# final report

November 10, 2020

# Traffic Impact Study

Warehouse Complex Minor Lane Louisville, KY

Prepared for

Louisville Metro Planning Commission





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### **INTRODUCTION**

The development plan for a warehouse complex on Minor Lane in Louisville, KY shows 1,355,000 square feet. The site currently has 85 manufactured home sites, which will be removed. **Figure 1** displays a map of the site. Access to the development will be from two entrances on Minor Lane. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study, the impact area was defined to be the intersection of Minor Lane at Outer Loop and the proposed entrances.

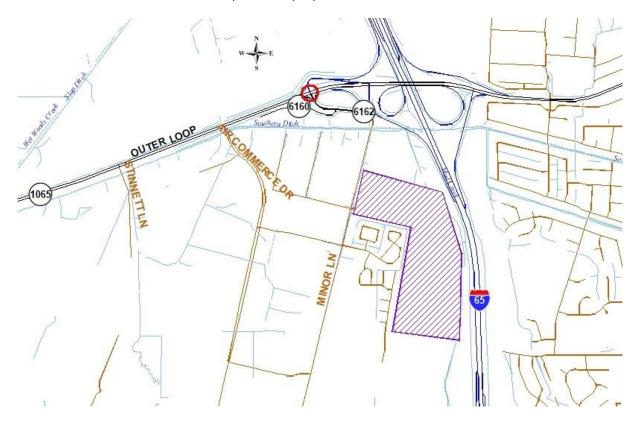


Figure 1. Site Map

### **EXISTING CONDITIONS**

Minor Lane is maintained by the Louisville Metro with an estimated 2020 ADT of 6,000 vehicles per day between Outer Loop and Transglobal Drive as estimated from a 2016 turning movement count at Outer Loop. The road is a two-lane roadway with twelve-foot lanes, with a two-foot shoulder. The speed limit is 35 mph. There are no sidewalks. The intersection with Outer Loop is controlled with a traffic signal. At the intersection there are dual left turn lanes. All right turn lanes at the intersection operate as free-flow.

Peak hour traffic count for the intersections was obtained from the Traffic Impact Study for <u>Louisville Renaissance</u> <u>Zone Renaissance Business Park</u> dated October 2016 and prepared by The Corradino Group. The counts were collected in August 2016. **Figure 2** illustrates the 2016 a.m. and p.m. peak hour traffic volumes. The Appendix contains the full count data from that study.

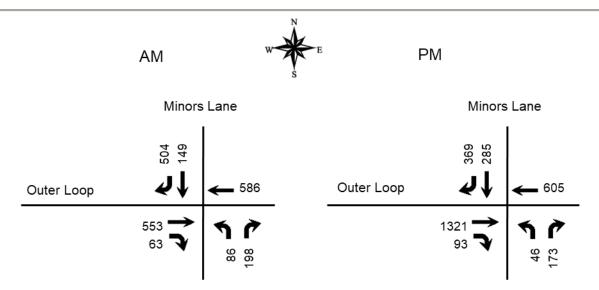


Figure 2. Existing (2016) Peak Hour Volumes

### **FUTURE CONDITIONS**

The project completion date is 2022. An annual growth rate of 0.5 percent was applied to the 2016 volumes. This was determined by the historical growth at KYTC stations 632. The trip generation from the Louisville Renaissance Business Park has been included as fully completed. **Figure 3** displays the 2022 No Build peak hour volumes.

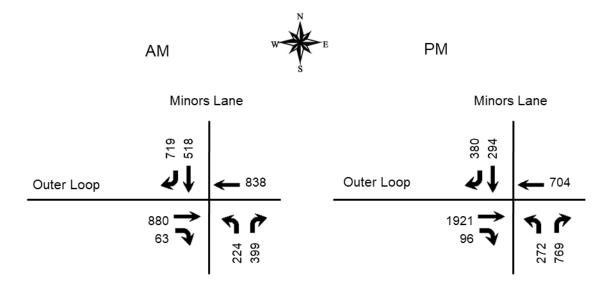


Figure 3. No Build Peak Hour Volumes

### TRIP GENERATION

The Institute of Transportation Engineers <u>Trip Generation Manual</u>, 10<sup>th</sup> Edition contains trip generation rates for a wide range of developments. The land use "Warehouse (150)" was used. The trip generation results are listed in **Table** 1. The new trips were assigned to the highway network with the percentages shown in **Figure 4**. **Figure 5** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. I	Peak H	lour	P.M. F	Peak	Hour
Land Use	Trips	In	Out	Trips	In	Out
Warehouse (1,355,000)	188	144	44	190	51	139

