

MEMORANDUM

Date: October 13, 2022 **TG:** 1.22356.00

To: Nick Wecker – Barghausen Consulting Engineers

From: Kassi Leingang, PE – Transpo Group

Subject: Arlington Brown Bear – Traffic Analysis

This memorandum summarizes the results of the trip generation and queueing study completed for the proposed Arlington Brown Bear project. This memorandum includes an overview of the project, project trip generation, queueing analysis, and estimates the traffic impact fee.

Project Description

The project site is located east of 43rd Avenue NE, south of 172nd Street NE in Arlington. The proposed project would construct a single carwash tunnel (2,550 square feet) with four (4) vacuum stations (see Figure 1). The site is an unoccupied lot adjacent to existing commercial uses with access provided via an existing driveway along 43rd Avenue NE as well as an existing north/south internal roadway along the western side of the site connecting to the adjacent commercial developments. Circulation for the carwash tunnel is proposed to be counterclockwise with the entrance located on the northeast corner of the site.

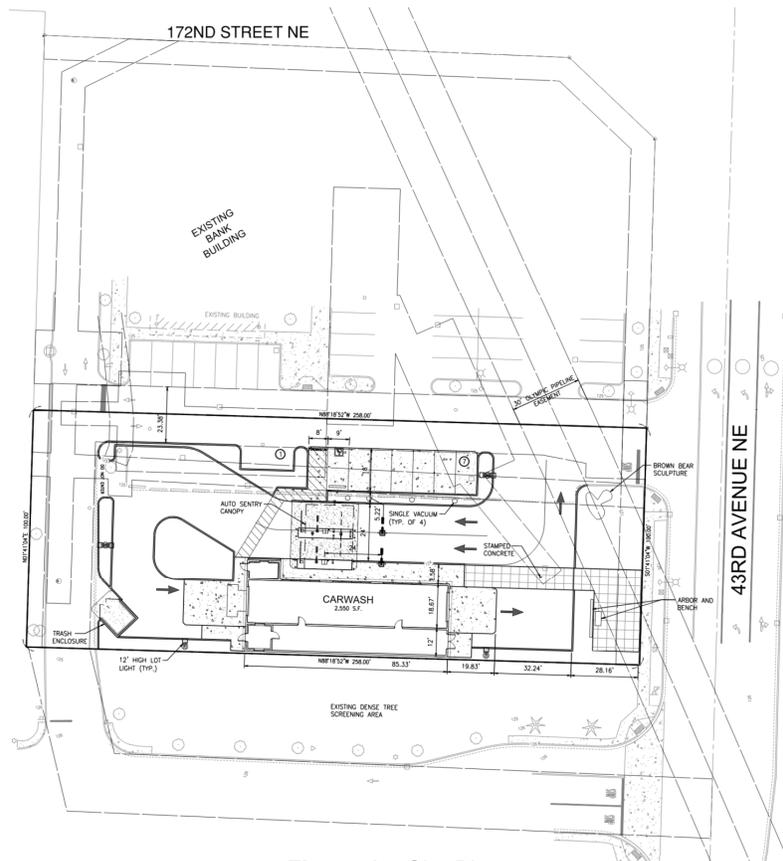


Figure 1 – Site Plan

Trip Generation

The trip generation for the proposed project was estimated based on traffic counts conducted at an existing Brown Bear site with similar features. Counts were conducted at the existing Brown Bear facility in Sammamish which includes a single car wash tunnel and detail express stalls (vacuuming stations) consistent with the proposed project. The counts took place in October 2019 on two mid-weekdays as well as one Saturday for the full day.¹ Table 1 shows the observed daily and peak hour trips generated by the site during both the weekday and Saturday. Given the sites are similar in services and capacity, the observed traffic volumes are consistent with the projections for the proposed project.

¹ The detailed counts conducted by TENW at the Sammamish Brown Bear facility is provided in Attachment A.

The observed trip generation was validated based on the data available in Institute of Transportation Engineers (ITE) *Trip Generation Manual* (11th Edition, 2021) and is shown in Table 1. ITE's Automated Car Wash (LU #948) land use includes limited data for the weekday PM and Saturday peak hours but does not provide studies for daily.

