



Engineers, Surveyors, Planners, Scientists

July 18, 2014

Mr. Andrew Walther
New Albany Company
PO Box 490
8000 Walton Parkway, Suite 120
New Albany, Ohio 43054

Subject: Morse Road Senior Living – Revised Traffic Study
Gahanna, Ohio

Dear Mr. Walther,

This letter serves to summarize traffic analysis methodologies and results associated with the proposed access plan for this development located on Morse Road just west of US 62 in Gahanna, Ohio. This study focuses on the level of service and turn lane warrants met for the proposed site driveways that will serve the site along Morse Road and US 62. A preliminary site plan is attached for reference.

Proposed Development

The proposed development includes 154 retirement-style condominium units as well as the potential for up to 32,000 square feet of office space, a potential retail building of up to 16,800 s.f. of retail space and a potential 3,200 square-foot sit-down style restaurant. This site will be served by multiple access driveways connected to Morse Road and US 62 west and south of the Morse Road roundabout intersection. Site access is planned to include one full-movement driveway on US 62 (Drive 4) and two, full-movement driveways on Morse Road serving the east end commercial portion of the site (Drives 2 and 3). An added all-in/right-out only driveway (Drive 1) is planned on Morse Road in front of the retirement residences at the west end of the site. Other future cross-access connections may also provide access to/from adjacent sites.

Existing Conditions

Morse Road is a two-lane, east/west arterial roadway with a signed speed limit of 45 miles per hour with a straight alignment and virtually flat profile along the site frontage. US 62 is a two-lane, major arterial roadway that forms the site frontage on the southeast portion of the site. US 62 is currently signed at 35 miles per hour at the site frontage.

Data Collection

Turning movement traffic counts were performed at Morse Road/Preserve Crossing Boulevard and at US 62/Pamela Drive from 5-6 PM in the evening peak. The single hour peak was identified from a previous traffic count we performed on US 62 just north of the roundabout at James Rivers Road. The turning movement count data is attached for reference.

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Traffic Volume Projections

Estimated site generated traffic was added to background traffic to determine Opening Year traffic conditions for use in traffic analyses as part of this study. Traffic volumes were projected for afternoon weekday peak hour conditions. Volume plates illustrating site-generated and total traffic volumes for the PM peak hour are attached for reference.

Background Traffic Volumes

The 2014 PM peak hour turning movement traffic counts at Morse Road/Preserve Crossing Boulevard and at US 62/Pamela Drive were used as existing traffic levels. Both counts were increased to 2024 background traffic levels using a 2.7% annual growth rate derived from the design designation data for the Morse Road project by the City of Columbus. Traffic data included on the title sheet for that project was useful in calculating the growth rate for both roadways that front this planned site. Turning movement count data and the title sheet designation data are attached for reference.

Site Generated Traffic Volumes

New trips calculated for the 154 retirement dwelling units and retail/office space were based on trip generation rates published in the *ITE Trip Generation* manual, 9th Edition (2012). Weekday afternoon (PM) peak hour trips for the site were assigned to the adjacent street network based on the distribution of existing PM peak traffic observed at the two count locations combined with engineering judgment of likely site traffic origins/destinations. A shared-trip reduction was calculated for the planned land use mix based on ITE recommended practices to account for trip ends that are captured on the site. Trip generation calculations are summarized in **Table 1** below:

Table 1: Expected trip generation using ITE rates

Land Use	Square Feet or Units	ITE Code	Time Period	ITE Formula	Total Trips	Trips Entering	Trips Exiting
Senior Adult Housing (Attached) (Use for Apartment Communities) Most Independent	154 units	252	ADT	Average Rate=3.44	530	265	265
			AM Peak	Average Rate=0.2	31	11	20
			PM Peak	Average Rate=0.25	39	21	18
Office	32,000 sf	710	ADT	$\ln(T)=0.76\ln(x)+3.68$	552	276	276
			AM Peak	$\ln(T)=0.80\ln(x)+1.57$	77	68	9
			PM Peak	$T=1.12(x)+78.45$	114	19	95
Speciality Retail Center	16,800 sf	826	ADT	$T=42.78(x)+37.66$	756	378	378
			AM Peak*	$T=4.91(x)+115.59$	198	95	103
			PM Peak	$T=2.40(x)+21.48$	62	27	35
High-Turnover Sit-Down Restaurant	3,200 sf	932	ADT	Average Rate = 127.15	408	204	204
			AM Peak	Average Rate = 10.81	35	See Below	
			PM Peak	Average Rate = 9.85	32	See Below	
			67%	AM Primary Trips	23	13	10
			33%	AM Pass-By Trips	12	6	6
			57%	PM Primary Trips	18	11	7
			43%	PM Pass-By Trips	14	7	7

Site-generated trip ends were distributed to the adjacent streets as described above. A minor distinction was made between the residential and commercial trip distributions to account for the likely draw of residents within Preserve Crossing to the commercial portion of this site that the residential component seems unlikely to share. The resultant distribution is expected to be as follows:

- 20% to/from the south on US 62
- 35% to/from the north/east on US 62/Morse Road
- 40% to/from the west on Morse Road (45% for residential component)
- 5% to/from Preserve Crossing Boulevard (commercial only)

All site generated traffic for this development was assigned to the adjacent roadway network via the four proposed access driveways. Turn restrictions at the proposed senior living driveway were factored into the driveway assignments. Site traffic assignments, internal trip capture rates/calculations and total traffic volume plates are attached for reference.

Traffic Analyses

Traffic volume projections identified above were used to analyze the proposed access points. The specific focus of the study is on performing capacity analyses and turn lane warrant analyses at the proposed site driveways; analyses were based on expected 2024 PM Peak hour conditions for this study. Total traffic volume data is attached for reference.

Capacity Analyses

Capacity analyses were completed at each proposed site driveway to determine the expected level of service during 2024 PM Peak conditions for full buildout of the site. The three full-movement driveways serving the commercial portion of the site and the partially restricted driveway serving the senior living residential portion were analyzed as part of this study. Results from the Synchro analyses indicate acceptable level of service is expected at each location, except for the egress left turn movements at Drives 2 and 3, the two, full-movement driveways along Morse Road. The northbound left turn movements at Drives 2/3 are predicted to operate at failed level of service with over 100 seconds of average delay. It should be noted that poor level of service on sidestreet left turn movements is common at unsignalized intersections, especially during peak hours of the adjacent street traffic.

Some of the sidestreet left turn delay issue may be addressed if/when motorists use the option at these two driveways to instead turn right and head east to the adjacent roundabout at US 62, then circle back around westbound, essentially completing the left turn they were hoping to make from the site driveways. Other motorists may choose to wait for an acceptable gap for some period of time, but queued traffic in the left turn egress movements should queue on site and should not affect traffic flow on the public street. Capacity analysis results are illustrated in **Table 2** below.

Table 2: 2024 PM Build Capacity Analysis Results

Intersection	Eastbound	Westbound	Northbound			Int.
	LT	LT	LT	RT	App.	
Morse Rd/Dr 1 (North/South Stop Control)	–	B/10.6	–	C/18.7	C/18.7	–
Morse Rd/Dr 2 (North/South Stop Control)	–	B/10.5	F/121.7	C/18.9	F/100.1	–
Morse Rd/Dr 3 (North/South Stop Control)	–	B/10.7	F/104.1	C/19.6	F/61.1	–
US62/Dr 4 (North/South Stop Control)	A/8.9	–	–	–	–	C/23.3

Notes:

For stop controlled intersections: X/X = Level of Service/ Highest side street delay per vehicle
 Through traffic on Morse Road and US62 does not stop, only movements with delay are shown.

Turn Lane Warrants

Turn lane warrants were evaluated at the proposed site driveways pursuant to the requirements set forth in the Location and Design Manual, Volume 1 (Ohio Department of Transportation, 2012). The graphs for two-lane roadways with posted speed limits greater than 40 miles per hour were consulted for the four driveway locations. Results are illustrated on the attached graphs and indicate that left turn lanes are warranted on Morse Road at the senior living driveway and the two full movement driveways, as well as on US 62 at the full-movement driveway there. A right turn lane is also warranted at Drive 3 (eastern-most driveway) on Morse Road serving the commercial portion of the site.

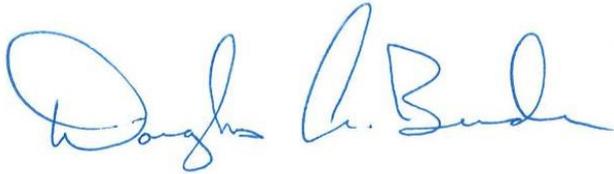
It should be noted that planned widening of Morse Road will provide a center left turn lane along the site frontage and a center left turn lane exists on US 62 at its approach to the Morse Road roundabout intersection. The left turn lanes were all sized at 175 feet in length which can fit on US 62 at the planned site driveway within existing pavement that already exists there. The left turn lanes on Morse Road can be provided by restriping the center left turn lane, if necessary, to indicate a dedicated left turn lane at each site driveway with full ingress. The right turn lane that is warranted on Morse Road at Drive 3 should be constructed as a new improvement.

Conclusions and Recommendations

Turn lane warrants indicate that left turn lanes are warranted at the three Morse Road driveways including the senior living drive and two planned full-movement driveways, as well as northbound on US 62 at the Drive 4 entrance. Due to planned improvements on Morse Road or existing pavement on US 62, pavement for these left turn lanes already exist or will be provided prior to the completion of site development. The pavement for these turn lanes may only need to be restriped as a dedicated lane or remain as a center, two-way left turn lane in their existing/planned condition. A right turn lane is warranted at Drive 3, the eastern-most driveway along Morse Road.

If marked as dedicated turn lanes, all warranted turn lanes should be 175-feet in length, including the 50-foot drop taper. No other off-site improvements are warranted or recommended at this time. Drive 2 should be provided as a full-movement driveway in conjunction with the senior living site so that all egress movements are available to senior living residents when the facility opens. If you have any questions during your review, please contact me directly at (614) 775-4650 at your convenience.

Sincerely,



Douglas A. Bender, PE, PTOE
Senior Traffic Engineer

Attachments

Copies: Todd Cunningham, EMH&T (w/att)

EMH&T

5500 New Albany Rd.

Columbus, OH 43054

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File Name : Morse Rd - Preserve Crossing

Site Code : 00000000

Start Date : 5/13/2014

Page No : 1

Groups Printed- Cars - Trucks

Start Time	PRESERVE Southbound					MORSE Westbound					PRESERVE Northbound					MORSE Eastbound					Int. Total
	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	
05:00 PM	3	0	9	0	12	0	128	17	0	145	0	0	0	0	0	24	192	0	0	216	373
05:15 PM	3	0	11	0	14	0	175	22	0	197	0	0	0	0	0	24	180	0	0	204	415
05:30 PM	6	0	10	0	16	0	154	16	0	170	0	0	0	0	0	26	186	0	0	212	398
05:45 PM	4	0	3	0	7	0	153	23	0	176	0	0	0	0	0	28	184	0	0	212	395
Total	16	0	33	0	49	0	610	78	0	688	0	0	0	0	0	102	742	0	0	844	1581
Grand Total	16	0	33	0	49	0	610	78	0	688	0	0	0	0	0	102	742	0	0	844	1581
Apprch %	32.7	0	67.3	0		0	88.7	11.3	0		0	0	0	0		12.1	87.9	0	0		
Total %	1	0	2.1	0	3.1	0	38.6	4.9	0	43.5	0	0	0	0	0	6.5	46.9	0	0	53.4	
Cars	16	0	33	0	49	0	604	78	0	682	0	0	0	0	0	102	736	0	0	838	1569
% Cars	100	0	100	0	100	0	99	100	0	99.1	0	0	0	0	0	100	99.2	0	0	99.3	99.2
Trucks	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	12
% Trucks	0	0	0	0	0	0	1	0	0	0.9	0	0	0	0	0	0	0.8	0	0	0.7	0.8

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File Name : US 62 - Pamela Dr

Site Code : 00000000

Start Date : 5/13/2014

Page No : 1

Groups Printed- Cars - Trucks

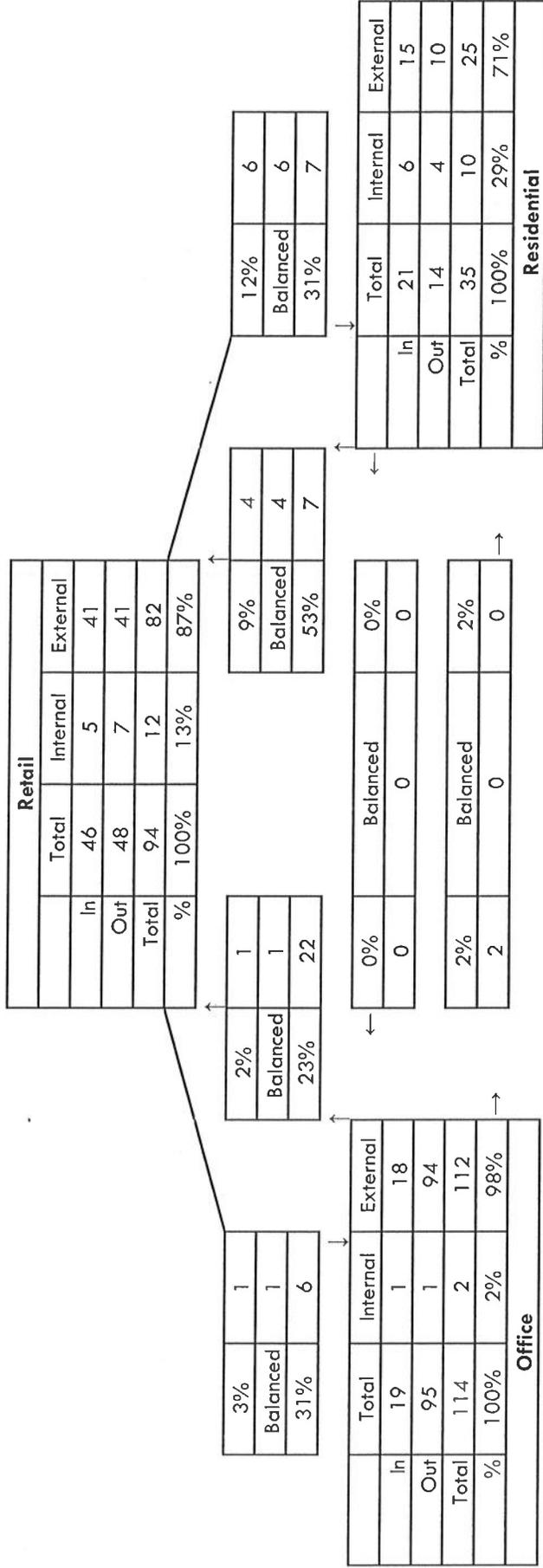
Start Time	PAMELA DR Southbound					US 62 Westbound					PAMELA DR Northbound					US 62 Eastbound					Int. Total
	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	
05:00 PM	0	0	0	0	0	2	110	0	0	112	0	0	0	0	0	0	169	1	0	170	282
05:15 PM	0	0	0	0	0	3	140	0	0	143	0	0	6	0	6	0	159	1	0	160	309
05:30 PM	0	0	0	0	0	4	104	0	0	108	0	0	2	0	2	0	157	1	0	158	268
05:45 PM	0	0	0	0	0	2	118	0	0	120	0	0	0	0	0	0	140	1	0	141	261
Total	0	0	0	0	0	11	472	0	0	483	0	0	8	0	8	0	625	4	0	629	1120
Grand Total	0	0	0	0	0	11	472	0	0	483	0	0	8	0	8	0	625	4	0	629	1120
Apprch %	0	0	0	0	0	2.3	97.7	0	0	0	0	0	100	0	0	0	99.4	0.6	0	0	
Total %	0	0	0	0	0	1	42.1	0	0	43.1	0	0	0.7	0	0.7	0	55.8	0.4	0	56.2	
Cars	0	0	0	0	0	11	460	0	0	471	0	0	8	0	8	0	618	4	0	622	1101
% Cars	0	0	0	0	0	100	97.5	0	0	97.5	0	0	100	0	100	0	98.9	100	0	98.9	98.3
Trucks	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	7	0	0	7	19
% Trucks	0	0	0	0	0	0	2.5	0	0	2.5	0	0	0	0	0	0	1.1	0	0	1.1	1.7

