MEMORANDUM

To:	James Merten, P.E.,City of Neenah		
From:	Kenneth H. Voigt, P.E., Transportation Engineer		
Date:	February 12, 2021	Project No.:	49-0123.00
Re:	Final Report on Blue Parking Structure Traffic Analysis		

Study Background

The City of Neenah has requested Ayres Associates to analyze the feasibility of constructing a 600-space parking structure to replace the existing 123 space Blue Lot surface parking facility. This analysis looks at the year 2020 and 2040 traffic operating conditions for selected downtown intersections under existing surface parking lot conditions and the traffic impact of a new parking structure. The 2020 analysis involves a comparison of 2020 existing conditions to 2020 conditions with traffic from a new parking structure. The 2040 analysis involves a comparison of 2040 background traffic growth conditions to 2040 conditions that includes traffic from a new parking structure in addition to traffic generated by potential new Main Street developments.

The Blue parking lot is located west of Church Street between Columbian and Doty Avenues. Blue lot access is limited to driveways located on Brien Street, which serves as a local street connection between Columbian and Doty Avenues as shown on Figure 1.

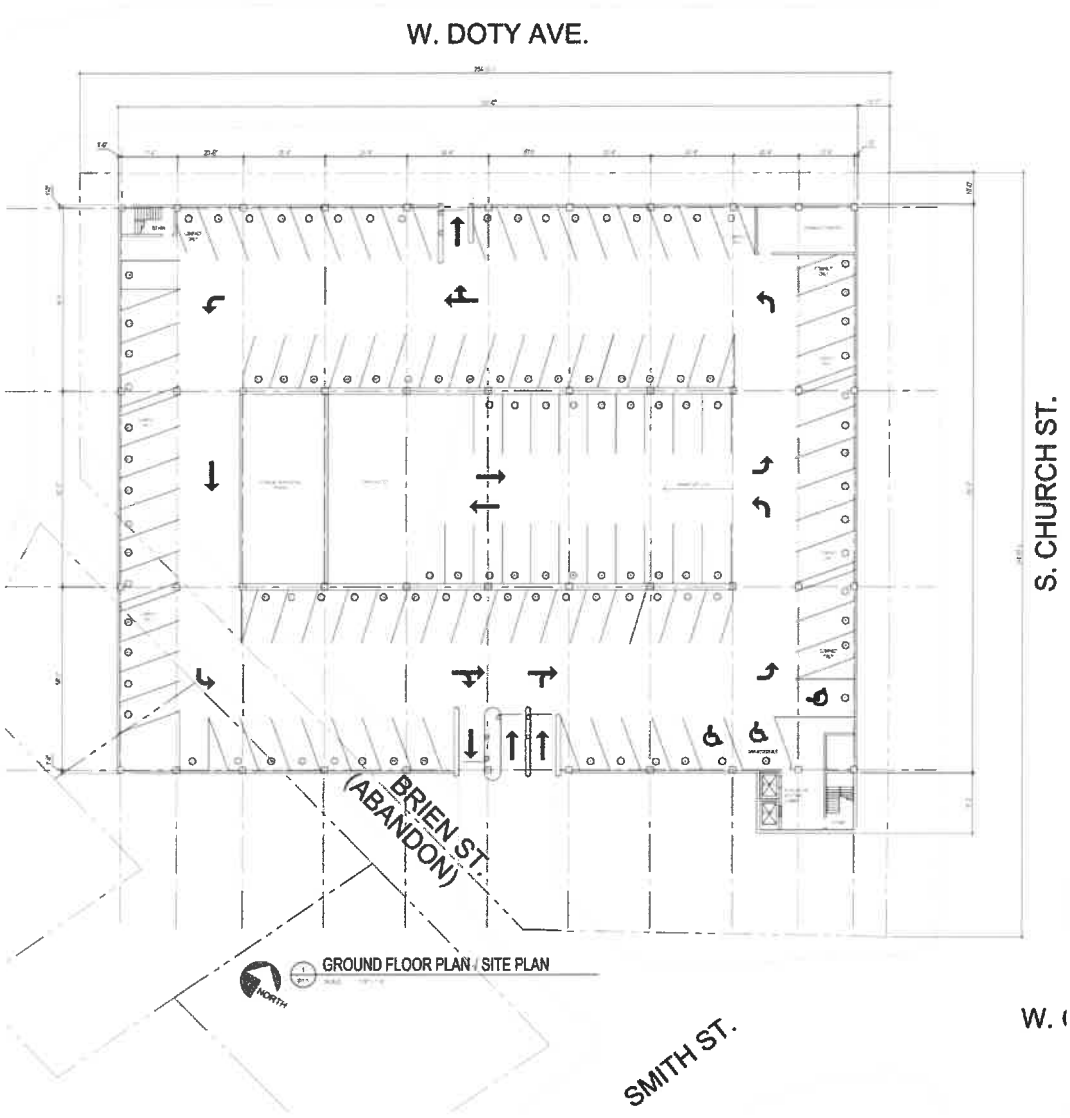
Figure 1: Existing Blue Surface Parking Lot

262.523.4488 | N17 W24222 Riverwood Drive, Suite 310 | Waukesha, WI 53188-1132
www.AyresAssociates.com

Parking Structure Design

Parking structure design for the Blue parking lot requires vacation of portions of Brien Street as shown on Figure 2.

Figure 2: Blue Lot Parking Structure Design



Under this design, the structure contains 5 parking levels with a total of 618 parking spaces. The primary structure entrance and exit driveway is located on a short Brien Street connection to Smith Street/Columbian Avenue. An additional 'exit only' driveway is located on Doty Avenue. The Doty Avenue driveway purpose of the structure design is to minimize queuing backups inside the structure when cars are exiting during the evening peak traffic hour.

Figure 3 illustrates a rendering for a potential parking structure facade.

Figure 3: Blue Parking Structure Rendering

Figure 3 shows a view of the southeast corner stairwell and elevator access of the structure. It is noted that the stairwell and elevator access can be relocated to the northeast corner of the structure to provide closer accessibility to downtown businesses from the Doty Avenue intersection with Church Street. Detailed drawings for each floor of the parking structure design are included in the Appendix to this Technical Memorandum.

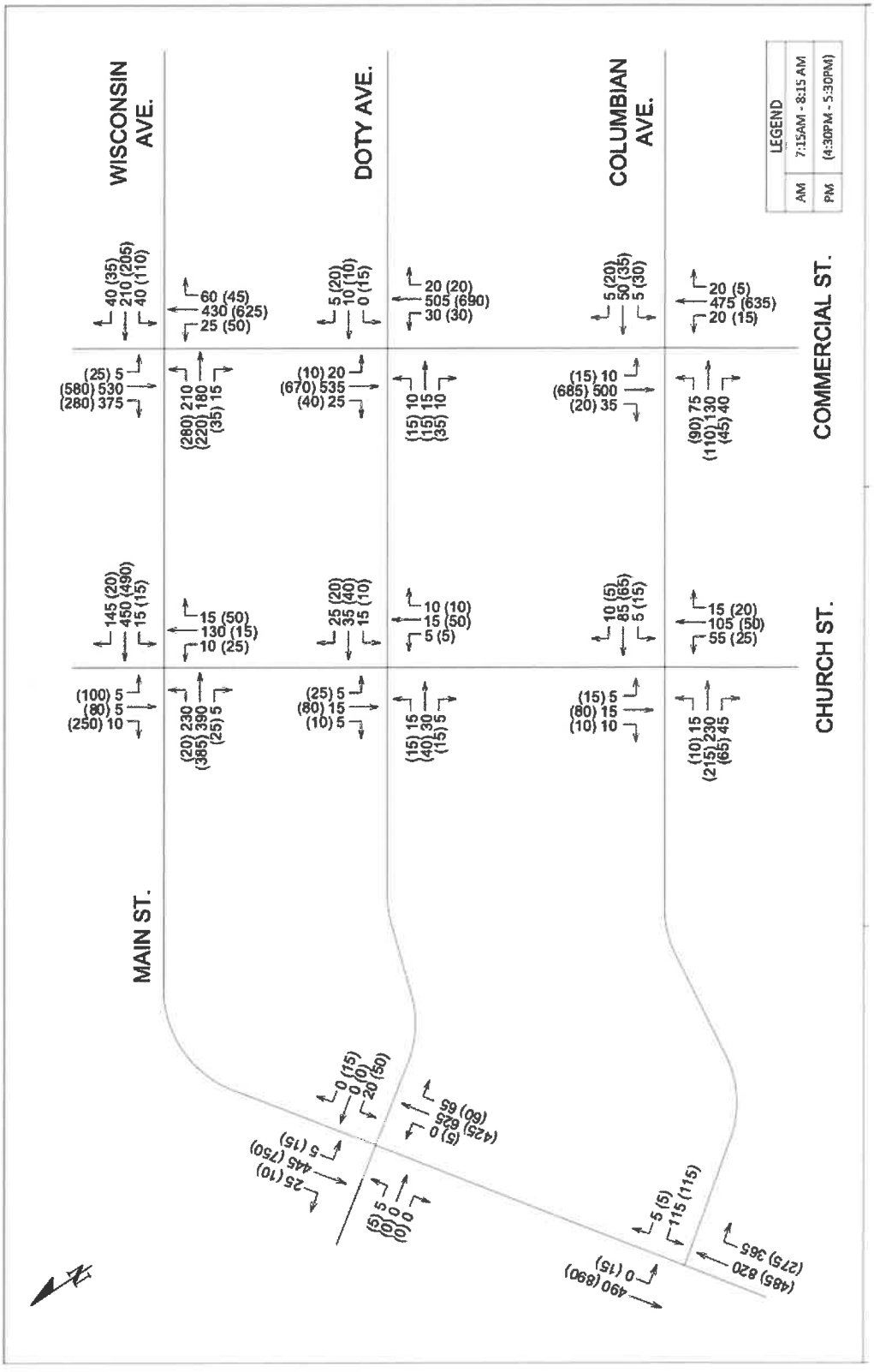
Traffic Operation

For traffic analysis purposes it is assumed that the parking facility is 90 percent occupied, which according to national parking design criteria is considered a 'full' employee parking facility. It is also assumed that the parking facility is empty at the start of the morning peak traffic hour with no vehicles exiting the facility. In comparison, during the evening traffic period it assumed the structure is at 90% of its capacity exiting the structure along with 10% of its capacity entering the structure.

Existing 2020 Parking Lot Intersection Operation:

Existing year 2020 morning and evening peak hour traffic volumes are shown on Figure 4. These volumes are based on counts collected in 2018 by the City of Neenah.

Figure 4: Year 2020 Morning and Evening Peak Hour Intersection Traffic Volumes



Intersection Operation: Intersection operation is quantified by Level of Service (LOS) categories. These LOS categories have been defined by the National Academy of Sciences Transportation Research Board and have been adopted by Federal, state and local municipalities to analyze intersection operation. LOS is determined based on the average amount of delay experienced by each vehicle entering an intersection during the study period and is categorized by grades of 'A' through 'F'. Level of Service (LOS) 'D', as defined in the Highway Capacity Manual 6th Edition (HCM), is normally used as the threshold for acceptable peak hour intersection operation in built out urban areas. Table 1 summarizes the different intersection LOS parameters.

Table 1: Intersection Level of Service Description

Alpha LOS	Signalized (sec/veh)	Unsignalized Delay (sec/veh)	Description
A	≤ 10	≤ 10	No Congestion: Very few vehicles experience delay.
B	> 10 - 20	> 10 – 15	Minimal Congestion: Some vehicles experience delay but many travel through intersection without stopping.
C	> 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.
E	> 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.

The 95th percentile queue is also included in the operations summaries of this memorandum as an additional performance measure. The 95th 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 95th 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 memorandum are shown in HCM 2000 format.

Year 2020 Existing Traffic Operation: Tables 2 and 3 summarize existing intersection operating conditions during the morning and evening peak traffic period, respectively.