Table 1. Trip Generation Estimates

Source	Weekday				Saturday			
	Daily	PM Peak Hour ³			Daily	Peak Hour ⁴		
		In	Out	Total		In	Out	Total
Local Observations¹	680	41	40	81	526	57	55	112
ITE's Automated Carwash (LU #948)²	NA	39	39	78	NA	19	22	41

1. Local observations as completed at the Brown Bear facility in Sammamish in October 2019 by TENW on two mid-weekdays.
2. Institute of Transportation Engineers (ITE) *Trip Generation Manual* (11th Edition, 2021) for Automated Car Wash (LU #948). No data available for the daily.
3. The weekday PM peak hour is the peak hour that occurs within 4-6 p.m.
4. The peak hour throughout the Saturday. The observations showed this hour to occur in the evening from 4:15-5:15 p.m. ITE did not specify when the peak hour occurred.

As shown in Table 1, the average weekday PM peak hour trip generation rate as observed at the Sammamish Brown Bear facility for a single carwash tunnel, consistent with the proposed project, is 81 trips. This is similar to the forecast trip generation using ITE for the proposed single carwash tunnel, with 78 trips during the weekday PM peak hour. Additionally, the single carwash tunnel was observed to generate 680 weekday daily trips. Traffic volumes on a Saturday are forecast to generate fewer daily trips than the weekday but with a higher peak hour.

Queueing

The observations at the Sammamish Brown Bear facility in October 2019 also included a review of queueing (number of vehicles queued to use the carwash) for both the weekdays and Saturday. The observations showed a maximum queue of 4 vehicles on both observed weekdays and a maximum queue of 7 vehicles on the Saturday. Queueing is related to the density of arrivals, that is, the more vehicles that arrival in a brief period of time, the higher probability of queueing, projected traffic volumes, and capacity of the service tunnel.

Figure 2 illustrates the proposed site configuration can accommodate 12 vehicles² queued to use the carwash (excluding a vehicle activity using the carwash) which well exceeds the observed queueing at a similar Brown Bear facility. The maximum observed queue of 7 vehicles is approximately 60 percent of the available queueing storage at the proposed site.

² The vehicle size is 19' long by 7' wide, consistent with AASHTO's passenger car design vehicle.

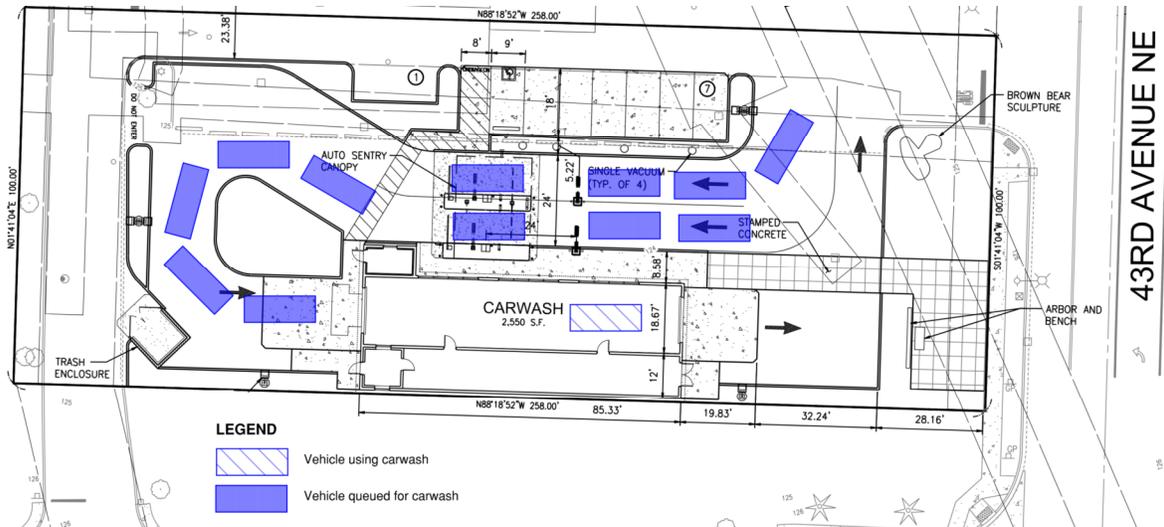


Figure 2 – On-Site Queue Capacity

Traffic Impact Fee

The project would pay traffic impact fees to the City of Arlington. The City has identified a traffic impact fee of \$3,355 per PM peak hour trip.³ Based on the estimated trip generation above assuming the observations of a similar Brown Bear facility, the project is anticipated to generate 81 weekday PM peak hour trips, which equates to an estimated traffic impact fee of \$271,755. The City will calculate the final fee at time of permit issuance. The fee will be based on the impact fee rates in effect at the time of building permit issuance.

