

### MEMORANDUM

To:	James Merten, P.E., City of Neenah		
From:	Kenneth H. Voigt, P.E., Transportation	Engineer	
Date:	April 13, 2021	Project No.:	49-0123.00
Re:	Final Report on Hewitt Parking Structure	e Traffic Ana	alysis

The City of Neenah has requested Ayres Associates to analyze the feasibility of constructing a parking structure to replace the existing 152-space Hewitt surface parking lot adjacent to Commercial Street. 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. One design involves a single access structure with 578-spaces and a two access structure with 630 spaces. (It is noted that a companion Traffic Engineering Study Technical Memorandum has been prepared, at the City's request, to study intersection operation of a smaller 298-space parking structure along with the feasibility of installing traffic signals at the parking structure driveways on Commercial Street.)

The Hewitt surface parking lot shown on Figure 1 is located along the east side of Commercial Street with a single entrance lane driveway located approximately 400 feet north of Wisconsin Avenue and a dual lane exit driveway located approximately 490 feet north of Wisconsin Avenue.



### Figure 1: Existing Hewitt Surface Parking Lot

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262.523.4488 | N17 W24222 Riverwood Drive, Suite 310 | Waukesha, WI 53188-1132 www.AyresAssociates.com As shown on Figure 1, the parking lot is surround by a canal except along its access connection with Wisconsin Avenue. A pedestrian bridge connects the parking lot to the Neenah Centers property parking lot to the south.

#### **Parking Structure Design Alternatives**

Two parking structure concept design alternatives were developed as a replacement for the Hewitt surface parking lot. The first alternative limits parking structure access to Commercial Street, similar to existing surface lot access conditions. 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 2 shows the ground level parking structure configuration for the single access design alternative.





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

Figure 3 shows the ground level parking structure configuration for a two access parking structure design alternative.



Figure 3: 630-Space 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.

Detailed drawings for each floor of both parking structure design alternatives are included in the Appendices attached to this Technical Memorandum.

### **Traffic Operation**

The following Commercial Street corridor intersections are analyzed in this Technical Memorandum:

- Hewitt Parking Lot Driveway
- Wisconsin Avenue
- Doty Avenue
- Columbian Avenue

According to Commercial Street traffic count data south of Wisconsin Avenue collected in 2016 by the Wisconsin Department of Transportation (WisDOT), morning peak hour traffic volumes during the 7:15 A.M. to 8:15 A.M. morning are significantly less than evening volumes during the 4:30 P.M. to 5:30 P.M. time period, as shown on Figure 4.



Figure 4: Hourly Traffic Distribution on Commercial Street South of Wisconsin Avenue

Based on the WisDOT traffic count data and intersection traffic movement counts collected by the City in 2018, the traffic operation impacts of a new Hewitt parking structure analyzes these two time periods when downtown employees are either reporting to work during the morning peak hour or departing downtown during the evening peak hour. For analysis purposes, it is assumed the parking structure is 90 percent occupied.

Figure 5 shows year 2020 morning and evening peak hour study intersection turning movement volumes with the existing surface parking lot.



Figure 5: Year 2020 Commercial Street Peak Hour Intersection Traffic Volumes

Intersection operation is nationally defined by Level of Service (LOS) categories. These LOS categories have been developed by the National Academy of Sciences Transportation Research Board and adopted by Federal, state and local municipalities as a standard for

quantifying intersection operation. Level of Service (LOS) 'D', as defined in the Highway Capacity Manual 6<sup>th</sup> Edition (HCM), is normally used as the threshold for acceptable peak hour intersection operation in built-out urban areas Level of Service is determined based on the average amount of delay experienced by each vehicle entering an intersection during the study time period and is categorized by grades of 'A' through 'F'. Table 1 summarizes the different intersection LOS descriptions.

Alpha	Signalized	Unsignalized Delay	
LOS	(sec/veh)	(sec/veh)	Description
А	≤ 10	≤ 10	No Congestion: Very few vehicles experience delay.
В	> 10 – 20	> 10 – 15	Minimal Congestion: Some vehicles experience delay but many travel through intersection without stopping.
С	> 20 – 35	> 15 – 25	Minor Congestion: Many vehicles experience delay but some travel through intersection without stopping.
D	> 35 – 55	> 25 – 35	Moderate Congestion: Most vehicles experience delay.
Е	> 55 – 80	> 35 – 50	Severe Congestion: Most vehicles experience significant delay. Volumes nearing capacity.
F	> 80 Or V/C >1.0	> 50 Or V/C >1.0	Extreme Congestion: Nearly all vehicles experience significant delay. Volume may be higher than capacity. Potential gridlock.

Table 1: Intersecti	on Level of S	ervice Des	scription
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The 95<sup>th</sup> percentile queue is also included in the intersection operation summaries in this Memorandum as an additional performance measure. The 95<sup>th</sup> percentile queue (sometimes referred to as the "maximum probable queue") represents the distance away from the stop bar of an intersection at which 95% of all queues for a given traffic movement are expected to extend. In other words, there is only a 5% probability that the 95<sup>th</sup> percentile queue length will be exceeded during the analysis period.

Intersection operation for the traffic signal and STOP sign controls at the study intersections were analyzed using Synchro 10 software. The results presented in this report are based on HCM 2000 format.

### **Existing Hewitt Surface Lot Operation:**

Traffic operation with the existing Hewitt surface parking lot is analyzed for both current year 2020 and projected year 2040 traffic volume conditions.

<u>Year 2020</u>: Table 2 summarizes existing year 2020 traffic operation at the Commercial Street study intersections.

