

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 Traffic Analysis

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

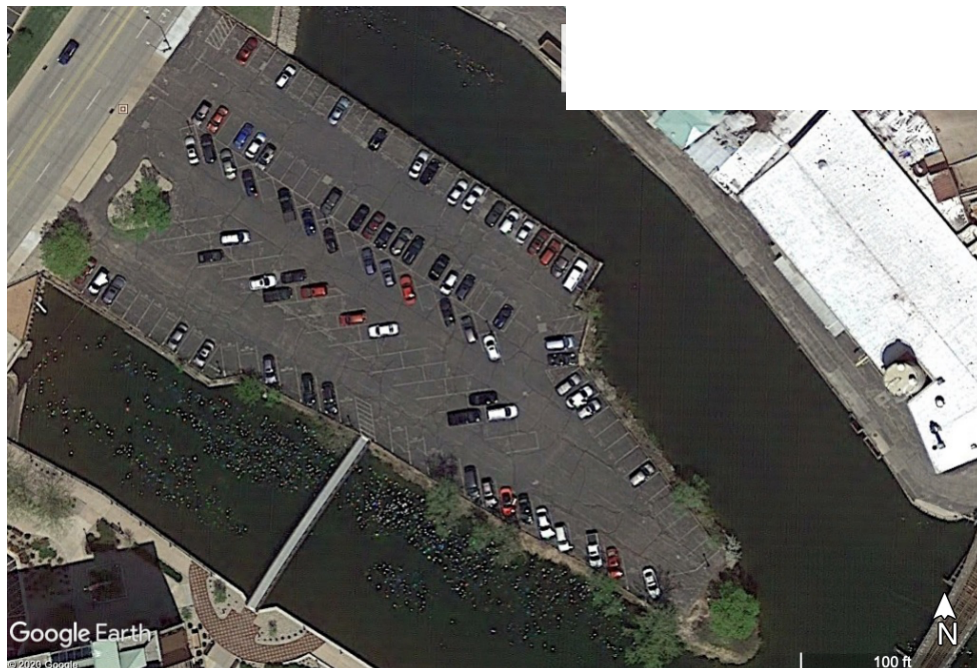
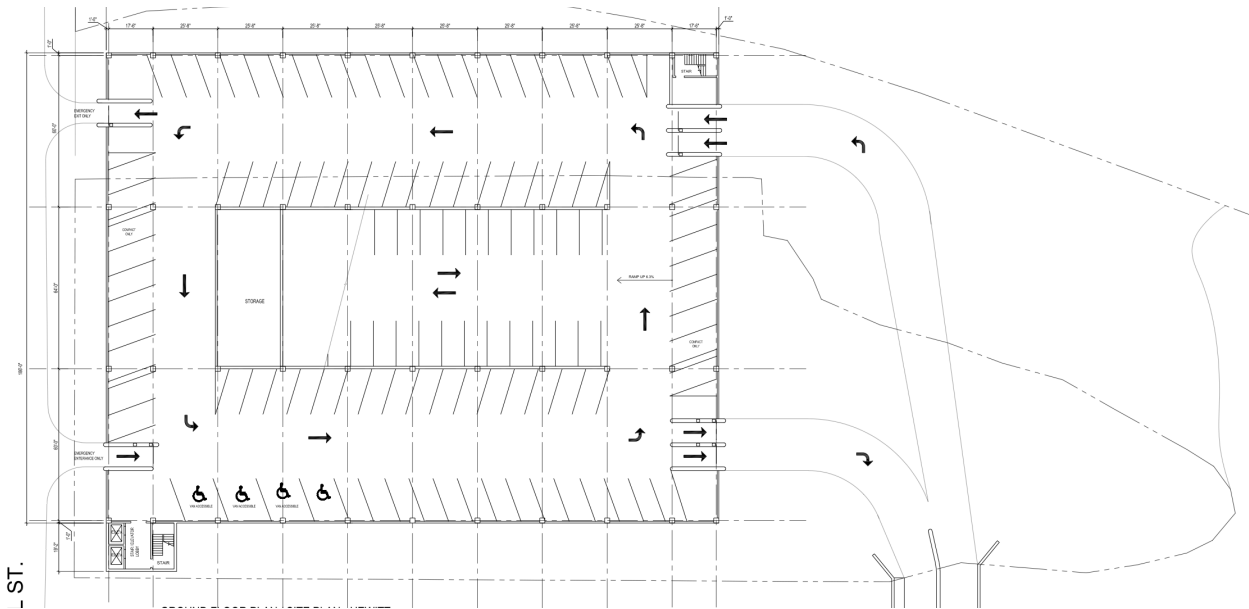


Figure 3: 630-Space Hewitt Parking Structure Two Access Design Alternative



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.

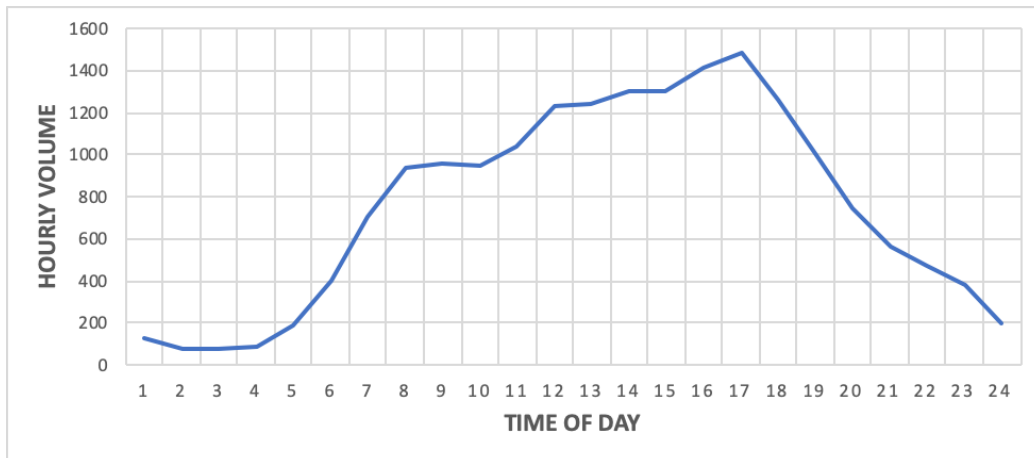
Traffic Operation

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.

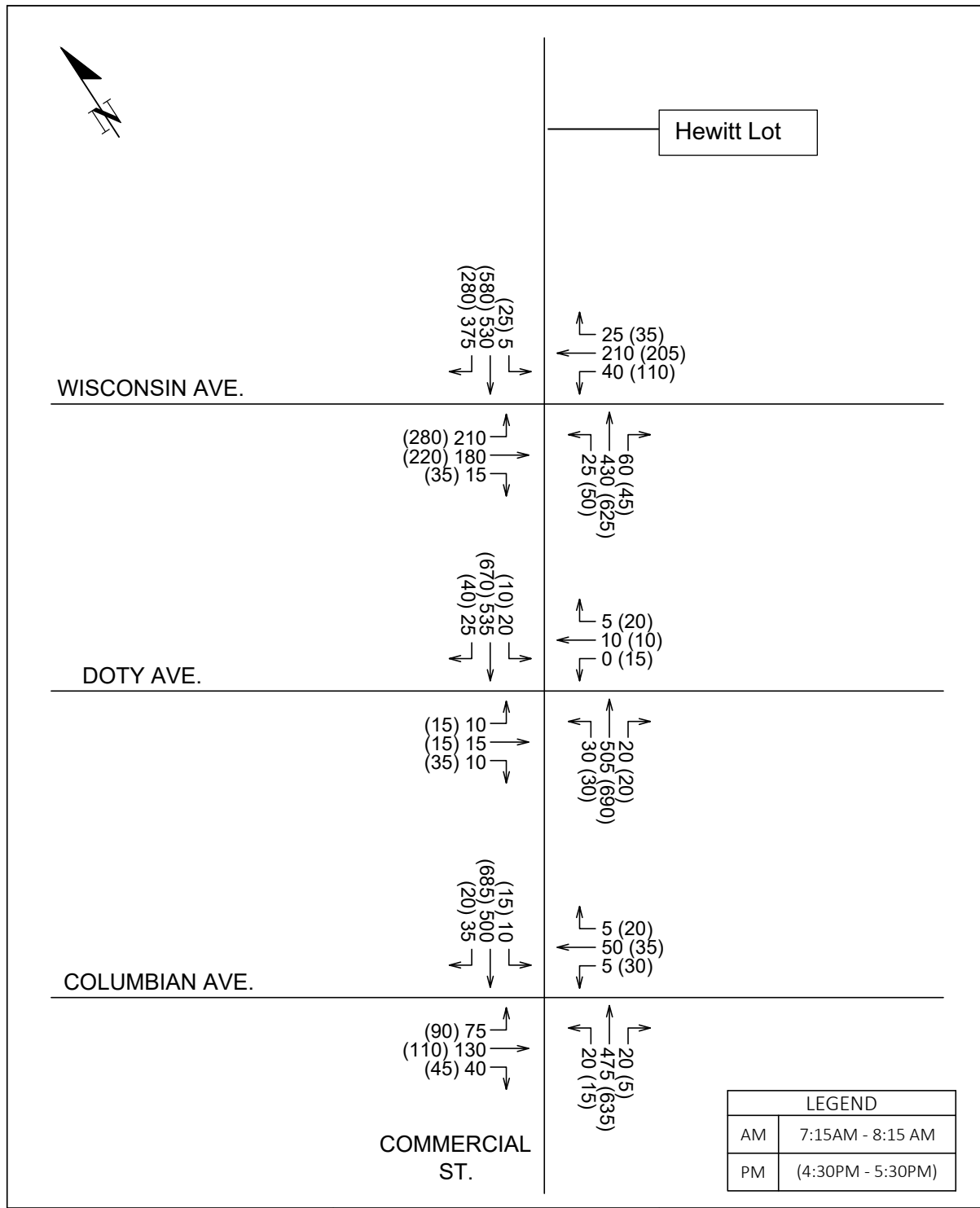
Figure 4: Hourly Traffic Distribution on Commercial Street South of Wisconsin Avenue



