

MEMORANDUM

To: David De Angelis, Village of Elm Grove

From: Kenneth H. Voigt, P.E.

Date: July 26, 2017

Project Number: 49-0077.00

Re: Wisconsin Avenue Extension to Pilgrim Parkway

Ayres Associates was requested by the Village of Elm Grove to provide a professional engineering opinion on the following set of transportation questions related to the Wisconsin Avenue extension and potential realignment of Watertown Plank Road:

1. What are the traffic projections for Watertown Plank Road and Pilgrim Parkway 'with' and 'without' a Wisconsin Avenue extension?
2. How much traffic will be generated by a proposed 'Convention Center' at the Brookfield Square Shopping Mall?
3. What is the crash history pattern at the Bluemound Road intersection with Pilgrim Parkway/Moreland Road?
4. Is there adequate 'Sight Distance' for northbound traffic at Bluemound Road to see traffic conditions at a Wisconsin Avenue extension intersection with Pilgrim Parkway?
5. What is the impact of removing the northbound right turn channelization bumpout on Pilgrim Parkway between the Bluemound Road and Watertown Plank Road intersections?
6. What is the impact of closing the North Shore Bank driveway on Pilgrim Parkway at the Watertown Plank Road intersection?
7. Where would be the best location to close Terrace Drive to 'cut-through' traffic?
8. Why were the current Wisconsin Avenue options chosen?

The following information provides Ayres Associates' professional opinion on each of the eight Village questions.

1. Watertown Plank Road and Pilgrim Parkway Traffic Projections 'With' and 'Without' a Wisconsin Avenue Extension

Historic daily traffic volumes provide a context on past traffic growth trends that could be used as an indicator of future trends. Historic daily traffic volume data for Pilgrim Parkway south of Gebhardt Road, Watertown Plank Road and Bluemound Road west of Pilgrim Parkway were obtained from the Wisconsin Department of Transportation (WisDOT) and are summarized on Table 1.

Table 1: Historic Daily Traffic Volumes (vehicles per day)

Year	Pilgrim Parkway	Bluemound Road	Watertown Plank Road
	South of Gebhardt Road	East of Pilgrim Parkway	East of Pilgrim Parkway
2000	10,400	41,500	6,200
2003	14,700	38,700	6,000
2006	14,750	36,800	5,500
2009	14,700	48,300	6,300
2012	14,800	33,300	6,300
2015	12,000	34,000	5,600

Source: Wisconsin Department of Transportation. It is noted that the WisDOT does not collect traffic counts on Wisconsin Avenue.

As shown on Table 1, daily traffic volumes have remained relatively constant on the study roadways during the 15-year time period between 2000 and 2015. It's difficult to identify why traffic on Bluemound Road experienced a significant traffic increase in 2009 and then returned to historic levels thereafter. Typically, the increase in traffic shown in 2009 would be attributed to traffic counter error or roadway traffic diversion from adjacent highways such as I-94, Greenfield Avenue or North Avenue. Overall, this data indicates that traffic volume levels have been relatively constant over the past 15 years.

The Village of Elm Grove requested the Southeastern Wisconsin Regional Planning Commission (SEWRPC) to prepare a set of traffic projections 'with' and 'without' a Wisconsin Avenue connection to Pilgrim Parkway. The traffic projections prepared this June are for the years 2017 and 2050 involving the following roadway network scenarios:

- A. Existing Conditions without any roadway changes
- B. Extend Wisconsin Avenue to Pilgrim Parkway without any changes to Watertown Plank Road
- C. Extend Wisconsin Avenue to Pilgrim Parkway and relocate Watertown Plank Road to the north side of Ace Hardware. (This scenario the restricts existing Watertown Plank Road and North Shore Bank driveway access to right turns to/from Pilgrim Parkway).
- D. Same as Scenario C except Terrace Drive would be cul-de-saced at its intersection with Bluemound Road

It is noted that two earlier Wisconsin Avenue traffic projections were developed to analyze peak hour Wisconsin Avenue traffic impacts on Pilgrim Parkway by the City of Brookfield. The first analysis was based on Year 2020 annual average daily traffic (AADT) projections prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) for evaluation of improved I-94 accessibility with a new split interchange connection between Calhoun and Brookfield Roads. The second study provided Year 2011 and 2031 peak hour traffic projections prepared by Traffic Analysis and Design (TADI) for the City of Brookfield for analysis of the extension of Wisconsin Avenue.

Table 2 summarizes the new SEWRPC daily traffic volume projections for Scenarios A through Scenario D on the study area roadway network.

Table 2: Year 2017 Watertown Plank Road/Wisconsin Avenue Extension Scenario Traffic Summary

Road Segment	Roadway Network Scenario			
	A Existing Condition	B Extension Only	C Extension + Relocate WPR	D Extension + Close Terrace
Watertown Plank Road (WPR) East of Pilgrim Parkway				
- existing WPR	7,000	7,000	2,000	3,000
- relocated WPR	--	--	4,000*	6,000
- east of Terrace Dr.	9,000	9,000	9,000	10,000
Wisconsin Avenue				
-west of Pilgrim Pkwy	--	3,000	4,000	5,000
-west of Main Street	3,000	4,500	5,000	6,000
Terrace Drive	3,000	3,000	4,000*	--
Main Street so. of Wis	3,000	4,500	5,000	5,000
Pilgrim Parkway				
-north on WPR	16,500	17,500	17,500	17,500
-north of Bluemound	23,500	21,500	19,500	21,500*
-south of Bluemound	35,500	35,500	35,500	35,500
Bluemound Road				
-east of Terrace Dr.	30,000	29,500	29,500	28,500
-east of Pilgrim Pkwy	31,000	30,500	31,500	28,500*
-west of Pilgrim Pkwy	36,000	33,000	32,500	31,500

note: * volumes are sensitive to traffic congestion at Terrace Drive/Bluemound Road intersection
Source: Southeastern Wisconsin Regional Planning Commission

The following section describes the basic changes in daily traffic levels from the data presented in Table 2. As shown on Table 2, the SEWRPC traffic projections for Scenario A (existing year 2017 conditions) vary slightly from the 2015 volumes counted by the WisDOT but are of similar overall magnitude as it relates to peak hour conditions. What is important from the SEWRPC traffic projections is the change that may be expected in traffic volumes due to a Wisconsin Avenue extension to Pilgrim Road. The data on Table 2 indicates that traffic on Watertown Plank Road is not expected to change under Scenario B due to an extension of Wisconsin Avenue. Under Scenario B traffic on the Wisconsin Avenue extension is projected at 3,000 vpd with traffic on Pilgrim Parkway north of Wisconsin Avenue only increasing by 6 percent from 16,500 to 17,500 vpd. The 3,000 vpd projected on Wisconsin Avenue reflects a 3,000 vpd decrease in Bluemound Road traffic west of Pilgrim Parkway.

In comparison, under Scenario C, with a realigned Watertown Plank Road that connects with Wisconsin Avenue, it is projected that 2,500 vpd would remain on the existing Watertown Plank Road connection to Pilgrim Parkway with 4,000 vpd using the realigned segment of Watertown Plank Road. Likewise, traffic on a Wisconsin Avenue extension would increase to 4,000 vpd. Table 2 data also indicates that daily traffic on Pilgrim Parkway under Scenario C would not change with a realigned Watertown Plank Road.