		202	0 Existir	ng AM F	Peak Ho	our	r Traffic	Operati	ions - Co	m	mercia	al Stree	t					
Scenario	Control	MOE							Move	em	ent							OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
		LOS	В	(	C		С	1	3			Α				Α		Α
Columbian Avenue	Signal	Delay (sec)	19.8	isting AM Peak Hour Traffic Operations - Commercial Street Movement NBR SBL SBT SBR 3 C C B NBL NBT NBR SBL SBT SBR 3 C C B A A 22.1 17.7 5.2 $5.6 - 5.6 - 5.6$ 0 100 25' 50' 22.1 $50' - 5.6 - 5.6 - 5.6$ 0 22.1 17.7 $5.2 - 5.6 - 5.6 - 5.6$ 0 20.1 $50' - 5.6 - 5.6 - 5.6$ 1 20.1 $50' - 5.6 - 5.6 - 5.6$ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2											8.7			
		Queue (ft)	50'	18         22.0         22.1         17.7         5.2         5.6         5           0'         100'         25'         50'         50'         250'         250'           D         D         A         A         A         A           29.0         26.1         8.1         8.0         25'           25'         25'         25'         25'         25'											-			
		LOS		0'         100'         25'         50'         50'         250'           D         D         A         A           29.0         26.1         8.1         8.0											Α			
Doty Avenue	Stop	Delay (sec)		D         D         A         A           29.0         26.1         8.1         8.0           25'         25'         25'         25'											1.7			
		Queue (ft)		25'				25'				25'				25'		
		LOS	D	$\begin{array}{c c c c c c c c c c c c c c c c c c c $											С			
Wisconsin Avenue	Signal	Delay (sec)	35.1	32.1	27.1	Π	31.6	54.7	35.4		19.2	2	2.6		28.7	33	.7	32.6
		Queue (ft)	225'	200'	25'	Π	50'	*250	50'		25'	4	75'		25'	*4	75	
				D         C         C         C         D         D         B         C         C         C         C           35.1         32.1         27.1         31.6         54.7         35.4         19.2         22.6         28.7         33.7         3           225'         200'         25'         50'         *250         50'         25'         475'         25'         *475														
																1		
		202	0 Existi	ng PM I	Peak He	our	r Traffic	Operati	ons - Co	omi	mercia	al Stree	et			ł	-	
Scenario	Control	202 MOE	0 Existi	ng PM I	Peak Ho	our	r Traffic	Operati	ons - Co Move	em	mercia	al Stree	t					OVERALL
Scenario	Control	202 MOE	0 Existii EBL	ng PM F	Peak He	our	r Traffic WBL	Operati WBT	ons - Co Move WBR	em	mercia ent NBL	al Stree NBT	et NBR		SBL	SBT	SBR	OVERALL
Scenario	Control	202 MOE LOS	0 Existi EBL C	ng PM I EBT	Peak He EBR	our	r Traffic WBL C	Operati WBT	ons - Co Move WBR	em	mercia ent NBL	al Stree NBT A	t NBR		SBL	SBT A	SBR	OVERALL
Scenario Columbian Avenue	Control	202 MOE LOS Delay (sec)	0 Existin EBL C 20.6	EBT	Peak Ho EBR C	our	r Traffic WBL C 22.4	Operati WBT	ons - Co Move WBR	em	mercia ent NBL	al Stree NBT A 5.2	et NBR		SBL	<b>SBT</b> A 5.9	SBR	OVERALL A 8.4
Scenario Columbian Avenue	Control Signal	202 MOE LOS Delay (sec) Queue (ft)	0 Existi EBL C 20.6 50'	EBT	Peak Ho EBR C 1.5	our	r Traffic WBL C 22.4 25'	Operati WBT 18 5	Move WBR 3 .2 0'		mercia ent NBL	NBT A 5.2 125	et NBR		SBL	<b>SBT</b> A 5.9 300'	SBR	OVERALL A 8.4 
Scenario Columbian Avenue	Control Signal	202 MOE LOS Delay (sec) Queue (ft) LOS	0 Existi EBL C 20.6 50'	EBT ( 21 10 E	Peak He EBR C 1.5	our	r Traffic WBL C 22.4 25'	Operati WBT	ons - Co Move WBR 3 .2 0'		mercia ent NBL	NBT A 5.2 125 A	et NBR		SBL	<b>SBT</b> A 5.9 300' A	SBR	OVERALL A 8.4  A
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	202 MOE LOS Delay (sec) Queue (ft) LOS Delay (sec)	0 Existi EBL C 20.6 50'	EBT (21 10 E 42.5	Peak He EBR C 5	our	r Traffic WBL C 22.4 25'	Operati WBT 18 5 E 45.3	Move WBR 3 .2 0'		mercia ent NBL	A Stree NBT A 5.2 125 A 8.4	et NBR		SBL	<b>SBT</b> A 5.9 300' A 8.3	SBR	OVERALL A 8.4  A 3.4
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	202 MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	0 Existin EBL C 20.6 50'	EBT (21 10 E 42.5 75'	Peak He EBR C 1.5 00'		r Traffic WBL C 22.4 25'	Operati WBT 18 5 E 45.3 50'	ons - Co Move WBR 3 .2 0'		mercia ent NBL	NBT A 5.2 125 A 8.4 25'	t		SBL	<b>SBT</b> A 5.9 300' A 8.3 25'	SBR	OVERALL A 8.4  A 3.4 

### Table 2: Existing Year 2020 Commercial Street Peak Hour Traffic Operation with the Hewitt Surface Parking Lot

As shown on Table 2, all intersection traffic movements are currently operating at LOS 'D' or better conditions during the morning and evening peak hour except for evening peak hour traffic movements on the east and west approaches of Doty Avenue which are operating at LOS 'E' under two-way STOP sign control. The traffic operation data on Table 2 indicates that southbound queuing at the Commercial Street intersection with Wisconsin Avenue experiences a maximum backup of 525 feet with a northbound intersection queue of 725 feet during the evening peak hour. The 525-foot southbound vehicle back-up conflicts with the Hewitt parking lot driveways on Commercial Street which is located 400 feet north of Wisconsin Avenue. For reference purposes, Figure 6 illustrates the Commercial Street study intersection spacing distances.

100' 225'

50'

50'

Delay (sec) 44.9 36.8 28.9 32.1 52.9 36.2 17.1

Queue (ft) \*300 250' 50'

\* 95th percentile volume exceeds capacity, queue may be longer

Wisconsin Avenue

Signal

29.5

\*725

38.7

50'

27.8

\*425

33.3

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### Figure 6: Commercial Street Study Intersection Spacing

The traffic operation data summarized on Table 2 also indicates northbound traffic operates as a progressive traffic stream between the Wisconsin Avenue and Columbian Avenue intersections. The acceptable LOS operation is attributed to good traffic progression timing between the signalized intersections at Wisconsin Avenue and Columbian Avenue.

<u>Year 2040 Surface Parking Lot Traffic Operation</u>: Figure 7 illustrates year 2040 intersection turning movement traffic projections based on an annual traffic growth rate of 0.5% per year.



Figure 7: Year 2040 Commercial Street Peak Hour Intersection Traffic

Table 3 summarizes year 2040 traffic operation at the Commercial Street study intersections under the existing Hewitt surface parking lot condition.

									_					
		2040	Existing	g AM Pe	eak Hour	Traffic O	peration	s - Comm	nercial S	itreet				
Scenario	Control	MOE						Movem	nent					OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT NBR	SBL	SBT	SBR	
		LOS	В	(	с	С		В		А		Α		А
Columbian Avenue	Signal	Delay (sec)	19.3	21	L.6	22.0	17	7.1		5.8		6.3		9.1
		Queue (ft)	50'	10	00'	25'	5	0'		100'		250'		-
		LOS		Е			D			А		Α		А
Doty Avenue	Stop	Delay (sec)		36.6			31.3			8.2		8.2		1.8
		Queue (ft)		25'			25'			25'		25'		-
		LOS	D	С	С	С	E	С	С	С	D		E	D
Wisconsin Avenue	Signal	Delay (sec)	36.8	30.8	25.5	30.7	56.8	34.1	24.7	29.6	36.0	55	5.1	43.2
		Queue (ft)	250'	225'	25'	50'	*275	50'	50'	*550	25'	*5	50	-

# Table 3: Year 2040 Commercial Street Peak Hour Traffic Operation with Surface Hewitt Parking Lot

		2040	Existing	g PM Pe	ak Hou	r٦	raffic Op	eration	s - Comm	۱e	rcial S	treet					
Scenario	Control	MOE							Moven	ne	ent						OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR	SBL	SBT	SBR	
		LOS	С	(	0		С	E	3			Α			Α		А
Columbian Avenue	Signal	Delay (sec)	20.2	20	.9		22.3	17	.6			5.9			6.8		9.0
		Queue (ft)	75'	10	00'		25'	5	0'			150'			350'		
		LOS		F				F				Α			Α		А
Doty Avenue	Stop	Delay (sec)		62.2				69.3				8.6			8.7		4.7
		Queue (ft)		75'				75'				25'			25'		
		LOS	E	D	С		С	E	D		В	0	(	D	(	С	D
Wisconsin Avenue	Signal	Delay (sec)	61.8	37.9	28.4		31.2	55.0	35.2		19.6	43	.4	53.0	33	3.3	41.4
		Queue (ft)	*375	*200	50'		100'	*250	50'		50'	*8	25	*75	*5	600	-
*95th perc	entile volu	ime exceeds cap	pacity, q	ueue m	nay be lo	on	ger										

As shown on Table 3, by the year 2040, the southbound approach of Commercial Street is expected to experience a maximum 500-foot to 550-foot queue during the morning and evening peak hours blocking access to/from the existing Hewitt surface parking lot driveways.