Table 2: Year 2020 Existing Morning Peak Hour Intersection Operation

2020 Existing AM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey Street	Stop	LOS		A	A	A			F		B					A
		Delay (sec)		0.0	0.0	0.0			100.5		12.0					6.5
		Queue (ft)		25'	25'	25'			175'		25'					--
Doty Avenue	Stop	LOS	A			B			E			D				A
		Delay (sec)	0.0			10.2			39.1			34.3				0.8
		Queue (ft)	25'			25'			25'			25'				--

2020 Existing AM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Stop	LOS	B			A			B			A				B
		Delay (sec)	12.0			9.1			10.6			8.7				10.9
		Queue (ft)	75'			25'			50'			25'				--
Doty Avenue	Stop	LOS	A			A			B			A				A
		Delay (sec)	7.4			7.4			11.2			9.5				6.8
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	B	A		A	B		D			D		D		B
		Delay (sec)	11.9	7.2		6.0	13.4		46.2			38.2		38.1		15.2
		Queue (ft)	100'	225'		25'	*550		175'			25'		25'		--

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

2020 Existing 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	Signal	LOS	B	C		C	B		A			A				A
		Delay (sec)	19.8	22.0		22.1	17.7		5.2			5.6				8.7
		Queue (ft)	50'	100'		25'	50'		50'			250'				--
Doty Avenue	Stop	LOS	D			D			A			A				A
		Delay (sec)	29.0			26.1			8.1			8.0				1.7
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	D	C	C	C	D	D	B	C		C	C			C
		Delay (sec)	35.1	32.1	27.1	31.6	54.7	35.4	19.2	22.6		28.7	33.7			32.6
		Queue (ft)	225'	200'	25'	50'	*250	50'	25'	475'		25'	*475			--

As shown on Table 2, the only morning intersection movements operating below acceptable levels are the Torrey Street northbound left turn at Main Street (LOS 'F') and the northbound approach of Doty Avenue to Main Street (LOS 'E'). Table 2 also indicates that, although the other study intersections are operating at acceptable levels, the north and southbound signalized approaches of Commercial Street at Wisconsin Avenue are experiencing 475-foot maximum queues with the Wisconsin Avenue westbound shared 'Through/Right Turn' lane at Church Street experiencing a 550-foot maximum queue.

Table 3: Year 2020 Existing Evening Peak Hour Intersection Operation

2020 Existing PM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey Street	Stop	LOS		A	A	A			F		B					A
		Delay (sec)		0.0	0.0	8.8			70.3		10.2					4.7
		Queue (ft)		25'	25'	25'			125'		25'					--
Doty Avenue	Stop	LOS	A			A			F			E				A
		Delay (sec)	9.8			9.2			76.7			45.9				4.1
		Queue (ft)	25'			25'			100'			25'				--

2020 Existing PM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Stop	LOS	B			A			A			A				B
		Delay (sec)	11.7			9.0			9.3			9.5				10.5
		Queue (ft)	75'			25'			25'			25'				--
Doty Avenue	Stop	LOS	A			A			B			B				6.6
		Delay (sec)	7.4			7.4			10.0			11.0				A
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	E	B		A	B		C			D		C		C
		Delay (sec)	62.1	13.2		9.3	14.7		34.3			38.3		32.7		21.3
		Queue (ft)	50'	275'		25'	200'		75'			200'		75'		--

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

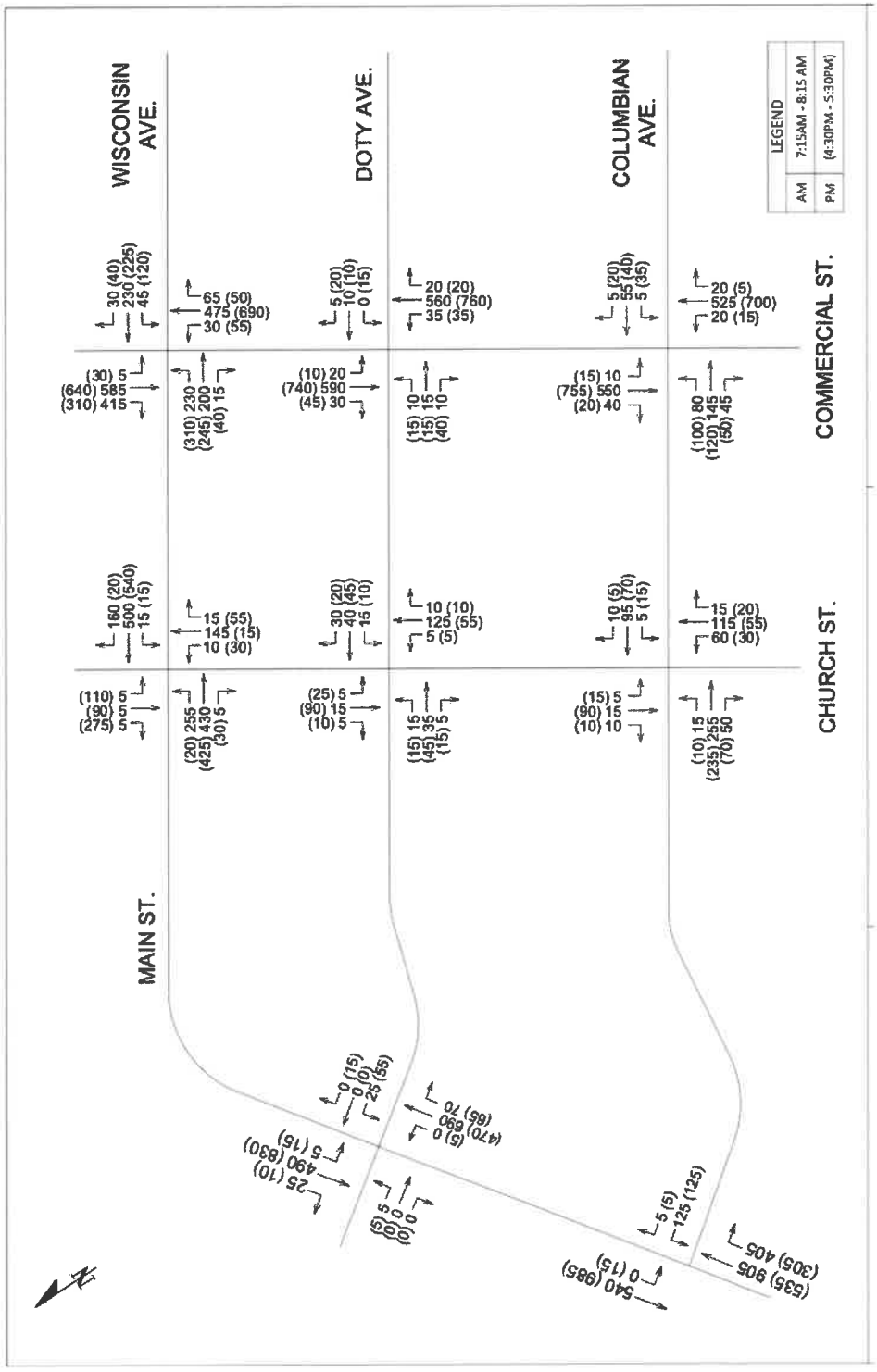
2020 Existing PM Peak Hour Traffic Operations - Commercial Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Signal	LOS	C	C		C	B		A			A				A
		Delay (sec)	20.6	21.5		22.4	18.2		5.2			5.9				8.4
		Queue (ft)	50'	100'		25'	50'		125'			300'				--
Doty Avenue	Stop	LOS	E			E			A			A				A
		Delay (sec)	42.5			45.3			8.4			8.3				3.4
		Queue (ft)	75'			50'			25'			25'				--
Wisconsin Avenue	Signal	LOS	D	D	C	C	D	C	B	C		D	C			C
		Delay (sec)	44.9	36.8	28.9	32.1	52.9	36.2	17.1	29.5		38.7	27.8			33.3
		Queue (ft)	*300	250'	50'	100'	225'	50'	50'	*725		50'	*425			--

During the evening peak hour, Table 3 indicates the northbound left turn on Torrey Street and the northbound approach of Doty Avenue are both operating at LOS 'F' with the southbound approach of Doty Avenue operating at LOS 'E'. The east and westbound Stop sign controlled approaches of Doty Avenue at Commercial Street are operating at LOS 'E' in both directions along with the eastbound left turn lane on Wisconsin Avenue at Church Street which is also operating at LOS 'E' during the evening peak hour. Although operating at LOS 'C', the northbound approach of Commercial Street can experience a maximum queue approaching 725 feet. This queuing condition is managed with signal coordination between the Wisconsin Avenue and Columbian traffic signals.

Year 2040 Traffic

Figure 5 shows Year 2040 morning and evening peak hour study intersection traffic volumes based on projecting traffic growth at an annual rate of 0.5 percent per year.

Figure 5: Year 2040 Existing Condition Morning and Evening Peak Hour Traffic



Year 2040 Traffic Operation: Tables 4 and 5 summarize Year 2040 background traffic growth intersection operating conditions during the morning and evening peak traffic period, respectively.

Table 4: Year 2040 Morning Peak Hour Intersection Operation

2040 Existing AM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Torrey Street	Stop	LOS		A	A		A				F		B					B
		Delay (sec)		0.0	0.0		0.0				201.2		12.6					12.7
		Queue (ft)		25'	25'		25'				250'		25'					--
Doty Avenue	Stop	LOS	A				B				F				E			A
		Delay (sec)	0.0				10.6				52.9				41.7			1.2
		Queue (ft)	25'				25'				50'				25'			--

2040 Existing AM Peak Hour Traffic Operations - Church Street																	
Scenario	Control	MOE	Movement														OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Columbian Avenue	Stop	LOS	B				A				B				A			B
		Delay (sec)	13.3				9.5				11.3				8.9			11.9
		Queue (ft)	100'				25'				50'				25'			--
Doty Avenue	Stop	LOS	A				A				B				A			A
		Delay (sec)	7.4				7.4				11.8				9.7			6.9
		Queue (ft)	25'				25'				25'				25'			--
Wisconsin Avenue	Signal	LOS	C	A			A	B			D				D		D	B
		Delay (sec)	20.7	8.1			6.8	16.9			45.8				37.3		37.1	18.3
		Queue (ft)	*225	275'			25'	*600			175'				25'		25'	--

2040 Existing 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	Signal	LOS	B	C			C	B			A				A			A
		Delay (sec)	19.3	21.6			22.0	17.1			5.8				6.3			9.1
		Queue (ft)	50'	100'			25'	50'			100'				250'			--
Doty Avenue	Stop	LOS	E				D				A				A			A
		Delay (sec)	36.6				31.3				8.2				8.2			1.8
		Queue (ft)	25'				25'				25'				25'			--
Wisconsin Avenue	Signal	LOS	D	C	C		C	E	C		C	C			D	E		D
		Delay (sec)	36.8	30.8	25.5		30.7	56.8	34.1		24.7	29.6			36.0	55.1		43.2
		Queue (ft)	250'	225'	25'		50'	*275	50'		50'	*550			25'	*550		--

As shown on Table 4, in the year 2040 the northbound left turn on Torrey Street at its intersection with Main Street is expected to continue to operate at LOS 'F'. The north and southbound approaches of Doty Avenue at Main Street are expected to operate at LOS 'F' and LOS 'E', respectively, during the morning peak. The Doty Street Stop sign controlled eastbound approach with Commercial Street is expected to operate at LOS 'E' as are the westbound 'Through' movement and the southbound 'Shared Through/Right Turn' movements at the Wisconsin Avenue intersection with Commercial Street. The north and southbound maximum queues on Commercial Street at its intersection with Wisconsin Avenue are projected to increase from 475 feet in 2020 to 550 feet in 2040.