Under Scenario C, traffic levels on Terrace Drive would increase from 3,000 vpd to 4,000 vpd. Due to the Village's concerns with potential traffic diversion to Terrace Drive that may occur from prohibiting westbound left turns at the existing Watertown Plank Road intersection with Pilgrim Road, SEWRPC conducted an extra analysis, not shown on Table 2, that indicates

traffic volumes on Terrace Drive could increase to 8,000 vpd if there were minimal delays at its intersection with Bluemound Road. However, field observations indicate during peak traffic hours experiences long delays at the Terrace Drive intersection with Bluemound Road.

Finally, under Scenario D, which involves a Wisconsin Avenue extension, a realigned Watertown Plank Road and the cul-de-sacing of Terrace Drive at its intersection with Bluemound Road, a realigned Watertown Plank Road would carry 6,000 vpd with existing Watertown Plank Road carrying 3,000 vpd. Under this scenario traffic on a Wisconsin Avenue extension would increase from 4,000 vpd to 5,000 vpd with no change in projected traffic levels on Pilgrim Parkway north of Watertown Plank Road.

In response to questions at a public information meeting, SEWRPC also prepared at the Village's request, traffic projections for the year 2050 with Pilgrim Parkway at its existing 2-lane cross-section and with a potential 4-lane cross-section. Table 3 summarizes year 2050 daily traffic projections for the study area roadway network for Scenarios A through D described above for the Year 2017 analysis. The traffic projections shown on Table 3 reflect year 2050 volumes with Pilgrim Parkway as a 2-lane roadway.

Table 3: Year 2050 Watertown Plank Road/Wisconsin Avenue Extension Scenario Traffic Summary With a 2-Lane Pilgrim Parkway

Road Segment	Roadway Network Scenario			
	A Existing Condition	B Extension Only	C Extension + Relocate WPR	D Extension + Close Terrace
Watertown Plank Road East of Pilgrim Parkway				
- existing WPR	8,500	8,500	2,500	3,500
- relocated WPR	--	--	4,500*	7,500
- east of Terrace	10,500	10,500	10,500	11,500
Wisconsin Avenue				
-west of Pilgrim	--	3,500	4,500	5,500
-west of Main	3,500	5,500	6,000	7,000
Terrace Drive	3,500	3,000	5,000*	--
Main Street	3,500	4,500	5,500	5,500
Pilgrim Parkway				
-north on WPR	16,500	17,000	17,000	17,000
-north of Bluemound	25,000	22,000	19,500	22,500*
-south of Bluemound	39,500	31,500	31,500	31,500
Bluemound Road				
-east of Terrace	32,500	28,500	29,500	27,500
-east of Pilgrim	33,500	29,500	31,500	27,000*
-west of Pilgrim	40,000	30,500	32,500	29,000

note: * volumes are sensitive to traffic congestion at Terrace Drive/Bluemound Road intersection
Source: Southeastern Wisconsin Regional Planning Commission

Overall, Table 3 indicates similar traffic volume impacts as previously described for the year 2017. Basically, by the year 2050 without a Wisconsin Avenue extension, traffic on Watertown Plank Road is expected to increase from 7,000 vpd to 8,500 vpd. Pilgrim Parkway traffic north of Ace Hardware would not increase if it remains at 2 lanes but would increase from 16,500 vpd to

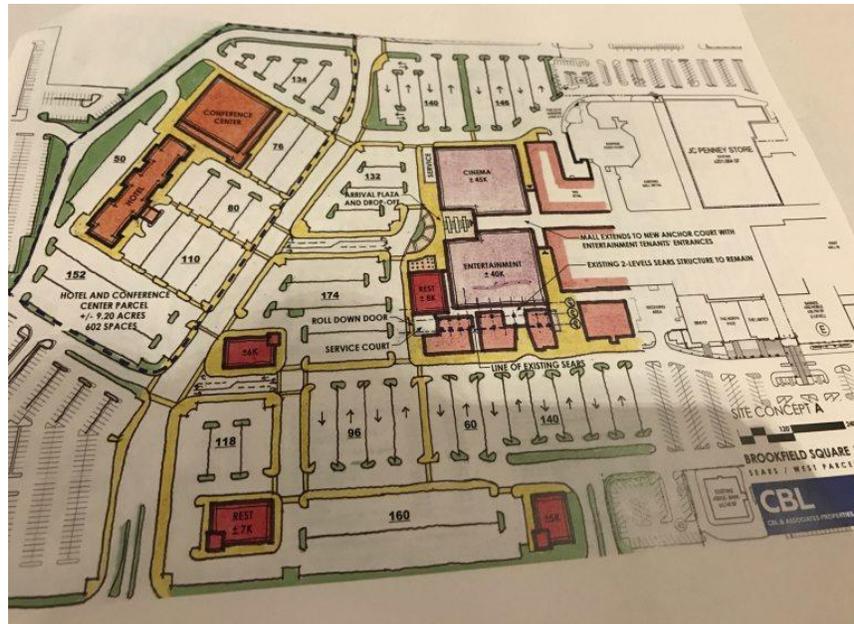
17,500 if widened to 4 lanes. Bluemound Road traffic east of Pilgrim Parkway would increase from 31,000 vpd to 33,500 vpd 'with' or 'without' widening of Pilgrim Parkway to 4 lanes.

With a Wisconsin Avenue extension, traffic on Watertown Plank Road is expected to increase from 7,000 vpd to 8,500 vpd which is the same as would occur without a Wisconsin Avenue extension. Pilgrim Parkway traffic north of a Wisconsin Avenue extension traffic would increase slightly from 17,000 vpd to 18,000 if widened from 2 lanes to 4 lanes. Bluemound Road traffic would not change with the widening of Pilgrim Road north of a Wisconsin Avenue extension.

2. Brookfield Square Mall Convention Center Traffic

Based on recent newspaper articles on a new convention center and hotel facility located at the recently vacated Sears auto care building at the Brookfield Square Mall as shown in Figure 1.

Figure 1: Proposed Brookfield Hotel and Convention Center



The convention center would include approximately 43,000 square feet of meeting space, including a 15,000 to 18,000 square foot ballroom with ancillary meeting rooms. The hotel would include between 150 and 175 rooms.

There are several factors to consider when estimating the impact of a new development on the adjacent street network. The first factor to consider is the number of trips generated by the development. The second factor to consider is that an existing conference facility and hotel is located immediately adjacent to Brookfield Square Mall which already generates traffic on the adjacent street network. The final consideration involves trips already generated by the Mall that may also use the new convention center/hotel facilities.