During the morning peak hour, southbound Commercial Street LOS operation at the Wisconsin Avenue intersection projects the 'shared through/right turn' lane and westbound 'through' lane to operate at LOS 'E'. The maximum queuing for the southbound 'shared through/right turn' lane is 550 feet. Westbound 'through' traffic maximum queuing is projected at 275 feet. In comparison, during the evening peak hour, operation of the eastbound left turn and the westbound 'through' movements on Wisconsin Avenue are projected to operate at LOS 'E with 375-foot and 250-foot maximum queues, respectively.

In 2040, the west approach of Doty Avenue is expected to operate at LOS 'E' during the morning peak hour with both the east and west approaches operating at LOS 'F' during the evening peak hour.

### Hewitt Parking Structure Traffic Operation:

The following traffic analysis looks at the traffic impact of both single access and two access parking structure concept designs in the year 2020 and 2040. The year 2020 and 2040 peak

hour traffic volumes previously shown on Figures 5 and 7 have been reduced, as shown on Figure 8, to reflect replacement of the existing surface parking lot trips with the addition of new parking structure trips.



Figure 8: Peak Hour Traffic Reduction from Replacement of Hewitt Surface Parking Lot

<u>Year 2020 Single Access Parking Structure Operation</u>: Figure 9 identifies the distribution of morning and evening peak hour traffic patterns for a single access Hewitt parking structure design. For analyses purposes a 578-space, 5-level parking structure is assumed with 520 vehicles entering and 60 vehicles exiting the structure during the morning peak hour with the reverse condition occurring during the evening peak hour. This assumption represents a parking structure that is nearly 90 percent occupied.



Figure 9: Peak Hour Single Access Parking Structure Traffic Distribution

Figure 10 illustrates year 2020 traffic with the redistribution of peak hour volumes associated with construction of a single access Hewitt parking structure.





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Table 4 summarizes year 2020 traffic operation at the study intersections along Commercial Street for a single access 578-space parking structure design.

													I I					
		2020 On	e-Appro	ach AN	/I Peak	Ho	our Traf	fic Oper	ations -	Co	omme	rcial St	reet					
Scenario	Control	MOE							Moven	ne	ent							OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR	SB	L	SBT	SBR	
		LOS	С	(	5		С	E	3			Α				Α		Α
Columbian Avenue	Signal	Delay (sec)	20.1	21	9		22.0	17	.7			5.5				5.7		8.7
		Queue (ft)	50'	10	00'		25'	5	0'			100'				250'		
		LOS		Е				D				Α				Α		Α
Doty Avenue	Stop	Delay (sec)		35.0				30.6				8.0				8.3		1.8
		Queue (ft)		25'				25'				25'				25'		
		LOS	D	С	С		С	D	D		С	[	)	D	)	D		D
Wisconsin Avenue	Signal	Delay (sec)	47.8	30.0	25.5		31.5	54.7	35.4		21.7	35	.0	40	.6	43.	3	40.6
		Queue (ft)	*175	100'	25'		50'	*250	50'		25'	*6	25	25	5'	*50	0	
Hewitt Driveway		LOS											۸		(	C		A
Entrance	Free	Delay (sec)										0	.0		17	.0		4.9
		Queue (ft)										2	5'		10	00'		
Hewitt Driveway		LOS					F		В			Α				Α		A
Exit	Stop	Delay (sec)				_	51.4		11.3			0.0				0.0		0.9
		Queue (ft)					50'		25'			25'				25'		
		2020 On	e-Appro	ach PN	1 Peak I	Ho	our Traff	ic Opera	ations - (	Co	ommer	rcial St	eet					
Scenario	Control	MOE							Mover	ne	ent							OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR	SE	L	SBT	SBR	
		LOS	С	(	C		С	I	3			Α				Α		Α
<b>Columbian Avenue</b>	Signal	Delay (sec)	20.7	21	5		22.4	18	.2			5.3				6.7		8.6
		Queue (ft)	75'	10	00'		25'	5	0'			125'				350'		
		LOS		F				F				Α				Α		Α
Doty Avenue	Stop	Delay (sec)		65.5				62.6				8.7				8.4		4.5
		Outputs (A)		75'				75'				25'				25'		
		Queue (it)					С	D								D		
Wisconsin Avenue	1	LOS	D	D	С		-	U	D		C	(	2	D				 D
	Signal	LOS Delay (sec)	D 49.6	D 36.8	C 28.9		32.1	52.9	36.2		С 20.4	30	: .9	40	.4	37.	0	 D 37.4
	Signal	LOS Delay (sec) Queue (ft)	D 49.6 *225	200'	C 28.9 25'		32.1 100'	52.9 225'	D 36.2 50'		C 20.4 50'	30 *7	50 50	40 50	.4 )'	37.	0	 D 37.4 
Howitt Drivover	Signal	LOS Delay (sec) Queue (ft) LOS	D 49.6 *225	36.8 200'	C 28.9 25'		32.1 100'	52.9 225'	36.2 50'		20.4 50'	30 *7	50 50	40 50	.4	37. *57 B	0	 D 37.4  A
Hewitt Driveway	Signal Free	LOS Delay (sec) Queue (ft) LOS Delay (sec)	D 49.6 *225	36.8 200'	C 28.9 25'		32.1 100'	52.9 225'	36.2 50'		C 20.4 50'	30 *7	50 0.9 0 0	40 50	.4 )' 10	37. *57 B ).6	0	 D 37.4  A 0.5
Hewitt Driveway Entrance	Signal Free	LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	D 49.6 *225	36.8 200'	C 28.9 25'		32.1 100'	52.9 225'	36.2 50'		20.4 50'	30 *7 0 2	50 50 4 .0 5'	40 50	.4 )' 10 2	37. *57 B 0.6 5'	0	 D 37.4  A 0.5 
Hewitt Driveway Entrance	Signal Free	LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	D 49.6 *225	36.8 200'	C 28.9 25'		32.1 100'	52.9 225'	D 36.2 50'		20.4 50'	30 *7 0 2 A	2 0.9 50 A .0 5'	D 40 50	.4 )' 10 2	37. *57 B 0.6 5' A	0	 D 37.4  A 0.5  F
Hewitt Driveway Entrance Hewitt Driveway	Signal Free Stop	LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec)	D 49.6 *225	36.8 200'	C 28.9 25'		32.1 100' F 655.3	52.9 225'	D 36.2 50' C 19.7		C 20.4 50'	30 *7 0 2 A 0.0	50 50 A .0 5'	D 40 50	.4 )' 10 2	37. *57 B 0.6 5' A 0.0	0	 D 37.4  A 0.5  F 76.5

## Table 4: Year 2020 Commercial Street Peak Hour Intersection Operation with a Single Access Hewitt Parking Structure

\* 95th percentile volume exceeds capacity, queue may be longer

As shown on Table 4, with a single access structure design, all intersection traffic movements in 2020 are expected to operate at LOS 'D' or better except for the Doty Avenue approaches to Commercial Street which are expected to experience LOS 'E' and 'F' operation. During the evening peak hour, the left turn movement exiting the parking structure, that includes separate left and right turn entrance and exit lanes at Commercial Street, is expected to operate at LOS 'F' with a maximum 600-foot left turn backup as vehicles wait to enter the traffic stream on Commercial Street. This LOS 'F' driveway condition also occurs during the morning peak hour but is limited to a 50-foot queue due to the lower volume of exiting vehicles. The southbound Commercial Street maximum queue of 575 feet from the Wisconsin Avenue intersection is

expected to periodically block access to/from the parking structure entrance for southbound entering and exiting vehicles.