Summary and Findings

The proposed project would construct a Brown Bear with a single carwash tunnel and 4 vacuuming stations which is anticipated to generate 680 weekday daily trips with approximately 81 occurring during the weekday PM peak hour. Additionally, based on a review of queuing, the proposed site would accommodate the peak queuing demand such that no off-site impacts are anticipated.

³ Traffic impact fee per *City of Arlington Impact and Mitigation Fees* (Revised 12/2020).

Attachment A: Brown Bear Observations

Brown Bear Car Wash¹
Existing Trip Generation and Maximum Queues Summary - Weekday Daily
Wednesday 10/23/19 and Thursday 10/24/19

Day	Weekday Daily Trip Generation			Maximum Vehicle Queue Observed	
	In	Out	Total	Time Period	Max Queue (Veh)
Wednesday - October 23, 2019	384	384	768	1:00-2:00 p.m.	4
Thursday - October 24, 2019	295	295	590	4:00-5:00 p.m.	4
2-Day Average			679		

Note:

1. The existing Brown Bear Car Wash is located at 3050 228th Ave SE in the City of Sammamish.

Brown Bear Car Wash (3050 228th Ave SE, Sammamish, WA)
Existing Trip Generation Summary - Daily
Wednesday - October 23, 2019

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips			
	In	Out	In	Out	In	Out	Total	
7:00 AM	0	0	1	1	1	1	2	
7:15 AM	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	2 7:00 - 8:00 a.m.
8:00 AM	2	2	1	0	3	2	5	5 7:15 - 8:15 a.m.
8:15 AM	4	4	1	2	5	6	11	16 7:30 - 8:30 a.m.
8:30 AM	2	2	0	0	2	2	4	20 7:45 - 8:45 a.m.
8:45 AM	2	2	1	0	3	2	5	25 8:00 - 9:00 a.m.
9:00 AM	3	3	0	1	3	4	7	27 8:15 - 9:15 a.m.
9:15 AM	6	6	0	0	6	6	12	28 8:30 - 9:30 a.m.
9:30 AM	3	3	0	0	3	3	6	30 8:45 - 9:45 a.m.
9:45 AM	5	5	0	0	5	5	10	35 9:00 - 10:00 a.m.
10:00 AM	9	9	3	1	12	10	22	50 9:15 - 10:15 a.m.
10:15 AM	10	10	1	2	11	12	23	61 9:30 - 10:30 a.m.
