

TECHNICAL MEMORANDUM

To: Danny Welch, Integrity Construction & Construction Services
From: Ryan Bernal, Ali Mustafa, Kimley-Horn and Associates, Inc.
Date: July 17, 2024
Re: **Magnussen's Toyota – Queuing Analysis**

This memorandum documents the queuing data collected at the existing Magnussen's Toyota site in the City of Palo Alto and compares it against the proposed site plan, to determine whether the vehicle queuing capacity provided at the new Magnussen's Toyota site in the City of Mountain View is sufficient to meet the observed queuing demand at existing service facility.

Project Understanding

The Magnussen's Toyota of Palo Alto is currently located in the southeast corner of San Antonio Rd. / W. Middlefield Rd., in the City of Palo Alto. This existing facility will be relocated to a new location in the City of Mountain View. The new location is in the southeast corner Independence Ave. / Old Middlefield Way, approximately 0.35 miles east of the existing location. Access to the new facility is proposed via driveways from Independence Ave. and Old Middlefield Way. The Site Plan for the proposed facility is shown in **Appendix A**.

A total of three service lanes will be provided at this new facility in Mountain View, like the existing facility in Palo Alto. Vehicles arriving for servicing enter the site either from Independence Ave. or Old Middlefield Way and maneuver through the drive aisle to access the service lanes. Service Lane 1 is for vehicles with appointments and service Lane 2 & Lane 3 are general lanes without appointment.

The proposed facility will be similar in size and will offer the same services which were offered at the existing facility. It is anticipated that the existing customers at the Palo Alto site will shift to the proposed facility in Mountain View and daily operations are expected to be the same. The dealership utilizes porters to move vehicles into service or parking, and the average that vehicles are in the service queue is 13.5 minutes.

Queuing Data

Based on the information provided by the Magnussen's Toyota of Palo Alto, the peak days for servicing were Monday and Saturday. Existing servicing records for the month of April 2024 were checked to confirm the peak weekday and weekend day. As per the data provided, Monday and Friday were peak weekdays with similar average number of servicing vehicles and Saturday was the peak day during weekend. Therefore, queuing data was collected on a typical weekday (Monday) and on Saturday at the Magnussen's Toyota of Palo Alto. The queuing data was collected by service lanes, and minimum/maximum queues observed every 15-minutes were documented. The queue data collected is shown in **Appendix B**.

The maximum queues observed at the existing facility, on a typical weekday and weekend by service lane for every 15-minutes is shown in **Table 1** below:

Table 1: Magnussen's Toyota of Palo Alto – Queuing Data

Time Period	Saturday (April 20, 2024)			Monday (April 22, 2024)		
	Service Lane #			Service Lane #		
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3
	Max Vehicles	Max Vehicles	Max Vehicles	Max Vehicles	Max Vehicles	Max Vehicles
7:00 - 7:15 AM	1	4	4	1	0	1
7:15 - 7:30 AM	1	2	3	0	1	1
7:30 - 7:45 AM	1	0	1	0	1	0
7:45 - 8:00 AM	1	1	1	0	1	1
8:00 - 8:15 AM	1	1	1	0	1	2
8:15 - 8:30 AM	0	2	1	0	0	1
8:30 - 8:45 AM	1	1	1	0	1	0
8:45 - 9:00 AM	0	1	2	0	2	2
9:00 - 9:15 AM	1	1	2	0	2	3
9:15 - 9:30 AM	1	1	0	0	1	2
9:30 - 9:45 AM	0	0	1	0	3	3
9:45 - 10:00 AM	1	1	1	0	1	2
10:00 - 10:15 AM	1	1	1	0	1	2
10:15 - 10:30 AM	1	2	2	0	0	1
10:30 - 10:45 AM	1	2	0	0	1	2
10:45 - 11:00 AM	0	1	0	0	0	1
11:00 - 11:15 AM	0	1	0	1	1	0
11:15 - 11:30 AM	1	1	0	1	0	0
11:30 - 11:45 AM	0	1	0	2	1	0
11:45 - 12:00 PM	0	0	1	0	0	0
12:00 - 12:15 PM	0	1	1	1	0	1
12:15 - 12:30 PM	0	1	1	1	0	1
12:30 - 12:45 PM	0	0	1	3	0	0
12:45 - 1:00 PM	0	1	1	2	0	0
1:00 - 1:15 PM	0	1	1	0	1	1
1:15 - 1:30 PM	0	1	1	0	1	1
1:30 - 1:45 PM	0	1	1	0	1	1
1:45 - 2:00 PM	0	1	0	0	1	1
2:00 - 2:15 PM	0	1	0	0	1	1
2:15 - 2:30 PM	0	0	0	1	1	3
2:30 - 2:45 PM	0	0	1	1	1	1
2:45 - 3:00 PM	0	0	1	0	2	1
3:00 - 3:15 PM	0	1	0	0	0	1
3:15 - 3:30 PM	0	0	0	0	1	0
3:30 - 3:45 PM	0	0	0	0	1	1
3:45 - 4:00 PM	0	1	1	0	1	1
4:00 - 4:15 PM	0	0	1	1	0	1
4:15 - 4:30 PM	0	0	1	0	1	1
4:30 - 4:45 PM	0	1	1	1	1	2
4:45 - 5:00 PM	0	1	1	1	1	1
5:00 - 5:15 PM	0	0	1	1	1	1
5:15 - 5:30 PM	0	0	1	1	1	1
5:30 - 5:45 PM	0	1	1	1	1	0
5:45 - 6:00 PM	0	1	1	0	1	3