<u>Year 2040 Single Access Hewitt Parking Structure Traffic Operation</u>: Figure 11 shows the year 2040 peak hour traffic movements at the Commercial Street study intersections for a single access parking structure design alternative.

Figure 11: Year 2040	Commercial Street	<b>Peak Hour Intersection</b>	Traffic with a Si	ngle
	Approach Hewit	tt Parking Structure		



Table 5 summarizes year 2040 traffic operation at the study intersections on Commercial Street with a single access parking structure design alternative.

		2040 On	e-Appro	ach AN	1 Peak	Ho	ur Traffie	: Operat	ions - Co	mmer	ial Stre	et				
Scenario	Control	MOE							Moven	nent						OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
		LOS	В	(	C		С	E	3		Α			Α		А
Columbian Avenue	Signal	Delay (sec)	19.6	21	.5		21.9	17	.1		6.2			6.5		9.2
		Queue (ft)	50'	10	00'		25'	5	0'		100'			250'		
		LOS		E				E			А			Α		Α
Doty Avenue	Stop	Delay (sec)		44.8				37.8			8.3			8.2		1.9
		Queue (ft)		50'				25'			25'			25'		-
		LOS	E	С	С		С	E	С	С		D	D		F	E
Wisconsin Avenue	Signal	Delay (sec)	59.5	29.5	24.6		30.7	56.8	34.1	25.2	52	2.7	50.6	72	2.4	58.1
		Queue (ft)	*225	100'	25'		50'	*275	50'	25'	*7	00	25'	*5	575	
Howitt Drivoway		LOS										Ą	0	2		Α
Entranco	Free	Delay (sec)									0	.0	18	.8		5.4
Entrance		Queue (ft)									2	5'	12	5'		
		LOS					F		В		Α			Α		Α
Hewitt Driveway Exit	Stop	Delay (sec)					66.9		11.6		0.0			0.0		1.0
		Queue (ft)					50'		25'		25'			25'		
		2040 On	e-Appro	ach PN	1 Peak	Но	ur Traffic	: Operat	ions - Co	mmer	ial Stre	et				
Scenario	Control	2040 On MOE	e-Appro	oach PN	1 Peak	Но	ur Traffic	: Operat	ions - Co Moven	mmere nent	ial Stre	et				OVERALL
Scenario	Control	2040 On MOE	e-Appro	each PN	1 Peak EBR	Ho	ur Traffic WBL	Operat WBT	ions - Co Moven WBR	mmer nent NBL	ial Stre	et NBR	SBL	SBT	SBR	OVERALL
Scenario	Control	2040 On MOE LOS	e-Appro EBL C	each PN EBT	1 Peak EBR	Ho	ur Traffic WBL C	: Operat WBT	ions - Co Moven WBR	mmero nent NBL	ial Stree	et NBR	SBL	SBT A	SBR	OVERALL
Scenario Columbian Avenue	Control Signal	2040 On MOE LOS Delay (sec)	e-Appro	EBT	EBR	Ho	ur Traffic WBL C 22.3	WBT	ions - Co Moven WBR 3	mmere hent NBL	NBT A 6.0	et NBR	SBL	<b>SBT</b> A 7.7	SBR	OVERALL A 9.2
Scenario Columbian Avenue	Control Signal	2040 On MOE LOS Delay (sec) Queue (ft)	e-Appro EBL C 20.4 75'	EBT ( 20 10	<b>EBR</b> 0.9	Ho	ur Traffic WBL C 22.3 25'	WBT 17 5	ions - Co Moven WBR 3 '.6 0'	mmero nent NBL	NBT A 6.0 150'	et NBR	SBL	<b>SBT</b> A 7.7 350'	SBR	OVERALL A 9.2
Scenario Columbian Avenue	Control Signal	2040 On MOE LOS Delay (sec) Queue (ft) LOS	e-Appro EBL C 20.4 75'	EBT ( 20 10 F	1 Peak EBR 0.9	Ho	ur Traffic WBL C 22.3 25'	WBT 17 5 F	ions - Co Moven WBR 3 '.6 0'	mmer hent NBL	NBT A 6.0 150' A	et NBR	SBL	<b>SBT</b> A 7.7 350' A	SBR	OVERALL A 9.2  A
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec)	e-Appro EBL C 20.4 75'	EBT (0 20 10 F 107.0	1 Peak EBR 0.9	Ho	ur Traffic WBL C 22.3 25'	Coperat WBT 17 5 F 106.2	ions - Co Moven WBR 3 '.6 0'	mmer hent NBL	NBT A 6.0 150' A 8.9	et NBR	SBL	<b>SBT</b> A 7.7 350' A 8.7	SBR	OVERALL A 9.2  A 7.0
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	e-Appro EBL C 20.4 75'	EBT ( 20 10 F 107.0 125'	1 Peak EBR 0.9	Ho	WBL C 22.3 25'	WBT 17 5 F 106.2 75'	ions - Co Moven WBR 3 '.6 0'	mmere hent NBL	ial Stree NBT A 6.0 150' A 8.9 25'	et NBR	SBL	<b>SBT</b> A 7.7 350' A 8.7 25'	SBR	OVERALL A 9.2  A 7.0 
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL C 20.4 75'	EBT (0 20 10 107.0 125' D	1 Peak EBR 0.9 00'	Ho	ur Traffic WBL C 22.3 25' C	WBT 17 5 F 106.2 75' E	ions - Co Moven WBR 3 (.6 0'	NBL	ial Stree NBT A 6.0 150' A 8.9 25'	et NBR	SBL	<b>SBT</b> A 7.7 350' A 8.7 25'	SBR D	OVERALL A 9.2  A 7.0  D
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop Signal	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec)	e-Appro EBL C 20.4 75' E E 69.6	EBT (0 200 10 F 107.0 125' D 37.9	EBR 00' C 28.4		ur Traffic WBL C 22.3 25' C 31.2	Operat WBT 17 5 F 106.2 75' E 55.0	ions - Co Moven WBR 3	Mmeronent NBL	ial Stree	et NBR	SBL 57.6	SBT A 7.7 350' A 8.7 25'	<b>SBR</b> D	OVERALL A 9.2  A 7.0  D 49.7
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop Signal	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	e-Appro EBL C 20.4 75' E 69.6 *300	EBT ( 20 10 107.0 125' D 37.9 *250	EBR 0.9 00' 28.4 25'		ur Traffic WBL C 22.3 25' C 31.2 100'	Operat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 6 0' 6 0' 	NBL NBL 24.5 50'	ial Stree	et NBR D 7.0	SBL 557.6 *75	SBT A 7.7 350' A 8.7 25' 5 5 *{	<b>SBR</b> D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7 
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop Signal	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	e-Appro EBL C 20.4 75' E 69.6 *300	EBT ( 20 107 107.0 125' D 37.9 *250	EBR 		ur Traffic WBL C 22.3 25' C 31.2 100'	Coperat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 6 0' D 35.2 50'	C 24.5 50'	ial Stree NBT A 6.0 150' A 8.9 25' 42 *8	et NBR D 7.0 550 A	SBL 	SBT A 7.7 350' A 8.7 25' 5: 5: 5: 5:	<b>SBR</b> D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  A
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway	Control Signal Stop Signal Free	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	e-Appro EBL C 20.4 75' E 69.6 *300	EBT ( 20 10 107.0 125' D 37.9 *250	C 28.4		wBL C 22.3 25' C 31.2 100'	Coperat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 .6 0' 0 5 3 5 2 5 0'	C 24.5 50'	ial Stree NBT A 6.0 150' A 8.9 25' 47 47 47 47 47 47 47 47 47 47	et NBR D 7.0 350 A	SBL 	SBT A 7.7 350' A 8.7 25' 5 5 5 1	<b>SBR</b> D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  A 0.6
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway Entrance	Control Signal Stop Signal Free	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	e-Appro EBL C 20.4 75' E 69.6 *300	EBT ( 200 107.0 125' D 37.9 *250	EBR 2. 9.9 00' 28.4 25'		wBL C 22.3 25' C 31.2 100'	Operat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 .6 0' 0 5 3 5 2 5 0'	C 24.5 50'	ial Street NBT A 6.0 150' A 8.9 25' 42 42 42 42 42 42 42 42 42 42	et NBR D 7.0 550 A .0 5'	SBL 	SBT A 7.7 350' A 8.7 25' \$ 5: 3 1 5'	<b>SBR</b> D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  A 0.6 
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway Entrance	Control Signal Stop Signal Free	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	e-Appro EBL C 20.4 75' E 69.6 *300	EBT ( 200 107.0 125' D 37.9 *250	EBR 2 9.9 00' 28.4 25'		wBL C 22.3 25' C 31.2 100'	Coperat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 .6 0' 0 50' 35.2 50' 2 50'	Merent NBL C 24.5 50'	ial Stree NBT A 6.0 150' A 8.9 25' 42 42 42 42 42 42 42 42 42 42	et NBR D 7.0 550 A .0 5'	SBL 	SBT A 7.7 350' A 8.7 25' 5 *6 3 1 5' A	<b>SBR</b> D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  49.7  A 0.6  F
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway Entrance	Control Signal Stop Signal Free Stop	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL C 20.4 75' E 69.6 *300	EBT (0 20 10 107.0 125' D 37.9 *250	EBR 2 9.9 00' 28.4 25'		wBL C 22.3 25' C 31.2 100' F 956.7	Coperat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 .6 0' 0 3.5.2 50' 35.2 50' 2.5 2.5	Mmerent NBL NBL C C Z4.5 C Z4.5 C	ial Stree NBT A 6.0 150' A 8.9 25' 42 42 42 0 0 2 4 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	et NBR D 7.0 550 A .0 5'	SBL 	SBT A 7.7 350' A 8.7 25' \$ 5 3 1 5' A 0.0	D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  A 0.6  F 102.2
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway Entrance	Control Signal Stop Signal Free Stop	2040 On MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	EBL C 20.4 75' E 69.6 *300	EBT ( 200 100 F 107.0 125' D 37.9 *250	1 Peak EBR 00' C 28.4 25'		wBL C 22.3 25' C 31.2 100' F 956.7 675'	Coperat WBT 17 5 F 106.2 75' E 55.0 *250	ions - Co Moven WBR 3 .6 0' 3 .6 0 3 .2 5 0' 3 5 .2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 0' 4 2 5 4 2 5 4 4 4 5 5 4 5 4 5 5 5 5 5 5	Immerse         NBL           NBL         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0	ial Stree NBT A 6.0 150' A 8.9 25' 422 422 0 0 25' A 0.0 25'	et NBR D 7.0 550 A .0 5'	SBL E 57.6 *75 E 11 2. 	SBT A 7.7 350' A 8.7 25' 55 .1 5' A 0.0 25'	D 1.9 550	OVERALL A 9.2  A 7.0  D 49.7  A 0.6  F 102.2 