10:30 AM	8	8	0	1	8	9	17	72 9:45 - 10:45 a.m.
10:45 AM	9	9	1	1	10	10	20	82 10:00 - 11:00 a.m.
11:00 AM	6	6	2	2	8	8	16	76 10:15 - 11:15 a.m.
11:15 AM	9	9	3	1	12	10	22	75 10:30 - 11:30 a.m.
11:30 AM	7	7	2	3	9	10	19	77 10:45 - 11:45 a.m.
11:45 AM	5	5	0	1	5	6	11	68 11:00 - 12:00 p.m.
12:00 PM	7	7	1	0	8	7	15	67 11:15 - 12:15 a.m.
12:15 PM	8	8	1	2	9	10	19	64 11:30 - 12:30 a.m.
12:30 PM	8	8	2	1	10	9	19	64 11:45 - 12:45 a.m.
12:45 PM	11	11	1	1	12	12	24	77 12:00 - 1:00 p.m.
1:00 PM	9	9	1	1	10	10	20	82 12:15 - 1:15 p.m.
1:15 PM	8	8	0	1	8	9	17	80 12:30 - 1:30 p.m.
1:30 PM	5	5	0	0	5	5	10	71 12:45 - 1:45 p.m.
1:45 PM	10	10	3	1	13	11	24	71 1:00 - 2:00 p.m.
2:00 PM	9	9	1	2	10	11	21	72 1:15 - 2:15 p.m.
2:15 PM	9	9	1	0	10	9	19	74 1:30 - 2:30 p.m.
2:30 PM	12	12	1	1	13	13	26	90 1:45 - 2:45 p.m.
2:45 PM	7	7	1	3	8	10	18	84 2:00 - 3:00 p.m.
3:00 PM	13	13	2	0	15	13	28	91 2:15 - 3:15 p.m.
3:15 PM	10	10	1	1	11	11	22	94 2:30 - 3:30 p.m.
3:30 PM	9	9	1	3	10	12	22	90 2:45 - 3:45 p.m.
3:45 PM	10	10	0	2	10	12	22	94 3:00 - 4:00 p.m.
4:00 PM	10	10	2	0	12	10	22	88 3:15 - 4:15 p.m.
4:15 PM	11	11	1	1	12	12	24	90 3:30 - 4:30 p.m.
4:30 PM	13	13	2	2	15	15	30	98 3:45 - 4:45 p.m.
4:45 PM	9	9	2	1	11	10	21	97 4:00 - 5:00 p.m.
5:00 PM	16	16	2	2	18	18	36	111 4:15 - 5:15 p.m.
5:15 PM	7	7	3	3	10	10	20	107 4:30 - 5:30 p.m.
5:30 PM	10	10	0	1	10	11	21	98 4:45 - 5:45 p.m.
5:45 PM	2	2	0	0	2	2	4	81 5:00 - 6:00 p.m.
6:00 PM	10	10	2	1	12	11	23	68 5:15 - 6:15 p.m.
6:15 PM	3	3	1	2	4	5	9	57 5:30 - 6:30 p.m.
6:30 PM	2	2	1	1	3	3	6	42 5:45 - 6:45 p.m.
6:45 PM	4	4	1	0	5	4	9	47 6:00 - 7:00 p.m.
7:00 PM	1	1	0	1	1	2	3	27 6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	18 6:30 - 7:30 p.m.
7:30 PM	0	0	1	0	1	0	1	13 6:45 - 7:45 p.m.
7:45 PM	0	0	0	1	0	1	1	5 7:00 - 8:00 p.m.
Total	333	333	51	51	384	384	768	