An estimate was made of the number of trips generated by a 43,000 square foot convention center and a 175 room hotel. The standard resource for estimating trips generated by different development types is the Institute of Transportation Engineers *Trip Generation Manual*, 9th edition. Unfortunately, ITE does not provide trip data for convention centers. Convention center

trip activity is greatly dependent on facility programming with four general types of events, such as 1) trade shows, 2) public consumer shows, 3) banquets and 4) conventions. Lacking any detailed event programming data, research conducted on convention centers indicates it may be assumed a Brookfield Convention Center might generate approximately 3,500 trips per day when the facility is programmed for a convention or consumer trade show. It was calculated that a 175-room hotel with a 75% room occupancy rate, based on ITE trip generation data, can be expected to generate 1,200 trips per day. During a convention center event, it is expected that a majority of the hotel trips, up to 80%, will be made by attendees to the convention center resulting in a daily total of 240 non-convention center generated hotel trips. Therefore, the combined trip activity generated by a convention center/hotel facility may generate a total of 3,740 trips per day.

Finally, traffic generated by a convention center/hotel complex needs to be assigned to the adjacent street network to determine its impact on Pilgrim Parkway. Based on standard traffic pattern trip distribution procedures endorsed by the WisDOT, it is assumed that the majority of convention center traffic, approximately 66%, or up to 2,460 trips per day, would utilize the adjacent I-94 freeway. It also estimated that up to 3.8%, or 140 trips per day, of convention center traffic would use Pilgrim Parkway north of Watertown Plank Road, with approximately 9%, or 350 trips per day, using Bluemound Road east and west of Pilgrim Parkway. Table 3 summarizes an estimate for the distribution of daily trips generated by a potential Brookfield Square convention center/hotel complex.

Table 3: Daily Trip Distribution for a Brookfield Square Convention Center/Hotel Complex

Street Segment	Percent Trips	New Traffic(vpd)
Pilgrim Parkway North of Bluemound Road	3.8	140
Bluemound Road east of Pilgrim Parkway	9.2	350
Bluemound Road west of Pilgrim Parkway	9.2	350
Moorland Road south of I-94	11.8	440
I-94 east of Moorland Road	33.6	1,250
I-94 west of Moorland Road	32.4	1,210
Total	100.0	3,740

In summary, it is concluded that daily traffic volumes on Pilgrim Parkway could increase from approximately 14,000 vpd to 14,140 trips per day when a convention center activity is programmed. It is also concluded that daily traffic on Bluemound Road could increase from 34,000 vpd to 34,350 vpd.

3. Historic Crash Patterns

The principal reason that Village officials are evaluating the realignment of Watertown Plank Road to align with an extension of Wisconsin Avenue is due to the WisDOT traffic safety consideration of reducing Watertown Plank Road access at its existing intersection with Pilgrim Parkway. The WisDOT has notified the Village that they may prohibit westbound left turns from Watertown Plank Road onto southbound Pilgrim Parkway due to traffic safety concerns at the Pilgrim Parkway intersections with Watertown Plank Road and Bluemound Road. Table 4 below summarizes the 6-year crash patterns at these intersections, as well as at the Bluemound Road intersection with Terrace Drive.

Table 4: Pilgrim Parkway/Bluemound Road Area Crash History (2011-2016)

Intersection	Severity			Frequency						Total
	PDO	Injury	Fatality	2011	2012	2013	2014	2015	2016	
Bluemound & Pilgrim	99	70	0	36	31	28	30	23	21	169
Pilgrim & Watertown Plank	36	6	0	8	7	4	10	9	4	42
Bluemound & Terrace	3	2	0	2	0	1	1	1	0	5
Total	138	78	0	46	38	33	41	33	25	216

Source: Wisconsin Department of Transportation

Table 5 summarizes the crash collision patterns at the study intersections.

Table 5: Pilgrim Parkway/Bluemound Road Area Collision Patterns (2011 -2016)

Intersection	Collision Pattern						Total
	Angle	Rear-End	Sideswipe	Fixed Object	Head-On	Bike/Ped	
Bluemound & Pilgrim	28	122	7	11	0	1	169
Pilgrim & Watertown Plank	25	7	8	1	1	0	42
Bluemound & Terrace	2	1	2	0	0	0	5
Total	55	130	17	12	1	1	216

Source: Wisconsin Department of Transportation

As shown on Table 4, over the last 6 years there have been 42 crashes at the Watertown Plank Road intersection with Pilgrim Parkway. The number of annual crashes at this intersection have been relatively constant ranging between 7 to 10 crashes per year, except during 2013 and 2016 when only 4 crashes were reported each year. Of the 42 crashes, only 6 crashes, or 14%, involved personal injuries. Table 5 indicates that the majority of crashes, 25 or 60%, involved right angle collisions which normally result in personal injuries, which is contrary to the existing crash severity data.

In comparison, the Bluemound Road intersection with Pilgrim Parkway/Moorland Boulevard experienced significantly higher traffic crashes totaling 169 crashes over the same 6-year period. It is noted that the annual number of crashes per year at the intersection has demonstrated a steady decreasing trend from a high of 36 crashes in 2011 to a low of 21 crashes in 2016. Of the 169 total crashes 70, or 41%, resulted in personal injuries. Table 5 indicates that the majority of crashes, 122 or 72%, involved rear-end collisions.

The Terrace Drive intersection is included in this crash history due to reported safety concerns related to cut-through traffic diverting from Watertown Plank Road to avoid congestion from the westbound left turns on Watertown Plank Road at its intersection with Pilgrim Parkway. The cut-through traffic condition at Bluemound Road conflicts with a high volume of eastbound U-turns on Bluemound Road at its intersection with Terrace Drive. A review of annual crashes reported at the Terrace Drive intersection with Bluemound Road indicates no change over the past 6 years, totaling only 5 crashes during that time period, two crashes resulted in personal injuries.

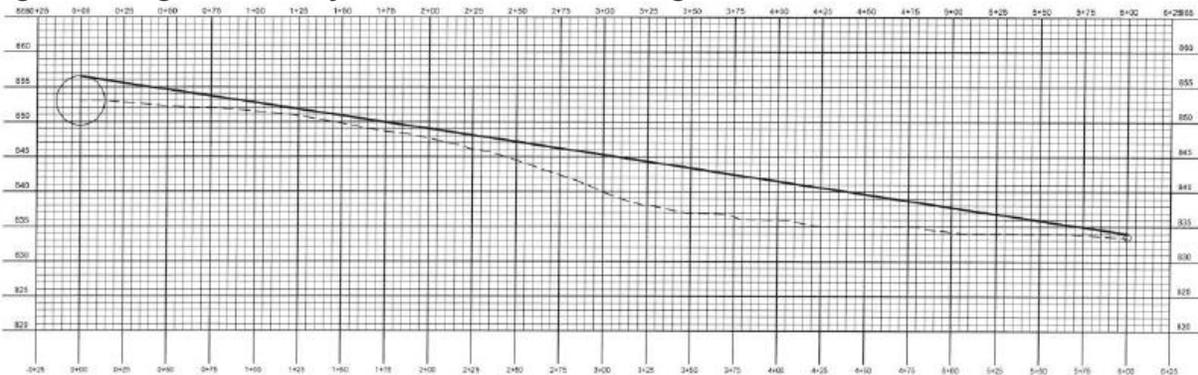
The collision pattern at this intersection is evenly distributed between right angle (2), rear-end (1) and sideswipe (2) collisions.

