



TJW ENGINEERING, INC.
TRAFFIC ENGINEERING &
TRANSPORTATION PLANNING
CONSULTANTS

February 3, 2021

Mr. Mike Yao
CORE STATES GROUP
4240 East Jurupa Street, Suite 402
Ontario, CA 91761

Subject: Drive-Through Queue Analysis - 15475 Los Gatos Road McDonalds

Dear Mr. Yao:

TJW ENGINEERING, INC. (TJW) is pleased to submit this drive-through queue analysis for the proposed circulation and drive-through configuration changes at the McDonalds restaurant at 15475 Los Gatos Road in the City of Los Gatos. This report summarizes the results of site queue observations conducted at two comparable McDonalds location with two order boards.

Appendix A contains the proposed site plan for the McDonalds restaurant at 15475 Los Gatos Road.

Drive-Through Queue Analysis Methodology

Peak periods for McDonalds restaurants are typically weekdays in the morning, lunchtime, and in the evening. Therefore, site queue observations were conducted on a weekday from 6:00-9:00 AM, 11:00 AM-2:00 PM, and 4:30-7:30 PM. Data was collected in 5-minute increments at three comparable McDonalds locations with drive-through configurations similar to the proposed project modifications.

The data collection resulted in sample size of 108 weekday data points at each location for a total of 324 data points. The data collected can be used to determine the 85th percentile queue length, which is typically used to determine the appropriate vehicle stacking needed for drive through restaurants.

Comparative Sites

Comparable sites for drive-through queue analysis were determined based on discussions with the project applicant. Drive-through queue and operational information was collected at the following three McDonalds sites:

- *Danville McDonalds* located at 10000 Crow Canyon Road, Danville CA
- *Pleasant Hill McDonalds* located at 1690 Contra Costa Blvd, Pleasant Hill, CA

- *San Ramon McDonalds* located at 2481 San Ramon Valley Blvd., San Ramon CA

The *Danville McDonalds* consists of two drive through lanes that merge into one lane. The drive-through is served by two order boards, similar to the proposed modifications at the Los Gatos location. Data was collected at the Danville site on Thursday, April 11, 2019.

The *Pleasant Hill McDonalds* consists of two drive through lanes that merge into one lane. The drive-through is served by two order boards, similar to the proposed modifications at the Los Gatos location. Data was collected at the Pleasant Hill site on Thursday, April 11, 2019.

At the time data was collected, the *San Ramon McDonalds* consisted of a single drive through lane with one order board. Data was collected at the San Ramon site on Thursday, April 11, 2019.