Trip Generation Calculations
Institute of Transportation Engineer, 7th Edition

Baseline Condition - Without Internal Capture Rates

Land Use	Square Feet or Units	ITE Code	Time Period	ITE Formula	Total Trips	Trips In	Trips Out	
<u>Speciality Retail Center</u>	16,800 sf	826	ADT	$T=42.78(x)+37.66$	756	378	378	
			AM Peak*	$T=4.91(x)+115.59$	198	95	103	
			PM Peak	$T=2.40(x)+21.48$	62	27	35	
			*Peak of GENERATOR					
High-Turnover Sit-Down Restaurant	3,200 sf	932	ADT	Average Rate = 127.15	408	204	204	
			AM Peak	Average Rate = 10.81	35	19	16	
			PM Peak	Average Rate = 9.85	32	19	13	
RETAIL TOTAL					ADT	1,164	582	582
					AM TOTAL	233	114	119
					PM TOTAL	94	46	48
Office	32,000 sf	710	ADT	$\ln(T)=0.76\ln(x)+3.68$	552	276	276	
			AM Peak	$\ln(T)=0.80\ln(x)+1.57$	77	68	9	
			PM Peak	$T=1.12(x)+78.45$	114	19	95	
OFFICE TOTAL					ADT	552	276	276
					AM TOTAL	77	68	9
					PM TOTAL	114	19	95
<u>Senior Adult Housing</u> (Attached) <small>(Use for Apartment Communities) Most Independent</small>	154 units	252	ADT	Average Rate=3.44	530	265	265	
			AM Peak	$T=0.20(x)-1.66$	29	10	19	
			PM Peak	$T=0.24(x)-2.11$	35	21	14	
RESIDENTIAL TOTAL					ADT	530	265	265
					AM TOTAL	29	10	19
					PM TOTAL	35	21	14
SITE TOTAL					ADT	2,246	1,123	1,123
					AM TOTAL	339	192	147
					PM TOTAL	243	86	157

PM Peak Hour of Adjacent Street Traffic



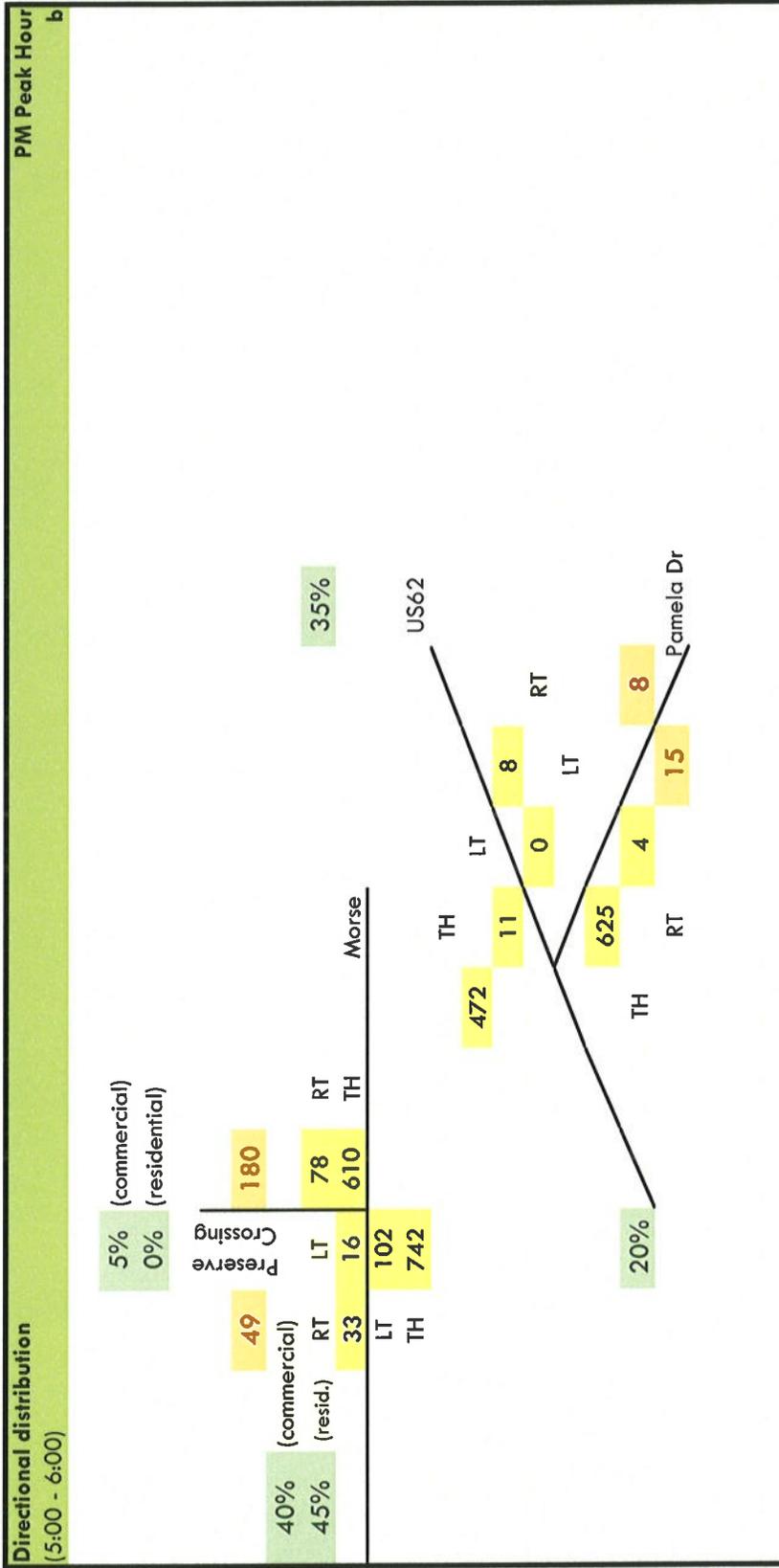
Net External Trips for Multi-Use Development				
	Retail	Office	Residential	Total
In	41	18	15	74
Out	41	94	10	145
Total	82	112	25	219
Single-Use Trip Gen. Est.	94	114	35	243
INTERNAL CAPTURE RATE				10%

Trip Generation Rates
Institute of Transportation Engineer, 9th Edition

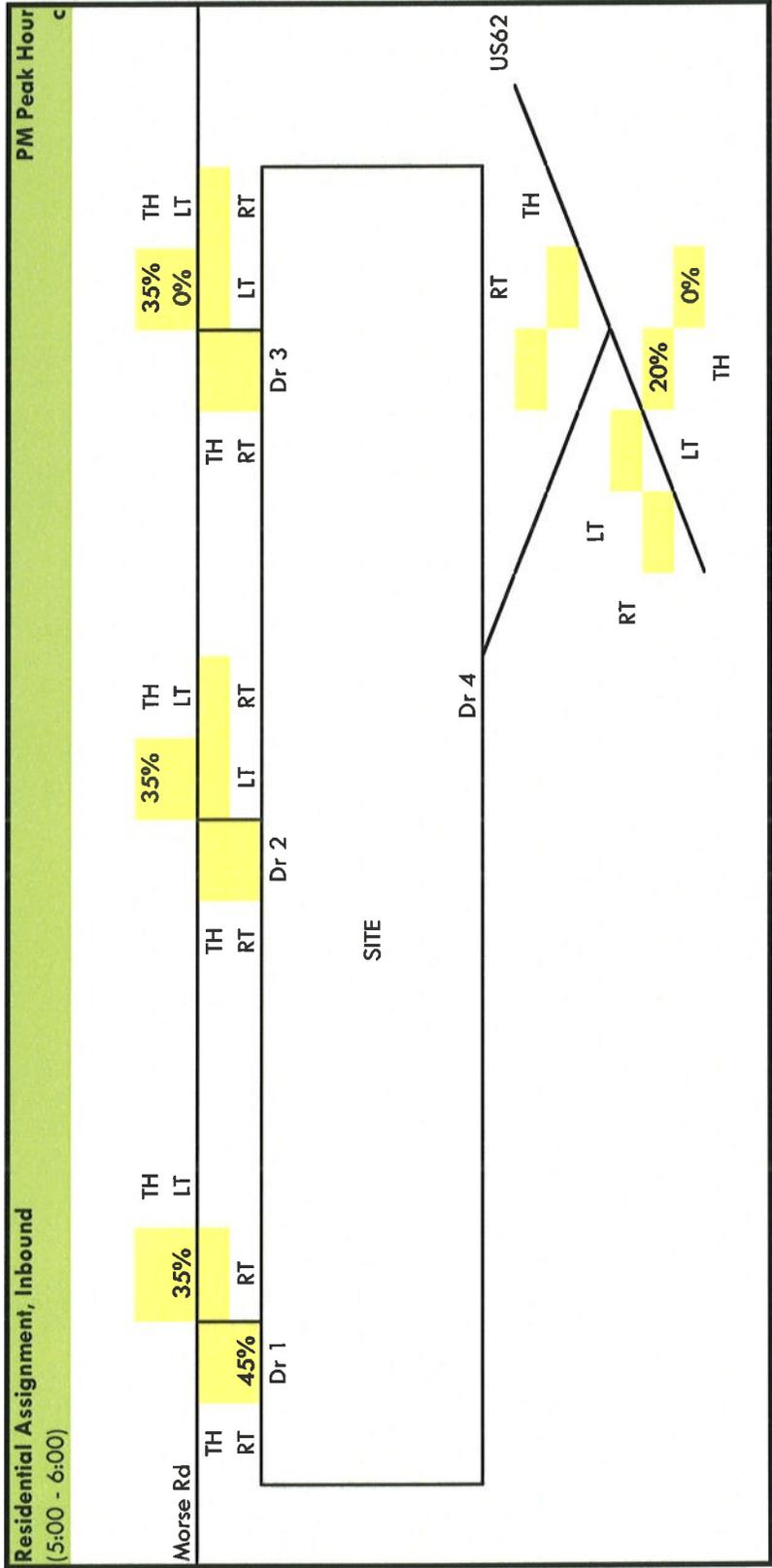
Final Condition - With Internal Capture Rates

Land Use	Square Feet or Units	Percent of Land Use	Time Period	Type of Trip	Total Trips	Trips Entering	Trips Exiting
RETAIL TOTAL	20,000 sf	100%	PM Peak	Total	94	46	48
				Internal	-12	-5	-7
				External	82	41	41
Speciality Retail Center	16,800	84%	PM Peak	Total	62	27	35
				Internal	-10	-4	-6
				External	52	23	29
				0% (Pass-By)	0	0	0
				(Primary)	52	23	29
High-Turnover Sit-Down Restaurant	3,200	16%	PM Peak	Total	32	19	13
				Internal	-2	-1	-1
				External	30	18	12
				43% (Pass-By)	13	7	6
				(Primary)	17	11	6
OFFICE TOTAL	32000	100%	PM Peak	Total	114	19	95
				Internal	-2	-1	-1
				External	112	18	94
RESIDENTIAL TOTAL	154	100%	PM Peak	Total	35	21	14
				Internal	-10	-6	-4
				External	25	15	10
SITE TOTAL			PM Peak	Total	243	86	157
				Internal	-24	-12	-12
				External	219	74	145
				(Pass-By)	13	7	6
				(Primary)	206	67	139

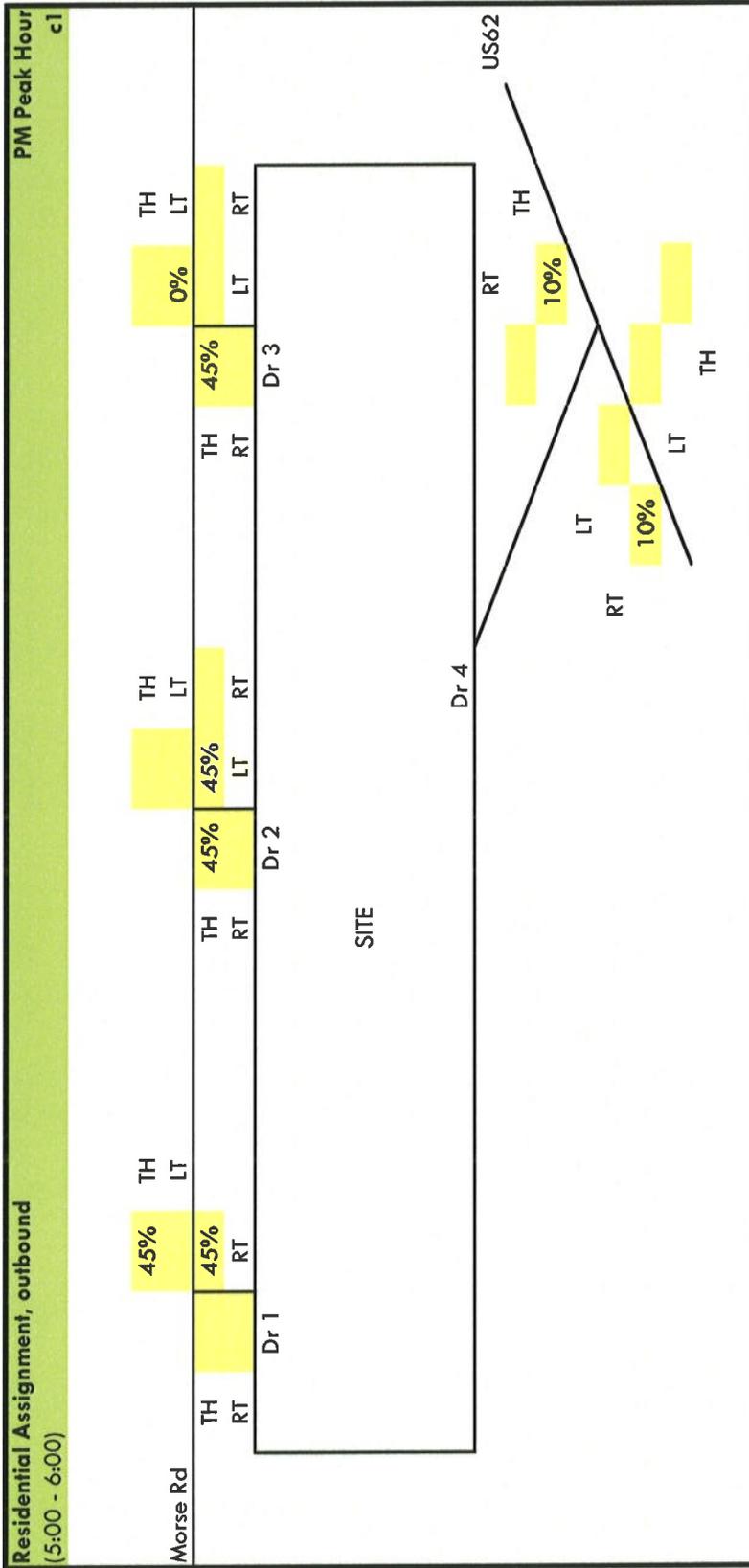
Morse Road Senior Living
Access Study
Traffic Volume Calculations



