Transportation Impact Study Report for North Central Roseville Specific Plan – Parcel 49

Prepared for:
City of Roseville

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RS14-3252

FEHR PEERS

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EXECUTIVE SUMMARY

This study analyzed the transportation impacts associated with the development of Parcel 49 in the North Central Roseville Specific Plan (NCRSP) area. The project site is located in the southeast quadrant of the Washington Boulevard/Blue Oaks Boulevard intersection (see Figure 1). The potential off-site impacts of the project were analyzed under baseline conditions. In addition, the project access and internal circulation were evaluated.

The traffic study evaluated three distinct phases of the proposed project as follows:

- Phase 1 – Topgolf, a golf/entertainment facility consisting of a 64,000 square foot building with hitting bays, a full-service restaurant, bar, lounges, corporate meeting space, and a family-entertainment area.
- Phase 2 – Three restaurants totaling 11,200 square feet, five office buildings totaling 116,500 square feet, seven retail pads totaling 37,800 square feet, a 125-room hotel, and a 25-space park-and-ride lot.
- Phase 3 – Bayside Covenant Church complex consisting of three buildings: a 60,000 square foot assembly building with a 2,800 person seating capacity, a 50,000 square foot building for children activities/classrooms, and a 20,000 square foot building for youth activities/classrooms.

Buildout of the proposed project (Phases 1, 2 and 3) will result in 592 and 843 new weekday AM and PM peak hour trips, respectively.

Compared to the current zoning of the site (mixture of office and retail), the proposed project would result in a 65 percent reduction in weekday AM peak hour trips and a 55 percent decrease in PM peak hour trips.

Compared to the previous Cinemark project, the proposed project would result in 57 percent decrease in weekday AM peak hour trips and a 41 percent decrease in PM peak hour trips.

The analysis evaluated weekday AM and PM peak hour traffic impacts for each Phase of the proposed project under baseline conditions. The analysis also studied project impacts on nine City intersections and on State Route 65 from Pleasant Grove Boulevard to Sunset Boulevard.

Phase 1 (Topgolf) of the project does not result in any significant traffic impacts during weekday AM and PM peak hours.

Phase 1 plus 2 results in significant impacts at two intersections. The Blue Oaks Boulevard/Washington Boulevard/SR 65 SB ramp intersection would worsen from LOS D to E in the PM peak hour, and the Washington Boulevard/Road A (project access) would worsen from LOS B to F in the PM peak hour. The poor level of service at both intersections is caused by back-up of northbound traffic on Washington Boulevard approaching Blue Oaks Boulevard. To mitigate impacts at both intersections, a northbound right-turn pocket of 250 feet should be constructed on Washington Boulevard at the Blue Oaks Boulevard/Washington Boulevard intersection. With this mitigation, the Blue Oaks Boulevard/Washington Boulevard intersection would operate acceptably at LOS D, and the Washington Boulevard/Road A intersection would operate acceptably at LOS C.

Buildout of the project does not result in additional traffic impacts during the weekday AM and PM peak hours.

Because a substantial amount of traffic is expected before and after weekend church services, the study analyzed traffic impacts for a Saturday evening 6 PM church worship service and for a Sunday morning 11 AM church service. The study estimated the amount of traffic that the church and other uses on the project site would generate by 15-minute increment both before and after a worship service, with particular focus on Washington Boulevard. Traffic conditions were simulated using state-of-the-practice software. These simulations led to recommendations to improve traffic flow both directly at the interface of the project with Washington Boulevard and along Blue Oaks Boulevard. These recommendations, which subsequently were incorporated into the site plan, included enhancing the roundabout on Road A and a major internal driveway to better serve traffic entering the project site, and providing a new driveway from northbound Washington Boulevard into the project site that would only be opened before church worship services. With these improvements all study intersections would operate at acceptable levels of service, per the City's general plan policy.

The project site will provide ample parking supply (2,789 spaces) at buildout. Under the atypical occurrence that church attendance levels are at 100 percent of seating capacity for a Saturday evening or a Sunday morning church service, the ratio of parking demand versus supply is estimated to be 91 percent during Saturday evening services and 86 percent during Sunday morning services.

Based on the results of an analysis of the overlap of outbound and inbound traffic between Sunday church worship services, we recommend that the interval of time between the end of the earlier service and the beginning of the next service be 60 minutes. We also recommend that the spacing between services be further reviewed with the Stage 2 approvals when there is a specific proposal for operations and a traffic management plan for church operations.

INTRODUCTION

PURPOSE

This study analyzes the transportation impacts associated with the development of Parcel 49 in the North Central Roseville Specific Plan (NCRSP) area. The project site is located in the southeast quadrant of the Washington Boulevard/Blue Oaks Boulevard intersection in Roseville, CA (see Figure 1). The potential off-site traffic impacts of three distinct phases of the project are analyzed under baseline plus project conditions.

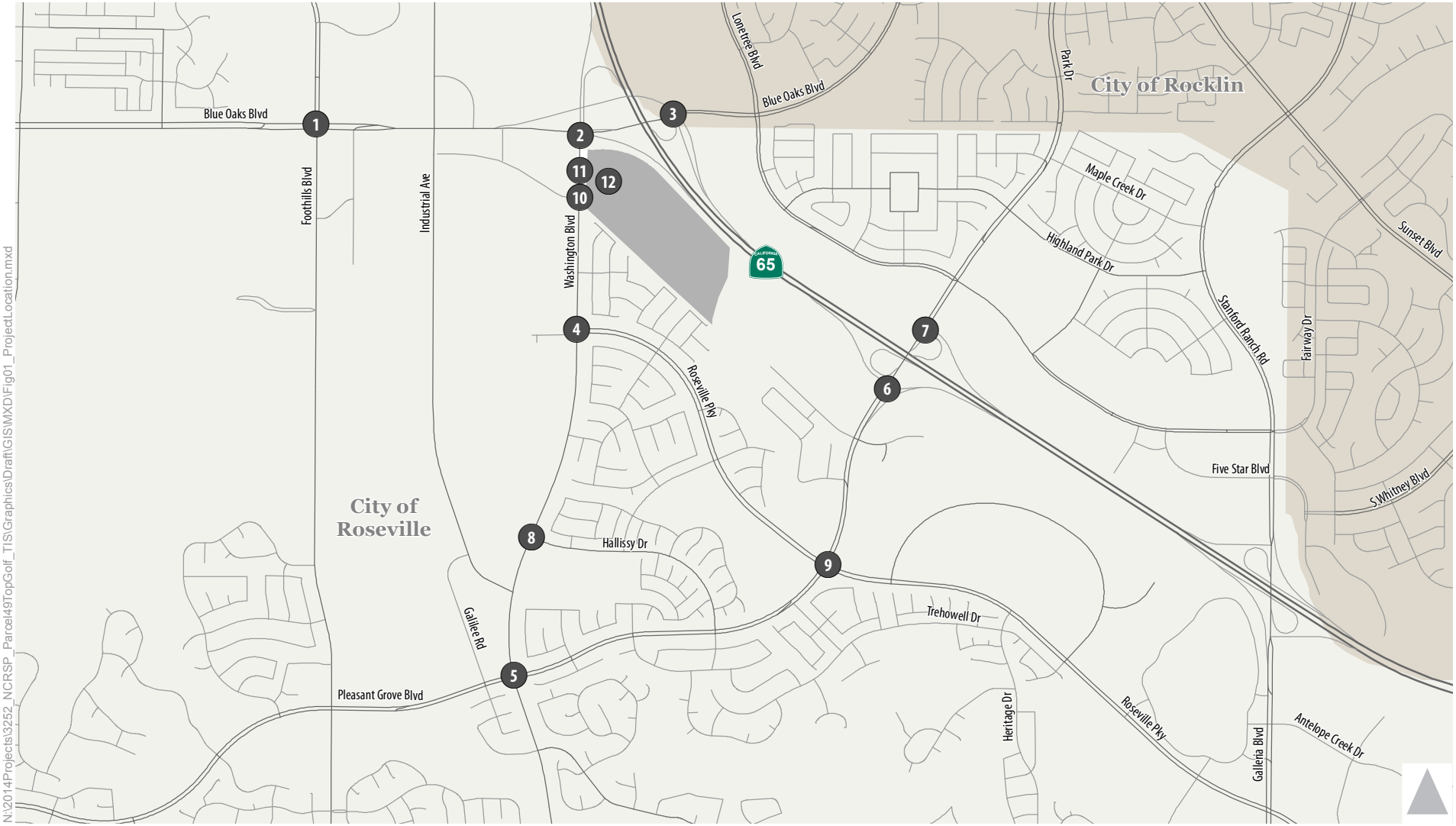
PROJECT DESCRIPTION

NCRSP Parcel 49 consists of 58.9 acres. Figure 2 contains a site plan provided by the project applicant. Access to the site is available from Washington Boulevard at two locations; Roads A and B. The southernmost access at Road A will be signalized. The northern access at Road B will be right in and out only. An emergency vehicle access (EVA) is located in the southeast corner of the site from Garden Park Drive.

This study analyzed the transportation impacts of three development phases of this parcel as described:

- Phase 1 consists of a Topgolf facility. Topgolf is a golf entertainment complex to be located in the eastern portion of the site plan. It is a 64,000 square foot three-story facility with 102 hitting bays, an outdoor outfield enclosed by netting, full-service restaurant, bar, lounges and corporate/event meeting space and family entertainment area with games.
- Phase 2 consists of 11,200 square feet of restaurant use, 116,500 square feet of office use, 37,800 square feet of retail use, a 125-room hotel and a 25 space park-and-ride lot. The restaurants, retail pads and hotel are located in the northwest portion of the parcel, and the office buildings are situated further into the site.
- Phase 3 is located in the center of the parcel and consists of a 60,000 square foot church assembly building with a 2,800-person seating capacity, a 50,000 square foot building for children activities/classrooms, and a 20,000 square foot building for youth activities/classrooms.

Note that the site plan shown in Figure 2 reflects recommendations made by Fehr & Peers on an earlier site plan to improve traffic flow and circulation from Washington Boulevard into the project site. The recommendations are two-fold; first, to modify the roundabout on Road A and a primary driveway within the project site to provide better traffic flow into the project's parking areas, and second, to provide a right-turn ingress driveway on northbound Washington Boulevard into the project site that will be open only before weekend church services.



1 Study Intersection

Project Site

Note: Location 12 is the main roundabout within the project site.

Figure 1

Project Site

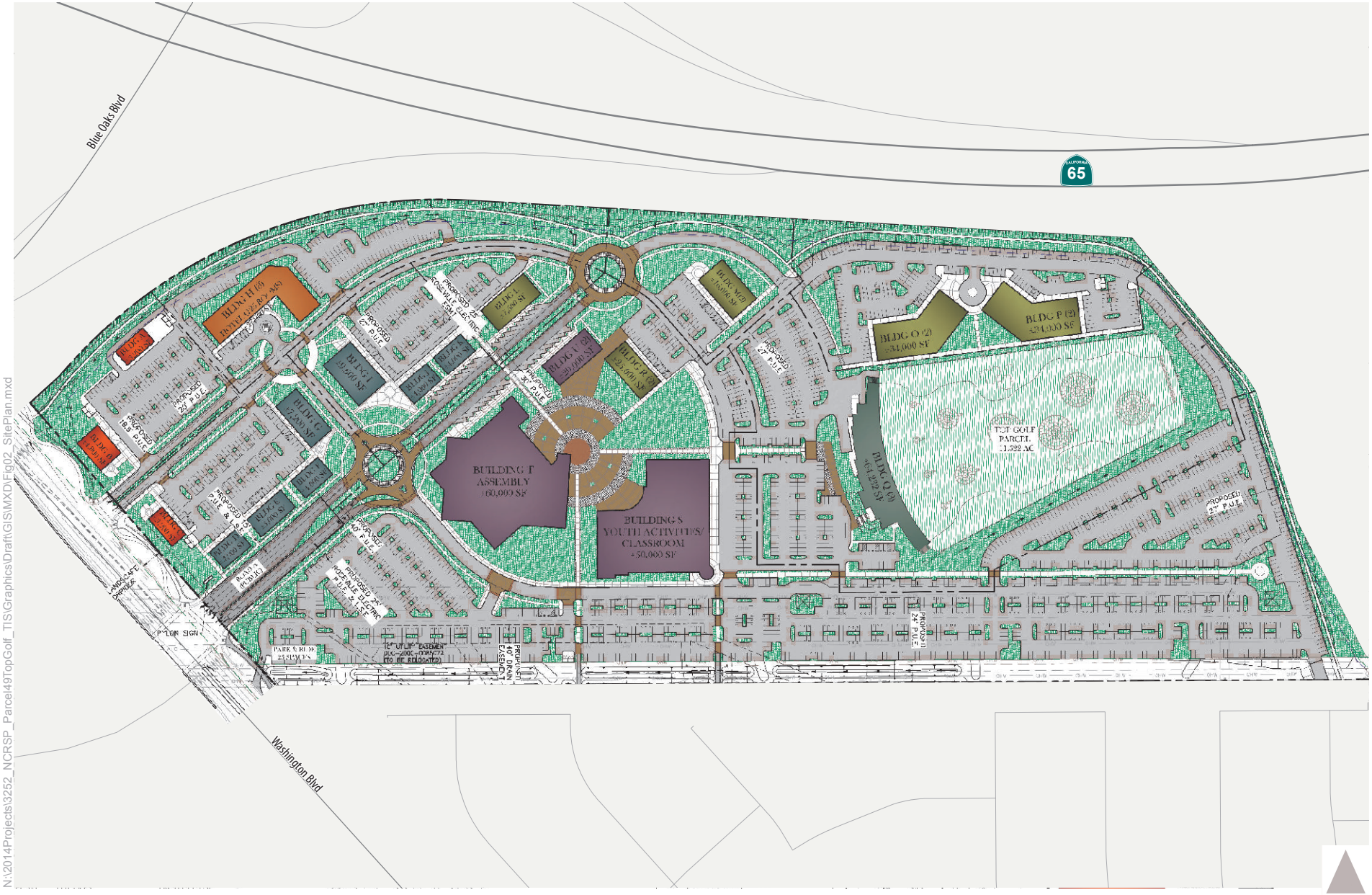


Figure 2

Project Site Plan

STUDY ANALYSIS SCENARIOS

The project is expected to be developed by phases as described above, potentially over the course of several years. Therefore, the study analyzes the transportation impacts of:

- Phase 1 (Topgolf)
- Phase 1 plus Phase 2
- Project Buildout (Phase 1 plus Phase 2 plus Phase 3)

STUDY AREA

The following intersections were selected for analysis under weekday AM and PM peak hour periods under baseline conditions and baseline plus project phases:

1. Blue Oaks Boulevard/Foothills Boulevard
2. Blue Oaks Boulevard/Washington Boulevard
3. Blue Oaks Boulevard/State Route (SR) 65 Northbound ramps
4. Roseville Parkway/Washington Boulevard
5. Pleasant Grove Boulevard/Washington Boulevard
6. Pleasant Grove Boulevard/SR 65 Southbound ramps
7. Pleasant Grove Boulevard/SR 65 Northbound ramps
8. Washington Boulevard/Hallissy Drive
9. Roseville Parkway/Pleasant Grove Boulevard
10. Washington Boulevard/Road A (with project)
11. Washington Boulevard/Road B (with project)
12. Road A roundabout (with project)

Per Caltrans request, the study analyzed the SR 65 freeway segments between Pleasant Grove Boulevard and Sunset Boulevard.

Also, due to the high traffic activity level expected during weekend church worship services, the study analyzed Saturday evening (before service) and Sunday midday (after service) periods under baseline plus project buildout conditions along Washington Boulevard between Roseville Parkway and Blue Oaks Boulevard.

ANALYSIS METHODOLOGY

The intersections and freeway segments in the study area were analyzed using procedures consistent with the Highway Capacity Manual (Transportation Research Board, 2010). At intersections, the level of service

(LOS) is based on the average delay experienced by motorists traveling through the intersection. Table 1 displays the average delay range for each LOS category associated with signalized and unsignalized intersections. The overall intersection average delay is used to determine the LOS for intersection with signal, all-way stop, or roundabout control. The movement with the highest delay is used to assign the intersection LOS for side-street stop controlled intersections.

TABLE 1 – INTERSECTION LEVEL OF SERVICE THRESHOLDS

Level of Service	Description (for signalized intersections)	Average Delay[1]	
		Signalized	Unsignalized
A	Operations with very low delay occurring with favorable traffic signal progression and/or short cycle lengths.	< 10	< 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 to 20	> 10 to 15
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 to 35	> 15 to 25
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35 to 55	> 25 to 35
E	Operations with high delay values indicating poor progression, and long cycle lengths. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55 to 80	> 35 to 50
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80	> 50

Note: 1. Average delay expressed in seconds per vehicle.
Source: Highway Capacity Manual (Transportation Research Board, 2010)

The study intersections were analyzed using the Synchro/SimTraffic traffic analysis software. This micro-simulation program models the interaction of vehicles, pedestrians, traffic signals, and the roadway configuration. By modeling individual vehicles, the analysis can account for the effect of queue spillbacks on upstream lanes and intersections, delay to unbalanced lane utilization, and interaction between intersections due to signal coordination.

For freeways, the level of service is based on density of vehicles traveling on a segment. Table 2 shows the average density range for each LOS category for mainline and ramp junction freeway segments.

TABLE 2 – FREEWAY LEVEL OF SERVICE THRESHOLDS		
Level of Service	**Mainline Density[1]**	**Ramp Junction Density[1]**
A	< 11	< 10
B	> 11 to 18	> 10 to 20
C	> 18 to 26	> 20 to 28
D	> 26 to 35	> 28 to 35
E	> 35 to 45	> 35 to 43
F	> 45 or demand exceeds capacity[2]	> 43 or demand exceeds capacity[2]

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. Occurs when freeway demand exceeds upstream or downstream segment capacity or when demand exceeds ramp capacity

Source: Highway Capacity Manual (Transportation Research Board, 2010)

SIGNIFICANCE CRITERIA

The City of Roseville's level of service policy calls for maintaining a LOS C standard at a minimum of 70 percent of all signalized intersections in the City during the weekday PM peak hour. The City Council, following a public hearing, may determine, on a case-by-case basis that "extraordinary" improvements are not feasible or desirable and may relax the LOS C standard for a particular intersection. As part of the September 2012 approval of the Creekview Specific Plan, the City Council amended the General Plan to acknowledge and accept that 39 intersections within the City will operate at worse than LOS C under 2025 PM peak hour conditions. The following three study intersections are included in the list of 39 intersections (projected 2025 LOS is shown in parentheses):

- Blue Oaks Boulevard/Foothills Boulevard (LOS F)
- Pleasant Grove Boulevard/Roseville Parkway (LOS F)
- Pleasant Grove Boulevard/Washington Boulevard (LOS E)

The LOS results were calculated using the aforementioned "Circular 212" methodology. The City of Roseville has chosen to shift away from this methodology for this study, instead relying on the more state-of-the-practice Highway Capacity Manual (HCM) procedures. There are several meaningful differences between the Circular 212 and HCM procedures. Whereas Circular 212 provides a LOS result that represents conditions for the entire peak hour, HCM procedures apply a peak hour factor to represent

conditions during the busiest 15-minutes of the peak hour. The use of HCM-compliant micro-simulation models (such as SimTraffic being used in this study) account for the effects of vehicle spillbacks that can affect upstream intersections. These factors, among many others, help explain why intersection analysis results presented in this study may differ from those shown in previous studies.