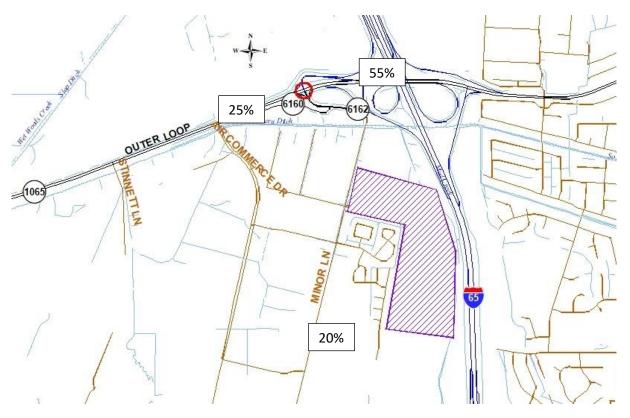


Figure 4. Trip Distribution Percentages

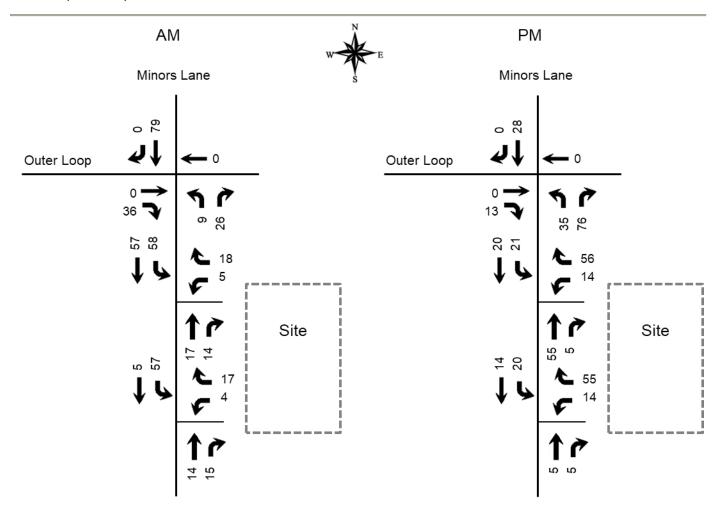


Figure 5. Peak Hour Trips Generated by Site

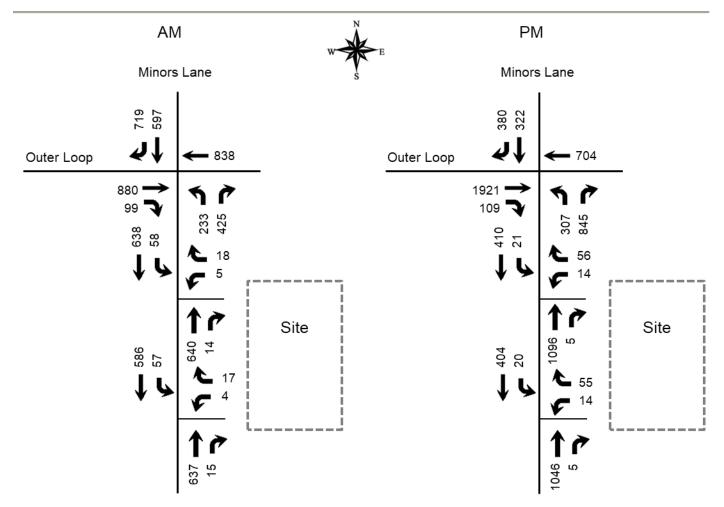


Figure 6. Build Peak Hour Volumes

### **ANALYSIS**

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a "Level of Service". Level of Service is a ranking scale from A through F, "A" is the best operating condition and "F" is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the <u>Highway Capacity Manual</u>, 6<sup>th</sup> edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

		A.M.			P.M.	
Approach	2018	2022	2022	2018	2022	2022
, ipp. 6 d.6	Existing	No Build	Build	Existing	No Build	Build
	В	С	С	С	С	С
Outer Loop at Minor Lane	17.5	28.5	33.8	21.5	28.9	28.7
	В	С	С	С	D	D
Outer Loop Westbound	17.5	22.5	21.5	21.0	37.7	36.7
	В	С	С	В	В	В
Outer Loop Eastbound	18.8	22.7	22.7	16.6	19.5	19.5
	В	С	С	В	В	В
Minor Lane Northbound	19.3	22.2	22.0	16.1	19.3	20.0
	В	D	Е	С	С	С
I 65 Ramp Southbound	15.7	40.3	55.7	29.1	29.3	31.2
Minor Lane at Entrance (North)						
Fatrones Westbound			С			С
Entrance Westbound			15.0			24.5
Minor Lane Southbound			Α			В
Minor Lane Southbound			9.4			11.2
Minor Lane at Entrance (South)						
Entrance Weathound			В			С
Entrance Westbound			14.7			22.8
Minor Long Couthbarrad			Α			В
Minor Lane Southbound			9.4			10.9

Key: Level of Service, Delay in seconds per vehicle

The entrance was evaluated for turn lanes using the Kentucky Transportation Cabinet <u>Highway Design Guidance</u> Manual dated July, 2020. Left turn lanes are required at the entrances.

### **CONCLUSIONS**

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2022, there will be a manageable impact to the existing highway network, with Levels of Service remaining within acceptable limits. The delays experienced in the area will increase within acceptable limits. Left turn lanes will be required at the entrances.