In summary, the number of traffic crashes per year at the Watertown Plank Road intersection with Pilgrim Parkway has not changed since 2011 with the number of crashes per year at the Bluemound Road intersection decreasing over the last 6 years. However, it is noted that field observations of the two Pilgrim Parkway intersections indicate that typically there may be 4 to 5 eastbound left turns from Bluemound Road that block the Bluemound Road intersection when traffic on Bluemound Road receives a green traffic signal indication. This creates the potential for numerous right angle collisions on Bluemound Road

4. Pilgrim Parkway Sight Distance Conditions with a Wisconsin Avenue Extension

Ayres Associates was requested to determine if there is adequate safe ‘decision sight distance’ for northbound drivers on Pilgrim Parkway traveling at 35 mph to be able to stop if there is a stopped car or other object at a Wisconsin Avenue intersection. The WisDOT *Facilities Development Manual* indicates that a vehicle traveling at 35 mph requires a ‘desirable’ decision sight distance of 590 feet to see a 6-inch object on a roadway and take adequate action such as stopping to avoid striking the object. Figure 2 provides an existing cross-section view of Pilgrim Parkway, based on GIS topographic data, and the line of sight from a driver’s eye at a height of 3.5 feet in a northbound car to a 6-inch roadway object at a Wisconsin Avenue intersection.

Figure 2: Pilgrim Parkway Profile and Decision Sight Distance for Northbound Motorists



As shown on Figure 2, a northbound motorist is provided approximately 600 feet under existing roadway conditions to see a 6-inch tall object at a Wisconsin Avenue intersection. This is an important safety consideration related to traffic safety for westbound right turning cars exiting a relocated Watertown Plank Road as a ‘Right Turn On Red’ maneuver.

In summary, this analysis indicates there is adequate sight distance to provide safe conditions along Pilgrim Parkway with a new Wisconsin Avenue intersection.

5. Pilgrim Road Curb Bumpout Removal

Figure 3 on the following page shows the existing northbound curb bumpout on Pilgrim Parkway, between Bluemound Road and Watertown Plank Road, highlighted within a red circle. The purpose of the curb bumpout is to control and manage traffic conflicts between Bluemound Road and Watertown Plank Road.

Figure 3: Pilgrim Road Northbound Curb Bumpout



As shown on Figure 3, the bumpout serves to merge westbound right turns from Bluemound Road into the existing two northbound through traffic lanes on Pilgrim Parkway. It is noted that the two northbound traffic lanes align with the two through traffic lanes on the south side of the Bluemound Road intersection. As drivers travel north, away from the Bluemound Road intersection, the bumpout provides a separate northbound right turn lane for cars turning onto Watertown Plank Road. Figure 3 also shows the dual eastbound left turn lanes on Bluemound Road at its intersection with Pilgrim Parkway which directs left turning traffic into the existing two northbound lanes on Pilgrim Parkway.

It is Ayres Associates professional opinion that removal of the curb bumpout would increase intersection safety conflict problems by creating a traffic weaving area within a very confined distance of about 220 feet between the Bluemound and Watertown Plank Road intersections. More specifically, because it is expected that the majority of westbound right turn traffic from Bluemound Road will continue north, rather than stay in the right lane to turn east on Watertown Plank Road, these vehicles would be required to merge in with northbound through traffic from Moorland Road and eastbound left turn traffic from Bluemound Road, if the curb bumpout were removed. This traffic weaving conflict issue is compounded due to the presence of eastbound left turn vehicles from Bluemound Road and northbound through vehicles from Moorland Road that desire to make a right turn at Watertown Plank Road. During peak hours, the short segment of Pilgrim Parkway between the Watertown Plank and Bluemound Road intersections is frequently grid-locked, which can back up into the Bluemound Road intersection.

In summary, it is Ayres Associates professional opinion that removal of the existing Pilgrim Parkway bumpout would increase northbound traffic safety conflicts between Bluemound Road and Watertown Plank Road.

6. North Shore Bank Driveway Relocation

There are two issues related to this topic. The first issue involves the impact from reducing North Shore Bank access on Pilgrim Parkway traffic congestion and queuing problems, with the second issue involving the impact of reducing North Shore Bank access for its customers and employees. Figure 4 shows the three existing street network access points to the North Shore Bank development that currently has one driveway on Bluemound Road and two driveways on Watertown Plank Road. It is noted, based on WisDOT traffic safety concerns, any access restrictions involving partial restriction to right turns only or full closure to all traffic movements at the southern North Shore Bank driveway opposite Watertown Plank Road may or may not occur with an eastward extension of Wisconsin Avenue to Pilgrim Parkway.

Figure 4: North Shore Bank Access



Pilgrim Parkway Congestion/Queuing Impact: Under current operation the southern North Shore Bank driveway is signalized and provides a separate green traffic movement phase for right/through/left turn movements exiting onto Pilgrim Road. Restricting Bank access to right turn ingress or egress movements eliminates the need to provide a traffic signal phase for through/left turn movements exiting the Bank driveway. Under this condition the existing green phase signal time could be reallocated to move north and southbound through traffic on Pilgrim Parkway and/or to increase green time for eastbound left turns from Watertown Plank Road.

The primary traffic signal purpose is to allow the high eastbound traffic volumes on Watertown Plank Road to safely enter Pilgrim Parkway.

It is Ayres Associates professional opinion that since the green traffic signal phase for North Shore Bank traffic is relatively short, elimination of that green phase would not significantly reduce existing congestion or queuing problems along Pilgrim Parkway.

Bank Customer/Employee Impact: Under a partial Watertown Plank Road intersection closure scenario with the extension of Wisconsin Avenue, as shown on Figure 5, full access to North Shore Bank may be reduced to two primary locations with one driveway on Bluemound Road and a new traffic signal controlled intersection on Pilgrim Parkway. It is expected that additional access to the Bank parking lots would be provided from the Wisconsin Avenue extension. This scenario may create some driver indirection and increased traffic circulation in the North Shore Bank parking lots and internal roadway system, particularly for customers who want to park at the main Bank entrance on Bluemound Road. It is noted that North Shore Bank is considered a 'destination' type trip, which is not as sensitive to business accessibility as 'pass-by' trip types. Partial right turn access to/from the North Shore Bank southern driveway should minimize safety conflict concerns along Pilgrim Parkway.

Figure 5: Wisconsin Avenue Extension/ Watertown Plank Road Design Concept



As shown on Figure 5, it is expected that the extension of Wisconsin Avenue to Pilgrim Parkway will require relocation of the northern North Shore Bank direct access driveway opposite the Ace Hardware driveway. Under this concept, the existing North Shore Bank 'north-south' parking lot circulation roadway adjacent to the west side of Pilgrim Parkway would not connect directly with Wisconsin Avenue due to its close proximity, approximately 120 feet, to a new signalized

intersection on Pilgrim Parkway. A traffic engineering analysis of the Wisconsin Avenue extension is required to determine the exact location of a new Wisconsin Avenue driveway connection to the north side of the North Shore Bank parking lot and circulation to the main office entrance facing Bluemound Road.