Figure 1: Danville McDonalds Site



Figure 2: Pleasant Hill McDonalds Site

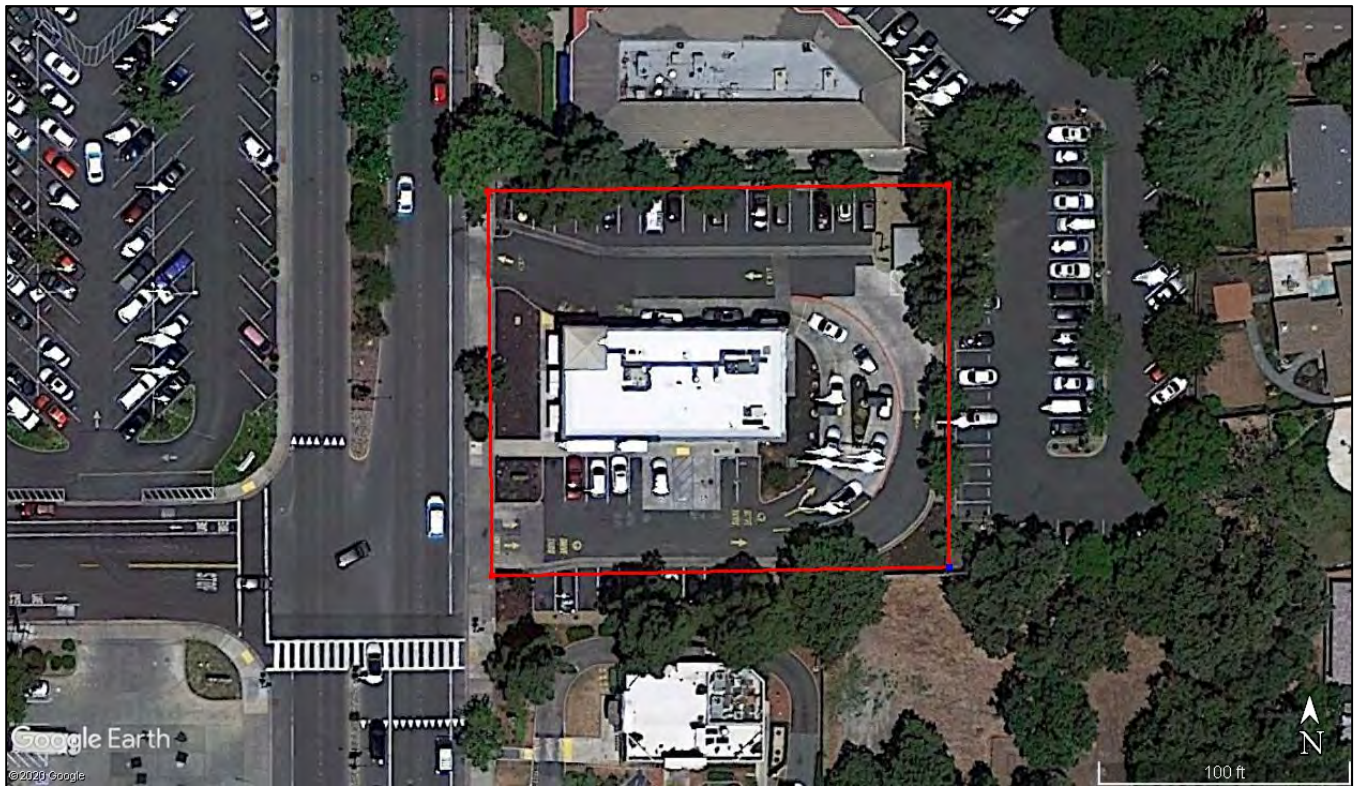


Figure 3: San Ramon McDonalds Site



The drive-through queue was observed and recorded at each of the survey sites during the following time periods, which correspond with typical peak periods of demand at McDonalds restaurants:

- Thursday morning from 6:00 AM to 9:00 AM
- Thursday mid-day from 11:00 AM to 2:00 PM; and
- Thursday evening from 4:30 PM to 7:30 PM.

The queue was recorded in five-minute increments resulting in 108 data points per site and a total of 324 observation points overall. For each 5-minute interval, the highest queue observed within the interval was recorded.

Drive-Through Queue Observation Results

Based on the collected data, **Table 1** shows the number of times a certain queue length occurred and the probability of that queue length not being exceeded. Complete observation data is provided in **Appendix B**.

Table 1: Summary of Drive-Through Queue Observations and Analysis

Drive-Through Queue Analysis			
Queue Length (Vehicles)	Number of Occurrences	Total Number of Data Points	Probability of Exceeding Queue Length
0	32	32	90.12%
1	44	76	76.54%
2	50	126	61.11%
3	35	161	50.31%
4	35	196	39.51%
5	44	240	25.93%
6	23	263	18.83%
7	21	284	12.35%
8	20	304	6.17%
9	11	315	2.78%
10	4	319	1.54%
11	4	323	0.31%
12	0	323	0.31%
13	1	324	0.00%
85th Percentile Info			
Queue Length: 7 Vehicles		Data Point: 276th	

When determining the appropriate queue storage, a drive-through should typically be designed to accommodate the 85th percentile queue length. Based on the data collected at the three comparable sites, the 85th percentile queue length is seven (7) vehicles which occurred at the 276th data point. The maximum observed queue was thirteen (13) vehicles occurring one time.

As shown in potential queue management exhibit in **Appendix A**, the proposed site reconfiguration will construct a single lane drive-through with two order boards and a single pick-up window. The drive-through lane will have room for approximately 8 vehicles before it would spill into the nearest drive aisle. This capacity would meet the 85th percentile queue observed at the comparable sites.

While the proposed drive-through configuration will accommodate the 85th percentile queue, TJW recommends that the site have a queue management plan in place for periods in which a longer queue may form. Potential forms of queue management could include restaurant staff taking orders via tablets and directing traffic. Vehicles in the drive-through queue should be directed to pull forward, keep driveway aisles clear, and not block existing parking spaces. This would help maximize the capacity of the drive-through while maintaining on-site circulation. **Appendix A** contains potential forms of queue management to be considered for the proposed site reconfiguration.