## **APPENDIX**

Rain - 80 Degrees JCPS in Session

### **Traffic Counts**

Cummins Consulting Services, PLLC 4661 Marlberry Place

Lexington, Kentucky, United States 40509 859.361.2589 You can count on CCS Count Name: Minors at Outer Loop Site Code: Site 4 Start Date: 08/18/2016 Page No: 1

Turning Movement Data

							I urning	Movem	ent Data	3							
		Minors La	ine Ramp			KY1065 - Out	ter Loop Road			Minor	s Lane			KY1065 - Ou	ter Loop Road		
Start Time		South	bound			West	bound			North	bound			East	bound		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
7:00 AM	0	38	78	116	0	105	0	105	9	0	56	65	0	131	7	138	424
7:15 AM	0	34	120	154	0	113	0	113	24	0	54	78	0	128	7	135	480
7:30 AM	0	37	133	170	0	154	0	154	13	0	66	79	0	152	13	165	568
7:45 AM	0	43	144	187	0	164	0	164	32	0	47	79	0	129	21	150	580
Hourly Total	0	152	475	627	0	536	0	536	78	0	223	301	0	540	48	588	2052
8:00 AM	0	33	115	148	0	126	0	126	26	0	37	63	0	134	15	149	486
8:15 AM	0	36	112	148	0	142	0	142	15	0	48	63	0	138	14	152	505
8:30 AM	0	43	97	140	0	130	0	130	13	0	37	50	0	133	15	148	468
8:45 AM	0	27	97	124	1	109	0	110	14	0	53	67	0	207	21	228	529
Hourly Total	0	139	421	560	1	507	0	508	68	0	175	243	0	612	65	677	1988
*** BREAK ***	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
4:00 PM	0	56	87	143	0	113	0	113	20	0	53	73	0	310	20	330	659
4:15 PM	0	66	79	145	0	120	0	120	10	0	34	44	0	300	20	320	629
4:30 PM	0	64	74	138	0	116	0	116	19	0	41	60	0	330	30	360	674
4:45 PM	0	61	93	154	0	136	0	136	10	0	49	59	0	331	23	354	703
Hourly Total	0	247	333	580	0	485	0	485	59	0	177	236	0	1271	93	1364	2665
5:00 PM	0	67	78	145	0	154	0	154	10	0	48	58	0	380	27	407	764
5:15 PM	0	83	91	174	0	148	0	148	18	0	42	60	0	271	27	298	680
5:30 PM	0	74	107	181	0	167	0	167	8	0	34	42	0	339	16	355	745
5:45 PM	0	47	97	144	1	183	0	184	10	0	35	45	0	277	18	295	668
Hourly Total	0	271	373	644	1	652	0	653	46	0	159	205	0	1267	88	1355	2857
Grand Total	0	809	1602	2411	2	2180	0	2182	251	0	734	985	0	3690	294	3984	9562
Approach %	0.0	33.6	66.4	-	0.1	99.9	0.0	-	25.5	0.0	74.5	-	0.0	92.6	7.4	-	-
Total %	0.0	8.5	16.8	25.2	0.0	22.8	0.0	22.8	2.6	0.0	7.7	10.3	0.0	38.6	3.1	41.7	-
Motorcycles	0	2	1	3	0	6	0	6	0	0	2	2	0	7	2	9	20
% Motorcycles	-	0.2	0.1	0.1	0.0	0.3		0.3	0.0	-	0.3	0.2	-	0.2	0.7	0.2	0.2
Cars	0	579	1260	1839	2	1646	0	1648	182	0	565	747	0	2615	209	2824	7058
% Cars	-	71.6	78.7	76.3	100.0	75.5		75.5	72.5	-	77.0	75.8	-	70.9	71.1	70.9	73.8
Light Goods Vehicles	0	174	64	238	0	338	0	338	48	0	105	153	0	605	52	657	1386
% Light Goods Vehicles	-	21.5	4.0	9.9	0.0	15.5		15.5	19.1	-	14.3	15.5	-	16.4	17.7	16.5	14.5
Buses	0	13	15	28	0	7	0	7	3	0	10	13	0	10	9	19	67
% Buses	-	1.6	0.9	1.2	0.0	0.3	-	0.3	1.2	-	1.4	1.3		0.3	3.1	0.5	0.7
Single-Unit Trucks	0	15	150	165	0	99	0	99	10	0	25	35	0	271	14	285	584
% Single-Unit Trucks	-	1.9	9.4	6.8	0.0	4.5	-	4.5	4.0	-	3.4	3.6		7.3	4.8	7.2	6.1
Articulated Trucks	0	26	112	138	0	84	0	84	8	0	27	35	0	182	8	190	447
% Articulated Trucks	_	3.2	7.0	5.7	0.0	3.9	-	3.8	3.2		3.7	3.6		4.9	2.7	4.8	4.7

# **Trip Distribution from Louisville Renaissance Business Park**

Table 7 - Outer Loop and Air Commerce Drive Trip Distribution Results

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Cars	67	-	118	-	-	-	-	133	76	378	128	-
AM Trucks	19	-	37	-	-	-	-	22	27	56	7	-
PM Cars	132	-	379	-	-	-	-	52	22	98	217	-
PM Trucks	25	-	126	-	-	-	-	3	8	26	8	-

Table 8 - Outer Loop and Minors Lane Trip Distribution Results

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Cars	128	-	181	-	329	176	-	202	-	-	118	-
AM Trucks	7	-	14	-	40	24	-	32	-	-	37	-
PM Cars	217	-	549	-	128	35	-	63	-	-	379	-
PM Trucks	8	-	42	-	11	8	-	18	-	-	126	-

At Minor Lane EB and WB columns are reversed when compared with Air Commerce Drive trips.