In summary, it is Ayres Associates professional opinion that closure of the southern Pilgrim Road driveway to North Shore Bank opposite existing Watertown Plank Road would reduce customer access to the Bank and that construction of a Wisconsin Avenue extension will require relocating the northern Pilgrim Road Bank access to the west along the extension of Wisconsin Avenue. It is reasonable to maintain the existing safe right turn access to/from the southern Bank driveway on Pilgrim Parkway.

7. Terrace Drive Closure to Eliminate Neighborhood 'Cut-Through' Traffic

Village of Elm Grove officials are aware of the existing traffic cut-through pattern on Terrace Drive between Watertown Plank Road and Bluemound Road as motorists attempt to avoid traffic congestion at the Pilgrim Parkway intersections with Watertown Plank Road and Bluemound Road. In addition, Terrace Drive traffic conflict concerns exist between eastbound U-turns and southbound right turns at its intersection with Bluemound Road. It is expected that the Pilgrim Parkway access restrictions proposed by the WisDOT on the westbound left turn from Watertown Plank Road would significantly increase 'cut-through' traffic on Terrace Drive, which runs through a residential neighborhood. Concern has been expressed that relocation of Watertown Plank Road to align with a Wisconsin Avenue extension may encourage additional 'cut-through' traffic on Terrace Drive. Based on these concerns, Village of Elm Grove officials are evaluating the potential of closing access to Terrace Drive. There are two basic options for Terrace Drive closure to eliminate 'cut-through' traffic patterns. These options involve cul-de-sacing Terrace Drive at its intersection with Bluemound Road or with Watertown Plank Road. Other options, such as prohibiting left or right turns at the Terrace Drive intersection or extending left turn lane storage length on Bluemound Road are not considered to be effective or feasible due to the intersections' close proximity to Pilgrim Road, respectively.

Cul-de-sacing Terrace Drive at Bluemound Road provides the advantage of eliminating 'cut-through' traffic concerns, as well as eliminating Terrace Drive right turn traffic safety conflicts with eastbound U-turns on Bluemound Road. The two disadvantages of this option involve encouraging 'cut-through' traffic to use Sunny Slope Road, Rosedale Drive, or other neighborhood streets that connect between Watertown Plank Road and Bluemound Road, plus it eliminates direct Bluemound Road access to residents that live along Terrace Drive and to some extent residents along Froedtert Drive.

In comparison, the construction of a Terrace Drive cul-de-sac at Watertown Plank Road provides the similar advantage of reducing 'cut-through' traffic on Terrace Drive and reducing Terrace Drive southbound right turn conflicts at Bluemound Road. The disadvantages of this option are that it would encourage 'cut-through' traffic to use other neighborhood streets, particularly on Froedtert Drive, and it eliminates direct Watertown Plank Road access for residents who live on Terrace Drive.

In summary, both options to close Terrace Drive to eliminate 'cut through' traffic between Watertown Plank Road and Bluemound Road have the negative impact of encouraging 'cut-through' traffic to use other neighborhood streets, as well as reducing neighborhood access for residents along Terrace Drive. The benefit of constructing a Terrace Drive cul-de-sac at its intersection with Bluemound Road is that it eliminates neighborhood 'cut through' traffic on

Terrace Drive and existing traffic safety movement conflicts on Bluemound Road. It is expected that the Bluemound Road U-turn/right-turn conflicts would be minor at other Bluemound Road intersections east of Terrace Drive.

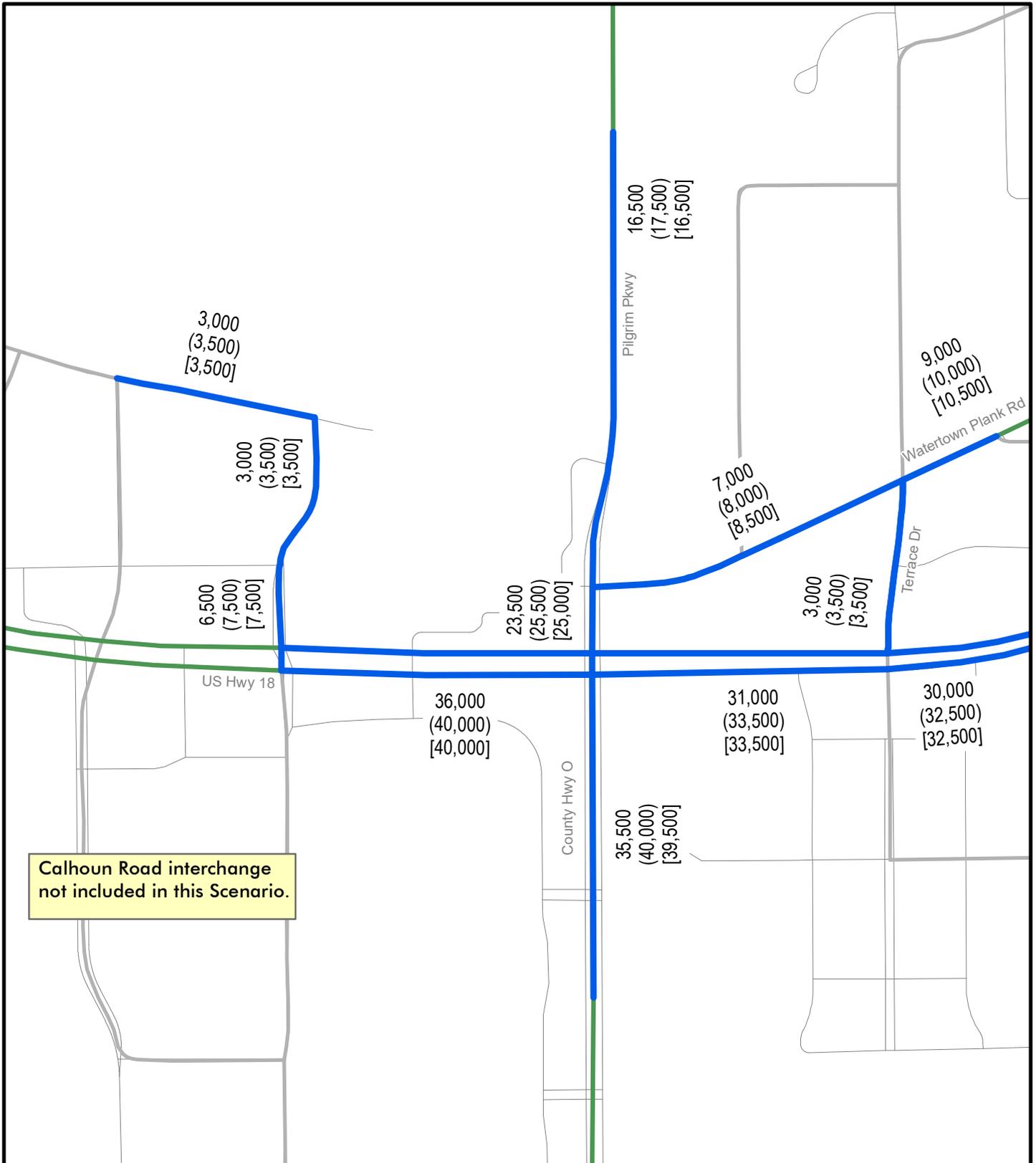
It is Ayres Associates professional opinion, that cul-de-sacing Terrace Drive at Bluemound Road is the best option based on traffic safety conflicts on Bluemound Road at its intersection with Terrace Drive and the potential increase in neighborhood 'cut through' traffic diversion that may occur with the prohibition of westbound left turns from Watertown Plank Road at Pilgrim Parkway.