The City of Roseville does not have a level of service policy for the AM peak hour. However, consistent with other environmental documents recently prepared in the City, this study analyzes traffic impacts for AM peak hour conditions and treats an unacceptable AM peak hour condition as a significant impact, even if such a result is not prescribed under the City's level of service policy.

The City of Roseville does not have a level of service policy for weekend peak hours. The weekend analysis results shown herein are for informational purposes and to identify improvements for better site access and internal circulation.

The City's level of service policy does not address side-street stop controlled intersections. For this study, the LOS will be reported at the side street stop controlled driveway at Washington Boulevard/Road B for informational purposes only. No impact criteria will be applied.

The *State Route 65 Corridor System Management Plan (CSMP)* (Caltrans, 2009) identifies a concept LOS F for the segment of SR 65 between I-80 and Blue Oaks Boulevard. According to this document, this designation refers to the minimum acceptable LOS over the next twenty years. Page 9 of the CSMP states, "Some heavily congested route segments now have a concept LOS F because the improvements required to achieve LOS E are not feasible due to environmental, right-of-way, financial, and other factors". According to the CSMP, for existing LOS F operations, no further exacerbation is permitted, as indicated by delay or other performance measurement. The CSMP establishes a concept LOS E for SR 65 from north of Blue Oaks Boulevard into and through the City of Lincoln.

The following thresholds of significance have been used to determine whether implementing the proposed project would result in a significant transportation impact. These thresholds of significance are derived from questions posed in Appendix G of the CEQA Guidelines, thresholds of significance from applicable general plans and previous environmental documents, and professional judgment. The project would have a significant impact under Baseline Plus Project Conditions if one of the following conditions were to occur.

1. Cause a signalized intersection (excluding the 3 listed above) that is currently operating at LOS C or better to operate at LOS D or worse during the weekday AM or PM peak hours

2. Cause a signalized intersection (excluding the 3 listed above) that is currently operating at LOS D or E to worsen by one or more LOS categories (i.e., from LOS D to E) during the weekday AM or PM peak hours

3. Cause one or more of the 3 signalized intersections listed above to operate worse than its General Plan adopted 2025 CIP LOS during the weekday AM or PM peak hours

4. Cause one or more of the 3 signalized intersections listed above to degrade by one or more LOS category (i.e. from LOS E to LOS F) during the weekday AM or PM peak hours

5. Cause a facility maintained by Caltrans to worsen from acceptable to unacceptable during the weekday AM or PM peak hours

6. Worsen unacceptable operations to a significant degree at a facility maintained by Caltrans during the weekday AM or PM peak hours

7. Cause traffic at an off-ramp maintained by Caltrans to queue back to the mainline, or add traffic to an off-ramp that already queues back to the mainline on the weekday or weekend AM or PM peak hours

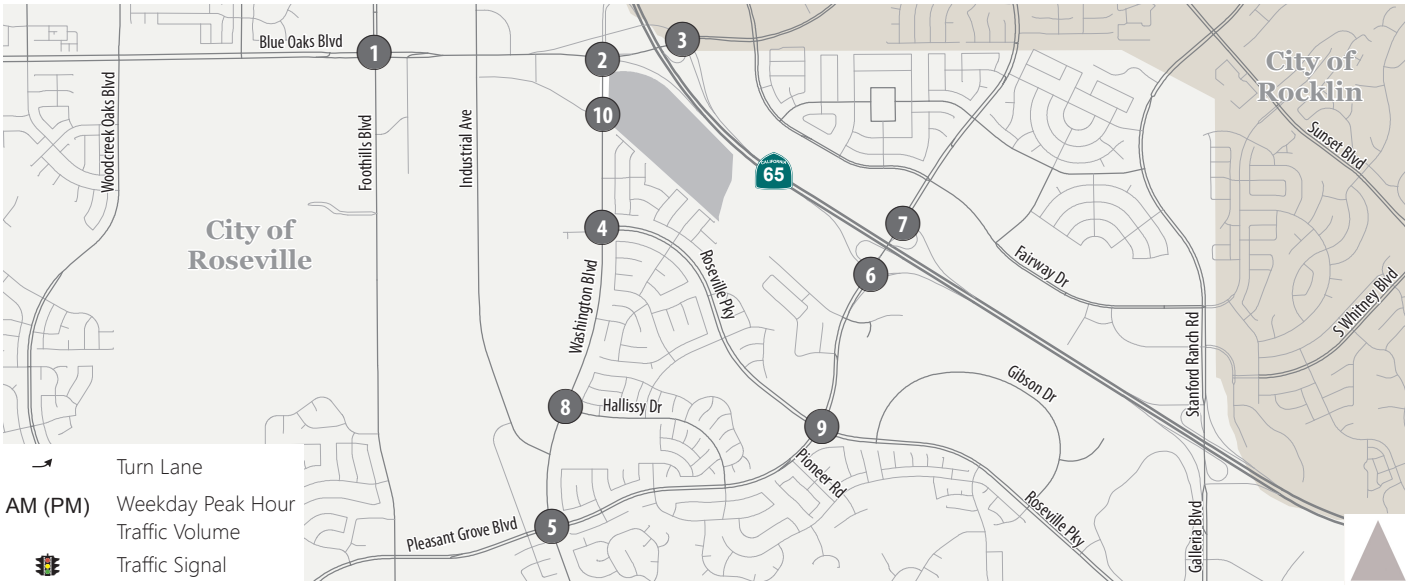
BASELINE CONDITIONS

Traffic counts for eight of the nine existing study intersections were provided by the City of Roseville. These counts were taken in March 2014. Traffic counts for the ninth intersection, Blue Oaks Boulevard/SR 65 off-ramp, were conducted in September, 2014. Traffic counts for the SR 65 freeway mainline segments were collected from Caltrans' PeMS online traffic volume database.

Figure 3 displays the weekday AM and PM peak hour traffic volumes and lane configurations at the study intersections.

As discussed earlier, because the church trip generation is expected to be substantial before and after weekend worship services, the study also analyzed project impacts under Saturday evening and Sunday morning conditions. For purposes of this study it was assumed that Saturday evening services would begin at 6 PM and the late morning Sunday service would begin at 11 AM. We obtained traffic counts on Washington Boulevard from Roseville Parkway to Blue Oaks Boulevard for the one hour periods before and after the Saturday and Sunday services. These periods are 5:15 to 6:15 PM (arrival) and 7 to 8 PM (departure) on Saturday, and 10:15 to 11:15 AM (arrival) and 12 noon to 1 PM (departure) on Sunday. Figure 4 shows the baseline Saturday evening (arrival) and Sunday midday (departure) traffic volumes.

A new U.S. Government Services Administration (GSA) office is planned to be built on a parcel located on the west side of Washington Boulevard, and that the GSA office's main access would be located at the fourth leg of the Washington Boulevard/Road A intersection. The office building is expected to consist of about 120,000 square feet of office space. To account for the presence of the GSA building, we estimated the trip generation and distribution of GSA trips, and we assigned those trips and added them onto existing traffic volumes. As such, the existing conditions analysis contained herein includes traffic generated by the GSA building.



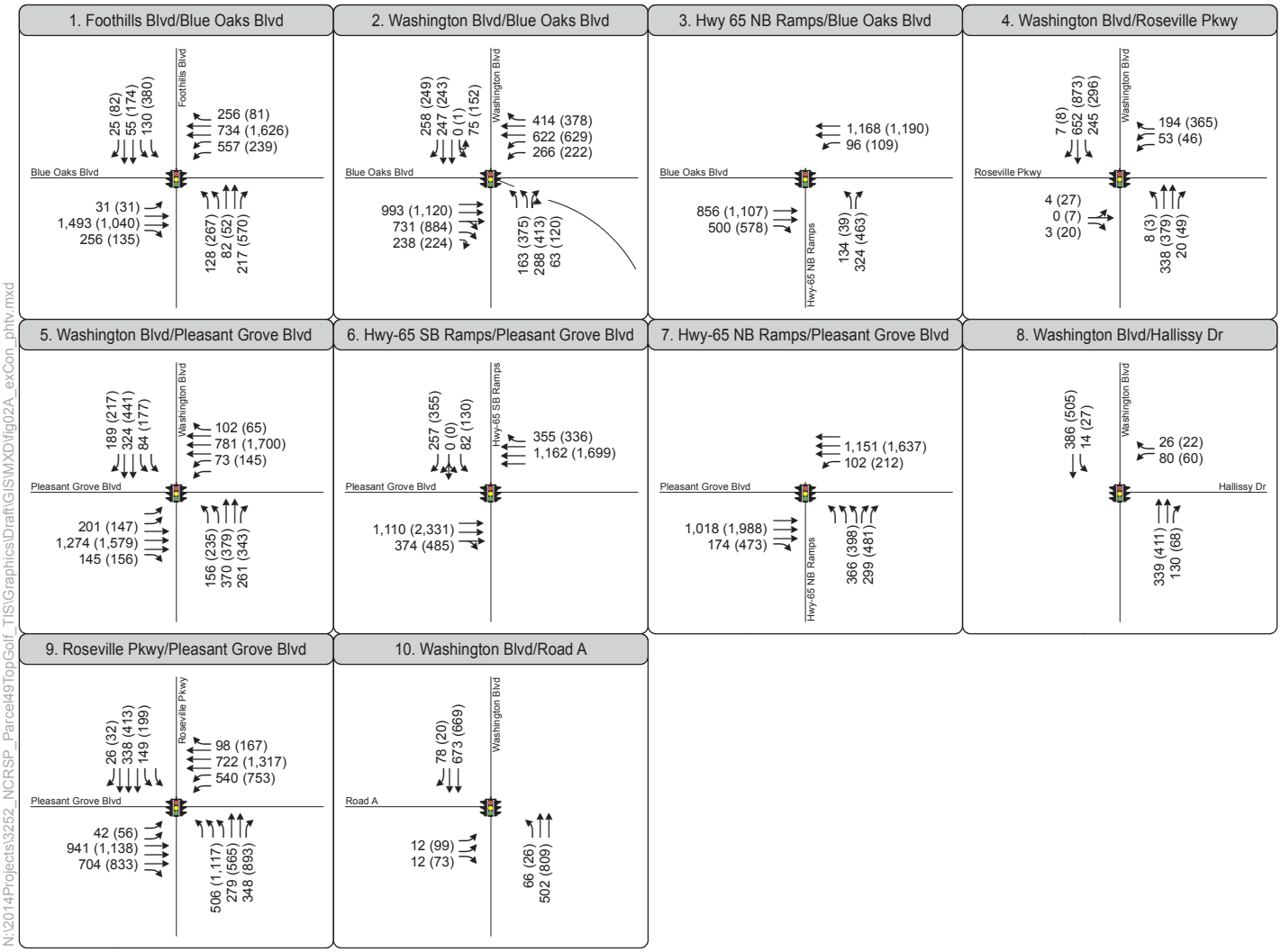
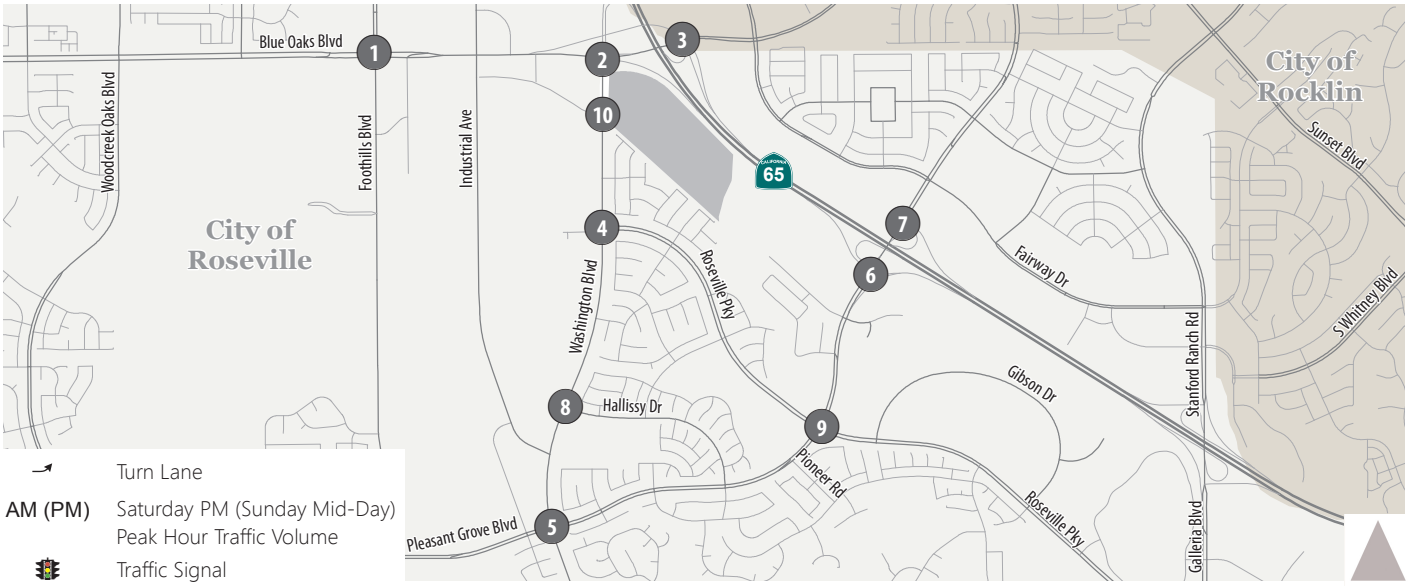


Figure 3

Peak Hour Traffic Volumes and Lane Configurations - Baseline Conditions (Weekday)



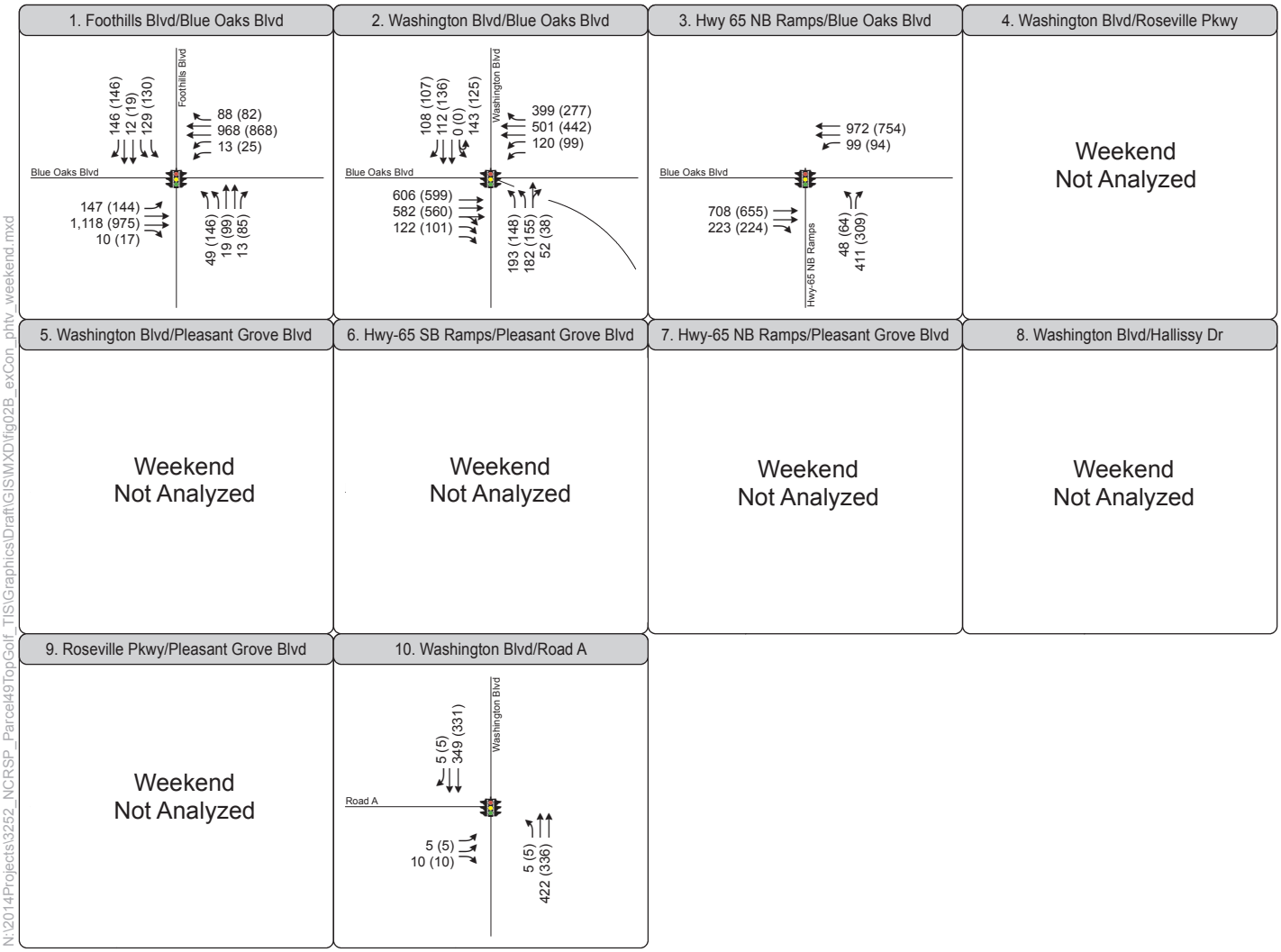


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Figure 4

Peak Hour Traffic Volumes and Lane Configurations - Baseline Conditions (Weekend)

INTERSECTION OPERATIONS

Using the volumes and lane configurations shown in Figure 3 and the SimTraffic model described earlier, Fehr & Peers analyzed baseline traffic operations at all of the study intersections. Table 3 displays the baseline weekday AM and PM peak hour LOS and average delay at the study intersections. During the AM peak hour, the intersections with the highest delay are Blue Oaks Boulevard/Foothills Boulevard (LOS E) and Pleasant Grove Boulevard/Roseville Parkway (LOS D). The intersections immediately adjacent to the project site operate at LOS C or better. During the PM peak hour, Pleasant Grove Boulevard/Roseville Parkway has the highest delay (LOS E) and three other intersections operate at LOS D including the Blue Oaks Boulevard/Washington Boulevard intersection at the northwest corner of the project site.