### **HCS Reports**

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Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	3.0	0.0				5	6	7	Y
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Case Number						7.0		_	8.0	-		9.0			11.0
Phase Duration	1, S					82.3		$\rightarrow$	82.3			27.7			30.0
Change Period		,.			_	7.1		_	7.1	_	_	6.6			7.1
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Max Out Proba	bility				_			_				1.00			1.00
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Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12		6		3		18		4	14
Adjusted Flow I	Rate ( v	), veh/h			634	72		637		93		215		162	548
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n		1696			1752	2	1743				1766	
Queue Service	Time (	g s ), S			14.9			14.4		3.3				5.6	
Cycle Queue C	learanc	e Time ( <i>g շ</i> ), s			14.9			14.4		3.3				5.6	
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Incremental De	, ,.				0.5			0.5		0.2				0.4	
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Intersection De	ntersection Delay, s/veh / LOS					17	.5						В		
Multimodal Re					EB			WE		-	NB			SB	
Pedestrian LOS				2.27	-	В	1.91	-	В	2.16		В	2.3	_	В
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Signal Informa	tion					<u> </u>								_	1
Cycle, s	140.0	Reference Phase	2		<b>⊨</b> a `	5 8	7					_ ,	₹ ,	<b>`</b> ],	<b>.</b>
Offset, s	0	Reference Point	End	Green	72.9	22.9	23.4	0.0	0.0	0.0				3	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.1	3.6	0.0	0.0	0.0					V
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	3.0	0.0	0.0	0.0		5	6	7	
Timer Results				EBI	-	EBT	WB	L	WBT	NBL	-	NBT	SBI	-	SBT
Assigned Phase	е					2			6		$\perp$	8			4
Case Number						7.0			8.0			9.0			11.0
Phase Duration	, S				$\overline{}$	80.0			80.0		$\perp$	30.0			30.0
Change Period	( Y+R	c), S				7.1			7.1			6.6			7.1
Max Allow Head	dway ( <i>I</i>	<i>ИАН</i> ), s				0.0			0.0			5.2			5.2
Queue Clearan	ce Time	e ( g s ), s										25.4			25.9
Green Extension	n Time	( <b>g</b> e ), S				0.0			0.0			0.0			0.0
Phase Call Pro	bability											1.00			1.00
Max Out Proba	bility										$\perp$	1.00			1.00
Movement Gro	up Res	ults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12		6		3		18		4	14
Adjusted Flow I	Rate ( v	), veh/h			945	106		911		253		462		649	782
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n		1696			1752		1743				1766	
Queue Service	Time (	g s ), s			25.9			23.6		9.1				23.9	
Cycle Queue C	learanc	e Time ( <i>g շ</i> ), s			25.9			23.6		9.1				23.9	
Green Ratio ( g	/C )				0.52			0.52		0.17				0.17	
Capacity ( c ), v					1766			1825		583				603	
Volume-to-Capa	acity Ra	tio (X)			0.535			0.499		0.435				1.076	
Back of Queue	( Q ), ft/	In ( 90 th percentile)	)		362.1			339.3	3	165.3				546.5	
Back of Queue	( Q ), ve	eh/In ( 90 th percenti	le)		13.6			13.1		6.6				21.3	
		RQ) (90 th percent	-		0.24			0.38		0.41				0.76	
Uniform Delay (	(d1), s	/veh			22.3			21.7		52.4				58.1	
Incremental De					1.0			1.0		0.7				58.8	
Initial Queue De					0.0			0.0		0.0				0.0	
Control Delay (		,.			23.3	5.0		22.7		53.1		5.0		116.8	5.0
Level of Service					С	Α		С		D		Α		F	А
Approach Delay				21.5	5	С	22.7	,	С	22.0		С	55.7	7	E
ntersection Delay, s/veh / LOS						33							С		
Intersection De															
	oulto				EB			MP			NID			CD	
Multimodal Re Pedestrian LOS		/1.08		2.27	EB	В	1.91	WB	В	2.16	NB	В	2.3	SB	В