Conclusion

The proposed project at the McDonalds restaurant at 15475 Los Gatos Road will reconfigure the existing restaurant and construct a single lane drive-through with two order boards. The drive-through will have the capacity for approximately eight (8) vehicles before spilling into the nearest driveway aisle. Based on data from three comparable sites, the proposed drive-through lane will accommodate the observed 85th percentile queue length which is seven (7) vehicles.

Please contact us at (949) 878-3509 if you have any questions regarding this analysis.

Sincerely,



Thomas Wheat, PE, TE
President

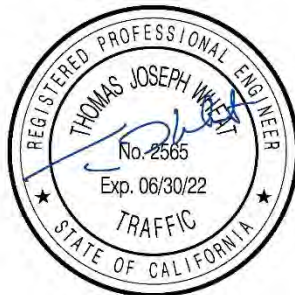


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Jeffrey Chinchilla, PE
Project Engineer



APPENDIX A

SITE PLAN/QUEUE MANAGEMENT

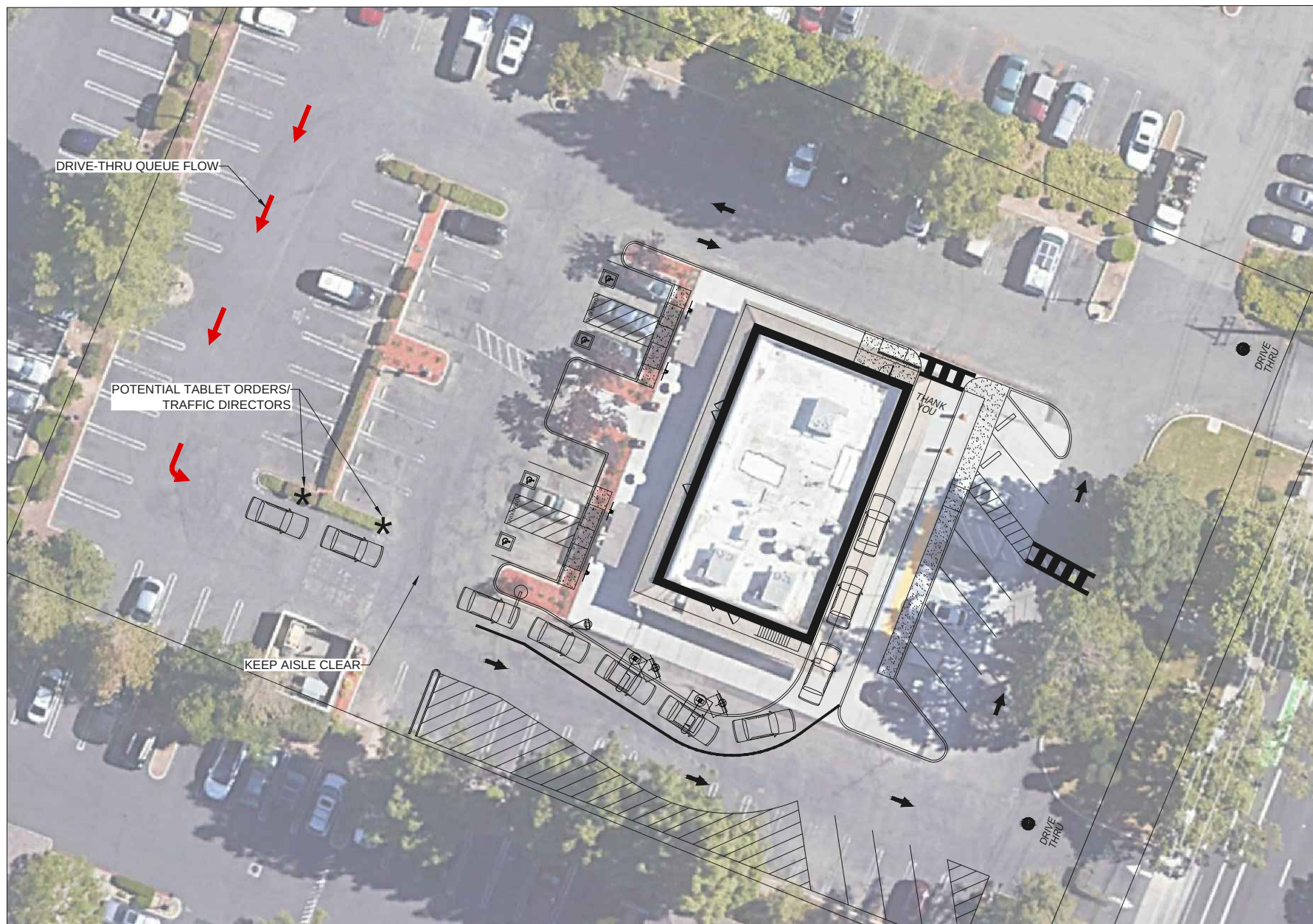


Exhibit 2: Potential Queue Management



15475 Los Gatos Road McDonalds
Drive-Through Queue Analysis

CSG-21-001



APPENDIX B

DRIVE-THROUGH QUEUE DATA

McDonalds
 10000 Crow Canyon Road
 Danville, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
6:00 AM	1	0	0	1
6:05 AM	0	0	0	0
6:10 AM	1	0	0	1
6:15 AM	0	0	0	0
6:20 AM	2	0	0	2
6:25 AM	0	0	0	0
6:30 AM	1	0	0	1
6:35 AM	0	0	0	0
6:40 AM	1	0	0	1
6:45 AM	3	0	1	4
6:50 AM	1	0	0	1
6:55 AM	0	0	0	0
7:00 AM	1	0	0	1
7:05 AM	3	0	0	3
7:10 AM	0	0	0	0
7:15 AM	2	0	0	2
7:20 AM	0	0	1	1
7:25 AM	1	0	0	1
7:30 AM	2	0	0	2
7:35 AM	0	1	0	1
7:40 AM	2	0	0	2
7:45 AM	0	0	1	1
7:50 AM	0	0	1	1
7:55 AM	0	0	0	0
8:00 AM	0	1	0	1
8:05 AM	3	0	0	3
8:10 AM	0	0	1	1