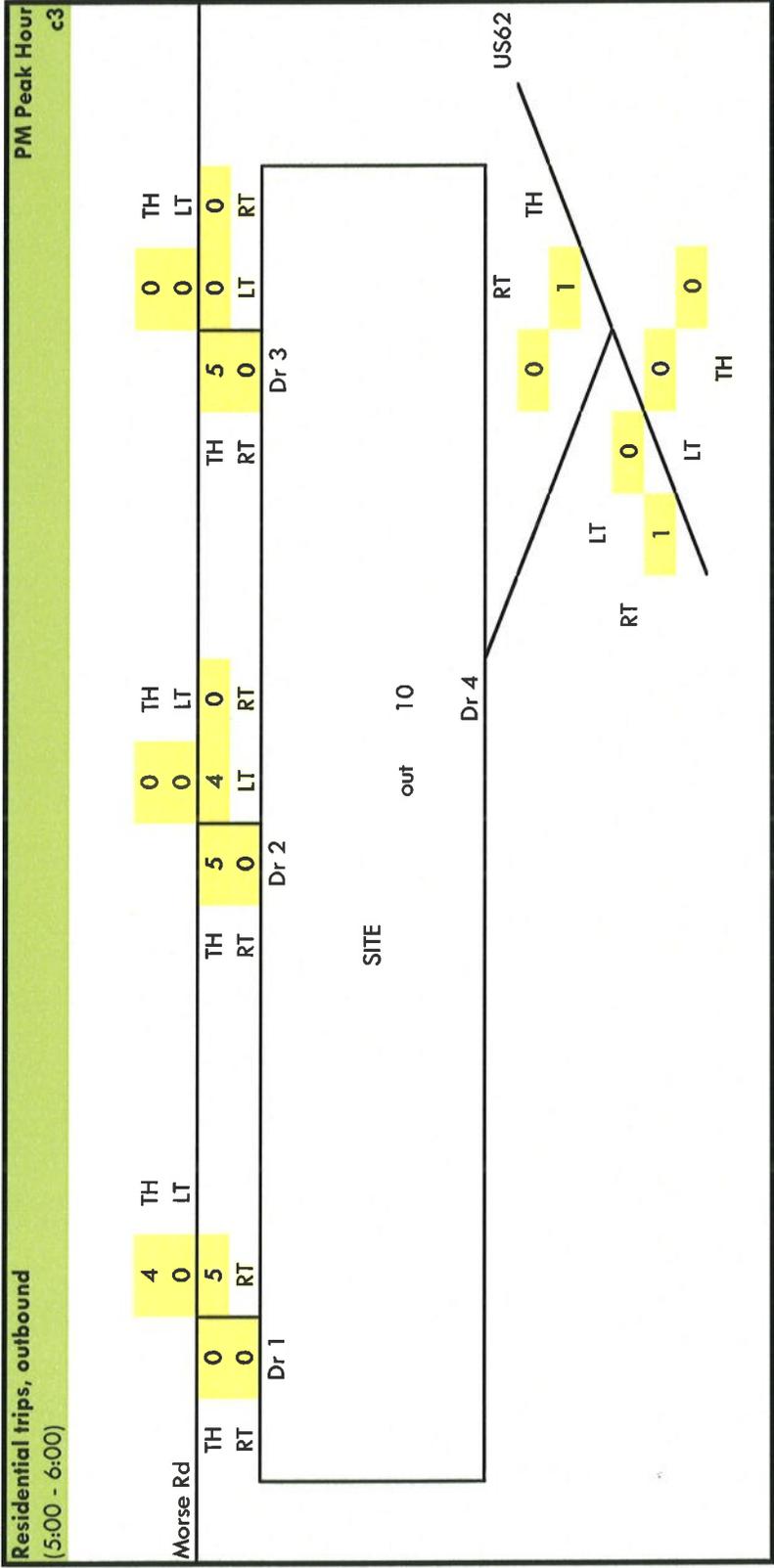
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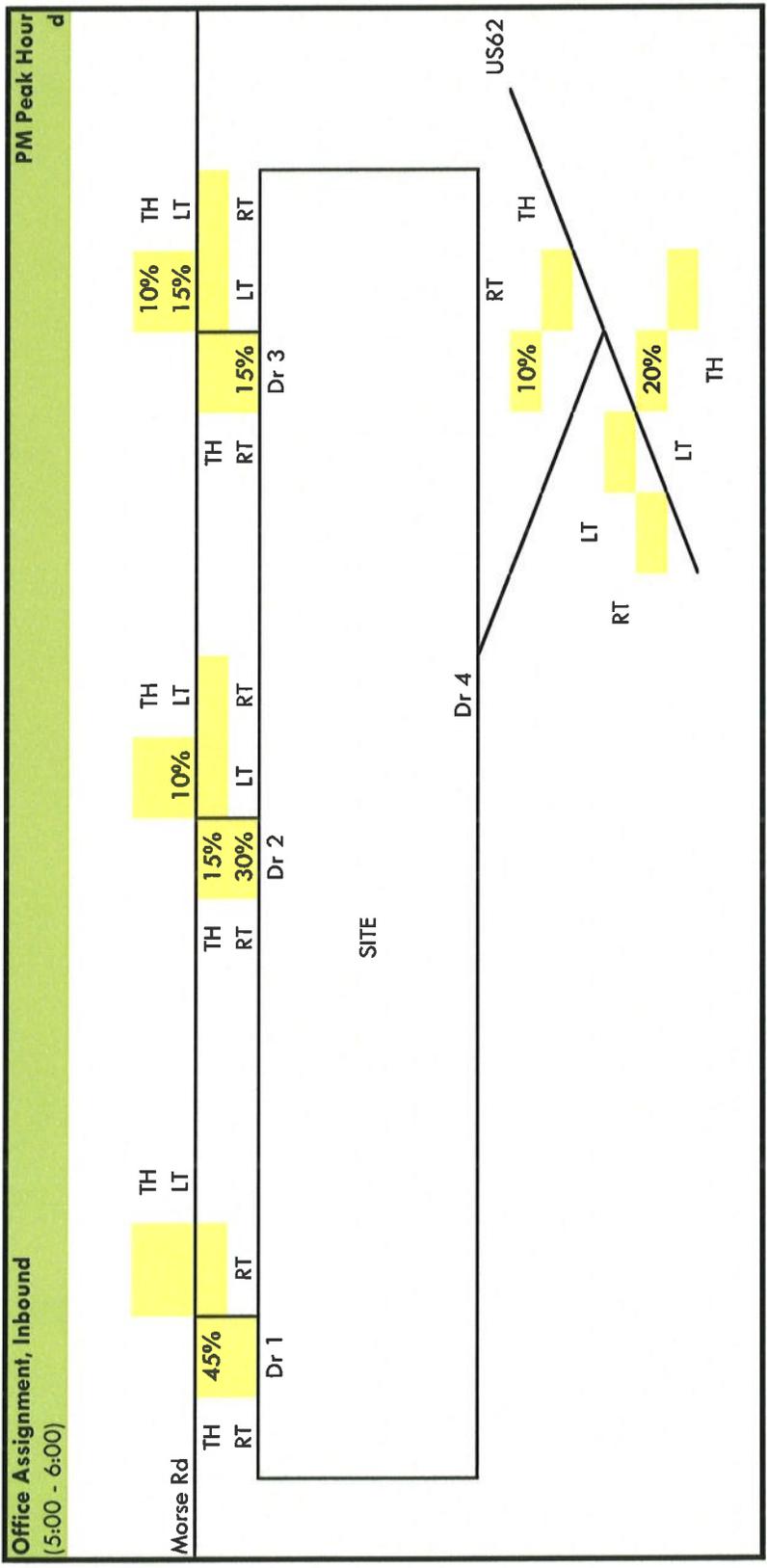
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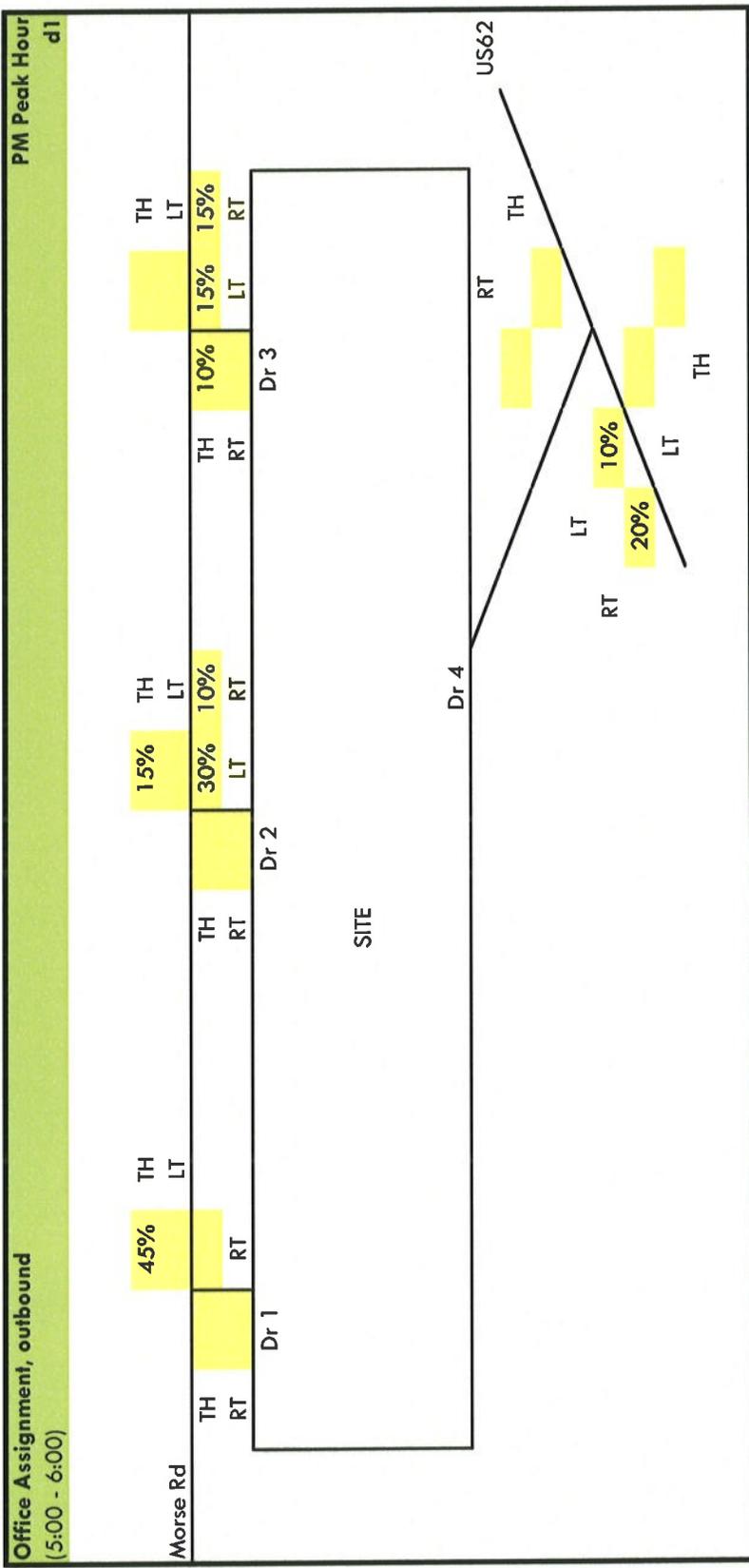
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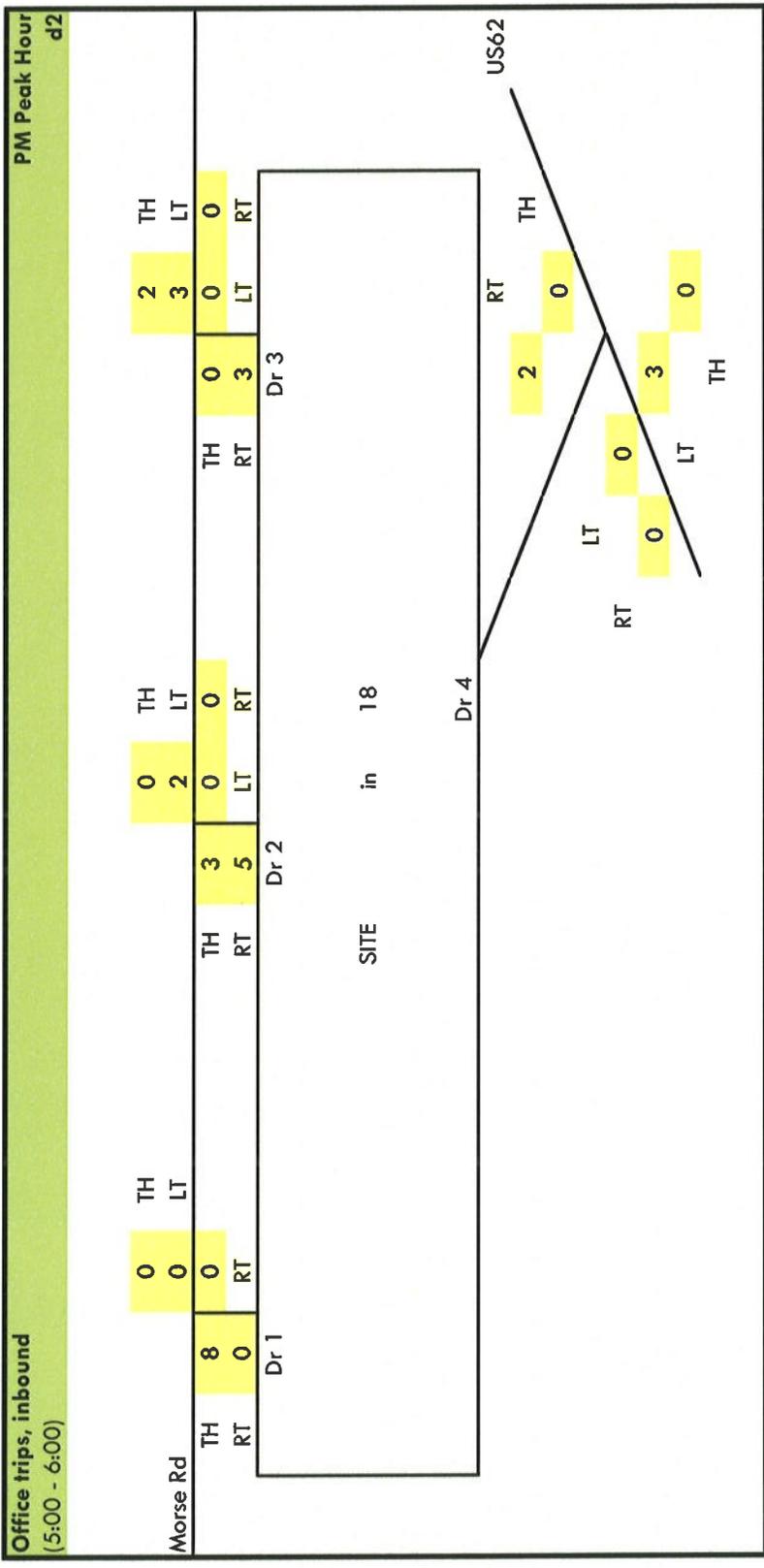
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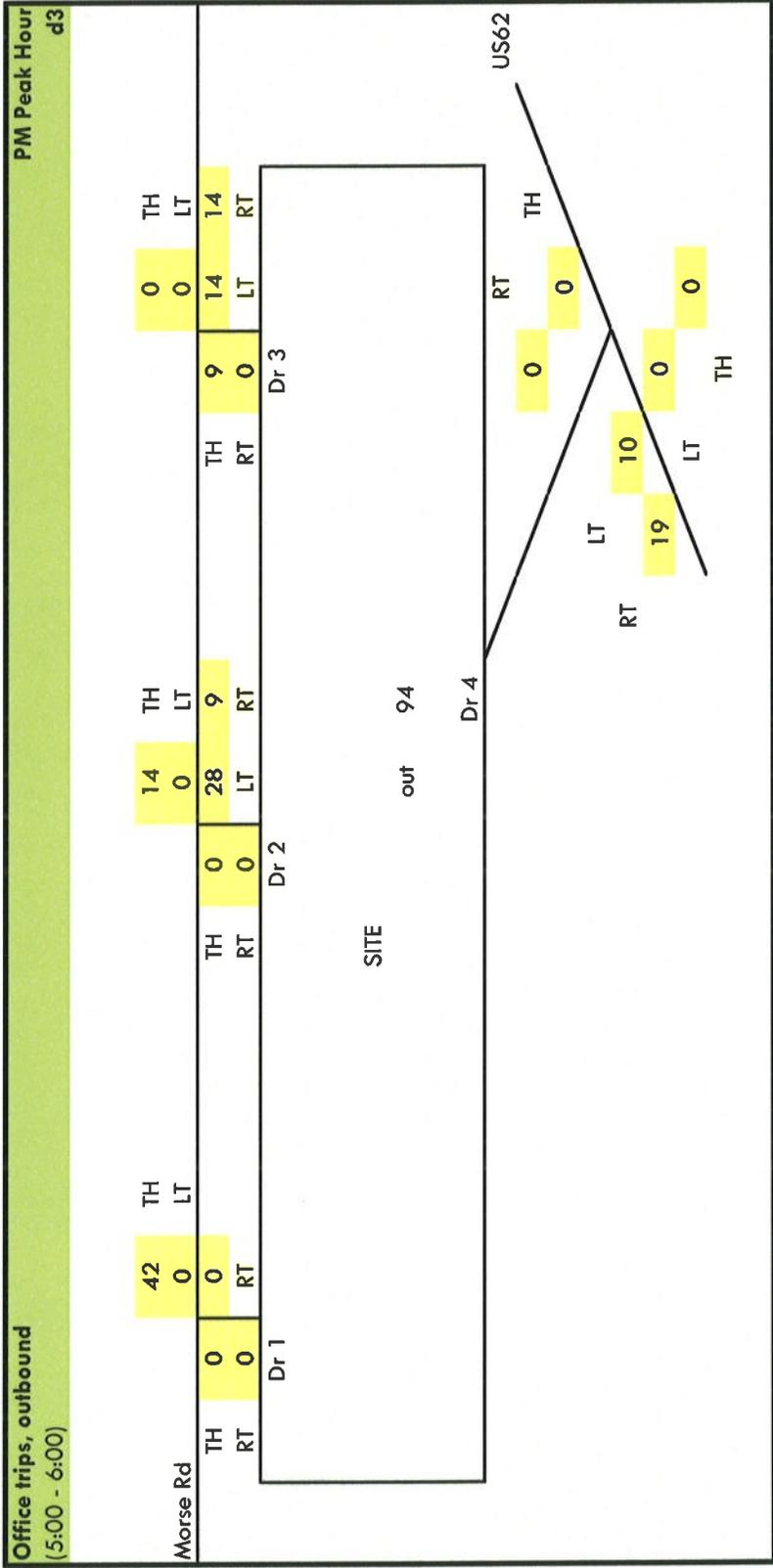
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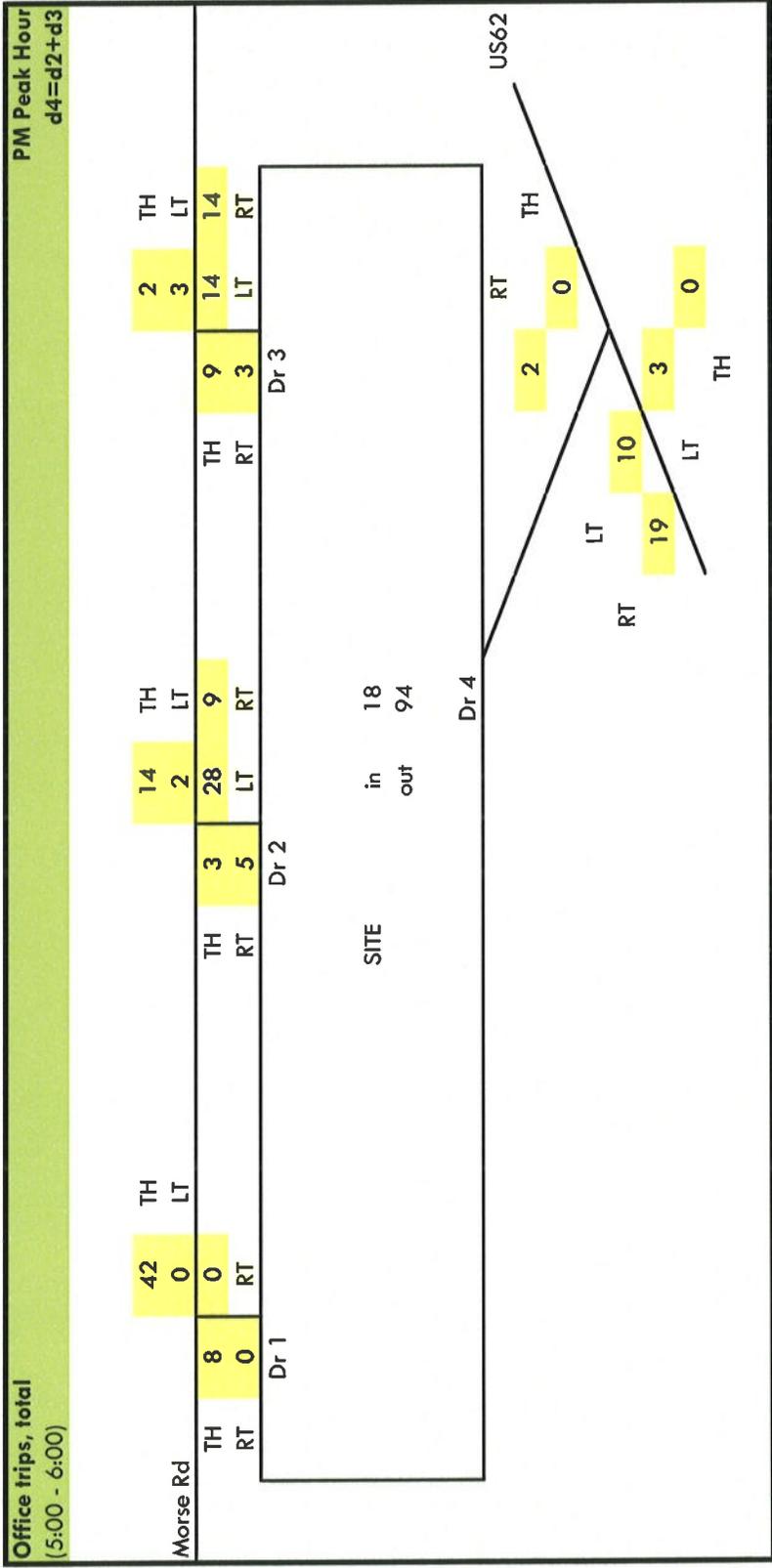