## Table 5: Year 2040 Commercial Street Peak Hour Intersection Operation with a Single Access Hewitt Parking Structure

The year 2040 intersection operation summary on Table 5 indicates that the southbound 'shared through/left turn' lane on Commercial Street at the Wisconsin Avenue intersection is expected to operate at LOS 'F during the morning peak hour with a 575-foot queue. During the evening peak hour, the southbound 'shared through/right turn' lane is expected to operate at LOS 'E' but with a longer 650-foot queue. Table 5 analysis data also indicates that in the year 2040, the Wisconsin Avenue eastbound left and the westbound through movements are expected to operate at LOS 'E' during the morning and evening peak hours.

### Two Access Parking Structure

A two access parking structure design with driveways on both Commercial Street and Wisconsin Avenue restricts Commercial Street access to right turns in and right turns out to minimize conflicts with Commercial Street traffic and maximum southbound queuing backups

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that occur at the Wisconsin Avenue intersection. The left turn restriction requires those movements to use the Wisconsin Avenue intersection with Commercial Street to access the parking structure driveway on Wisconsin Avenue at the Neenah Centers parking lot. Even though the design of this structure provides 630 parking spaces, the following intersection operation analysis assumes for direct comparison purposes to the single access structure a total of 520 vehicles entering and 60 vehicles exiting during the morning peak hour.

<u>Year 2020 Two Access Parking Structure Design Traffic Operation</u>: Figure 12 shows peak hour traffic distribution patterns for a two access Hewitt parking structure design.

Figure 12: Peak Hour Intersection	Traffic Distribution wi	ith a Two <i>l</i>	Access He	witt Parking
	Structure			



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Figure 13 shows year 2020 peak hour intersection traffic volumes at the Commercial Street study intersections for a two-access parking structure.



	(935) 1345	▲ 25 (260) ▲ 175 670 (	Two Access Parking Structure
WISCONSIN AVE.	(60) 315 (590) 585 (285) 415 ↓	▲ 30 (40)	$\begin{array}{c} (260) \\$
	(310) 255 (255) 235 (25) 15 ↓	<	(40) 345 <u></u> (325) 270 <del>&gt;</del>
DOTY AVE.	(820) 595 (45) 30 →	↓ 5 (20) ← 10 (10) ↓ 0 (15)	
	(15) 10 - (15) 15> (40) 10↓		
COLUMBIAN AVE.	(815) 10 / (815) 555 / (40) 40 / (40)	<sup>≜</sup> 5 (20) <del>&lt; 55 (40)</del> √ 5 (35)	
	(105) 90 (120) 145 (50) 45		LEGEND
	COMMERCIAL ST.	0)	AM         7:15AM - 8:15 AM           PM         (4:30PM - 5:30PM)

Table 6 summarizes year 2020 peak hour study intersection operation with a two-access parking structure design.