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 6th 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.

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 intersection operation summaries in 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 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.

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

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

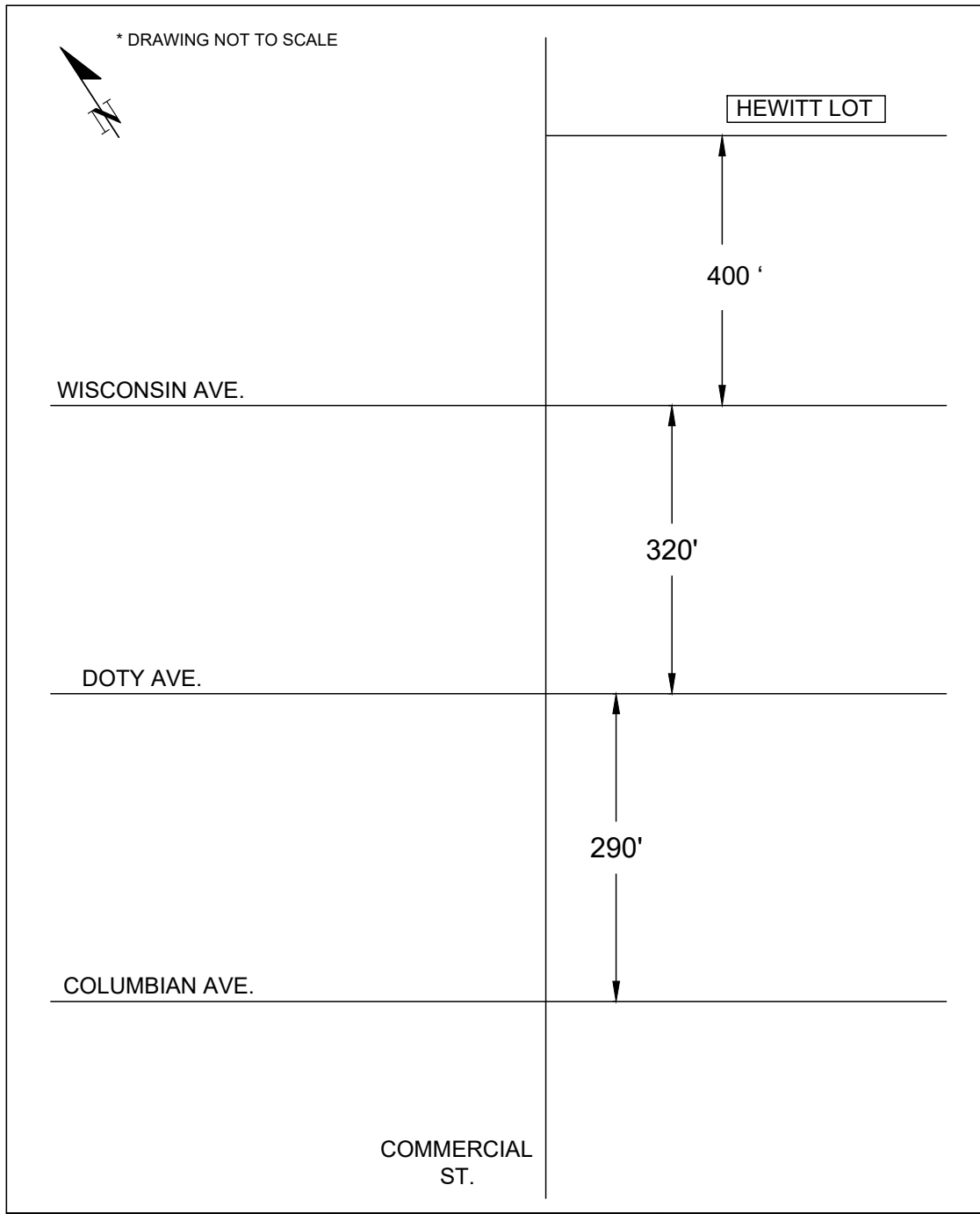
2020 Existing AM Peak Hour Traffic Operations - Commercial Street														
Scenario	Control	MOE	Movement											OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Columbian Avenue	Signal	LOS	B	C		C	B		A			A		A
		Delay (sec)	19.8	22.0		22.1	17.7		5.2			5.6		8.7
		Queue (ft)	50'	100'		25'	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	--

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	--

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

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.

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.

Year 2040 Surface Parking Lot Traffic Operation: 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

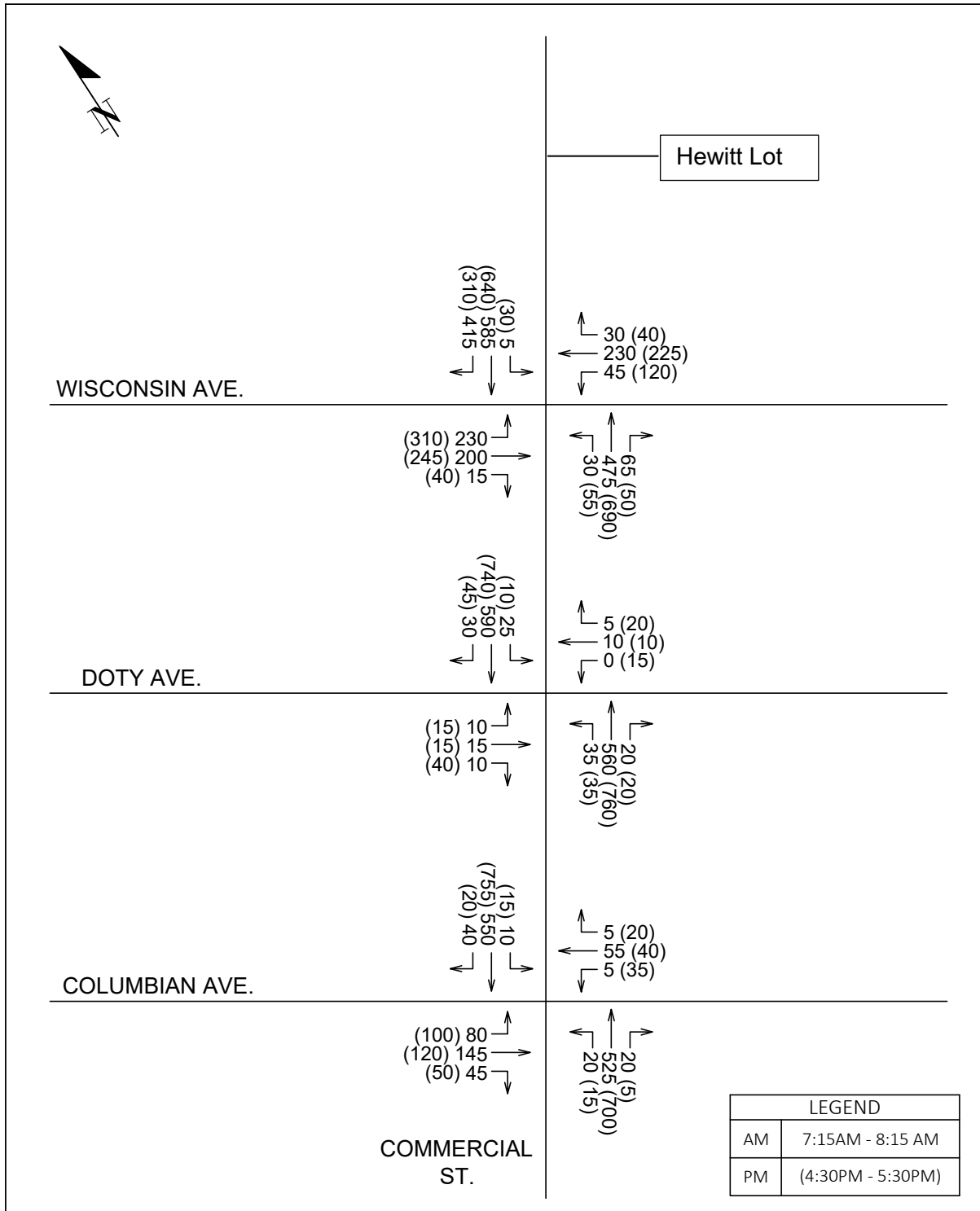


Table 3 summarizes year 2040 traffic operation at the Commercial Street study intersections under the existing Hewitt surface parking lot condition.