TABLE 3 – WEEKDAY INTERSECTION OPERATIONS FOR BASELINE CONDITIONS

Intersection	Control	LOS / Average Delay[1]	
		AM Peak Hour	PM Peak Hour
1. Blue Oaks Blvd/Foothills Blvd	Signal	E / 75	D / 52
2. Blue Oaks Blvd/Washington Blvd/Hwy 65 SB Ramps	Signal	C / 28	D / 52
3. Blue Oaks Blvd/Hwy 65 NB Ramps	Signal	B / 14	B / 18
4. Washington Blvd/Roseville Pkwy	Signal	B / 11	B / 16
5. Pleasant Grove Blvd/Washington Blvd	Signal	C / 28	D / 39
6. Hwy 65 SB Ramps/Pleasant Grove Blvd	Signal	B / 10	B / 15
7. Hwy 65 NB Ramps/Pleasant Grove Blvd	Signal	B / 16	C / 22
8. Washington Blvd/Hallissy Drive	Signal	A / 6	A / 6
9. Pleasant Grove Blvd/Roseville Pkwy	Signal	D / 35	E / 66
10. Washington Blvd/Road A	Signal	A / 8	B / 14

Note: 1. Average delay expressed in seconds per vehicle
Source: Fehr & Peers, 2014

Saturday and Sunday church peak arrival and departure periods were also analyzed. Table 4 shows that the study intersections nearest to the project site that currently operate with LOS C or better conditions during these weekend hours.

TABLE 4 – WEEKEND INTERSECTION OPERATIONS FOR BASELINE CONDITIONS

Intersection	Control	LOS / Average Delay[1]	
		Saturday PM	Sunday Midday
2. Blue Oaks Blvd/Washington Blvd/Hwy 65 SB Ramps	Signal	C / 23	C / 22
3. Blue Oaks Blvd/Hwy 65 NB Ramps	Signal	B / 12	A / 9
10. Washington Blvd/Road A	Signal	A / 3	A / 4

Note: 1. Average delay expressed in seconds per vehicle
Source: Fehr & Peers, 2014

FREEWAY OPERATIONS

Fehr & Peers analyzed baseline weekday AM and PM peak hour operating conditions on SR 65 from south of Pleasant Grove Boulevard to Sunset Boulevard. Tables 5 and 6 show the LOS and average density for the northbound and southbound directions, respectively. In the northbound direction, the Pleasant Grove Boulevard off-ramp has LOS F conditions during both AM and PM peak hours because the peak hour demand exceeds the freeway mainline capacity. Other locations in the northbound direction operate with LOS D or better conditions during both peak hours.

In the southbound direction, merge segment at the eastbound Pleasant Grove Boulevard on-ramp has LOS E/F conditions during the peak hours. Field observations show that the southbound segment between Pleasant Grove Boulevard and Galleria Boulevard is a bottleneck during both peak hours. Because of the bottleneck, congested conditions – speeds less than 35 mph – extend upstream to Blue Oaks Boulevard. Although the HCM analysis results show LOS C, D or E conditions between Blue Oaks Boulevard and Pleasant Grove Boulevard, actual conditions are LOS F due to the downstream bottleneck that causes queueing to extend through this area. Other study segments in the southbound direction operate with LOS D or better conditions during both peak hours.

TABLE 5 – WEEKDAY NORTHBOUND FREEWAY OPERATIONS FOR BASELINE CONDITIONS			
Freeway Segment	**Type**	**LOS / Density[1]**	
		AM Peak Hour	**PM Peak Hour**
Pleasant Grove Blvd Off-ramp	Diverge	F / -	F / -
Pleasant Grove Blvd Off to On-ramp	Basic	D / 33	D / 29
Pleasant Grove Blvd to Blue Oaks Blvd	Weave[2]	C	E
Blue Oaks Blvd Off to On-ramp	Basic	C / 24	C / 24
Blue Oaks Blvd On-ramp	Merge	D / 33	D / 33
Blue Oaks Blvd to Sunset Blvd	Basic	D / 32	D / 31
Sunset Blvd Off-ramp	Diverge	C / 24	C / 24

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.

Source: Fehr & Peers, 2014

TABLE 6 – WEEKDAY SOUTHBOUND FREEWAY OPERATIONS FOR BASELINE CONDITIONS			
Freeway Segment	**Type**	**LOS / Density[1]**	
		AM Peak Hour	**PM Peak Hour**
Sunset Blvd WB On-ramp	Merge	D / 28	C / 23
Sunset Blvd EB On-ramp	Merge	C / 24	C / 22
Sunset Blvd to Blue Oaks Blvd	Basic	D / 29	C / 26
Blue Oaks Blvd Off-ramp	Diverge	D / 33	D / 31
Blue Oaks Blvd Off to On-ramp	Basic	C / 23	C / 20
Blue Oaks Blvd WB On-ramp	Merge	D / 30	C / 26
Blue Oaks Blvd to Pleasant Grove Blvd	Weave[2]	C / 22[3,4]	C[4]
Pleasant Grove Blvd Off to On-ramp	Basic	D / 32[4]	D / 28[4]
Pleasant Grove Blvd WB On-ramp	Merge	E / 36[4]	D /33[4]
Pleasant Grove Blvd EB On-ramp	Merge	F / -	E / 37[4]

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.
3. The segment operates "out of the realm of weaving," so the HCM basic segment LOS and density is reported.
4. Field observations show that recurring congestion south of the Pleasant Grove Blvd interchange causes queues that extend back to Blue Oaks Blvd under both the AM and PM peak hours; therefore, the actual conditions are LOS F.

Source: Fehr & Peers, 2014

BASELINE PLUS PROJECT PHASE 1 (TOPGOLF) CONDITIONS

Phase 1 of the project is the Topgolf facility. Topgolf is a golf entertainment complex consisting of a 64,000 square foot three-story building with 102 hitting bays, a full-service restaurant, bar, lounges, and corporate meeting space and a family entertainment area with games.

The site plan for Phase 1 is shown in Figure 5. As shown, the only access to the site for Phase 1 will be provided by Road A. The intersection of Road A and Washington Boulevard will be signalized with four lanes on the westbound approach: two left-turn pockets, a shared through/right-turn lane, and a right-turn lane. Two inbound lanes will be provided to receive two southbound left-turn pocket lanes. A northbound right-turn pocket lane will also be constructed.

TRAFFIC GENERATION

Most traffic studies use trip generation rates for various land uses contained in Trip Generation, published by the Institute of Transportation Engineers (ITE). Since Topgolf is such a new and unique type of facility, ITE does not have rates for such a use. Therefore, we conducted traffic and parking counts at a Topgolf facility located in Scottsdale, Arizona. The Scottsdale Topgolf site is self-contained, meaning that it is the only use on the site. It is also the same size as the proposed Roseville Topgolf facility.

Traffic counts at the Scottsdale Topgolf facility were taken over a Friday-Sunday period in late August, 2014. According to the count results, Topgolf generated 2,563 total trips on Friday, 3,456 trips on Saturday, and 3,155 trips on Sunday. Figures 6, 7 and 8 show the number of inbound and outbound trips generated by Topgolf on Friday, Saturday and Sunday, respectively. Figure 9 shows this data for all three days combined. Observations of Topgolf's traffic characteristics are:

- Friday morning traffic volumes were less than 50 vehicles per hour until 11 AM.
  Friday's vehicle activity was consistent from 11 AM to midnight. The highest inbound hour occurred from 8 to 9 PM, and the highest outbound hour occurred from 9 to 10 PM.
- Saturday volumes consistently increased throughout the day. Inbound hourly traffic peaked at 6-7 PM, and outbound hourly volumes peaked from 8-9 PM. Saturday peak hours are higher than the Friday and Sunday peak hours.
- Sunday hourly traffic volumes are consistent from noon to midnight.

Table 7 shows the number of Topgolf inbound and outbound trips that would be generated during the study analysis periods.

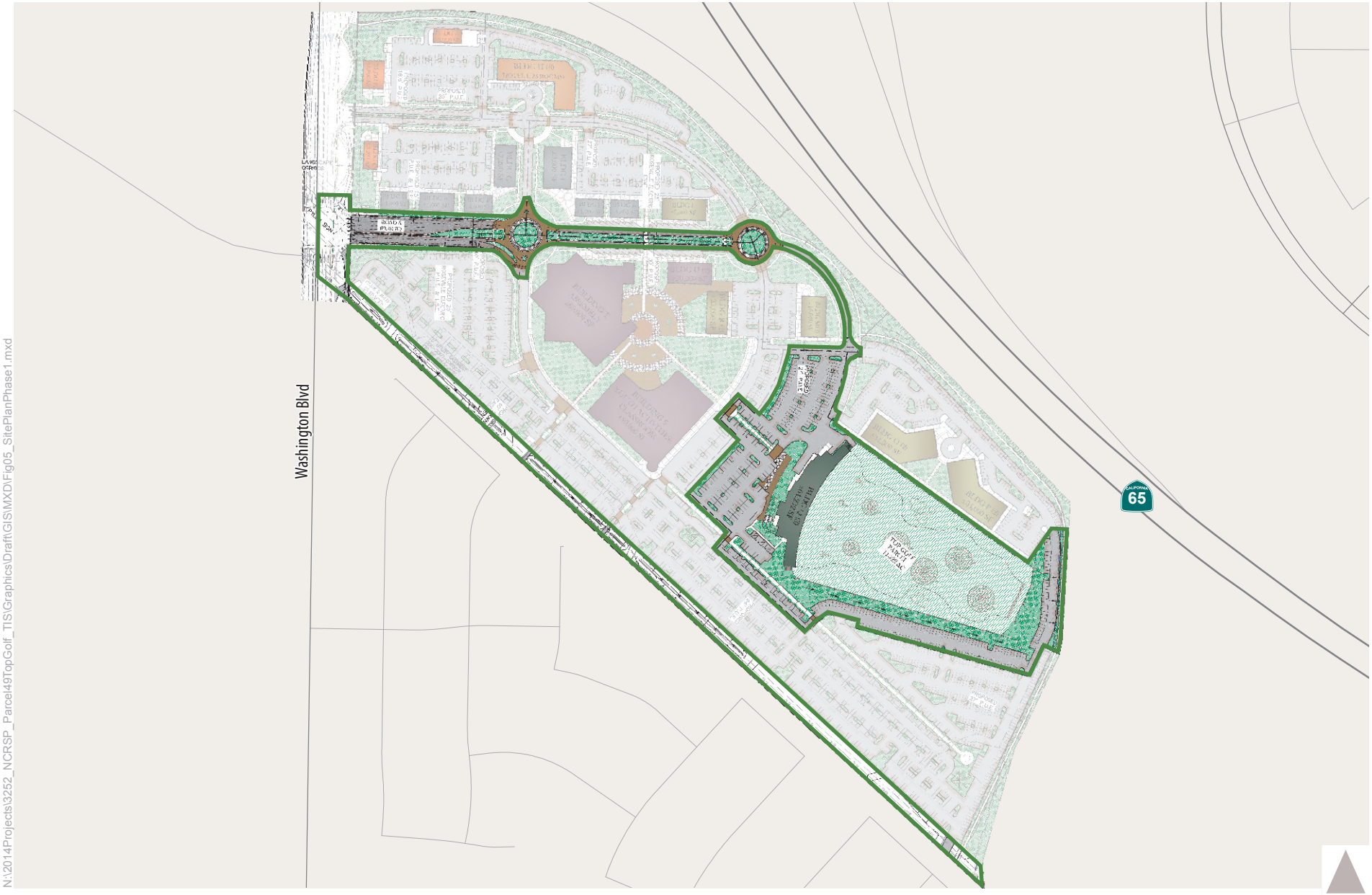

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Figure 5

Project Site Plan -

Baseline Plus Project Phase 1 Conditions

TABLE 7 – TOPGOLF TRIP GENERATION																		
Weekday						**Saturday**						**Sunday**						
AM Peak Hour			**PM Peak Hour**			**Before Service**			**After Service**			**Before Service**			**After Service**		
7:30 AM to 8:30 AM			4:30 PM to 5:30 PM			5:15 PM to 6:15 PM			7:00 PM to 8:00 PM			10:15 AM to 11:15 AM			12:00 PM to 1:00 PM		
In	Out	**Total**	In	Out	**Total**	In	Out	**Total**	In	Out	**Total**	In	Out	**Total**	In	Out	**Total**
28	4	**32**	91	92	**183**	153	109	**262**	161	151	**312**	65	33	**98**	107	77	**184**

Note: Trip generation reflects the Scottsdale Topgolf 15-minute counts for the specified analysis periods.

PARKING UTILIZATION

The Topgolf facility on Parcel 49 is planned to have 439 parking spaces. Parking supply for Topgolf is expected to be adequate under near-term conditions when Topgolf is the only facility on Parcel 49; however, the City requested we estimate Topgolf's parking utilization for Saturday evening and Sunday morning church services. Therefore, we obtained parking utilization data from the Scottsdale Topgolf facility on Saturday evening at 7 PM and on Sunday morning at noon. The results showed that 397 parking spaces were occupied at 7 PM on Saturday evening and 234 parking spaces were occupied at noon on Sunday morning.

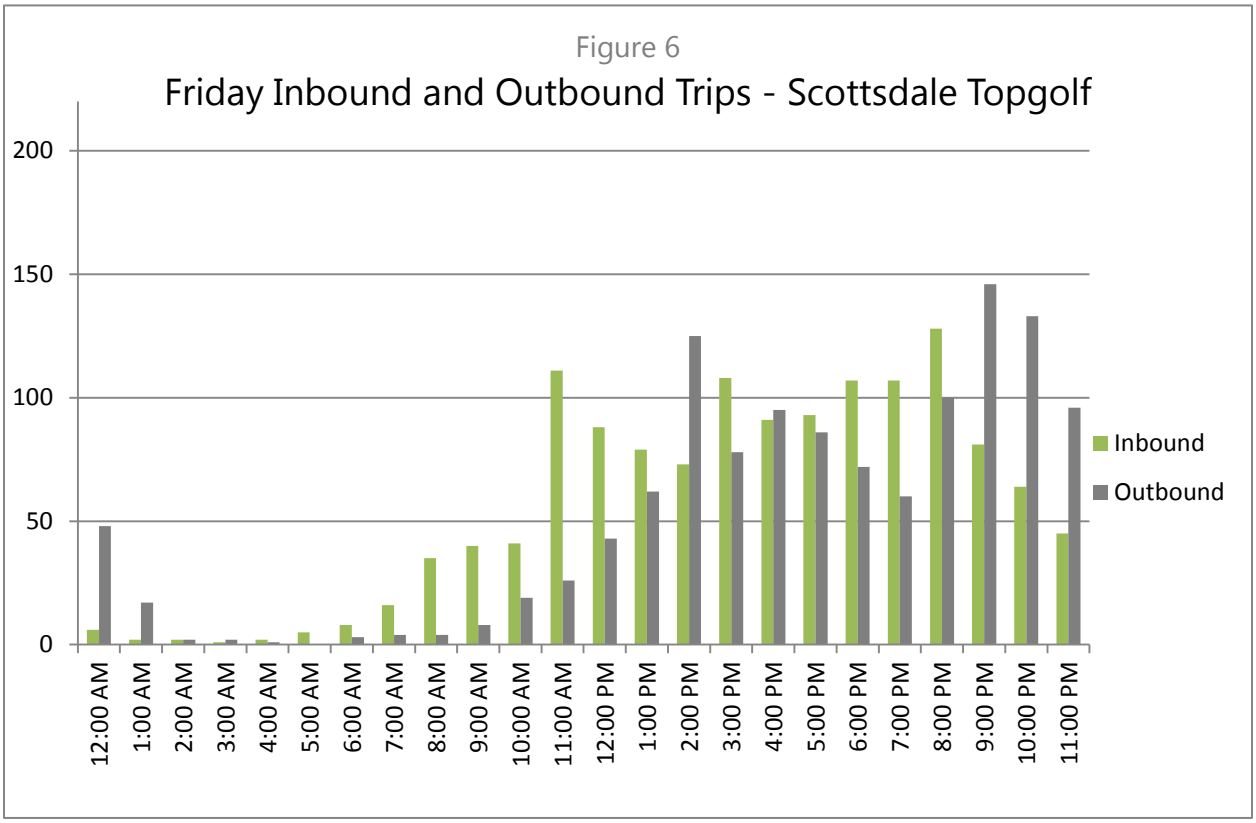
TRIP DISTRIBUTION

The expected distribution of project trips onto the adjacent roadway network was determined based on existing traffic volumes and travel patterns, the location of complementary uses, and output from the City of Roseville CIP traffic model. Figure 10 shows that 65 percent of project traffic is expected to travel to/from the north on Washington Boulevard, with 35 percent travelling to/from the south.

TRAFFIC ASSIGNMENT

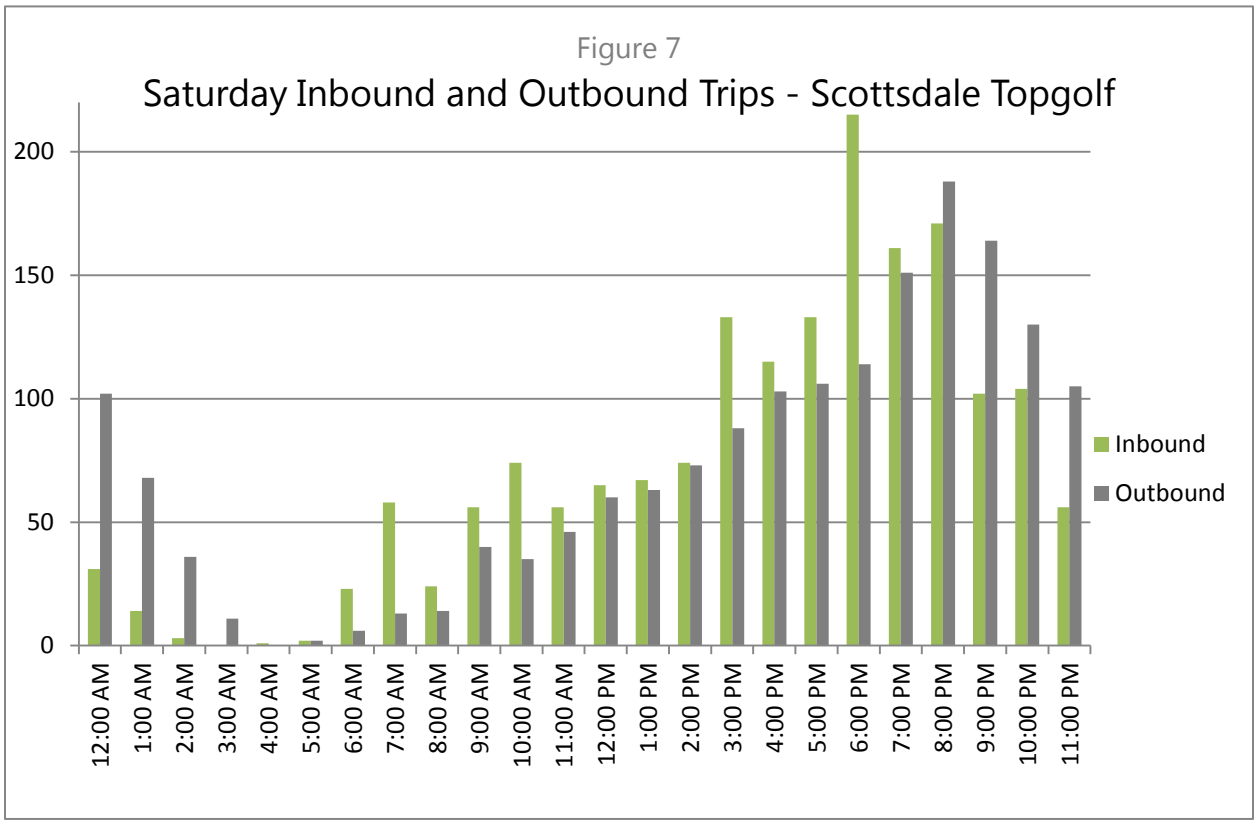
The trips expected to be generated by the Topgolf facility were assigned to the study intersections. Figure 11 shows the resulting weekday AM and PM peak hour traffic volumes under Baseline Plus Phase 1 (Topgolf) conditions.