As shown in **Table 1** above, the maximum 15-minutes queues observed on a Saturday (April 20, 2024) were 1 vehicle in Lane 1 (multiple time periods), 4 vehicles in Lane 2 (7:00 – 7:15 AM), and 4 vehicles in Lane 3 (7:00 – 7:15 AM).

On Monday (April 22, 2024), the maximum 15-minutes queues observed were 2 vehicles (11:30 AM – 11:45 AM) in Lane 1, 3 vehicles in Lane 2 (9:30 – 9:45AM), and 3 vehicles in Lane 3 (9:00-9:00 AM; 9:30 – 9:45 AM). Longer queues were observed during the early hours of operation and minimal queues were observed after lunch time on both Saturday and Monday.

The new site plan has a vehicle queuing capacity of 6 vehicles for Lane 1 & Lane 2, and 5 vehicles for Lane 3 as shown in Appendix A. This vehicle queuing capacity is more than the maximum 15-minutes queues observed at the existing site, therefore, the occurrence of the queues extending beyond the site to Old Middlefield Way is not expected to occur.

Contingency Plan

Based on the on-site queuing analysis and maximum queue observations at the existing Magnussen's Toyota site in Palo Alto, it can be concluded that the vehicle storage capacity of approximately 6-vehicles for service Lane 1 & Lane 2 and 5 vehicles for Lane 3 provided at the proposed Magnussen's Toyota site in Mountain View is sufficient to meet the anticipated/observed demand.

In case if unusual demand for servicing is observed on any day which causes the queues to exceed beyond 6-vehicles in Lanes 1 & 2 and 5-vehicles in Lane 3, the Toyota staff will enact a contingency plan (see **Appendix A**), which involves an employee installing cones at each service lane to restrict additional vehicles waiting in line and blocking the entrance to the site. These additional vehicles will be directed to use the alternate path with the site and wait until the service lanes can accommodate additional vehicles. Alternatively, porters employed by Magnussen's Toyota will also be available to assist customers to move their vehicles arriving for service and ensure the queues do not spill beyond the site on to City streets.

Conclusions

The proposed site plan for Magnussen's Toyota of Mountain View provides sufficient on-site queuing capacity to meet the anticipated/observed demand of customers accessing the site for servicing their vehicles. The contingency plan ensures that the on-site queues do not spill to the City streets leading to traffic congestion and safety issues. Therefore, it can be concluded that no further traffic analysis is needed for the proposed Magnussen's Toyota of Mountain View site.

Attachments:

Appendix A – Proposed Site Plan.

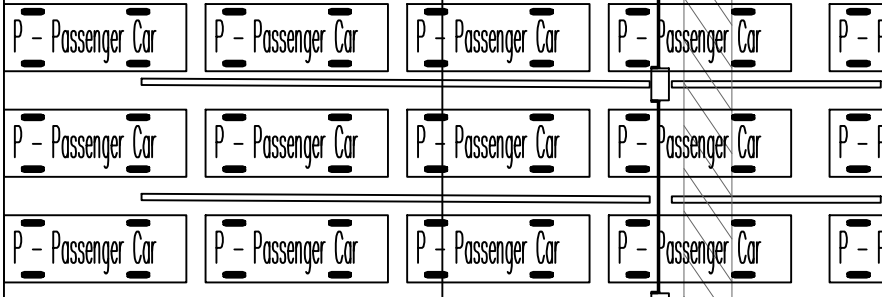
Appendix B – Queuing Data

Appendix A – Proposed Site Plan

Lane 3

Lane 2

Lane 1



PATH FOLLOWED BY
SERVICE VEHICLES IF
THE SERVICE LANES
ARE OCCUPIED

12.5'