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

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		--
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	*200	50'		100'	*250	50'		50'	*825			*75	*500		--
* 95th percentile volume exceeds capacity, queue may be longer																		

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.

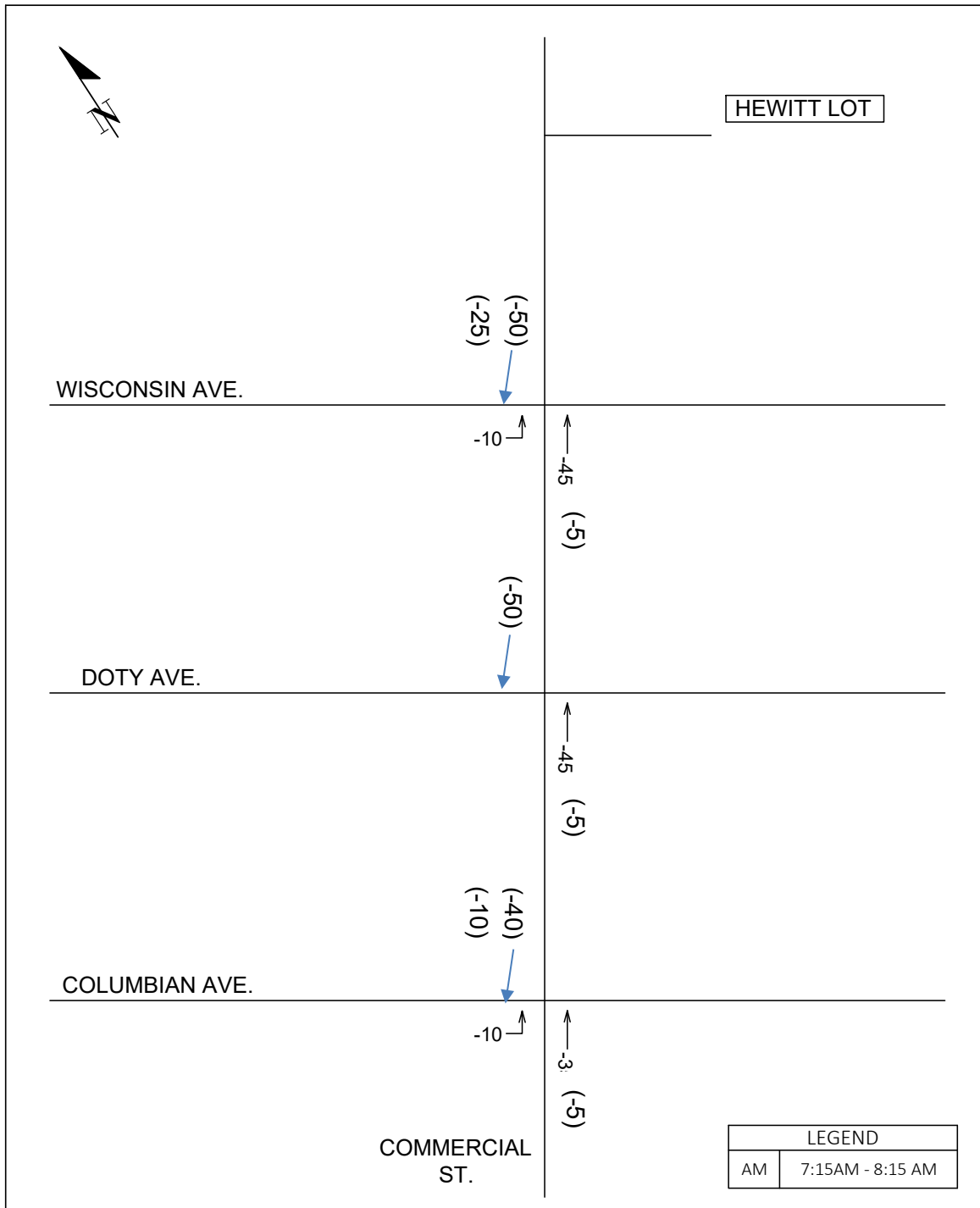
In 2040, the west approach of Doty Avenue is expected to operate at LOS 'E' during the morning peak hour with both the east and west approaches operating at LOS 'F' during the evening peak hour.

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



Year 2020 Single Access Parking Structure Operation: 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

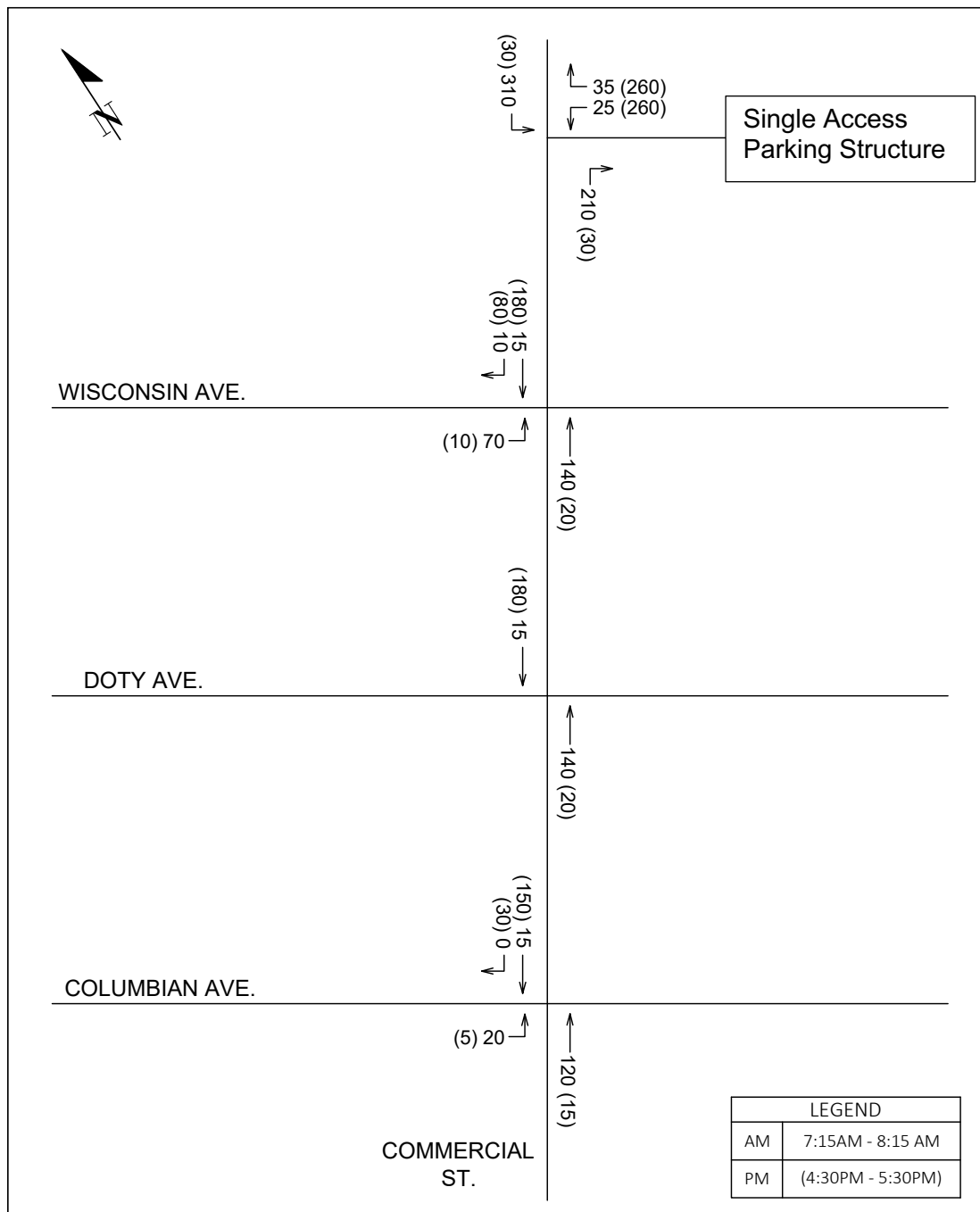


Figure 10 illustrates year 2020 traffic with the redistribution of peak hour volumes associated with construction of a single access Hewitt parking structure.