8. Why were the current Wisconsin Avenue options chosen?

The Wisconsin Department of Transportation has indicated they may remove the existing traffic signals and reconstruct the Watertown Plank Road intersection to eliminate westbound left turn movements from Watertown Plank Road to southbound Pilgrim Parkway. A detailed peak hour traffic analysis was conducted by the City of Brookfield in 2011 to evaluate different intersection options to accommodate an extension of Wisconsin Avenue to connect with Pilgrim Parkway at the existing parking lot driveway to Ace Hardware. That study analyzed 2011 and year 2031 Pilgrim Parkway intersection operation for a: 1) 'Do Nothing' option with no Wisconsin Avenue extension; 2) maintain the existing traffic signals at Watertown Plank Road and construct a new Wisconsin Avenue intersection with Pilgrim Parkway; and 3) closure of existing Pilgrim Parkway access to and realignment of Watertown Plank Road to intersect with a new extension of Wisconsin Avenue.

In summary, based on the WisDOT plans to prohibit westbound left turns from Watertown Plank Road at Pilgrim Parkway due to traffic safety conditions and the analysis of Wisconsin Avenue extension intersection connection options with Pilgrim Parkway, it is Ayres Associates professional opinion that realignment of Watertown Plank Road provides the best solution for the Village of Elm Grove. This conclusion is based on maintaining full Watertown Plank Road access for Elm Grove residents and business patrons, and traffic safety mitigation along Pilgrim Parkway.

In addition, Ayres Associates evaluation of existing 'cut-through' traffic problems along Terrace Drive, a local neighborhood residential street, and traffic safety conflicts at the Terrace Drive intersection with Bluemound Road indicates the Village should consider cul-de-sacing Terrace Drive at its intersection with Bluemound Road.



Calhoun Road interchange not included in this Scenario.

WISCONSIN AVENUE EXTENSION STUDY

FORECAST YEARS 2017 AND 2050 AVERAGE WEEKDAY TRAFFIC (AWDT) VOLUMES
SCENARIO A

LOCATION DESCRIPTION: WISCONSIN AVENUE EXTENSION, VILLAGE OF ELM GROVE
COUNTY: WAUKESHA
FORECAST YEARS: 2017, 2050
SEWRPC PROJECT ID: 200-1000
PREPARED BY: C. HIEBERT, G. ALE
DATE: 7/10/2017

XXXX NOWCAST YEAR 2017 AWDT
(XXXX) FORECAST YEAR 2050 AWDT: PILGRIM PKWY 4 LANES
[XXXX] FORECAST YEAR 2050 AWDT: PILGRIM PKWY 2 LANES

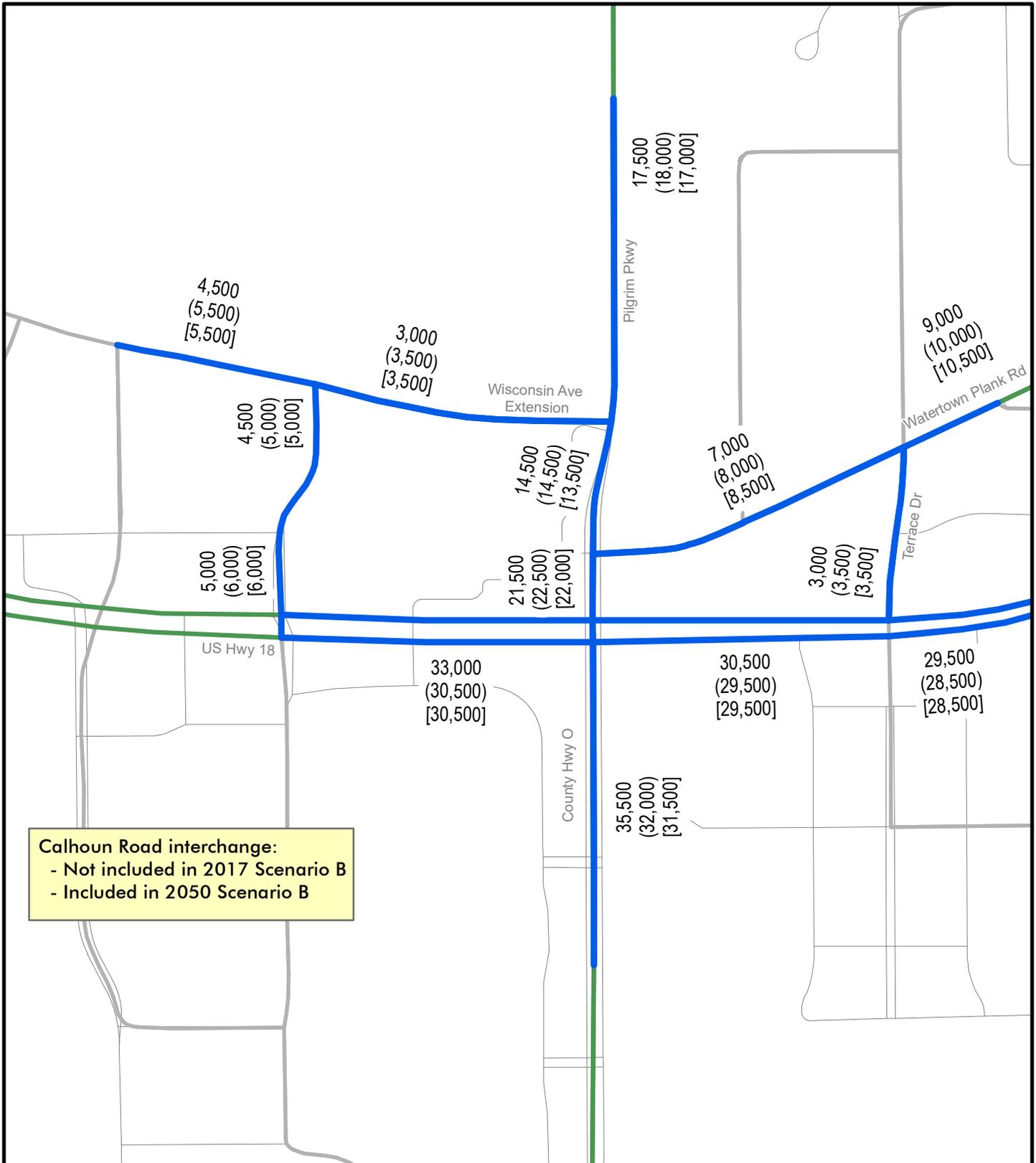
- █ FORECAST FACILITY
- █ FREEWAY MAINLINE
- █ SURFACE ARTERIAL
- █ SYSTEM RAMPS/FREEWAY CD
- █ SERVICE RAMP
- █ NON-ARTERIAL



NOTES:

- (A) FORECASTS ARE PREPARED WITHIN THE CONTEXT OF THE VISION 2050 LAND USE AND TRANSPORTATION PLAN, AND INCLUDE FULL IMPLEMENTATION OF ALL LAND-USE AND TRANSPORTATION RECOMMENDATIONS.
- (B) FORECASTS UTILIZE THE COMMISSION'S 5TH GENERATION TRAVEL DEMAND MODELS.
- (C) YEAR 2017 FORECASTS ARE CONSISTENT WITH THE YEAR 2017 IMPLEMENTATION STAGES OF THE RECOMMENDED YEAR 2050 REGIONAL LAND USE AND TRANSPORTATION PLAN (VISION 2050).