		2020 7		-h 695	Dearbox.			F . C				Char				-		
		2020 Two-A	Approa	cn AM	Peak	lou	r Traf	nc Ope	rations	Comn	iercia	street						
Scenario	Control	MOE							Move	ment							ov	ERALL
			EBL	EBT	EBR	۱	WBL	WBT	WBR	NBL	NBT	NBR	SBL		SBT	SBR		
		LOS	С	0	2		С	E	3		Α				А			Α
Columbian Avenue	Signal	Delay (sec)	20.1	21	9	2	22.0	17	7.7		5.5			5	5.6		1	8.7
	-	Queue (ft)	50'	10	0'		25'	5	0'		100			2	50'			
		1.05		D				D			Α				A		-	Δ
Doty Avenue	Ston	Delay (sec)		34.3		-		30.1		-	8.0			5	3.3			1.8
DotyAvenue	5100	Oueue (#)		25'		+		25'		-	25'		-		25'		<u> </u>	
				25	6	+	6	25	<u> </u>	- C	23	<u> </u>	-	ť		D		
	Circul	Delevices	27.7	20.7	24.0		L 10.2	E	L 22.7	24.7	<u> </u>	76	F	2		12.2		F
Wisconsin Avenue	Signal	Delay (sec)	37.7	30.7	24.9		30.2	58.1	33./	21./		7.0	903.	2		13.3	1/	46.Z
		Queue (ft)	175	125	25'	_	50'	*300	50.	25'	-	625	*52	5		475		
Hewitt Driveway at		LOS		A				,	A .			_		_	В		<u> </u>	A
Wisconsin	Free	Delay (sec)	9	.2				0	.0					1	0.3		2	3.9
		Queue (ft)	5	0'				2	5'					2	25'			
Hewitt Driveway		LOS										A			Α			Α
Entranco	Free	Delay (sec)										D.0			0.0		(	0.0
Entrance		Queue (ft)									1	25'			25			
		LOS							В		Α				Α			Α
Hewitt Driveway	Stop	Delay (sec)	1						11.1		0.0	- 1			0.0			0.1
Exit	_	Queue (ft)							25'		25'				25	-		
		2020 7			Dealet		- <b>T</b> - 6			6		Charact						
		2020 Two-/	Approa	ch PM	Peak	lou	ır Traf	fic Ope	rations	Comm	ercial	Street						
Scenario	Control	2020 Two-/ MOE	Approa	ch PM	Peak	lou	r Traf	fic Ope	rations - Move	Comm	ercial	Street					OVE	RALL
Scenario	Control	2020 Two-/ MOE	Approa EBL	ch PM EBT	Peak H	lou	r Traf WBL	fic Oper WBT	rations · Move WBR	Comm ment NBL	ercial	Street NBR	SBL		SBT	SBR	OVE	ERALL
Scenario	Control	2020 Two-/ MOE LOS	Approa EBL C	EBT	Peak H EBR	lou	r Traf WBL C	fic Oper WBT	Move WBR	Comm ment NBL	NBT A	Street NBR	SBL		SBT A	SBR	OVE	A
Scenario Columbian Avenue	Control	2020 Two-/ MOE LOS Delay (sec)	Approa EBL C 20.7	EBT (21	Peak H EBR	lou N	WBL C 22.4	fic Oper WBT E	Move WBR 3	Comm ment NBL	NBT A 5.3	Street NBR	SBL	6	<b>SBT</b> A 5.4	SBR	OVE	A 3.5
Scenario Columbian Avenue	Control Signal	2020 Two-/ MOE LOS Delay (sec) Queue (ft)	EBL C 20.7	EBT ( 21 10	Peak H	lou 1	r Traf WBL C 22.4 25'	fic Oper WBT E 18 5(	Move WBR 3.2 0'	Comm ment NBL	NBT A 5.3 125	Street NBR	SBL	6	<b>SBT</b> A 5.4 75'	SBR	OVE	A 3.5
Scenario Columbian Avenue	Control Signal	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS	Approa EBL C 20.7 75'	EBT ( 21 10 F	Peak F EBR 1.5	lou 1	r Traf WBL C 22.4 25'	fic Oper WBT E 18 50 F	Move WBR 3 3.2 0'	Comm ment NBL	NBT A 5.3 125 A	Street NBR	SBL	6	SBT A 5.4 75' A	SBR	OVE	A A 3.5 
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2020 Two-A MOE LOS Delay (sec) Queue (ft) LOS Delay (sec)	EBL C 20.7 75'	EBT ( 21 10 F 55.4	Peak F EBR 1.5 10'	lou 1	r Traf WBL C 22.4 25'	fic Oper WBT 18 5( F 55.7	Move WBR 3.2 0'	Comment NBL	NBT A 5.3 125 A 8.6	Street NBR	SBL	6	<b>SBT</b> A 5.4 75' A 3.4	SBR	0VE	A 3.5 - A 1.0
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	EBL C 20.7 75'	EBT ( 21 10 55.4 75'	Peak H		r Traf	fic Oper WBT 18 50 F 55.7 50'	Move WBR 3 3.2 0'	Comment NBL	NBT A 5.3 125 A 8.6 25'	Street NBR	SBL	6	SBT A 5.4 75' A 3.4 25'	SBR	0VE	A 3.5  A 1.0 
Scenario Columbian Avenue Doty Avenue	Control Signal Stop	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL C 20.7 75' E	EBT ( 21 10 F 55.4 75' D	Peak F		r Traf	<b>WBT</b> 18 50 F 55.7 50' F	Move WBR 3 3.2 0' C	Comment NBL	NBT A 5.3 125 A 8.6 25'	Street NBR	SBL F	6	SBT A 5.4 75' A 3.4 25'	D SBR	0VE	A 3.5  A 1.0  E
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop Signal	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec)	EBL C 20.7 75' E E E 56.8	EBT ( 21 ( 21 ( 21 ( 21 ( 27) ( 25,4 ( 75') D ( 35,7)	Peak F		C 22.4 25' C 25' C 26.3	fic Open WBT 18 56 F 55.7 50' F 185.1	Move WBR 3 3.2 0' C 30.2	Comm ment NBL	NBT A 5.3 125 A 8.6 25'	Street	SBL	6	<b>SBT</b> A 5.4 75' A 3.4 25' 3	D.	0VE	A 3.5 - A 1.0 - E 6.9
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop	2020 Two- MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	EBL C 20.7 75' E E 56.8 *350	EBT ( 21 10 55.4 75' D 35.7 *275	Peak H		r Traf	fic Open WBT 188 50 F 55.7 50' F 185.1 *625	Move WBR 3 2.2 0' C 30.2 50'	Comm ment NBL	NBT A 5.3 125 A 8.6 25' 5 5	Street NBR	SBL	6	SBT A 5.4 75' A 3.4 25' 3 3	D 6.8 50'	0VE	A 3.5  A 4.0  E 6.9 
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue	Control Signal Stop Signal	2020 Two- MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	EBL 20.7 75' E 56.8 *350	EBT ( 21 10 55.4 75' D 35.7 *275 A	Peak F		r Traf WBL C 22.4 25' C 26.3 175'	fic Open WBT E 18 50 F 55.7 50' F 185.1 *625	Move           WBR           3           3           0'           0	Comment NBL	NBT A 5.3 125 A 8.6 25' 5 	Street NBR	SBL F 98.3 *125	6 21 8 2	SBT A 5.4 75' A 3.4 25' 3 3 C	D 6.8 50'	0VE	A 3.5  A 4.0  E 6.9  A
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at	Control Signal Stop Signal	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) Delay (sec) Queue (ft) LOS Delay (sec)	EBL C 20.7 75' E 56.8 *350	EBT ( 21 10 55.4 75' D 35.7 *275 A	Peak H		r Trafi WBL C 22.4 25' C 26.3 175'	fic Oper WBT E 18 50 F 55.7 50' F 185.1 *625 /	Kove           WBR           3           3           0'           0	Comment NBL	NBT A 5.3 125 A 8.6 25' 5 	Street	SBL F 98.3 *125	6	SBT A 5.4 75' A 3.4 25' 3 3 25' 3 20 7.0	D 6.8 50'	0VE	A 3.5  A 4.0  E 6.9  A A
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin	Control Signal Stop Signal Free	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Oueue (ft)	Approa EBL C 20.7 75' E E 56.8 *350	EBT ( 21 10 55.4 75' D 35.7 *275 A .5 5'	Peak H		r Traf WBL C 22.4 25' C 26.3 175'	fic Oper WBT E 18 50' F 185.1 *625 / 0 0 2	rations- Move WBR 3.2 0' C 30.2 50' A 4. 0.0	Comment NBL	NBT A 5.3 125 A 8.6 25' 5 5 *	Street	SBL F 98.3 *129	8	SBT A 5.4 75' A 3.4 25' 3 3 C 7.0 7.0	D 6.8 50'	0VE	A 3.5  A 4.0  E 6.9  A 1.5
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin	Control Signal Stop Signal Free	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	Approa EBL C 20.7 75' E 56.8 *350 8 8 2	EBT ( 21 10 55.4 75' D 35.7 *275 A .5 5'	Peak   EBR 5 00' 27.9 25'		r Trafi WBL C 22.4 25' C 26.3 175'	fic Oper B 18 50 F 55.7 50' F 185.1 *625 <i>J</i> 0. 2	rations - Move WBR 3 3 2 0' 3 3 2 0' 3 3 2 0' 3 3 2 0' 3 3 2 0' 3 3 2 0' 3 3 3 3 3 3 3 3 3 3 3 3 3	Comm ment NBL 2 2 2 2 1.2 50'	NBT A 5.3 125 A 8.6 25' 5 5 *	Street NBR	SBL F 98.3 *125	6 2 8 2 5 5	SBT A 5.4 75' 3.4 25' 3 3 25' 3 C 7.0 7.0	D 66.8 50'	0VE	A A A A A A A A A A A
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin	Control Signal Stop Signal Free	2020 Two-/ MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL 20.7 75' E 56.8 *350 8 2	EBT ( 21 10 F 55.4 75' D 35.7 *275 A .5 5'	Peak H EBR 5.5 00' 25' 25'		r Traf WBL C 22.4 25' C 26.3 175'	fic Open WBT 18 50 F 55.7 50' F 185.1 *625 <i>A</i> 0. 2:	rations - Move WBR 3 3 2 0' C 30.2 50' 3 0 5' -	Comment NBL	NBT A 5.3 125 A 8.6 25' 5 5 *	Street NBR	5BL	6 2 2 8 2 3 5 1 7	SBT A 5.4 75' 3.4 25' 3 3 C 7.0 25' A	D 6.8 50'	0VE	A A A A A A A C C C C C C C C C C C C C
Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin Hewitt Driveway	Control Signal Stop Signal Free Free	2020 Two- MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL 20.7 75' E 56.8 *350 8 2	EBT (21) 10 55.4 75' D 35.7 *275 A .5 5'	Peak H EBR 1.5 10 <sup>1</sup> 27.9 25 <sup>1</sup>		r Traf WBL C 22.4 25' C 26.3 175'	fic Open WBT 18 55.7 50' F 185.1 *625 4 0. 21	rations - Move WBR 3 2.2 0' C 30.2 50' 3 0 5'	Com ment NBL Com C C C C C C C C C C C C C C C	NBT A 5.3 125 A 8.6 25' 5 5 5 5 5 5 5 5 ( *)	Street NBR	SBL F 98.3 *125	6 2: 8 2 3 5	SBT A 5.4 75' 3.4 25' 3 3 C 7.0 75' A 0.0	D 6.8 50'	0VF	A A 3.5  A A A 6.9  A A A A 0.0
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Scenario Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin Hewitt Driveway Entrance	Control Signal Stop Signal Free Free	2020 Two- MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS	EBL C 20.7 75' E 56.8 *350 8 2	EBT (21 10 55.4 75' D 35.7 *275 A .5 5'	Peak I EBR 5 100' 27.9 25'		r Traf	fic Open WBT 18 50 F 55.7 50' F 185.1 *625 4 0. 2	rations - Move WBR 3.2 0' C 30.2 50' 4. 0 5' C C C	Com ment NBL Com C C C C C C C C C C C C C C C C C C	NBT A 5.3 125 A 8.6 25' 5 5 5 5 ( ( ( ( ( 2 2) ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 4 ( ) 5 ( ) 4 ( ) 4 ( ) 5 ( ) 4 ( ) 4 ( ) 5 ( ) 1 ( ) 5 () 5 ( ) 5 () () 5 () 5 () 5 () () () () () () () () () () () () ()	Street NBR E 7.6 750 A 0.0 25'	SBL	6 2: 8 2 5 1 7 7	SBT A 5.4 75' A 3.4 25' 3 3 25' A 0.0 25' A 0.0	D 6.8 50'	0V8	A A 3.5  E 6.9  4 A A A 0.0  A A A A
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Scenario Scenario Columbian Avenue Doty Avenue Wisconsin Avenue Hewitt Driveway at Wisconsin Hewitt Driveway Entrance Hewitt Driveway Entrance	Control Signal Stop Signal Free Free Stop	2020 Two- MOE LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft) LOS Delay (sec) Queue (ft)	EBL C 20.7 75' E 56.8 *350 8 2	EBT ( 21 10 55.4 75' 0 35.7 *275 A .5 5'	Peak I EBR 5 0' 27.9 25'		r Traff WBL C 22.4 25' 26.3 175'	fic Oper B 18 5( F 55.7 50' F 185.1 *625 4 0. 2	rations - Move WBR 3.2 0' C 30.2 50' A 0 5' C 19.7 100'	Com ment NBL Com Solution	NBT A 5.3 125 A 8.6 25' 5 5 5 5 5 ( ( ( ( ( ( ( ( ( ( ( ( ( (	Street NBR	SBL F 98.3 *129	6 2: 8 2 5	SBT A 5.4 75' 3.4 25' 3 3 25' A 0.0 25' A 0.0 25'	D 6.8 50'	0VE	A A 3.5 - A 4.0 - - 6.9 - A 4.5 - A 0.0 - A 2.5 - A 2.5 - - - - - - - - - - - - -