Table 5: Year 2040 Evening Peak Hour Intersection Operation

2040 Existing PM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey Street	Stop	LOS		A	A	A			F		B					A
		Delay (sec)		0.0	0.0	9.0			134.0		10.4					8.7
		Queue (ft)		25'	25'	25'			200'		25'					--
Doty Avenue	Stop	LOS	B			A			F			F				A
		Delay (sec)	10.2			9.4			147.4			58.6				7.4
		Queue (ft)	25'			25'			125'			25'				--

2040 Existing PM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Stop	LOS	B			A			A			A				B
		Delay (sec)	12.7			9.3			9.7			9.9				11.2
		Queue (ft)	75'			25'			25'			25'				--
Doty Avenue	Stop	LOS	A			A			B			B				A
		Delay (sec)	7.4			7.5			10.2			11.3				6.7
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	E	B		B	B		C			D		C		C
		Delay (sec)	62.1	16.1		11.1	17.9		34.6			37.3		30.4		23.0
		Queue (ft)	50'	325'		25'	425'		75'			200'		75'		--

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

2040 Existing PM 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	Signal	LOS	C	C		C	B		A			A				A
		Delay (sec)	20.2	20.9		22.3	17.6		5.9			6.8				9.0
		Queue (ft)	75'	100'		25'	50'		150'			350'				--
Doty Avenue	Stop	LOS	F			F			A			A				A
		Delay (sec)	62.2			69.3			8.6			8.7				4.7
		Queue (ft)	75'			75'			25'			25'				--
Wisconsin Avenue	Signal	LOS	E	D	C	C	E	D	B	D		D	C			D
		Delay (sec)	61.8	37.9	28.4	31.2	55.0	35.2	19.6	43.4		53.0	33.3			41.4
		Queue (ft)	*375	*300	50'	100'	*250	50'	50'	*825		*75	*500			--

During the evening peak hour, year 2040 traffic is expected to operate at LOS 'F' on the northbound approach of Torrey Street and on the Doty Avenue approaches to Main Street during the evening peak hour compared to year 2020 operation. However, the southbound approach of Doty Avenue changes from LOS 'E' to LOS 'F' in 2040. Likewise, the east and westbound Stop sign controlled approaches of Doty Avenue at Commercial Street change from LOS 'E' to LOS 'F' operation by the year 2040. The Wisconsin Avenue eastbound left turn continues to operate at LOS 'E' in 2040. Northbound queuing on Commercial Street at its intersection with Wisconsin Avenue is projected to increase from 725 feet to 825 feet.

Blue Lot Parking Structure Analysis

This analysis involves replacing the existing 123-space parking lot traffic with traffic using a 618-space parking structure.

Surface Lot Removal: Figures 6 and 7 identify the expected trip reduction distribution on the study intersections from removal of the Blue surface parking lot facility.

Figure 6: Morning Peak Hour Trip Reduction with Blue Surface Parking Lot Removal

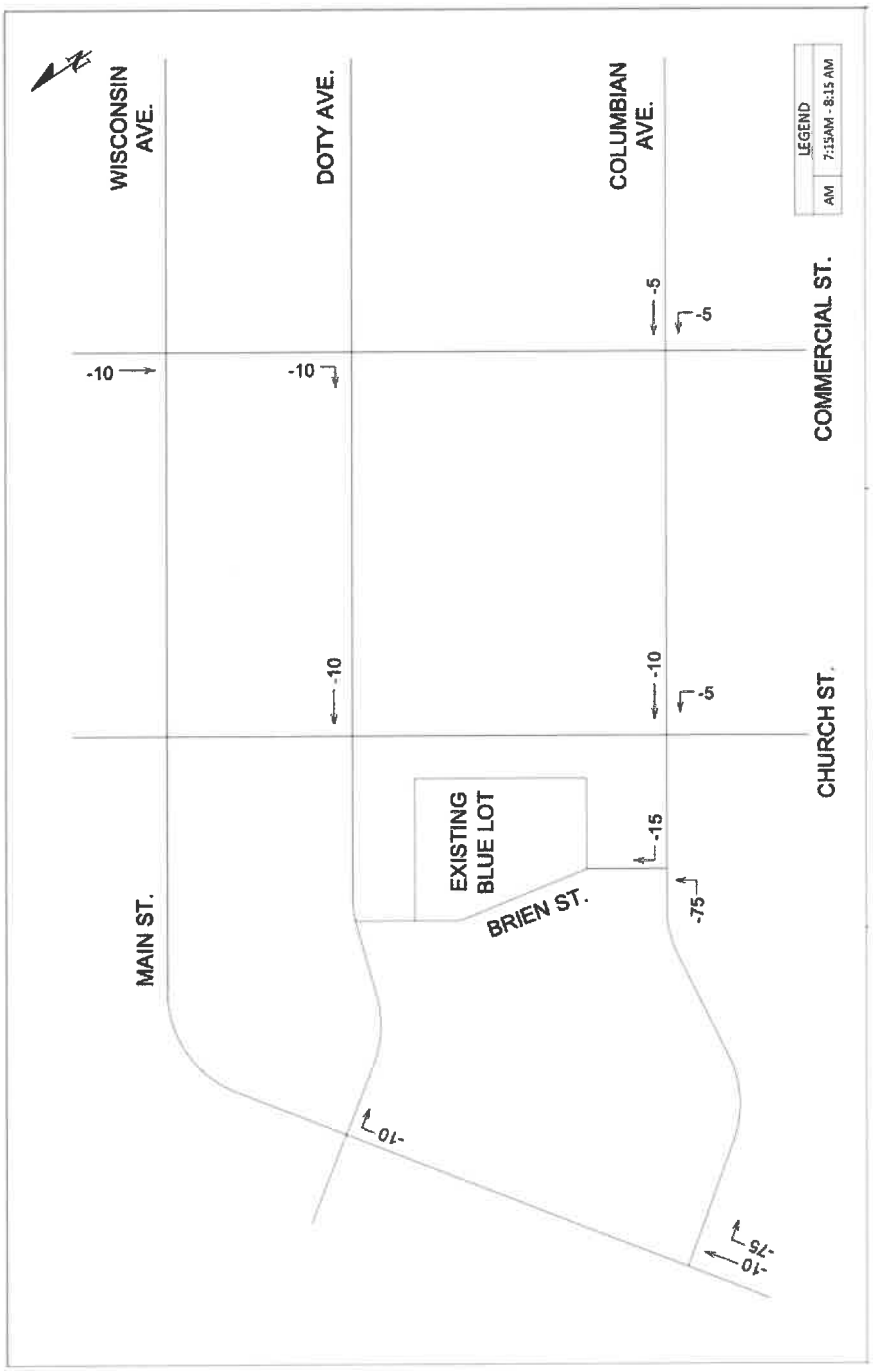
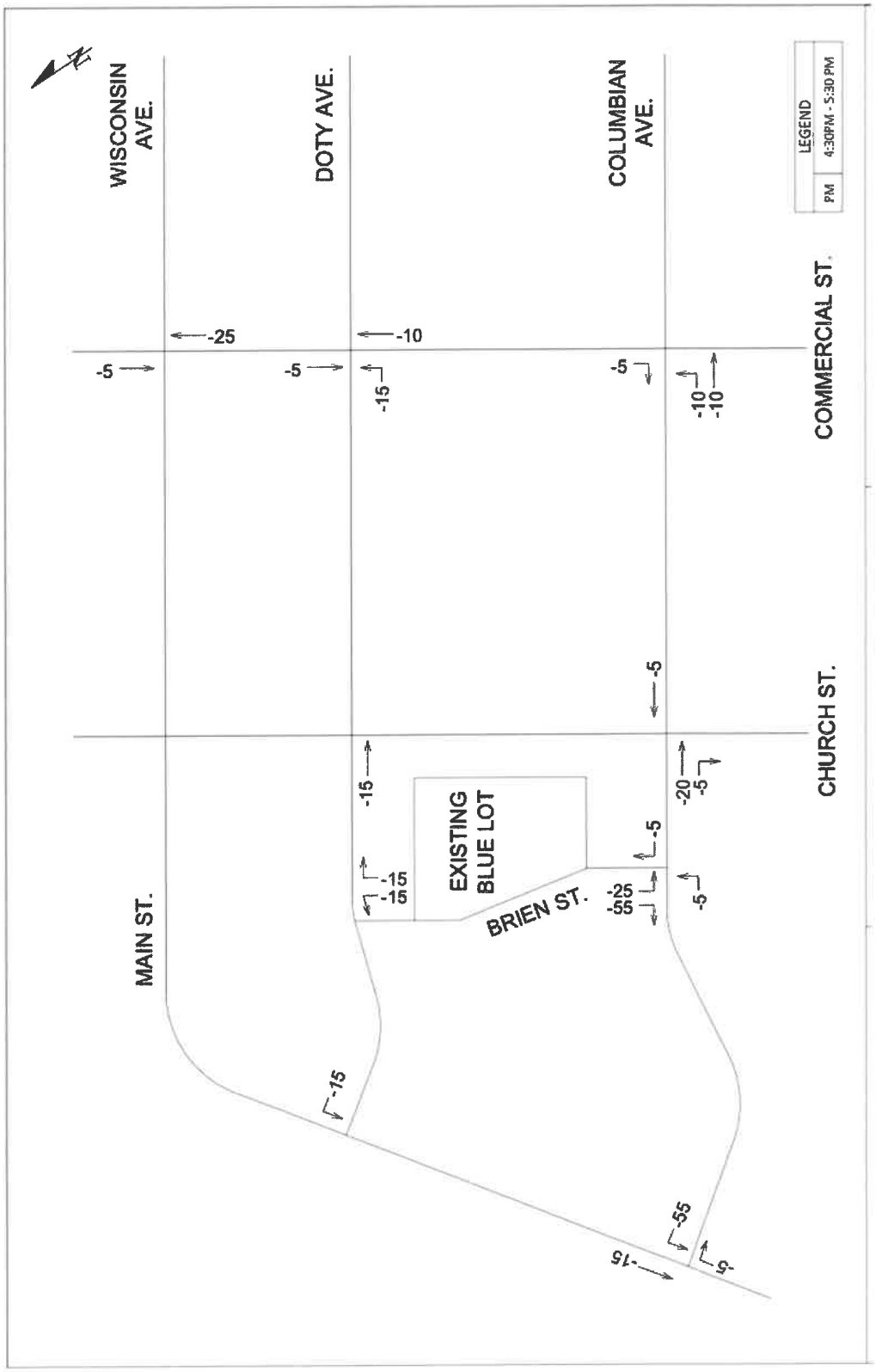


Figure 7: Evening Peak Hour Trip Reduction with Blue Surface Parking Lot Removal



Blue Parking Structure Trip Distribution

Figures 8 and 9 identify the study intersection distribution of trips associated with a new 618-space parking structure.