Figure 6



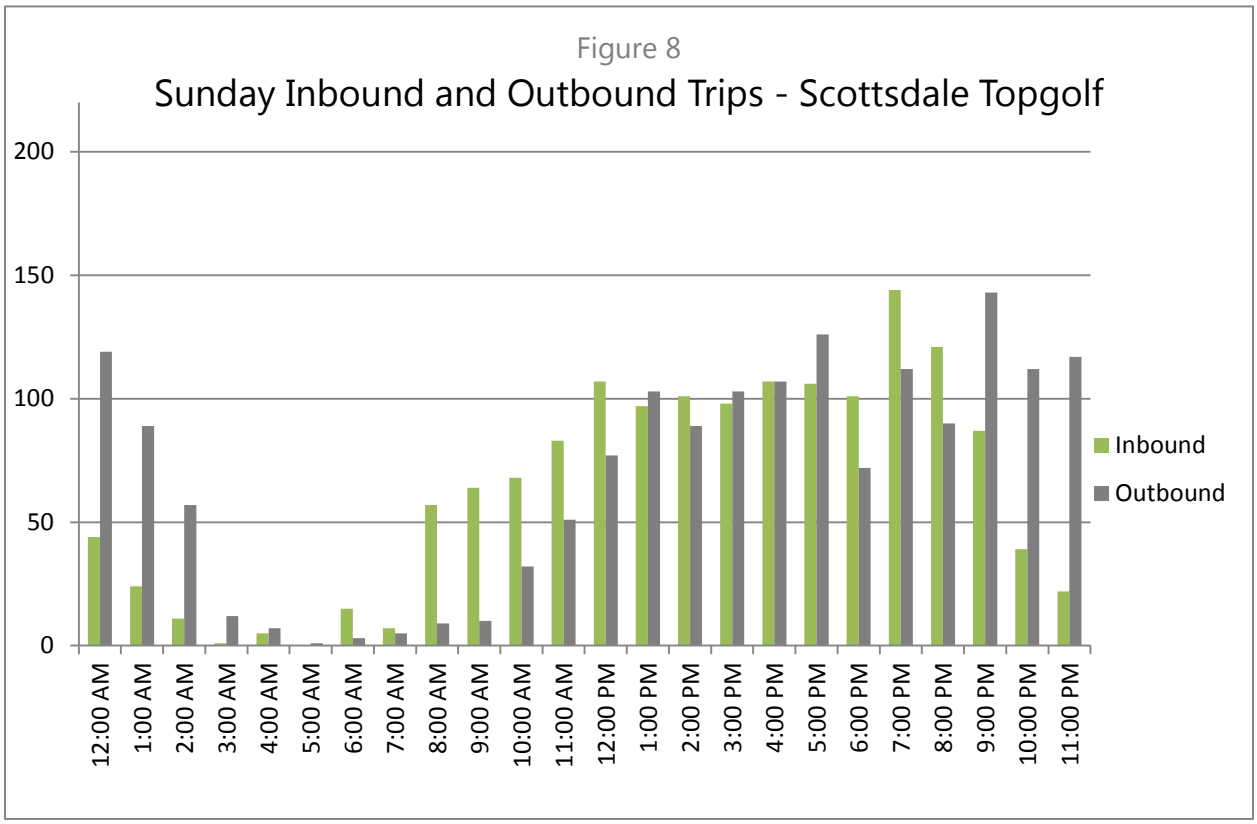
Note: Count data was collected by 15-minute increments. For illustrative purposes, the counts were aggregated into 1-hour periods

Figure 7



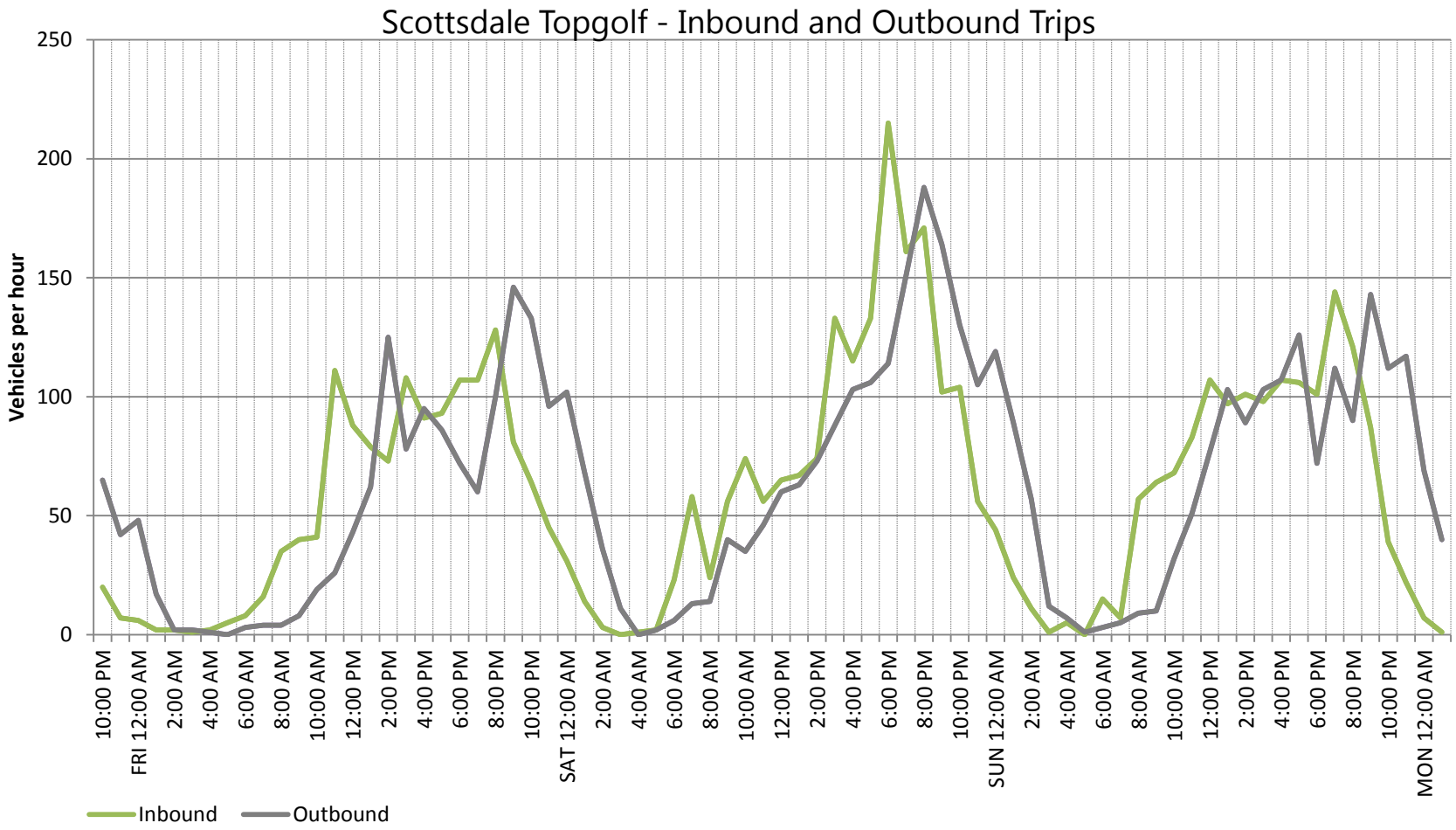
Note: Count data was collected by 15-minute increments. For illustrative purposes, the counts were aggregated into 1-hour periods . Analysis period for Saturday before service is from 5:15 PM to 6:15 PM based on Church peak period, which differs from Topgolf peak period.

Figure 8



Note: Count data was collected by 15-minute increments. For illustrative purposes, the counts were aggregated into 1-hour periods

Figure 9



Note: Count data was collected by 15-minute increments. For illustrative purposes, the counts were aggregated into 1-hour periods

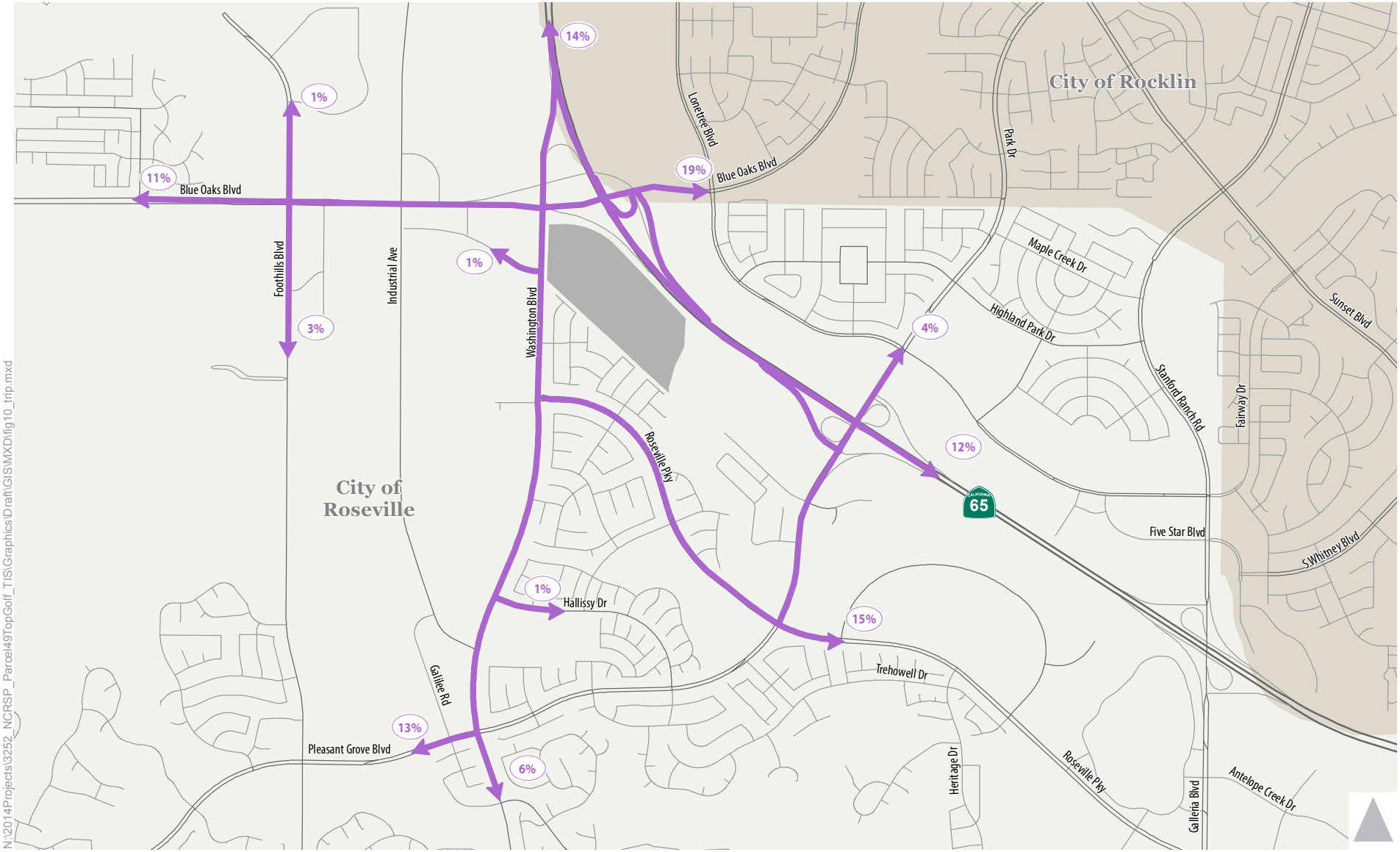
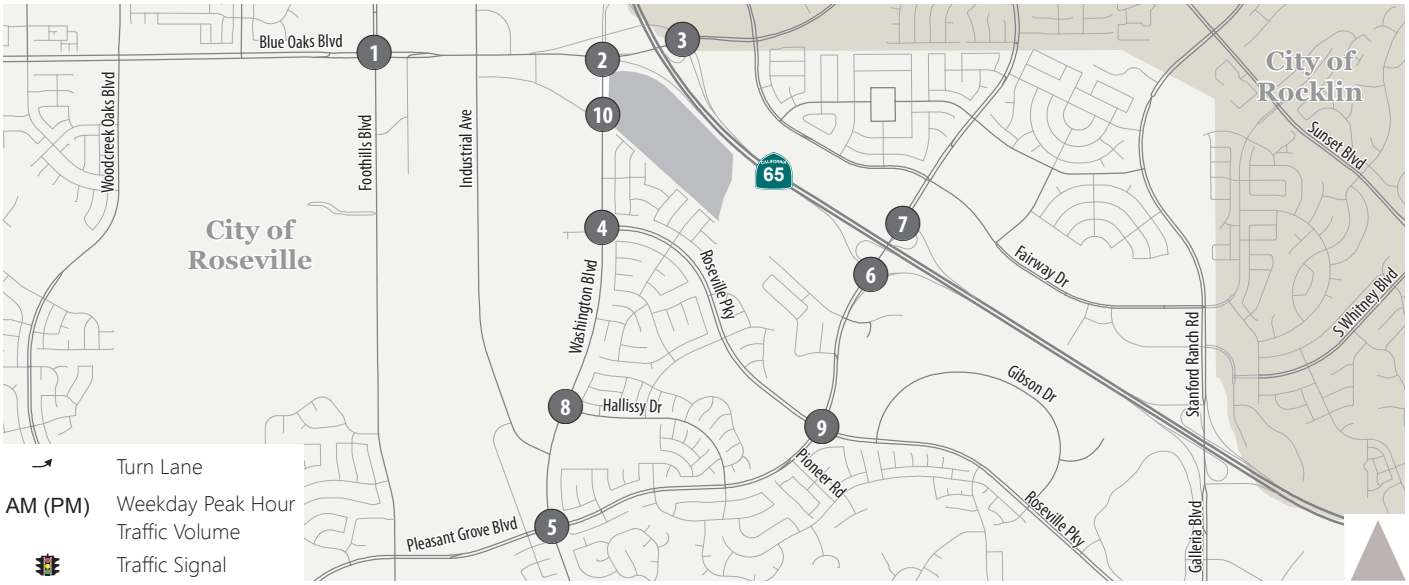


Figure 10

Project Trip Distribution



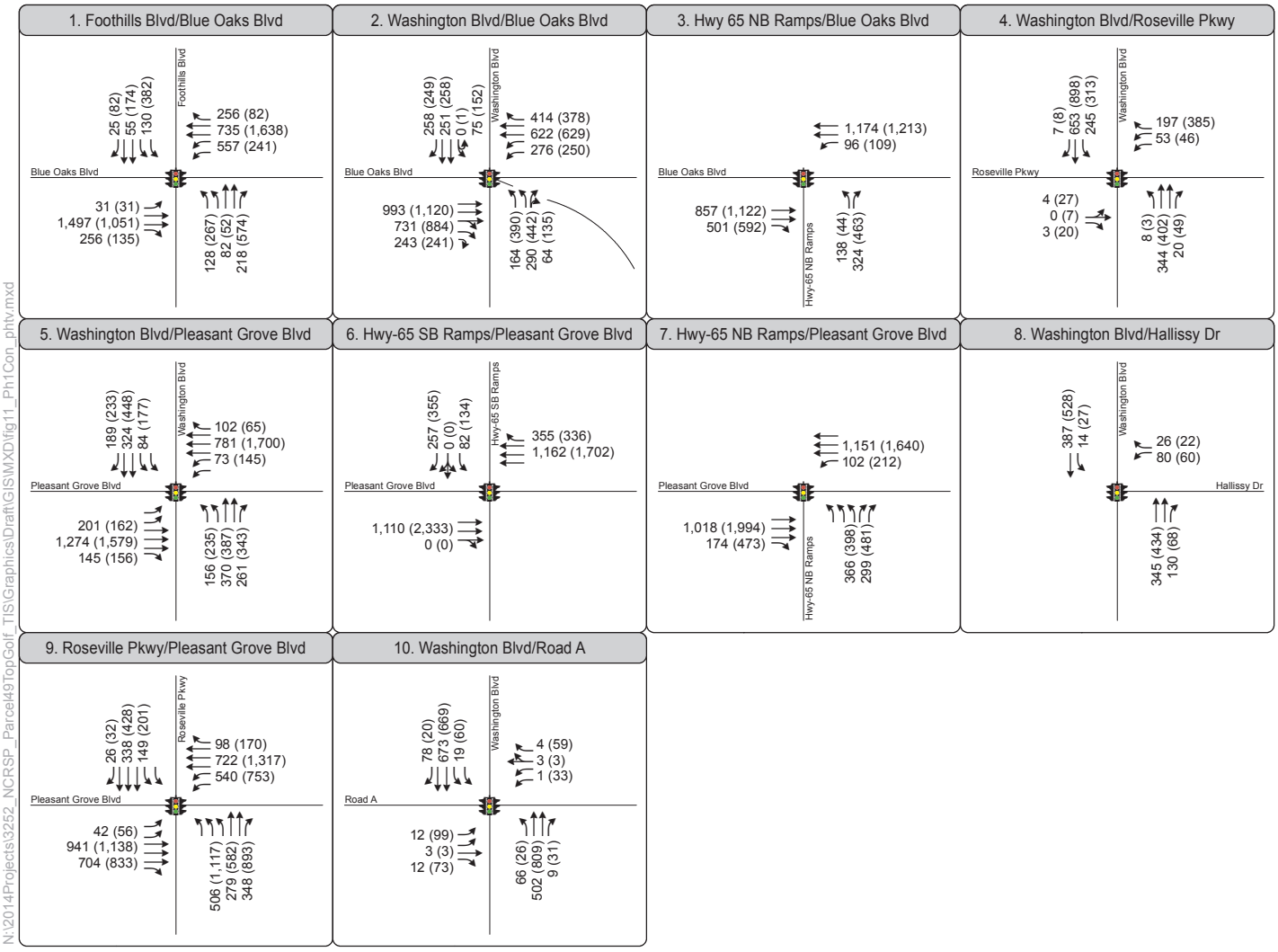


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Figure 11

Peak Hour Traffic Volumes and Lane Configurations - Baseline Plus Phase 1 Conditions (Weekday)

INTERSECTION OPERATIONS

The study intersections were analyzed with the traffic volumes and lane configurations shown in Figure 11. Table 8 shows the weekday AM and PM peak hour LOS and delay at the study intersections. Note that the intersection of Washington Boulevard/Road A is expected to operate at LOS A conditions during the AM peak hour and LOS C during the PM peak hour under Baseline Plus Phase 1 (Topgolf) conditions.