8:15 AM	3	0	0	3
8:20 AM	3	0	0	3
8:25 AM	0	0	2	2
8:30 AM	3	0	1	4
8:35 AM	1	0	0	1
8:40 AM	0	0	2	2
8:45 AM	0	0	0	0
8:50 AM	1	0	0	1
8:55 AM	1	0	1	2

McDonalds
 10000 Crow Canyon Road
 Danville, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
11:00 AM	2	0	0	2
11:05 AM	0	0	1	1
11:10 AM	0	0	1	1
11:15 AM	0	0	0	0
11:20 AM	0	0	0	0
11:25 AM	0	0	0	0
11:30 AM	1	0	0	1
11:35 AM	0	0	0	0
11:40 AM	0	0	0	0
11:45 AM	4	1	3	8
11:50 AM	6	0	0	6
11:55 AM	3	1	1	5
12:00 PM	3	1	1	5
12:05 PM	0	0	0	0
12:10 PM	5	0	0	5
12:15 PM	2	0	2	4
12:20 PM	2	1	2	5
12:25 PM	7	0	1	8
12:30 PM	3	0	1	4
12:35 PM	2	1	0	3
12:40 PM	3	1	1	5
12:45 PM	4	1	3	8
12:50 PM	2	1	1	4
12:55 PM	4	0	1	5
1:00 PM	2	1	1	4
1:05 PM	4	0	1	5
1:10 PM	1	0	2	3
1:15 PM	0	1	2	3
1:20 PM	5	0	0	5
1:25 PM	0	0	1	1
1:30 PM	2	0	0	2
1:35 PM	1	0	0	1
1:40 PM	2	0	0	2
1:45 PM	4	1	0	5
1:50 PM	0	0	0	0
1:55 PM	2	0	0	2

McDonalds
 10000 Crow Canyon Road
 Danville, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
4:30 PM	1	1	0	2
4:35 PM	3	0	0	3
4:40 PM	2	0	0	2
4:45 PM	1	0	0	1
4:50 PM	0	0	0	0
4:55 PM	0	0	0	0
5:00 PM	2	1	2	5
5:05 PM	6	1	2	9
5:10 PM	6	0	1	7
5:15 PM	3	0	1	4
5:20 PM	3	1	1	5
5:25 PM	4	0	0	4
5:30 PM	4	2	1	7
5:35 PM	2	0	0	2
5:40 PM	4	1	1	6
5:45 PM	3	0	0	3
5:50 PM	6	0	1	7
5:55 PM	0	1	2	3
6:00 PM	2	0	1	3
6:05 PM	1	0	0	1
6:10 PM	4	0	0	4
6:15 PM	3	4	4	11
6:20 PM	5	3	1	9
6:25 PM	5	0	0	5
6:30 PM	6	1	1	8
6:35 PM	3	1	1	5
6:40 PM	2	0	0	2
6:45 PM	4	1	2	7
6:50 PM	6	0	1	7
6:55 PM	3	0	0	3
7:00 PM	2	0	0	2
7:05 PM	1	0	0	1
7:10 PM	0	0	0	0
7:15 PM	0	0	0	0
7:20 PM	1	0	1	2
7:25 PM	1	0	0	1