Figure 8: Morning Peak Hour Blue Parking Structure Trip Distribution

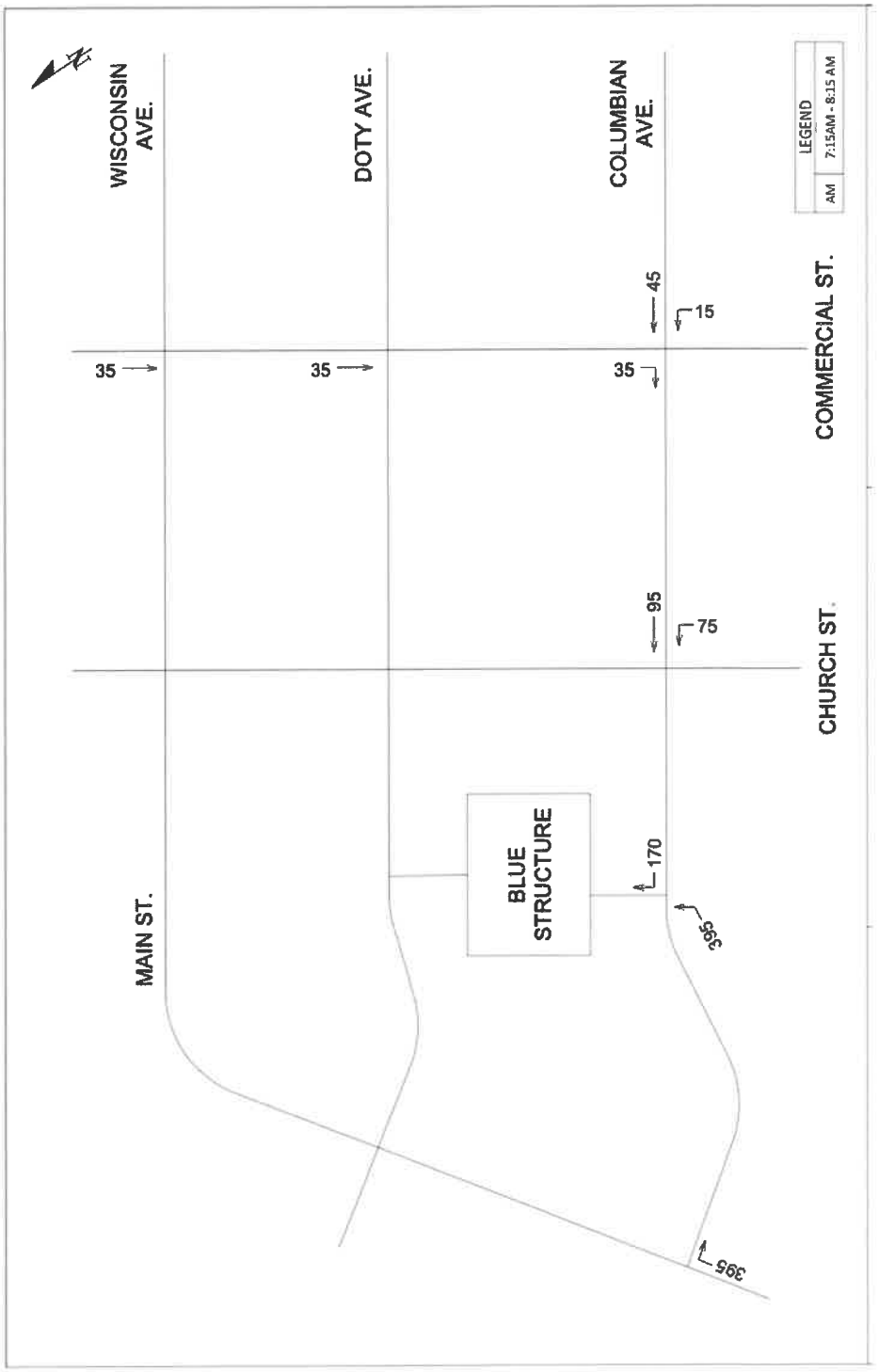
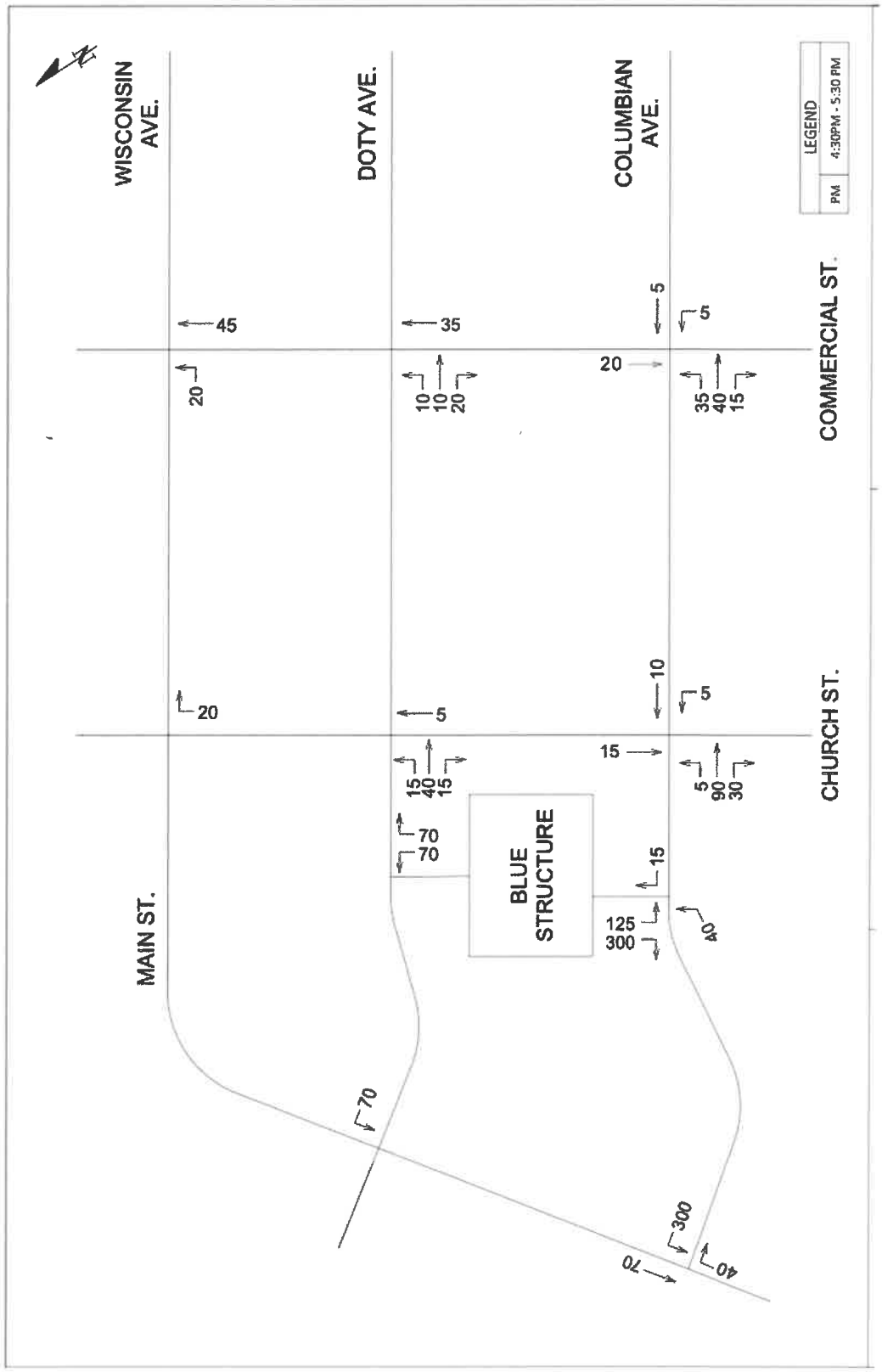


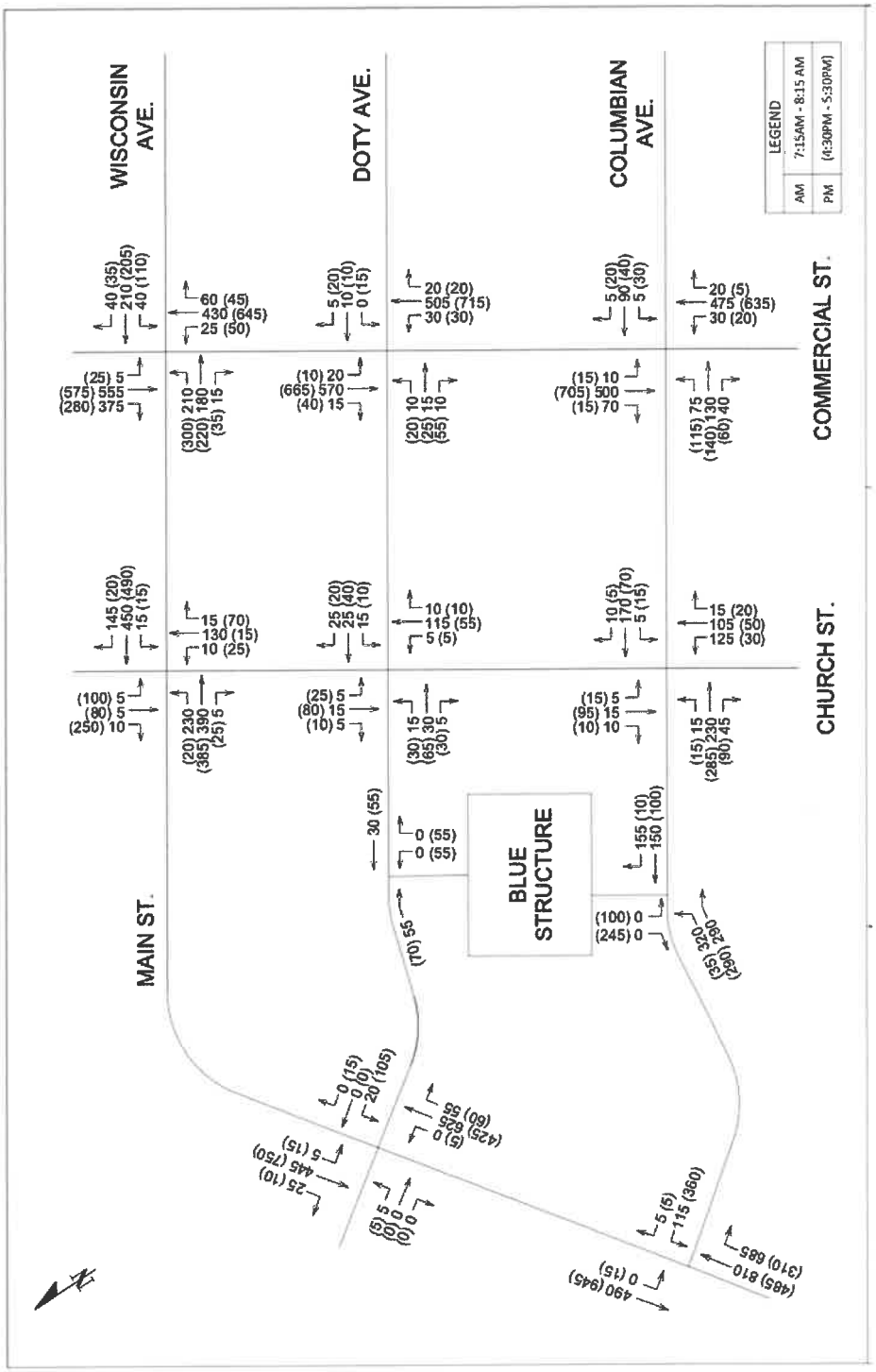
Figure 9: Evening Peak Hour Blue Parking Structure Trip Distribution



Year 2020 Blue Lot Structure Operation:

Figure 10 shows year 2020 intersection peak hour traffic movements with the addition of new trips generated by the construction of a 618-space parking structure replacement to the Blue surface parking lot.

Figure 10: Year 2020 Morning and Evening Peak Hour Traffic with Blue Parking Structure



Tables 6 and 7 summarize existing year 2020 intersection operating conditions during the morning and evening peak traffic period with a 618-space parking structure, respectively.

Table 6: Year 2020 Morning Peak Hour Intersection Operation with Blue Parking Structure

2020 Proposed Blue Structure AM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey Street	Stop	LOS		A	A	A			F		B					A
		Delay (sec)		0.0	0.0	0.0			95.7		11.9					5.3
		Queue (ft)		25'	25'	25'			150'		25'					--
Doty Avenue	Stop	LOS	A			B			E			D				A
		Delay (sec)	0.0			10.1			38.8			34.0				0.8
		Queue (ft)	25'			25'			25'			25'				--

2020 Proposed Blue Structure AM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Stop	LOS	B			B			B			A				B
		Delay (sec)	14.2			11.5			13.8			9.4				13.2
		Queue (ft)	100'			50'			75'			25'				--
Doty Avenue	Stop	LOS	A			A			B			A				A
		Delay (sec)	7.4			7.4			11.1			9.5				7.0
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	B	A		A	B		D			D		D		B
		Delay (sec)	11.9	7.2		6.0	13.4		46.2			38.2		38.1		15.2
		Queue (ft)	100'	225'		25'	*350		175'			25'		25'		--

2020 Proposed Blue Structure 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	Signal	LOS	C	C		C	B		A			A				A
		Delay (sec)	20.8	21.2		21.7	18.2		5.4			6.0				9.1
		Queue (ft)	50'	100'		25'	50'		75'			275'				--
Doty Avenue	Stop	LOS	D			D			A			A				A
		Delay (sec)	30.7			26.9			8.1			8.0				1.7
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	D	C	C	C	D	D	B	C		C	D			C
		Delay (sec)	35.1	32.1	27.1	31.6	54.7	35.4	19.8	22.6		28.7	35.5			33.3
		Queue (ft)	125'	75'	25'	50'	*250	50'	25'	475'		25'	*500			--

2020 Proposed Blue Structure AM Peak Hour Traffic Operations - Blue Structure Driveways														
Scenario	Control	MOE	Movement											OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR		SBL	SBR	
Entrance/Exit on Torrey Street	Stop	LOS	A				A					A		A
		Delay (sec)	9.2				0.0					0.0		3.2
		Queue (ft)	50'				25'					25'		--
Exit on Doty Avenue	Stop	LOS		A			A			A				A
		Delay (sec)		0.0			0.0			0.0				0.0
		Queue (ft)		25'			25'			25'				--

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

Table 6 indicates that morning peak hour operation of the study intersections in 2020 with traffic generated by a new Blue parking structure is expected to result in the Torrey Street and Doty Avenue northbound approaches to Main Street continuing to operate to LOS 'F' and 'E', respectively, similar to how they operate without a new parking structure. Table 6 also indicates that the driveway entrances to a new Blue parking structure should operate at LOS 'A'. The maximum northbound 'Shared/Through Right Turn Lane on Commercial Street Remains at 475 feet with the addition of parking structure traffic.