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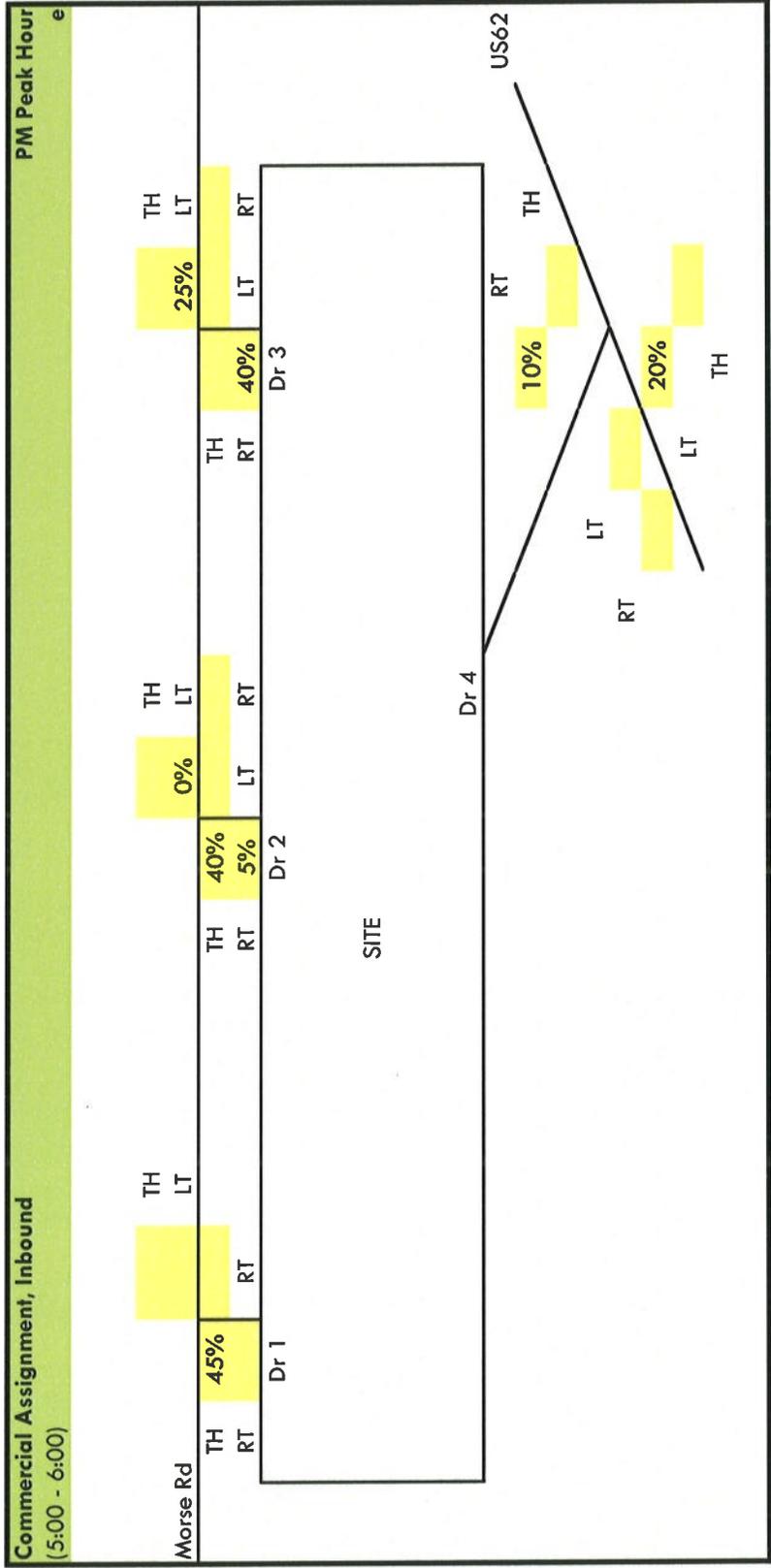


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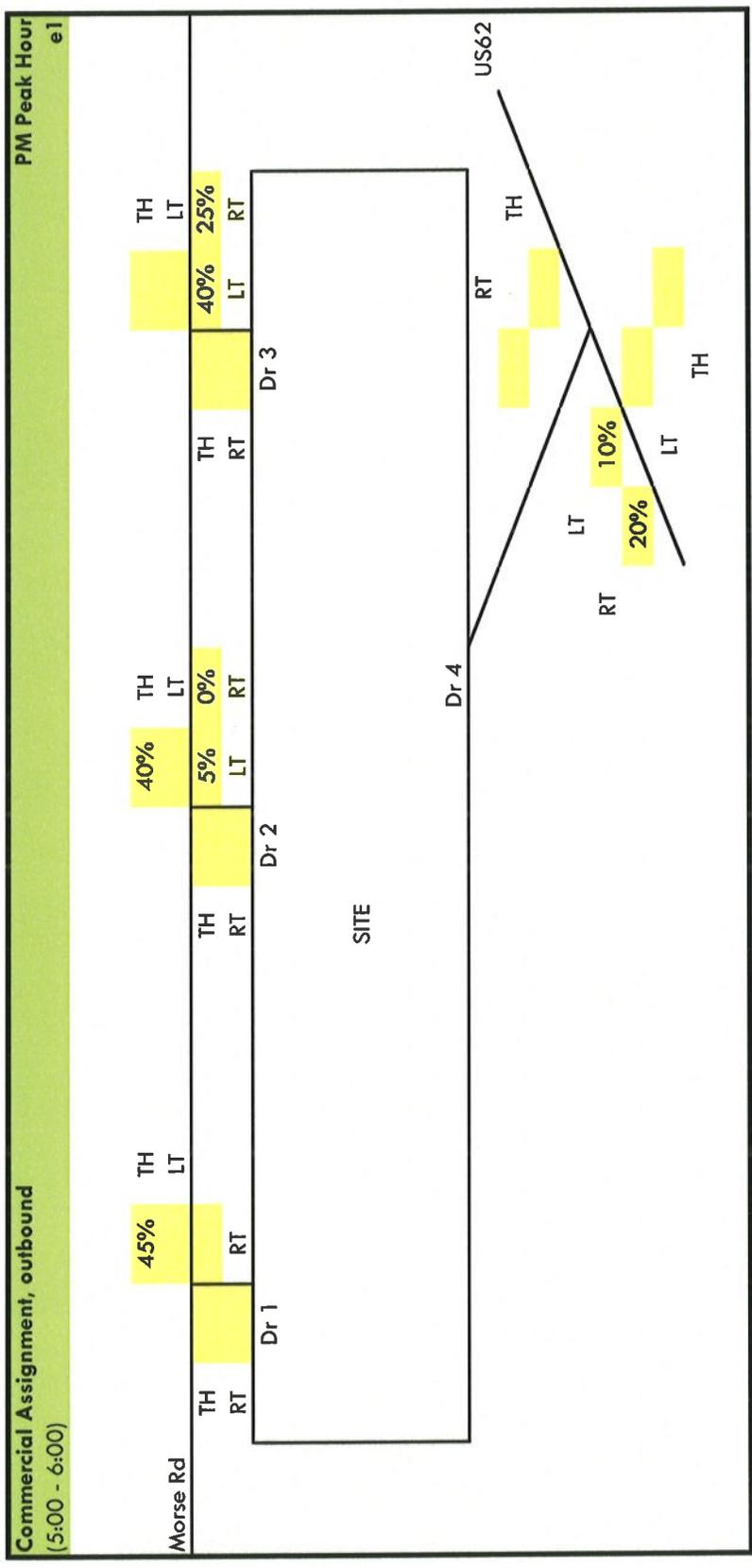
Traffic Volume Calculations