Figure 10: Year 2020 Commercial Street Peak Hour Intersection Traffic with a Single Approach Hewitt Parking Structure

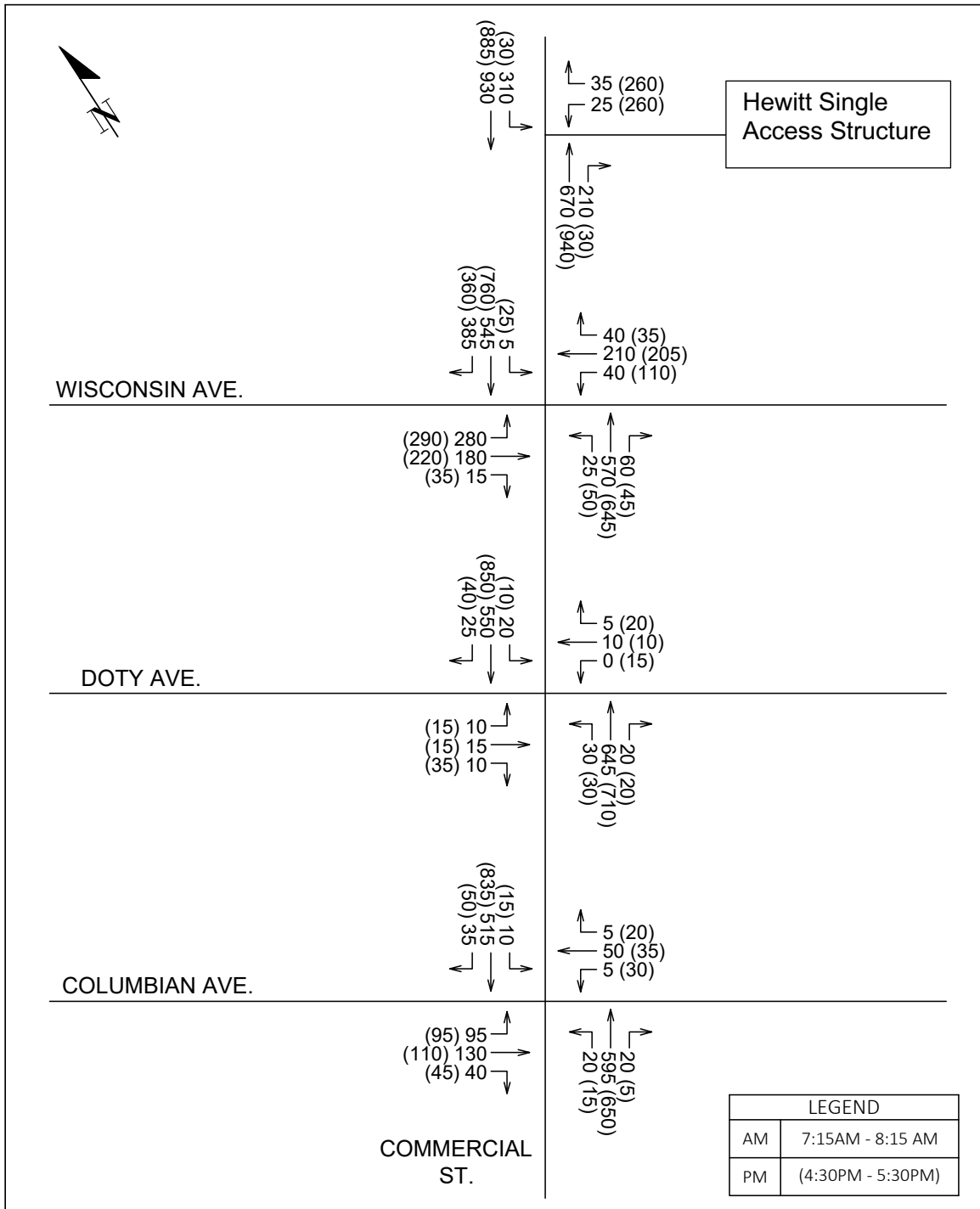


Table 4 summarizes year 2020 traffic operation at the study intersections along Commercial Street for a single access 578-space parking structure design.

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

2020 One-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	Signal	LOS	C	C		C	B		A			A		A
		Delay (sec)	20.1	21.9		22.0	17.7		5.5			5.7		8.7
		Queue (ft)	50'	100'		25'	50'		100'			250'		--
Doty Avenue	Stop	LOS	E			D			A			A		A
		Delay (sec)	35.0			30.6			8.0			8.3		1.8
		Queue (ft)	25'			25'			25'			25'		--
Wisconsin Avenue	Signal	LOS	D	C	C	C	D	D	C	D		D	D	D
		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'	*625		25'	*500	--
Hewitt Driveway Entrance	Free	LOS							A			C		A
		Delay (sec)							0.0			17.0		4.9
		Queue (ft)							25'			100'		--
Hewitt Driveway Exit	Stop	LOS				F		B	A			A		A
		Delay (sec)				51.4		11.3	0.0			0.0		0.9
		Queue (ft)				50'		25'	25'			25'		--

2020 One-Approach 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)	20.7	21.5		22.4	18.2		5.3			6.7		8.6
		Queue (ft)	75'	100'		25'	50'		125'			350'		--
Doty Avenue	Stop	LOS	F			F			A			A		A
		Delay (sec)	65.5			62.6			8.7			8.4		4.5
		Queue (ft)	75'			75'			25'			25'		--
Wisconsin Avenue	Signal	LOS	D	D	C	C	D	D	C	C		D	D	D
		Delay (sec)	49.6	36.8	28.9	32.1	52.9	36.2	20.4	30.9		40.4	37.0	37.4
		Queue (ft)	*225	200'	25'	100'	225'	50'	50'	*750		50'	*575	--
Hewitt Driveway Entrance	Free	LOS							A			B		A
		Delay (sec)							0.0			10.6		0.5
		Queue (ft)							25'			25'		--
Hewitt Driveway Exit	Stop	LOS				F		C	A			A		F
		Delay (sec)				655.3		19.7	0.0			0.0		76.5
		Queue (ft)				600'		100'	25'			25'		--

* 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.

Year 2040 Single Access Hewitt Parking Structure Traffic Operation: 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 Peak Hour Intersection Traffic with a Single Approach Hewitt Parking Structure