Table 7: Year 2020 Evening Peak Hour Intersection Operation with Blue Parking Structure

2020 Proposed Blue Structure PM Peak Hour Traffic Operations - Main Street

Scenario	Control	MOE	Movement												OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Torrey Street	Stop	LOS		A	A	A			F		B				F
		Delay (sec)		0.0	0.0	8.8			750.6		10.2				127.6
		Queue (ft)		25'	25'	25'			950'		25'				--
Doty Avenue	Stop	LOS	A			A			F			E			C
		Delay (sec)	9.8			9.2			264.0			45.9			23.1
		Queue (ft)	25'			25'			250'			25'			--

2020 Proposed Blue Structure PM Peak Hour Traffic Operations - Church Street

Scenario	Control	MOE	Movement												OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Columbian Avenue	Stop	LOS	C			A			B			B			B
		Delay (sec)	16.5			9.6			10.1			10.5			13.7
		Queue (ft)	125'			25'			25'			25'			--
Doty Avenue	Stop	LOS	A			A			B			B			A
		Delay (sec)	7.4			7.5			10.9			12.1			6.5
		Queue (ft)	25'			25'			25'			25'			--
Wisconsin Avenue	Signal	LOS	E	B		B	B		C			D		C	C
		Delay (sec)	62.1	15.3		10.8	17.0		32.5			37.1		29.8	22.3
		Queue (ft)	50'	275'		25'	300'		75'			200'		75'	--

2020 Proposed Blue Structure PM 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	Signal	LOS	B	C		C	B		A			A			A
		Delay (sec)	19.8	21.0		22.4	16.8		6.2			7.0			9.5
		Queue (ft)	75'	100'		25'	50'		125'			325'			--
Doty Avenue	Stop	LOS	F			F			A			A			A
		Delay (sec)	65.1			56.4			8.4			8.4			5.9
		Queue (ft)	125'			50'			25'			25'			--
Wisconsin Avenue	Signal	LOS	E	D	C	C	D	D	B	C		D	C		D
		Delay (sec)	55.7	36.8	28.9	32.1	52.9	36.2	17.0	31.5		40.8	27.6		35.3
		Queue (ft)	*225	175'	25'	100'	225'	50'	50'	*750		50'	*425		--

2020 Proposed Blue Structure PM Peak Hour Traffic Operations - Blue Structure Driveways

Scenario	Control	MOE	Movement										OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	
Entrance/Exit on Torrey Street	Stop	LOS	A				A				C		A
		Delay (sec)	7.5				0.0				15.2		7.1
		Queue (ft)	25'				25'				100'		--
Exit on Doty Avenue	Stop	LOS		A			A		A				A
		Delay (sec)		0.0			0.0		9.6				4.5
		Queue (ft)		25'			25'		25'				--

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

During the evening peak hour, Table 7 indicates year 2020 traffic with a Blue parking structure should continue to operate at LOS 'F' on the northbound approach of Torrey Street. The Doty Avenue south and northbound approaches to Main Street, during the evening peak hour, operate at the same LOS 'E' and 'F' levels, respectively, to the year 2020 operation without a new parking structure. The east and westbound Stop sign controlled approaches of Doty Avenue at Commercial Street worsen from LOS 'E' to LOS 'F' operation with new parking structure traffic. The Wisconsin Avenue eastbound left turn continues to operate at LOS 'E'. Northbound queuing on Commercial Street at its intersection with Wisconsin Avenue is projected to increase from 725 feet to 750 feet.

Year 2040 Blue Structure Operation:

The Year 2040 peak hour traffic analysis assumes that existing year 2020 background traffic on the downtown street network grows at a rate of 0.5% per year. The Year 2040 traffic volumes also assume several potential new developments will be constructed consistent with City land use plans. Figure 11 shows the location of the future development sites.

Figure 11: Potential Downtown Development Sites

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

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

	Development	Size	ITE Code	Morning Peak Hour Enter	Exit	Total	Evening Peak Hour Enter	Exit	Total
1.	General Office	75,000 sf	710	80	15	95	15	70	85
	Mid-Rise Apartments	70 du's	221	5	20	25	20	10	30
	Subtotal			85	35	120	35	80	115
2.	Mid-Rise Apartments	72 du's	221	5	20	25	20	10	30
3.	General Office	100,000 sf	710	100	15	115	20	95	115
	Retail	15,000 sf	820	10	5	15	25	30	55
	Subtotal			110	20	130	45	125	160
4.	Retail	8,000 sf	820	5	5	10	15	15	30
	Mid-Rise Apartments	38 du's	221	5	10	15	10	5	15
	Community Plaza	5 acres	411	0	0	0	15	10	25
	Subtotal			10	15	25	40	30	70
	Total			210	90	300	140	245	375

The peak hour trips generated by each of the future developments were assigned to the study intersections based on existing peak hour traffic distribution patterns and are shown on Figures 12 and 13