TABLE 8 – WEEKDAY INTERSECTION OPERATIONS FOR BASELINE PLUS PHASE 1 CONDITIONS

Intersection	Baseline Conditions		Baseline Plus Phase 1	
	AM	PM	AM	PM
1. Blue Oaks Blvd/Foothills Blvd	E / 75	D / 52	E / 58	D / 46
2. Blue Oaks Blvd/Washington Blvd/ Hwy 65 SB Ramps	C / 28	D / 52	C / 31	D / 51
3. Blue Oaks Blvd/Hwy 65 NB Ramps	B / 14	B / 18	B / 15	B / 19
4. Washington Blvd/Roseville Pkwy	B / 11	B / 16	B / 12	B / 15
5. Pleasant Grove Blvd/Washington Blvd	C / 28	D / 39	C / 27	D / 37
6. Hwy 65 SB Ramps/Pleasant Grove Blvd	B / 10	B / 15	B / 11	B / 15
7. Hwy 65 NB Ramps/Pleasant Grove Blvd	B / 16	C / 22	B / 17	C / 22
8. Washington Blvd/Hallissy Drive	A / 6	A / 6	A / 6	A / 6
9. Pleasant Grove Blvd/Roseville Pkwy	D / 35	E / 66	D / 37	E / 65
10. Washington Blvd/Road A	A / 8	B / 14	A / 9	C / 22

Notes: Level of service and average delay expressed in seconds per vehicle are reported.
Source: Fehr & Peers, 2014

Some intersections have lower average delay under plus project conditions. This occurs when the project adds trips to intersection movements with low delay. The overall intersection delay is a volume-weighted average of movement delays so that the calculation when the project trips are included can result in a lower intersection delay. At the Blue Oaks Boulevard/Foothills Boulevard intersection, the average delay decreases under Phase 1 conditions (although the LOS remains at E) because the signal timing has been

optimized for the forecasted volumes under Phase 1 conditions. Except for the Washington Boulevard/Road A intersection, all study intersections have the same LOS under Baseline and Phase 1 conditions. Therefore, Phase 1 of the project does not result in significant impacts at any of the study intersections.

FREEWAY OPERATIONS

Tables 9 and 10 show freeway operations on SR 65 near the project area under Baseline and Baseline Plus Phase 1 Conditions. In the northbound direction, the LOS stays the same at all study locations with the Phase 1 trips added to Baseline Conditions. The number of project trips using the freeway are not high enough to change the vehicle density at most study locations during both peak hours. In the southbound direction, the LOS stays the same at all but one location. The weave segment between Blue Oaks Boulevard and Pleasant Grove Boulevard changes from LOS C to D during the PM peak hour.

TABLE 9 – WEEKDAY NORTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PHASE 1 CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Phase 1	
		AM	PM	AM	PM
Pleasant Grove Blvd Off-ramp	Diverge	F / -	F / -	F / -	F / -
Pleasant Grove Blvd Off to On-ramp	Basic	D / 33	D / 29	D / 33	D / 29
Pleasant Grove Blvd to Blue Oaks Blvd	Weave[2]	C	E	C	E
Blue Oaks Blvd Off to On-ramp	Basic	C / 24	C / 24	C / 24	C / 24
Blue Oaks Blvd On-ramp	Merge	D / 33	D / 33	D / 32	D / 33
Blue Oaks Blvd to Sunset Blvd	Basic	D / 32	D / 31	D / 30	D / 32
Sunset Blvd Off-ramp	Diverge	C / 24	C / 24	C / 23	C / 24

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.

Source: Fehr & Peers, 2014

TABLE 10 – WEEKDAY SOUTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PHASE 1 CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Phase 1	
		AM	PM	AM	PM
Sunset Blvd WB On-ramp	Merge	D / 28	C / 23	D / 28	C / 23
Sunset Blvd EB On-ramp	Merge	C / 24	C / 22	C / 24	C / 22
Sunset Blvd to Blue Oaks Blvd	Basic	D / 29	C / 26	D / 29	C / 26
Blue Oaks Blvd Off-ramp	Diverge	D / 33	D / 31	D / 34	D / 31
Blue Oaks Blvd Off to On-ramp	Basic	C / 23	C / 20	C / 23	C / 20
Blue Oaks Blvd WB On-ramp	Merge	D / 30	C / 26	D / 30	C / 26
Blue Oaks Blvd to Pleasant Grove Blvd	Weave[2]	C / 22[3,4]	C[4]	C / 22[3,4]	D[4]
Pleasant Grove Blvd Off to On-ramp	Basic	D / 32[4]	D / 28[4]	D / 32[4]	D / 29[4]
Pleasant Grove Blvd WB On-ramp	Merge	E / 36[4]	D /33[4]	E / 36[4]	D /33[4]
Pleasant Grove Blvd EB On-ramp	Merge	F / -	E / 37[4]	F / -	E / 37[4]

Notes:
1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.
3. The segment operates "out of the realm of weaving," so the HCM basic segment LOS and density is reported.
4. Field observations show that recurring congestion south of the Pleasant Grove Blvd interchange causes queues that extend back to Blue Oaks Blvd under both the AM and PM peak hours; therefore, the actual conditions are LOS F.

Source: Fehr & Peers, 2014

Table 11 shows queues on the off-ramps at the Blue Oaks Boulevard and Pleasant Grove Boulevard interchanges. The storage length shown in the table is measured from the ramp terminal intersection to the off-ramp painted gore. Under Phase 1 conditions, the average maximum queue on the off-ramps is 275 feet or less during both weekday peak hours. Therefore, Phase 1 of the project does not result in significant impacts at any of SR 65.

TABLE 11 – WEEKDAY OFF-RAMP QUEUES FOR BASELINE PLUS PHASE 1 CONDITIONS

Location	Direction	Storage	Average Maximum Queue	
			AM	PM
Blue Oaks Blvd	Northbound	1,125 ft[1]	150 ft	275 ft
	Southbound	2,250 ft	150 ft	200 ft
Pleasant Grove Blvd	Northbound	1,575 ft	175 ft	225 ft
	Southbound	1,575 ft	250 ft	275 ft

Note: 1. Measured from the split on the off-ramp between this ramp and the direct ramp to westbound Blue Oaks Blvd.
Source: Fehr & Peers, 2014

BASELINE PLUS PROJECT PHASE 1 & 2 CONDITIONS

Phase 2 of the project consists of the following uses:

- Three restaurants totaling 11,200 square feet
- Five office buildings totaling 116,500 square feet
- Seven retail pads totaling 37,800 square feet
- A 125-room hotel
- A 25-space park-and-ride lot.

The site plan for Phase 1 and 2 is shown in Figure 12. Road B will be constructed with Phase 2. Road B is situated north of and parallel to Road A. Right turns in and out only will be provided at Road B's intersection at Washington Boulevard. A northbound right-turn pocket will be provided on Washington Boulevard for traffic accessing Road B.

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Figure 12

Project Site Plan -

Baseline Plus Project Phase 1 and 2 Conditions

TRIP GENERATION

The amount of traffic that Phase 2 will generate was estimated using information contained in Trip Generation, Ninth Edition, published by the Institute of Transportation Engineers. Table 12 shows the number of vehicle trips that Phase 1 plus Phase 2 will generate during the study periods.

TABLE 12 – PROJECT PHASE 1+2 TRIP GENERATION

Land Use	Weekday						Saturday						Sunday					
	AM Peak Hour			PM Peak Hour			Before Service			After Service			Before Service			After Service		
	7:30 AM to 8:30 AM			4:30 PM to 5:30 PM			5:15 PM to 6:15 PM			7:00 PM to 8:00 PM			10:15 AM to 11:15 AM			12:00 PM to 1:00 PM		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Topgolf	28	4	32	91	92	183	153	109	262	161	151	312	65	33	98	107	77	184
Office[1]	190	26	216	36	173	209	0	0	0	0	0	0	0	0	0	0	0	0
Retail[1,2]	53	33	86	150	162	312	95	200	295	53	58	111	65	37	102	184	95	279
Hotel	37	31	68	44	32	76	30	30	60	30	30	60	20	40	60	20	20	40
Restaurant[1,2]	64	57	121	60	51	111	84	74	158	84	74	158	64	57	121	64	57	121
Park & Ride Lot	14	4	18	4	12	16	0	0	0	0	0	0	0	0	0	0	0	0
Gross Trips	386	155	541	385	522	907	362	413	775	328	313	641	214	167	381	375	249	624
Internal Trips	-15	-6	-21	-12	-19	-32	-9	-14	-23	-7	-7	-13	-6	-5	-11	-12	-8	-20
Pass-by Trips	-23	-18	-41	-77	-77	-154	-54	-82	-136	-41	-40	-81	-39	-28	-67	-74	-46	-120
New Trips	**348**	**131**	**479**	**296**	**426**	**721**	**299**	**317**	**616**	**280**	**266**	**547**	**169**	**134**	**303**	**289**	**195**	**484**

Note: 1. Internal trip reduction is assumed to be 5% of office, retail, and restaurant trips for all scenarios.

2. Pass-by trip reduction is assumed to be 20% for retail and restaurant in the weekday AM peak hour, and 30% for the Saturday and Sunday scenarios. During the weekday PM peak hour, pass-by trip reduction was 34% for retail and 43% for restaurant, as determined using the average percentages in the ITE Trip Generation, Ninth Edition.

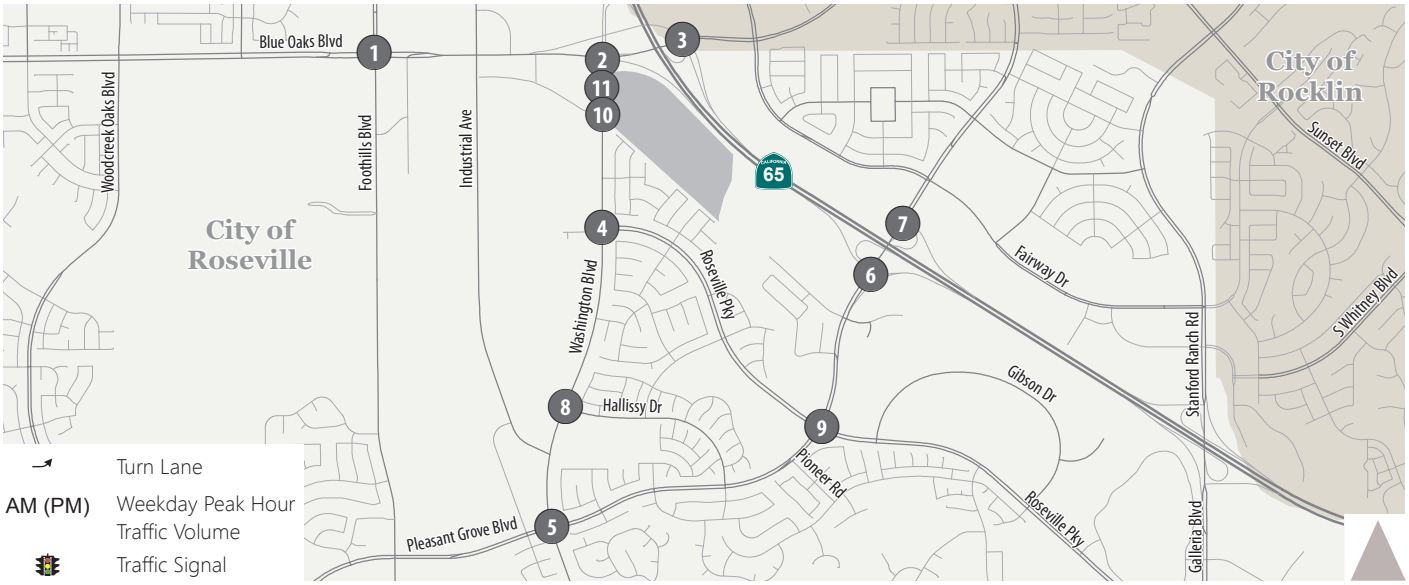
Source: Fehr & Peers, 2014

TRIP DISTRIBUTION

The distribution of Phase 2 trips is expected to be the same as the distribution of Phase 1 trips (see Figure 10).

TRAFFIC ASSIGNMENT

Phase 1 and Phase 2 traffic volumes were assigned to the study intersections. Traffic was assigned to Roads A and B in the project based on the proximity of the Phase 2 uses to each driveway and on the turning movements allowed at the intersections with Washington Boulevard. Figure 13 contains Baseline Plus Phase 1 and Phase 2 traffic volumes at the study intersections.



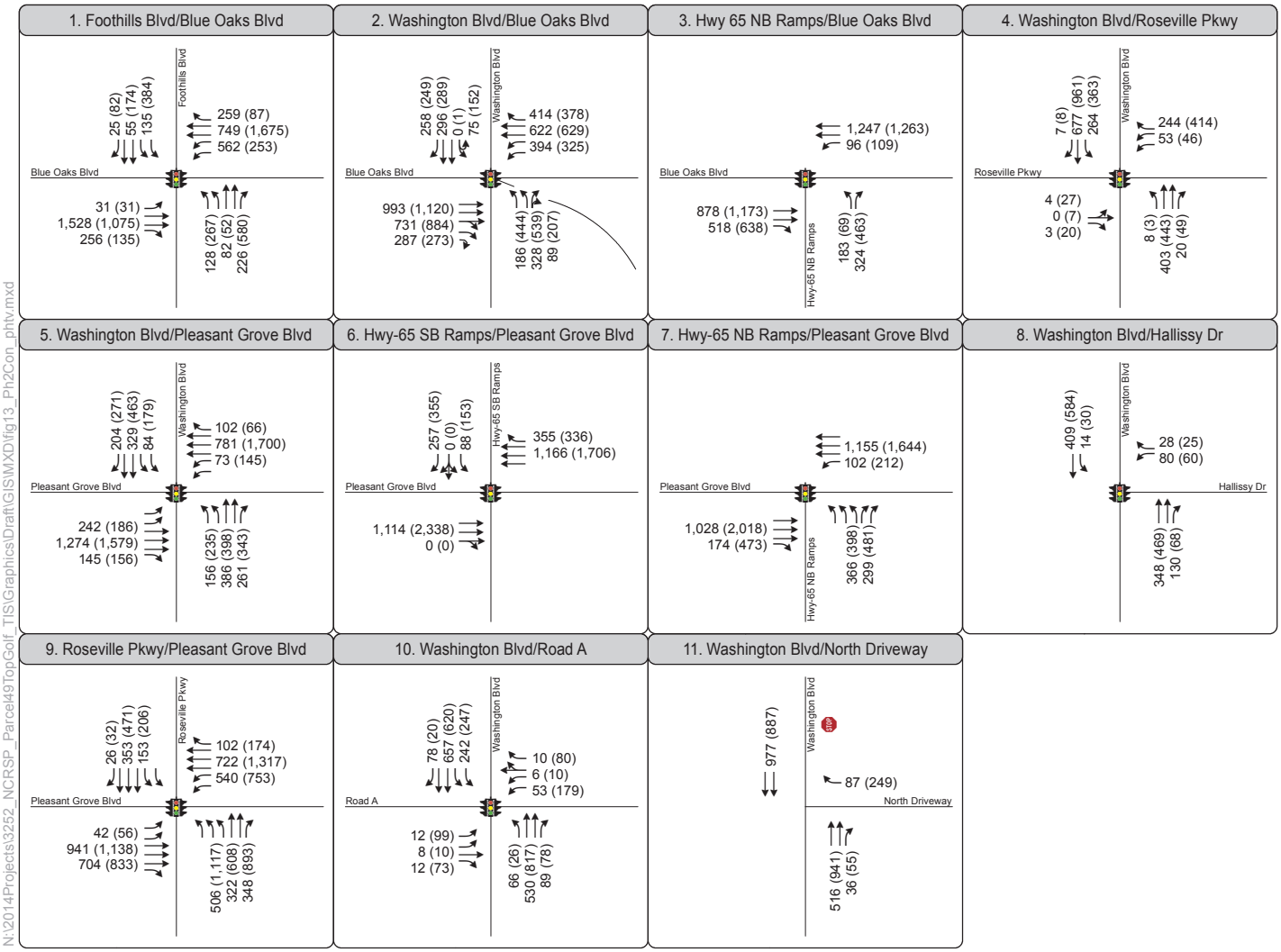


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Figure 13

Peak Hour Traffic Volumes and Lane Configurations - Baseline Plus Phase 1 and 2 Conditions (Weekday)

INTERSECTION OPERATIONS

The study intersections were analyzed with the traffic volumes and lane configuration shown in Figure 13. Table 13 shows the weekday AM and PM peak hour LOS and delay at the study intersections under Baseline and Baseline Plus Phases 1 & 2 Conditions.