### Table 6: Year 2020 Commercial Street Peak Hour Intersection Operation with a Two **Access Hewitt Parking Structure**

\* 95th percentile volume exceeds capacity, queue may be longer

As shown on Table 6, year 2020 intersection operation of the Commercial Street parking structure driveways are expected to operate at LOS 'C' or better with a maximum queue of 100 feet during the evening peak hour. The second parking structure driveway on Wisconsin Avenue is expected to operate at LOS 'A' during the morning peak hour and LOS 'C' during the evening peak hour with a maximum queue of 75 feet. The southbound Commercial Street left turn lane at Wisconsin Avenue is expected to operate at LOS 'F' during both morning and evening peak

hours with maximum queues of 525 feet and 125 feet, respectively. The westbound Wisconsin Avenue 'through' movement is expected to operate at LOS 'E' during the morning peak hour. During the evening peak hour, the eastbound left turn lane and the northbound 'shared through/left turn' lane are expected to operate at LOS 'E' with the westbound through lane at LOS 'F' at the Wisconsin Avenue intersection.

<u>Year 2040 Two Access Parking Structure Traffic Operation</u>: Figure 14 shows the year 2040 peak hour traffic movements at the study intersections with a two-access design parking structure.

	(935) 13		
$\not H$	345 -	1 25 (260)	HEWITT LOT
	↓	▲ 175 (20) ← 670 (103)	
WISCONSIN AVE.	(60) 315 <u></u> (590) 585 <u></u> (285) 415 <u></u>		$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	(310) 255 (255) 235 (25) 15 √	←65 (50) ←570 (705) √ 30 (55)	(40) 345 <u></u> (325) 270 <del>&gt;</del>
DOTY AVE.	(820) 595 (45) 30 →		
	(15) 10 ⊥ (15) 15 → (40) 10 ↓	←20 (20)     ←655 (7775)     √35 (35)	
_COLUMBIAN AVE.	(815) 555 → (40) 40 →		
	(105) 90 <u></u> (120) 145 <u></u> (50) 45 <sub>↓</sub>	<ul> <li>▲ 20 (5)</li> <li>▲ 610 (71)</li> <li>✓ 20 (15)</li> </ul>	LEGEND
	COMMERCIAL	0	AM 7:15AM - 8:15 AM
	ST.		PM (4:30PM - 5:30PM)

Figure 14: 2040 Commercial Street Peak Hour Intersection Traffic with a Two Access Hewitt Parking Structure

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Table 7 shows year 2040 peak hour traffic operating conditions for a two-access parking structure design alternative.