N4°10'23"E 357.82'

4.6'

12.1'

12.1'

D

E

C

B

A

Appendix B – Queuing Data



Date: Saturday, April 20th, 2024
 Location: Toyota Service Center Bay - 690 San Antonio Rd, Palo Alto
 Time: 7:00AM-6:00PM

Lane 1 (Near Building)						Lane 2 (Middle Lane)						Lane 3 (Last Lane)					
Time	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue	PM Average	Time	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue	PM Average	Time	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue	PM Average
7:00	1	1				7:00	1	4				7:00	1	4			
7:15	1	1				7:15	1	2				7:15	1	3			
7:30	1	1	1	1		7:30	0	0	1	2		7:30	1	1	1	2	
7:45	1	1				7:45	1	1				7:45	1	1			
8:00	1	1				8:00	1	1				8:00	1	1			
8:15	0	0				8:15	1	2				8:15	1	1			
8:30	1	1	1	1		8:30	1	1	1	1		8:30	1	1	1	1	
8:45	0	0				8:45	1	1				8:45	1	2			
9:00	1	1				9:00	1	1				9:00	1	2			
9:15	1	1				9:15	1	1				9:15	0	0			
9:30	0	0	1	1		9:30	0	0	1	1		9:30	1	1	1	1	
9:45	1	1				9:45	1	1				9:45	1	1			
10:00	1	1				10:00	1	1				10:00	1	1			
10:15	1	1				10:15	1	2				10:15	1	2			
10:30	1	1	1	1		10:30	1	2	1	2		10:30	0	0			
10:45	0	0				10:45	1	1				10:45	0	0			
11:00	0	0				11:00	1	1				11:00	0	0			
11:15	1	1				11:15	1	1	1	1		11:15	0	0			
11:30	0	0				11:30	1	1				11:30	0	0			
11:45	0	0				11:45	0	0				11:45	1	1			
AM Average	1	1	1	1		AM Average	1	1	1	1		AM Average	1	1	1	1	
12:00	0	0				12:00	1	1				12:00	1	1			
12:15	0	0				12:15	1	1				12:15	1	1			
12:30	0	0	0	0		12:30	0	0	1	1		12:30	1	1	1	1	
12:45	0	0				12:45	1	1				12:45	1	1			
13:00	0	0				13:00	1	1				13:00	1	1			
13:15	0	0				13:15	1	1	1	1		13:15	1	1	1	1	
13:30	0	0				13:30	1	1				13:30	1	1			
13:45	0	0				13:45	1	1				13:45	0	0			
14:00	0	0				14:00	1	1				14:00	0	0			
14:15	0	0				14:15	0	0				14:15	0	0			
14:30	0	0	0	0		14:30	0	0	0	1		14:30	1	1	1	1	
14:45	0	0				14:45	0	0				14:45	1	1			
15:00	0	0				15:00	1	1				15:00	0	0			
15:15	0	0				15:15	0	0				15:15	0	0			
15:30	0	0	0	0		15:30	0	0	1	1		15:30	0	0			
15:45	0	0				15:45	1	1				15:45	1	1			
16:00	0	0				16:00	0	0				16:00	1	1			
16:15	0	0				16:15	0	0				16:15	1	1			
16:30	0	0	0	0		16:30	1	1	1	1		16:30	1	1	1	1	
16:45	0	0				16:45	1	1				16:45	1	1			
17:00	0	0				17:00	0	0				17:00	1	1			
17:15	0	0				17:15	0	0	1	1		17:15	1	1	1	1	
17:30	0	0				17:30	1	1	1	1		17:30	1	1	1	1	
17:45	0	0				17:45	1	1	1	1		17:45	1	1	1	1	
PM Average	0	0	0	0		PM Average	1	1	1	1		PM Average	1	1	1	1	



Date: Monday April 22nd, 2024
 Location: Toyota Service Center Bay - 690 San Antonio Rd, Palo Alto
 Time: 7:00AM-6:00PM