Figure 12: Potential Main Street Development Morning Peak Hour Trip Distribution

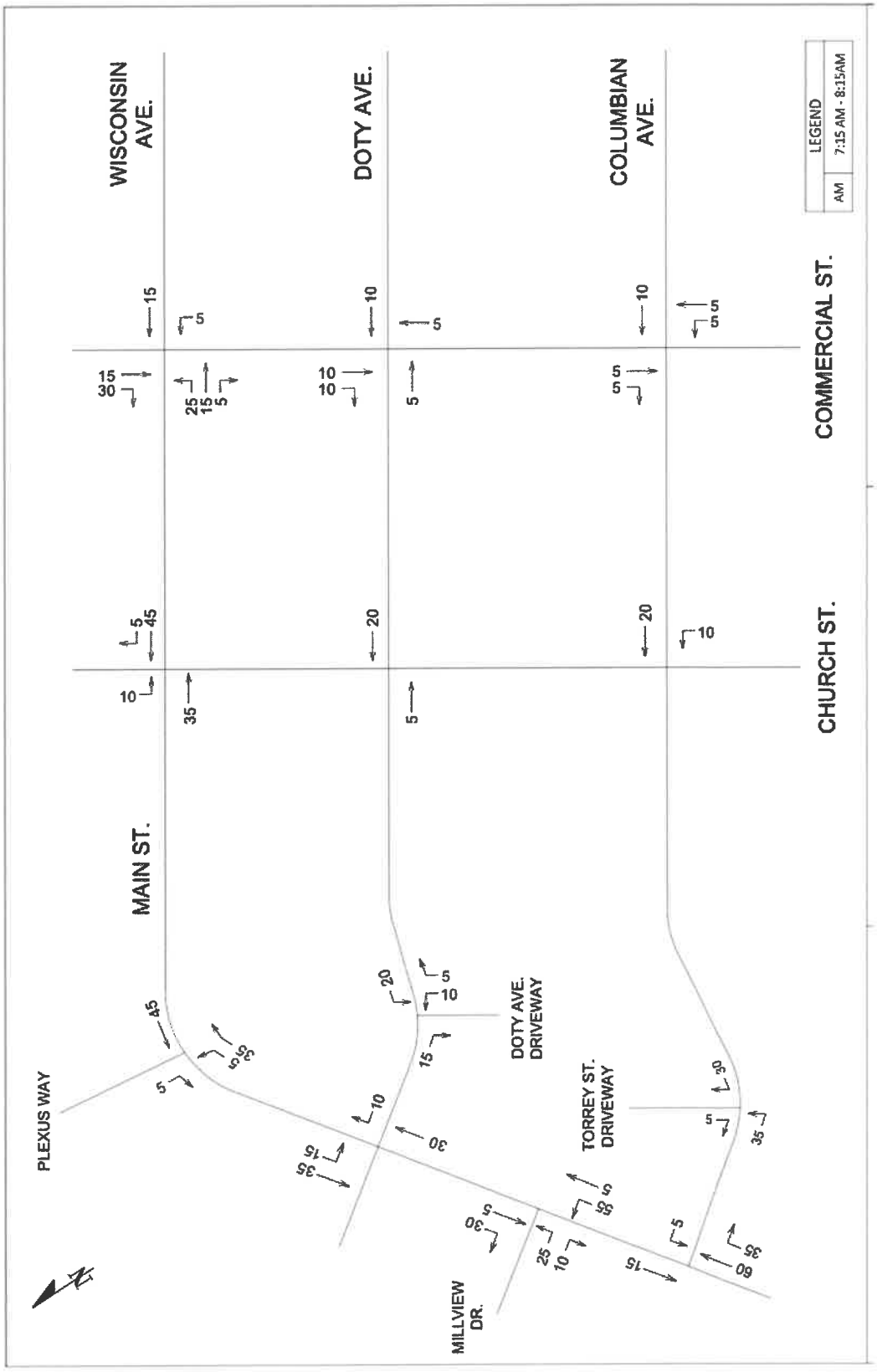


Figure 13: Potential Main Street Development Evening Peak Hour Trip Distribution

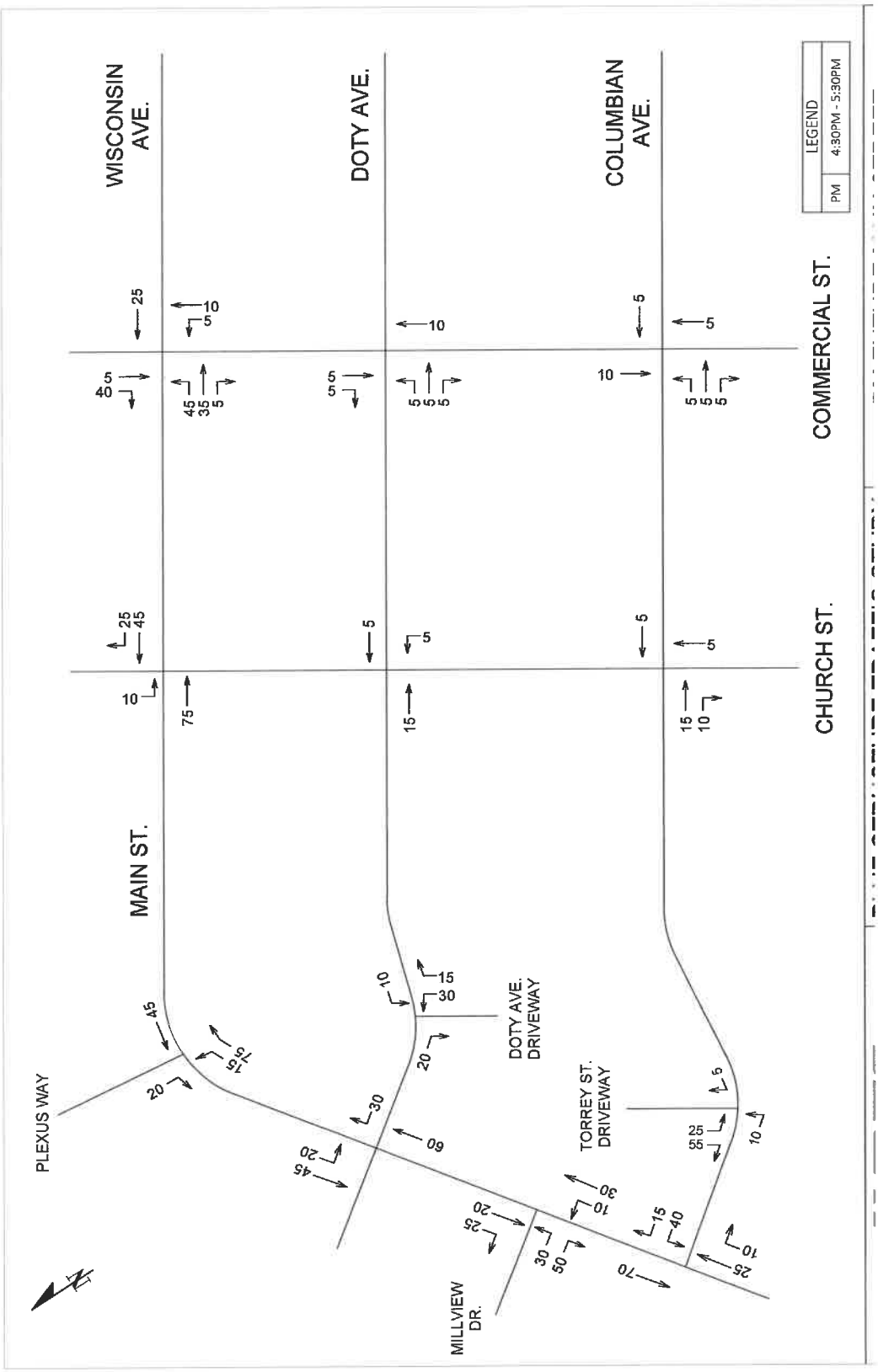
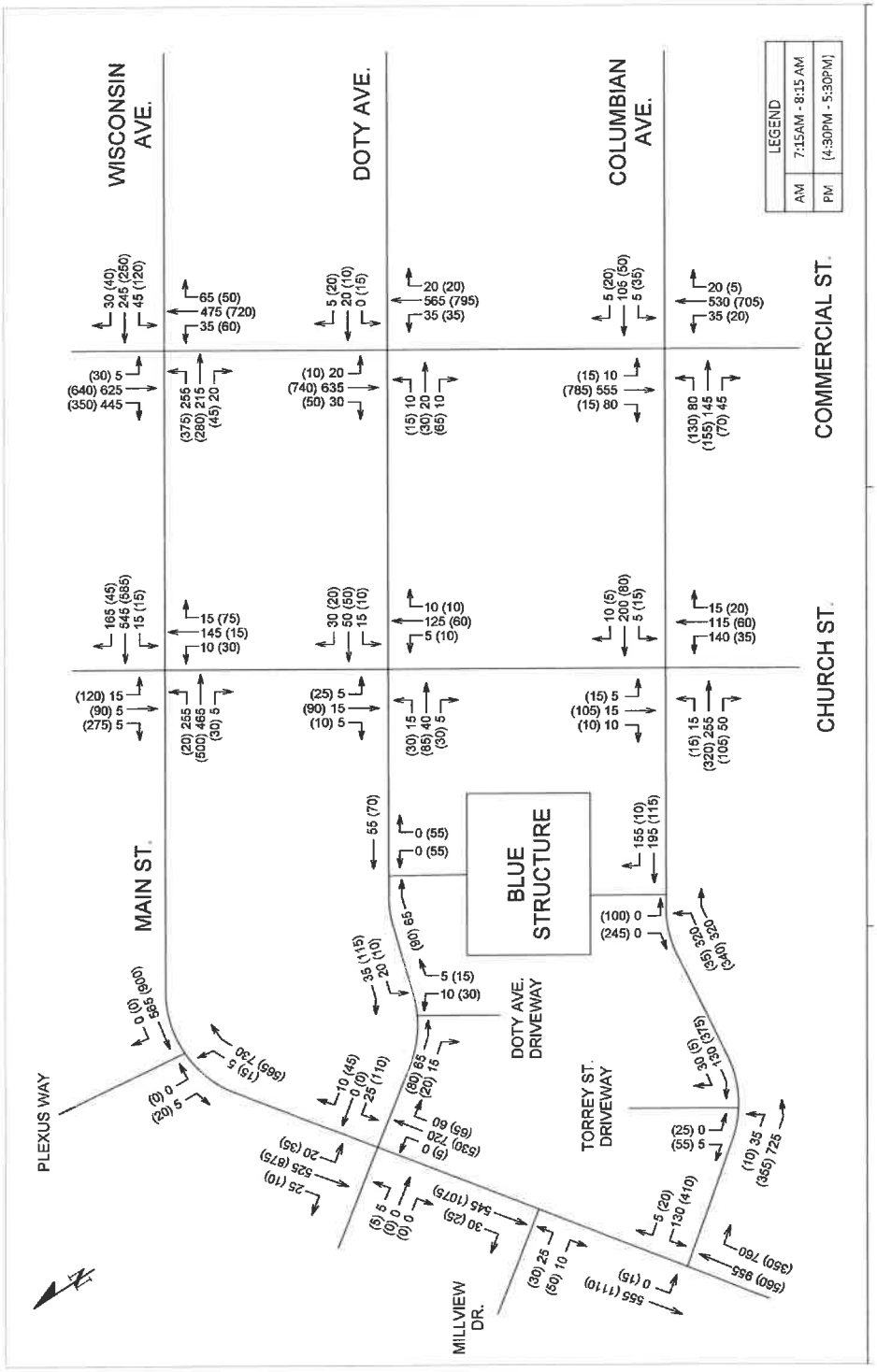


Figure 14 shows morning and evening projected year 2040 intersection traffic movement volumes with trips generated by a Blue parking structure along with trips generated by potential future Main Street development identified by City staff.

Figure 14: Year 2040 Morning and Evening Peak Hour Traffic with Potential New Main Street Development and Blue Parking Structure



Tables 8 and 9 summarize year 2040 intersection operating conditions during the morning and evening peak traffic period, respectively, with a 618-space Blue lot Parking structure and potential new Main Street development.

Table 8: Year 2040 Morning Peak Hour Intersection Operation with a Blue Parking Structure and Potential New Main Street Development Trips

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Main Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey Street	Stop	LOS		A	A	A			F		B					C
		Delay (sec)		0.0	0.0	0.0			278.4		12.9					15.1
		Queue (ft)		25'	25'	25'			275'		25'					--
Doty Avenue	Stop	LOS	A			B			F			F				A
		Delay (sec)	0.0			10.9			58.6			53.6				1.8
		Queue (ft)	25'			25'			50'			25'				--

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Columbian Avenue	Stop	LOS	C			B			C			A				C
		Delay (sec)	16.9			13.0			16.1			9.9				15.4
		Queue (ft)	125'			75'			100'			25'				--
Doty Avenue	Stop	LOS	A			A			B			A				A
		Delay (sec)	7.4			7.4			12.0			9.8				6.7
		Queue (ft)	25'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	C	A		A	B		D			D		D		C
		Delay (sec)	29.2	8.5		6.9	18.8		45.8			38.0		37.1		20.4
		Queue (ft)	275'	300'		25'	*600		175'			50'		25'		--

2040 Proposed Blue Structure 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	Signal	LOS	C	C		C	B		A			A				A
		Delay (sec)	20.6	20.7		21.5	17.7		6.2			7.0				9.6
		Queue (ft)	50'	100'		25'	50'		100'			250'				--
Doty Avenue	Stop	LOS	E			D			A			A				A
		Delay (sec)	47.4			43.5			8.2			8.2				2.6
		Queue (ft)	50'			25'			25'			25'				--
Wisconsin Avenue	Signal	LOS	D	C	C	C	E	C	C	C		D	F			E
		Delay (sec)	39.9	29.3	24.0	29.9	58.5	33.3	25.5	34.0		39.3	96.4			61.8
		Queue (ft)	200'	125'	25'	50'	*300	50'	50'	*550		25'	*600			--

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Downtown Driveways																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Torrey St. Driveway	Stop	LOS				A				A		A				A
		Delay (sec)				9.1				0.0		7.7				0.4
		Queue (ft)				25'				25'		25'				--

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Downtown Driveways																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL		NBR	SBL	SBT	SBR		
Doty Ave. Driveway	Stop	LOS		A		A			A							A
		Delay (sec)		0.0		7.4			9.3							1.9
		Queue (ft)		25'		25'			25'							--

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

As shown on Table 8, during the year 2040 morning peak hour, both the northbound approaches of Torrey Street and of Doty Avenue at Main Street continue to operate at LOS 'F' while the southbound approach operation worsens from LOS 'E' to LOS 'F' when compared to the year 2040 traffic operation analysis findings as previously shown in Table 4 (without a new

parking structure or potential Main Street development). The eastbound approach of Doty Avenue to Commercial Street is expected to operate at LOS 'E'. The westbound 'Through' movement of Wisconsin Avenue at Commercial Street changes from LOS 'D' to LOS 'E'. The southbound 'Shared/Through Right Turn Lane' of Commercial Street changes from LOS 'D' to LOS 'F'. Most importantly, the overall LOS of the Wisconsin Avenue intersection with Commercial Street operates at LOS 'E' during the morning peak hour. Table 8 also indicates that the Torrey Street and Doty Avenue driveways with a new Blue parking structure are expected to operate at LOS 'A' similar to its operation with a new parking structure and without any potential new Main Street development in the year 2020.

Table 9 shows year 2040 evening peak hour intersection traffic operation with trips generated by a new 618-space parking structure and potential new development along Main Street.

Table 9: Year 2040 Evening Peak Hour Intersection Operation with Blue Parking Structure and Potential New Main Street Development Trips

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Main Street

Scenario	Control	MOE	Movement												OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Torrey Street	Stop	LOS		A	A	A			F		B				F
		Delay (sec)		0.0	0.0	9.1			1414.4		10.7				235.5
		Queue (ft)		25'	25'	25'			>1000		25'				--
Doty Avenue	Stop	LOS	B			A			F			F			F
		Delay (sec)	10.5			9.9			849.9			94.6			78.9
		Queue (ft)	25'			25'			450'			25'			--

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Church Street

Scenario	Control	MOE	Movement												OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Columbian Avenue	Stop	LOS	C			B			B			B			C
		Delay (sec)	22.0			10.1			10.9			11.2			17.1
		Queue (ft)	200'			25'			25'			50'			--
Doty Avenue	Stop	LOS	A			A			B			B			A
		Delay (sec)	7.4			7.6			11.6			12.9			6.6
		Queue (ft)	25'			25'			25'			25'			--
Wisconsin Avenue	Signal	LOS	E	C		B	C		D			D		C	C
		Delay (sec)	62.1	23.2		15.3	26.4		35.9			39.0		25.8	27.9
		Queue (ft)	50'	400'		25'	325'		75'			200'		75'	--

2040 Proposed Blue Structure PM 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	Signal	LOS	B	C		C	B		A			A			B
		Delay (sec)	19.3	20.2		22.3	16.0		7.2			8.4			10.3
		Queue (ft)	75'	100'		25'	50'		150'			325'			--
Doty Avenue	Stop	LOS	F			F			A			A			B
		Delay (sec)	132.0			128.5			8.6			8.4			11.6
		Queue (ft)	175'			100'			25'			25'			--
Wisconsin Avenue	Signal	LOS	F	D	C	C	E	C	C	F		E	D		E
		Delay (sec)	123.1	38.5	27.2	30.4	57.7	33.9	22.2	60.3		66.7	40.3		57.2
		Queue (ft)	*400	*325	50'	100'	*300	50'	50'	*875		*75	*525		--

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Downtown Driveways

Scenario	Control	MOE	Movement										OVERALL
			EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Torrey St. Driveway	Stop	LOS				B			A		A			A
		Delay (sec)				14.1			0.0		8.2			1.5
		Queue (ft)				25'			25'		25'			--

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Downtown Driveways

Scenario	Control	MOE	Movement											OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	
Doty Ave. Driveway	Stop	LOS		A		A			A					A
		Delay (sec)		0.0		7.5			9.9					1.9
		Queue (ft)		25'		25'			25'					--

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

During the evening peak hour, in the year 2040, it is expected that the northbound approach of Torrey Avenue and the north and southbound approaches of Doty Avenue will operate at LOS 'F' with a new parking structure and potential new Main Street development. It is expected that year 2040 evening peak hour operation at the east and westbound Doty Street approaches to Commercial Street will continue to operate at LOS 'F'. Similar to morning peak hour operation, traffic impacts at the Wisconsin Avenue intersection with Commercial Street are expected to result in the northbound 'shared through/right turn' movements operating at LOS 'F' with a

maximum queue of 875 feet. The overall intersection operation during the evening peak hour will be similar to the morning peak hour operation at LOS 'E'.