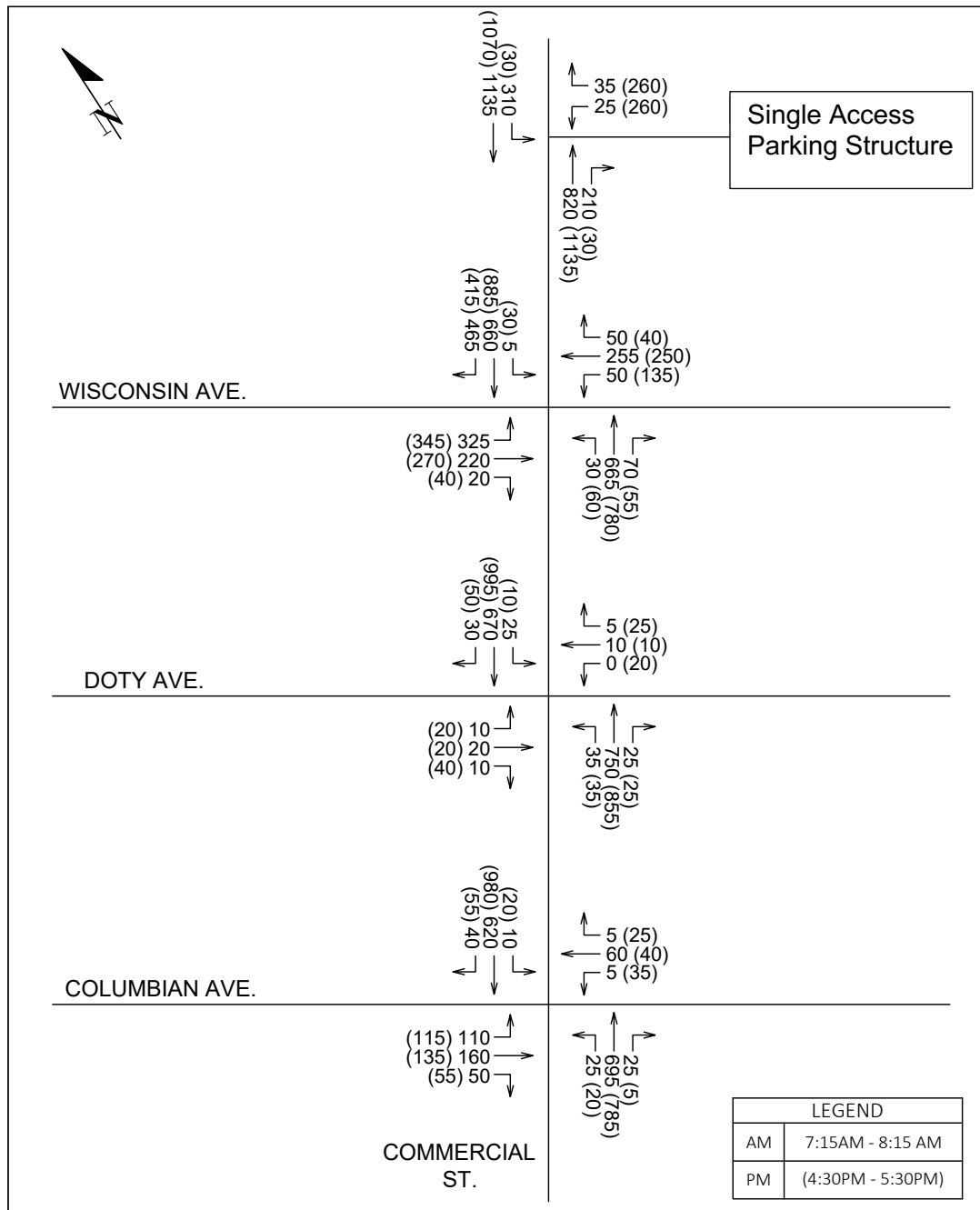


Table 5 summarizes year 2040 traffic operation at the study intersections on Commercial Street with a single access parking structure design alternative.

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

2040 One-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	Signal	LOS	B	C		C	B		A			A		A
		Delay (sec)	19.6	21.5		21.9	17.1		6.2			6.5		9.2
		Queue (ft)	50'	100'		25'	50'		100'			250'		—
Doty Avenue	Stop	LOS	E			E			A			A		A
		Delay (sec)	44.8			37.8			8.3			8.2		1.9
		Queue (ft)	50'			25'			25'			25'		—
Wisconsin Avenue	Signal	LOS	E	C	C	C	E	C	C	D		D	F	E
		Delay (sec)	59.5	29.5	24.6	30.7	56.8	34.1	25.2	52.7		50.6	72.4	58.1
		Queue (ft)	*225	100'	25'	50'	*275	50'	25'	*700		25'	*575	—
Hewitt Driveway Entrance	Free	LOS								A		C		A
		Delay (sec)								0.0		18.8		5.4
		Queue (ft)								25'		125'		—
Hewitt Driveway Exit	Stop	LOS				F		B		A			A	A
		Delay (sec)				66.9		11.6		0.0			0.0	1.0
		Queue (ft)				50'		25'		25'			25'	—

2040 One-Approach 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)	20.4	20.9		22.3	17.6		6.0			7.7		9.2
		Queue (ft)	75'	100'		25'	50'		150'			350'		—
Doty Avenue	Stop	LOS	F			F			A			A		A
		Delay (sec)	107.0			106.2			8.9			8.7		7.0
		Queue (ft)	125'			75'			25'			25'		—
Wisconsin Avenue	Signal	LOS	E	D	C	C	E	D	C	D		E	D	D
		Delay (sec)	69.6	37.9	28.4	31.2	55.0	35.2	24.5	47.0		57.6	51.9	49.7
		Queue (ft)	*300	*250	25'	100'	*250	50'	50'	*850		*75	*650	—
Hewitt Driveway Entrance	Free	LOS								A		B		A
		Delay (sec)								0.0		11.1		0.6
		Queue (ft)								25'		25'		—
Hewitt Driveway Exit	Stop	LOS				F		C		A			A	F
		Delay (sec)				956.7		22.5		0.0			0.0	102.2
		Queue (ft)				675'		100'		25'			25'	—

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

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

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.

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

Figure 12: Peak Hour Intersection Traffic Distribution with a Two Access Hewitt Parking Structure

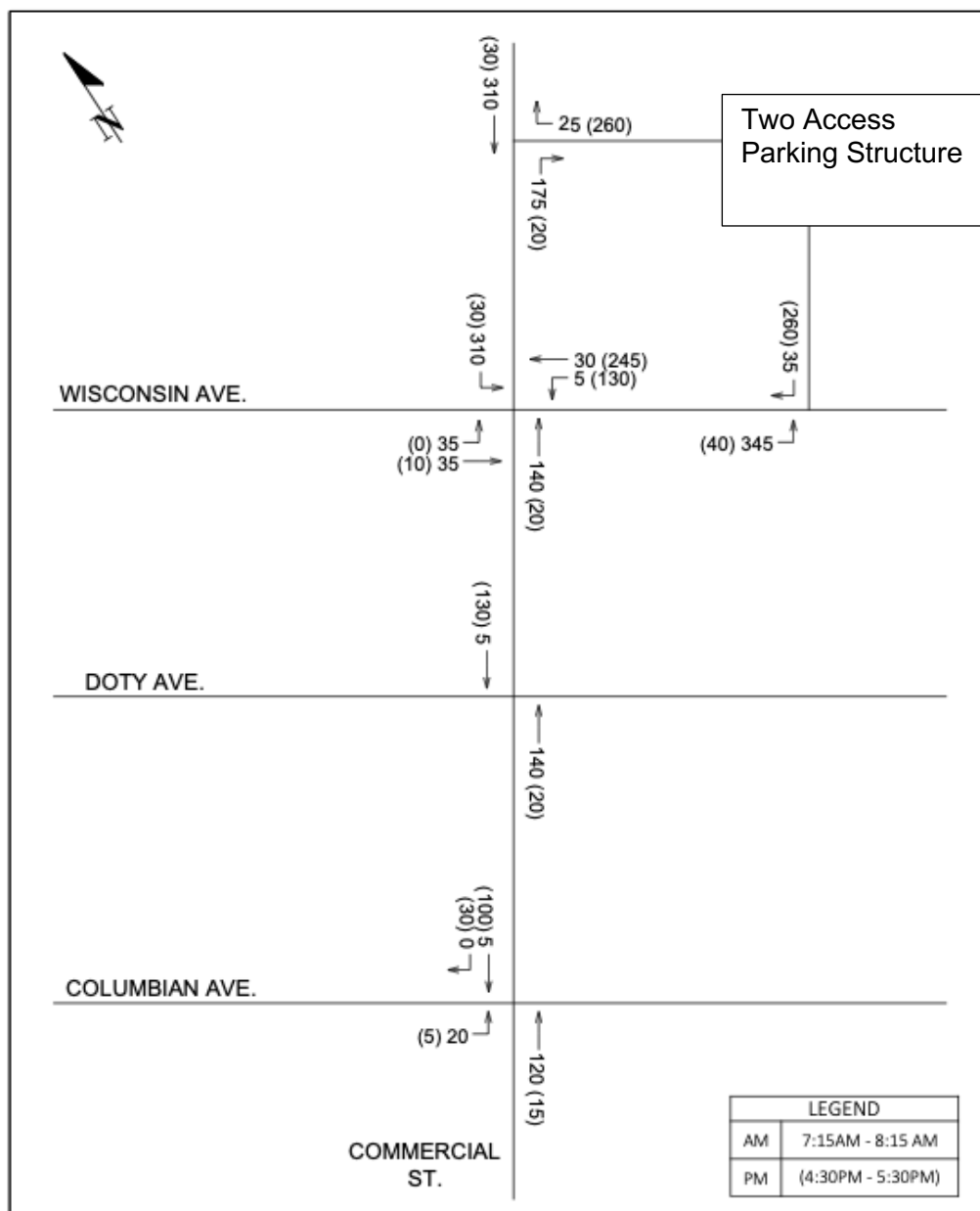


Figure 13 shows year 2020 peak hour intersection traffic volumes at the Commercial Street study intersections for a two-access parking structure.