Calhoun Road interchange:
 - Not included in 2017 Scenario B
 - Included in 2050 Scenario B

WISCONSIN AVENUE EXTENSION STUDY

FORECAST YEARS 2017 AND 2050 AVERAGE WEEKDAY TRAFFIC (AWDT) VOLUMES SCENARIO B

LOCATION DESCRIPTION: WISCONSIN AVENUE EXTENSION, VILLAGE OF ELM GROVE
 COUNTY: WAUKESHA
 FORECAST YEARS: 2017, 2050
 SEWRPC PROJECT ID: 200-1000
 PREPARED BY: C. HIEBERT, G. ALE
 DATE: 7/10/2017

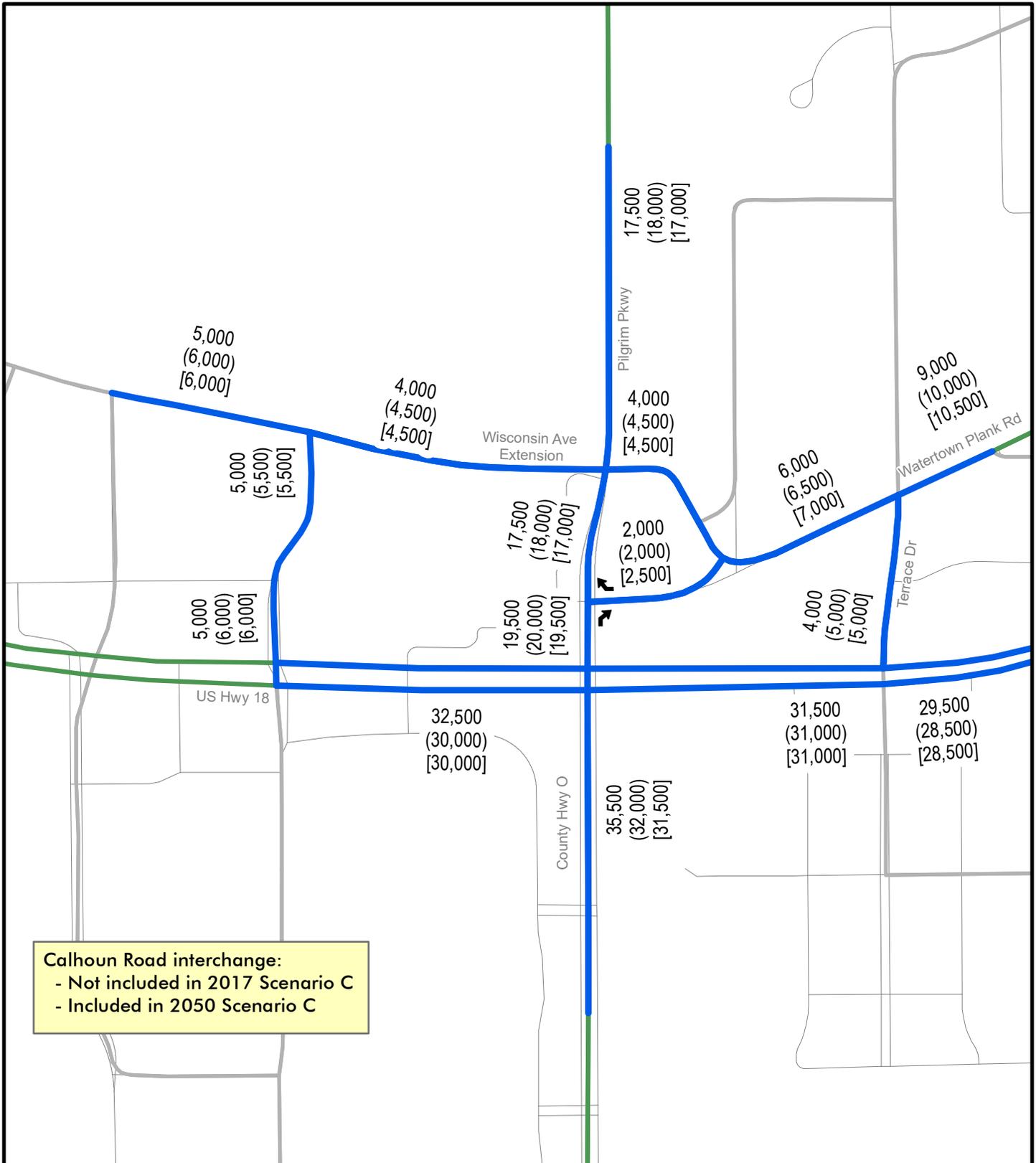
- XXXX NOWCAST YEAR 2017 AWDT
- (XXXX) FORECAST YEAR 2050 AWDT: PILGRIM PKWY 4 LANES
- [XXXX] FORECAST YEAR 2050 AWDT: PILGRIM PKWY 2 LANES
- █ FORECAST FACILITY
- █ FREEWAY MAINLINE
- █ SURFACE ARTERIAL
- █ SYSTEM RAMPS/FREEWAY CD
- █ SERVICE RAMP
- █ NON-ARTERIAL



NOTES:

- (A) FORECASTS ARE PREPARED WITHIN THE CONTEXT OF THE VISION 2050 LAND USE AND TRANSPORTATION PLAN, AND INCLUDE FULL IMPLEMENTATION OF ALL LAND-USE AND TRANSPORTATION RECOMMENDATIONS.
- (B) FORECASTS UTILIZE THE COMMISSION'S 5TH GENERATION TRAVEL DEMAND MODELS.
- (C) YEAR 2017 FORECASTS ARE CONSISTENT WITH THE YEAR 2017 IMPLEMENTATION STAGES OF THE RECOMMENDED YEAR 2050 REGIONAL LAND USE AND TRANSPORTATION PLAN (VISION 2050).