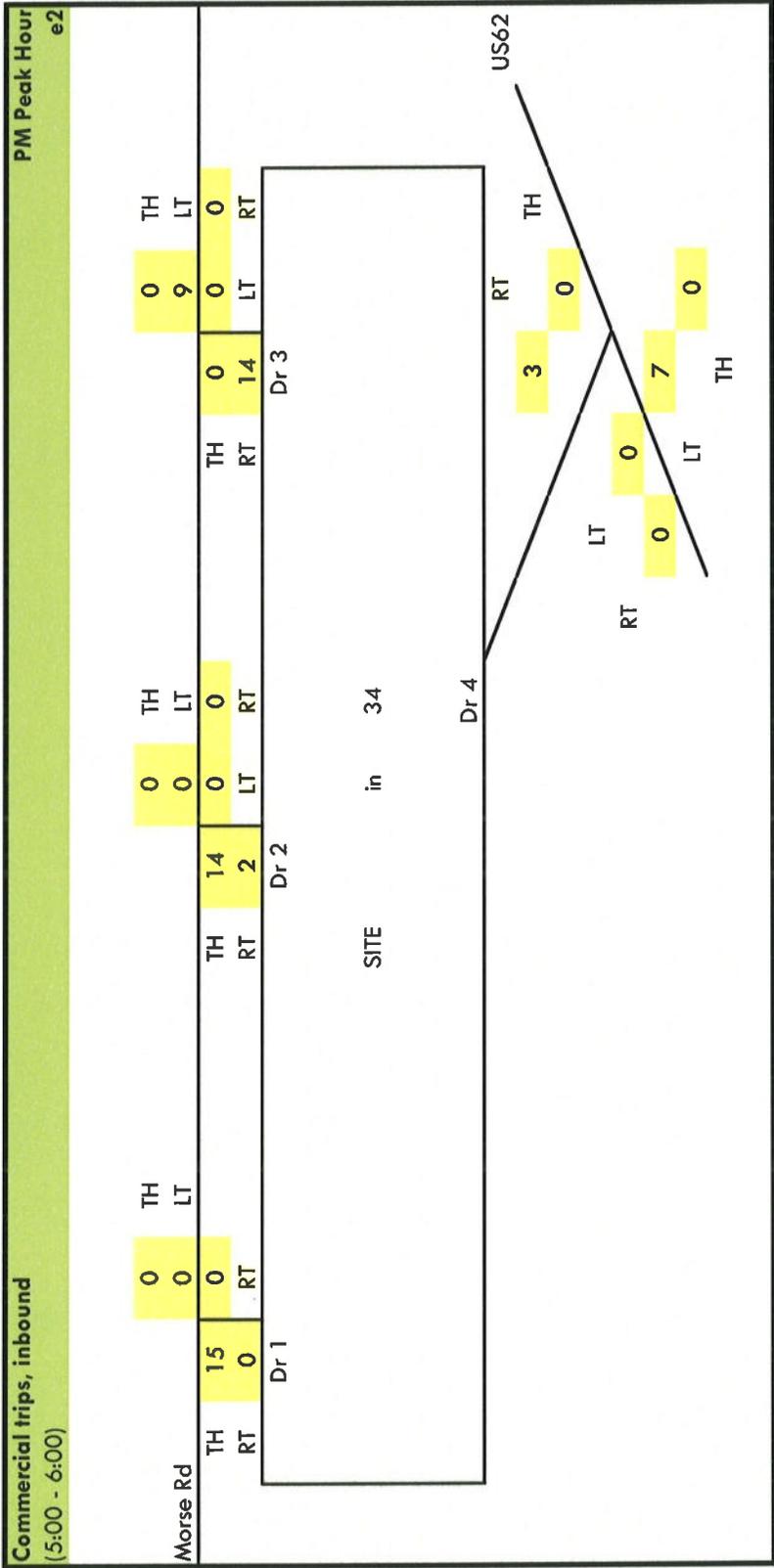
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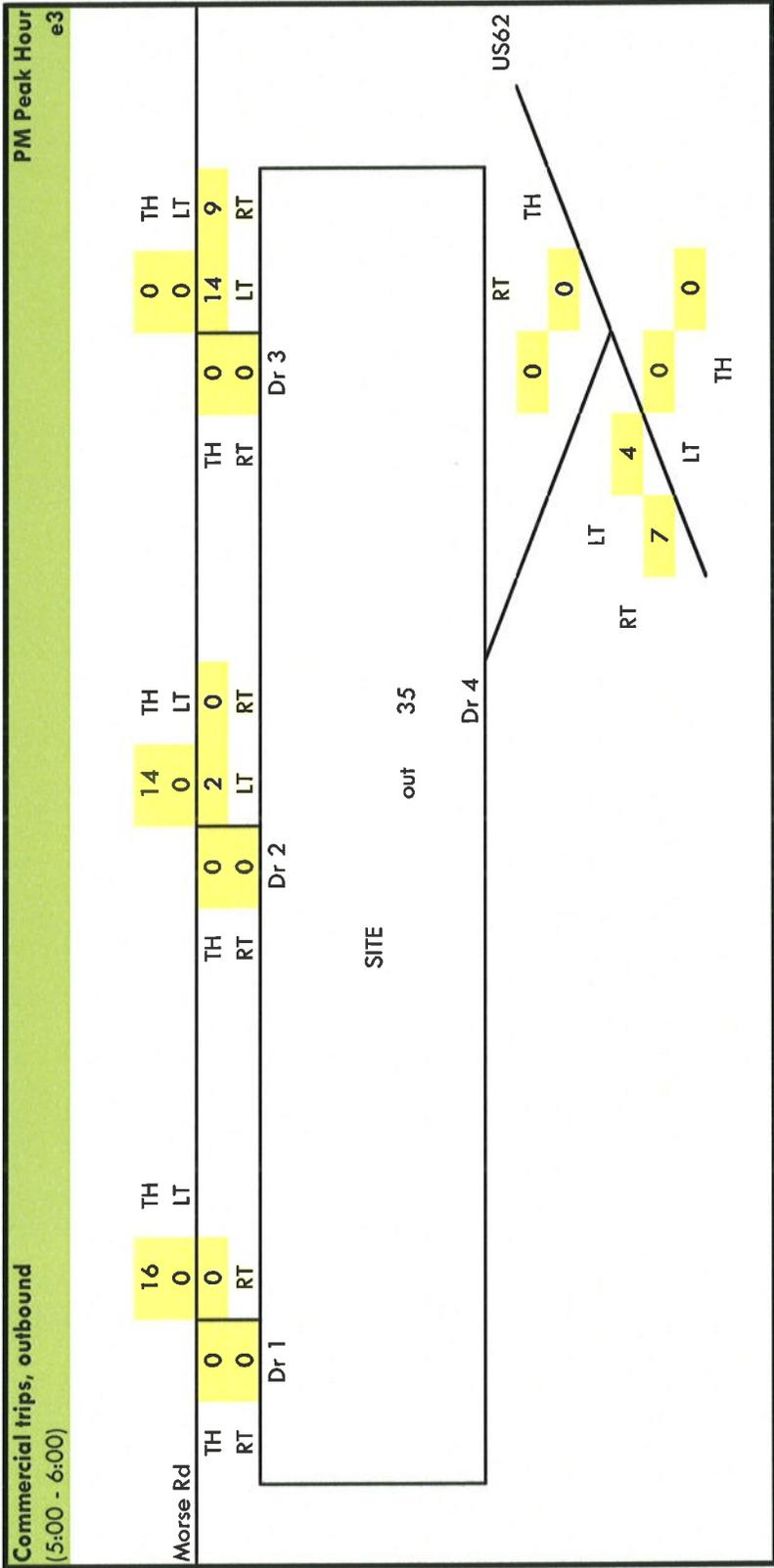
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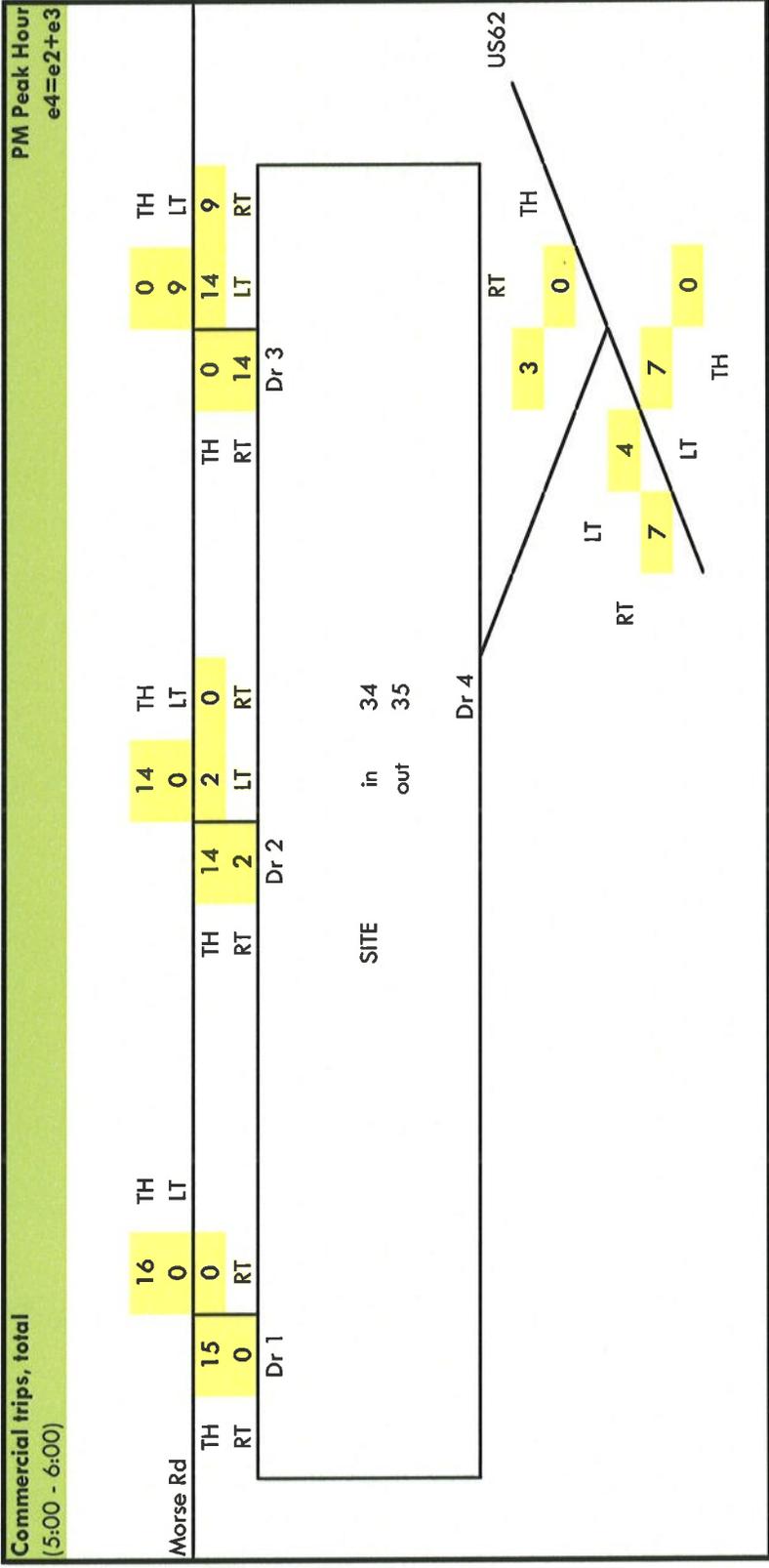
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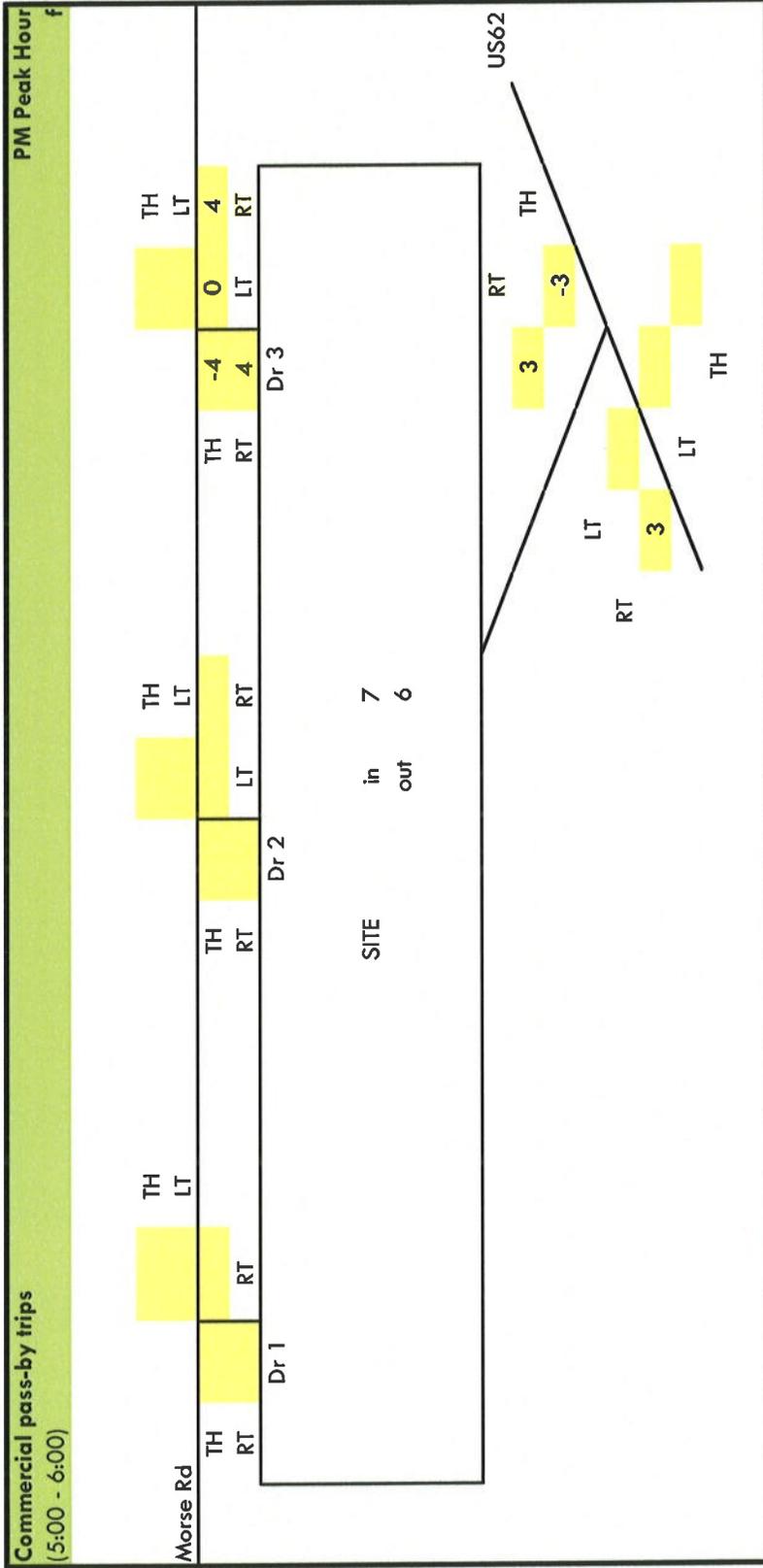
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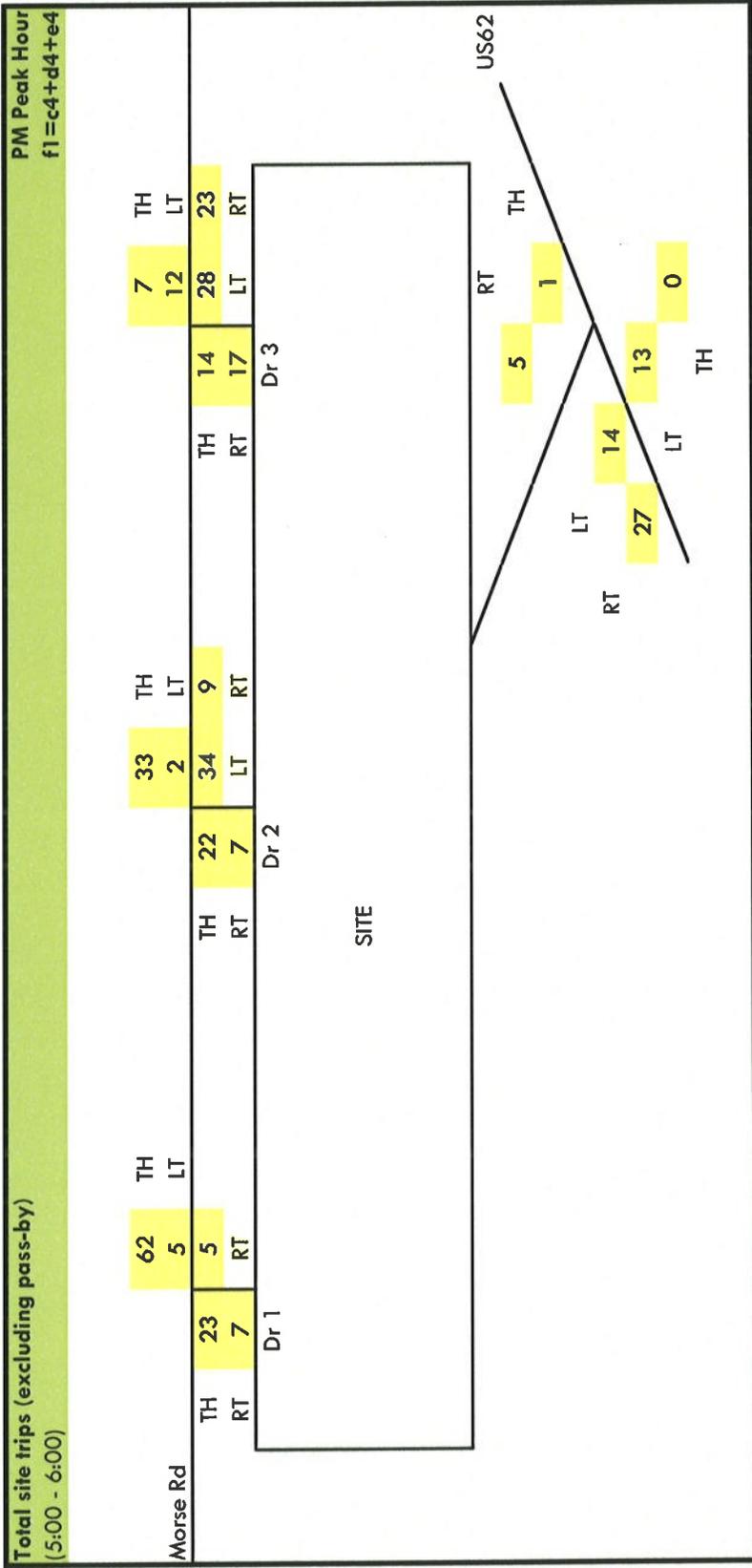
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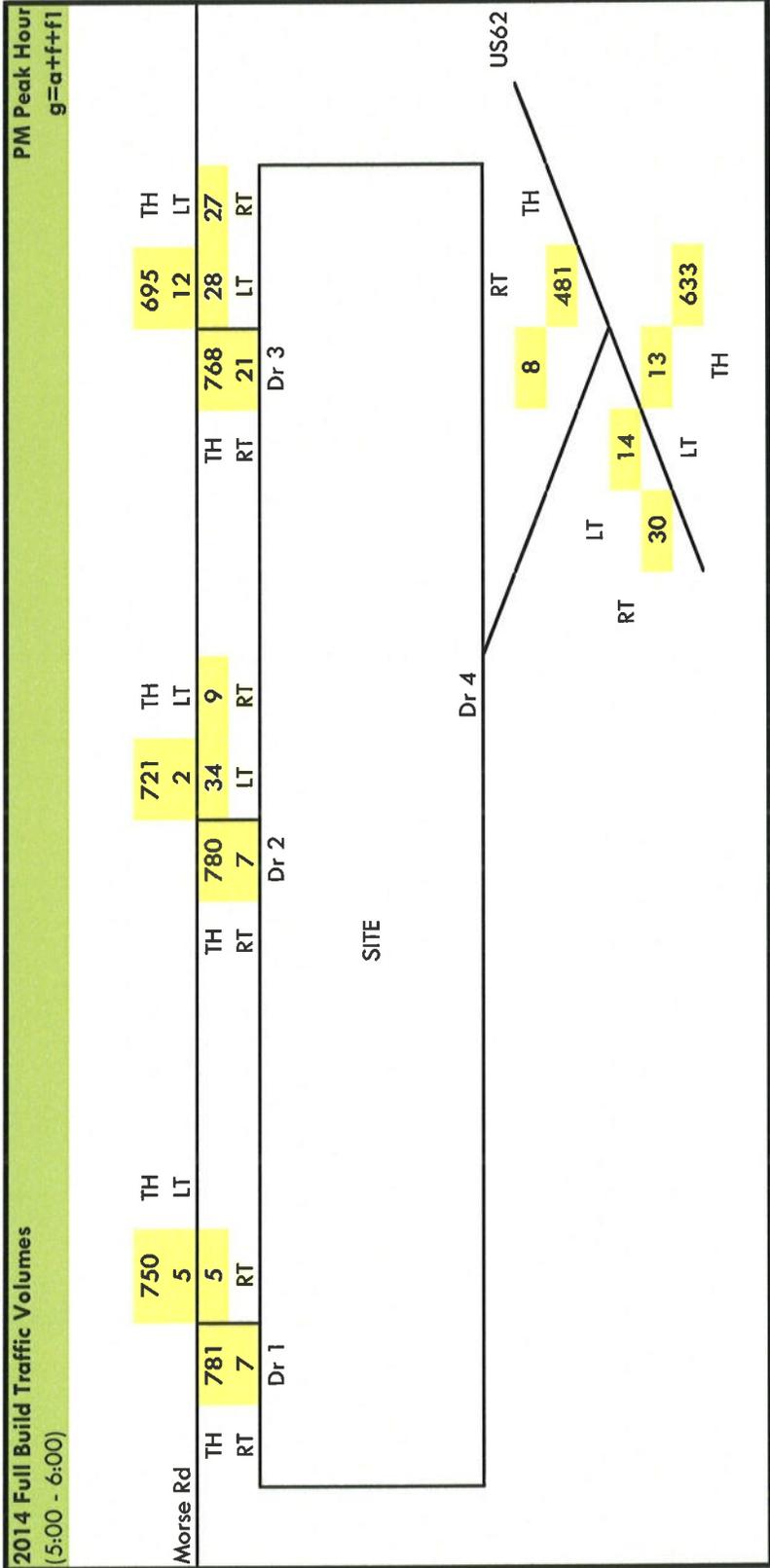
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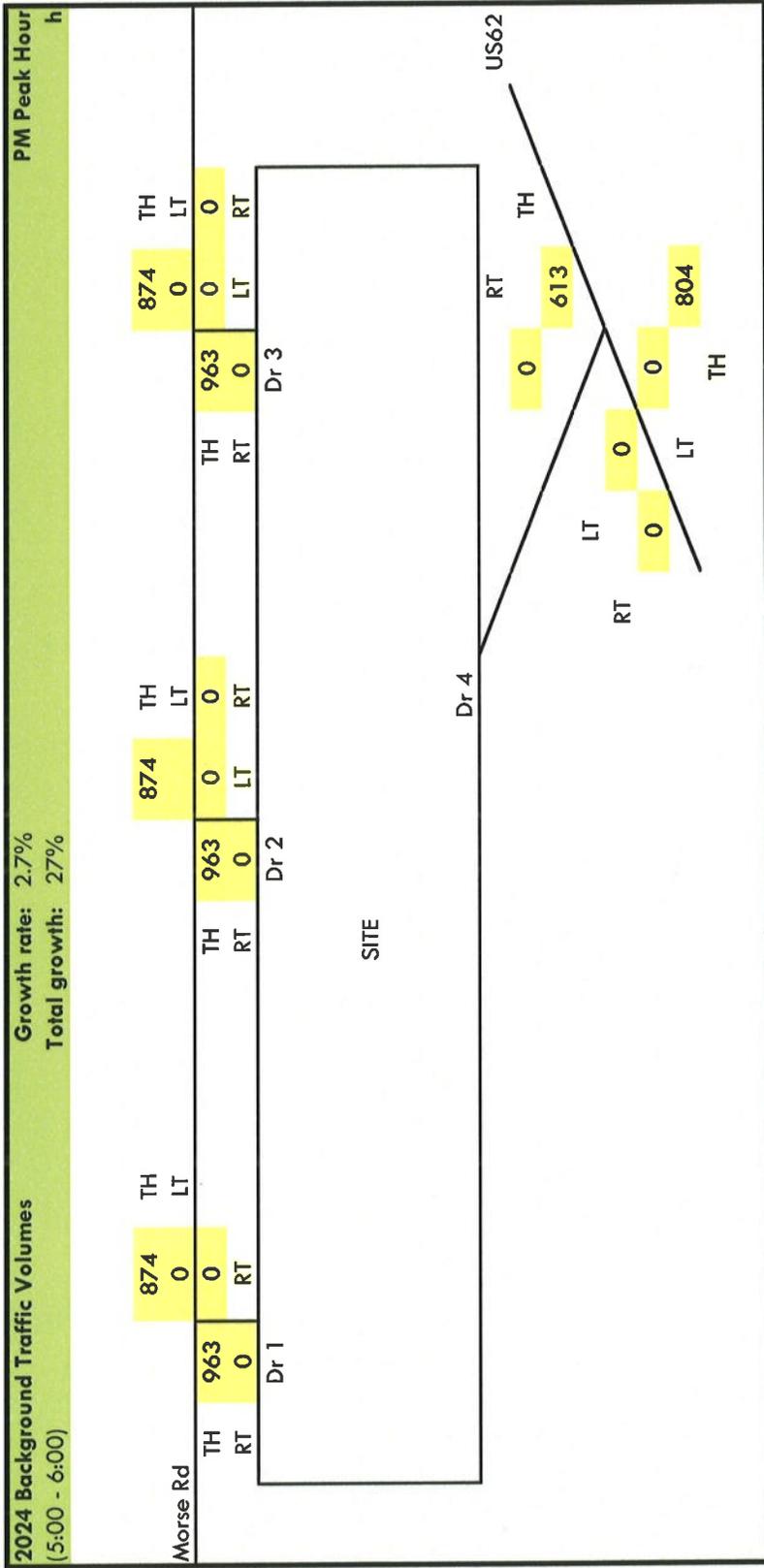
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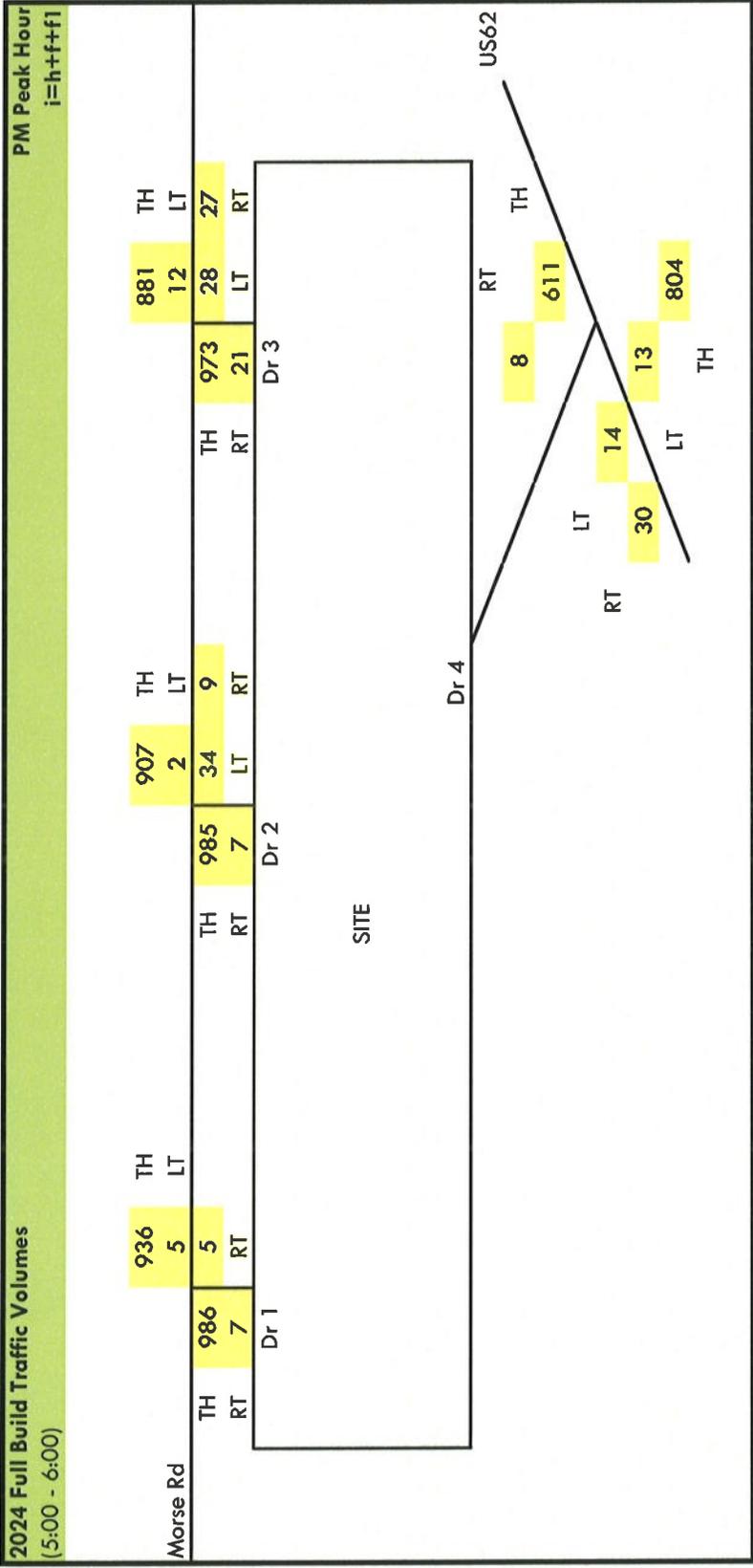
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TWO-WAY STOP CONTROL SUMMARY