Figure 13: Year 2020 Commercial Street Peak Hour Intersection Traffic with a Two Access Hewitt Parking Structure

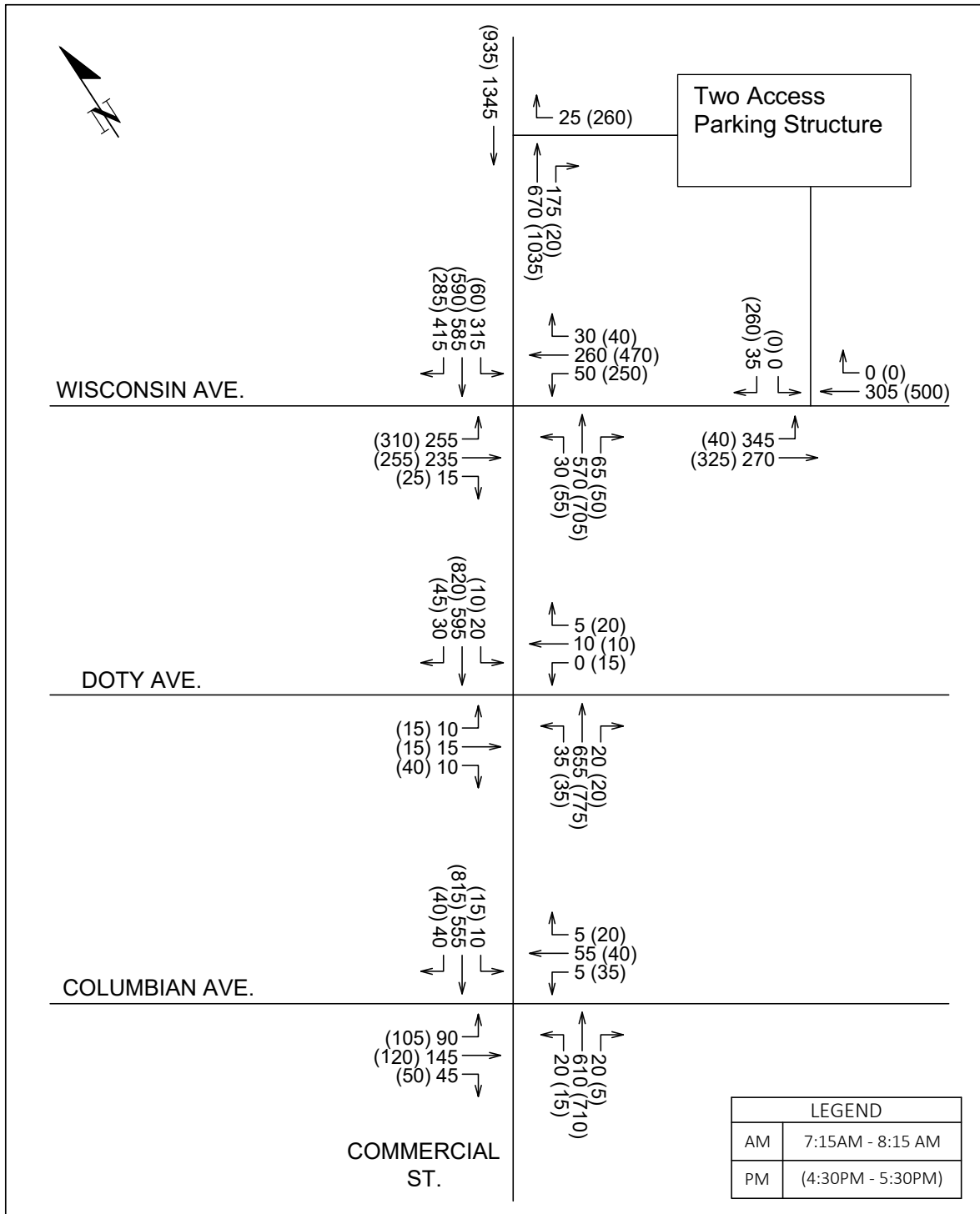


Table 6 summarizes year 2020 peak hour study intersection operation with a two-access parking structure design.

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

2020 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	Signal	LOS	C	C		C	B		A			A		A
		Delay (sec)	20.1	21.9		22.0	17.7		5.5			5.6		8.7
		Queue (ft)	50'	100'		25'	50'		100'			250'		--
Doty Avenue	Stop	LOS	D			D			A			A		A
		Delay (sec)	34.3			30.1			8.0			8.3		1.8
		Queue (ft)	25'			25'			25'			25'		--
Wisconsin Avenue	Signal	LOS	D	C	C	C	E	C	C	D		F	D	F
		Delay (sec)	37.7	30.7	24.9	30.2	58.1	33.7	21.7	37.6		903.2	43.3	146.2
		Queue (ft)	175'	125'	25'	50'	*300	50'	25'	*625		*525	*475	--
Hewitt Driveway at Wisconsin	Free	LOS	A			A						B		A
		Delay (sec)	9.2			0.0						10.3		3.9
		Queue (ft)	50'			25'						25'		--
Hewitt Driveway Entrance	Free	LOS							A			A		A
		Delay (sec)							0.0			0.0		0.0
		Queue (ft)							25'			25'		--
Hewitt Driveway Exit	Stop	LOS				B			A			A		A
		Delay (sec)				11.1			0.0			0.0		0.1
		Queue (ft)				25'			25'			25'		--

2020 Two-Approach 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)	20.7	21.5		22.4	18.2		5.3			6.4		8.5
		Queue (ft)	75'	100'		25'	50'		125'			275'		--
Doty Avenue	Stop	LOS	F			F			A			A		A
		Delay (sec)	55.4			55.7			8.6			8.4		4.0
		Queue (ft)	75'			50'			25'			25'		--
Wisconsin Avenue	Signal	LOS	E	D	C	C	F	C	C	E		F	D	E
		Delay (sec)	56.8	35.7	27.9	26.3	185.1	30.2	21.2	57.6		98.3	36.8	66.9
		Queue (ft)	*350	*275	25'	175'	*625	50'	50'	*750		*125	350'	--
Hewitt Driveway at Wisconsin	Free	LOS	A			A						C		A
		Delay (sec)	8.5			0.0						17.0		4.5
		Queue (ft)	25'			25'						75'		--
Hewitt Driveway Entrance	Free	LOS							A			A		A
		Delay (sec)							0.0			0.0		0.0
		Queue (ft)							25'			25'		--
Hewitt Driveway Exit	Stop	LOS				C			A			A		A
		Delay (sec)				19.7			0.0			0.0		2.5
		Queue (ft)				100'			25'			25'		--

* 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.