2040 Two-Approach AM Peak Hour Traffic Operations - Commercial Street																	
Scenario	Control	MOE		Movement										OVERALL			
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT SBR	
Columbian Avenue		LOS	В	в С			С	В			A					А	
	Signal	Delay (sec)	19.6 21.5				21.9	17.1			6.2				6	9.2	
		Queue (ft)	50' 100'				25'	50'			100'				2		
Doty Avenue Sto		LOS	E					E			A					А	
	Stop	Delay (sec)	43.6					37.2			8.3				٤	1.9	
		Queue (ft)	50'				25'				25'				2		
Wisconsin Avenue	Signal	LOS	D	С	С		С	E	С		С		F		F	F	F
		Delay (sec)	40.8	29.5	23.4		29.4	60.3	32.5		25.4	63	3.0		2092.6	78.5	291.5
		Queue (ft)	*200	125'	25'		50'	*325	50'		25'	*7	00		*575	*550	
Howitt Drivoursy at		LOS		A			A		Ā							А	
Wisconsin	Free	Delay (sec)	9.3				0.0							1	3.7		
		Queue (ft)	50'				25'						2	25'			
Howitt Drivoursy		LOS											٩			A	А
Entrance	Free	Delay (sec)										0	.0			0.0	0.0
		Queue (ft)										2	5'			25'	-
Hewitt Driveway Exit		LOS							В			Α				А	A
	Stop	Delay (sec)					11.5				0.0					0.0	0.1
		Queue (ft)				Γ			25'			25'				25'	

### Table 7: Year 2040 Commercial Street Peak Hour Intersection Operation with a Two Access Hewitt Parking Structure

2040 Two-Approach PM Peak Hour Traffic Operations - Commercial Street																		
Scenario	Control	MOE	Movement												OVERALL			
			EBL	EBT	EBR		WBL	WBT	WBR	N	BL	NBT	NBR		SBL	SBT	SBR	
Columbian Avenue		LOS	с с				С	E	3	A					A			Α
	Signal	Delay (sec)	20.4 20.9				22.3	17	6.0				7.4				9.1	
		Queue (ft)	75' 100'				25'	5	125'					3	-			
Doty Avenue Stop		LOS	F					A					A			Α		
		Delay (sec)	88.5					89.9		8.8					8.7			6.0
		Queue (ft)	100'					75'		25'					25'			-
Wisconsin Avenue	Signal	LOS	F	D	С		С	F	С	(	С	F			F		E	F
		Delay (sec)	83.7	39.2	28.4		28.1	208.3	30.3	22	2.9	88.	1		131.2	43	3.6	82.7
		Queue (ft)	*400 *325 50' 175' *650 50' 50' *850		*150	50 *425		-										
Howith Delveryou at		LOS	A					ļ	Α				С			Α		
Wicconcin	Free	Delay (sec)	8.6				0.		0.0						18.3			4.5
wisconsin		Queue (ft)	25'				2		25'					75'			-	
Harrist Balance		LOS										Α				Α		Α
Entranco	Free	Delay (sec)									0.0				0.0		0.0	
Entrance		Queue (ft)								25'		1			25'		-	
Hewitt Driveway Exit		LOS							С			A				Α		Α
	Stop	Delay (sec)							22.5			0.0				0.0		2.6
		Queue (ft)							100'			25'				25'		
* 95th percentile volume exceeds capacity, queue may be longer																		

As summarized on Table 7, the Commercial Street parking structure driveways are expected to operate at LOS 'C' or better during both the morning and evening peak hours. The Wisconsin Avenue parking structure driveway is expected to operate at LOS 'B' during the morning peak hour and LOS 'C' during the evening peak hour. During the morning peak hour, the southbound Commercial Street approach and the northbound 'shared through/left turn' lane at Wisconsin

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Avenue are expected to operate at LOS 'F' with the westbound 'through' movement on Wisconsin Avenue operating at LOS 'E'. In comparison, during the evening peak hour, the following Wisconsin Avenue intersection movements: eastbound left turn; westbound 'through'; northbound 'shared through/right turn' and southbound left turn are expected to operate at LOS 'F' with the southbound 'shared through/right turn' operating at LOS 'E'.

### Conclusions

- 1. Existing Hewitt Surface Parking Lot
  - a. <u>Year 2020</u>: Operation of all intersection approaches are at LOS 'D' or better except for the STOP sign controlled east/west Doty Avenue approaches to Commercial 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 maximum queue periodically blocking the parking lot entrance which is located 400 feet north of Wisconsin Avenue.
  - b. Year 2040: Commercial Street southbound approach queuing at Wisconsin Avenue increases to a maximum of 550 feet operating at LOS 'E' during the morning peak hour.

Conclusions: The Commercial Street study intersections with the existing Hewitt surface parking lot operate with minimal LOS concerns except for north and southbound queuing on Commercial Street at Wisconsin Avenue which operates at saturated traffic levels. Maximum southbound queuing at Wisconsin Avenue cab block access to the Hewitt parking lot driveways.

### 2. Single Access Hewitt Parking Structure

- a. <u>Year 2020</u>: With a single access parking structure that has separated dual entrance and exit lane driveways on Commercial Street, the left turn exit movement is expected to operate at LOS 'F' during the evening peak hour with a 600-foot queue inside the structure. The other predominant operation concern involves the Commercial Street southbound queue at Wisconsin Avenue which is expected to extend 575 feet.
- b. <u>Year 2040</u>: 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 at 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.

Recommendation: Construction of a single access parking structure with 578 spaces is not recommended at the Hewitt surface parking lot site due to extensive evening peak hour internal LOS 'F' exiting delays and internal 650-foot queues, along with it's Commercial Street traffic impact involving 575-foot to 650-foot southbound queues at Wisconsin Avenue by the year 2040.

#### 3. Two Access Hewitt Parking Structure

a. <u>Year 2020</u>: It is expected that structure operation will be restricted to right turns in and out of the structure only to minimize traffic conflicts on Commercial Street.

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This restriction requires southbound parking structure traffic on Commercial Street to continue past the structure driveways to turn left at Wisconsin Avenue to use the second access driveway connected to the Neenah Centers parking lot. Likewise, traffic exiting the parking structure to travel southbound on Commercial Street will be required to use the Neenah Centers parking lot connection to Wisconsin Avenue and proceed to make a westbound left turn at the Wisconsin Avenue intersection with Commercial Street.

Under this condition, the structure driveways on Commercial Street are expected to 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 300-foot queue with the southbound Wisconsin Avenue left turn on Commercial Street operating at LOS 'F with a 525-foot queue extending past the Commercial Street parking structure driveways.

b. <u>Year 2040</u>: The Wisconsin Avenue intersection with Commercial Street, during the evening peak hour is expected to operate with the following 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-foot 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.

Recommendation: Construction of a two access parking structure 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 turn 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 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.

### Appendix A Single Access Parking Structure 5-Level Design Concept



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Appendix B Two Access Parking Structure 5-Level Design Concept