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		HCS	7 Sig	nalize	d Inte	ersect	tion F	Resu	lts Su	ımmar	У				
General Inform	nation								Interse	ction Infe	ormati	on		14741	ЬŲ
Agency	iution	Diane B. Zimmerma	n Traffi	c Engin	eering			$\rightarrow$	Duratio		0.250		┨	TIT	
Analyst		DBZ	arr rrain	-		11/4/2	020	$\rightarrow$	Area Ty		Othe		- 2		
Jurisdiction		552		Time F		PM Pe		_	PHF	рс	0.95	<u> </u>	→ +		-
Urban Street		Outer Loop			is Year		Jak	$\rightarrow$		s Period	1> 5:	00			
Intersection		Minors Ln/I 65 SB		File Na		PM 16	VIIC		Allalysi	3 F CHOU	12 0.	00	-		
Project Descrip	tion	Minor Warehouses		FIIC IN	allic	FIVI IC	.xus						-  ₹	ין ר אור איני	20
r roject Descrip	LIOTI	Willior Waterlouses													
Demand Inform	nation				EB		$\overline{}$	WE	3		NB		$\overline{}$	SB	
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v					1321	93		60	5	46		173		285	369
, ,,															
Signal Informa	tion						Т							_	
Cycle, s	150.0	Reference Phase	2	1	₩.	- R 2	7						$\rightarrow$	``\	4
Offset, s	0	Reference Point	End	Green	86.9	22.9	19.4	0.0	0.0	0.0		1	<b>Y</b> 2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.1	3.6	0.0					$\leftarrow$		K 2
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	3.0	0.0				5	6	7	Y
Timer Results				EBL	.	EBT	WB	L	WBT	NBI	-	NBT	SB	L	SBT
Assigned Phase	е					2			6			8			4
Case Number						7.0			8.0			9.0			11.0
Phase Duration	, s					94.0			94.0			26.0			30.0
Change Period,	( Y+R	c ), S				7.1			7.1			6.6			7.1
Max Allow Head	dway ( I	<i>МАН</i> ), s				0.0		$\neg$	0.0		$\neg$	5.2			5.2
Queue Clearan										1		19.0			24.9
Green Extensio						0.0			0.0			0.5			0.0
Phase Call Prol	bability	, ,										1.00			1.00
Max Out Proba	bility							$\perp$				1.00			1.00
Movement Gro	up Res	ults			EB			WB		Т	NB			SB	
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12		6		3		18		4	14
Adjusted Flow F	Rate ( v	), veh/h			1286	91		637		48		182		300	388
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n		1766			1781		1730				1781	
Queue Service	Time (	g s ), s			36.1			13.7		1.9				11.7	
Cycle Queue C	learanc	e Time ( <i>g շ</i> ), s			36.1			13.7		1.9				11.7	
Green Ratio ( g					0.58			0.58		0.13				0.15	
Capacity ( c ), v					2046			2063	3	448				544	
Volume-to-Capa		tio (X)			0.628			0.309	9	0.108				0.552	
Back of Queue	( Q ), ft/	In (90 th percentile)	)		472.1			211.3	3	37.1				212.4	
		eh/ln ( 90 th percenti			18.4			8.3		1.5				8.4	
		RQ) (90 th percent	-		0.31			0.23		0.09				0.30	
Uniform Delay (		, , , ,			20.9			16.2	_	57.6				58.8	
Incremental De					1.2			0.4		0.2				1.5	
Initial Queue De		•			0.0			0.0		0.0				0.0	
Control Delay (		, .			22.1	5.0		16.6		57.8		5.0		60.3	5.0
Level of Service					С	Α		В		Е		Α		E	А
Approach Delay				21.0		С	16.6		В	16.1		В	29.		С
Intersection De						21							С		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		2.26	_	В	1.90	_	В	2.17	_	В	2.33		В
, Jacobilan LOC	- 55516	OS S		1.72	$\rightarrow$	В	1.01	$\rightarrow$	A	2.17	_	F	1.00	-	A

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		HCS	7 Sig	nalize	d Inte	ersect	tion R	Resu	lts Su	mmar	/				
General Inform	otion								Intorno	ction Infe	. rm oti	- n		14741	la U
_	iation	Diana B. Zimmarma	n Troffi	o Engin	ooring			$\rightarrow$			0.250		- I	ŢŢŢ	
Agency		Diane B. Zimmerma	an Iraiii			11/4/2	000	$\rightarrow$	Duration		-		- 2		
Analyst		DBZ							Area Ty PHF	pe	Other			. ;	
Jurisdiction		0.41		Time F		PM Pe		$\rightarrow$		Dariad	+	00	_ =		
Urban Street		Outer Loop		<u> </u>	is Year	-			Analysis	Period	1> 5:	00	- E		
Intersection		Minors Ln/I 65 SB		File Na	ame	PM 22	NB.xus	S					-  1	ነነሰ	
Project Descrip	tion	Minor Warehouses												14141	n II
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move				L	T	R	L	T	_	L	T	R	L	T	R
Demand ( v ), v				-	1921	96	+-	70		272	+	769	<del>  -</del>	294	380
Demand (V), V	CHIII		-		1021	30	-	70	•	212		700	-	204	300
Signal Informa	tion					IJ.		Т	$\neg$	$\overline{}$					T
Cycle, s	150.0	Reference Phase	2	1	_, ՟	- E	7						_	<b>~</b>	4
Offset, s	0	Reference Point	End		2000	) (	200.4					1	2	3	
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		22.9	3.6	0.0		0.0			<b>←</b>		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	3.0	0.0		0.0		5	6	7	Y
						1	12.0		,	, 5.5					
Timer Results				EBL		EBT	WB	L	WBT	NBI		NBT	SB	L	SBT
Assigned Phase	e					2			6			8			4
Case Number						7.0		$\rightarrow$	8.0			9.0			11.0
Phase Duration	. S				$\rightarrow$	90.0		_	90.0		_	30.0		_	30.0
Change Period,		c) s			$\rightarrow$	7.1		_	7.1			6.6			7.1
Max Allow Head					$\rightarrow$	0.0		_	0.0			5.2		_	5.2
Queue Clearan		· ·				0.0			0.0			25.4			24.9
Green Extensio		( - ):			_	0.0		_	0.0		_	0.0		_	0.0
Phase Call Prol		(9 = ), 3		_		0.0		_	0.0	_		1.00		_	1.00
Max Out Probal					_			_			_	1.00		-	1.00
								11.5			115				
Movement Gro	•	suits			EB			WB	T 5		NB			SB	
Approach Move				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Move					2	12		6	+	3		18	_	4	14
Adjusted Flow F		,,		$\vdash$	1861	93		741	+	286		809	_	309	400
		ow Rate ( s ), veh/h/l	n	-	1766			1781	-	1730				1781	
Queue Service				$\vdash$	74.7	$\vdash$		17.6	-	11.4				12.1	
Cycle Queue C		e Time ( <i>g</i> c ), s			74.7			17.6	_	11.4				12.1	
Green Ratio ( g				$\vdash$	0.55			0.55	_	0.16				0.15	
Capacity ( c ), v				-	1953	-		1968	$\rightarrow$	540			_	544	
Volume-to-Capa		· · ·		$\vdash$	0.953			0.377	_	0.531			_	0.569	
		(In ( 90 th percentile)			926.5			264	-	200.7				218.9	
		eh/ln ( 90 th percenti			36.2			10.4	-	7.9				8.6	
		RQ) (90 th percent	ile)		0.62			0.29	+	0.50				0.30	
Uniform Delay (					31.7			19.0		58.2				59.0	
Incremental De	• •				7.6			0.6		1.3				1.8	
Initial Queue De		,.			0.0			0.0		0.0				0.0	
Control Delay (					39.3	5.0		19.5		59.6		5.0		60.7	5.0
Level of Service					D	L A		В		E		A		E	A
Approach Delay				37.7		D	19.5	5	В	19.3		В	29.3	3	С
Intersection De	ntersection Delay, s/veh / LOS					28	5.9						С		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		2.27		В	1.91	_	В	2.17	_	В	2.32		В
		os .		2.24	$\rightarrow$	В	1.10	$\rightarrow$	A			F	1.0	-	A