Service Bay Lanes

Time	Lane 1 (Near Building)				Lane 2 (Middle Lane)				Lane 3 (Last Lane)					
	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue	Time	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue	Time	Minimum Vehicles In Queue	Max Vehicles In Queue	Average Minimum Queue	Average Max Queue
7:00	0	1	1	0	7:00	1	0	1	0	7:00	1	1	1	1
7:15	0	0	0	0	7:15	1	1	1	1	7:15	1	1	1	1
7:30	0	0	0	0	7:30	1	1	1	1	7:30	0	0	1	1
7:45	0	0	0	0	7:45	1	1	1	1	7:45	1	1	1	1
8:00	0	0	0	0	8:00	1	1	1	1	8:00	1	1	2	1
8:15	0	0	0	0	8:15	0	0	0	0	8:15	1	1	1	1
8:30	0	0	0	0	8:30	1	1	1	1	8:30	0	0	0	1
8:45	0	0	0	0	8:45	1	2	2	2	8:45	1	1	2	1
9:00	0	0	0	0	9:00	1	2	2	2	9:00	1	3	3	1
9:15	0	0	0	0	9:15	1	1	1	1	9:15	1	1	2	3
9:30	0	0	0	0	9:30	1	3	3	3	9:30	1	3	3	1
9:45	0	0	0	0	9:45	1	1	1	1	9:45	1	2	2	1
10:00	0	0	0	0	10:00	1	1	1	1	10:00	1	2	2	1
10:15	0	0	0	0	10:15	0	0	0	0	10:15	1	1	1	2
10:30	0	0	0	0	10:30	1	1	1	1	10:30	1	1	2	1
10:45	0	0	0	0	10:45	0	0	0	0	10:45	1	1	1	1
11:00	1	1	1	1	11:00	1	1	1	1	11:00	0	0	0	0
11:15	1	1	1	1	11:15	0	0	0	0	11:15	0	0	0	0
11:30	1	2	1	1	11:30	1	1	1	1	11:30	0	0	0	0
11:45	0	0	0	0	11:45	0	0	0	0	11:45	0	0	0	0
AM Average	0	0	0	0	AM Average	1	1	1	1	AM Average	1	1	1	1
12:00	1	1	1	1	12:00	0	0	0	0	12:00	1	1	1	1
12:15	1	1	1	1	12:15	0	0	0	0	12:15	1	1	1	1
12:30	1	3	1	2	12:30	0	0	0	0	12:30	0	0	0	1
12:45	1	2	0	0	12:45	0	0	0	0	12:45	0	0	0	1
13:00	0	0	0	0	13:00	1	1	1	1	13:00	1	1	1	1
13:15	0	0	0	0	13:15	1	1	1	1	13:15	1	1	1	1
13:30	0	0	0	0	13:30	1	1	1	1	13:30	1	1	1	1
13:45	0	0	0	0	13:45	1	1	1	1	13:45	1	1	1	1
14:00	0	0	0	0	14:00	1	1	1	1	14:00	1	1	1	1
14:15	1	1	1	1	14:15	1	1	1	1	14:15	1	3	1	2
14:30	1	1	1	1	14:30	1	1	1	1	14:30	1	1	1	1
14:45	0	0	0	0	14:45	1	2	1	1	14:45	1	1	1	1
15:00	0	0	0	0	15:00	0	0	0	0	15:00	1	1	1	1
15:15	0	0	0	0	15:15	1	1	1	1	15:15	0	0	0	1
15:30	0	0	0	0	15:30	1	1	1	1	15:30	1	1	1	1
15:45	0	0	0	0	15:45	1	1	1	1	15:45	1	1	1	1
16:00	1	1	1	1	16:00	0	0	0	0	16:00	1	1	1	1
16:15	0	0	0	0	16:15	1	1	1	1	16:15	1	1	1	1
16:30	1	1	1	1	16:30	1	1	1	1	16:30	1	2	1	1
16:45	1	1	1	1	16:45	1	1	1	1	16:45	1	1	1	1
17:00	1	1	1	1	17:00	1	1	1	1	17:00	1	1	1	1
17:15	1	1	1	1	17:15	1	1	1	1	17:15	1	1	1	1
17:30	1	1	1	1	17:30	1	1	1	1	17:30	0	0	1	1
17:45	0	0	0	0	17:45	1	1	1	1	17:45	1	3	3	1
PM Average	1	1	1	1	PM Average	1	1	1	1	PM Average	1	1	1	1