Brown Bear Car Wash (3050 228th Ave SE, Sammamish, WA)
Existing Trip Generation Summary - Daily
Thursday - October 24, 2019

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips			Hourly Totals
	In	Out	In	Out	In	Out	Total	
7:00 AM	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	
7:45 AM	1	1	0	0	1	1	2	2 7:00 - 8:00 a.m.
8:00 AM	3	3	0	0	3	3	6	8 7:15 - 8:15 a.m.
8:15 AM	2	2	1	0	3	2	5	13 7:30 - 8:30 a.m.
8:30 AM	3	3	0	1	3	4	7	20 7:45 - 8:45 a.m.
8:45 AM	4	4	0	0	4	4	8	26 8:00 - 9:00 a.m.
9:00 AM	3	3	0	0	3	3	6	26 8:15 - 9:15 a.m.
9:15 AM	4	4	2	0	6	4	10	31 8:30 - 9:30 a.m.
9:30 AM	9	9	1	2	10	11	21	45 8:45 - 9:45 a.m.
9:45 AM	8	8	2	1	10	9	19	56 9:00 - 10:00 a.m.
10:00 AM	4	4	1	1	5	5	10	60 9:15 - 10:15 a.m.
10:15 AM	6	6	0	2	6	8	14	64 9:30 - 10:30 a.m.
10:30 AM	6	6	1	0	7	6	13	56 9:45 - 10:45 a.m.
10:45 AM	7	7	3	1	10	8	18	55 10:00 - 11:00 a.m.
11:00 AM	6	6	0	3	6	9	15	60 10:15 - 11:15 a.m.
11:15 AM	8	8	0	0	8	8	16	62 10:30 - 11:30 a.m.
11:30 AM	7	7	0	0	7	7	14	63 10:45 - 11:45 a.m.
11:45 AM	6	6	1	0	7	6	13	58 11:00 - 12:00 p.m.
12:00 PM	9	9	1	1	10	10	20	63 11:15 - 12:15 a.m.
12:15 PM	6	6	1	1	7	7	14	61 11:30 - 12:30 a.m.
12:30 PM	7	7	2	1	9	8	17	64 11:45 - 12:45 a.m.
12:45 PM	7	7	0	1	7	8	15	66 12:00 - 1:00 p.m.
1:00 PM	12	12	3	2	15	14	29	75 12:15 - 1:15 p.m.
1:15 PM	7	7	1	2	8	9	17	78 12:30 - 1:30 p.m.
1:30 PM	9	9	2	2	11	11	22	83 12:45 - 1:45 p.m.
1:45 PM	4	4	1	2	5	6	11	79 1:00 - 2:00 p.m.
2:00 PM	5	5	1	1	6	6	12	62 1:15 - 2:15 p.m.
2:15 PM	9	9	0	0	9	9	18	63 1:30 - 2:30 p.m.
2:30 PM	8	8	2	1	10	9	19	60 1:45 - 2:45 p.m.
2:45 PM	8	8	0	1	8	9	17	66 2:00 - 3:00 p.m.
3:00 PM	7	7	0	0	7	7	14	68 2:15 - 3:15 p.m.
3:15 PM	7	7	2	2	9	9	18	68 2:30 - 3:30 p.m.
3:30 PM	11	11	2	0	13	11	24	73 2:45 - 3:45 p.m.
3:45 PM	5	5	0	2	5	7	12	68 3:00 - 4:00 p.m.
4:00 PM	9	9	2	0	11	9	20	74 3:15 - 4:15 p.m.
4:15 PM	4	4	0	0	4	4	8	64 3:30 - 4:30 p.m.
4:30 PM	5	5	1	2	6	7	13	53 3:45 - 4:45 p.m.
4:45 PM	4	4	0	1	4	5	9	50 4:00 - 5:00 p.m.
5:00 PM	2	2	0	0	2	2	4	34 4:15 - 5:15 p.m.
5:15 PM	6	6	1	1	7	7	14	40 4:30 - 5:30 p.m.
5:30 PM	5	5	0	0	5	5	10	37 4:45 - 5:45 p.m.
5:45 PM	4	4	0	0	4	4	8	36 5:00 - 6:00 p.m.
6:00 PM	6	6	0	0	6	6	12	44 5:15 - 6:15 p.m.
6:15 PM	4	4	1	1	5	5	10	40 5:30 - 6:30 p.m.
6:30 PM	2	2	0	0	2	2	4	34 5:45 - 6:45 p.m.
6:45 PM	0	0	0	0	0	0	0	26 6:00 - 7:00 p.m.
7:00 PM	0	0	0	0	0	0	0	14 6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	4 6:30 - 7:30 p.m.
7:30 PM	0	0	0	0	0	0	0	0 6:45 - 7:45 p.m.
7:45 PM	0	0	1	1	1	1	2	2 7:00 - 8:00 p.m.
Total	259	259	36	36	295	295	590	

Brown Bear Car Wash¹
Existing Trip Generation and Maximum Queues Summary - Saturday Daily
Saturday 10/26/19

Day	Weekday Daily Trip Generation			Maximum Vehicle Queue Observed	
	In	Out	Total	Time Period	Max Queue (Veh)
Saturday - October 26, 2019	263	263	526	4:15 - 5:15 p.m.	7
Total			526		

Note:

1. The existing Brown Bear Car Wash is located at 3050 228th Ave SE in the City of Sammamish.

**Brown Bear Car Wash
Existing Trip Generation Summary - Daily
Saturday - October 26, 2019**

Interval Begin	Drive Thru Tunnel		Detail Express Stall		Total Trips				
	In	Out	In	Out	In	Out	Total		
7:00 AM	0	0	0	0	0	0	0		
7:15 AM	0	0	0	0	0	0	0		
7:30 AM	0	0	0	0	0	0	0		
7:45 AM	0	0	0	0	0	0	0	0	7:00 - 8:00 a.m.
8:00 AM	1	1	0	0	1	1	2	2	7:15 - 8:15 a.m.
8:15 AM	3	3	0	0	3	3	6	8	7:30 - 8:30 a.m.
8:30 AM	5	5	1	0	6	5	11	19	7:45 - 8:45 a.m.
8:45 AM	3	3	0	1	3	4	7	26	8:00 - 9:00 a.m.
9:00 AM	4	4	1	1	5	5	10	34	8:15 - 9:15 a.m.
9:15 AM	1	1	2	2	3	3	6	34	8:30 - 9:30 a.m.
9:30 AM	5	5	2	0	7	5	12	35	8:45 - 9:45 a.m.
9:45 AM	2	2	1	2	3	4	7	35	9:00 - 10:00 a.m.
10:00 AM	3	3	0	1	3	4	7	32	9:15 - 10:15 a.m.
10:15 AM	1	1	0	0	1	1	2	28	9:30 - 10:30 a.m.
10:30 AM	3	3	0	0	3	3	6	22	9:45 - 10:45 a.m.
10:45 AM	5	5	0	0	5	5	10	25	10:00 - 11:00 a.m.
11:00 AM	3	3	2	0	5	3	8	26	10:15 - 11:15 a.m.
11:15 AM	6	6	2	2	8	8	16	40	10:30 - 11:30 a.m.
11:30 AM	8	8	1	2	9	10	19	53	10:45 - 11:45 a.m.
11:45 AM	7	7	3	2	10	9	19	62	11:00 - 12:00 p.m.
12:00 PM	6	6	1	1	7	7	14	68	11:15 - 12:15 a.m.
12:15 PM	7	7	2	2	9	9	18	70	11:30 - 12:30 a.m.
12:30 PM	8	8	0	0	8	8	16	67	11:45 - 12:45 a.m.
12:45 PM	10	10	0	2	10	12	22	70	12:00 - 1:00 p.m.
1:00 PM	2	2	2	0	4	2	6	62	12:15 - 1:15 p.m.
1:15 PM	6	6	2	2	8	8	16	60	12:30 - 1:30 p.m.
1:30 PM	1	1	0	2	1	3	4	48	12:45 - 1:45 p.m.
1:45 PM	2	2	2	0	4	2	6	32	1:00 - 2:00 p.m.
2:00 PM	2	2	0	1	2	3	5	31	1:15 - 2:15 p.m.
2:15 PM	6	6	1	1	7	7	14	29	1:30 - 2:30 p.m.
2:30 PM	1	1	0	1	1	2	3	28	1:45 - 2:45 p.m.
2:45 PM	2	2	0	0	2	2	4	26	2:00 - 3:00 p.m.
3:00 PM	2	2	1	1	3	3	6	27	2:15 - 3:15 p.m.
3:15 PM	8	8	1	1	9	9	18	31	2:30 - 3:30 p.m.
3:30 PM	8	8	2	1	10	9	19	47	2:45 - 3:45 p.m.
3:45 PM	9	9	1	1	10	10	20	63	3:00 - 4:00 p.m.
4:00 PM	7	7	0	1	7	8	15	72	3:15 - 4:15 p.m.
4:15 PM	20	20	2	0	22	20	42	96	3:30 - 4:30 p.m.
4:30 PM	12	12	0	1	12	13	25	102	3:45 - 4:45 p.m.
4:45 PM	11	11	1	1	12	12	24	106	4:00 - 5:00 p.m.
5:00 PM	9	9	2	1	11	10	21	112	4:15 - 5:15 p.m.
5:15 PM	10	10	0	1	10	11	21	91	4:30 - 5:30 p.m.
5:30 PM	7	7	1	2	8	9	17	83	4:45 - 5:45 p.m.
5:45 PM	4	4	0	0	4	4	8	67	5:00 - 6:00 p.m.
6:00 PM	2	2	0	0	2	2	4	50	5:15 - 6:15 p.m.
6:15 PM	1	1	0	0	1	1	2	31	5:30 - 6:30 p.m.
6:30 PM	3	3	0	0	3	3	6	20	5:45 - 6:45 p.m.
6:45 PM	0	0	0	0	0	0	0	12	6:00 - 7:00 p.m.
7:00 PM	1	1	0	0	1	1	2	10	6:15 - 7:15 p.m.
7:15 PM	0	0	0	0	0	0	0	8	6:30 - 7:30 p.m.
7:30 PM	0	0	0	0	0	0	0	2	6:45 - 7:45 p.m.
7:45 PM	0	0	0	0	0	0	0	2	7:00 - 8:00 p.m.
Total	227	227	36	36	263	263	526		