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		HCS	7 Sig	nalize	d Inte	ersect	ion F	Resu	lts Su	ımmarı	У				
Canaval Inform									lmánunn	atian luf.	4:			14741	k U
General Inform	iation	Diana D. Zimanana	T 66	. F in				$\rightarrow$		ction Info	_		- 1	ŢŢŢ	
Agency		Diane B. Zimmerma	an Iraπi			44/4/0	200	$\rightarrow$	Duratio		0.250		- 2		
Analyst		DBZ				11/4/20		$\overline{}$	Area Ty	pe	Othe	r	-		
Jurisdiction				Time F		PM Pe		$\rightarrow$	PHF	- · ·	0.95		_		•
Urban Street		Outer Loop		-	is Year	-			Analysi	s Period	1> 5:	:00			
Intersection		Minors Ln/I 65 SB		File Na	ame	PM 22	B.xus						- 4	ነነ ሰ	
Project Descript	tion	Minor Warehouses												14 tey	MIL
Demand Inforn	nation				EB			WE	2		NB			SB	
Approach Move				L	T	R	L	T	_	L	T	R	L	T	R
Demand ( v ), v				<u> </u>	1921	109	-	70	_	307	+	845	-	322	380
Demand ( v ), v	CII/II				1921	109		70	+	307		040		322	300
Signal Informa	tion					IJ.	T								т
Cycle, s	150.0	Reference Phase	2	1	_ ⁺	12V							_	<b>\</b>	4
Offset, s	0	Reference Point	End		00.0	1000	00.1	1				1	2	3	A
Uncoordinated	No	Simult, Gap E/W	On	Green Yellow		22.9 5.1	3.6	0.0	_	_			<b>←</b>		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	3.0	0.0				5	6	7	Y
r drag made	Tixou	ominana oap iwo	0.1	1100		12.0	10.0	10.0	1011						
Timer Results				EBL		EBT	WB	L	WBT	NBI		NBT	SB	L	SBT
Assigned Phase	<u> </u>					2		_	6	1.2		8			4
Case Number						7.0			8.0			9.0			11.0
Phase Duration	s					90.0		_	90.0	_		30.0		-	30.0
Change Period,		c) S				7.1			7.1	_		6.6		-	7.1
Max Allow Head		7.			_	0.0		_	0.0	_		5.2		_	5.2
Queue Clearan						0.0		$\rightarrow$	0.0	_		25.4	_	_	24.9
Green Extensio		(- //			_	0.0		_	0.0	_	_	0.0		_	0.0
Phase Call Prob		(9 = ), 3		_		0.0		_	0.0	+		1.00	_		1.00
Max Out Probat				_	_	_		_		+	_	1.00		$\rightarrow$	1.00
Wax Gut Fobal	Jilley											1.00			1.00
Movement Gro	up Res	sults			EB			WB		Т	NB			SB	
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12		6		3		18		4	14
Adjusted Flow F	Rate ( v	), veh/h			1849	105		741		323		889		339	400
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n		1766			1781		1730				1781	
Queue Service		. , , , .			73.7			17.6		13.0				13.4	
Cycle Queue C					73.7			17.6		13.0				13.4	
Green Ratio ( g.		, - ,,			0.55			0.55	-	0.16				0.15	
Capacity ( c ), v					1953			1968	3	540				544	
Volume-to-Capa		atio (X)			0.947			0.377	$\overline{}$	0.599				0.623	
		/In ( 90 th percentile)			910.5			264	$\rightarrow$	225.7				239.4	
	, , ,	eh/ln ( 90 th percenti			35.6			10.4	$\overline{}$	8.9				9.4	
		RQ) (90 th percent	-		0.61			0.29	-	0.56				0.33	
Uniform Delay (		, , ,	,		31.5			19.0	_	58.9				59.5	
Incremental Del					7.0			0.6		2.2				2.6	
Initial Queue De					0.0			0.0		0.0				0.0	
Control Delay (					38.5	5.0		19.5		61.1		5.0		62.1	5.0
Level of Service					D	A		В		E		A		E	A
Approach Delay				36.7		D	19.5		В	20.0	)	В	31.2		C
Intersection Del				30.7		28				20.0			C		
	٠٠, ٥/٧٥	, 200				20	.,								
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		2.27		В	1.91	_	В	2.17		В	2.32		В
. Jaconian Loc		OS .		2.25	$\rightarrow$	В	1.10	-	A	2.17	_	F	1.10	-	A