Intersection Operation Improvements

Additional operational intersection analyses were conducted to improve operation of the Torrey Street intersection with Main Street and the Wisconsin Avenue intersection with Commercial Street. An evaluation analysis was also conducted for the Church Street intersection with Columbian Avenue.

1. Torrey Street and Main Street Intersection Improvement Analysis

The installation of traffic signals at this intersection was not analyzed in this Technical Memorandum as it was shown in previous studies to not satisfy the *Warrants for Traffic Signal Installation*.

Two roundabout design options were analyzed to improve operation of the Torrey Street intersection with Main Street. The first option involved a single-lane roundabout as shown in Figure 15.

Figure 15: Single-Lane Roundabout Design at Torrey Street and Main Street Intersection

Table 10 summarizes the operational traffic improvement associated with construction of a single-lane roundabout at the Torrey Street intersection with Main Street. The design is

compatible with Main Street traffic taming concepts developed for the City of Neenah and documented in a subsequent Technical Memorandum on Downtown Street network operation.

Table 11: 2040 AM/PM Torrey Street/Main Street Single Lane Roundabout Operation with a New Parking Structure and Potential New Main Street Development

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Main St. Roundabout with 1 WB Lane									
Scenario	Control	MOE	Movement						OVERALL
			EBT	EBR	WBL	WBT	NBL	NBR	
Torrey Street	Stop	LOS	C	B	A		B		B
		Delay (sec)	19.3	11.6	9.7		10.4		14.2
		Queue (ft)	275'	150'	100'		50'		--

* EB movement has an EBR bypass lane

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Main St. Roundabout with 1 WB Lane									
Scenario	Control	MOE	Movement						OVERALL
			EBT	EBR	WBL	WBT	NBL	NBR	
Torrey Street	Stop	LOS	A	A	F		B		F
		Delay (sec)	8.2	5.8	202.7		14.8		97.8
		Queue (ft)	75'	50'	>1000'		125'		--

* EB movement has an EBR bypass lane

As shown in Table 11, all year 2040 traffic movements with a single-lane roundabout are expected to operate at LOS 'C' or better during the morning peak hour. However, during the evening peak hour a single-lane roundabout does not accommodate year 2040 traffic projections with a new parking structure and potential new Main Street development. Year 2040 operation is at LOS 'F' overall intersection operation. This operational failure is attributed to the high volume of westbound evening peak hour 'through' traffic on Main Street.

Figure 16 illustrates an alternative roundabout concept design which includes a dual westbound lane at the Torrey Street intersection with Main Street.

Figure 16: Dual Lane Westbound Roundabout Design at Torrey Street/Main Street Intersection

As shown on Table 12, the dual westbound lane roundabout design is expected to allow all traffic movements to operate at LOS 'C' or better during both the morning and evening peak hour time periods.

Table 12: 2040 AM/PM Torrey Street/Main Street Dual Westbound Lane Roundabout Operation with a New Parking Structure and Potential New Main Street Development

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Main St. Roundabout with 2 WB Lane									
Scenario	Control	MOE	Movement						OVERALL
			EBT	EBR	WBL/WBT	WBT	NBL	NBR	
Torrey Street	Stop	LOS	C	B	A	A	B		B
		Delay (sec)	19.3	11.6	9.3	6.0	10.4		13.7
		Queue (ft)	275'	150'	50'	50'	50'		--

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Main St. Roundabout with 2 WB Lane									
Scenario	Control	MOE	Movement						OVERALL
			EBT	EBR	WBL/WBT	WBT	NBL	NBR	
Torrey Street	Stop	LOS	A	A	B	C	B		B
		Delay (sec)	8.2	5.8	15.0	18.7	14.8		13.0
		Queue (ft)	75'	50'	150'	175'	125'		--

* EB movement has an EBR bypass lane

2. Church Street and Columbian Avenue Intersection Improvement Analysis

The existing 4-way Stop sign controlled intersection was evaluated to determine if changing to 2-way Stop sign control on Church Street would improve traffic operation along Columbian Avenue. The Year 2020 intersection operation with a Blue parking structure (Tables 6 and 7) and the 2040 intersection operation with a Blue parking structure (Tables 8 and 9) and potential new Main Street developments indicates the Church Street/Columbian intersection is expected to operate at LOS 'A' on the Columbian Avenue approaches to the intersection.

Table 12 identifies year 2040 intersection operation as a 2-Way Stop sign control with the addition of a Blue parking structure and potential new Main Street development traffic. As shown on Table 12, the Columbian Avenue approaches continue to operate at LOS 'A' except the northbound approach of Church Street which is downgraded to LOS 'F' operation during the morning peak hour. In comparison, during the evening peak hour all movements are expected to operate at LOS 'A' and LOS 'C'.

Table 12: 2040 AM/PM Church Street/Columbian Avenue TWSC Intersection Operation with a New Parking Structure and Potential New Main Street Development

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Columbian Avenue	TWSC	LOS	A				A				F				C			C
		Delay (sec)	7.8				8.1				64.8				15.2			21.7
		Queue (ft)	25'				25'				250'				25'			–

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Church Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Columbian Avenue	TWSC	LOS	A				A				C				C			A
		Delay (sec)	7.5				8.5				23.7				23.6			7.7
		Queue (ft)	25'				25'				75'				75'			–

3. Wisconsin Avenue and Commercial Street Intersection Improvement Analysis

The year 2040 morning and evening peak hour operation analysis for the Wisconsin Avenue intersection with Commercial Street indicates overall intersection LOS 'E' operation with traffic associated with a new parking structure and potential future Main Street development. Table 13 provides a comparison of the operation without any traffic signal timing changes and with traffic signal timing modifications.

Table 13: 2040 AM/PM Wisconsin Avenue/Commercial Street intersection Operation with Signal Timing Modifications, a 618-Space Parking Structure and Potential New Main Street Development

a. Morning Peak Hour Operation With and Without Signal Timing Modifications

- **Operation Without Signal Timing Modification**

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Commercial Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Wisconsin Avenue	Signal	LOS	D	C	C		C	E	C		C	C			D	F		E
		Delay (sec)	39.9	29.3	24.0		29.9	58.5	33.3		25.5	34.0			39.3	96.4		61.8
		Queue (ft)	200'	125'	25'		50'	*300	50'		50'	*550			25'	*600		--

- **Operation with Signal Timing Modifications**
  - 6 seconds added to phases 2 and 6
  - 6 seconds taken away from phases 3 and 7

2040 Proposed Blue Structure AM Peak Hour Traffic Operations - Commercial Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Wisconsin Avenue	Signal	LOS	F	D	C		C	E	C		C	C			C	D		D
		Delay (sec)	125.0	36.7	28.4		30.4	58.5	33.3		24.4	23.7			30.5	50.7		49.8
		Queue (ft)	*275	175'	25'		50'	*300	50'		50'	275'			25'	*550		--

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

b. Evening Peak Hour Operation with and without Signal Timing Modifications

- **Operation Without Signal Timing Modifications**

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Commercial Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Wisconsin Avenue	Signal	LOS	F	D	C		C	E	C		C	F			E	D		E
		Delay (sec)	123.1	38.5	27.2		30.4	57.7	33.9		22.2	60.3			66.7	40.3		57.2
		Queue (ft)	*400	*325	50'		100'	*300	50'		50'	*875			*75	*525		--

- **Operation with Signal Timing Modifications**
  - 1 second added to phases 2 and 6
  - 1 second taken away from phases 3 and 7
    (The reasoning behind this is the Volume to Capacity Ratio changes from just above 1.0 to just below 1.0 which takes the approach from 'saturated' to 'unsaturated' operation.)

2040 Proposed Blue Structure PM Peak Hour Traffic Operations - Commercial Street																
Scenario	Control	MOE	Movement													OVERALL
			EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR	
Wisconsin Avenue	Signal	LOS	F	D	C		C	E	C		C	D			E	D		E
		Delay (sec)	145.1	40.8	27.9		30.7	57.7	33.9		21.3	54.3			64.4	37.7		58.1
		Queue (ft)	*425	*350	50'		100'	*300	50'		50'	*875			*75	*525		--

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

As shown on the intersection operation comparison in Table 13, overall morning peak hour intersection operation is improved from LOS 'E' to LOS 'D' reducing overall vehicle delays from 61.8 seconds to 49.8 seconds. The southbound 'Shared Through/Right Turn' movement on

Commercial Street improves from LOS 'F to LOS 'D' operation with the eastbound left turn on Wisconsin Avenue downgraded from LOS 'D' to LOS 'F' operation.

In comparison, during the evening peak hour overall intersection operation remains at LOS 'E' with nearly identical overall vehicles delays of 57 to 58 seconds. The only LOS change involves the northbound 'Shared Th/rough/Right Turn' operation which is improved from LOS 'F' to LOS 'D'.

Conclusions

Table 14 provides a simplified summary comparison of the key morning and evening intersection traffic movements that change operation which result in LOS 'E' or 'F' conditions due to background traffic growth between 2020 with a 618-space parking structure or in 2040 with a 600-space parking structure and traffic generated by potential new Main Street development.

Table 14: Summary of Key Intersection Traffic Movement Changes Resulting in LOS 'E' or LOS 'F' Operation

	Background Traffic With Structure		With Structure and Main Street Development	
Intersection	**2020**	**2040**	**2020**	**2040**
Torrey Street/Main Street				
NBLT on Torrey	F/F	F/F	F/F	F/F
Doty Avenue/Main Street				
NB on Doty	E/F	F/F	E/F	F/F
SB on Doty	D/E	E/F	D/E	F/F
Church Street/Wisconsin Avenue				
EBLT on Wisconsin	B/E	C/E	B/E	C/E
Doty Avenue/Commercial Street				
EB on Doty	D/E	E/E	D/F	E/F
WB on Doty	D/E	D/F	D/F	D/F
Wisconsin Avenue/Commercial Street				
EBLT on Wisconsin	D/D	D/E	D/E	D/F
WBTH on Wisconsin	D/D	E/E	D/D	E/E
NBTH/RT on Wisconsin	C/C	C/D	C/C	C/F
SBLT on Commercial	C/D	D/D	C/D	D/E
SBTH/RT on Commercial	C/C	E/C	D/C	F/D
Overall Intersection	C/C	D/D	C/D	E/E

Note: X/Y = morning peak hour/evening peak hour
NBLT = Northbound left turn
NBTH/RT = Northbound shared through/right turn lane
WBTH = Westbound through movement