TABLE 13 – WEEKDAY INTERSECTION OPERATIONS FOR BASELINE PLUS PHASES 1 & 2 CONDITIONS

Intersection	Baseline Conditions		Baseline Plus Phases 1 & 2 (With Mitigation)	
	AM	PM	AM	PM
1. Blue Oaks Blvd/Foothills Blvd	E / 75	D / 52	E / 74	D / 55 (D / 49)
2. Blue Oaks Blvd/Washington Blvd/ Hwy 65 SB Ramps	C / 28	D / 52	C / 34	**E / 59** (D / 49)
3. Blue Oaks Blvd/Hwy 65 NB Ramps	B / 14	B / 18	B / 17	B / 19 (B / 19)
4. Washington Blvd/Roseville Pkwy	B / 11	B / 16	B / 13	B / 18
5. Pleasant Grove Blvd/Washington Blvd	C / 28	D / 39	C / 28	D / 39
6. Hwy 65 SB Ramps/Pleasant Grove Blvd	B / 10	B / 15	B / 10	B / 14
7. Hwy 65 NB Ramps/Pleasant Grove Blvd	B / 16	C / 22	B / 15	C / 23
8. Washington Blvd/Hallissy Drive	A / 6	A / 6	A / 6	A / 7
9. Pleasant Grove Blvd/Roseville Pkwy	D / 35	E / 66	D / 36	E / 62
10. Washington Blvd/Road A	A / 8	B / 14	B / 13	**F / 82** (C / 29)

Notes: Bold and underline font indicates a project impact. Level of service and average delay expressed in seconds per vehicle are reported. Mitigation results are only reported for project impacts, shown in parentheses below the unmitigated results.

Source: Fehr & Peers, 2014

Similar to Phase 1 conditions, the average AM peak hour delay decreases under Phases 1 & 2 compared to baseline conditions at the Blue Oaks Boulevard/Foothills Boulevard intersection because the signal timing has been optimized for the forecasted volumes. During the AM peak hour, all study intersection operate at the same LOS in both scenarios except for the Washington Boulevard/Road A intersection which changes from LOS A to B.

During the PM peak hour, two intersections on Washington Boulevard adjacent to the project site would have impacts. The Blue Oaks Boulevard/Washington Boulevard intersection would worsen from LOS D to E, and the Washington Boulevard/Road A intersection would worsen from LOS B to F. To mitigate these impacts, a northbound right-turn pocket of 250 feet should be constructed at the Blue Oaks Boulevard/Washington Boulevard intersection. With this mitigation, the Blue Oaks Boulevard/Washington Boulevard intersection would improve to LOS D (49 seconds), and the Washington Boulevard/Road A intersection would improve to LOS C (29 seconds).

FREEWAY OPERATIONS

Tables 14 and 15 show freeway operations on SR 65 near the project area under Baseline and Baseline Plus Phases 1 & 2 Conditions. The LOS stays the same at most study locations with the Phase 1 & 2 trips added to Baseline Conditions. During the AM peak hour, the northbound weave segment between Pleasant Grove Boulevard and Blue Oaks Boulevard changes from LOS C to D. During the PM peak hour, two southbound segments change from LOS C to D: Sunset Boulevard to Blue Oaks Boulevard and Blue Oaks Boulevard to Pleasant Grove Boulevard. Since the LOS impact threshold for the freeway is LOS E. this change in operating conditions is acceptable.

TABLE 14 – WEEKDAY NORTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PHASES 1 & 2 CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Phases 1 & 2	
		AM	PM	AM	PM
Pleasant Grove Blvd Off-ramp	Diverge	F / -	F / -	F / -	F / -
Pleasant Grove Blvd Off to On-ramp	Basic	D / 33	D / 29	D / 34	D / 30
Pleasant Grove Blvd to Blue Oaks Blvd	Weave[2]	C	E	D	E
Blue Oaks Blvd Off to On-ramp	Basic	C / 24	C / 24	C / 24	C / 24
Blue Oaks Blvd On-ramp	Merge	D / 33	D / 33	D / 33	D / 33
Blue Oaks Blvd to Sunset Blvd	Basic	D / 32	D / 31	D / 32	D / 32
Sunset Blvd Off-ramp	Diverge	C / 24	C / 24	C / 24	C / 24

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.

Source: Fehr & Peers, 2014

TABLE 15 – WEEKDAY SOUTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PHASES 1 & 2 CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Phases 1 & 2	
		AM	PM	AM	PM
Sunset Blvd WB On-ramp	Merge	D / 28	C / 23	D / 29	C / 23
Sunset Blvd EB On-ramp	Merge	C / 24	C / 22	C / 25	C / 22
Sunset Blvd to Blue Oaks Blvd	Basic	D / 29	C / 26	D / 29	D / 26
Blue Oaks Blvd Off-ramp	Diverge	D / 33	D / 31	D / 34	D / 31
Blue Oaks Blvd Off to On-ramp	Basic	C / 23	C / 20	C / 23	C / 20
Blue Oaks Blvd WB On-ramp	Merge	D / 30	C / 26	D / 30	C / 26

TABLE 15 – WEEKDAY SOUTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PHASES 1 & 2 CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Phases 1 & 2	
		AM	PM	AM	PM
Blue Oaks Blvd to Pleasant Grove Blvd	Weave[2]	C / 22[3,4]	C[4]	C / 23[3,4]	D[4]
Pleasant Grove Blvd Off to On-ramp	Basic	D / 32[4]	D / 28[4]	D / 33[4]	D / 29[4]
Pleasant Grove Blvd WB On-ramp	Merge	E / 36[4]	D /33[4]	E / 36[4]	D / 33[4]
Pleasant Grove Blvd EB On-ramp	Merge	F / -	E / 37[4]	F / -	E / 37[4]

Notes:
1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.
3. The segment operates "out of the realm of weaving," so the HCM basic segment LOS and density is reported.
4. Field observations show that recurring congestion south of the Pleasant Grove Blvd interchange causes queues that extend back to Blue Oaks Blvd under both the AM and PM peak hours; therefore, the actual conditions are LOS F.

Source: Fehr & Peers, 2014

TABLE 16 – WEEKDAY OFF-RAMP QUEUES FOR BASELINE PLUS PHASES 1 & 2 CONDITIONS

Location	Direction	Storage	Average Maximum Queue	
			AM	PM
Blue Oaks Blvd	Northbound	1,125 ft[1]	300 ft	300 ft
	Southbound	2,250 ft	250 ft	225 ft
Pleasant Grove Blvd	Northbound	1,575 ft	175 ft	200 ft
	Southbound	1,575 ft	225 ft	300 ft

Note: 1. Measured from the split on the off-ramp between this ramp and the direct ramp to westbound Blue Oaks Blvd.

Source: Fehr & Peers, 2014

Table 16 shows queues on the off-ramps at the Blue Oaks Boulevard and Pleasant Grove Boulevard interchanges. Under Phases 1 & 2 conditions, the average maximum queue on the off-ramps is 300 feet or less during both weekday peak hours. Therefore, Phase 1 plus Phase 2 of the project does not cause significant impacts on SR 65.

BASELINE PLUS PROJECT BUILDOUT

Phase 3, the final phase of the project, is the proposed Bayside Church complex. The site plan for Project Buildout is shown in Figure 14. As shown, the complex consists of three buildings: a 60,000 square foot assembly building with a 2,800 person seating capacity, a 50,000 square foot building for children activities/classrooms, and a 20,000 square foot building for youth activities/classrooms.

The Phase 2 mitigation at Blue Oaks Boulevard/Washington Boulevard, a 250-foot northbound right-turn pocket, is assumed to be in place in the intersection analysis for Project Buildout (Phases 1, 2, & 3) Conditions.

TRIP GENERATION

The study determined Phase 3 project trip generation under weekday AM and PM peak hour conditions and before and after Saturday evening and Sunday midday church worship services.

Weekday Peak Hours

The trip generation of the church complex was estimated based on information contained in Trip Generation, 9th Edition, Institute of Transportation Engineers. Table 17 shows that the church complex is estimated to generate 113 trips in the weekday AM peak hour and 122 trips in the weekday PM peak hour.

TABLE 17 – CHURCH WEEKDAY TRIP GENERATION

Weekday					
AM Peak Hour			**PM Peak Hour**		
7:30 AM - 8:30 AM			4:30 PM - 5:30 PM		
In	Out	Total	In	Out	Total
62	51	113	66	56	122

Source: Trip Generation, 9th Edition, Institute of Transportation Engineers.

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Figure 14

Project Site Plan - Buildout Conditions (All Phases)

Saturday Evening and Sunday Midday Worship Services

Several assumptions regarding the operations and travel characteristics of the church on weekends were taken form a report recently completed for the Alantown Drive Bayside facility (Technical Memorandum – Bayside Covenant Church Traffic Impact Study, Fehr & Peers, May 28 2014). These assumptions are as follows:

- During services, the ratio of adults to children is consistently 4:1 (i.e., 1 child for every 4 adults). Children typically do not attend the worship services as they have their own program.
- Saturday evening services typically have attendance levels at about two-thirds of seating capacity.
- Sunday morning services typically have attendance levels at about 80 percent of seating capacity.
- The average vehicle occupancy (AVO) of service attendees is 2.05 persons per vehicle. This vehicle occupancy number was based on actual observations conducted in March 2014 at Bayside Covenant Church on Sierra College Boulevard, and further supported by actual observations in August 2014 at the Adventure Christian Church located closer to the project site.
- The trip arrival and departure characteristics (based on data collected by KD Anderson in March 2010 at Bayside Covenant Church on Sierra College Boulevard) for Saturday evening and Sunday morning church services are shown in Table 18.

TABLE 18 – CHURCH SERVICE TRIP ARRIVAL AND DEPARTURE CHARACTERISTICS

Arrival Patterns		**Departure Patterns**	
Time Period	**Inbound Travel to Second Sunday Service**	**Time Period**	**Outbound Travel After First Sunday Service**
Arrived between 30 and 45 minutes *before* service	9.1%	Departed within 15 minutes *before* the service ended	19.3%
Arrived between 15 and 30 minutes *before* service	26.2%	Departed within 15 minutes *after* the service ended	51.6%
Arrived within 15 minutes *before* service	44.0%	Departed between 15 to 30 minutes *after* the service ended	20.4%
Arrived within 15 minutes *after* service started	20.7%	Departed between 30 to 45 minutes *after* the service ended	8.7%
Total	100%	Total	100%

Source: KD Anderson Transportation Engineers, 2010

Using the assumptions described above, the Saturday evening worship service would be expected to have 1,867 adult attendees. Given the 4:1 adult-to-child ratio and the 2.05 AVO, this will result in 1,138 vehicles arriving before service and departing after service. The midday Sunday worship service would be expected to have 2,240 adult attendees, which would result in 1,366 vehicles arriving before service and departing after service.

For purposes of this study, it was assumed that the Saturday evening service would begin at 6 PM and the Sunday midday service would begin at 11 AM. These time periods represent a likely worst case scenario for purposes of the traffic study. Using the arrival and departure patterns previously discussed, the following table shows the trip generation by 15-minute increment for vehicles arriving to and departing a Saturday evening and Sunday midday worship service.

TABLE 19 – PROJECT PHASE 3 CHURCH WEEKEND TRIP GENERATION

Saturday								**Sunday**							
Before Service				**After Service**				**Before Service**				**After Service**			
5:15 PM - 6:15 PM				7:00 PM - 8:00 PM				10:15 AM - 11:15 AM				12:00 PM - 1:00 PM			
15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total
5:15 PM	103	3	106	7:00 PM	6	220	226	10:15 AM	124	4	128	12:00 PM	8	263	271
5:30 PM	298	9	307	7:15 PM	18	587	605	10:30 AM	358	11	369	12:15 PM	21	705	726
5:45 PM	501	15	516	7:30 PM	7	232	239	10:45 AM	601	18	619	12:30 PM	8	279	287
6:00 PM	236	7	243	7:45 PM	3	99	102	11:00 AM	283	8	291	12:45 PM	4	119	123
Total	**1138**	**34**	**1172**	**Total**	**34**	**1338**	**1172**	**Total**	**1366**	**41**	**1407**	**Total**	**41**	**1366**	**1407**

Source: Fehr & Peers, 2014

BUILDOUT OF THE PROJECT

This section first discusses the parking demand and supply for peak periods (i.e., during the Saturday evening and Sunday morning church worship periods). It then discusses the trip generation of the entire project land uses and the traffic impacts of those trips during the weekday AM and PM peak hours, and for the hours before and after the Saturday evening and Sunday morning church worship services.

Parking

A total of 2,789 parking spaces will be provided on the project site at build out. The parking demand on the entire site was estimated for Saturday evening and Sunday morning church service times based on the expected parking usage for each land use type within the project. The parking demand for Topgolf is based on actual parking utilization surveys completed at the Scottsdale facility. The parking demand for the retail, restaurant and hotel uses is assumed to be the parking supply provided by City code. It was assumed that the office space on this site would have little (50 spaces) parking demand on weekends.

Parking demand estimates for the church were prepared for two scenarios. The first scenario assumes the church's typical attendance levels which are 67 percent of assembly/worship building seating capacity for Saturday evening services and 80 percent seating capacity for Sunday morning services. The second scenario assumes attendance levels at 100 percent seating capacity for both the Saturday evening and Sunday morning services.

Table 20 shows the resulting parking demand estimates. On Saturday evening, if church attendance level was at 100 percent seating capacity, the entire parking lot would be 91 percent occupied with 241 unoccupied parking spaces. If the attendance level was at 100 percent for a Sunday morning service, the entire parking lot would be 86 percent occupied with 404 unoccupied parking spaces.

TABLE 20 – PARKING DEMAND DURING PEAK CHURCH SERVICES				
	SATURDAY		SUNDAY	
Uses	Church Attendance at 67% Capacity	Church Attendance at 100% Capacity	Church Attendance at 80% Capacity	Church Attendance at 100% Capacity
Church	1,138	1,707	1,366	1,707
Topgolf	397	397	234	234
Offices	50	50	50	50
Retail	125	125	125	125
Restaurants	144	144	144	144
Hotel	125	125	125	125
Total Demand	**1,979**	**2,548**	**2,044**	**2,385**
Number of Parking Spaces on Site (Supply)	2,789	2,789	2,789	2,789
Percent Demand Over Supply	71%	91%	73%	86%
Number of Empty Parking Spaces	**810**	**241**	**745**	**404**

Source: TSD Engineering and Fehr & Peers, 2014

For the purposes of this study, the parking supply was separated into three areas: those for users of the restaurants, retail pads and hotel, those for Topgolf customers, and those for church attendees. Assuming that most church attendees will park along the long southern portion of the site and not park in the northwest portion of the site, adequate parking proximity will be provided to users of the restaurants, retail pads, hotel, and Topgolf facility during peak church services periods. Note that it will be important for church attendees not to park in those parking areas designated for the users of the restaurants, retail pads, hotel and Topgolf facility.

Trip Generation

Table 21 shows the trip generation of project buildout during weekday AM and PM peak hours, and during Saturday evening and Sunday morning church service arrival and departure periods. During the weekday AM and PM peak hours the project buildout will generate 592 and 843 new trips, respectively. Compared to the current zoning of the site (mixture of office and retail), the proposed project would result in a 65 percent reduction in new weekday AM peak hour trips and a 55 percent decrease in new PM peak hour trips.

Compared to the previous Cinemark project, the proposed project would result in a 57 percent decrease in new weekday AM peak hour trips and a 41 percent decrease in new PM peak hour trips.

TABLE 21 – PROJECT BUILDOUT TRIP GENERATION

Land Use	Weekday						Saturday						Sunday					
	AM Peak Hour			PM Peak Hour			Before Service			After Service			Before Service			After Service		
	7:30 AM to 8:30 AM			4:30 PM to 5:30 PM			5:15 PM to 6:15 PM			7:00 PM to 8:00 PM			10:15 AM to 11:15 AM			12:00 PM to 1:00 PM		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Topgolf	28	4	32	91	92	183	153	109	262	161	151	312	65	33	98	107	77	184
Office[1]	190	26	216	36	173	209	0	0	0	0	0	0	0	0	0	0	0	0
Retail[1,2]	53	33	86	150	162	312	95	200	295	53	58	111	65	37	102	184	95	279
Hotel	37	31	68	44	32	76	30	30	60	30	30	60	20	40	60	20	20	40
Restaurant[1,2]	64	57	121	60	51	111	84	74	158	84	74	158	64	57	121	64	57	121
Park & Ride Lot	14	4	18	4	12	16	0	0	0	0	0	0	0	0	0	0	0	0
Church	62	51	113	66	56	122	1138	34	1172	34	1138	1172	1366	41	1407	41	1366	1407
Gross Trips	448	206	654	451	578	1029	1506	447	1947	362	1457	1819	1580	208	1788	416	1615	2031
Internal Trips	-15	-6	-21	-12	-19	-32	-90	-137	-227	-69	-66	-135	-65	-47	-112	-124	-76	-200
Pass-by Trips	-23	-18	-41	-77	-77	-154	-54	-82	-136	-41	-40	-81	-39	-28	-67	-74	-46	-120
New Trips	**410**	**182**	**592**	**362**	**482**	**843**	**1356**	**228**	**1584**	**252**	**1345**	**1597**	**1476**	**133**	**1609**	**218**	**1493**	**1711**

Note: 1. Internal trip reduction is assumed to be 5% of office, retail, and restaurant trips for all scenarios.

2. Pass-by trip reduction is assumed to be 20% for retail and restaurant in the weekday AM peak hour, and 30% for the Saturday and Sunday scenarios. During the weekday PM peak hour, pass-by trip reduction was 34% for retail and 43% for restaurant, as determined using the average percentages in the ITE Trip Generation, Ninth Edition.

Source: Fehr & Peers, 2014

As discussed earlier, the church traffic surges during arrival and departure periods which can overwhelm the roadway system. To evaluate the ability for the roadway system to be able to adequately serve these traffic surges, we first needed to estimate the amount of traffic by 15-minute increment that arrives and departs the site. Table 22 shows the amount of traffic for all uses by 15-minute increment that is projected to enter and exit the site during Saturday evening and Sunday morning church services. The volumes shown represent all traffic entering and exiting the project site, and not just church traffic.