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		H	CS7	Two-	-Way	Stop	J-C0	ntrol	кер	OIL										
General Information							Site	Inforn	natio	n						_				
Analyst	DBZ						Inters	ection			Entra	nce Nort	:h							
Agency/Co.	Diane	B Zimm	nerman T	raffic En	gineerin	g	Jurisd	liction												
Date Performed	11/11	/2020					East/\	West Stre	eet		Entra	nce								
Analysis Year	2022						North	/South S	Street		Mino	r Lane								
Time Analyzed	PM P	eak					Peak	Hour Fac	tor		0.95									
Intersection Orientation	North	n-South					Analy	sis Time	Period (	hrs)	0.25									
Project Description	Ware	house C	omplex																	
Lanes																				
				74474		† † † Y Street: Nor		7447												
Vehicle Volumes and Ad	justme	nts																		
Approach		Eastb	ound			Westl	oound			North	bound		Southbound							
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R				
Priority	_	10	11	12		7	8	9	1U	1	2	3	4U	4	5	6				
Number of Lanes	+	0	0	0		1	0	1	0	0	1	0	0	1	1	0				
Configuration	_					L		R				TR		L	T					
Volume (veh/h)	+					14		56			1096	5		21	410					
Percent Heavy Vehicles (%)	+					3		3						3						
Proportion Time Blocked	+						0													
Percent Grade (%)  Right Turn Channelized	+						lo													
Right fulli Channelized	+			1 -64	Only	- 1	10				<u> </u> 1									
Median Tyne I Storage									ı											
Median Type   Storage	leadwa	ve		Left	Only															
Critical and Follow-up H	leadwa	ys	I	Leit	Only	71	I	62						11		I				
Critical and Follow-up H Base Critical Headway (sec)	leadwa	ys		Leit	Only	7.1		6.2						4.1						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec)	leadwa	ys		Leit	Only	6.43		6.23						4.13						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec)	leadwa	ys		Leit	Only	6.43 3.5		6.23 3.3						4.13 2.2						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)			ervice		Only	6.43		6.23						4.13						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, ar			ervice			6.43 3.5 3.53		6.23 3.3 3.33						4.13 2.2 2.23						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, ar Flow Rate, v (veh/h)			ervice			6.43 3.5 3.53		6.23 3.3 3.33						4.13 2.2 2.23						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)  Delay, Queue Length, and Flow Rate, v (veh/h) Capacity, c (veh/h)			ervice			6.43 3.5 3.53 15 223		6.23 3.3 3.33 59 238						4.13 2.2 2.23 2.23 22 599						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)  Pelay, Queue Length, ar Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio			ervice			6.43 3.5 3.53 15 223 0.07		6.23 3.3 3.33 59 238 0.25						4.13 2.2 2.23 22 599 0.04						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)  Pelay, Queue Length, and Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh)			ervice			6.43 3.5 3.53 15 223 0.07 0.2		6.23 3.3 3.33 59 238						4.13 2.2 2.23 22 599 0.04 0.1						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)  Delay, Queue Length, and Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh) Control Delay (s/veh)			ervice			6.43 3.5 3.53 15 223 0.07		6.23 3.3 3.33 59 238 0.25 0.9						4.13 2.2 2.23 22 599 0.04						
Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)  Delay, Queue Length, and Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh)			ervice			6.43 3.5 3.53 15 223 0.07 0.2 22.3 C	4.5	6.23 3.3 3.33 59 238 0.25 0.9 25.0						2.2 2.23 22 599 0.04 0.1 11.2 B	.55					

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		Н	CS7	Two-	-Way	Stop	o-Co	ntrol	Rep	ort								
General Information		_	_	_			Site	Inforr	natio	n	_	_		_	_			
Analyst	DBZ						Inters	ection			Entrance North							
Agency/Co.	Diane	B Zimn	nerman 1	Fraffic En	gineerin	q		liction										
Date Performed	11/11	/2020					East/	West Str	eet		Entra	nce						
Analysis Year	2022						North	n/South :	Street		Mino	r Lane						
Time Analyzed	PM Pe	eak					Peak	Hour Fac	ctor		0.95							
Intersection Orientation	North	-South					Analy	sis Time	Period (	[hrs]	0.25							
Project Description	Ware	house C	omplex															
Lanes																		
				744717		다 하기 r Street: Nor		€ *										
Vehicle Volumes and Ad	ljustme	nts																
Approach		Easth	ound			Westl	oound			_	thbound Southbound							
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	0	0		1	0	1	0	0	1	0	0	1	1	0		
Configuration					_	L		R				TR		L	T	<u> </u>		
Volume (veh/h)						14		56			1096	5		21	410			
Percent Heavy Vehicles (%)						3		3						3		_		
Proportion Time Blocked	_																	
Percent Grade (%)	_						0											
Right Turn Channelized	+			1 -64	Ombi	- 1	lo				1							
Median Type   Storage  Critical and Follow-up F	leadwa	vs		Leit	Only								1					
Base Critical Headway (sec)				I	ī	7.1		6.2	I		I			4.1	I			
Critical Headway (sec)						6.43		6.23						4.13				
Base Follow-Up Headway (sec)						3.5		3.3						2.2				
Follow-Up Headway (sec)						3.53		3.33						2.23				
Delay, Queue Length, ar	nd Leve	l of S	ervice															
Flow Rate, v (veh/h)	T					15		59						22				
Capacity, c (veh/h)						223		238						599				
v/c Ratio						0.07		0.25						0.04				
95% Queue Length, Q <sub>95</sub> (veh)						0.2		0.9						0.1				
						22.3		25.0						11.2				
Control Delay (s/veh)																_		
Control Delay (s/veh)  Level of Service (LOS)						С		D						В				
							4.5	D							.5			