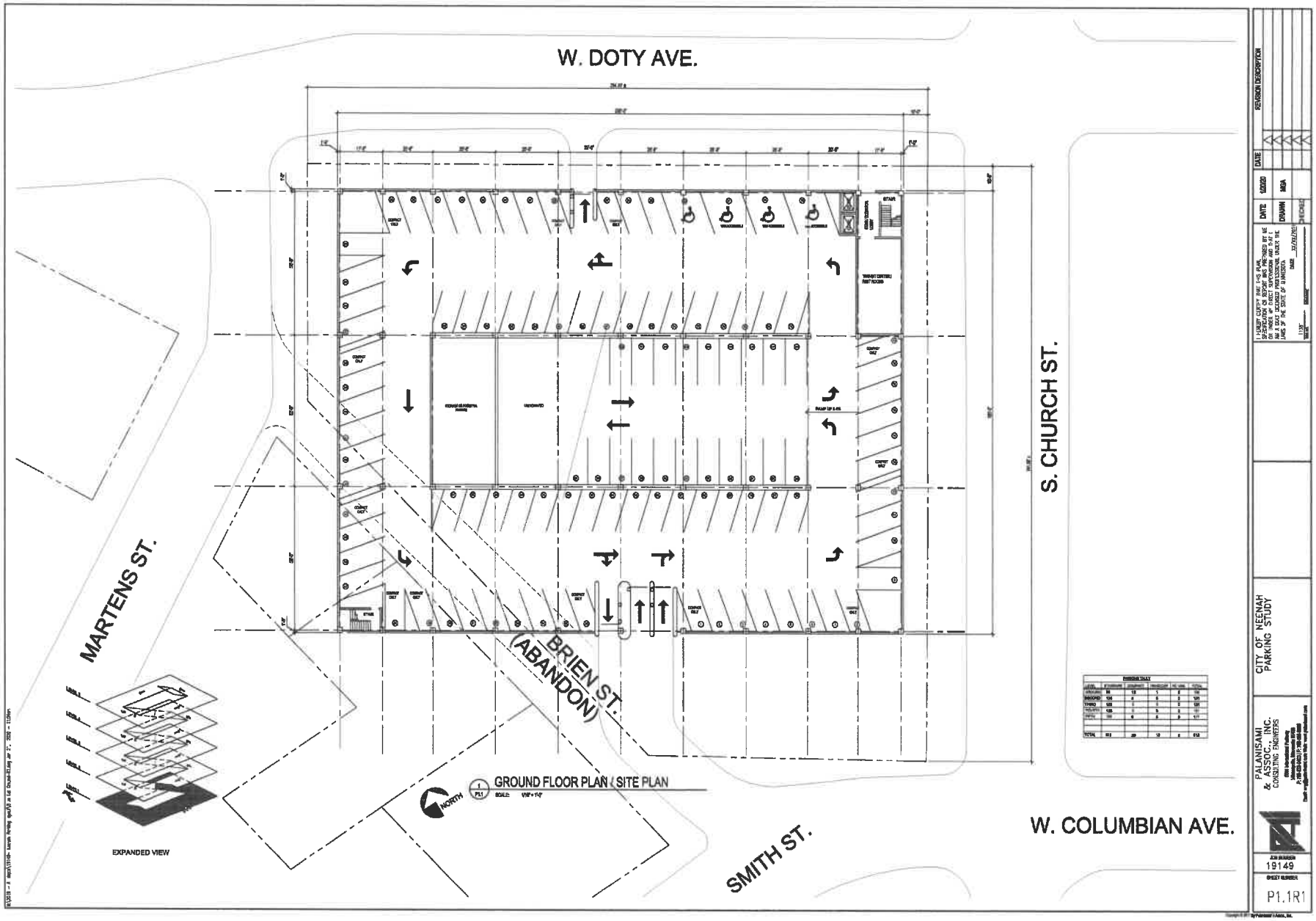
Based on the analysis presented in this Technical Memorandum and the key intersection operation summary in Table 14, it is concluded:

1. The downtown street network can accommodate traffic attracted to a new 618-space parking structure at the Blue surface parking lot site with some peak hour traffic operation impacts.
2. The Torrey Street intersection with Main Street should be reconstructed as a roundabout with

two westbound circulating lanes. This action is compatible with the Main Street traffic taming actions under consideration by the City of Neenah.

3. The Wisconsin Avenue intersection with Commercial Street is currently operating at LOS 'C' and 'D' peak hour conditions. By the year 2040 it is expected that operation of some background traffic growth movements at the intersection will worsen to LOS 'E'.
4. Construction of a 618-space parking structure west of Church Street in 2020 is not expected to significantly impact existing operation at the Wisconsin Avenue intersection with Commercial Street. However, by the year 2040 with traffic attracted to the new parking structure along with traffic generated by potential new Main Street development the intersection is expected to operate at oversaturated conditions. Intersection traffic signal modifications have the ability to improve year 2040 intersection operation for selected traffic movements, but the overall intersection operation is expected to remain at LOS 'E', but without oversaturated conditions.
5. The Doty Avenue Stop sign controlled approaches to Commercial Street experience LOS 'E' and 'F' operation with or without construction of the 600-space parking lot west of Church Street.
6. The Stop sign controlled northbound approach of Doty Avenue at its intersection with Main Street currently experiences LOS 'E' operation, which is expected to worsen to LOS 'F' in 2040 with the growth of background traffic. This operating condition is not expected to change with construction of a new 618-space parking structure.
7. Changing the 4-way Stop sign control at the Columbian Avenue intersection with Church Street to 2-way Stop sign control can be expected to negatively change northbound Church Street operation from LOS 'B' to LOS 'F' during the morning peak hour.

Appendix
5-Level Parking Structure Design Concept



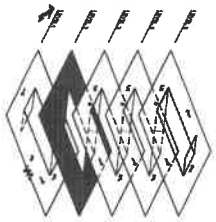
CITY OF NEENAH PARKING STUDY

PALANISAMI & ASSOC., INC. CONSULTING ENGINEERS

JOB NUMBER 19149

SHEET NUMBER P1.1R1

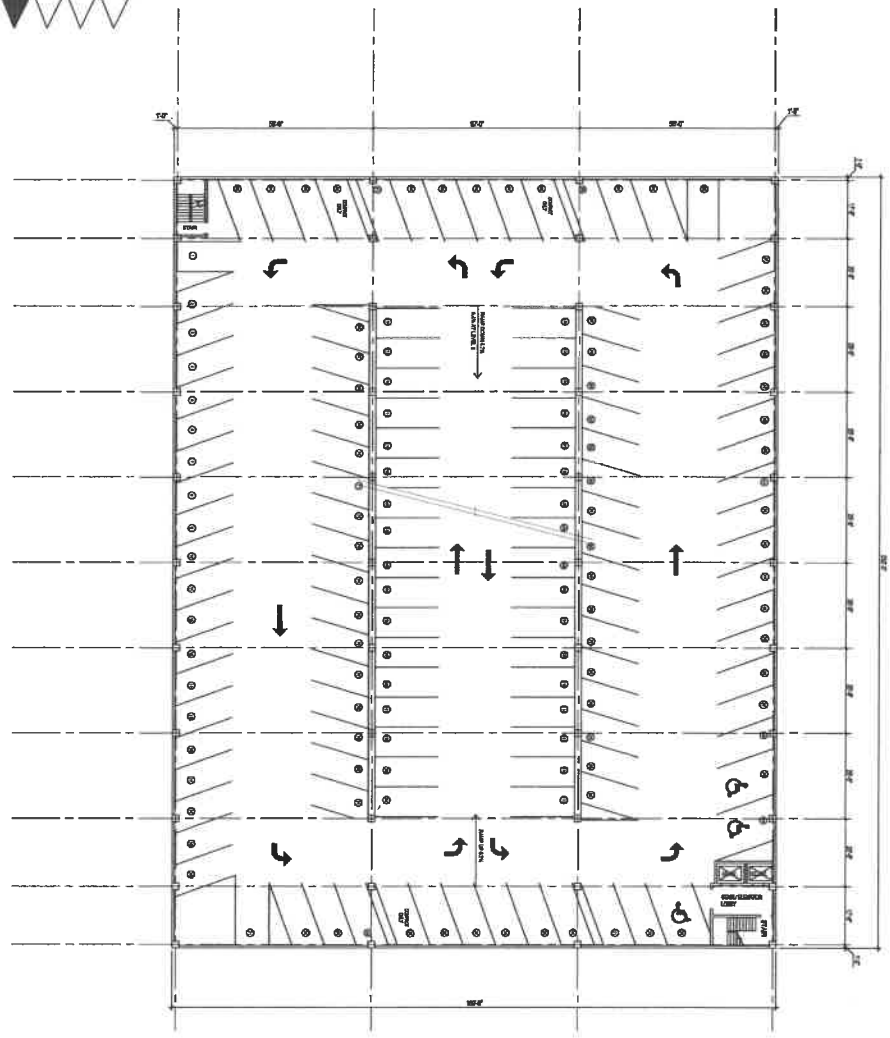
EXPANDED VIEW



NORTH

1 P1.2 SCALE: 1/8"=1'-0"

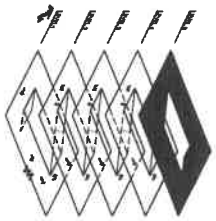
TYPICAL LEVEL PLAN (LEVELS 2 - 3 - 4)

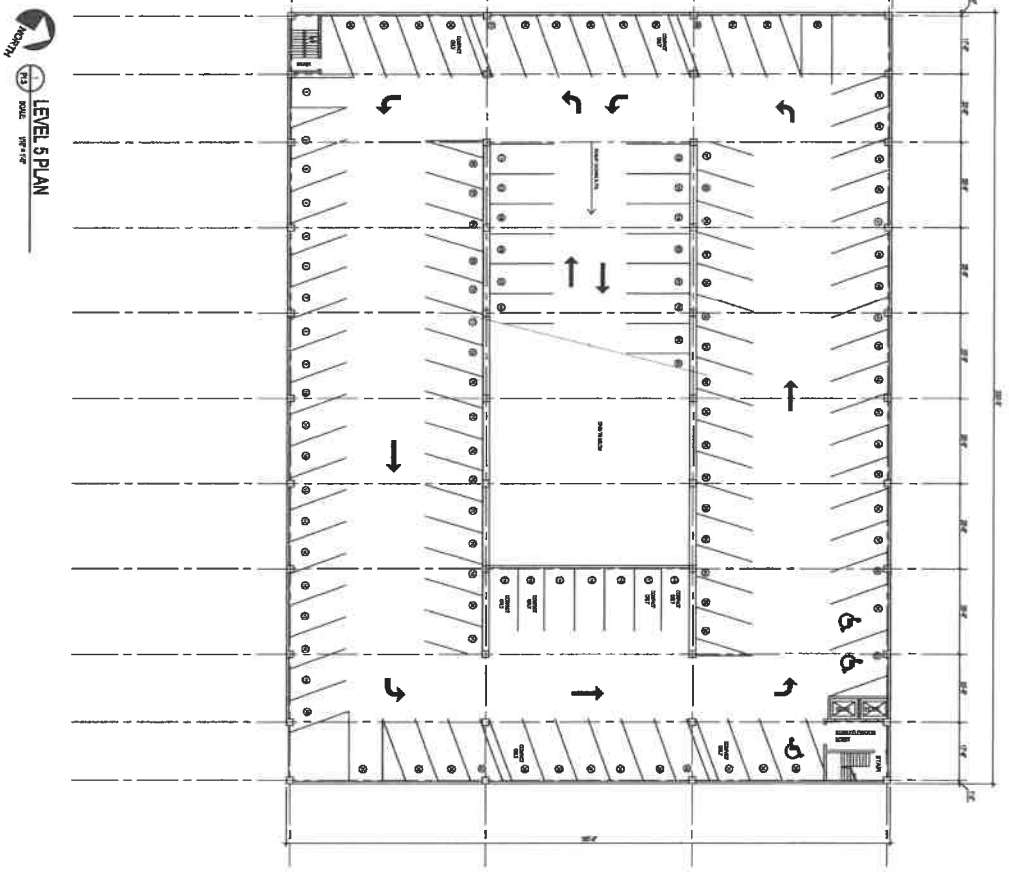


P1.2R1	19149		PALANISAMI & ASSOC., INC. CONSULTING ENGINEERS	CITY OF NEENAH PARKING STUDY		I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL UNDER THE LAWS OF THE STATE OF MINNESOTA. DATE 12/01/2019	DATE 12/2020 DRAWN MGA CHECKED

DATE	REVISION DESCRIPTION

EXPANDED VIEW





LEVEL 5 PLAN

P1.3R1	19149	PALANISAMI & ASSOC., INC. CONSULTING ENGINEERS	CITY OF NEENAH PARKING STUDY			DATE 12/2/20	DATE / REVISION DESCRIPTION
						DRAWN MGA	
						CHECKED	