TABLE 22 – PROJECT BUILDOUT WEEKEND NEW TRIPS

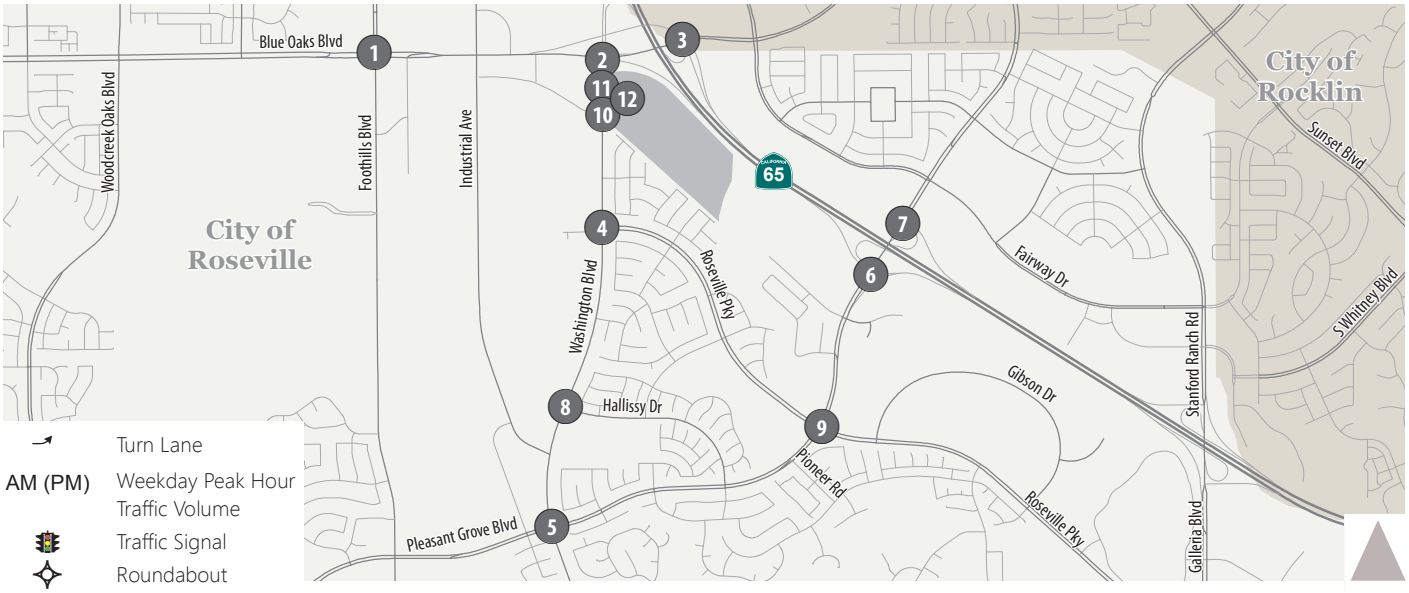
Saturday								**Sunday**							
Before Service				**After Service**				**Before Service**				**After Service**			
5:15 PM - 6:15 PM				7:00 PM - 8:00 PM				10:15 AM - 11:15 AM				12:00 PM - 1:00 PM			
15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total	15 Minute Interval	In	Out	Total
5:15 PM	172	72	243	7:00 PM	71	282	352	10:15 AM	162	33	195	12:00 PM	71	307	378
5:30 PM	366	78	443	7:15 PM	83	649	731	10:30 AM	395	41	436	12:15 PM	84	748	832
5:45 PM	570	85	654	7:30 PM	72	295	366	10:45 AM	639	48	687	12:30 PM	71	322	393
6:00 PM	304	76	379	7:45 PM	68	161	228	11:00 AM	320	38	358	12:45 PM	66	162	228
Total	**1410**	**310**	**1720**	**Total**	**293**	**1391**	**1678**	**Total**	**1515**	**161**	**1676**	**Total**	**292**	**1539**	**1831**

Source: Fehr & Peers, 2014

As shown in Table 22, the peak weekend project trips occur before the service on Saturday and after the service on Sunday. As a result, these peak hours – Saturday 5:15 to 6:15 PM and Sunday 12:00 to 1:00 PM – are analyzed for traffic impacts.

TRIP DISTRIBUTION

During the weekday, the distribution of Phase 3 trips is expected to be the same as the distribution of Phase 1 trips (see Figure 10). The peak hour traffic volumes for weekday and weekend are shown in Figure 15 and Figure 16, respectively. During the weekend peak hour, the surge in traffic before the church service is likely to affect trip distribution. Entering the project site from the south via the SR 65/Blue Oaks Boulevard interchange requires three consecutive left turn movements. These movements are likely to be congested, particularly during the 15 minutes before service. In contrast, entering from the south via Washington Boulevard will use a temporary inbound right-turn only driveway that will likely have low delay. As a result, the inbound weekend peak hour trip distribution for the church trips was reduced from 65 to 60 percent from the north.



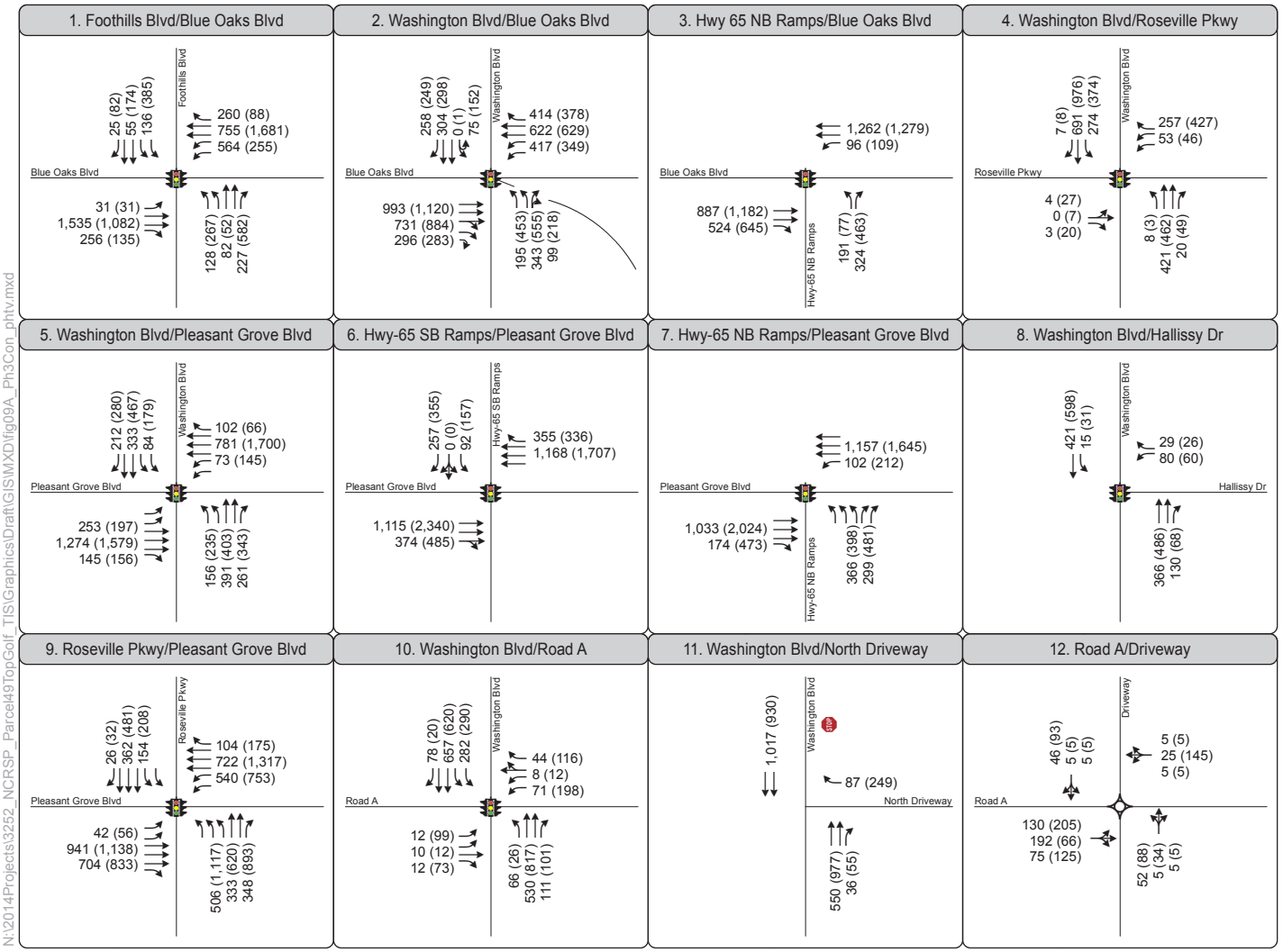


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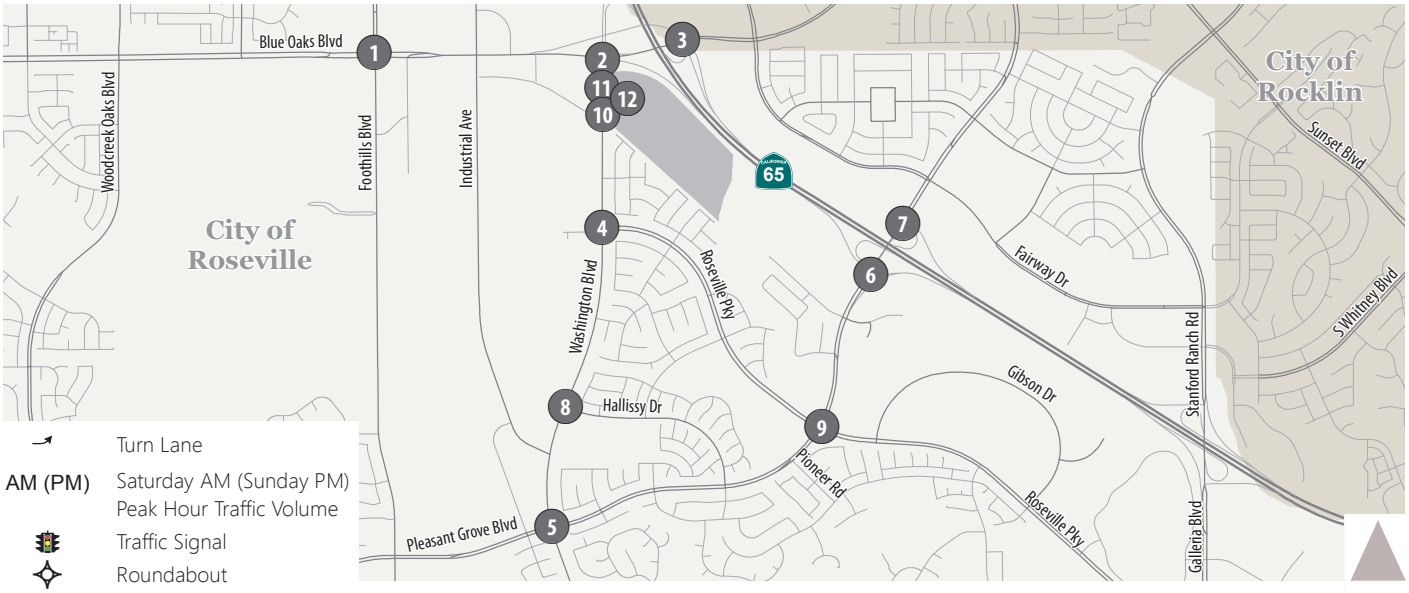
Figure 15

Peak Hour Traffic Volumes and Lane Configurations - Baseline Plus Phase 1, 2 and 3 Conditions (Weekday)



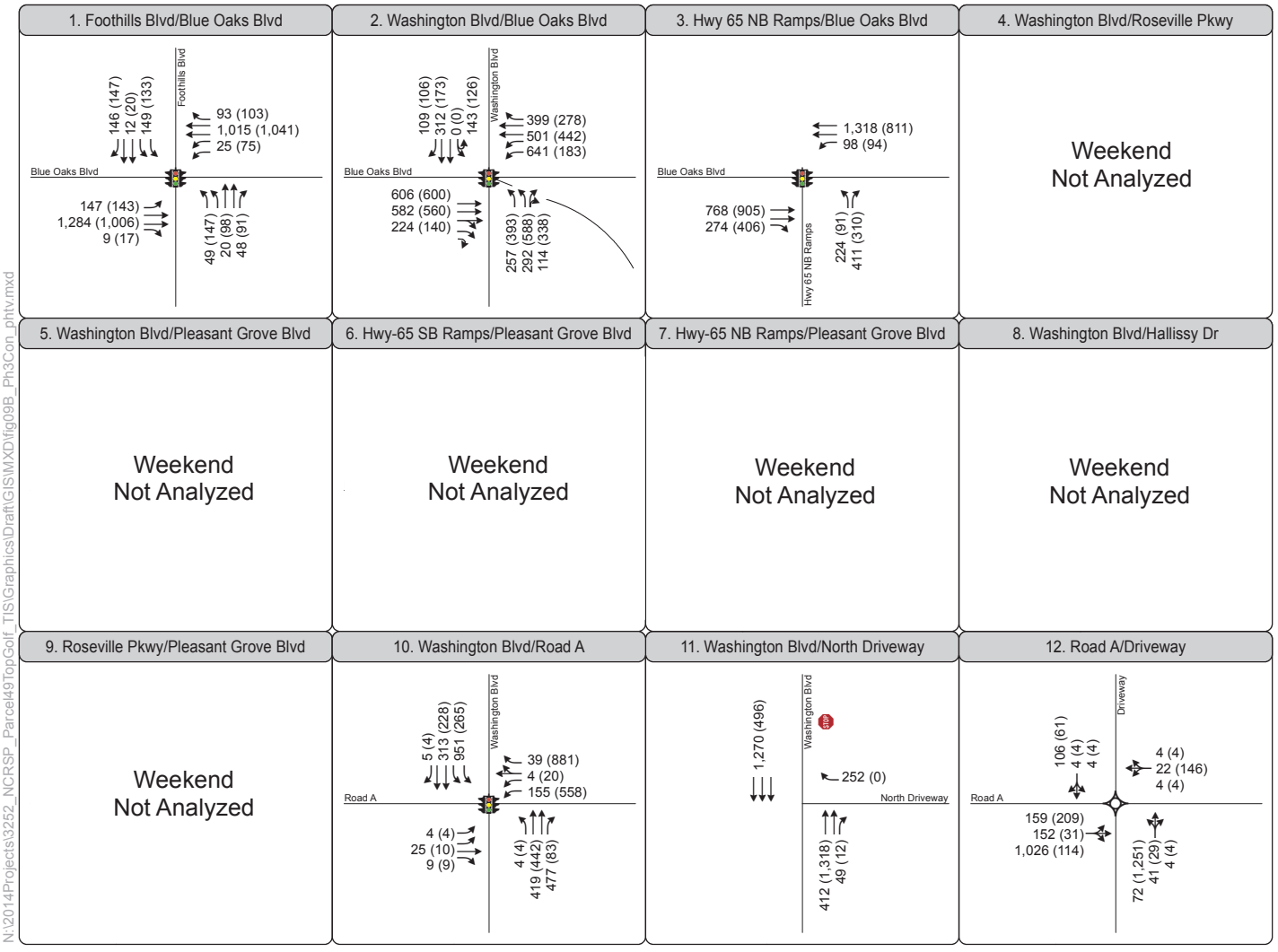


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Figure 16

Peak Hour Traffic Volumes and Lane Configurations - Baseline Plus Phase 1, 2 and 3 Conditions (Weekend)

INTERSECTION OPERATIONS

The study intersections were analyzed with the traffic volumes and lane configuration shown in Figure 15. Table 23 shows the weekday AM and PM peak hour LOS and delay at the study intersections under Baseline and Baseline Plus Buildout Conditions.

TABLE 23 – WEEKDAY INTERSECTION OPERATIONS FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Intersection	Baseline Conditions		Baseline Plus Buildout	
	AM	PM	AM	PM
1. Blue Oaks Blvd/Foothills Blvd	E / 75	D / 52	E / 74	E / 56 [2]
2. Blue Oaks Blvd/Washington Blvd/ Hwy 65 SB Ramps	C / 28	D / 52	C / 34	D / 54
3. Blue Oaks Blvd/Hwy 65 NB Ramps	B / 14	B / 18	B / 15	C / 21
4. Washington Blvd/Roseville Pkwy	B / 11	B / 16	B / 11	B / 16
5. Pleasant Grove Blvd/Washington Blvd	C / 28	D / 39	C / 29	D / 39
6. Hwy 65 SB Ramps/Pleasant Grove Blvd	B / 10	B / 15	B / 12	B / 16
7. Hwy 65 NB Ramps/Pleasant Grove Blvd	B / 16	C / 22	B / 17	C / 24
8. Washington Blvd/Hallissy Drive	A / 6	A / 6	A / 6	A / 6
9. Pleasant Grove Blvd/Roseville Pkwy	D / 35	E / 66	D / 37	E / 74 [2]
10. Washington Blvd/Road A	A / 8	B / 14	B / 17	C / 33

Notes: 1. Level of service and average delay expressed in seconds per vehicle are reported.

2. As part of the September 2012 approval of the Creekview Specific Plan, the City Council amended the General Plan to acknowledge and accept LOS F at these intersections.

Source: Fehr & Peers, 2014

During the weekday AM peak hour, intersection operations are similar under Baseline and Baseline Plus Project Buildout conditions. Only the Washington Boulevard/Road A intersection changes LOS, from A to B. During the PM peak hour, the LOS increases by one grade level at three intersections: Blue Oaks Boulevard/Foothills Boulevard, Blue Oaks Boulevard/SR 65 Northbound Ramps, and Washington Boulevard/Road A. However, all intersections operate with LOS E or better conditions, and no intersections have project impacts. The main project access intersection, Washington Boulevard/Road A, operates with LOS C or better conditions.

To assess traffic impacts related to church services, the study intersections near the project site were analyzed during the weekend peak hours: Saturday evening before services and Sunday midday after services. Table 24 compares the weekend peak hour LOS and delay under Baseline and Baseline Plus Project Buildout conditions.

TABLE 24 – WEEKEND INTERSECTION OPERATIONS FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Intersection	Baseline Conditions		Baseline Plus Buildout	
	Saturday PM	Sunday Midday	Saturday PM	Sunday Midday
2. Blue Oaks Blvd/Washington Blvd/ Hwy 65 SB Ramps	C / 23	C / 22	E / 78	C / 31
3. Blue Oaks Blvd/Hwy 65 NB Ramps	B / 12	A / 9	C / 25	B / 11
10. Washington Blvd/Road A	A / 3	A / 4	D / 39	C / 25

Notes: Level of service and average delay expressed in seconds per vehicle are reported.
Source: Fehr & Peers, 2014

The analysis of the Saturday PM peak hour includes the following assumptions for temporary traffic management before church services.

- A right-in only driveway on Washington Boulevard south of Road A would be open for church traffic. This driveway would be closed at all other times.
- The internal roadway connecting to the south leg of the west roundabout would be converted to one-way inbound operation with two lanes. Traffic exiting the parking area south and west of the church would circulate through the parking area between the church and Topgolf.

- Church traffic entering the project site via Road A would be divided between the right-turn bypass lane and the roundabout.

At the Granite Bay location, the Bayside Church employs a team of parking lot attendants to direct parking vehicles. A similar operation is assumed to be used at the proposed church facility.

During the Saturday PM peak hour, the church service coincides with peak demand for Topgolf and the restaurant facilities. For the peak 15 minutes before the church service, the adjacent intersection at Blue Oaks Boulevard/Washington Boulevard will operate with LOS E conditions (as shown in Table 24). When operations are averaged over the whole hour (5:15 to 6:15 PM), the LOS is D and the average delay is 55 seconds per vehicle. The other two study intersections have LOS D or better during the Saturday PM peak hour.

