Use	Size	ITE Code	Morning Peak Hour	Evening Peak Hour
1. General Office	75,000 sf	710	95	85
Mid-Rise Apartments	70 du's	221	20	30
2. Mid-Rise Apartments	72 du's	221	25	30
3. General Office	100,000 sf	710	115	115
Retail	15,000 sf	820	25	55
4. Retail	8,000 sf	820	10	30
Mid-Rise Apartments	38 du's	221	15	15
Community Plaza	5 acres	411	0	25
		Total Trips	305	385

The peak hour trips generated by each of the future developments were assigned to the study intersections based on existing peak hour traffic distribution patterns.

Conclusions

- The downtown street network can accommodate traffic attracted to a new 600-space parking structure at the Blue surface parking lot site with some peak hour traffic operation impacts.
- The Torrey Street intersection with Main Street should be reconstructed as a roundabout with two westbound circulating lanes. This action is compatible with the Main Street traffic taming actions recommended in the Wisconsin Avenue Traffic Analysis.
- The Wisconsin Avenue intersection with Commercial Street is currently operating at LOS 'C' and 'D' peak hour conditions. By the year 2040 it is expected that operation of some background traffic growth movements at the intersection will worsen to LOS 'E'.
- Construction of a 600-space parking structure west of Church Street in 2020 is not expected to significantly impact existing operation at the Wisconsin Avenue intersection with Commercial Street. However, by the year 2040 with traffic attracted to the new parking structure along with traffic generated by potential new Main Street development, the intersection is expected to operate at oversaturated conditions. Intersection traffic signal modifications have the ability to improve year 2040 intersection operation for

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selected traffic movements, but the overall intersection operation is expected to remain at LOS 'E', but without oversaturated conditions.

- The Doty Avenue Stop sign controlled approaches to Commercial Street experience LOS 'E' and 'F' operation with or without construction of the 600-space parking structure west of Church Street.

- The Stop sign controlled northbound approach of Doty Avenue at its intersection with Main Street currently experiences LOS 'E' operation, which is expected to worsen to LOS 'F' in 2040 with the growth of background traffic. This operating condition is not expected to change with construction of a new 600-space parking structure.

- Changing the 4-way Stop sign control at the Columbian Avenue intersection with Church Street to 2-way Stop sign control is expected to negatively change northbound Church Street operation from LOS 'B' to LOS 'F' during the morning peak hour.

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5. Roundabout Concept Design: Main Street Intersection with Green Bay Road

The feasibility of constructing a roundabout at the Green Bay Road intersection was analyzed under 2018 and 2040 traffic conditions. This summary provides a comparison of year 2040 peak hour traffic operation under existing traffic signal control and roundabout control.

Traffic Signal Operation

By the year 2040 morning peak hour, the westbound 'shared left turn/through' traffic movements on Main Street is expected to operate at LOS 'F' with all traffic movements on the eastbound approach of Main Street expected to operate at LOS 'E' with a maximum queue of 525 feet for the 'shared left turn/through' movement. In comparison, during the evening peak hour the westbound 'shared left turn/through' movements and all movements on the eastbound approach of Main Street are expected to operate at LOS 'F' with a maximum approach queue for both lanes of 525 feet. on the eastbound approach. It is noted that the traffic operational findings assume no adjustments are made to the existing traffic signal timings or intersection geometrics to improve intersection operation.

Roundabout Operation

A conceptual roundabout design was developed for the Green Bay Road intersection with Main Street to identify anticipated geometrics, potential right-of-way impacts, and impacts to utilities at the intersection. The conceptual design geometrics for the roundabout are based on Year 2040 traffic operational analysis results of the existing signalized intersection and consideration of providing a roundabout design that is compatible with the existing lane geometrics on each of the intersection approaches. The conceptual roundabout design is shown in Figure 14.

Figure 14: Roundabout Conceptual Design for Green Bay Road/Main Street Intersection

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By the Year 2040, all roundabout traffic movements are expected to operate at LOS 'C' or better during the 2040 morning peak hour, except for the eastbound 'shared through/right turn' lane which is expected to operate at LOS 'D' with a maximum queue of 275 feet. It is noted that the USH 41 northbound off-ramp to Main Street is approximately 370 feet from Green Bay Road intersection. During the evening peak hour all traffic movements are expected to operate at LOS 'B' or better with a maximum queue of 125 feet on the eastbound and westbound approaches.

It is planned to construct a new high school northwest of the Green Bay Road/Main Street intersection to serve the entire Neenah area. Much of the traffic generated by the future high school is expected to use Oakridge Road to/from Main Street. It is important that a traffic impact assessment conducted for the new school include an analysis of school traffic impacts on the operation of the conceptual roundabout design shown on Figure 14 due to potential queuing concerns on eastbound Main Street and the roundabout spacing to the US 41 ramp system.

Conclusion

The traffic operation analysis indicate that a roundabout will operate at acceptable LOS through the Year 2040 at the Main Street intersection with Green Bay Road under a projected annual traffic growth rate of 1 percent through the year 2040. If the annual traffic growth is less than 1 percent, the roundabout can be expected to operate with an improved LOS and shorter maximum queues.

It is noted that the traffic Impact assessment prepared for a new Neenah area high school planned for the area northwest of the Green Bay Road/Main Street intersection should include an analysis of its impact on Main Street queuing between US 41 ramps and Green Bay Road.

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