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		Н	CS7	Two-	-Way	Stop	o-Co	ntrol	Rep	ort								
General Information	_						Site	Inforr	natio	n								
Analyst	DBZ						Inters	ection			Entrance South							
Agency/Co.	Diane	B Zimm	nerman 1	raffic En	gineerin	g	Juriso	liction										
Date Performed	11/11	1/2020					East/	Nest Stre	eet		Entra	nce						
Analysis Year	2022						North	/South :	Street		Mino	r Lane						
Time Analyzed	AM P	eak					Peak	Hour Fac	ctor		0.91							
Intersection Orientation	North	n-South					Analy	sis Time	Period (	hrs)	0.25							
Project Description	Ware	house C	omplex															
Lanes																		
				7447177	រ Maio	ナ オキア r Street: Nor	† † r											
Vehicle Volumes and Adj	ustme	nts																
Approach	_	Eastb	ound			Westl	bound			North	bound			South	bound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority	₩	10	11	12		7	8	9	10	1	2	3	4U	4	5	6		
Number of Lanes	+	0	0	0		1	0	1	0	0	1	0	0	1	1	0		
Configuration	-					L		R				TR		L	T			
Volume (veh/h)	+	-				4		17			637	15	-	57	586			
Percent Heavy Vehicles (%)	-					3		3						3				
Proportion Time Blocked	+																	
Percent Grade (%)	+						0											
Right Turn Channelized  Median Type   Storage	+			Loft	Only	, i	lo				<u> </u> 1							
Critical and Follow-up H	 eadwa	ys		Leit	Offity													
Base Critical Headway (sec)	Т	<u>-</u>	П	П	П	7.1		6.2	П	П	Т	П	П	4.1	П			
Critical Headway (sec)						6.43		6.23						4.13				
Base Follow-Up Headway (sec)						3.5		3.3						2.2				
Follow-Up Headway (sec)						3.53		3.33						2.23				
Delay, Queue Length, an	d Leve	l of S	ervice															
Flow Rate, v (veh/h)	T					4		19						63				
Capacity, c (veh/h)	Ì					265		433						880				
v/c Ratio						0.02		0.04						0.07				
95% Queue Length, Q <sub>95</sub> (veh)						0.1		0.1						0.2				
Control Delay (s/veh)						18.8		13.7						9.4				
Level of Service (LOS)						С		В						А				
Approach Delay (s/veh)						14	4.7							0	.8			
Approach LOS							В											

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		Н	CS7	Two-	-Way	Sto	o-Co	ntrol	Rep	ort								
General Information	_								natio									
Analyst	DBZ						Inters	ection			Entrance South							
Agency/Co.	-	B Zimn	nerman 1	raffic En	gineerin						Entrance 200th							
Date Performed	+	1/2020					East/\	West Stre	eet		Entra	nce						
Analysis Year	2022	<u> </u>					-	n/South :			Mino	r Lane						
Time Analyzed	PM P	eak						Hour Fac			0.95							
Intersection Orientation	North	n-South					Analy	sis Time	Period (	hrs)	0.25							
Project Description	Ware	house C	omplex															
Lanes																		
				744717	<mark>រា</mark> Majo	† † Y Street: No	<b>↑</b> ↑↑↑	14474										
Vehicle Volumes and Adj	ustme	nts																
Approach	_	_	ound			_	bound				bound		Southbound					
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority	-	10	11	12		7	8	9	10	1	2	3	4U	4	5	6		
Number of Lanes	+	0	0	0		1	0	1	0	0	1	0	0	1	1	0		
Configuration	-					L		R			1015	TR		L	T			
Volume (veh/h)	+					14		55			1046	5		20	404			
Percent Heavy Vehicles (%)	-					3		3						3				
Proportion Time Blocked  Percent Grade (%)	+						0											
Right Turn Channelized							10											
	+			Loft	Only	- 1	10				1							
Median Type   Storage  Critical and Follow-up H	eadwa	ve		Leit	Offig								1					
		)				7.1		6.2						1 1				
Base Critical Headway (sec)  Critical Headway (sec)						7.1 6.43		6.23						4.1 4.13				
Base Follow-Up Headway (sec)						3.5		3.3						2.2				
Follow-Up Headway (sec)						3.53		3.33						2.23				
Delay, Queue Length, an	d Leve	l of Se	ervice			3.33		3.33						2.23				
		T	T. 1100			15		E0						24				
Flow Rate, v (veh/h)						15		58						21				
Capacity, c (veh/h)						236		256						627				
v/c Ratio						0.06		0.23						0.03				
95% Queue Length, Q <sub>95</sub> (veh)						0.2		0.8						0.1				
Control Delay (s/veh)  Level of Service (LOS)						21.3 C		23.2 C						10.9 B				
Approach Delay (s/veh)							2.8								.5			
							2.8 C							0				
Approach LOS							_											

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