General Information				Site Information				
Analyst	cw			Intersection	Morse Rd/Drive 1			
Agency/Co.	EMH&T			Jurisdiction	Columbus			
Date Performed	6/25/2014			Analysis Year				
Analysis Time Period	2024 PM Full Build							
Project Description Morse Road Senior Living, 2014-0877								
East/West Street: Morse Road				North/South Street: Drive 1				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		986	7	5	936			
Peak-Hour Factor, PHF	1.00	0.92	0.92	0.92	0.92	1.00		
Hourly Flow Rate, HFR (veh/h)	0	1071	7	5	1017	0		
Percent Heavy Vehicles	0	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)			5					
Peak-Hour Factor, PHF	1.00	1.00	0.92	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	0	0	5	0	0	0		
Percent Heavy Vehicles	0	0	1	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	1	0	0	0		
Configuration			R					
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L			R			
v (veh/h)		5			5			
C (m) (veh/h)		651			268			
v/c		0.01			0.02			
95% queue length		0.02			0.06			
Control Delay (s/veh)		10.6			18.7			
LOS		B			C			
Approach Delay (s/veh)	--	--	18.7					
Approach LOS	--	--	C					

TWO-WAY STOP CONTROL SUMMARY

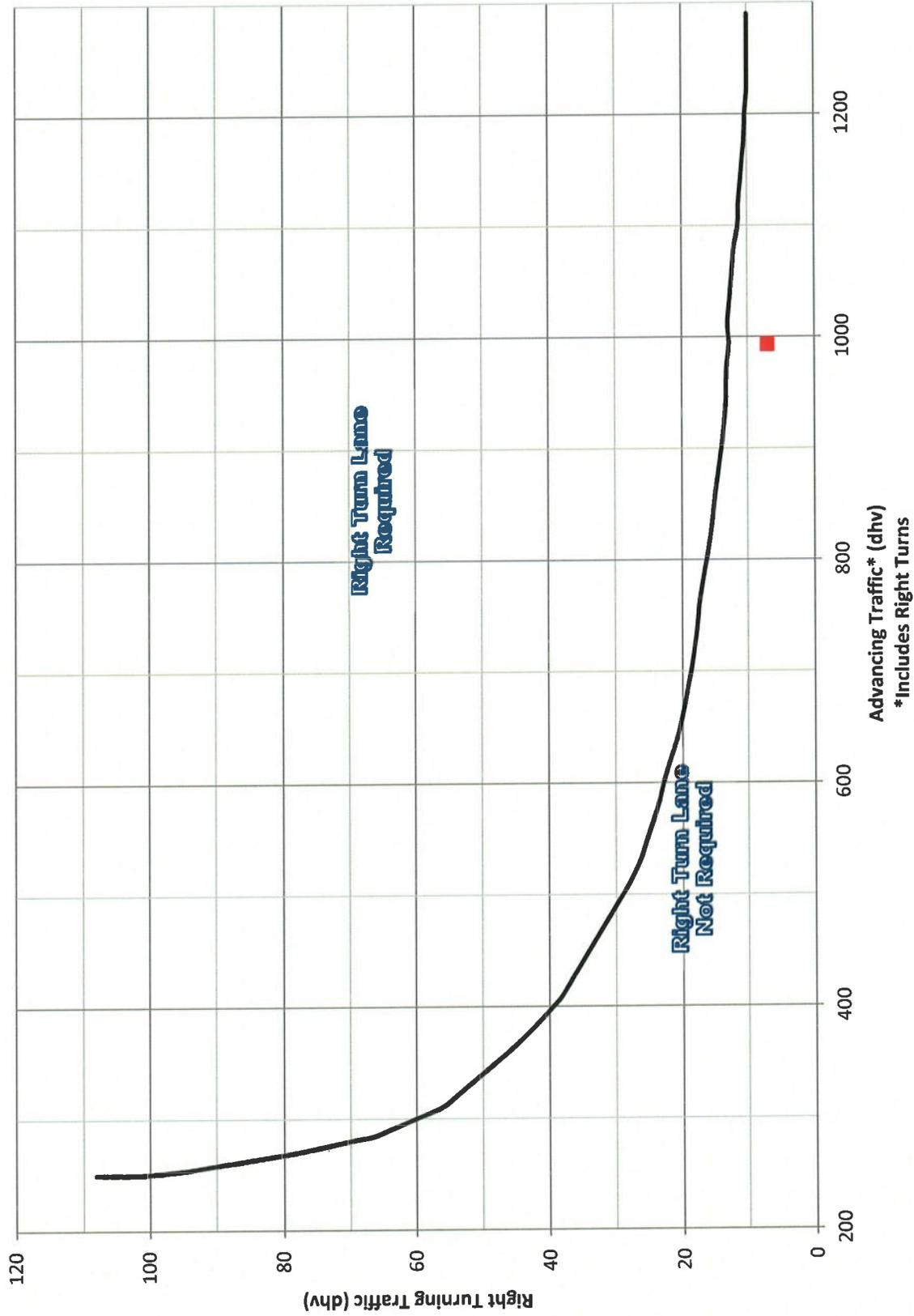
General Information			Site Information					
Analyst	cw		Intersection	Morse Rd/Drive 2				
Agency/Co.	EMH&T		Jurisdiction	Columbus				
Date Performed	6/25/2014		Analysis Year					
Analysis Time Period	2024 PM Full Build							
Project Description Morse Road Senior Living, 2014-0877								
East/West Street: Morse Road			North/South Street: Drive 2					
Intersection Orientation: East-West			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		985	7	2	907			
Peak-Hour Factor, PHF	1.00	0.92	0.92	0.92	0.92	1.00		
Hourly Flow Rate, HFR (veh/h)	0	1070	7	2	985	0		
Percent Heavy Vehicles	0	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	34	0	9					
Peak-Hour Factor, PHF	1.00	1.00	0.92	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	34	0	9	0	0	0		
Percent Heavy Vehicles	0	0	1	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	1	1	0	0	0	0		
Configuration	L		TR					
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		TR			
v (veh/h)		2	34		9			
C (m) (veh/h)		651	61		268			
v/c		0.00	0.56		0.03			
95% queue length		0.01	2.26		0.10			
Control Delay (s/veh)		10.5	121.7		18.9			
LOS		B	F		C			
Approach Delay (s/veh)	--	--	100.1					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information					
Analyst	cw		Intersection	Morse Rd/Drive 3				
Agency/Co.	EMH&T		Jurisdiction	Columbus				
Date Performed	6/25/2014		Analysis Year					
Analysis Time Period	2024 PM Full Build							
Project Description Morse Road Senior Living, 2014-0877								
East/West Street: Morse Road			North/South Street: Drive 3					
Intersection Orientation: East-West			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		973	21	12	881			
Peak-Hour Factor, PHF	1.00	0.92	0.92	0.92	0.92	1.00		
Hourly Flow Rate, HFR (veh/h)	0	1057	22	13	957	0		
Percent Heavy Vehicles	0	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	1	1	1	0		
Configuration		T	R	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	28	0	27					
Peak-Hour Factor, PHF	1.00	1.00	0.92	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	28	0	29	0	0	0		
Percent Heavy Vehicles	0	0	1	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	1	1	0	0	0	0		
Configuration	L		TR					
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		TR			
v (veh/h)		13	28		29			
C (m) (veh/h)		650	62		275			
v/c		0.02	0.45		0.11			
95% queue length		0.06	1.75		0.35			
Control Delay (s/veh)		10.7	104.1		19.6			
LOS		B	F		C			
Approach Delay (s/veh)	--	--	61.1					
Approach LOS	--	--	F					