During the Sunday midday peak hour, all three intersections operate with LOS C or better conditions. However, significant queues would exist on the Road A and Road B approaches to Washington Boulevard for vehicles leaving the project site. As a result, about 10 percent of the peak hour traffic demand will be waiting to exit the project site at the end of the peak hour.

FREEWAY OPERATIONS

Tables 25 and 26 show freeway operations on SR 65 near the project area under Baseline and Baseline Plus Buildout Conditions. The LOS stays the same at most study locations with the Phase 1 & 2 trips added to Baseline Conditions. During the AM peak hour, the northbound weave segment between Pleasant Grove Boulevard and Blue Oaks Boulevard changes from LOS C to D. During the PM peak hour, two southbound segments change from LOS C to D: Sunset Boulevard to Blue Oaks Boulevard and Blue Oaks Boulevard to Pleasant Grove Boulevard. These changes are the same as under Baseline Plus Phases 1 & 2 Conditions because the church has relatively few weekday peak hour trips.

TABLE 25 – WEEKDAY NORTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Buildout	
		AM	PM	AM	PM
Pleasant Grove Blvd Off-ramp	Diverge	F / -	F / -	F / -	F / -
Pleasant Grove Blvd Off to On-ramp	Basic	D / 33	D / 29	D / 34	D / 30
Pleasant Grove Blvd to Blue Oaks Blvd	Weave[2]	C	E	D	E
Blue Oaks Blvd Off to On-ramp	Basic	C / 24	C / 24	C / 24	C / 24
Blue Oaks Blvd On-ramp	Merge	D / 33	D / 33	D / 33	D / 33
Blue Oaks Blvd to Sunset Blvd	Basic	D / 32	D / 31	D / 32	D / 32
Sunset Blvd Off-ramp	Diverge	C / 24	C / 24	C / 24	C / 24

Notes: 1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.

Source: Fehr & Peers, 2014

TABLE 26 – WEEKDAY SOUTHBOUND FREEWAY OPERATIONS FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Freeway Segment	Type	Baseline Conditions		Baseline Plus Buildout	
		AM	PM	AM	PM
Sunset Blvd WB On-ramp	Merge	D / 28	C / 23	D / 29	C / 23
Sunset Blvd EB On-ramp	Merge	C / 24	C / 22	C / 25	C / 22
Sunset Blvd to Blue Oaks Blvd	Basic	D / 29	C / 26	D / 29	D / 26
Blue Oaks Blvd Off-ramp	Diverge	D / 33	D / 31	D / 34	D / 31
Blue Oaks Blvd Off to On-ramp	Basic	C / 23	C / 20	C / 23	C / 20
Blue Oaks Blvd WB On-ramp	Merge	D / 30	C / 26	D / 30	C / 26
Blue Oaks Blvd to Pleasant Grove Blvd	Weave[2]	C / 22[3,4]	C[4]	C / 23[3,4]	D[4]
Pleasant Grove Blvd Off to On-ramp	Basic	D / 32[4]	D / 28[4]	D / 33[4]	D / 29[4]
Pleasant Grove Blvd WB On-ramp	Merge	E / 36[4]	D /33[4]	E / 36[4]	D /33[4]
Pleasant Grove Blvd EB On-ramp	Merge	F / -	E / 37[4]	F / -	E / 37[4]

Notes:
1. Density expressed in passenger car equivalents per mile per lane
2. The Leisch Method used for weave section analysis does not produce a density estimate.
3. The segment operates "out of the realm of weaving," so the HCM basic segment LOS and density is reported.
4. Field observations show that recurring congestion south of the Pleasant Grove Blvd interchange causes queues that extend back to Blue Oaks Blvd under both the AM and PM peak hours; therefore, the actual conditions are LOS F.

Source: Fehr & Peers, 2014

Table 27 shows weekday peak hour queues on the off-ramps at the Blue Oaks Boulevard and Pleasant Grove Boulevard interchanges. Under Buildout conditions, the average maximum queue on the off-ramps is 300 feet or less during both weekday peak hours.

TABLE 27 – WEEKDAY OFF-RAMP QUEUES FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Location	Direction	Storage	Average Maximum Queue	
			AM	PM
Blue Oaks Blvd	Northbound	1,125 ft[1]	150 ft	300 ft
	Southbound	2,250 ft	250 ft	225 ft
Pleasant Grove Blvd	Northbound	1,575 ft	150 ft	250 ft
	Southbound	1,575 ft	250 ft	300 ft

Note: 1. Measured from the split on the off-ramp between this ramp and the direct ramp to westbound Blue Oaks Blvd.
Source: Fehr & Peers, 2014

Table 28 shows weekend peak hour queues on the off-ramps at the Blue Oaks Boulevard interchange. Under Buildout conditions, the average maximum queue on the off-ramps is 375 feet or less during both weekend peak hours.

TABLE 28 – WEEKEND OFF-RAMP QUEUES FOR BASELINE PLUS PROJECT BUILDOUT CONDITIONS

Location	Direction	Storage	Average Maximum Queue	
			Saturday PM	Sunday Midday
Blue Oaks Blvd	Northbound	1,125 ft[1]	225 ft	125 ft
	Southbound	2,250 ft	375 ft	200 ft

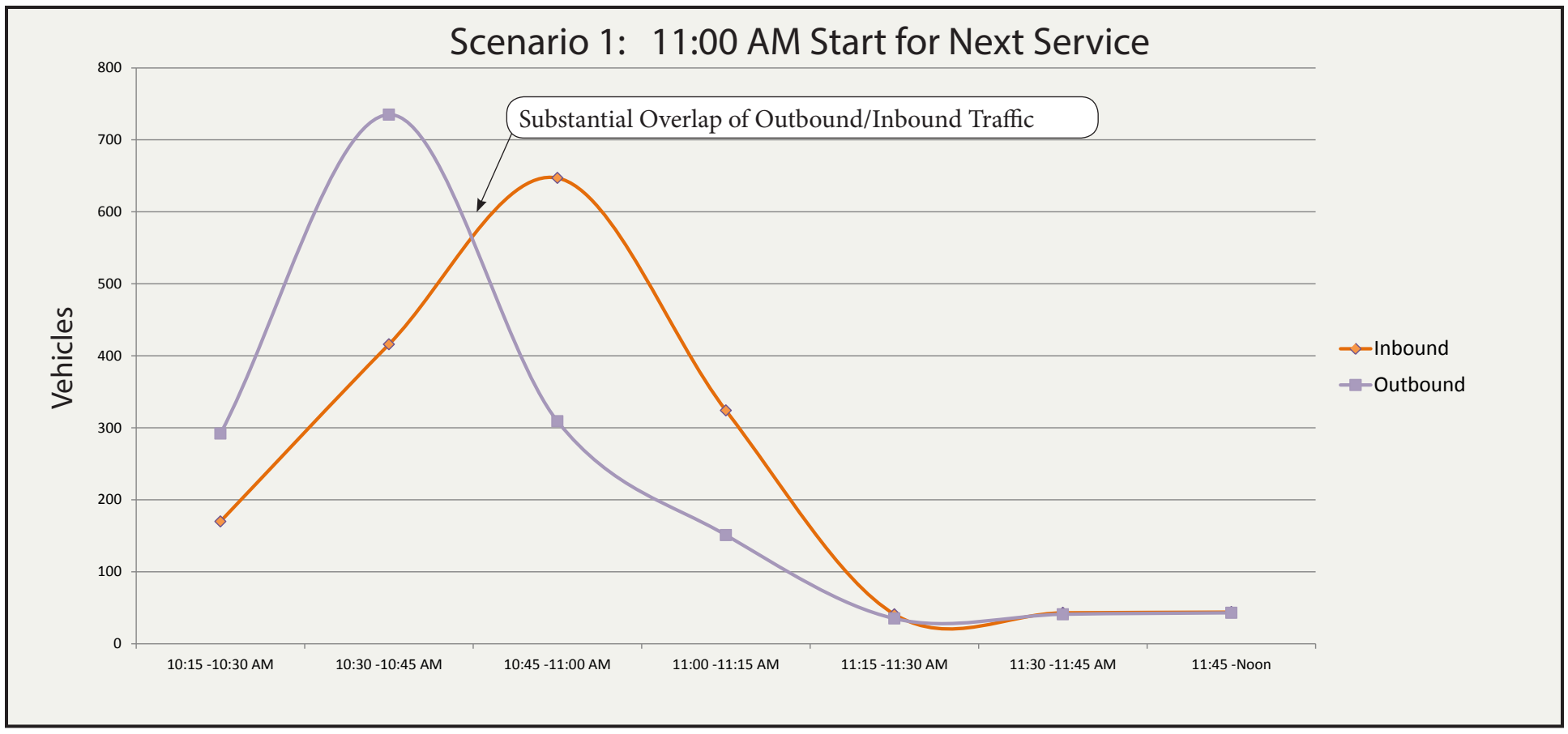
Note: 1. Measured from the split on the off-ramp between this ramp and the direct ramp to westbound Blue Oaks Blvd.
Source: Fehr & Peers, 2014

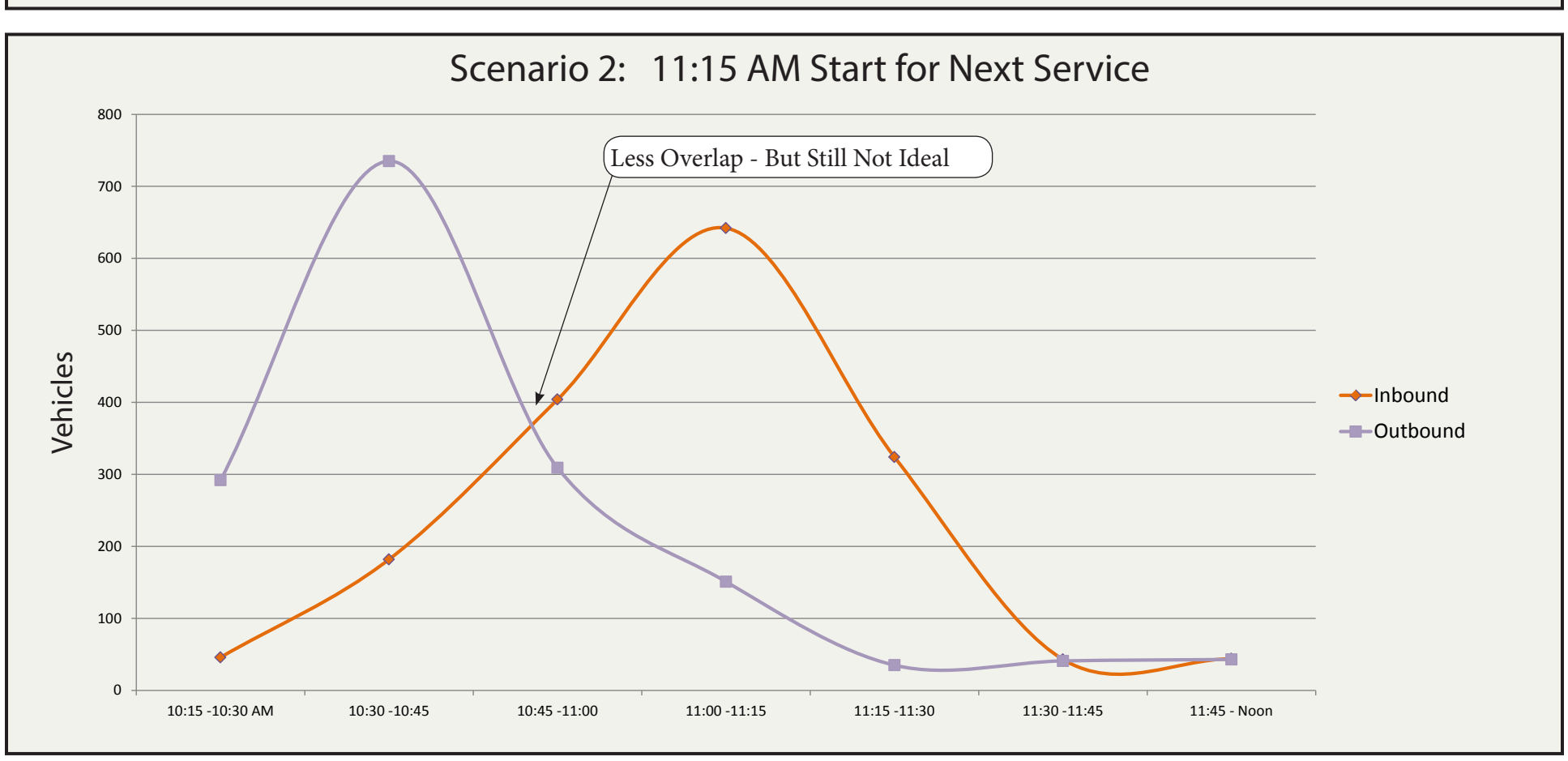
RECOMMENDED INTERVAL BETWEEN CHURCH SERVICES

Fehr & Peers performed an analysis to recommend a time interval between the end of a church worship service and the beginning of the next service on Sunday mornings.

Using the information presented earlier in the report, we developed estimates of traffic volumes (inbound and outbound) by 15-minute increments assuming three different interval scenarios as described. All scenarios assume that the Sunday morning worship service would commence at 9:15 AM and conclude at 10:30 AM, and that both the 9:15 AM and the following service would have an attendance level at 80 percent of capacity.

Scenario 1 assumes that the next service would begin at 11 AM (30 minutes after the conclusion of the 9:15 service). Scenario 2 assumes that the next service would begin at 11:15 AM, and Scenario 3 assumes the next service would begin at 11:30 AM. Figure 17 shows the inbound and outbound traffic volumes by 15-minute increment for each scenario. Scenario 1, which as mentioned assumes 30 minutes between the conclusion of the earlier service and the beginning of the next service, would result in significant overlap between outbound traffic from the earlier service and inbound traffic from the later service. This would lead to substantial delays for both outbound and inbound traffic; at 10:45 AM almost 600 vehicles would be entering the site while almost 600 vehicles would be exiting the site. Providing a 45-minute interval between services in Scenario 2 would improve traffic operations over Scenario 1, yet still about 350 vehicles would be entering the site when 350 vehicles would be exiting the site. Scenario 3, which assumes a full one hour period between the conclusion of the earlier service and the beginning of the next service, would result in minimal overlap of outbound and inbound vehicles, and as such, would result in minimal traffic delay. Given these results, we recommend that the interval of time between the conclusion of the earlier service and the beginning of the next service be 60 minutes. We also recommend that the spacing between services be further reviewed with the Stage 2 approvals when there is a specific proposal for operations and a traffic management plan for church operations.





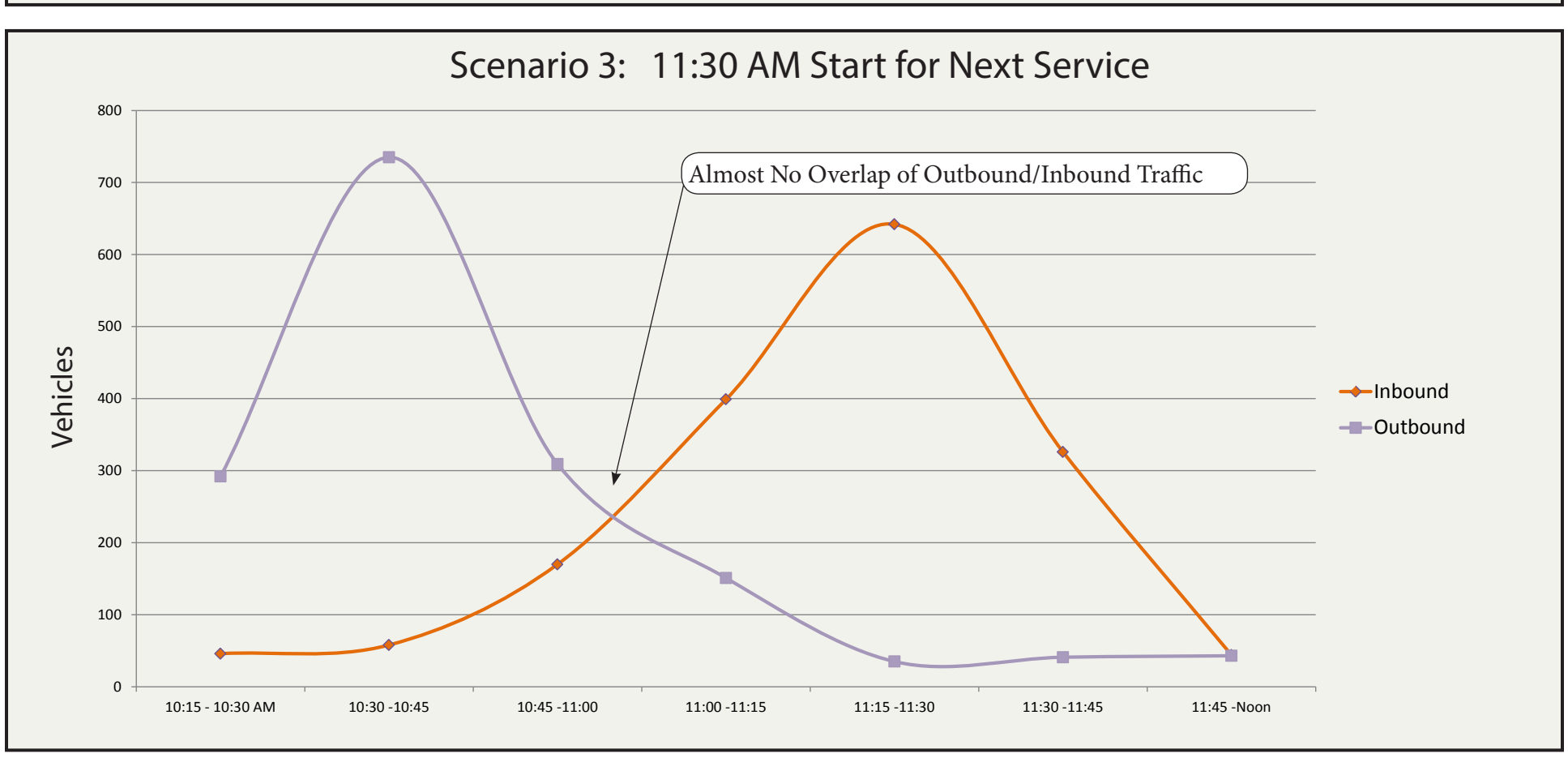


Figure 17

Church Service Scenarios
Inbound and Outbound Traffic Volumes

TECHNICAL APPENDIX:
BASELINE CONDITIONS

TECHNICAL APPENDIX:
PHASE 1 CONDITIONS

TECHNICAL APPENDIX:
PHASE 1 & 2 CONDITIONS

TECHNICAL APPENDIX:
PHASE 1, 2, & 3 CONDITIONS