McDonalds
 1690 Contra Costa Blvd
 Pleasant Hill, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
6:00 AM	0	0	0	0
6:05 AM	2	0	0	2
6:10 AM	1	1	0	2
6:15 AM	1	0	0	1
6:20 AM	2	0	0	2
6:25 AM	0	0	0	0
6:30 AM	0	0	0	0
6:35 AM	0	0	0	0
6:40 AM	2	0	0	2
6:45 AM	2	0	0	2
6:50 AM	0	1	0	1
6:55 AM	2	0	0	2
7:00 AM	3	0	0	3
7:05 AM	0	0	0	0
7:10 AM	0	1	0	1
7:15 AM	0	0	1	1
7:20 AM	3	0	0	3
7:25 AM	1	1	0	2
7:30 AM	5	1	0	6
7:35 AM	6	1	1	8
7:40 AM	3	0	0	3
7:45 AM	3	0	0	3
7:50 AM	1	0	0	1
7:55 AM	3	1	0	4
8:00 AM	1	0	0	1
8:05 AM	5	1	0	6
8:10 AM	5	0	0	5
8:15 AM	6	0	0	6
8:20 AM	6	3	0	9
8:25 AM	6	2	2	10
8:30 AM	6	2	1	9
8:35 AM	5	1	0	6
8:40 AM	0	0	0	0
8:45 AM	2	0	0	2
8:50 AM	0	1	1	2
8:55 AM	1	1	0	2

McDonalds
 1690 Contra Costa Blvd
 Pleasant Hill, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
11:00 AM	2	0	0	2
11:05 AM	0	1	0	1
11:10 AM	4	0	0	4
11:15 AM	2	1	0	3
11:20 AM	2	0	0	2
11:25 AM	3	0	0	3
11:30 AM	1	0	0	1
11:35 AM	2	1	1	4
11:40 AM	1	0	0	1
11:45 AM	0	0	0	0
11:50 AM	0	0	0	0
11:55 AM	1	0	0	1
12:00 PM	1	0	1	2
12:05 PM	2	1	0	3
12:10 PM	1	2	1	4
12:15 PM	4	1	0	5
12:20 PM	3	1	1	5
12:25 PM	3	0	0	3
12:30 PM	4	2	1	7
12:35 PM	5	0	0	5
12:40 PM	3	1	0	4
12:45 PM	1	1	0	2
12:50 PM	5	0	0	5
12:55 PM	5	2	2	9
1:00 PM	4	1	0	5
1:05 PM	6	1	1	8
1:10 PM	1	1	1	3
1:15 PM	2	1	0	3
1:20 PM	5	1	0	6
1:25 PM	2	0	0	2
1:30 PM	1	1	0	2
1:35 PM	3	0	0	3
1:40 PM	2	0	0	2
1:45 PM	1	0	0	1
1:50 PM	2	2	0	4
1:55 PM	2	2	2	6

McDonalds
 1690 Contra Costa Blvd
 Pleasant Hill, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Left Line Queue Order Board Back	Right Line Queue Order Board Back	Total Queue
4:30 PM	1	0	1	2
4:35 PM	2	0	0	2
4:40 PM	0	1	0	1
4:45 PM	4	1	0	5
4:50 PM	1	0	0	1
4:55 PM	2	2	3	7
5:00 PM	6	2	0	8
5:05 PM	4	2	1	7
5:10 PM	3	0	0	3
5:15 PM	2	1	0	3
5:20 PM	3	1	1	5
5:25 PM	1	1	0	2
5:30 PM	0	0	0	0
5:35 PM	0	0	0	0
5:40 PM	4	1	0	5
5:45 PM	1	0	0	1
5:50 PM	0	0	0	0
5:55 PM	1	0	0	1
6:00 PM	5	0	0	5
6:05 PM	2	1	0	3
6:10 PM	3	1	0	4
6:15 PM	3	1	1	5
6:20 PM	1	1	0	2
6:25 PM	0	2	0	2
6:30 PM	4	1	0	5
6:35 PM	1	1	0	2
6:40 PM	2	2	1	5
6:45 PM	2	1	1	4
6:50 PM	3	1	1	5
6:55 PM	1	1	0	2
7:00 PM	3	0	0	3
7:05 PM	2	0	1	3
7:10 PM	4	0	0	4
7:15 PM	1	1	0	2
7:20 PM	0	0	0	0
7:25 PM	2	0	0	2