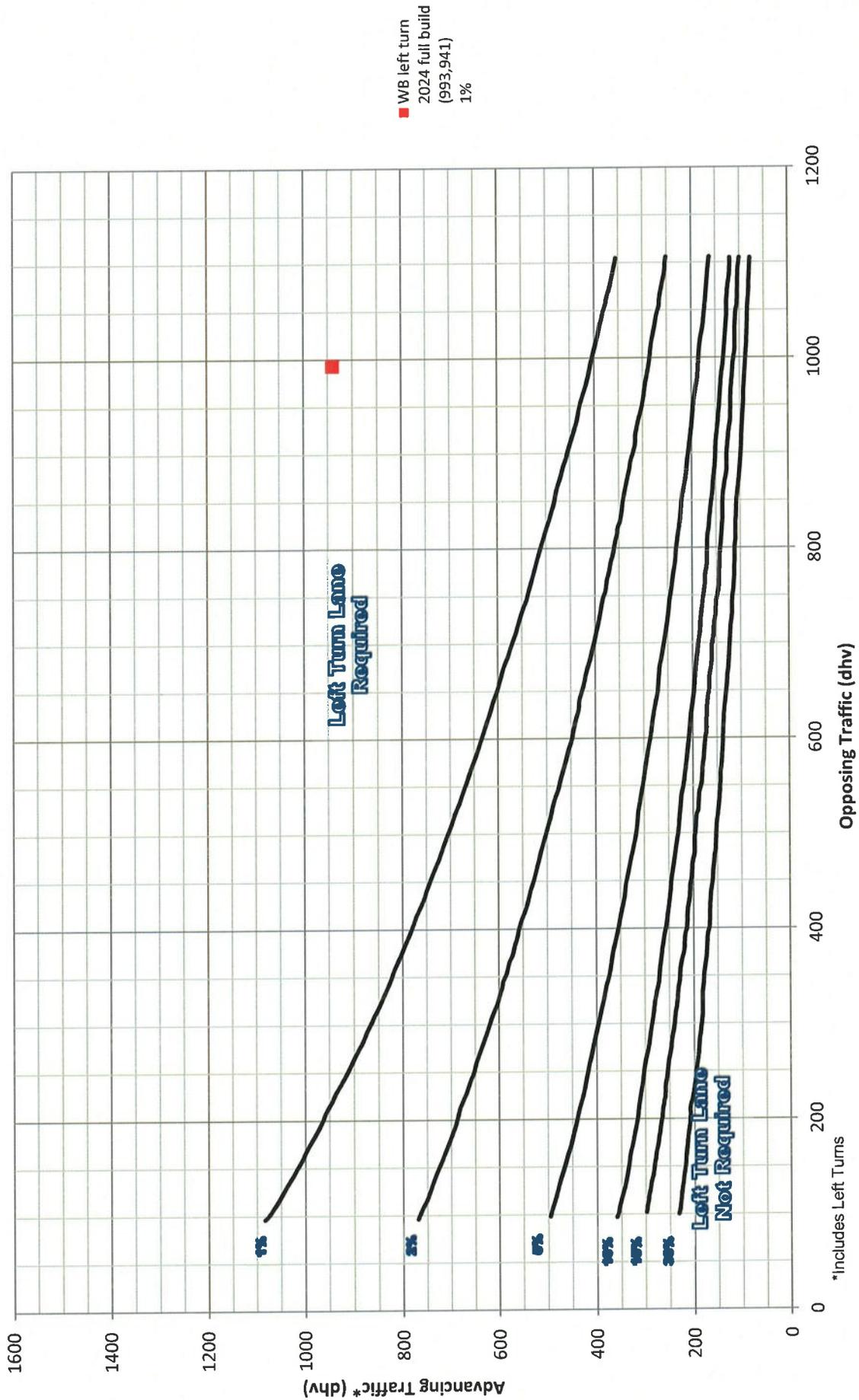
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	cw			Intersection				
Agency/Co.	EMH&T			Jurisdiction	Columbus			
Date Performed	6/25/2014			Analysis Year				
Analysis Time Period	2024 PM Full Build							
Project Description Morse Road Senior Living, 2014-0877								
East/West Street: US62				North/South Street: Drive 4				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	13	804			611	8		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	1.00		
Hourly Flow Rate, HFR (veh/h)	14	873	0	0	664	8		
Percent Heavy Vehicles	0	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				14		30		
Peak-Hour Factor, PHF	1.00	1.00	0.92	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	15	0	32		
Percent Heavy Vehicles	0	0	1	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	14						47	
C (m) (veh/h)	928						243	
v/c	0.02						0.19	
95% queue length	0.05						0.70	
Control Delay (s/veh)	8.9						23.3	
LOS	A						C	
Approach Delay (s/veh)	--	--					23.3	
Approach LOS	--	--					C	

Morse Road @ Drive 1
2-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed

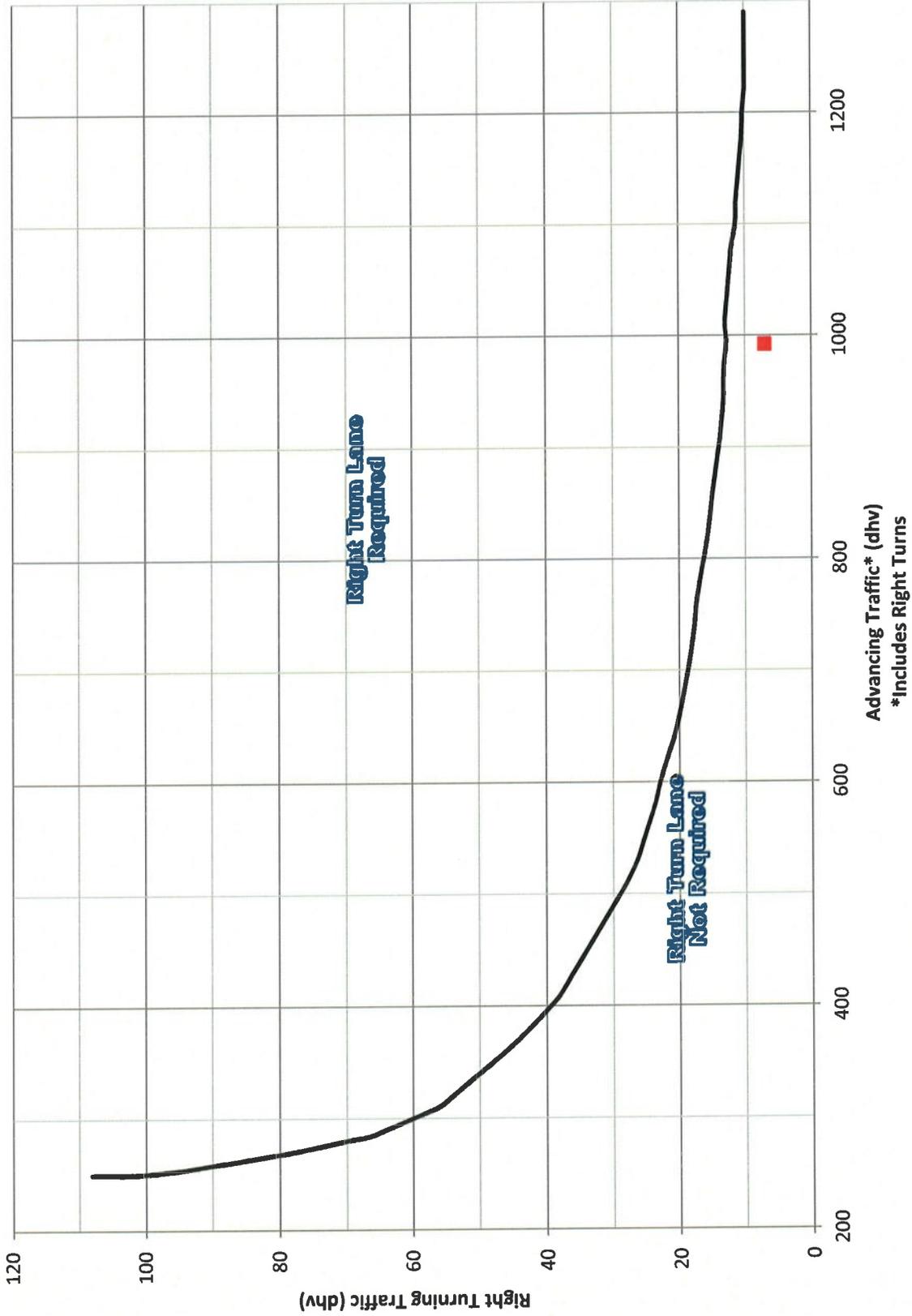


■ EB right turn
 2024 full build
 (993,7)

Morse Road @ Drive 1
2-Lane Highway Left Turn Lane Warrant
 >40 mph or 70 kph Posted Speed

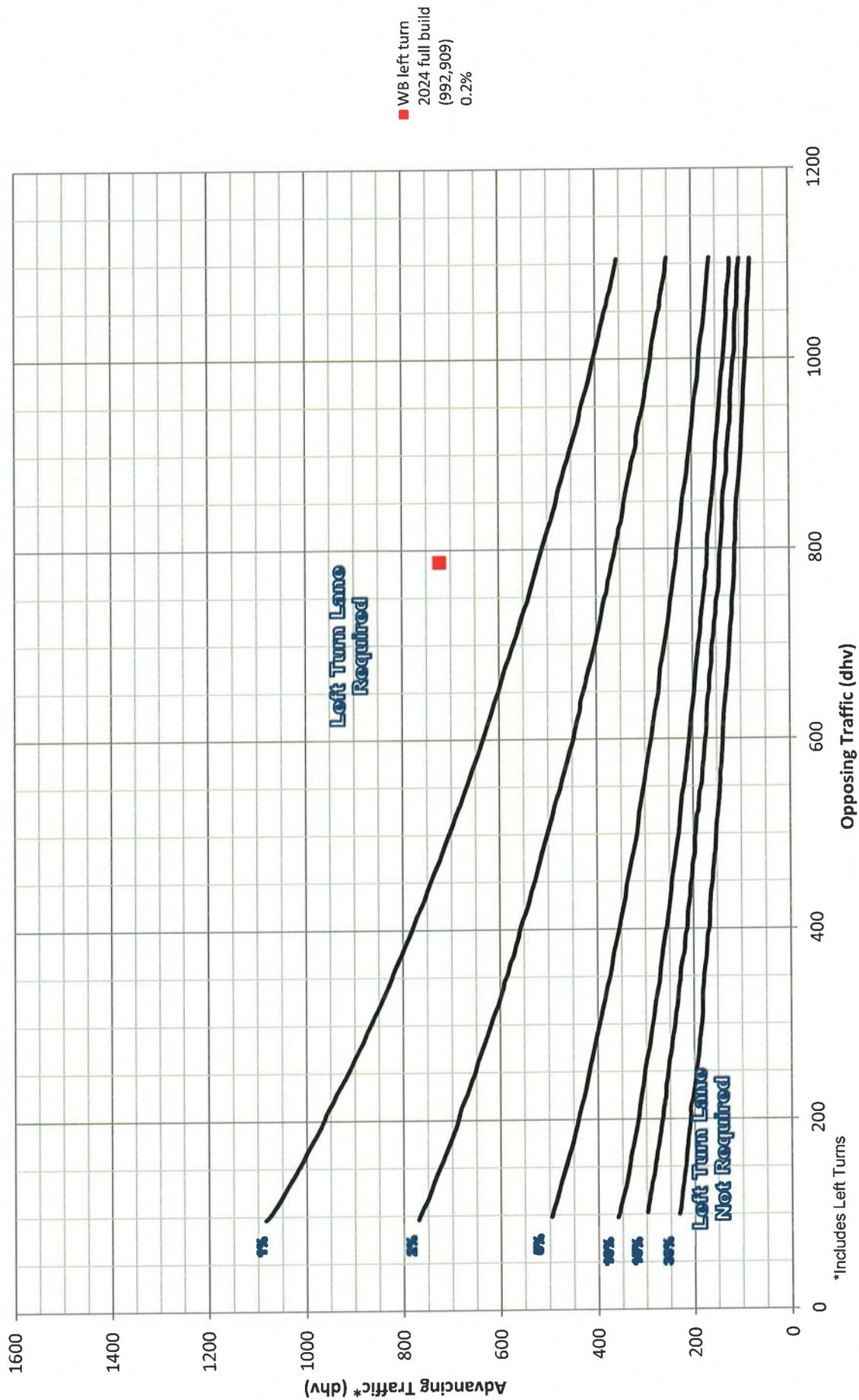


Morse Road @ Drive 2
2-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed

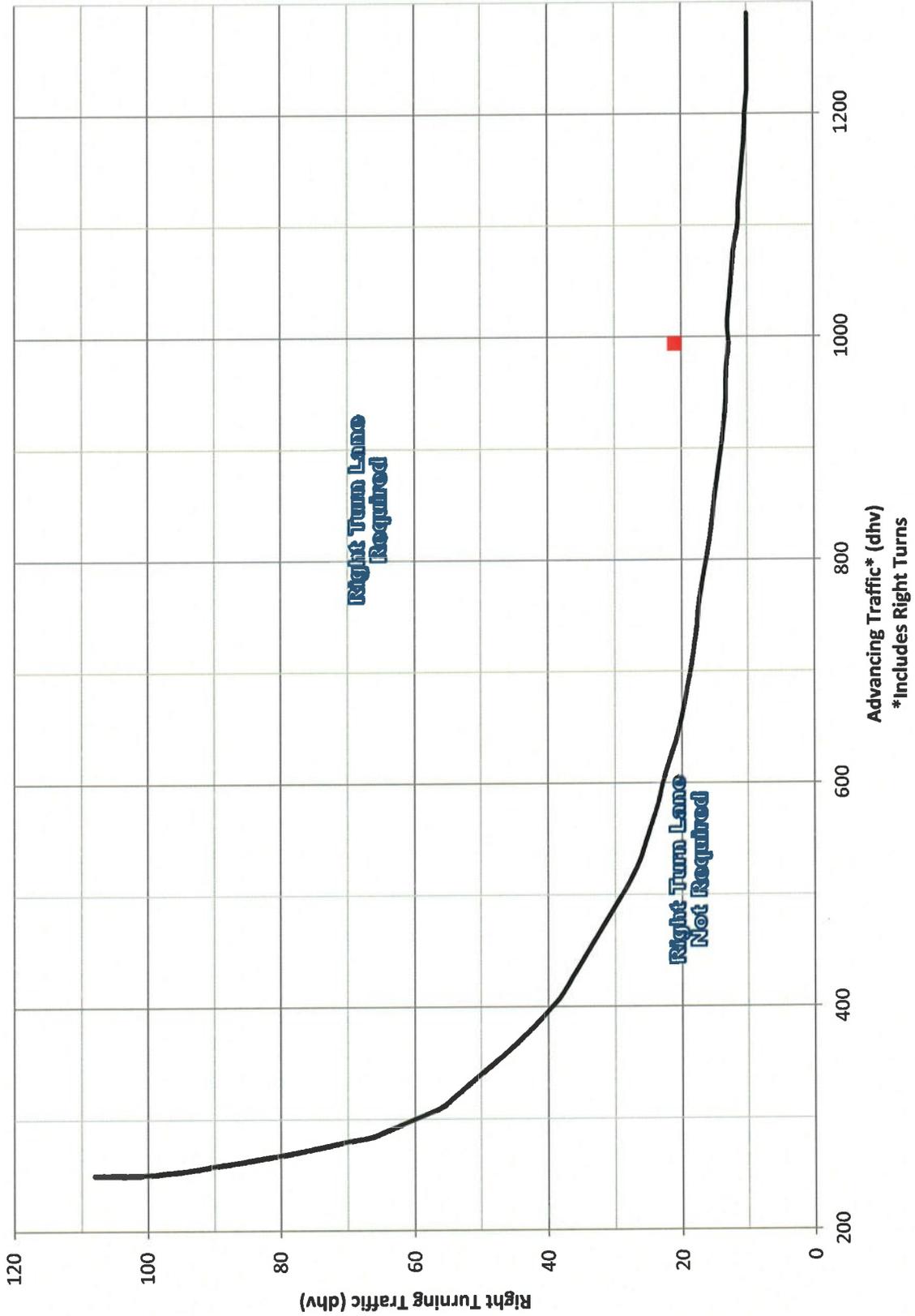


■ EB right turn
 2024 full build
 (992,7)