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

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

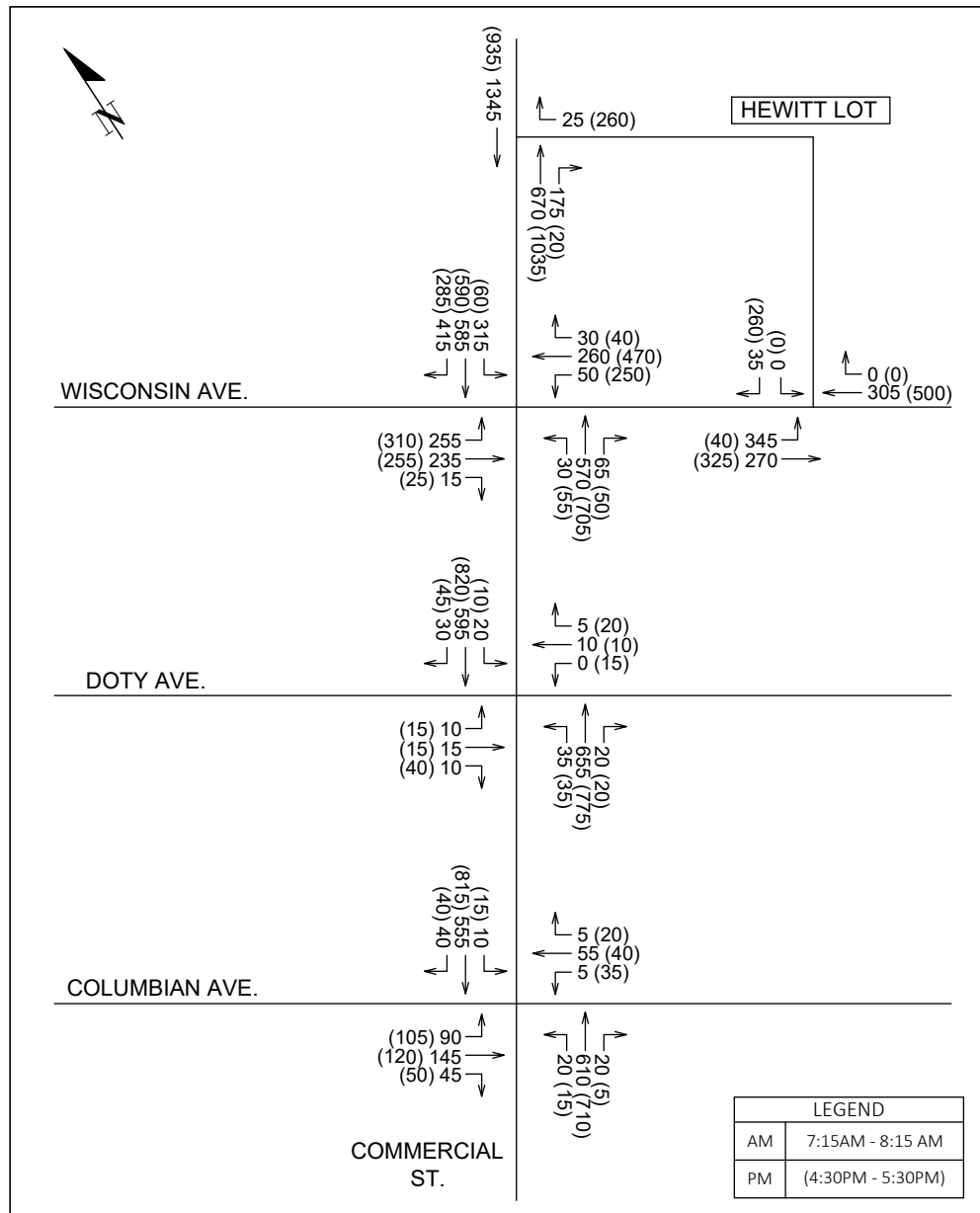


Table 7 shows year 2040 peak hour traffic operating conditions for a two-access parking structure design alternative.

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

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	Signal	LOS	B	C		C	B		A			A		A
		Delay (sec)	19.6	21.5		21.9	17.1		6.2			6.4		9.2
		Queue (ft)	50'	100'		25'	50'		100'			250'		--
Doty Avenue	Stop	LOS	E			E			A			A		A
		Delay (sec)	43.6			37.2			8.3			8.2		1.9
		Queue (ft)	50'			25'			25'			25'		--
Wisconsin Avenue	Signal	LOS	D	C	C	C	E	C	C	F		F	F	F
		Delay (sec)	40.8	29.5	23.4	29.4	60.3	32.5	25.4	63.0		2092.6	78.5	291.5
		Queue (ft)	*200	125'	25'	50'	*325	50'	25'	*700		*575	*550	--
Hewitt Driveway at Wisconsin	Free	LOS	A				A					B		A
		Delay (sec)	9.3				0.0					10.4		3.7
		Queue (ft)	50'				25'					25'		--
Hewitt Driveway Entrance	Free	LOS							A			A		A
		Delay (sec)							0.0			0.0		0.0
		Queue (ft)							25'			25'		--
Hewitt Driveway Exit	Stop	LOS					B		A			A		A
		Delay (sec)					11.5		0.0			0.0		0.1
		Queue (ft)					25'		25'			25'		--

2040 Two-Approach 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)	20.4	20.9		22.3	17.6		6.0			7.4		9.1
		Queue (ft)	75'	100'		25'	50'		125'			325'		--
Doty Avenue	Stop	LOS	F			F			A			A		A
		Delay (sec)	88.5			89.9			8.8			8.7		6.0
		Queue (ft)	100'			75'			25'			25'		--
Wisconsin Avenue	Signal	LOS	F	D	C	C	F	C	C	F		F	E	F
		Delay (sec)	83.7	39.2	28.4	28.1	208.3	30.3	22.9	88.1		131.2	43.6	82.7
		Queue (ft)	*400	*325	50'	175'	*650	50'	50'	*850		*150	*425	--
Hewitt Driveway at Wisconsin	Free	LOS	A				A					C		A
		Delay (sec)	8.6				0.0					18.3		4.5
		Queue (ft)	25'				25'					75'		--
Hewitt Driveway Entrance	Free	LOS							A			A		A
		Delay (sec)							0.0			0.0		0.0
		Queue (ft)							25'			25'		--
Hewitt Driveway Exit	Stop	LOS					C		A			A		A
		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

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. Year 2020: 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 can block access to the Hewitt parking lot driveways.

2. Single Access Hewitt Parking Structure

- a. Year 2020: 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. Year 2040: 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 its 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. Year 2020: 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.

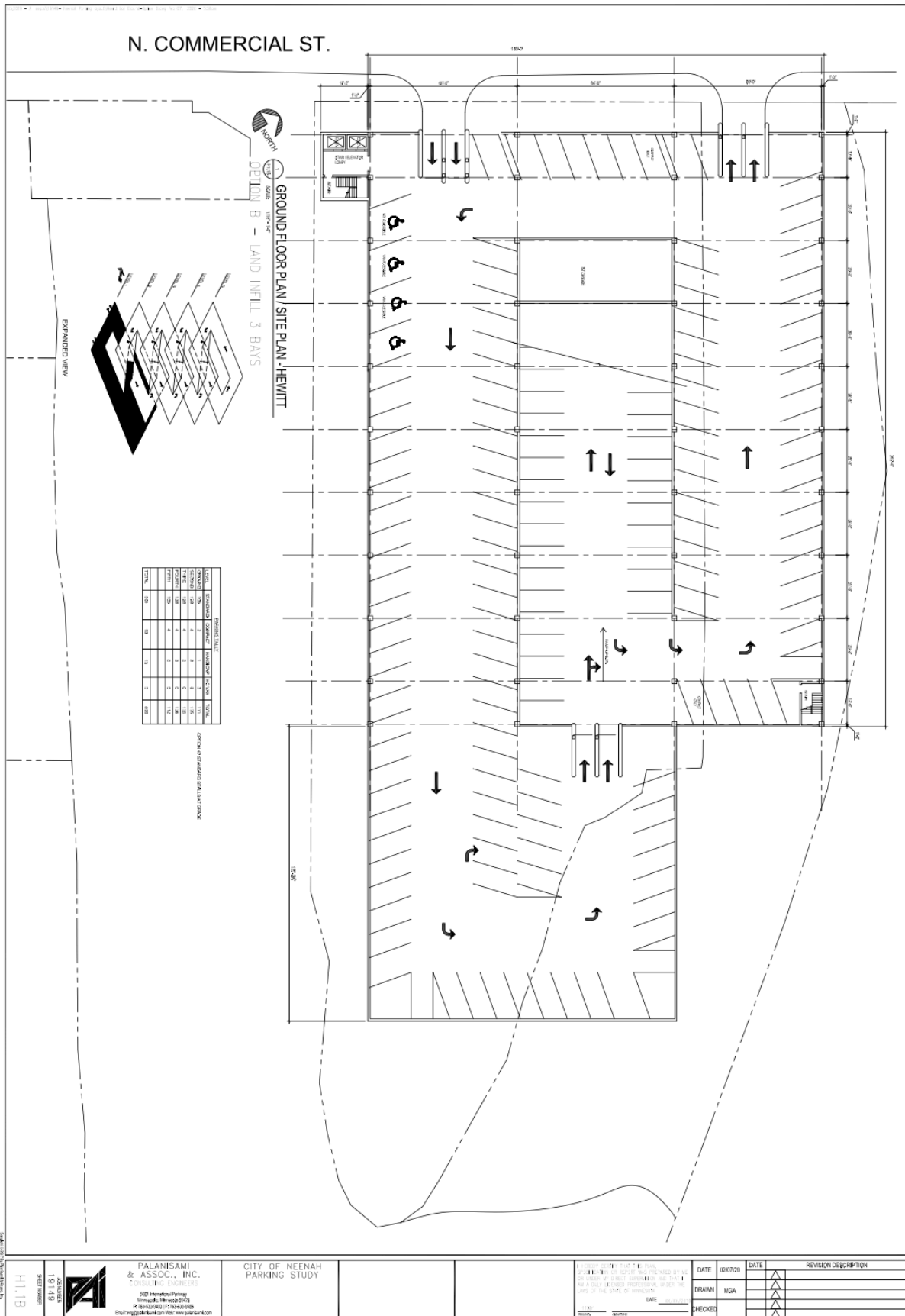
This restriction requires southbound parking structure traffic on Commercial Street to continue past the structure driveways to turn left at Wisconsin Avenue to use the second access driveway connected to the Neenah Centers parking lot. Likewise, traffic exiting the parking structure to travel southbound 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.