McDonalds
 2481 San Ramon Valley Road
 San Ramon, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Total Line Queue Order Board Back	Total Queue
6:00 AM	1	0	1
6:05 AM	1	1	2
6:10 AM	1	1	2
6:15 AM	3	2	5
6:20 AM	4	0	4
6:25 AM	3	5	8
6:30 AM	5	6	11
6:35 AM	3	3	6
6:40 AM	2	1	3
6:45 AM	2	1	3
6:50 AM	5	2	7
6:55 AM	4	4	8
7:00 AM	3	3	6
7:05 AM	3	3	6
7:10 AM	3	1	4
7:15 AM	3	5	8
7:20 AM	3	3	6
7:25 AM	2	2	4
7:30 AM	1	0	1
7:35 AM	2	0	2
7:40 AM	3	2	5
7:45 AM	2	2	4
7:50 AM	4	3	7
7:55 AM	2	2	4
8:00 AM	3	1	4
8:05 AM	2	5	7
8:10 AM	4	2	6
8:15 AM	3	1	4
8:20 AM	0	0	0
8:25 AM	1	1	2
8:30 AM	3	3	6
8:35 AM	3	3	6
8:40 AM	3	0	3
8:45 AM	2	1	3
8:50 AM	1	0	1
8:55 AM	1	1	2

McDonalds
 2481 San Ramon Valley Road
 San Ramon, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Total Line Queue Order Board Back	Total Queue
11:00 AM	1	6	7
11:05 AM	1	7	8
11:10 AM	4	6	10
11:15 AM	3	10	13
11:20 AM	4	7	11
11:25 AM	3	5	8
11:30 AM	2	7	9
11:35 AM	3	6	9
11:40 AM	2	6	8
11:45 AM	4	7	11
11:50 AM	2	5	7
11:55 AM	3	3	6
12:00 PM	3	6	9
12:05 PM	4	5	9
12:10 PM	2	7	9
12:15 PM	3	5	8
12:20 PM	4	1	5
12:25 PM	2	2	4
12:30 PM	1	0	1
12:35 PM	3	3	6
12:40 PM	3	5	8
12:45 PM	5	3	8
12:50 PM	4	3	7
12:55 PM	2	1	3
1:00 PM	1	3	4
1:05 PM	4	2	6
1:10 PM	3	7	10
1:15 PM	4	0	4
1:20 PM	3	0	3
1:25 PM	3	1	4
1:30 PM	2	0	2
1:35 PM	2	0	2
1:40 PM	3	1	4
1:45 PM	4	2	6
1:50 PM	4	6	10
1:55 PM	3	5	8

McDonalds
 2481 San Ramon Valley Road
 San Ramon, CA
 4/11/2019

Time	Queue Pick-up to Order Board	Total Line Queue Order Board Back	Total Queue
4:30 PM	4	5	9
4:35 PM	4	1	5
4:40 PM	4	1	5
4:45 PM	4	1	5
4:50 PM	3	4	7
4:55 PM	3	1	4
5:00 PM	1	0	1
5:05 PM	3	1	4
5:10 PM	4	0	4
5:15 PM	2	4	6
5:20 PM	4	4	8
5:25 PM	4	2	6
5:30 PM	3	2	5
5:35 PM	4	1	5
5:40 PM	3	1	4
5:45 PM	3	4	7
5:50 PM	4	4	8
5:55 PM	4	1	5
6:00 PM	3	2	5
6:05 PM	3	2	5
6:10 PM	2	3	5
6:15 PM	4	1	5
6:20 PM	1	2	3
6:25 PM	3	3	6
6:30 PM	3	3	6
6:35 PM	4	4	8
6:40 PM	2	2	4
6:45 PM	4	3	7
6:50 PM	3	2	5
6:55 PM	2	3	5
7:00 PM	2	3	5
7:05 PM	4	3	7
7:10 PM	3	4	7
7:15 PM	4	3	7
7:20 PM	4	3	7
7:25 PM	3	2	5