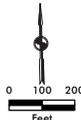
Calhoun Road interchange:
 - Not included in 2017 Scenario C
 - Included in 2050 Scenario C

WISCONSIN AVENUE EXTENSION STUDY

FORECAST YEARS 2017 AND 2050 AVERAGE WEEKDAY TRAFFIC (AWDT) VOLUMES
 SCENARIO C
 (WITH 60-SECOND PEAK HOUR DELAY INTO/OUT OF TERRACE DR AT BLUEMOUND RD)

LOCATION DESCRIPTION: WISCONSIN AVENUE EXTENSION, VILLAGE OF ELM GROVE
 COUNTY: WAUKESHA
 FORECAST YEARS: 2017, 2050
 SEWRPC PROJECT ID: 200-1000
 PREPARED BY: C. HIEBERT, G. ALE
 DATE: 7/10/2017

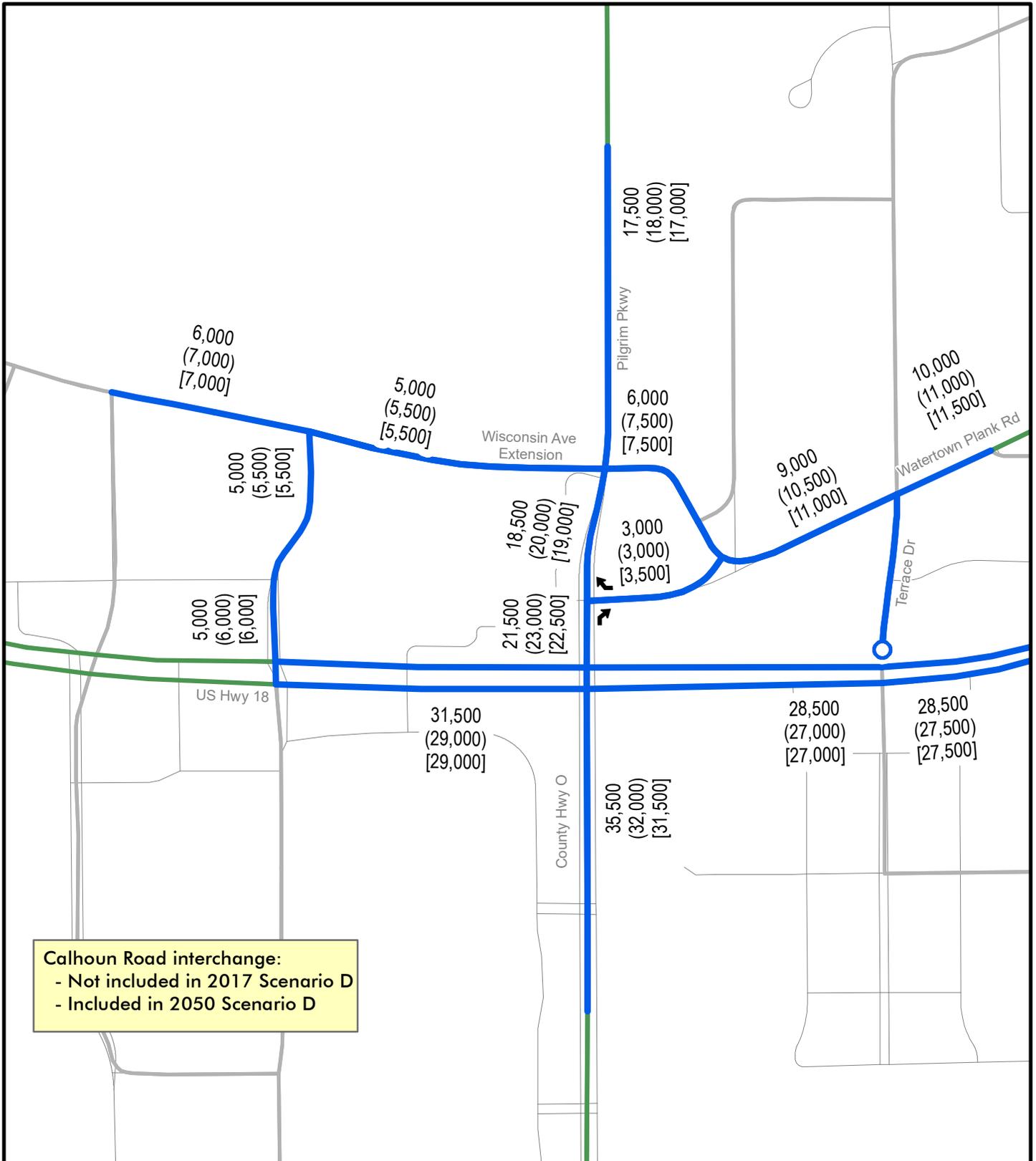
- XXXX NOWCAST YEAR 2017 AWDT
- (XXXX) FORECAST YEAR 2050 AWDT: PILGRIM PKWY 4 LANES
- [XXXX] FORECAST YEAR 2050 AWDT: PILGRIM PKWY 2 LANES
- FORECAST FACILITY
- FREEWAY MAINLINE
- SURFACE ARTERIAL
- SYSTEM RAMP/FREEWAY CD
- SERVICE RAMP
- NON-ARTERIAL



NOTES:

- (A) FORECASTS ARE PREPARED WITHIN THE CONTEXT OF THE VISION 2050 LAND USE AND TRANSPORTATION PLAN, AND INCLUDE FULL IMPLEMENTATION OF ALL LAND-USE AND TRANSPORTATION RECOMMENDATIONS.
- (B) FORECASTS UTILIZE THE COMMISSION'S 5TH GENERATION TRAVEL DEMAND MODELS.
- (C) YEAR 2017 FORECASTS ARE CONSISTENT WITH THE YEAR 2017 IMPLEMENTATION STAGES OF THE RECOMMENDED YEAR 2050 REGIONAL LAND USE AND TRANSPORTATION PLAN (VISION 2050).





Calhoun Road interchange:
 - Not included in 2017 Scenario D
 - Included in 2050 Scenario D

WISCONSIN AVENUE EXTENSION STUDY

FORECAST YEARS 2017 AND 2050 AVERAGE WEEKDAY TRAFFIC (AWDT) VOLUMES
 SCENARIO D
 (TERRACE DR WITH A CUL-DE-SAC AT BLUEMOUND RD)

LOCATION DESCRIPTION: WISCONSIN AVENUE EXTENSION, VILLAGE OF ELM GROVE
 COUNTY: WAUKESHA
 FORECAST YEARS: 2017, 2050
 SEWRPC PROJECT ID: 200-1000
 PREPARED BY: C. HIEBERT, G. ALE
 DATE: 7/10/2017

- XXXX NOWCAST YEAR 2017 AWDT
- (XXXX) FORECAST YEAR 2050 AWDT: PILGRIM PKWY 4 LANES
- [XXXX] FORECAST YEAR 2050 AWDT: PILGRIM PKWY 2 LANES
- FORECAST FACILITY
- FREEWAY MAINLINE
- SURFACE ARTERIAL
- SYSTEM RAMP/FREEWAY CD
- SERVICE RAMP
- NON-ARTERIAL



NOTES:

- (A) FORECASTS ARE PREPARED WITHIN THE CONTEXT OF THE VISION 2050 LAND USE AND TRANSPORTATION PLAN, AND INCLUDE FULL IMPLEMENTATION OF ALL LAND-USE AND TRANSPORTATION RECOMMENDATIONS.
- (B) FORECASTS UTILIZE THE COMMISSION'S 5TH GENERATION TRAVEL DEMAND MODELS.
- (C) YEAR 2017 FORECASTS ARE CONSISTENT WITH THE YEAR 2017 IMPLEMENTATION STAGES OF THE RECOMMENDED YEAR 2050 REGIONAL LAND USE AND TRANSPORTATION PLAN (VISION 2050).