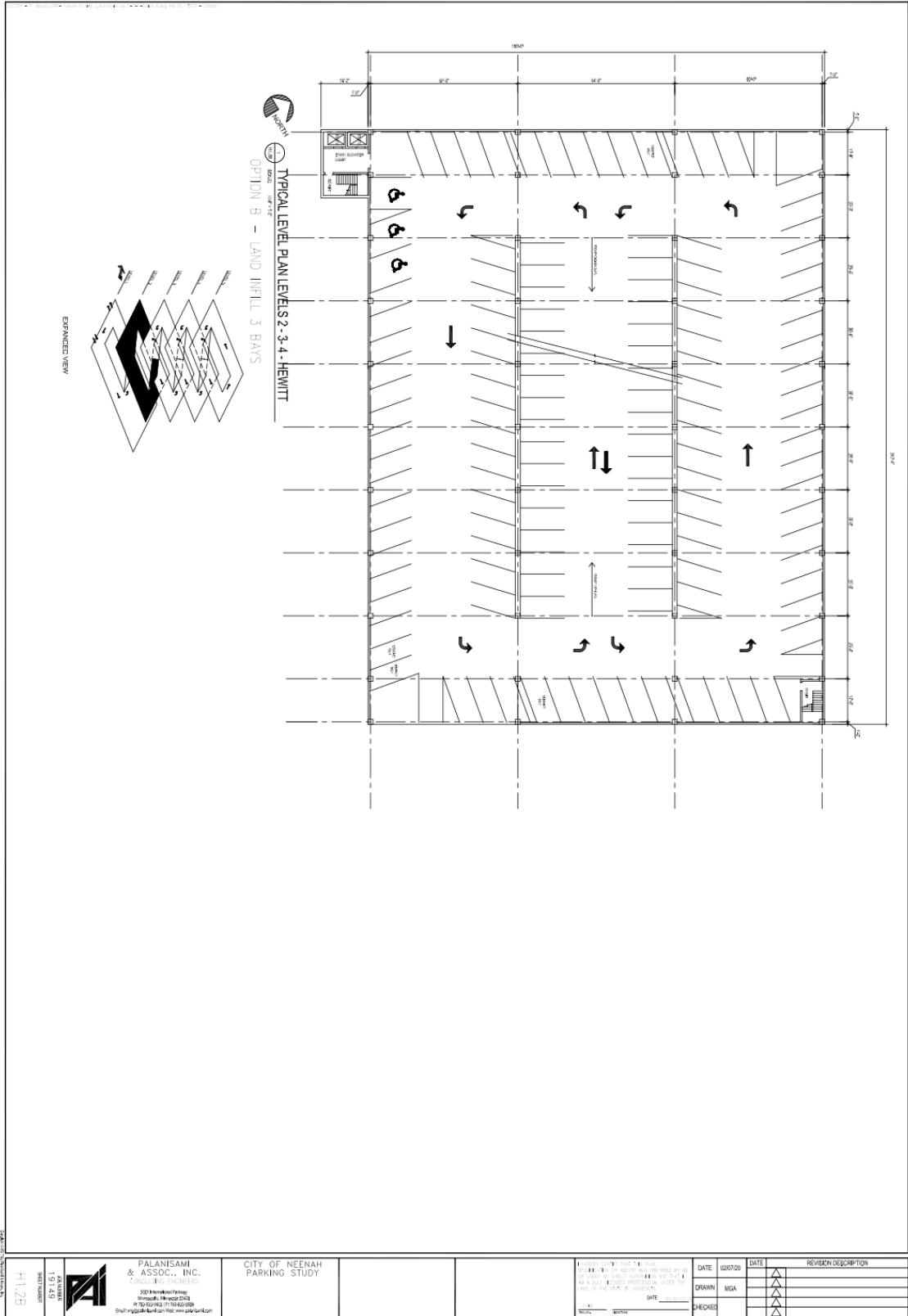
Under this condition, the structure driveways on Commercial Street are expected to operate at LOS 'C' or better. During the morning peak hour, the westbound 'through' movement on Wisconsin Avenue is expected to operate at LOS 'E' with a 300-foot queue with the southbound Wisconsin Avenue left turn on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

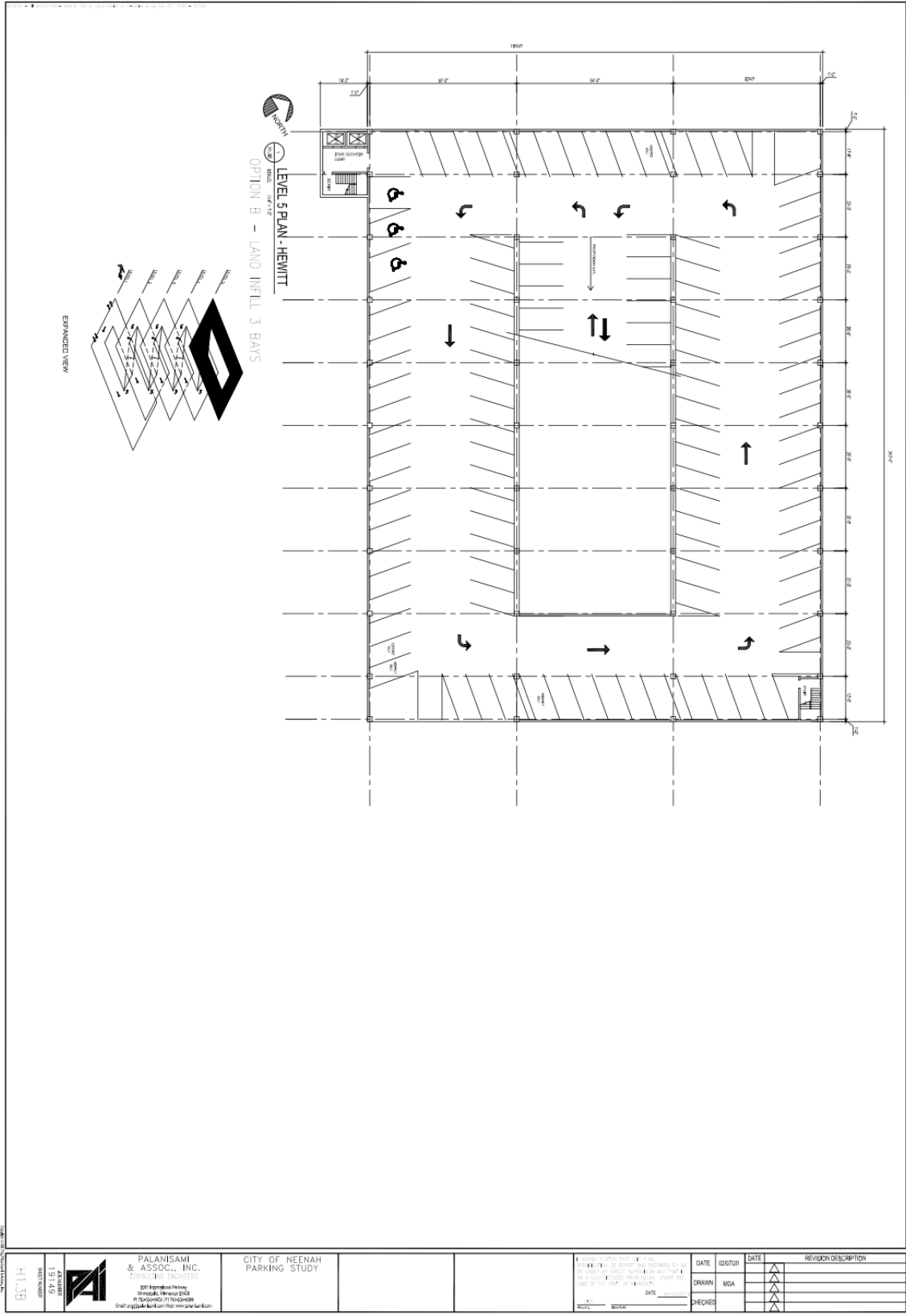
- b. Year 2040: The Wisconsin Avenue intersection with Commercial Street, during the evening peak hour is expected to operate with the following movements at LOS 'F': eastbound left turn with a 400-foot queue; westbound 'through' with a 650-foot queue; northbound 'shared through/right turn' lane with 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







H1.38	DATE 191449		PALANISAMI & ASSOC., INC. CONSULTING ENGINEERS 3911 Grandview Avenue Minneapolis, Minnesota 55412 P: 612.338.1111 Email: info@palanisami.com	CITY OF NEENAH PARKING STUDY			I HEREBY CERTIFY THAT THE DESIGN, SPECIFICATIONS, OR REPORT PREPARED BY ME OR UNDER MY CLOSE PERSONAL SUPERVISION AND UNDER MY SEAL AND THE SEAL OF THE CITY OF NEENAH, WISCONSIN, IS TRUE AND CORRECT.	DATE	06/01/2020	DATE		REVISION DESCRIPTION
								DRAWN	MGA			
								CHECKED				

Appendix B

Two Access Parking Structure

5-Level Design Concept