Morse Road @ Drive 2
2-Lane Highway Left Turn Lane Warrant
 >40 mph or 70 kph Posted Speed

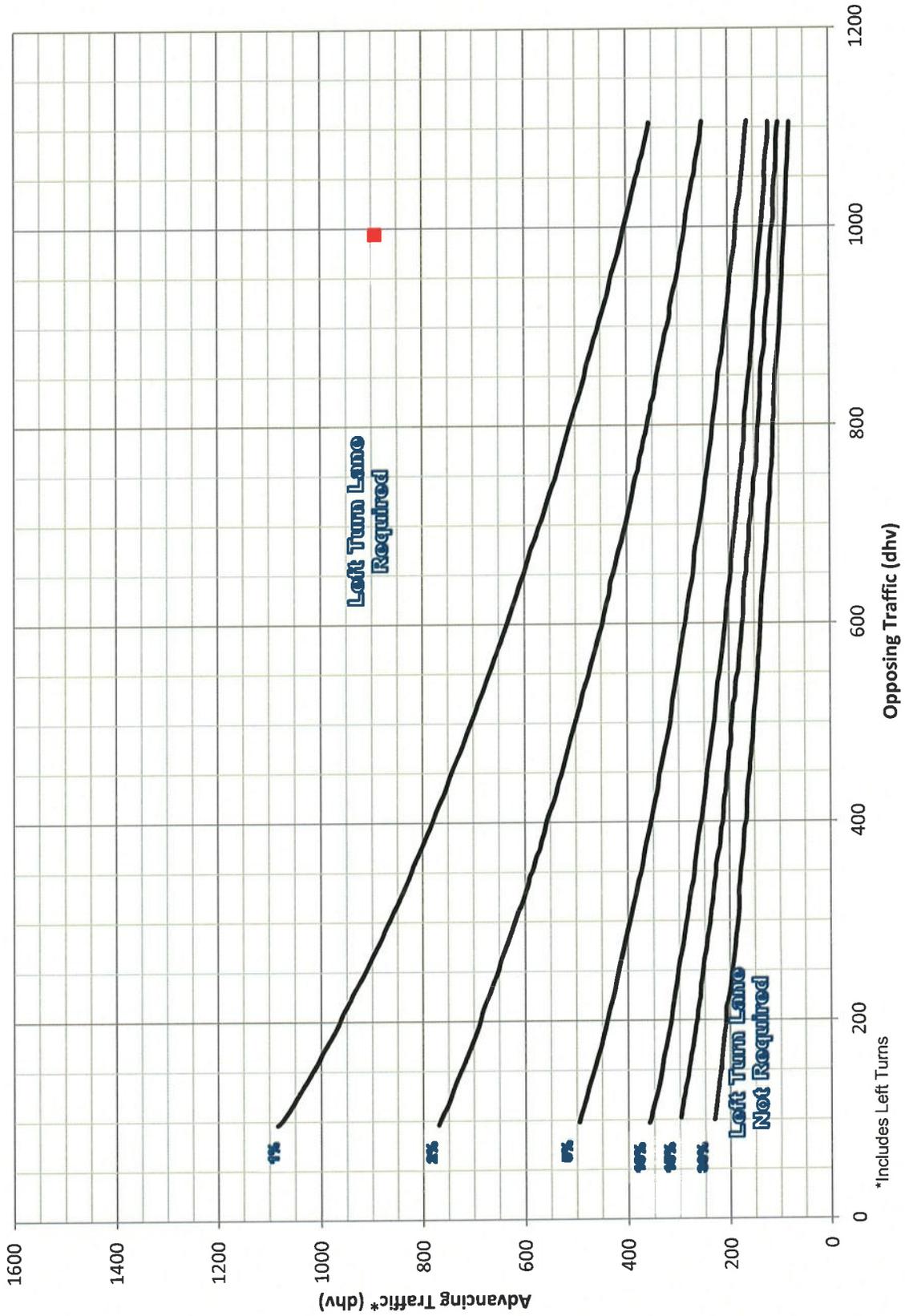


Morse Road @ Drive 3
2-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



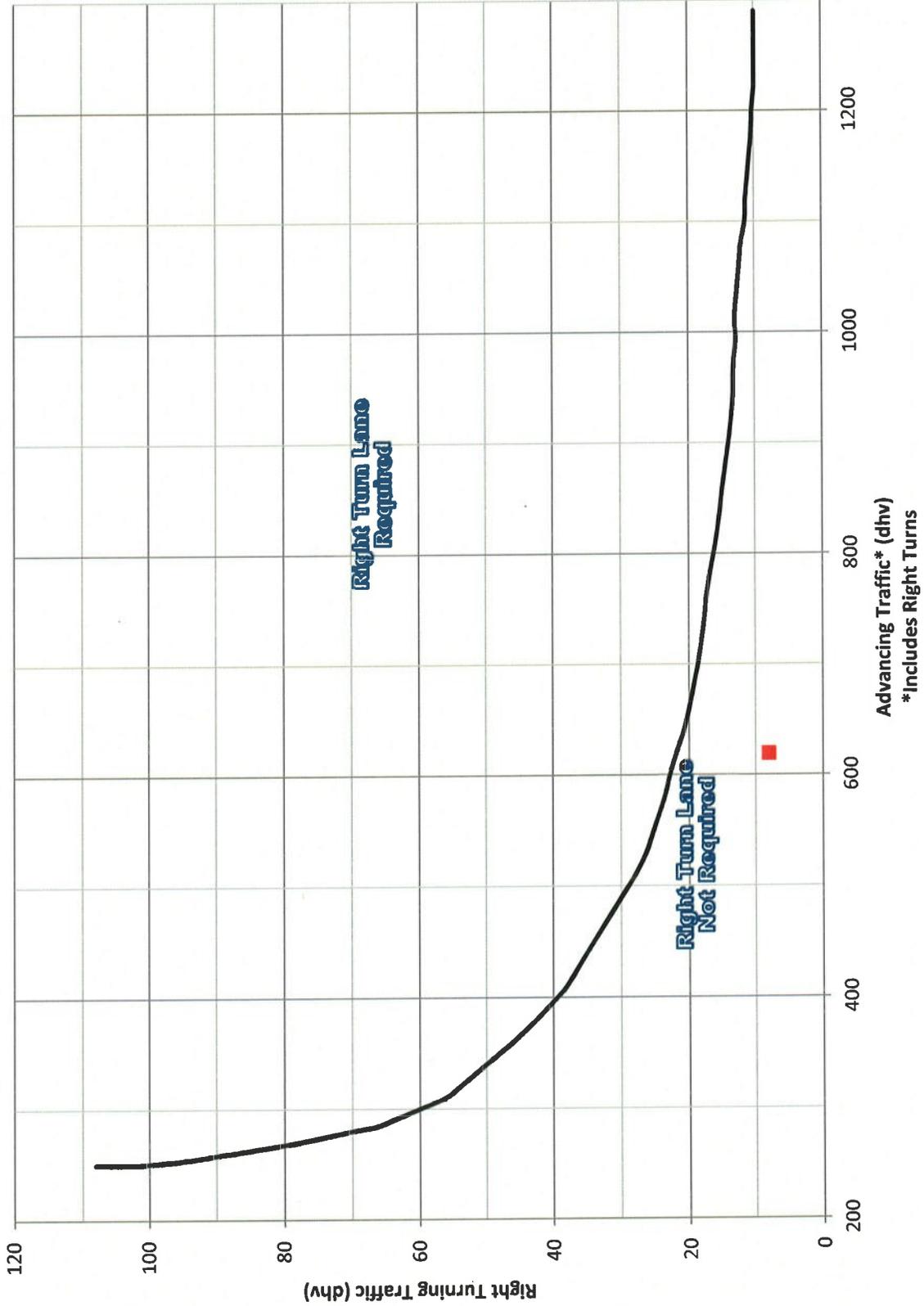
■ EB right turn
 2024 full build
 (994,21)

Morse Road @ Drive 3
2-Lane Highway Left Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



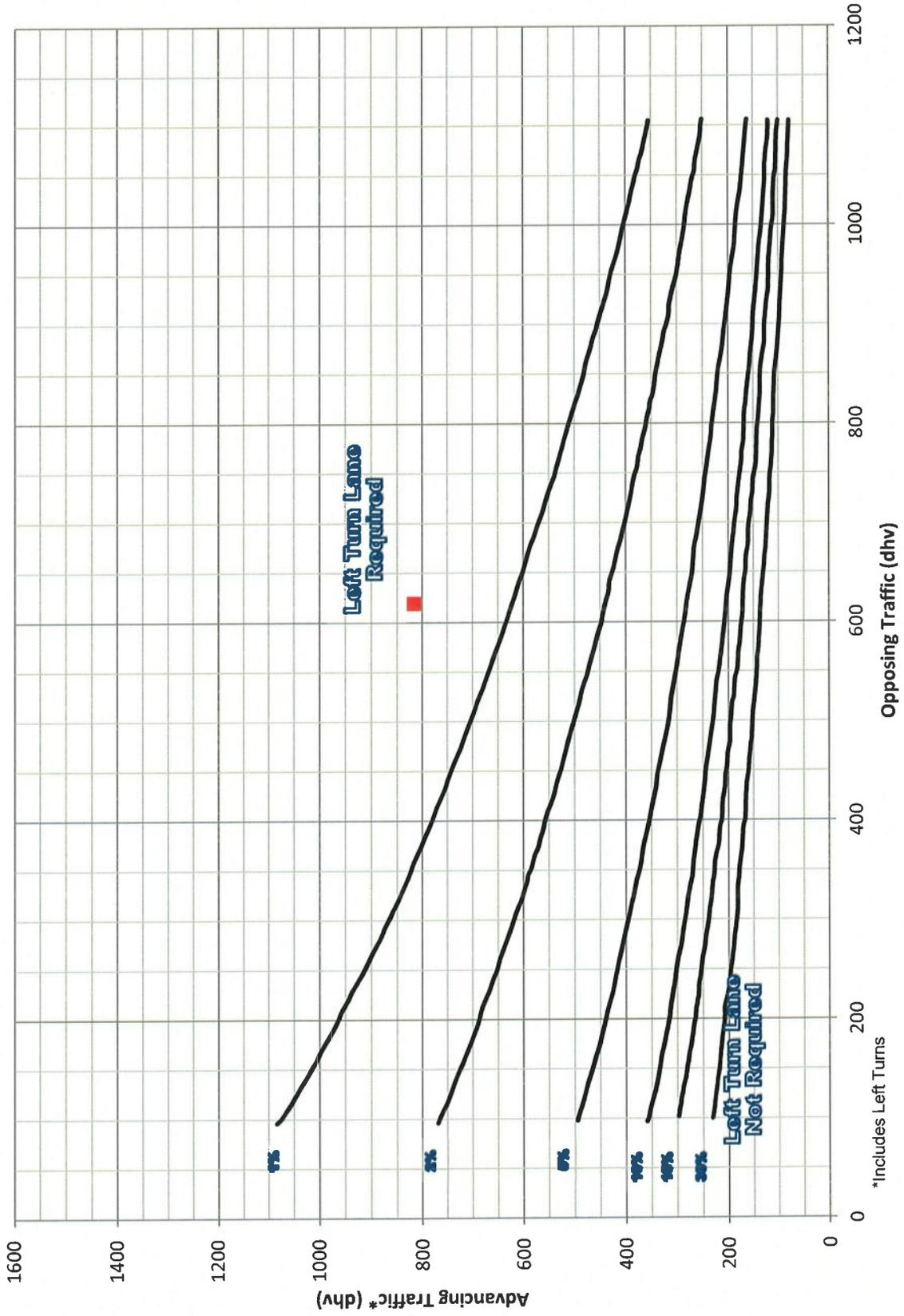
■ WB left turn
 2024 PM Peak
 (994,893)
 1.3%

US62 @ Drive 4
2-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



■ SB/WB right turn
 2024 full build
 (619,8)

US62 @ Drive 4
2-Lane Highway Left Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



*Includes Left Turns

Morse Road Senior Living
Access Study
Turn Lane Length Calculations

PM Peak Hour			
2024 Full Build			
Morse Road & Drive 1			
Movement	WBLT		
Design Speed	45	mph	
Cycle Length	60	seconds	
Control (Stop or Signal)	Stop		
Through Volume	936	vph	
Number of Through Lanes	1		
Turning Volume	5	vph	
Number of Turning Lanes	1		
Design Condition	B	A, B, or C	
Turning Percentage	1%		
Vehicles Per Cycle	0.1		
Storage Length	50	feet	
Deceleration/Taper	175	feet	
Calculated Turn Lane Length	175	feet	
No Block Distance	N.A.	feet	
No Block Turn Lane Length	N.A.	feet	

PM Peak Hour			
2024 Full Build			
Morse Road & Drive 2			
Movement	WBLT		
Design Speed	45	mph	
Cycle Length	60	seconds	
Control (Stop or Signal)	Stop		
Through Volume	907	vph	
Number of Through Lanes	1		
Turning Volume	2	vph	
Number of Turning Lanes	1		
Design Condition	B	A, B, or C	
Turning Percentage	0%		
Vehicles Per Cycle	0.0		
Storage Length	50	feet	
Deceleration/Taper	175	feet	
Calculated Turn Lane Length	175	feet	
No Block Distance	N.A.	feet	
No Block Turn Lane Length	N.A.	feet	

PM Peak Hour			
2024 Full Build			
Morse Road & Drive 3			
Movement	EBRT		
Design Speed	45	mph	
Cycle Length	60	seconds	
Control (Stop or Signal)	Stop		
Through Volume	973	vph	
Number of Through Lanes	1		
Turning Volume	21	vph	
Number of Turning Lanes	1		
Design Condition	B	A, B, or C	
Turning Percentage	2%		
Vehicles Per Cycle	0.4		
Storage Length	50	feet	
Deceleration/Taper	175	feet	
Calculated Turn Lane Length	175	feet	
No Block Distance	N.A.	feet	
No Block Turn Lane Length	N.A.	feet	

PM Peak Hour			
2024 Full Build			
Morse Road & Drive 4			
Movement	EBLT		
Design Speed	45	mph	
Cycle Length	60	seconds	
Control (Stop or Signal)	Stop		
Through Volume	804	vph	
Number of Through Lanes	1		
Turning Volume	13	vph	
Number of Turning Lanes	1		
Design Condition	B	A, B, or C	
Turning Percentage	2%		
Vehicles Per Cycle	0.2		
Storage Length	50	feet	
Deceleration/Taper	175	feet	
Calculated Turn Lane Length	175	feet	
No Block Distance	N.A.	feet	
No Block Turn Lane Length	N.A.	feet	

PM Peak Hour		
2024 Full Build		
Morse Road & Drive 3		
Movement	WBLT	
Design Speed	45	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	881	vph
Number of Through Lanes	1	
Turning Volume	12	vph
Number of Turning Lanes	1	
Design Condition	B	A, B, or C
Turning Percentage	1%	
Vehicles Per Cycle	0.2	
Storage Length	50	feet
Deceleration/Taper	175	feet
Calculated Turn Lane Length	175	feet
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet