13.9 Traffic Analysis

Gun Range Remediation and Reuse Project Traffic Analysis

March 2013

Prepared For: City of Huntington Beach

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Gun Range Remediation and Reuse Project
Traffic Analysis

City of Huntington Beach, CA

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Prepared for:

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1.0 Introduction

This report summarizes the results of a traffic study for the proposed Gun Range Remediation and Reuse Project in the City of Huntington Beach. The study provides the technical information for the environmental impact report being prepared for this project.

1.1 BACKGROUND AND SCOPE

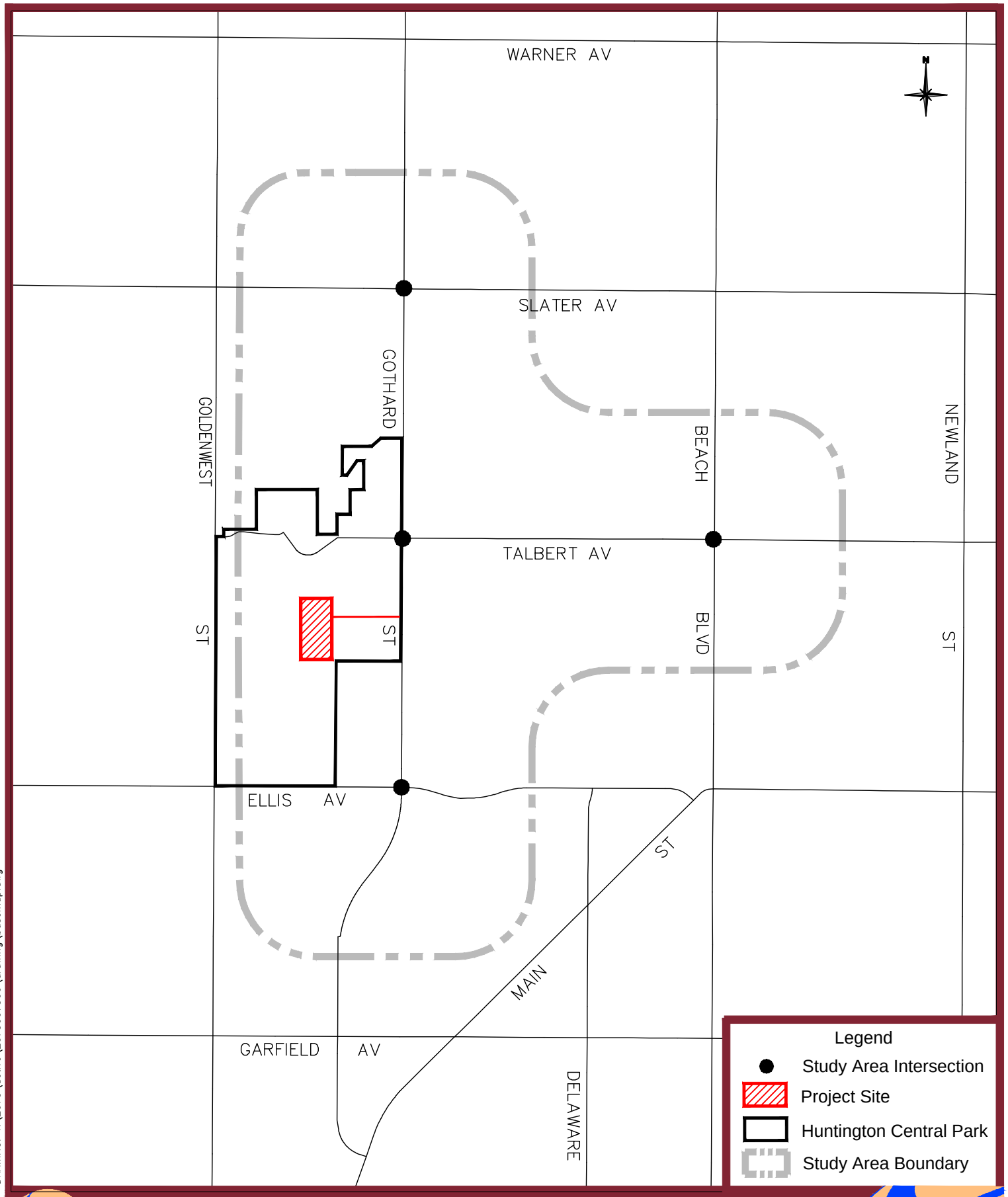
The proposed project will occupy 4.91acres within the southeastern portion of the 356.8-acre Huntington Central Park, located south of Slater Avenue, west of Gothard Street, north of Ellis Avenue, and east of Goldenwest Street. Figure 1-1 illustrates the project location and the study area intersections. The site is a former gun range and is currently vacant. The site will undergo remediation before the construction of the proposed project. Access will be maintained from Gothard Street east of the project site.

A range of recreational uses may be implemented after site remediation, including a park area, a dog park, four outdoor basketball courts, four outdoor tennis courts and parking spaces. In lieu of the outdoor basketball and tennis courts, the City may implement a 25,000 to 30,000 square feet skating area including 15,000 square feet of raised skate bowl area, 10,000 square feet of skatable concrete plaza area with curbs and railings of varying heights and the remaining acreage would be utilized for parking, landscape areas and seating area. The latter development scenario (skate park) has a higher trip generation and is therefore analyzed in this traffic analysis for impacts.

The traffic study provides a near term (existing year) analysis, short-range and long-range impact analyses of the proposed project. The near term analysis examines the existing-plus-project impacts and is compared against existing conditions to satisfy the California Environmental Quality Act (CEQA) requirements. The short-range analysis addresses conditions shortly after project completion and identifies project impacts related to additional traffic on the surrounding area street system in this timeframe. The long-range analyzes the project in a General Plan context.

Traffic analysis data sets presented in this traffic study are as follows:

1. Existing Conditions
2. Existing plus project
3. Short-range No-project (2016)
4. Short-range With-project (2016)
5. Long-range with current General Plan (No-project)
6. Long-range With-Project



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Proposed Project and Study Area Intersections

Figure 1-1

For the short-range impact analysis, the additional trips that will be generated by the proposed uses are added to the no-project background traffic conditions to show the impacts of the proposed project. The background (no-project) conditions are established by applying a growth factor to the existing conditions. The short-range analysis time frame is referred to as 2016.

The long-range analysis compares the current General Plan land uses with those proposed by the project. A year 2030 time frame is used for this analysis. The year 2030 forecasts are produced using the Huntington Beach Traffic Model (HBTM). This is a certified subarea model derived from the Orange County Transportation Analysis Model (OCTAM), following the consistency guidelines established by the Orange County Transportation Authority (OCTA).

Performance criteria for the City of Huntington Beach and Caltrans (for one intersection) are applied to the traffic volume data. These performance criteria use peak hour intersection volumes to measure level of service (LOS) and to define levels of significance for EIR purposes (see later section of this chapter).

To establish the trip generation estimates for the project, a special analysis identified applicable trip rates for the proposed skate park. Local skate parks within Orange County were surveyed, and a trip rate derived from the count data.

Consistent with the requirements of an EIR, only committed roadway improvements have been assumed, even for the long-range analysis using General Plan buildout land uses.

1.2 PERFORMANCE CRITERIA

The performance criteria used for evaluating traffic volumes and capacities on the study area street system are based on peak hour volumes. Using peak hour intersection turn movement volumes and the intersection lane geometry, intersection capacity utilization (ICU) values are calculated for each of the AM and PM peak hours. The ICU values represent volume/capacity (V/C) ratios for these time periods, and thereby provide a suitable measure of system performance. For the Caltrans intersection, the delay-based methodology, as contained in the Highway Capacity Manual (HCM), is also used (i.e., both ICU values and average delay are calculated for this intersection).

Table 1-1 summarizes the criteria used for the intersection LOS calculations and the relationship between ICU, average vehicle delay, and LOS. The significance criteria for intersections based on ICU contribution is also listed in the table. This is used for both City and Caltrans intersections (the delay calculations are used only to verify the LOS results as calculated from the ICU values).

Table 1-1 Performance Criteria - Intersections

The following are the performance criteria used for comparing volumes and capacities on the study area intersection:

I. PEAK HOUR INTERSECTION VOLUMES

Intersection capacity utilization (ICU) values calculated as follows:

Saturation Flow Rate: 1,700 vehicles per hour (VPH).

Clearance Interval: .05 ICU

Performance Standard

- Arterial intersections to achieve level of service (LOS) D or better (ICU not to exceed .90)

LOS ranges for ICU values are as follows:

ICU	LOS
0.00 – 0.60	A
0.61 – 0.70	B
0.71 – 0.80	C
0.81 – 0.90	D
0.91 – 1.00	E
Above 1.00	F

Significance Criteria

Project causes a significant impact if it contributes .01 or more to an ICU when the performance standard is exceeded.

II. CALTRANS INTERSECTION

Intersection LOS based on average vehicle delay in seconds as calculated using Highway Capacity Manual (HCM) procedures for signalized intersections. Performance standard as above, and LOS values for average vehicle delay are as follows:

Level of Service	Delay (seconds)
A	0 – 10.00
B	10.01 – 20.00
C	20.01 – 35.00
D	35.01 – 55.00
E	55.01 – 80.00
F	80.01 and up

Table 1-2 describes traffic flow quality for different V/C, ICU and vehicle delay ranges. Traffic levels of service are designated "A" through "F", with LOS "A" representing free flow conditions and LOS "F" representing severe traffic congestion. As listed in the previously referenced performance criteria table, LOS "D" (ICU not to exceed .90) is the performance standard that has been adopted by the City of Huntington Beach.

1.3 STUDY AREA

A study area has been defined according to the potential impacts of the proposed project. For peak hour intersection analyses, the one percent significance threshold generally translates to around 20 peak hour vehicles or more entering an intersection (since most intersections in the area have more than 2,000 vehicles per hour entering the intersection). Hence, this criterion has been used in selecting intersections for the impact analysis. Performance criteria appropriate for the City of Huntington Beach are applied to the traffic volume data.

1.4 REFERENCES

1. "Highway Capacity Manual 2000," Transportation Research Board, National Research Council, 2000.

2. "Huntington Beach Traffic Model (HBTM) Description and Validation," Austin-Foust Associates, April 2008.

3. "Gun Range Remediation – Transportation/Traffic Information," City of Huntington Beach, December 2008.

4. "Center Avenue Skate Park Study," Austin-Foust Associates, December 2011.

Table 1-2 Level of Service Descriptions – Signalized Intersections

Levels of service (LOS) for signalized intersections are defined in terms of ICU and delay as follows:

LOS	Description	Delay (sec)	ICU
A	LOS A describes operations with low control delay, up to 10 seconds per vehicle. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.	≤10	<.61
B	LOS B describes operations with control delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than the LOS A, causing higher levels of delay.	>10	<.71
C	LOS C describes operations with control delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	>20	<.81
D	LOS D describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	>35	<.91
E	LOS E describes operations with control delay greater than 55 and up to 80 seconds per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent.	>55	<1.00
F	LOS F describes operations with control delay in excess of 80 seconds per vehicle. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high V/C ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.	1.01 and above	Above 1.00

Source: Highway Capacity Manual 2000, Transportation Research Board, National Research Council

2.0 Transportation Setting

This chapter describes the transportation setting for the proposed project. Existing conditions for the study area circulation system are first summarized, followed by the future background setting against which project impacts are evaluated.

2.1 EXISTING CONDITIONS

The study area circulation system is shown in Figure 2-1 along with existing midblock lanes. The existing (2012) average daily traffic (ADT) volumes in the study area are presented in Figure 2-2. Arterial roadways in the vicinity of the project include Gothard Street with 16,000 ADT, Ellis Avenue with 9,000 ADT and Talbert Avenue with 17,000 ADT.

As described in the performance criteria section in Chapter 1.0, the intersection levels of service (LOS) are measured by peak hour intersection capacity utilization (ICU) values. For the Caltrans intersection (Beach Boulevard at Talbert Avenue), average vehicle delay calculations are also made using the Highway Capacity Manual (HCM) methodology.

Existing lane configurations and peak hour intersection volumes are illustrated in Figure 2-3 for the AM and PM peak hours, respectively. The corresponding levels of service are summarized in Table 2-1 (an intersection location diagram is provided in Figure 2-4). The calculations for the ICU values in this table can be found in Appendix B and the HCM calculations are in Appendix C.

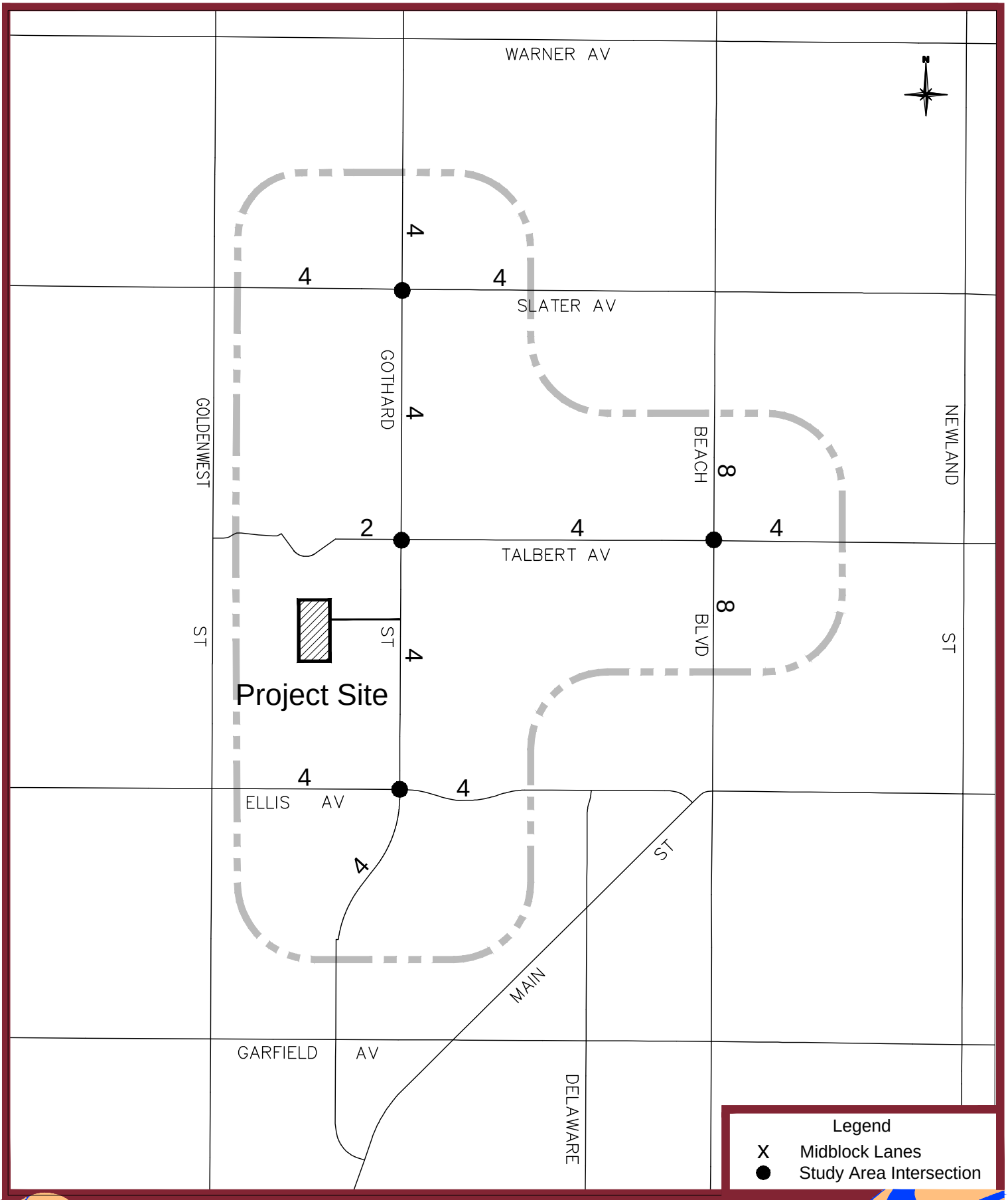
The existing conditions summary shows all intersections to be operating at LOS "D" or better during the AM and PM peak hours.

2.2 FUTURE CONDITIONS

The study area circulation system as defined by the Orange County Master Plan of Arterial Highways (MPAH) can be seen in Figure 2-5. As shown, all study area roadways are consistent with the current MPAH.

Recent action taken by the OCTA Board in December 2012 has resulted in the deletion of the Banning Bridge from the MPAH. The Banning Bridge is not assumed in this analysis, consistent with the latest board action.

Existing lane configurations are assumed for the short-range analysis and long-range analysis.



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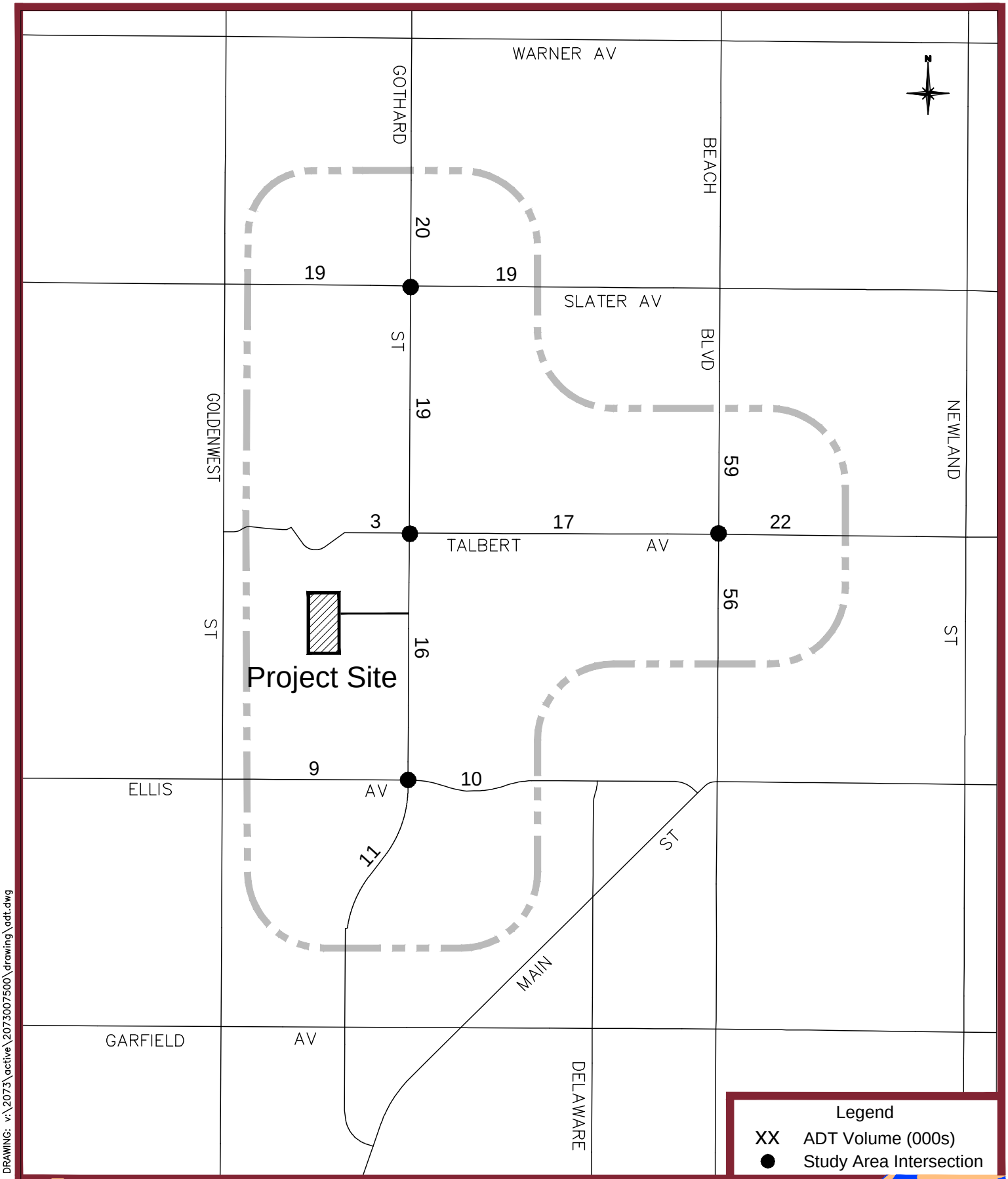
Existing Midblock Lanes

Figure 2-1



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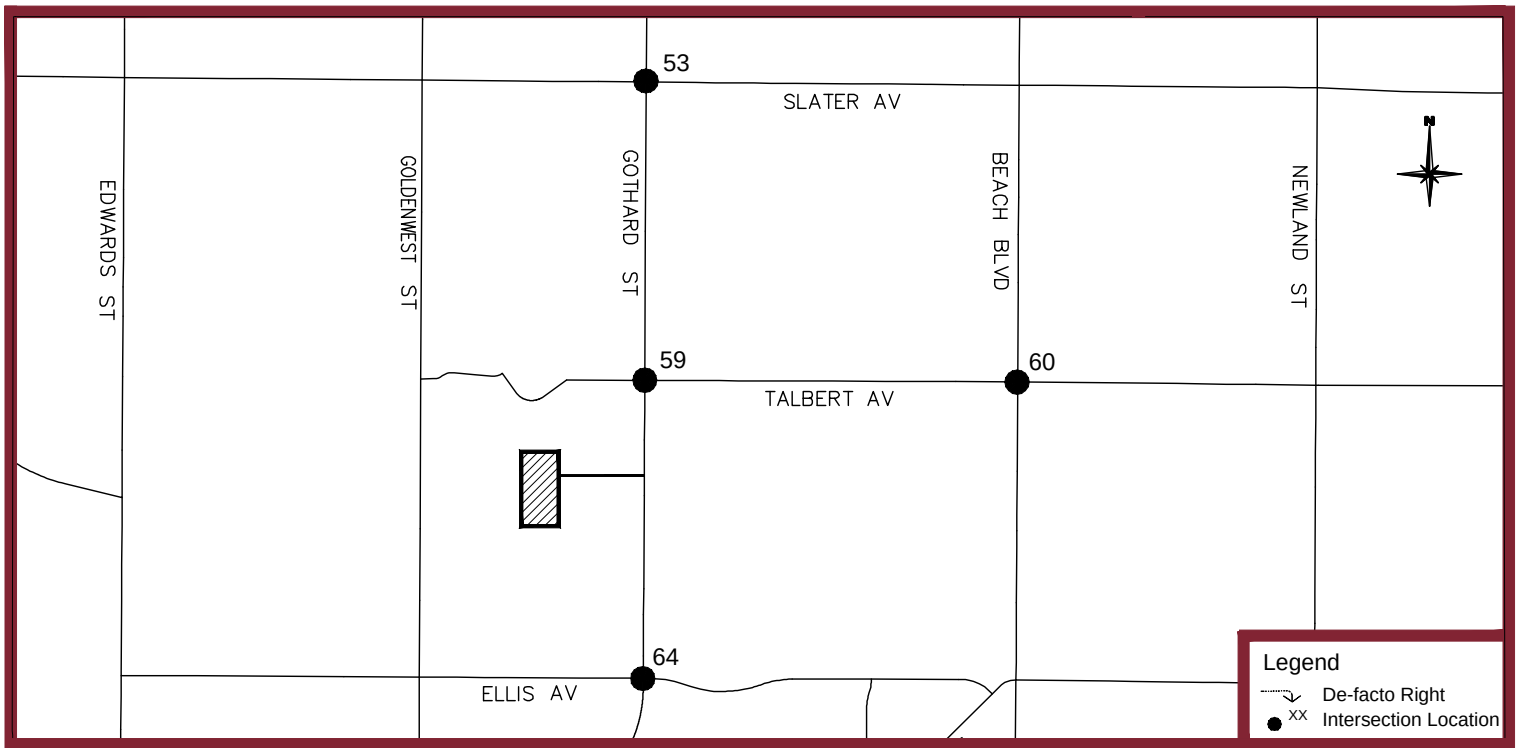
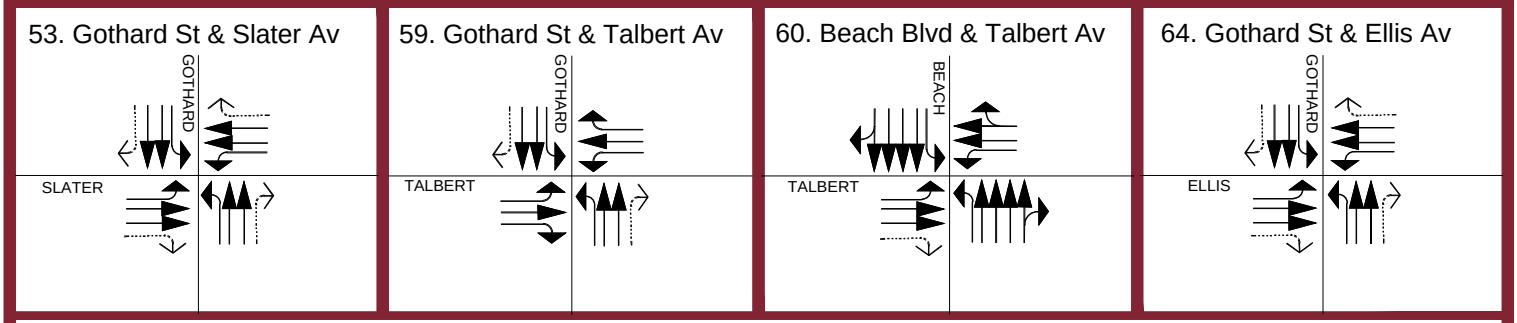
Existing ADT Volumes

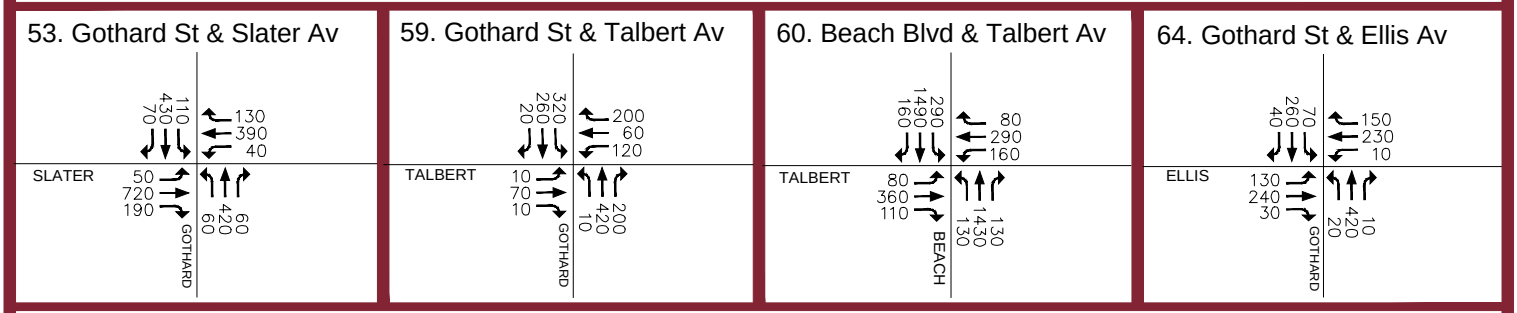
Figure 2-2



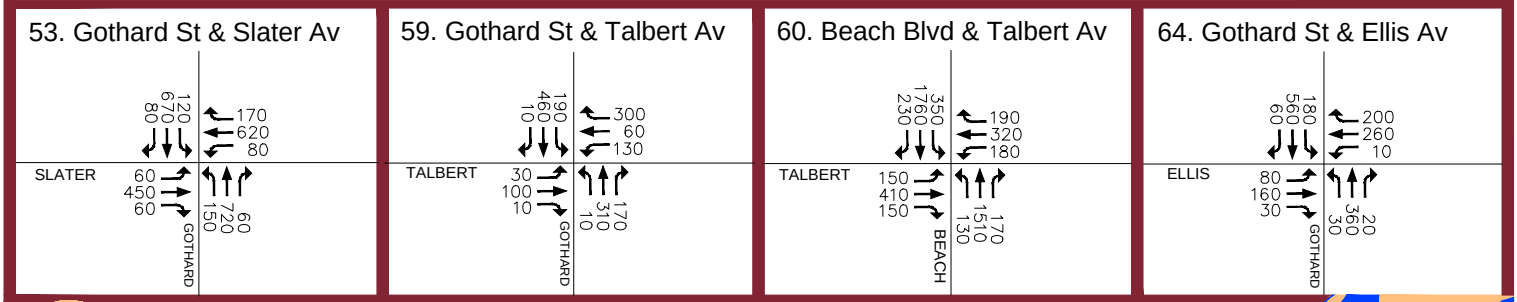
LANE CONFIGURATIONS



AM PEAK HOUR



PM PEAK HOUR



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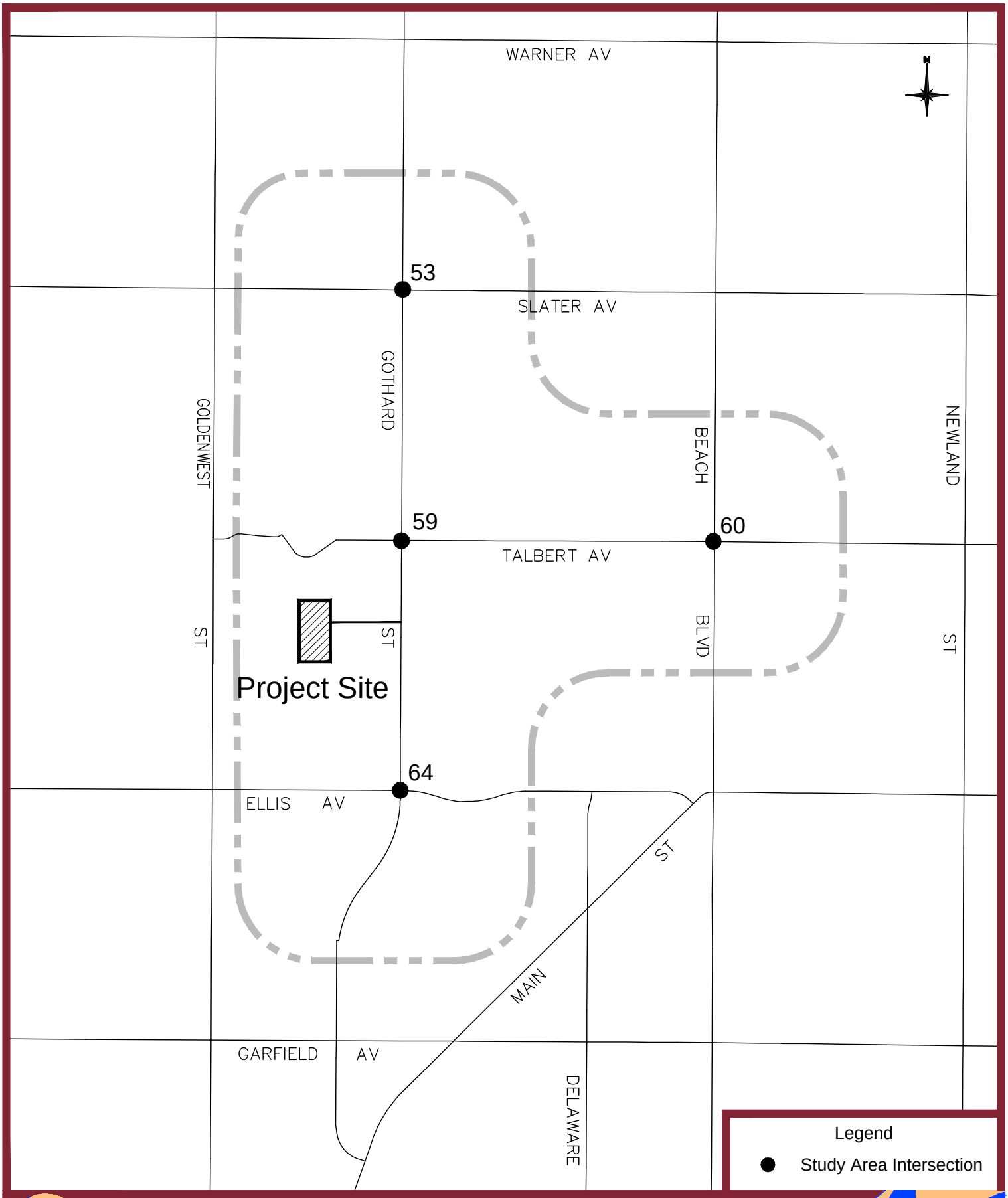
Existing Lane Configurations and Intersection Turning Movements

Figure 2-3

Table 2-1 Existing Intersection LOS Summary

Intersection Capacity Utilization (ICU)				
	AM Peak Hour		PM Peak Hour	
Location*	ICU	LOS	ICU	LOS
53 Gothard St & Slater Ave	.46	A	.56	A
59. Gothard St & Talbert Ave	.47	A	.39	A
60. Beach Blvd & Talbert Ave	.65	B	.75	C
64. Slater Ave & Ellis Ave	.36	A	.40	A
Highway Capacity Manual (HCM) Delay (Caltrans Intersection)				
	AM Peak Hour		PM Peak Hour	
Location*	Delay	LOS	Delay	LOS
60. Beach Blvd & Talbert Ave	34.8	C	39.5	D

* See intersection locations in Figure 2-4



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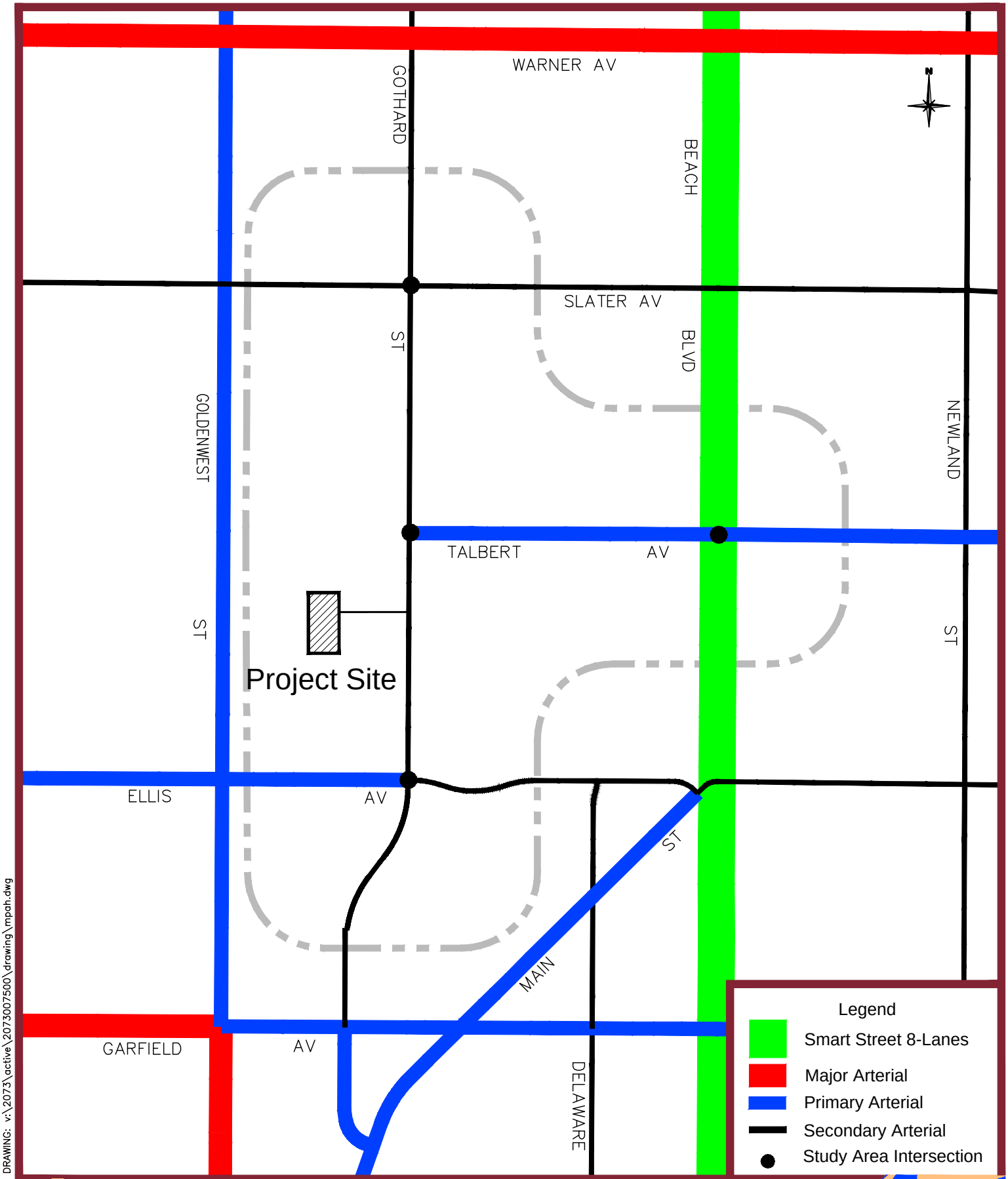
Intersection Location Map

Figure 2-4



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Master Plan of Arterial Highways (MPAH)

Figure 2-5

2.3 FUTURE GROWTH

Future growth in the City of Huntington Beach is portrayed in the Orange County Projections (OCP) 2010 and also in the Citywide land use database recently prepared by the City. The latter is the basis for long-range traffic forecasting and the Citywide growth statistics are as follows:

Category	2007	2030	Increase
Population	216,471	233,457	8%
Housing	76,890	83,396	8%
Employment	81,694	94,127	15%

These forecasts are similar to those in OCP-2010, and as can be seen they show an eight percent increase in population and housing and a 15 percent increase in employment by 2030 in Huntington Beach.

Long-range (2030) volumes used in this analysis are derived using the Huntington Beach Traffic Model (HBTM) as discussed in Chapter 1.0. The HBTM uses the land use projections listed above to forecast future traffic volumes on the citywide arterial street system.

For the short-range analysis, background (no-project) traffic volumes were derived by applying a four percent growth factor to the 2012 counts, which results in one percent growth per year. As noted earlier in this chapter, this represents a 2016 time frame and accounts for ambient growth and related projects during this time period. The project traffic is then added to the 2016 no-project conditions to derive the 2016 with-project data.

3.0 Project Description

This chapter describes the proposed project in terms of its traffic-related characteristics. The project trip generation, trip distribution and resulting project-generated traffic volumes on the study area circulation system are presented.

3.1 PROJECT DESCRIPTION

The proposed project will occupy 4.91 acres within the southeastern portion of the 356.8-acre Huntington Central Park. The project site (shown in Figure 3-1) is located west of Gothard Street and approximately 900 feet south of the Talbert Avenue termini. The project site is a former gun range and is currently vacant. The site will require remediation prior to the development of the proposed project. Sole facility access will be Gothard Street which will require improvements to the County-owned driveway. Use of the driveway was approved by the County on February 9, 2010.

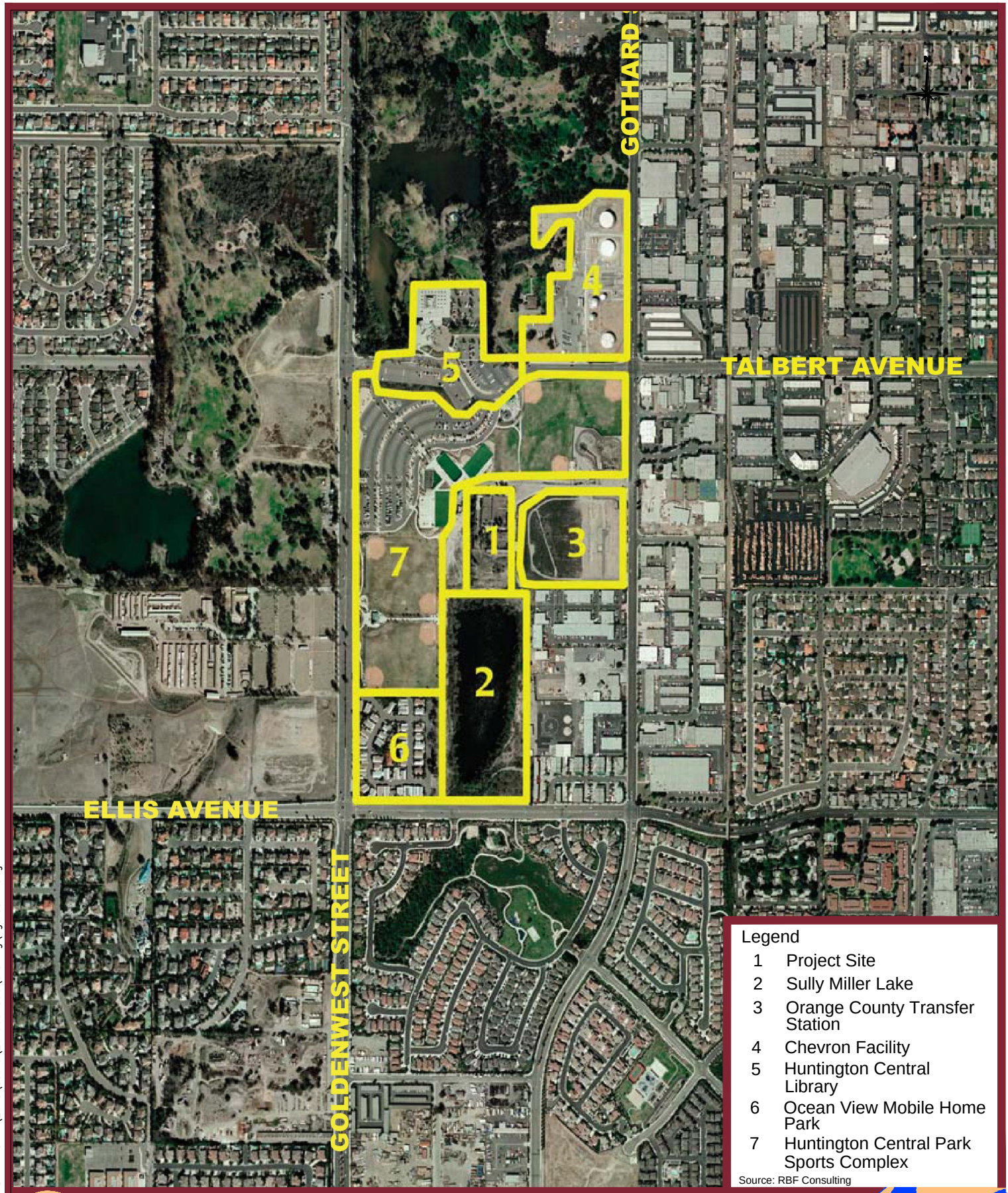
A range of recreational uses may be implemented after site remediation, including a park, a dog park, four outdoor basketball courts, four outdoor tennis courts and parking spaces. The city may implement a skate park in lieu of the outdoor basketball and tennis courts. The skate park includes a 25,000 to 30,000 square feet skating area including 15,000 square feet of raised skate bowl area, 10,000 square feet of skatable concrete plaza area with curbs and railings of varying heights and the remaining acreage would be utilized for parking, landscape areas and seating areas. The latter development scenario (skate park) has a higher trip generation and is therefore analyzed in this traffic analysis for impacts.

3.2 TRIP GENERATION

Table 3-1 summarizes the trip generation for the proposed project. As shown, the proposed project will generate 594 daily weekday trips at buildout, with 49 trips in the AM peak hour and 81 trips in the PM peak hour. Trip generation rates for the project land uses were derived from surveys of local skate parks located within Orange County that have similar characteristics to the proposed project (see discussion in Appendix D). As noted above, the trip generation utilized in this study is considered conservative since it assumes the implementation of a Skate Park.

3.3 GENERAL PLAN COMPARISON

The project site is a former gun range which is currently vacant. Under the General Plan, the parcel of land is listed as vacant.



Legend

1 Project Site
2 Sully Miller Lake
3 Orange County Transfer Station
4 Chevron Facility
5 Huntington Central Library
6 Ocean View Mobile Home Park
7 Huntington Central Park Sports Complex

Source: RBF Consulting

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Project Site Map

Figure 3-1

Table 3-1 Gun Range Reuse Trip Generation

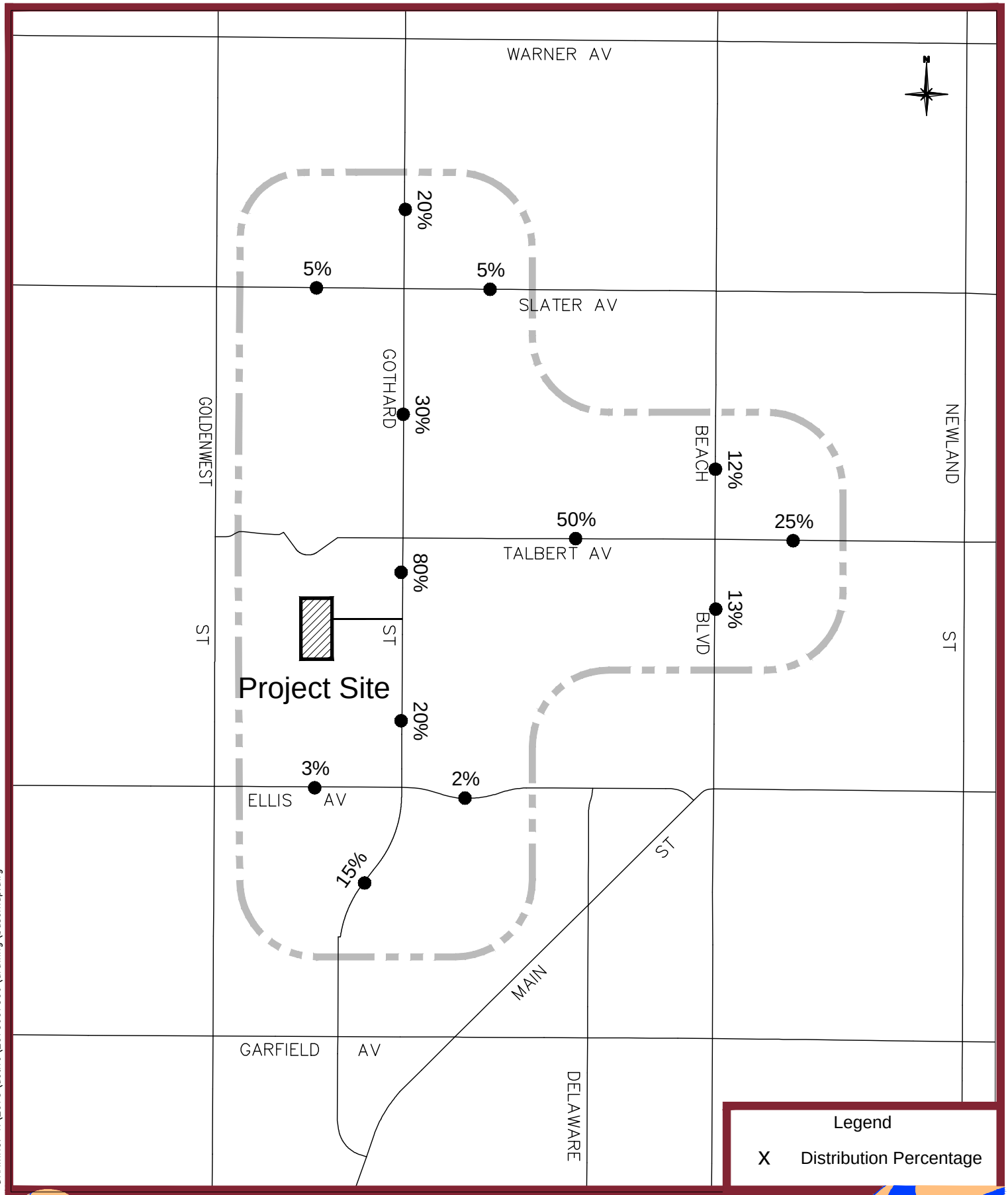
Project Description	Amount	AM Peak Hour			PM Peak Hour			ADT
		In	Out	Total	In	Out	Total	
Proposed Project								
Park Area[1]	.84 Acre	10	5	15	5	10	15	120
Dog Park[1]	2.00 Acre	15	10	25	10	15	25	200
Skate Park[2]	30.00 TSF	5	4	9	19	22	41	274
Total		**30**	**19**	**49**	**34**	**47**	**81**	**594**
Trip Rates								
Park Area[1]	Acre	11.9	6.0	17.9	6.0	11.9	17.9	143.0
Dog Park[1]	Acre	7.5	5.0	12.5	5.0	7.5	12.5	100.0
Skate Park[2]	TSF	.16	.14	.30	.63	.73	1.36	9.1

Notes:
[1] Based on the Gun Range Remediation – Transportation/Traffic Information from the City
[2] Based on Center Avenue Skate Park Traffic Study by Austin-Foust Associates, Inc.

3.5 TRIP DISTRIBUTION

Figure 3-2 illustrates the project trip distribution. These percentages have been applied to peak hour and daily trips and reflect the largely local use anticipated for the project.

Figure 3-3 shows the ADT project trips for the proposed project. These ADT project trips and the project peak hour intersection volumes (illustrated in Figure 3-4) are used in the short-range and long-range analyses to estimate project impacts.



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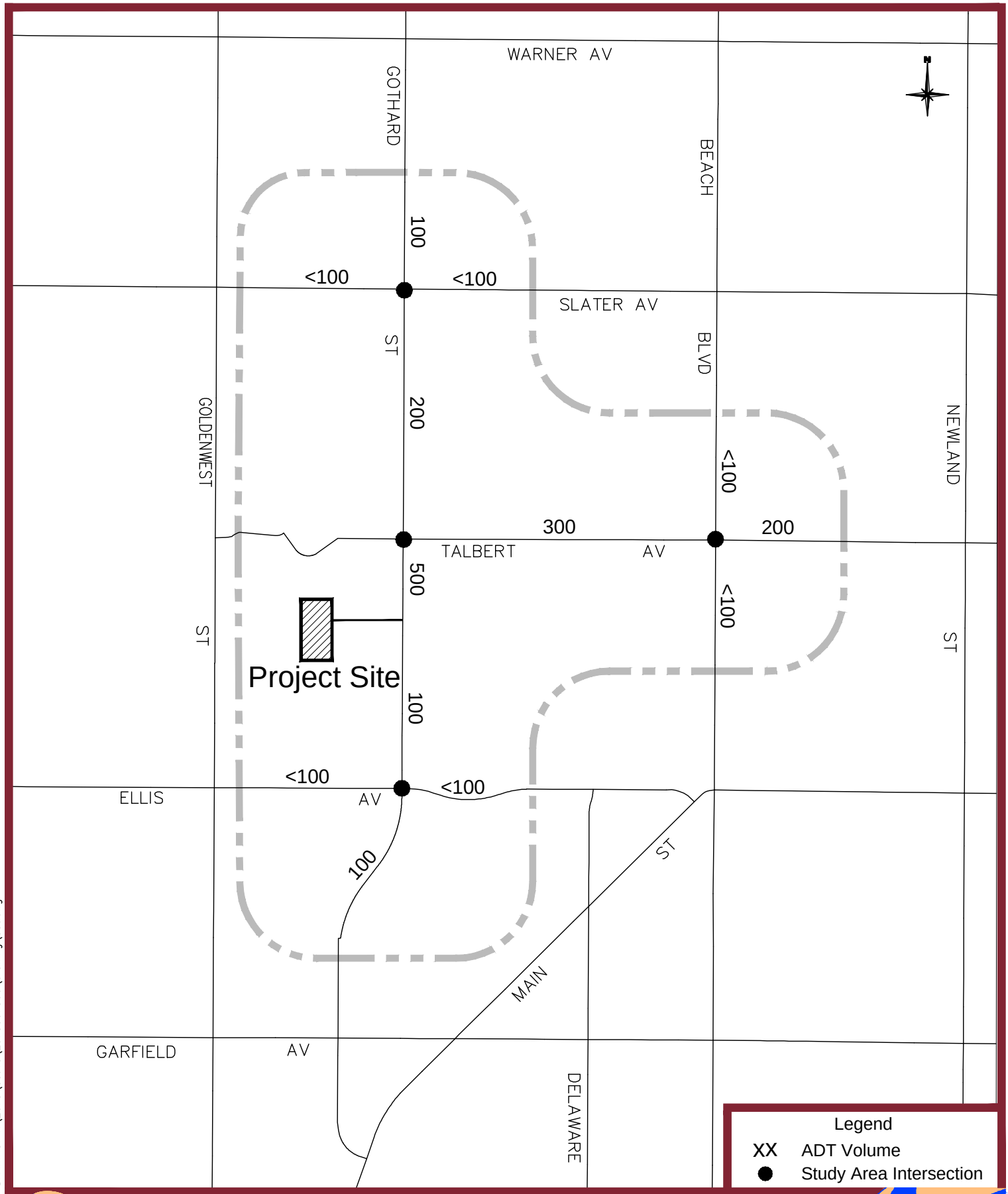
Project Distribution

Figure 3-2



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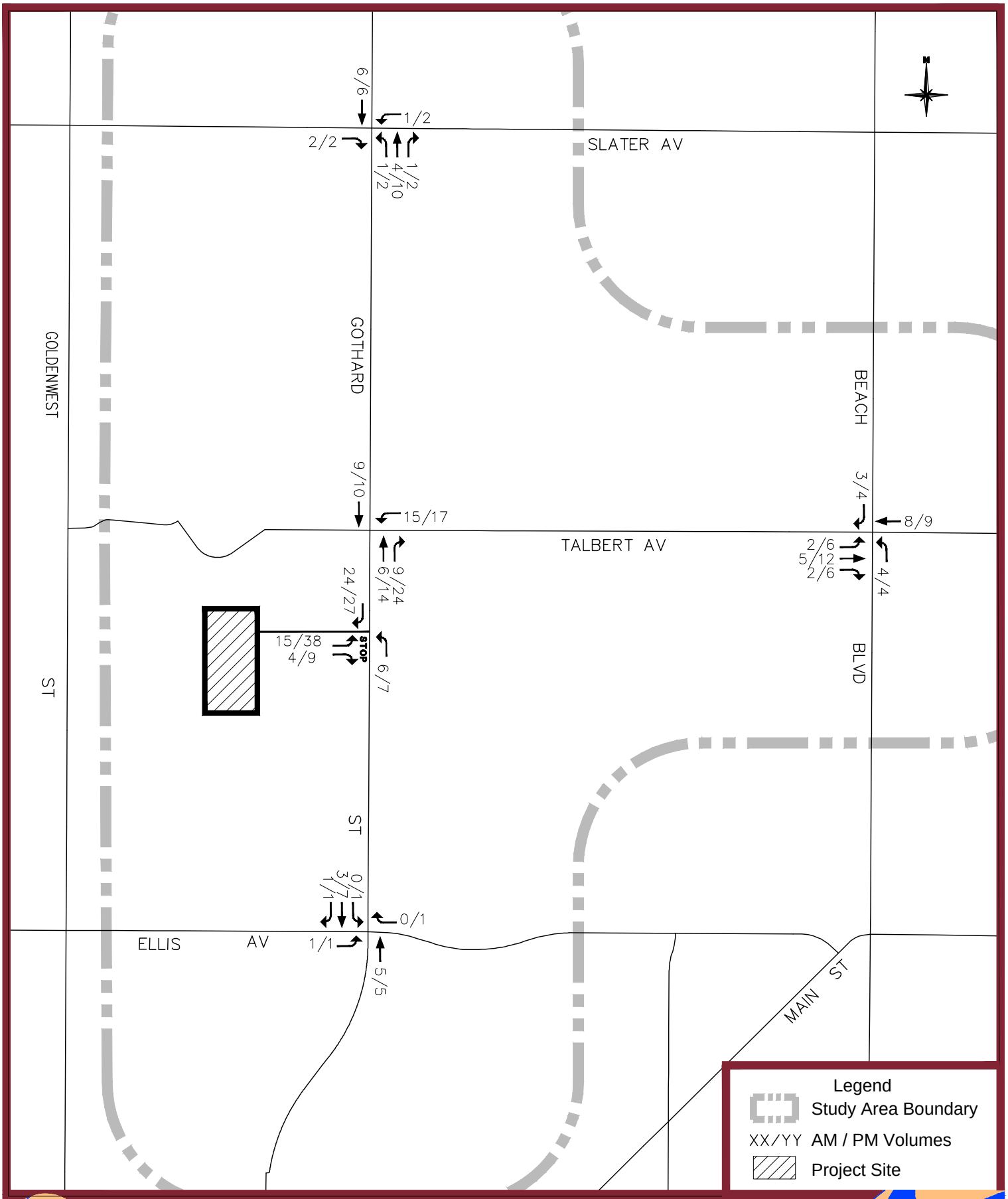
ADT Volumes - Project Only

Figure 3-3



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Site Access and Project Trips

Figure 3-4

4.0 Impact Analysis

This chapter discusses the traffic impacts of the project. The results are presented for three scenarios: existing plus project, short-range, and long-range analyses using the methodologies and performance criteria described in Chapter 1.0.

4.1 EXISTING PLUS PROJECT CONDITIONS

The purpose of the existing plus project analysis is to comply with the California Environmental Quality Act (CEQA), which requires that the baseline for assessing environmental impacts is the existing conditions at the time the notice of preparation (NOP) is prepared. The information presented in this section shows the traffic volumes obtained by adding traffic from the proposed project to existing traffic data. The analysis is hypothetical because the actual buildout timeframe of the project is year 2016.

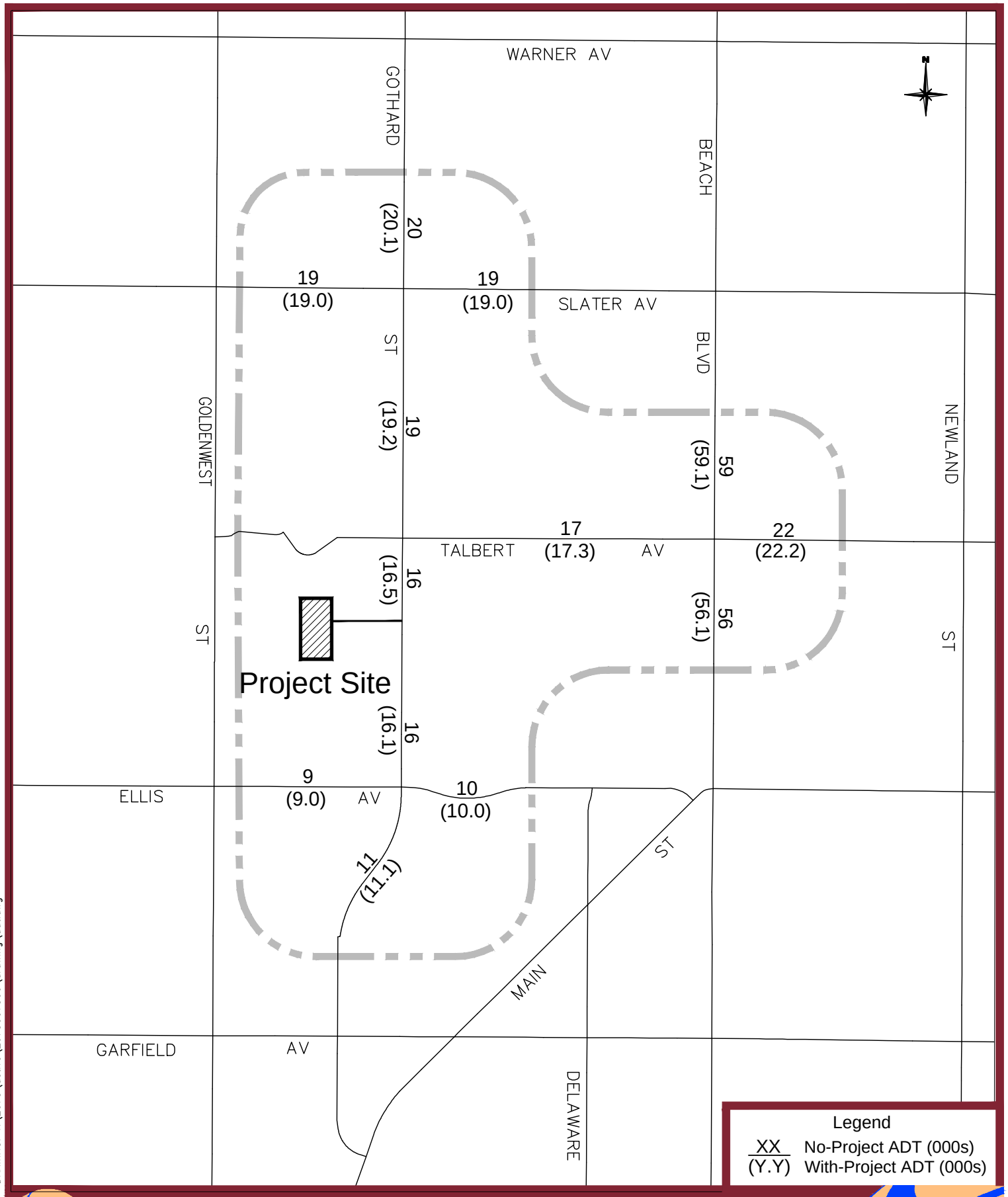
The average daily traffic (ADT) forecasts were prepared for a scenario in which traffic generated by the project is added to the existing traffic conditions based on the project trip distribution defined in Chapter 3.0. Figure 4-1 shows the ADT volumes for existing plus project conditions.

The corresponding AM and PM peak hour intersection volumes for existing-plus-project can be found in Appendix A. To derive the with-project volumes, the project-only peak hour intersection volumes (also shown in Appendix A) were added to the existing (no-project) conditions volumes. The corresponding intersection capacity utilization (ICU) values were then calculated and used to identify project impacts (See Appendix B for ICU worksheets). For the Caltrans intersection, a separate calculation was made using the Highway Capacity Manual (HCM) delay methodology, and the HCM worksheets can be found in Appendix C.

A summary of existing and existing-plus-project intersection performance is based on existing lane configurations. Table 4-1 lists the ICU values, the average vehicle delay for the Caltrans intersection, and the level of service (LOS) for the study area intersections. As can be seen here, all intersections meet the performance criteria and there are no significant project impacts.

4.2 SHORT-RANGE ANALYSIS

The short-range analysis compares no development on the project site to buildout of the project for a 2016 time frame. As noted in Chapter 2.0, 2016 no-project volumes were estimated by applying a growth factor to the existing (2012) counts, and then project traffic was added to these background volumes. Average daily traffic (ADT) volumes for 2016 are illustrated in Figure 4-2.



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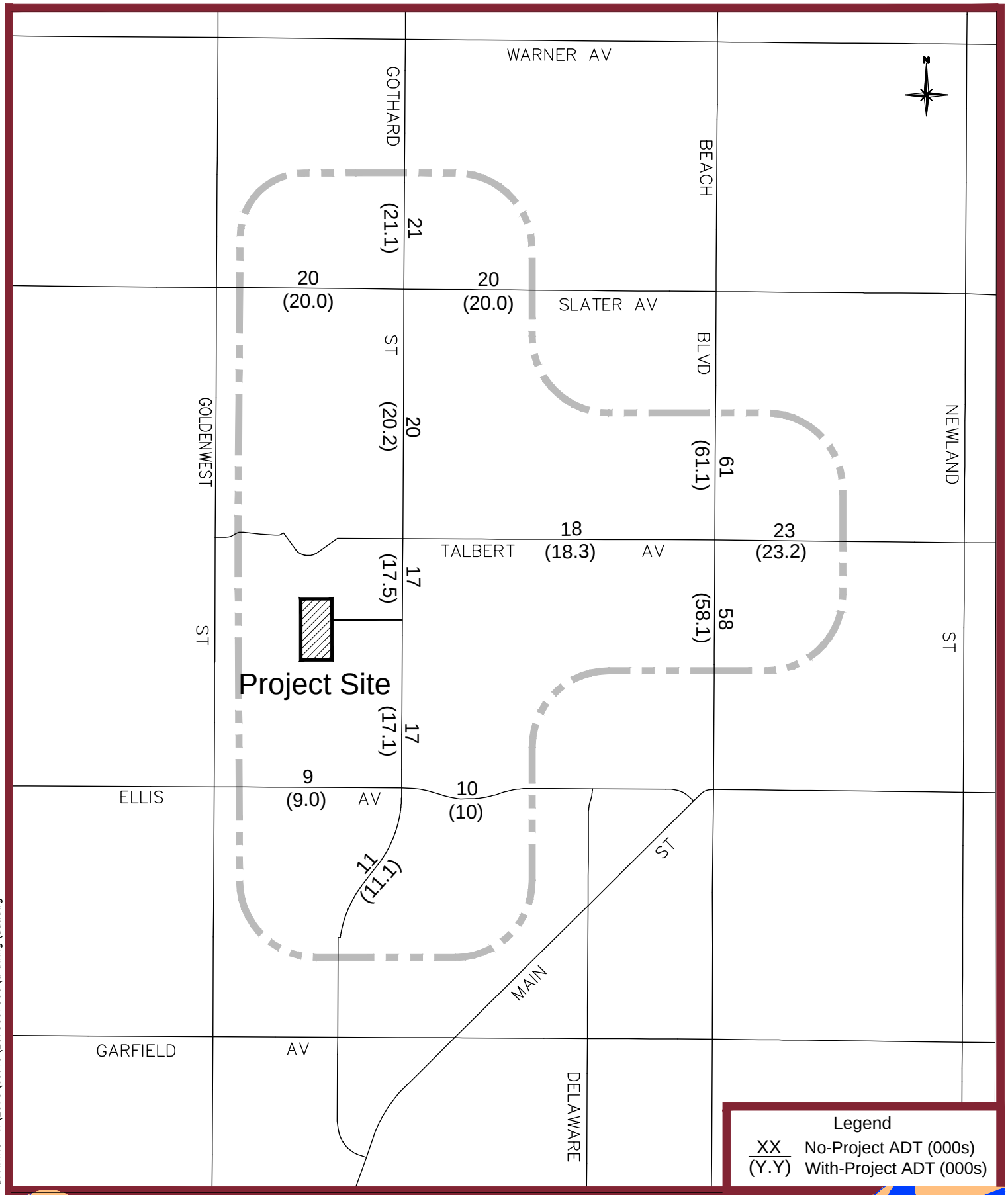
Existing Plus Project ADT Volumes

Figure 4-1

Table 4-1 Existing Plus Project Intersection LOS Summary

Intersection	No-Project				With Project			
	AM		PM		AM		PM	
	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
53 Gothard St & Slater Ave	.46	A	.56	A	.46	A	.56	A
59. Gothard St & Talbert Ave	.47	A	.39	A	.49	A	.41	A
60. Beach Blvd & Talbert Ave	.65	B	.75	C	.65	B	.75	C
64. Slater Ave & Ellis Ave	.36	A	.40	A	.37	A	.40	A
Highway Capacity Manual (HCM) Delay (Caltrans Intersection)								
Location	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
60. Beach Blvd & Talbert Ave	34.8	C	39.5	D	34.9	C	40.1	D



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Short-Range ADT Volumes

Figure 4-2

Table 4-2 lists the ICU values, the average vehicle delay for the Caltrans intersection, and LOS for the study area intersections. Intersection turning movements are illustrated in Appendix A for 2016 No-Project and 2016 With-Project scenarios. The corresponding ICU worksheets and HCM delay worksheets can be found in Appendix B and C, respectively. As can be seen here, all intersections meet the performance criteria.

4.3 LONG-RANGE ANALYSIS

As discussed in the methodology section, the long-range analysis compares the current General Plan to the proposed project. The 2030 ADT volumes for the With-Project and No-Project can be seen in Figure 4-3. These form the baseline against which the proposed project is compared.

With-project 2030 AM and PM peak hour intersection volumes were derived by adding project volumes to the 2030 current General Plan conditions. Appendix A illustrates the peak hour diagrams for the 2030 current General Plan and 2030 With-Project scenarios.

A summary of the 2030 ICU values, average vehicle delay for the Caltrans intersection, and LOS can be found in Table 4-3 (see Appendix B for actual ICU calculations and Appendix C for HCM delay worksheets). As shown, all intersections meet the performance criteria and operate at LOS D or better with the exception of Beach Boulevard and Talbert Avenue intersection, which operates at LOS F during the PM peak hour in both General Plan and With-Project scenarios. The recommended mitigation measure for this location is addressed in the following section.

4.4 MITIGATION MEASURES

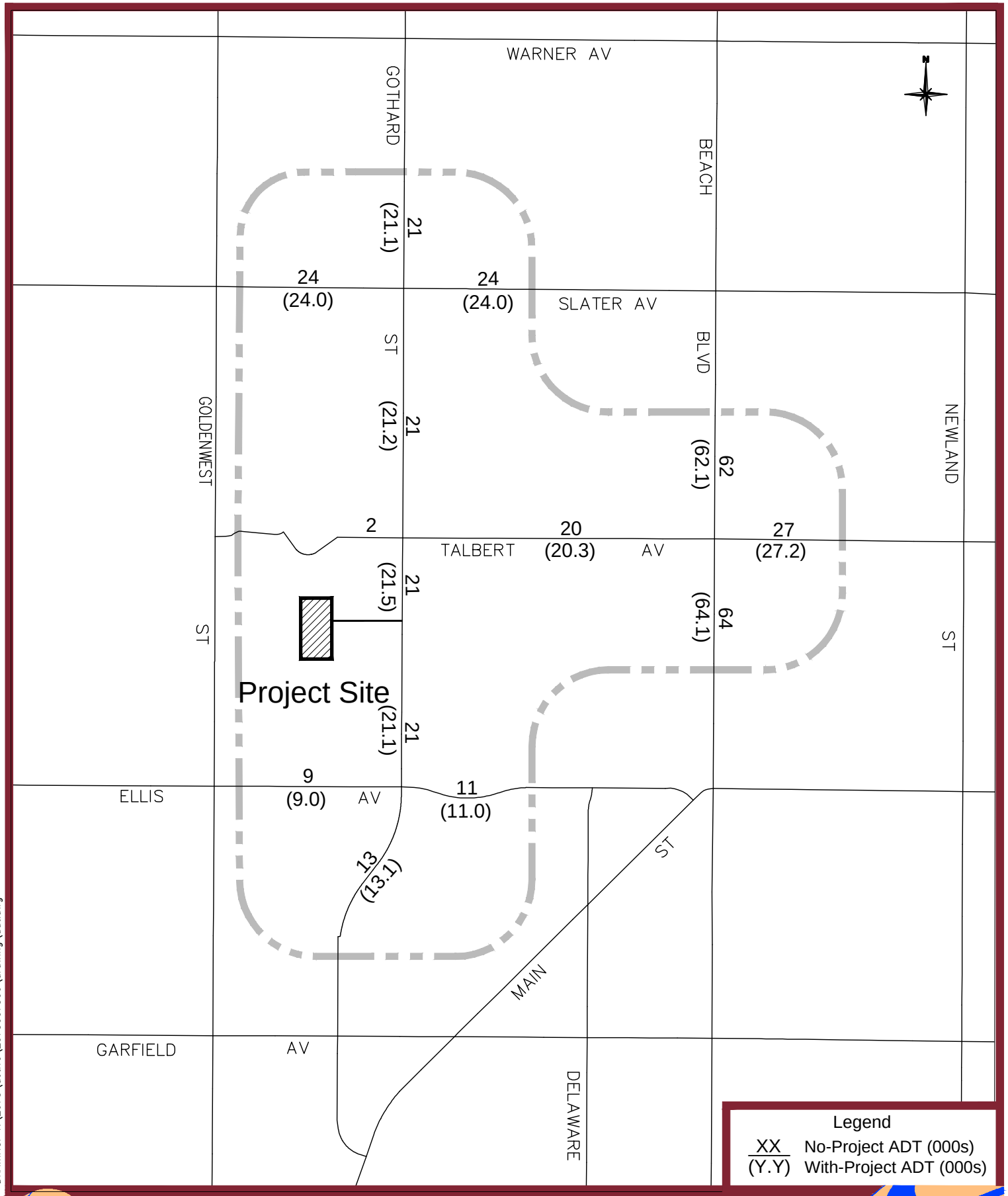
As previously mentioned, the intersection at Beach Boulevard and Talbert Avenue operates at LOS F during the PM peak hour under 2030 General Plan and 2030 With-Project conditions. The project has a significant contribution to a cumulative deficiency as this location is deficient with and without the project. Potential improvements for this intersection are identified in the Huntington Beach Circulation Element Update as identified below:

Location	Recommended Improvements
Beach Blvd & Talbert Avenue	Add 2nd westbound left turn lane Add defacto westbound right turn lane Add separate northbound right turn lane Add 2nd eastbound left turn lane Stripe defacto eastbound right turn lane

With the improvements mentioned above, the intersection operates at LOS D in the PM peak hour. To mitigate project impacts the project will need to contribute a fair share towards the recommended improvements through payment of traffic impacts fees or other fair share calculation method. .

Table 4-2 2016 Intersection LOS Summary

Intersection	No-Project				With Project			
	AM		PM		AM		PM	
	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
53 Gothard St & Slater Ave	.49	A	.58	A	.50	A	.58	A
59. Gothard St & Talbert Ave	.49	A	.40	A	.50	A	.42	A
60. Beach Blvd & Talbert Ave	.68	B	.77	C	.68	B	.78	C
64. Slater Ave & Ellis Ave	.37	A	.40	A	.37	A	.40	A
Highway Capacity Manual (HCM) Delay (Caltrans Intersection)								
	AM		PM		AM		PM	
Location	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
60. Beach Blvd & Talbert Ave	35.6	D	41.0	D	35.9	D	41.6	D



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2030 ADT Volumes

Figure 4-3

Table 4-3 2030 Intersection LOS Summary

Intersection	General Plan				Proposed Project			
	AM		PM		AM		PM	
	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
53 Gothard St & Slater Ave	.87	D	.71	C	.87	D	.71	C
59. Gothard St & Talbert Ave	.61	A	.86	D	.61	A	.88	D
60. Beach Blvd & Talbert Ave	.83	D	**1.02**	**F**	.85	D	**1.03**	**F**
64. Slater Ave & Ellis Ave	.52	A	.46	A	.52	A	.46	A
With Mitigation								
60. Beach Blvd & Talbert Ave					.77	C	.85	D
Highway Capacity Manual (HCM) Delay (Caltrans Intersection)								
Intersection	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
60. Beach Blvd & Talbert Ave	48.8	D	**83.8**	**F**	49.3	D	**85.1**	**F**
With Mitigation								
60. Beach Blvd & Talbert Ave					41.2	D	54.1	D

Note: Gray shading/bold font indicates a location that does not meet the established performance standard.

5.0 Other Items

This chapter discusses related traffic items such as the remediation of the former gun range site, project access and cumulative projects assumed in the traffic study.

5.1 SITE REMEDIATION

This section addresses the construction-related impacts during the remediation and construction phases of the proposed project site. It addresses the impacts of construction traffic, if any.

The remediation phase will remove the structures, asphalt and on-site contaminants associated with the former gun range, which involves 516 tons of demolished material and 15,000 cubic yards of exported soil. The construction phase will generate 384 tons of demolished material, 7,600 cubic yards of exported soil, and 7,600 cubic yards of imported soil.

The maximum number of trucks per day was calculated using the information provided by RBF/Michael Baker (Chiene, K., personal communication, January 21, 2013 and January 23, 2013). The maximum number of trucks per day was used to derive daily truck trip generation. These trips were then converted to passenger car equivalents (PCE) assuming 3.0 PCE per truck. In addition to trucks, construction-related activities include trips by construction workers plus trips for deliveries, inspection, etc. Table 5-1 summarizes the truck traffic, along with the other construction-related trips assumed in this analysis:

Table 5-1 Remediation/Construction Related Trip Generation

	Remediation		Construction	
Activity	Demolition	Soil Hauling	Demolition	Soil Hauling
Duration	20 days	30 days	6 days	35 days
Truck Trips	51	1,875	38	950
PCE Trips	153	5,625	114	2,850
Project Daily Trips	8 trips/day	188 trips/day	19	81 trips/day
Construction-Related Trips	4 trips/day	94 trips/day	10 trips/day	41 trips/day
Grand Total	12 trips/day	282 trips/day	5 trips/day	122 trips/day

Assumptions: PCE Factor of 3.0 for trucks and 1.0 for other trips.
Construction related traffic is typically around 50 percent lower than the truck traffic.

As shown, this results in a maximum of 282 trips per day during the remediation phase and 122 trips per day during the construction phase. A typical construction workday occurs from 7:00 AM to 5:00 PM, with many of the trips (particularly trucks) occurring outside the two peak hours. Using a maximum of 12.5 percent during the conventional peak hours of the surrounding roadways results in a peak hour trip generation of 35 trips for each time period for the worst-case scenario (remediation phase). Table 5-2 below summarizes the total trip generation for the remediation phase and provides a comparison against the proposed project trip generation.

Table 5-2 Trip Generation Comparison

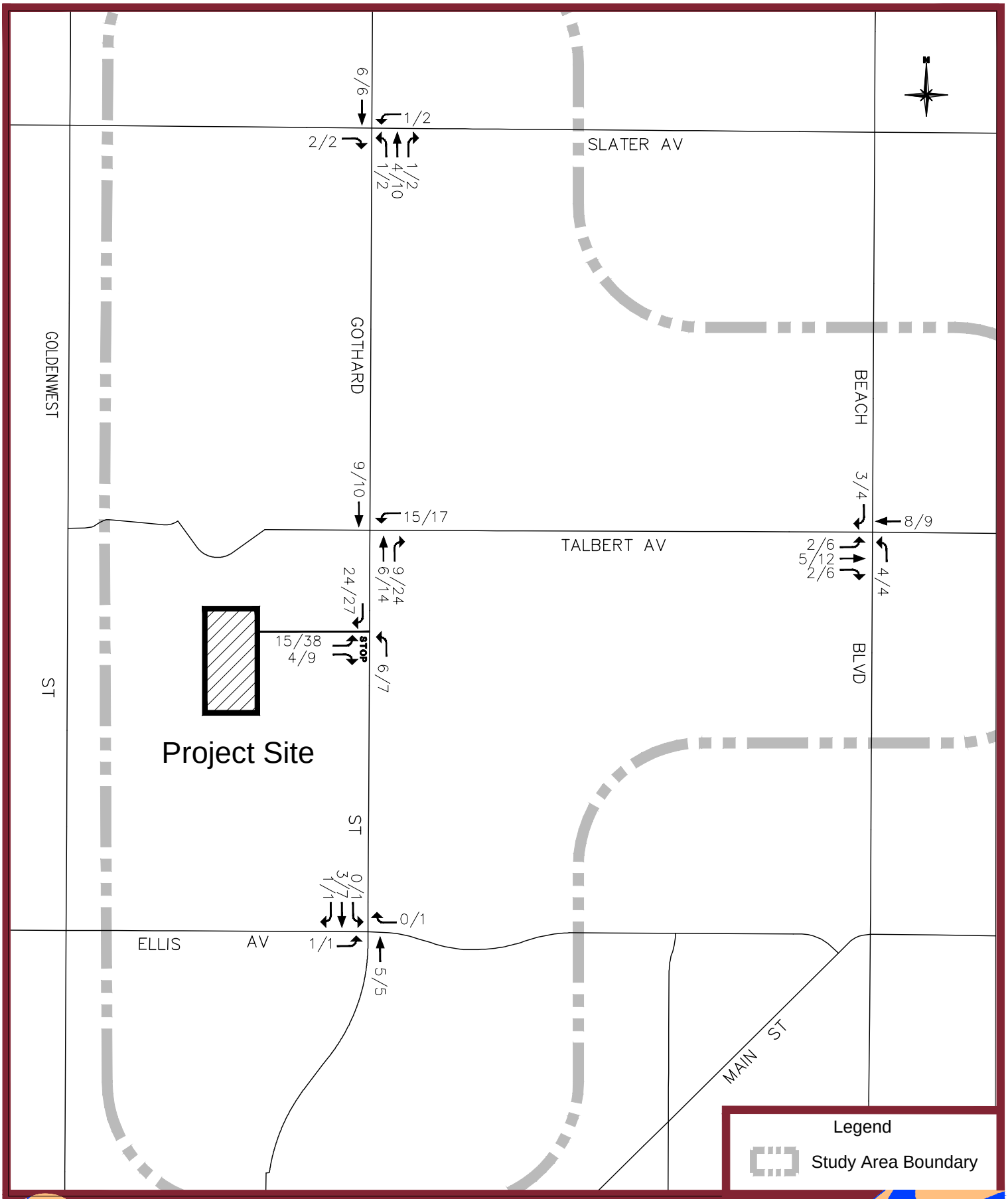
	AM Peak Hour			PM Peak Hour			ADT
	In	Out	Total	In	Out	Total	
Remediation	18	17	35	17	18	35	282
Proposed Project	30	19	49	44	37	81	594
Difference	(12)	(2)	(14)	(27)	(19)	(46)	(312)

As stated in the previous section, the proposed project did not have a significant traffic impact. The trip generation during the remediation phase (worst-case scenario) is less than that of the proposed project. In conclusion, the magnitude of the construction traffic would not result in a significant traffic impact.

5.2 PROJECT ACCESS

The project site is located on the west side of Gothard Street approximately 900 feet south of Talbert Avenue. A preliminary site map was previously presented in Chapter 3.0. Access to the site is solely from Gothard Street and the current street configuration would accommodate a full access driveway. Improvements would be required along the existing County-owned driveway. An Easement Deed allowing for the City's improvement and use of the driveway was approved by the County on February 9, 2010.

Construction traffic would primarily use Gothard and Talbert with longer trips utilizing Beach Boulevard to the east. Traffic generated by daily use of the public park would be expected to use Gothard and Talbert Streets primarily, with a relatively even distribution of traffic on area streets such as Ellis. Traffic is likely to disperse to local streets within relatively short distances from the park. Figure 5-1 shows the site access and the peak hour project trips associated with the project.



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Site Access and Project Trips

Figure 5-1

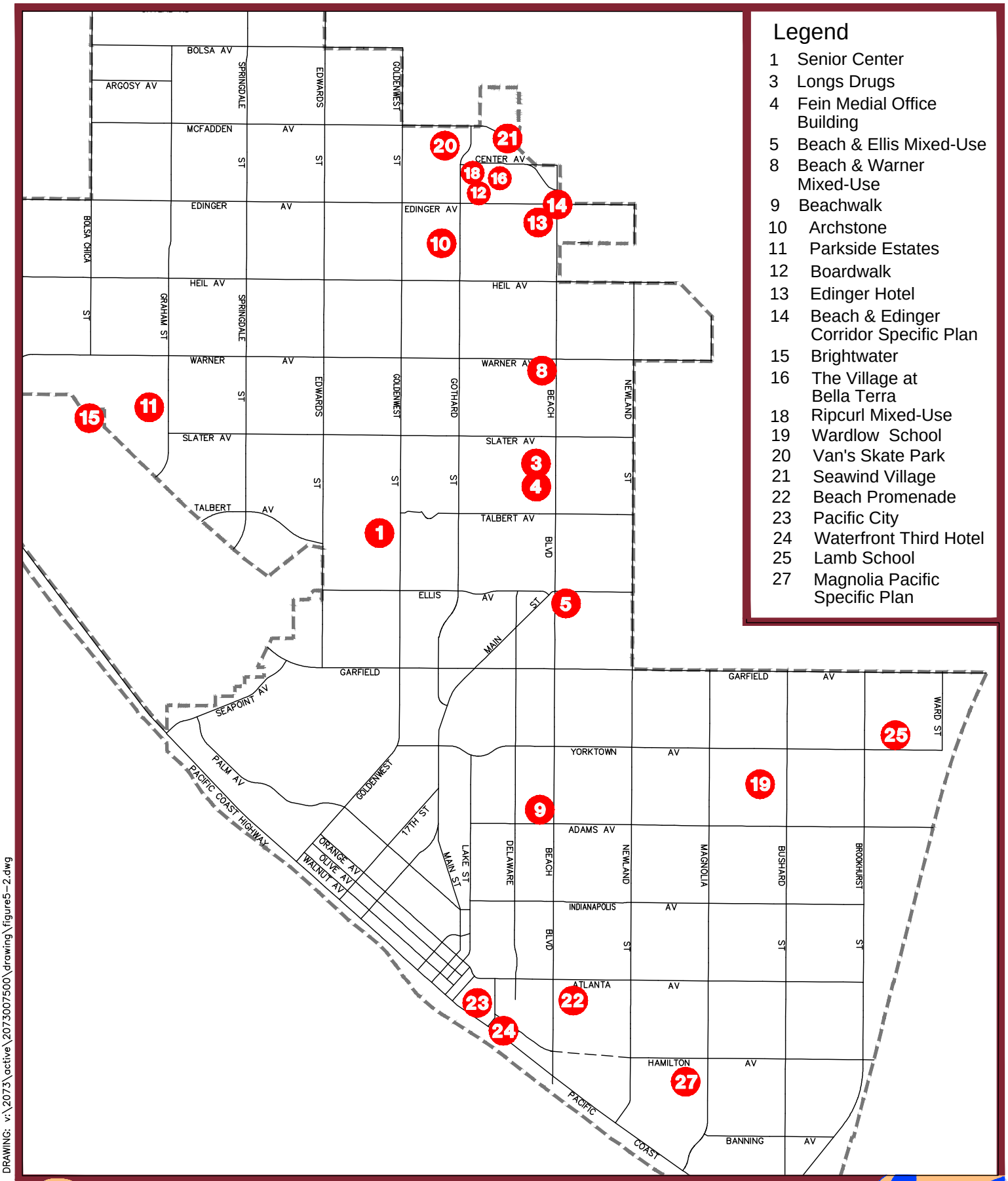
5.3 CUMULATIVE PROJECTS

Table 5-3 shows the cumulative projects assumed in the traffic analysis for year 2030 conditions. Figure 5-2 illustrates the cumulative project locations.

Table 5-3 Cumulative Projects List

Map ID	Land Use Type	Amounts/Units	Description of Cumulative Projects
1	37. Senior Center	45 TSF	Senior Center
3	10. Commercial General	8.8 TSF	Longs Drugs
4	13. Office	6.48 TSF Medical/Office	Fein Medical Office Building
5	20. Mixed Use Residential 21. Mixed Use Commercial	105 DU 30.7 TSF *Or* 274 DU 8.5 TSF *Or* 77.3 TSF Retail/Office	Beach & Ellis Mixed-Use
8	20. Mixed Use Residential 21. Mixed Use Commercial	272 DU 257 TSF	Beach & Warner Mixed Use
9	5. Res. High Density	173 DU	Beachwalk
10	5. Res. High Density	510 DU	Archstone
11	1. Res. Low Density	171 DU	Parkside Estates
12	20. Mixed Use Residential 21. Mixed Use Commercial	984 DU 60 TSF	Boardwalk (aka Murdy Commons)
13	8. Overnight Accommodations	200 Rooms Hotel	Edinger Hotel
14	New zoning for properties along Beach Boulevard and Edinger Avenue.		Beach and Edinger Corridors Specific Plan
15	1. Res. Low Density	349 DU	Brightwater
16	20. Mixed Use Residential 21. Mixed Use Commercial	*General Plan allows:* 713 DU 138 TSF *City approved:* 468 DU 30 TSF 154 TSF Costco	The Village at Bella Terra/Revised Village at Bella Terra
18	20. Mixed Use Residential 21. Mixed Use Commercial	330 DU 10 TSF	The Ripcurl Mixed Use Project
19	1. Res. Low Density	47 DU	Wardlow School
20	Skate Park	15.9 TSF Skate Plaza 11.9 TSF Skate Bowl 3.5 TSF Skate Shop/Concessions	Van's Skate Park
21	1. Res. Low Density 5. Res. High Density	10 DU 277 DU	Seawind Village Apartments
22	10. Commercial General	38.6 TSF	Beach Promenade
23	8. Overnight Accommodations 20. Mixed Use Residential 21. Mixed Use Commercial	516 DU 250 Rooms 191 TSF	Pacific City
24	8. Overnight Accommodations	156 Rooms	Waterfront Third Hotel
25	1. Res. Low Density	81 DU	Lamb School
27	1. Res. Low Density	502 DU	Magnolia Pacific Specific Plan (Ascon/Nesi Landfill)

Source: City of Huntington Beach Planning Department, January 2013.
Note: Cumulative projects that do not generate trips are not listed in this table.



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Cumulative Projects Location Map

Figure 5-2

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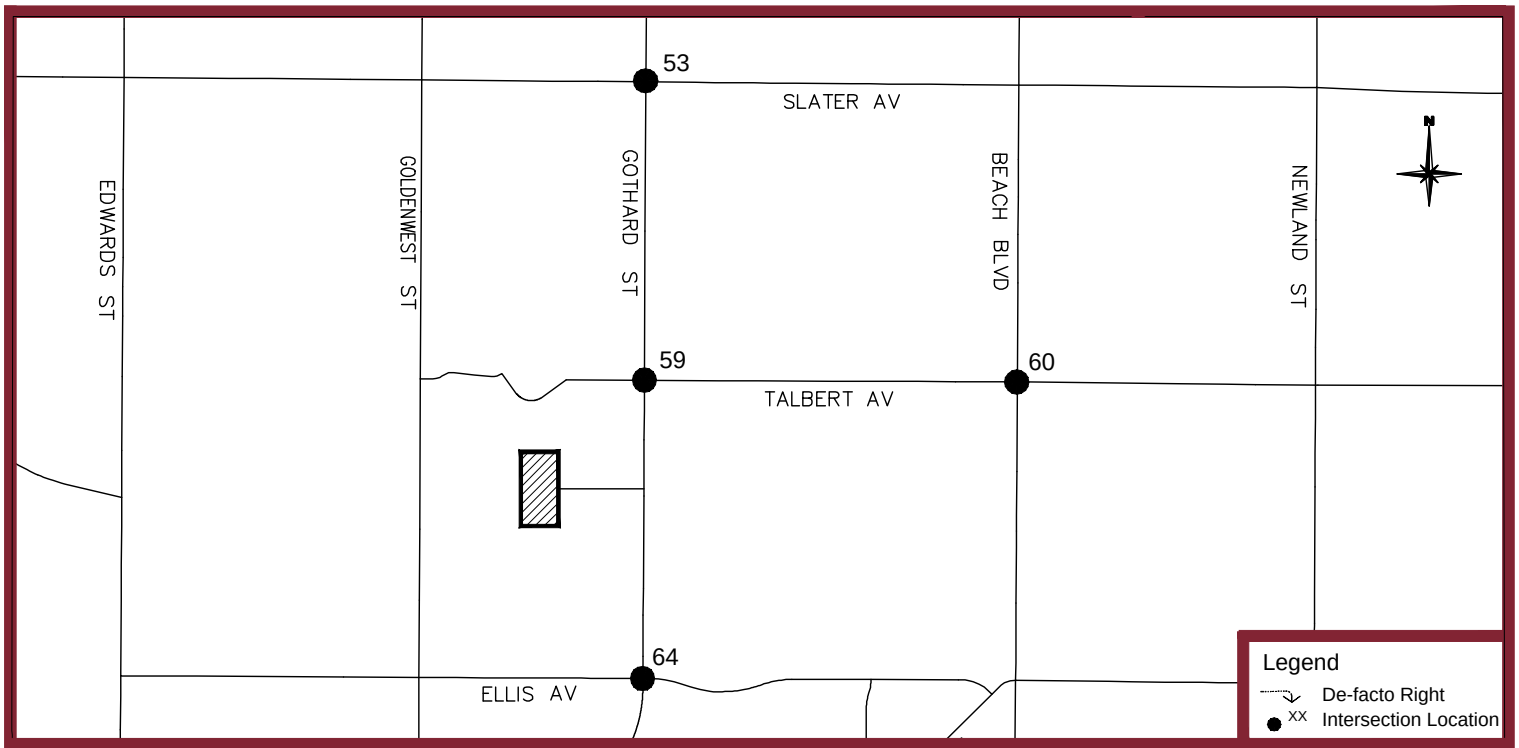
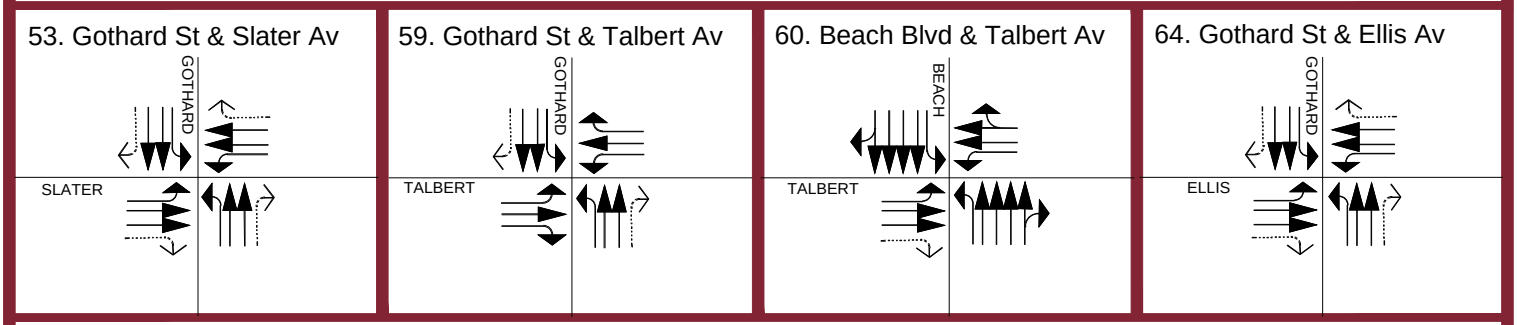
Appendix A
Peak Hour Volume Diagrams

APPENDIX A – Peak Hour Volume Diagrams



LANE CONFIGURATIONS



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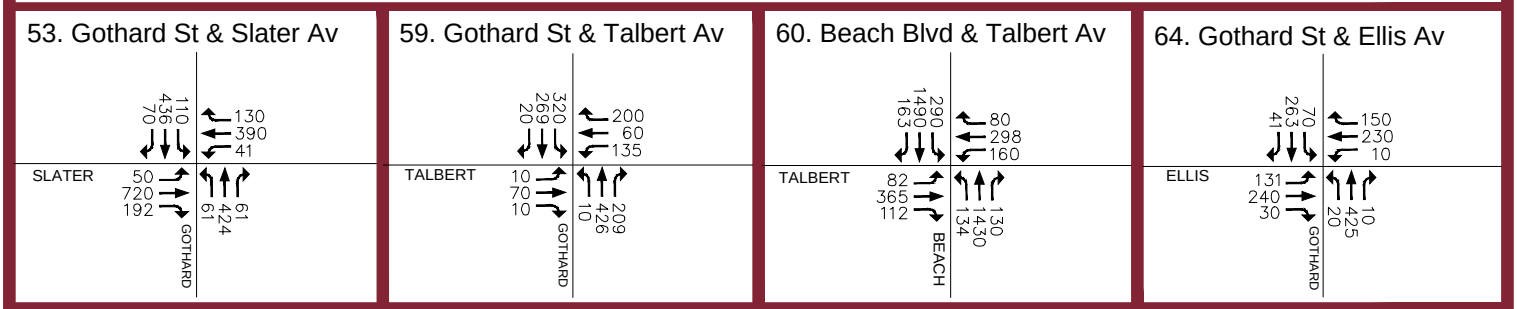

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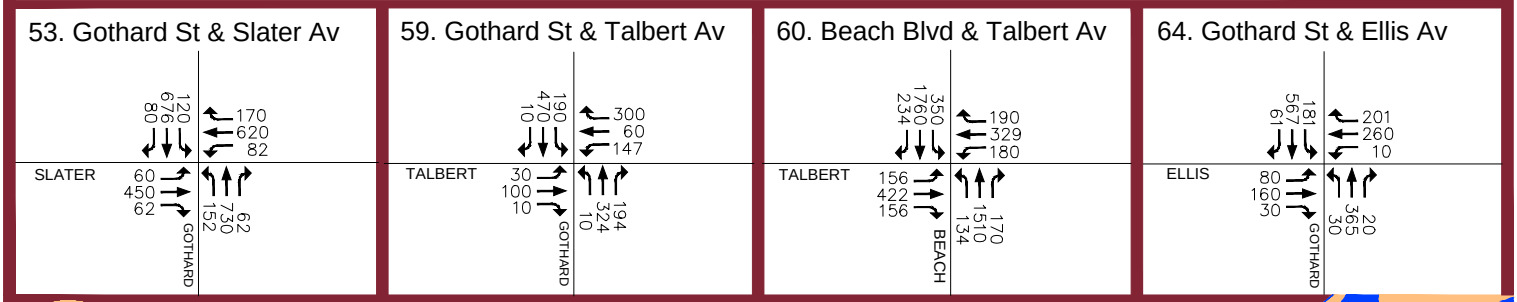

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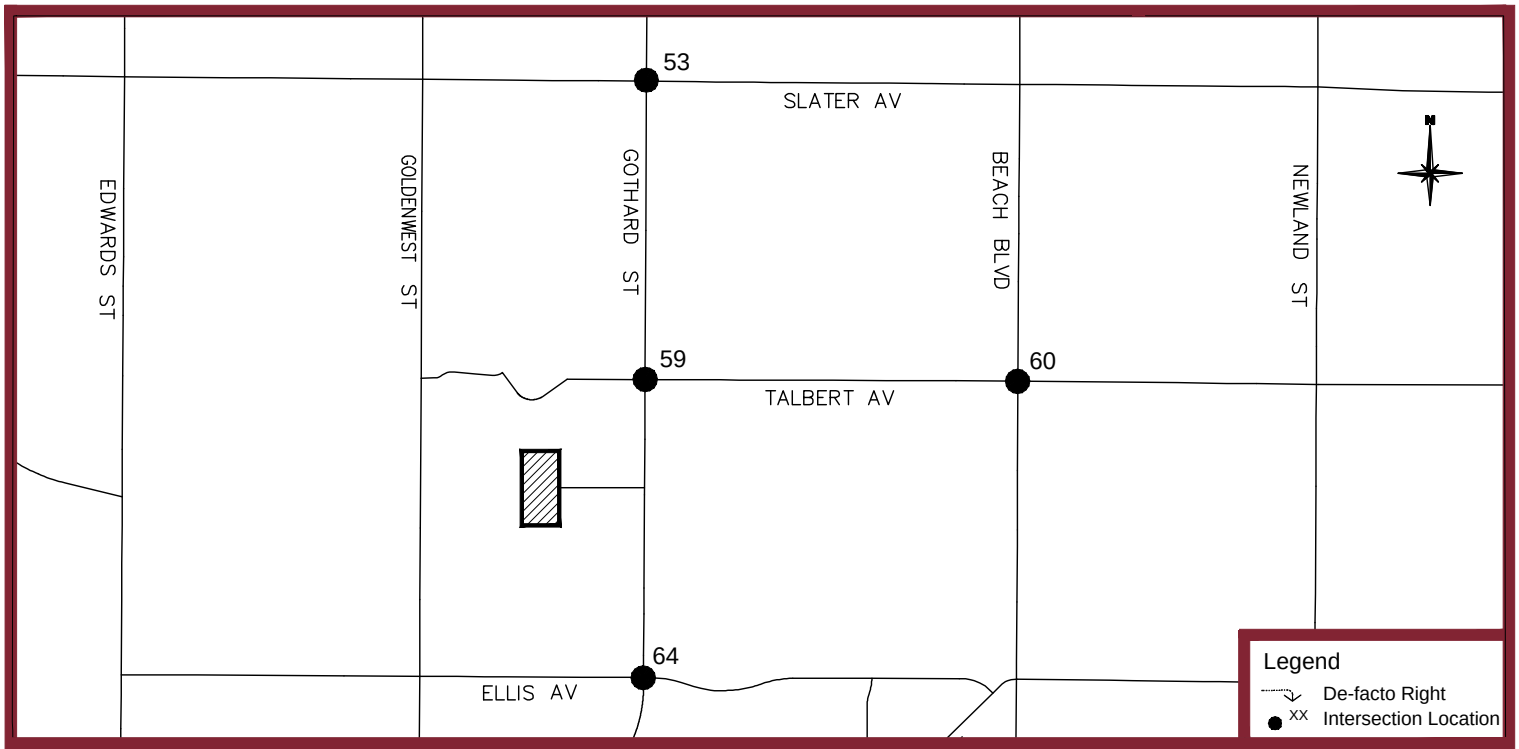
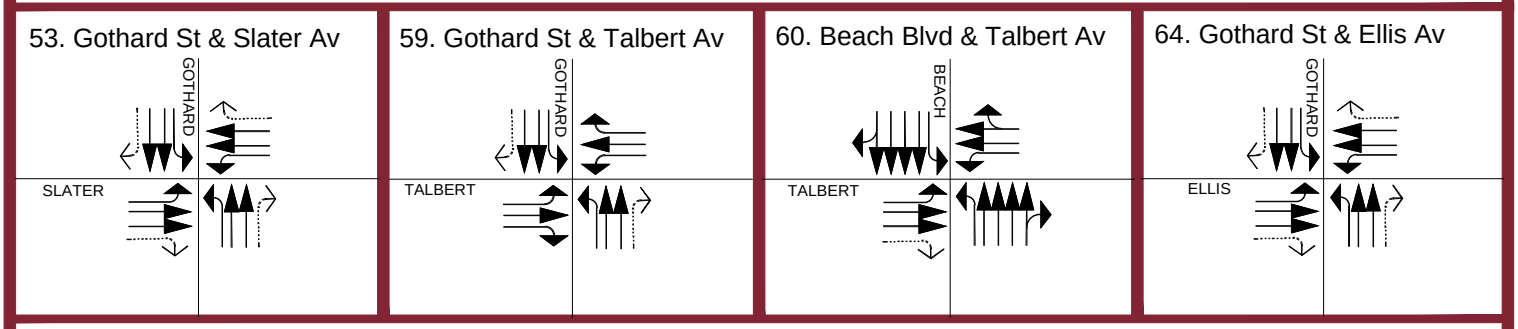
Existing Plus Project Lane Configurations and Intersection Turning Movements

Figure A-1



LANE CONFIGURATIONS



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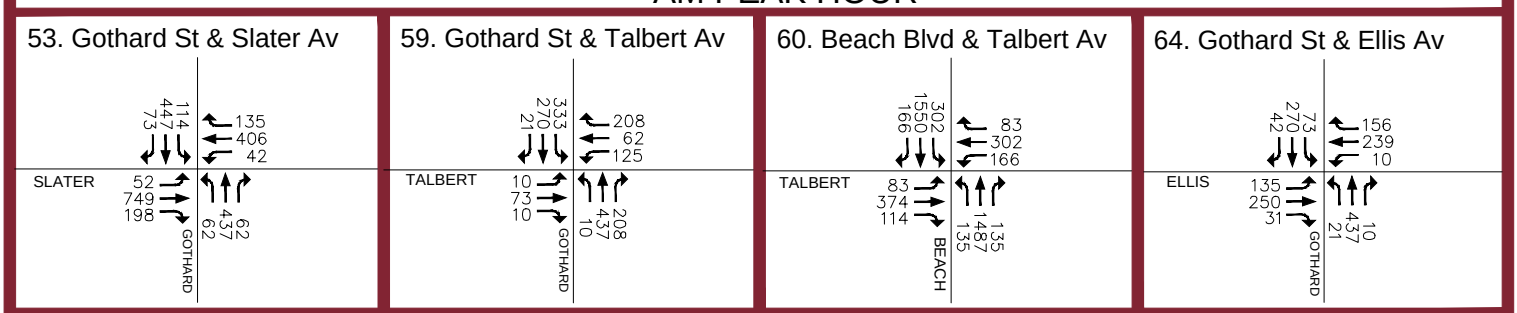

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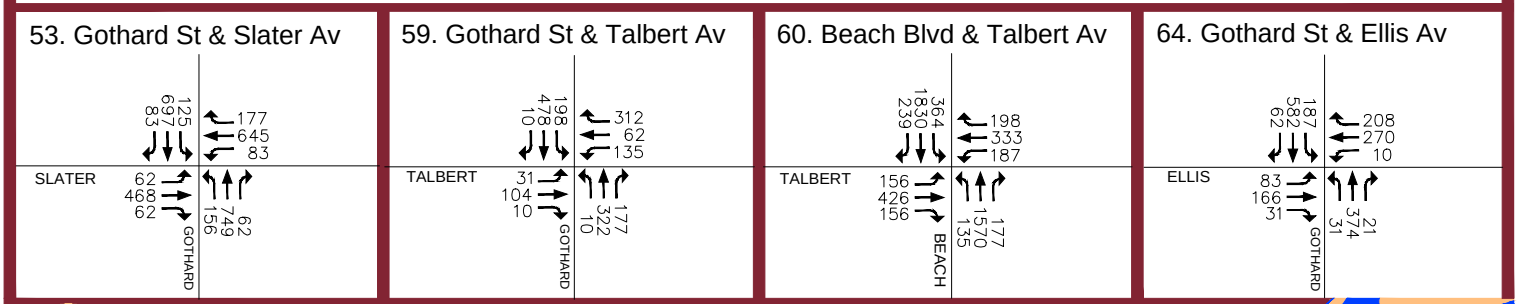

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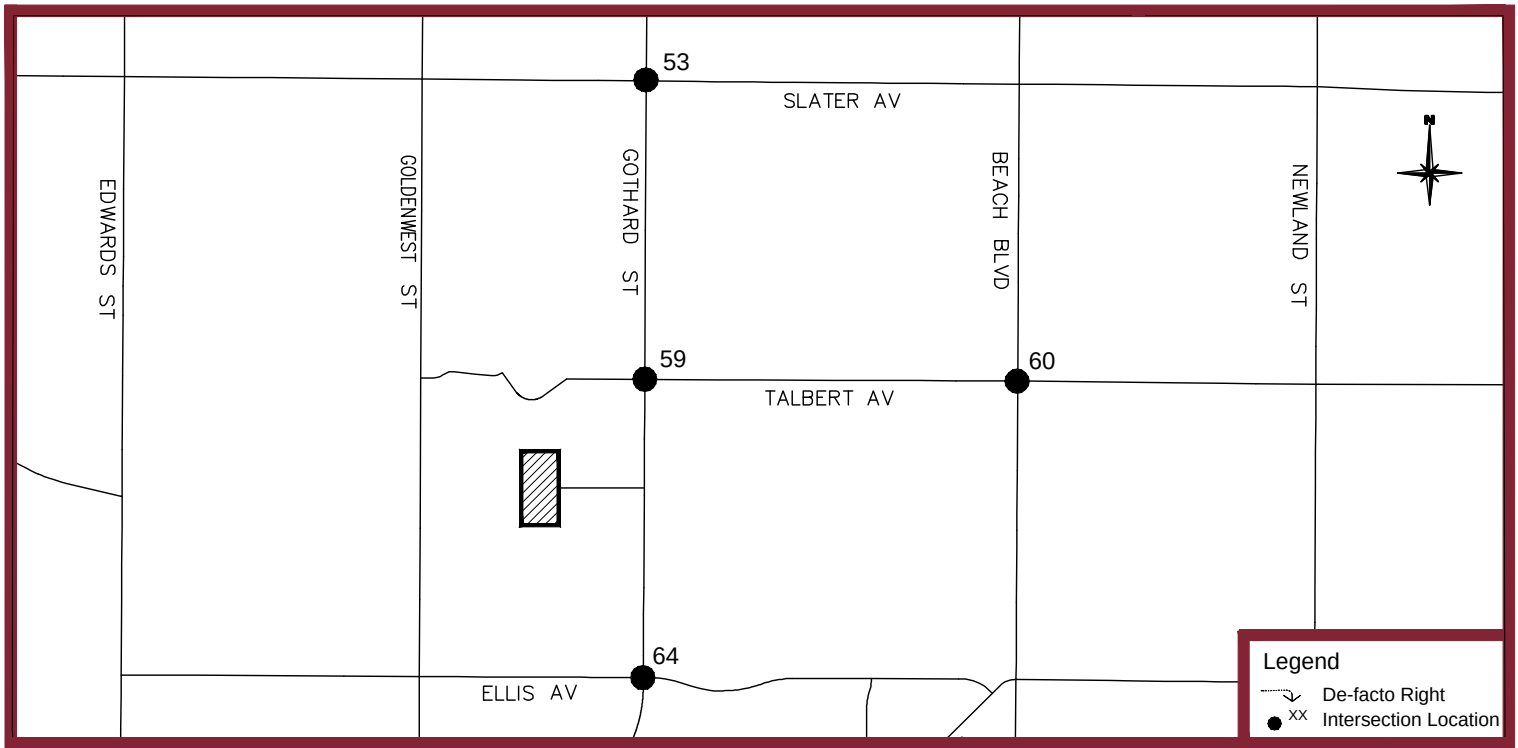
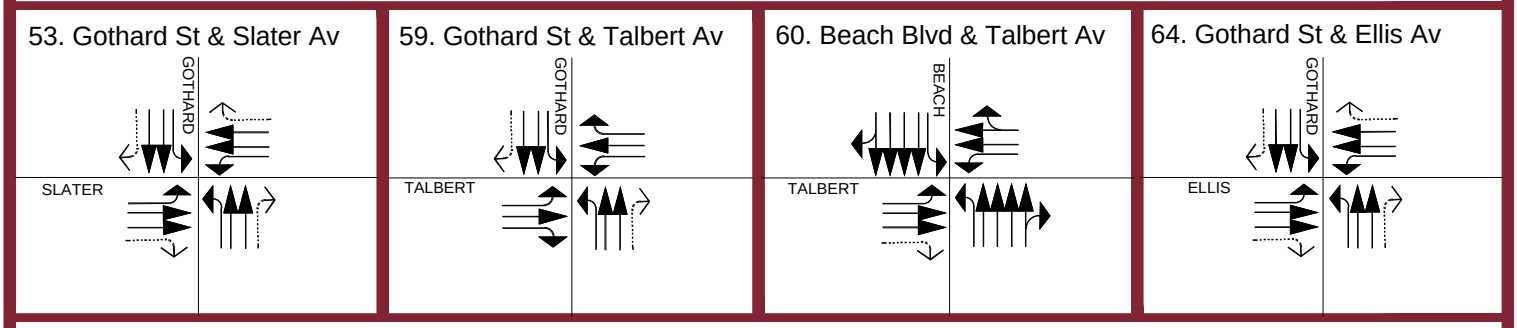
2016 No Project Lane Configurations and Intersection Turning Movements

Figure A-2



LANE CONFIGURATIONS



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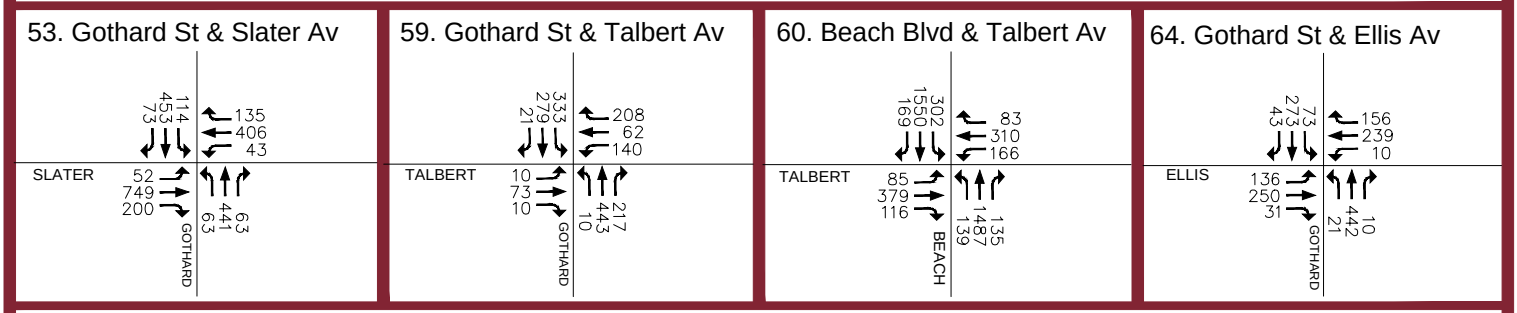

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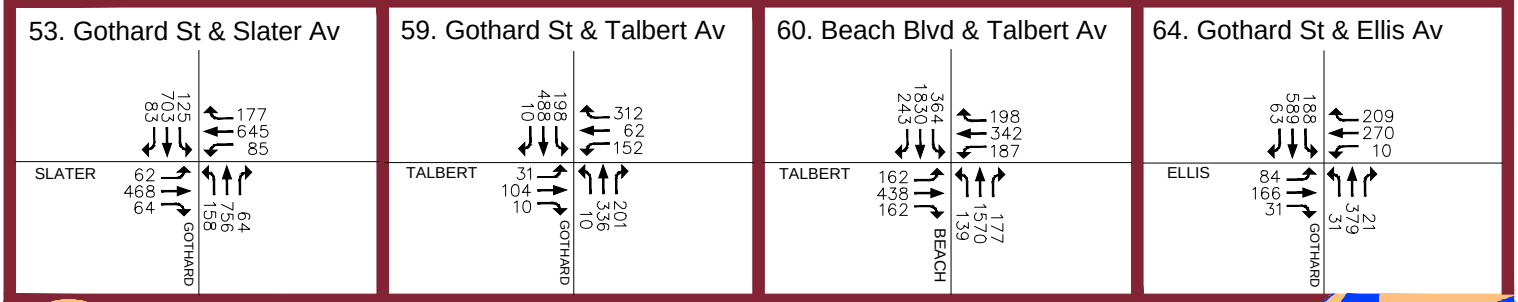

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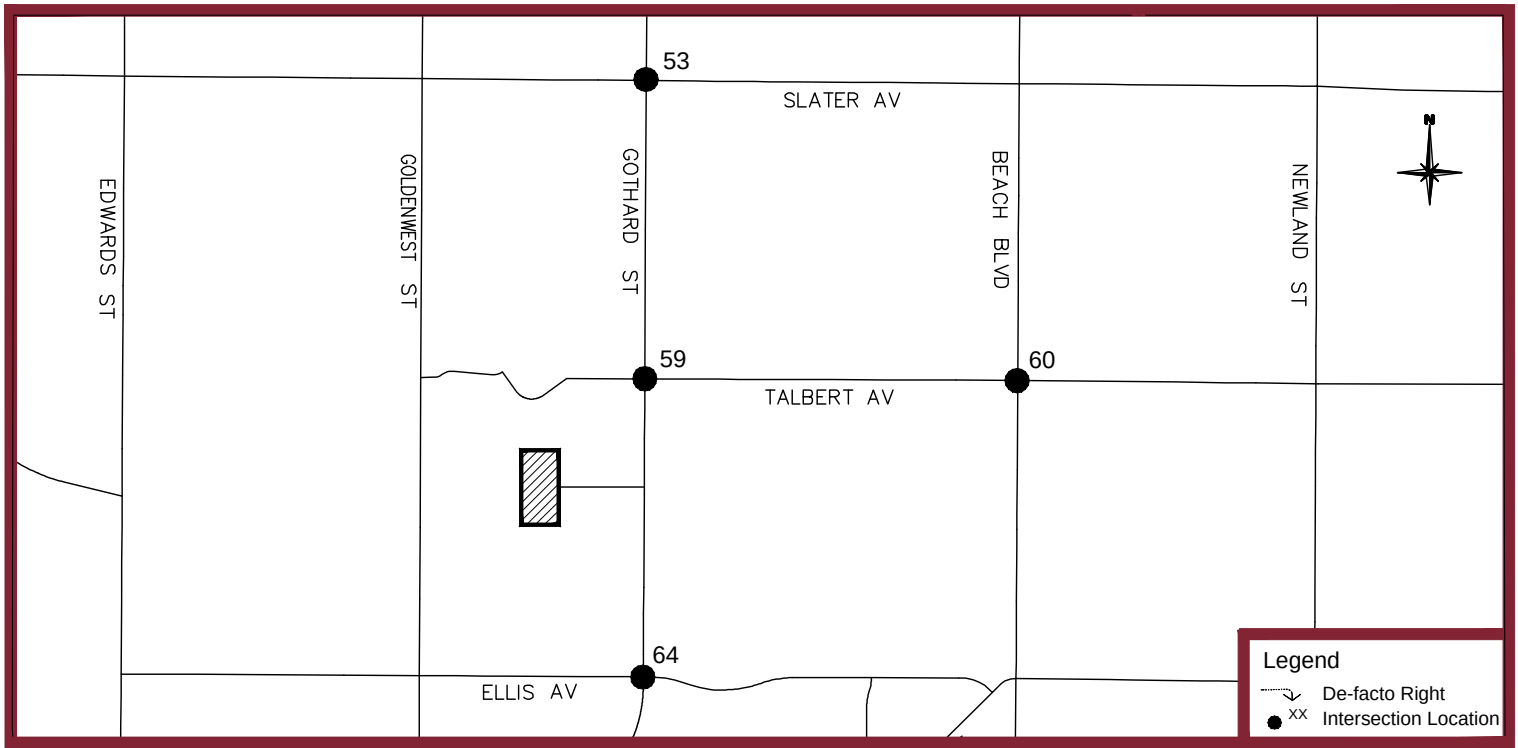
2016 With-Project Lane Configurations and Intersection Turning Movements

Figure A-3



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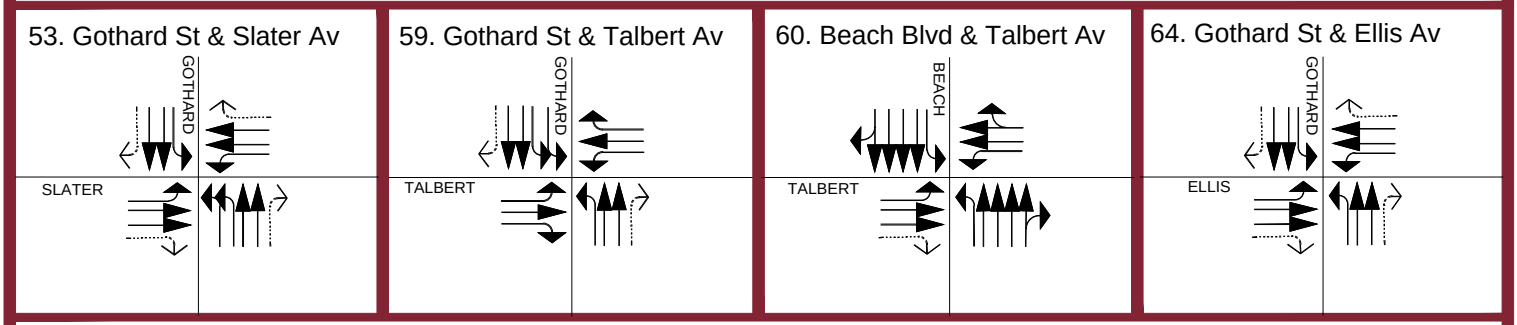

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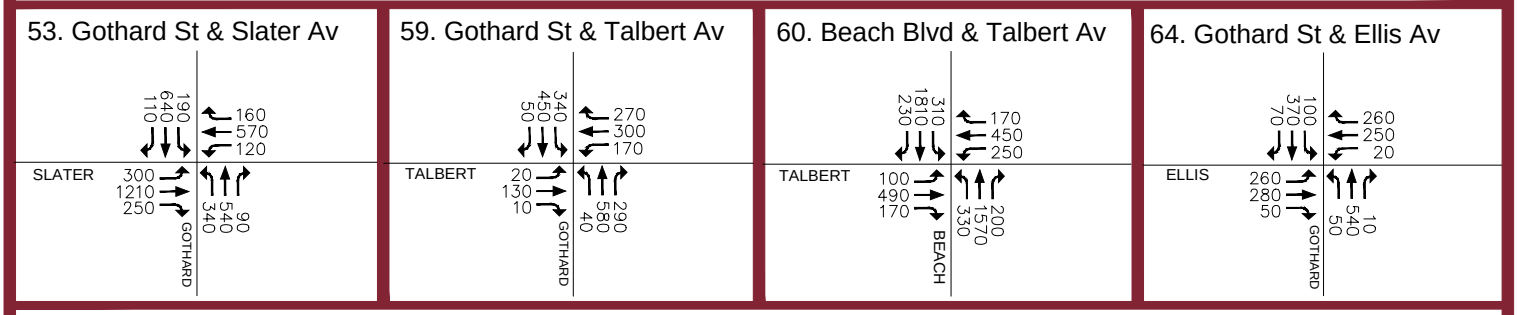

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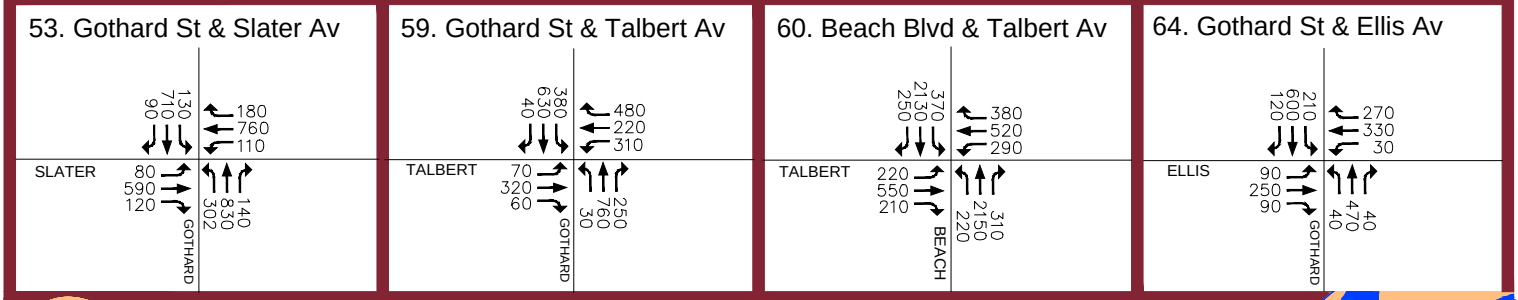

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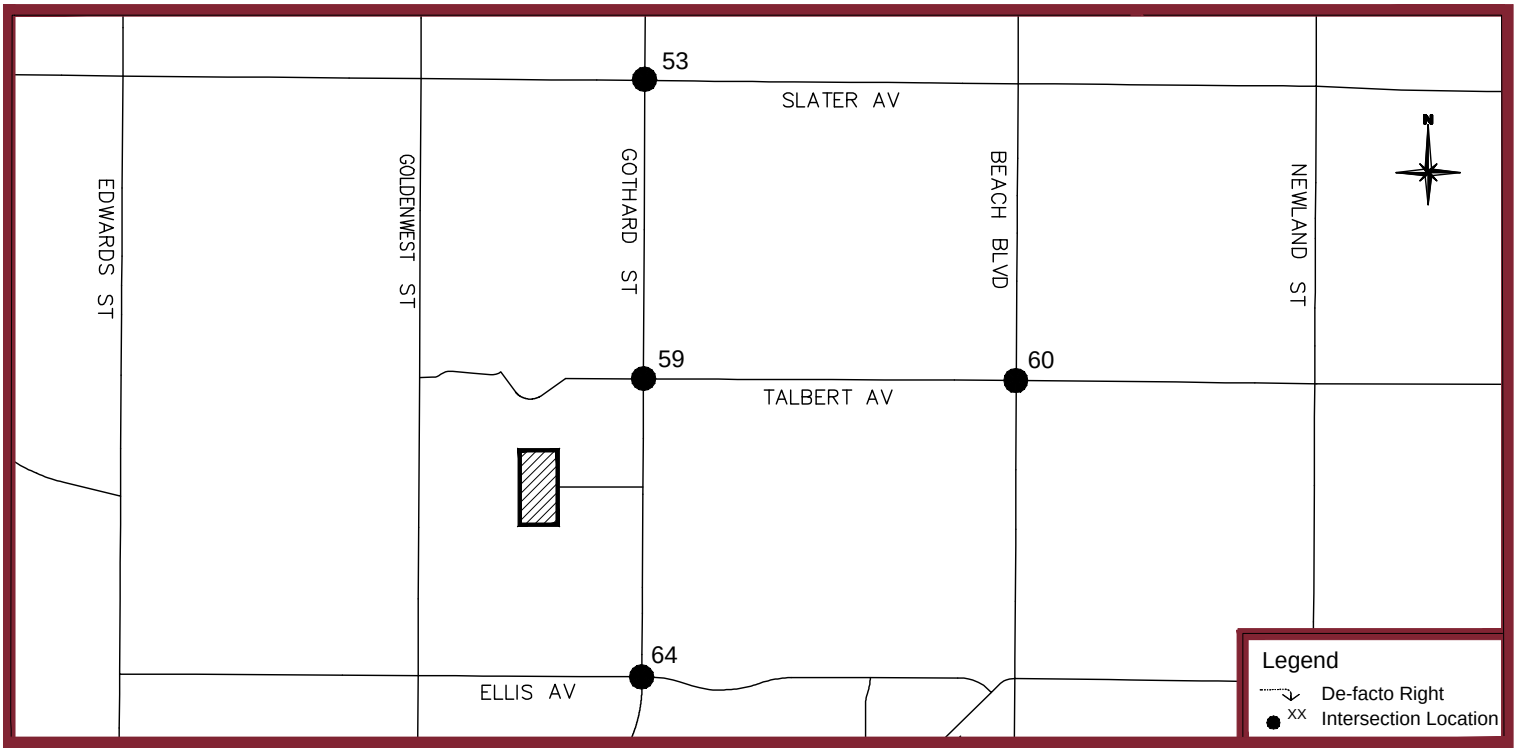
2030 General Plan Lane Configurations and Intersection Turning Movements

Figure A-4



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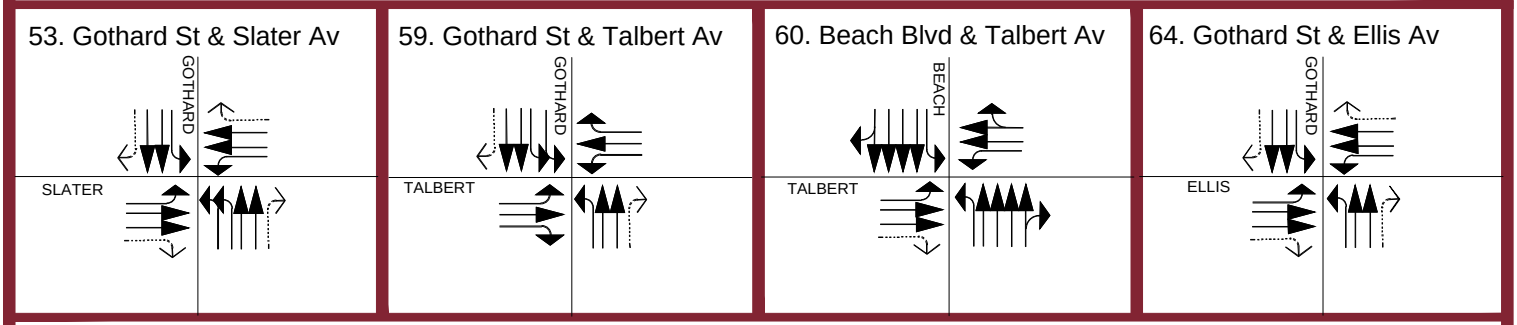

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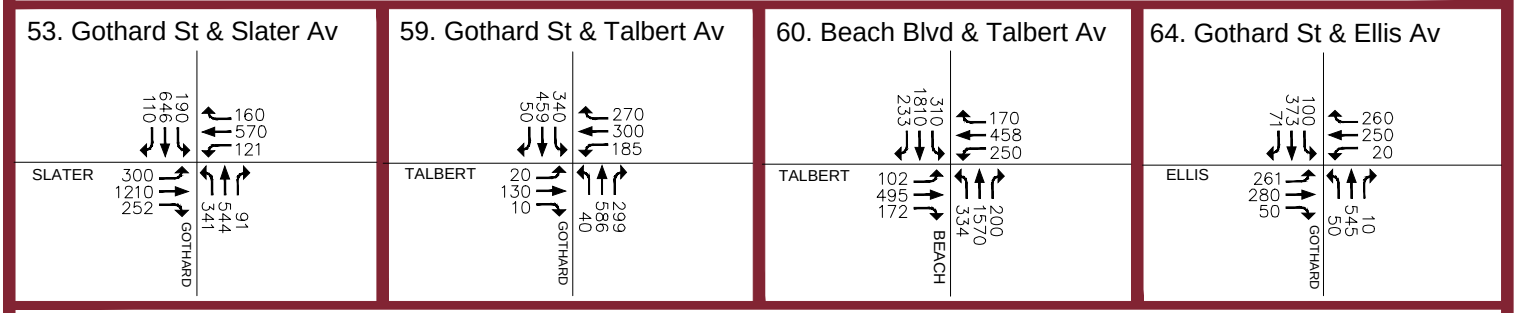

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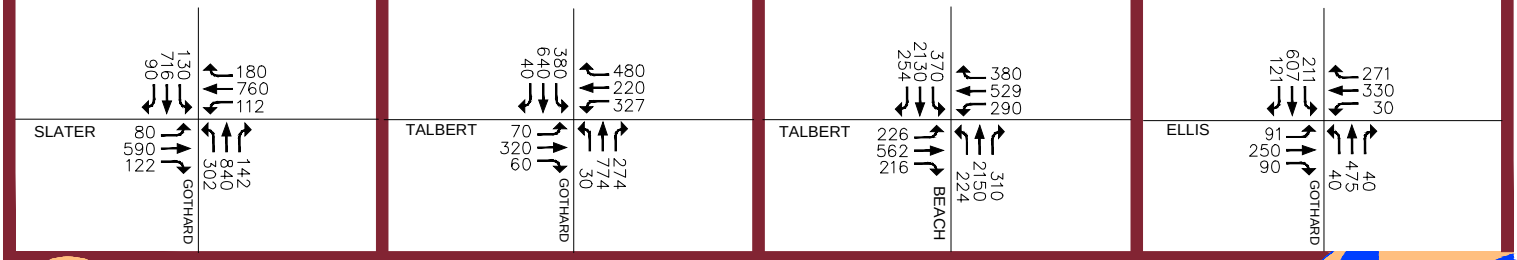

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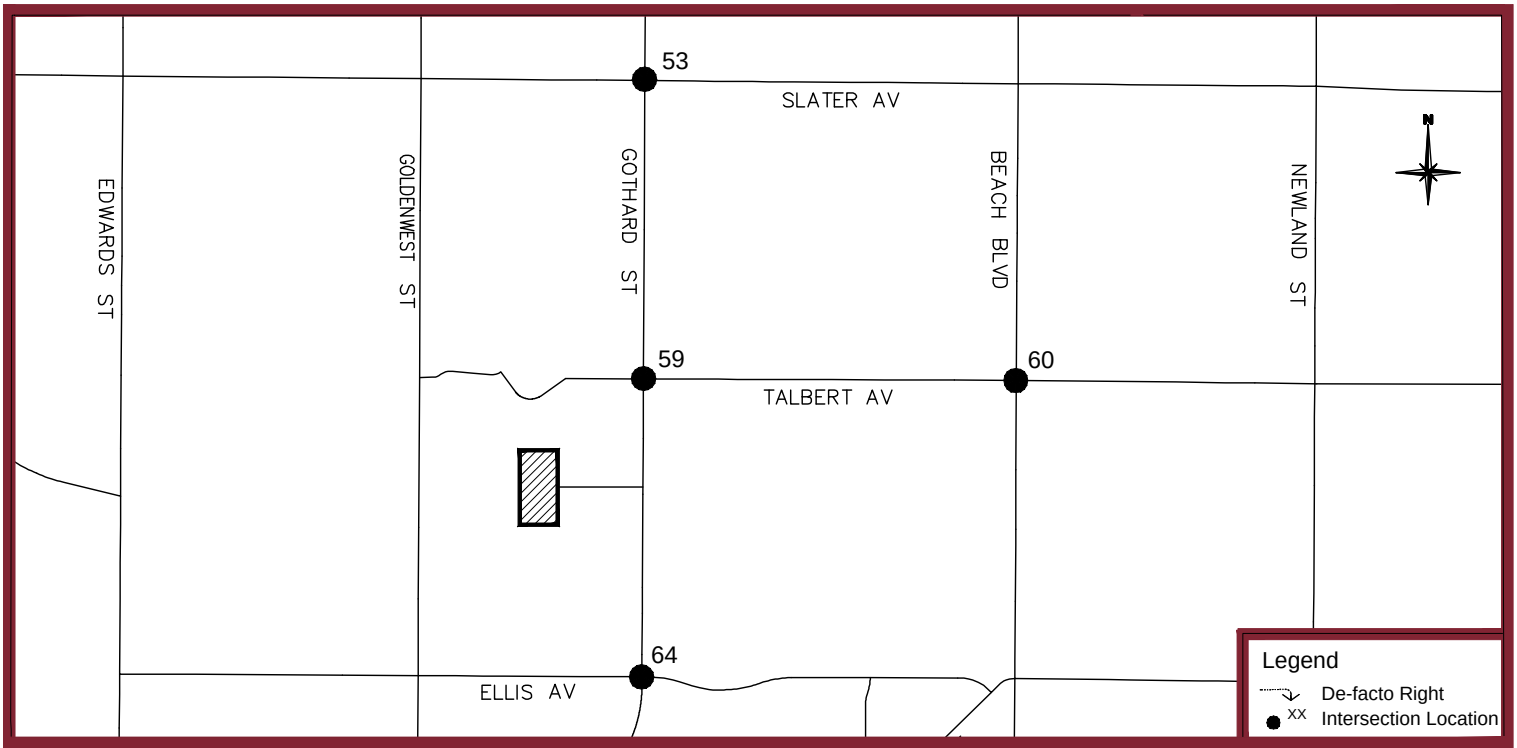
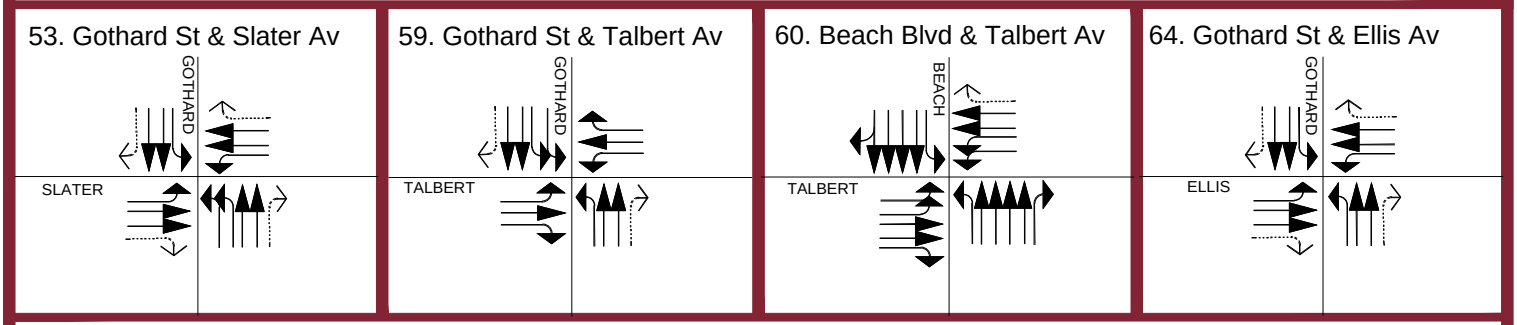
2030 With-Project Lane Configurations and Intersection Turning Movements

Figure A-5



LANE CONFIGURATIONS



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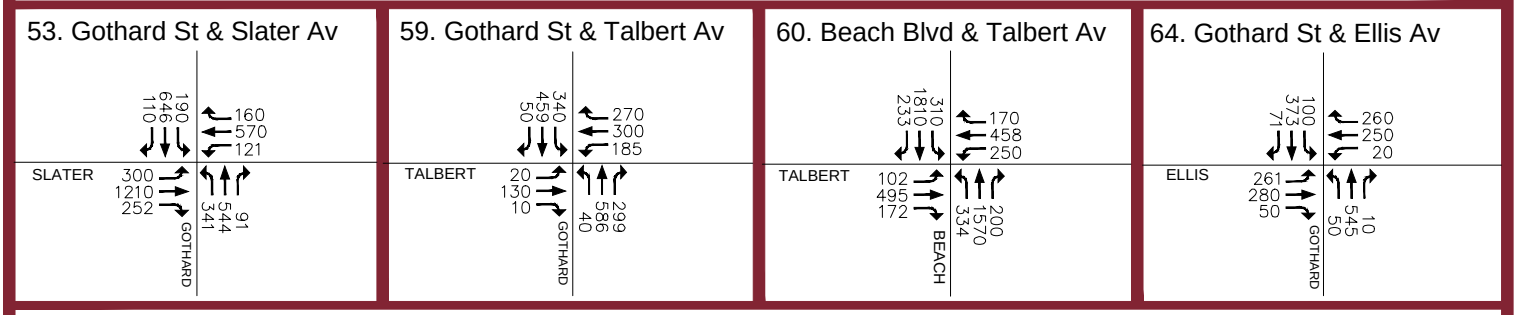

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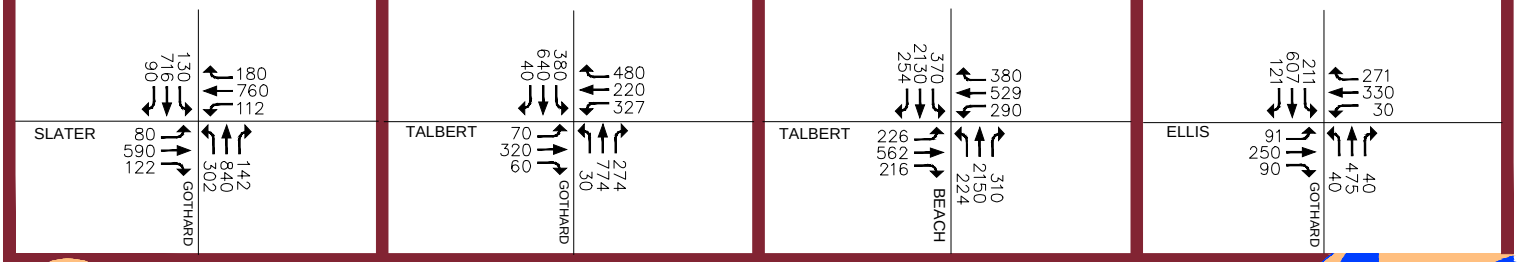

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2030 With-Project Lane Configurations and Intersection Turning Movements

Figure A-5

APPENDIX B – Intersection Capacity Utilization Worksheets

APPENDIX B – Intersection Capacity Utilization Worksheets

53. Gothard St & Slater Ave

Existing Count (2012)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	150	.09*
NBT	2	3400	420	.12*	720	.21
NBR	d	1700	60	.04	60	.04
SBL	1	1700	110	.06*	120	.07
SBT	2	3400	430	.13	670	.20*
SBR	d	1700	70	.04	80	.05
EBL	1	1700	50	.03	60	.04*
EBT	2	3400	720	.21*	450	.13
EBR	d	1700	190	.11	60	.04
WBL	1	1700	40	.02*	80	.05
WBT	2	3400	390	.11	620	.18*
WBR	d	1700	130	.08	170	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .56

Existing Plus Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	61	.04	152	.09*
NBT	2	3400	424	.12*	730	.21
NBR	d	1700	61	.04	62	.04
SBL	1	1700	110	.06*	120	.07
SBT	2	3400	436	.13	676	.20*
SBR	d	1700	70	.04	80	.05
EBL	1	1700	50	.03	60	.04*
EBT	2	3400	720	.21*	450	.13
EBR	d	1700	192	.11	62	.04
WBL	1	1700	41	.02*	82	.05
WBT	2	3400	390	.11	620	.18*
WBR	d	1700	130	.08	170	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .56

2016 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	62	.04	156	.09*
NBT	2	3400	437	.13*	749	.22
NBR	d	1700	62	.04	62	.04
SBL	1	1700	114	.07*	125	.07
SBT	2	3400	447	.13	697	.21*
SBR	d	1700	73	.04	83	.05
EBL	1	1700	52	.03	62	.04*
EBT	2	3400	749	.22*	468	.14
EBR	d	1700	198	.12	62	.04
WBL	1	1700	42	.02*	83	.05
WBT	2	3400	406	.12	645	.19*
WBR	d	1700	135	.08	177	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .58

2016 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	63	.04	158	.09*
NBT	2	3400	441	.13*	759	.22
NBR	d	1700	63	.04	64	.04
SBL	1	1700	114	.07*	125	.07
SBT	2	3400	453	.13	703	.21*
SBR	d	1700	73	.04	83	.05
EBL	1	1700	52	.03	62	.04*
EBT	2	3400	749	.22*	468	.14
EBR	d	1700	200	.12	64	.04
WBL	1	1700	43	.03*	85	.05
WBT	2	3400	406	.12	645	.19*
WBR	d	1700	135	.08	177	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .58

53. Gothard St & Slater Ave

2030 General Plan (No-Project)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	340	.20*	300	.18*
NBT	2	3400	540	.16	830	.24
NBR	d	1700	90	.05	140	.08
SBL	1	1700	190	.11	130	.08
SBT	2	3400	640	.19*	710	.21*
SBR	d	1700	110	.06	90	.05
EBL	1	1700	300	.18	80	.05*
EBT	2	3400	1210	.36*	590	.17
EBR	d	1700	250	.15	120	.07
WBL	1	1700	120	.07*	110	.06
WBT	2	3400	570	.17	760	.22*
WBR	d	1700	160	.09	180	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .87 .71

2030 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	341	.20*	302	.18*
NBT	2	3400	544	.16	840	.25
NBR	d	1700	91	.05	142	.08
SBL	1	1700	190	.11	130	.08
SBT	2	3400	646	.19*	716	.21*
SBR	d	1700	110	.06	90	.05
EBL	1	1700	300	.18	80	.05*
EBT	2	3400	1210	.36*	590	.17
EBR	d	1700	252	.15	122	.07
WBL	1	1700	121	.07*	112	.07
WBT	2	3400	570	.17	760	.22*
WBR	d	1700	160	.09	180	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .87 .71

59. Gothard St & Talbert Ave

Existing Count (2012)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	10	.01
NBT	2	3400	420	.12*	310	.09*
NBR	d	1700	200	.12	170	.10
SBL	1	1700	320	.19*	190	.11*
SBT	2	3400	260	.08	460	.14
SBR	d	1700	20	.01	10	.01
EBL	1	1700	10	.01	30	.02
EBT	1	1700	70	.04*	100	.06*
EBR	1	1700	10	.01	10	.01
WBL	1	1700	120	.07*	130	.08*
WBT	1	1700	60	.04	60	.04
WBR	1	1700	200	.12	300	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.39**

Existing Plus Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	10	.01
NBT	2	3400	426	.13*	324	.10*
NBR	d	1700	209	.12	194	.11
SBL	1	1700	320	.19*	190	.11*
SBT	2	3400	269	.08	470	.14
SBR	d	1700	20	.01	10	.01
EBL	1	1700	10	.01	30	.02
EBT	1	1700	70	.04*	100	.06*
EBR	1	1700	10	.01	10	.01
WBL	1	1700	135	.08*	147	.09*
WBT	1	1700	60	.04	60	.04
WBR	1	1700	200	.12	300	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.49**		**.41**

2016 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	10	.01
NBT	2	3400	437	.13*	322	.09*
NBR	d	1700	208	.12	177	.10
SBL	1	1700	333	.20*	198	.12*
SBT	2	3400	270	.08	478	.14
SBR	d	1700	21	.01	10	.01
EBL	1	1700	10	.01	31	.02
EBT	1	1700	73	.04*	104	.06*
EBR	1	1700	10	.01	10	.01
WBL	1	1700	125	.07*	135	.08*
WBT	1	1700	62	.04	62	.04
WBR	1	1700	208	.12	312	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.49**		**.40**

2016 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	10	.01
NBT	2	3400	443	.13*	336	.10*
NBR	d	1700	217	.13	201	.12
SBL	1	1700	333	.20*	198	.12*
SBT	2	3400	279	.08	488	.14
SBR	d	1700	21	.01	10	.01
EBL	1	1700	10	.01	31	.02
EBT	1	1700	73	.04*	104	.06*
EBR	1	1700	10	.01	10	.01
WBL	1	1700	140	.08*	152	.09*
WBT	1	1700	62	.04	62	.04
WBR	1	1700	208	.12	312	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.42**

59. Gothard St & Talbert Ave

2030 General Plan (No-Project)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	30	.02
NBT	2	3400	580	.17*	760	.22*
NBR	d	1700	290	.17	250	.15
SBL	1	1700	340	.20*	380	.22*
SBT	2	3400	450	.13	630	.19
SBR	d	1700	50	.03	40	.02
EBL	1	1700	20	.01*	70	.04
EBT	1	1700	130	.08	320	.19*
EBR	1	1700	10	.01	60	.04
WBL	1	1700	170	.10	310	.18*
WBT	1	1700	300	.18*	220	.13
WBR	1	1700	270	.16	480	.28
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.86**

2030 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	30	.02
NBT	2	3400	586	.17*	774	.23*
NBR	d	1700	299	.18	274	.16
SBL	1	1700	340	.20*	380	.22*
SBT	2	3400	459	.14	640	.19
SBR	d	1700	50	.03	40	.02
EBL	1	1700	20	.01*	70	.04
EBT	1	1700	130	.08	320	.19*
EBR	1	1700	10	.01	60	.04
WBL	1	1700	185	.11	327	.19*
WBT	1	1700	300	.18*	220	.13
WBR	1	1700	270	.16	480	.28
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.88**

60. Beach Blvd & Talbert Ave

Existing Count (2012)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08	130	.08
NBT	4	6800	1430	.23*	1510	.25*
NBR	0	0	130		170	
SBL	1	1700	290	.17*	350	.21*
SBT	4	6800	1490	.24	1760	.29
SBR	0	0	160		230	
EBL	1	1700	80	.05	150	.09*
EBT	2	3400	360	.11*	410	.12
EBR	d	1700	110	.06	150	.09
WBL	1	1700	160	.09*	180	.11
WBT	2	3400	290	.11	320	.15*
WBR	0	0	80		190	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .75

Existing Plus Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	134	.08	134	.08
NBT	4	6800	1430	.23*	1510	.25*
NBR	0	0	130		170	
SBL	1	1700	290	.17*	350	.21*
SBT	4	6800	1490	.24	1760	.29
SBR	0	0	163		234	
EBL	1	1700	82	.05	156	.09*
EBT	2	3400	365	.11*	422	.12
EBR	d	1700	112	.07	156	.09
WBL	1	1700	160	.09*	180	.11
WBT	2	3400	298	.11	329	.15*
WBR	0	0	80		190	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .75

2016 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	135	.08	135	.08
NBT	4	6800	1487	.24*	1570	.26*
NBR	0	0	135		177	
SBL	1	1700	302	.18*	364	.21*
SBT	4	6800	1550	.25	1830	.30
SBR	0	0	166		239	
EBL	1	1700	83	.05	156	.09*
EBT	2	3400	374	.11*	426	.13
EBR	d	1700	114	.07	156	.09
WBL	1	1700	166	.10*	187	.11
WBT	2	3400	302	.11	333	.16*
WBR	0	0	83		198	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .77

2016 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	139	.08	139	.08
NBT	4	6800	1487	.24*	1570	.26*
NBR	0	0	135		177	
SBL	1	1700	302	.18*	364	.21*
SBT	4	6800	1550	.25	1830	.30
SBR	0	0	169		243	
EBL	1	1700	85	.05	162	.10*
EBT	2	3400	379	.11*	438	.13
EBR	d	1700	116	.07	162	.10
WBL	1	1700	166	.10*	187	.11
WBT	2	3400	310	.12	342	.16*
WBR	0	0	83		198	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .78

60. Beach Blvd & Talbert Ave

2030 General Plan (No-Project)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	330	.19*	220	.13
NBT	4	6800	1570	.26	2150	.36*
NBR	0	0	200		310	
SBL	1	1700	310	.18	370	.22*
SBT	4	6800	1810	.30*	2130	.35
SBR	0	0	230		250	
EBL	1	1700	100	.06	220	.13*
EBT	2	3400	490	.14*	550	.16
EBR	d	1700	170	.10	210	.12
WBL	1	1700	250	.15*	290	.17
WBT	2	3400	450	.18	520	.26*
WBR	0	0	170		380	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 1.02

2030 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	334	.20*	224	.13
NBT	4	6800	1570	.26	2150	.36*
NBR	0	0	200		310	
SBL	1	1700	310	.18	370	.22*
SBT	4	6800	1810	.30*	2130	.35
SBR	0	0	233		254	
EBL	1	1700	102	.06	226	.13*
EBT	2	3400	495	.15*	562	.17
EBR	d	1700	172	.10	216	.13
WBL	1	1700	250	.15*	290	.17
WBT	2	3400	458	.18	529	.27*
WBR	0	0	170		380	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 1.03

2035 With-Project With Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	334	.20*	224	.13
NBT	4	6800	1570	.23	2150	.32*
NBR	1	1700	200	.12	310	.18
SBL	1	1700	310	.18	370	.22*
SBT	4	6800	1810	.30*	2130	.35
SBR	0	0	233		254	
EBL	2	3400	102	.03	226	.07
EBT	2	3400	495	.15*	562	.17*
EBR	1	1700	172	.10	216	.13
WBL	2	3400	250	.07*	290	.09*
WBT	2	3400	458	.13	529	.16
WBR	d	1700	170	.10	380	.22
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .85

64. Gothard St & Ellis Ave

Existing Count (2012)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	30	.02
NBT	2	3400	420	.12*	360	.11*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	70	.04*	180	.11*
SBT	2	3400	260	.08	560	.16
SBR	d	1700	40	.02	60	.04
EBL	1	1700	130	.08*	80	.05*
EBT	2	3400	240	.07	160	.05
EBR	d	1700	30	.02	30	.02
WBL	1	1700	10	.01	10	.01
WBT	2	3400	230	.07*	260	.08*
WBR	d	1700	150	.09	200	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.36** **.40**

Existing Plus Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	30	.02
NBT	2	3400	425	.13*	365	.11*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	70	.04*	181	.11*
SBT	2	3400	263	.08	567	.17
SBR	d	1700	41	.02	61	.04
EBL	1	1700	131	.08*	80	.05*
EBT	2	3400	240	.07	160	.05
EBR	d	1700	30	.02	30	.02
WBL	1	1700	10	.01	10	.01
WBT	2	3400	230	.07*	260	.08*
WBR	d	1700	150	.09	201	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.37** **.40**

2016 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01	31	.02
NBT	2	3400	437	.13*	374	.11*
NBR	d	1700	10	.01	21	.01
SBL	1	1700	73	.04*	187	.11*
SBT	2	3400	270	.08	582	.17
SBR	d	1700	42	.02	62	.04
EBL	1	1700	135	.08*	83	.05*
EBT	2	3400	250	.07	166	.05
EBR	d	1700	31	.02	31	.02
WBL	1	1700	10	.01	10	.01
WBT	2	3400	239	.07*	270	.08*
WBR	d	1700	156	.09	208	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.37** **.40**

2016 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01	31	.02
NBT	2	3400	442	.13*	379	.11*
NBR	d	1700	10	.01	21	.01
SBL	1	1700	73	.04*	188	.11*
SBT	2	3400	273	.08	589	.17
SBR	d	1700	43	.03	63	.04
EBL	1	1700	136	.08*	84	.05*
EBT	2	3400	250	.07	166	.05
EBR	d	1700	31	.02	31	.02
WBL	1	1700	10	.01	10	.01
WBT	2	3400	239	.07*	270	.08*
WBR	d	1700	156	.09	209	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.37** **.40**

64. Gothard St & Ellis Ave

2030 General Plan (No-Project)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	40	.02
NBT	2	3400	540	.16*	470	.14*
NBR	d	1700	10	.01	40	.02
SBL	1	1700	100	.06*	210	.12*
SBT	2	3400	370	.11	600	.18
SBR	d	1700	70	.04	120	.07
EBL	1	1700	260	.15*	90	.05*
EBT	2	3400	280	.08	250	.07
EBR	d	1700	50	.03	90	.05
WBL	1	1700	20	.01	30	.02
WBT	2	3400	250	.07*	330	.10*
WBR	d	1700	260	.15	270	.16
Right Turn Adjustment			WBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.46**

2030 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	40	.02
NBT	2	3400	545	.16*	475	.14*
NBR	d	1700	10	.01	40	.02
SBL	1	1700	100	.06*	211	.12*
SBT	2	3400	373	.11	607	.18
SBR	d	1700	71	.04	121	.07
EBL	1	1700	261	.15*	91	.05*
EBT	2	3400	280	.08	250	.07
EBR	d	1700	50	.03	90	.05
WBL	1	1700	20	.01	30	.02
WBT	2	3400	250	.07*	330	.10*
WBR	d	1700	260	.15	271	.16
Right Turn Adjustment			WBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.46**

APPENDIX C – HCM Worksheets

APPENDIX C – HCM Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	360	110	160	290	80	130	1430	130	290	1490	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3424		1770	6328		1770	6315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3424		1770	6328		1770	6315	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	80	360	110	160	290	80	130	1430	130	290	1490	160
RTOR Reduction (vph)	0	0	94	0	21	0	0	11	0	0	13	0
Lane Group Flow (vph)	80	360	16	160	349	0	130	1549	0	290	1637	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.7	17.2	17.2	15.2	23.7		13.4	47.4		24.2	58.2	
Effective Green, g (s)	8.7	17.2	17.2	15.2	23.7		13.4	47.4		24.2	58.2	
Actuated g/C Ratio	0.07	0.14	0.14	0.13	0.20		0.11	0.39		0.20	0.49	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	128	507	226	224	676		197	2499		356	3062	
v/s Ratio Prot	0.05	c0.10		c0.09	0.10		0.07	c0.24		c0.16	0.26	
v/s Ratio Perm			0.01									
v/c Ratio	0.62	0.71	0.07	0.71	0.52		0.66	0.62		0.81	0.53	
Uniform Delay, d1	54.1	49.0	44.5	50.3	43.0		51.1	29.1		45.8	21.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.2	4.7	0.1	10.3	0.7		7.8	1.2		13.3	0.7	
Delay (s)	63.2	53.7	44.6	60.6	43.7		58.9	30.2		59.1	22.2	
Level of Service	E	D	D	E	D		E	C		E	C	
Approach Delay (s)		53.2			48.8			32.5			27.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	410	150	180	320	190	130	1510	170	350	1760	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3341		1770	6311		1770	6297	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3341		1770	6311		1770	6297	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	150	410	150	180	320	190	130	1510	170	350	1760	230
RTOR Reduction (vph)	0	0	128	0	74	0	0	15	0	0	18	0
Lane Group Flow (vph)	150	410	22	180	436	0	130	1665	0	350	1972	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.6	17.3	17.3	15.9	19.6		13.4	43.0		27.8	57.4	
Effective Green, g (s)	13.6	17.3	17.3	15.9	19.6		13.4	43.0		27.8	57.4	
Actuated g/C Ratio	0.11	0.14	0.14	0.13	0.16		0.11	0.36		0.23	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	200	510	228	234	545		197	2261		410	3012	
v/s Ratio Prot	0.08	0.12		c0.10	c0.13		0.07	c0.26		c0.20	0.31	
v/s Ratio Perm			0.01									
v/c Ratio	0.75	0.80	0.09	0.77	0.80		0.66	0.74		0.85	0.65	
Uniform Delay, d1	51.6	49.7	44.6	50.3	48.3		51.1	33.6		44.2	23.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.6	8.9	0.2	14.1	8.0		7.8	2.2		15.7	1.1	
Delay (s)	66.1	58.6	44.7	64.4	56.3		58.9	35.7		59.9	24.9	
Level of Service	E	E	D	E	E		E	D		E	C	
Approach Delay (s)		57.3			58.4			37.4			30.1	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	365	112	160	298	80	134	1430	130	290	1490	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3427		1770	6328		1770	6313	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3427		1770	6328		1770	6313	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	365	112	160	298	80	134	1430	130	290	1490	163
RTOR Reduction (vph)	0	0	96	0	20	0	0	11	0	0	14	0
Lane Group Flow (vph)	82	365	16	160	358	0	134	1549	0	290	1639	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.8	17.2	17.2	15.2	23.6		13.5	47.4		24.2	58.1	
Effective Green, g (s)	8.8	17.2	17.2	15.2	23.6		13.5	47.4		24.2	58.1	
Actuated g/C Ratio	0.07	0.14	0.14	0.13	0.20		0.11	0.39		0.20	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	129	507	226	224	673		199	2499		356	3056	
v/s Ratio Prot	0.05	c0.10		c0.09	0.10		0.08	c0.24		c0.16	0.26	
v/s Ratio Perm			0.01									
v/c Ratio	0.64	0.72	0.07	0.71	0.53		0.67	0.62		0.81	0.54	
Uniform Delay, d1	54.0	49.1	44.5	50.3	43.2		51.1	29.1		45.8	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.8	4.9	0.1	10.3	0.8		8.7	1.2		13.3	0.7	
Delay (s)	63.9	54.0	44.6	60.6	44.1		59.8	30.2		59.1	22.2	
Level of Service	E	D	D	E	D		E	C		E	C	
Approach Delay (s)		53.5			49.0			32.6			27.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	422	156	180	329	190	134	1510	170	350	1760	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3345		1770	6311		1770	6295	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3345		1770	6311		1770	6295	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	156	422	156	180	329	190	134	1510	170	350	1760	234
RTOR Reduction (vph)	0	0	133	0	69	0	0	15	0	0	18	0
Lane Group Flow (vph)	156	422	23	180	450	0	134	1665	0	350	1976	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.8	17.5	17.5	15.9	19.6		13.5	42.8		27.8	57.1	
Effective Green, g (s)	13.8	17.5	17.5	15.9	19.6		13.5	42.8		27.8	57.1	
Actuated g/C Ratio	0.12	0.15	0.15	0.13	0.16		0.11	0.36		0.23	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	516	230	234	546		199	2250		410	2995	
v/s Ratio Prot	0.09	0.12		c0.10	c0.13		0.08	c0.26		c0.20	0.31	
v/s Ratio Perm			0.01									
v/c Ratio	0.77	0.82	0.10	0.77	0.82		0.67	0.74		0.85	0.66	
Uniform Delay, d1	51.5	49.7	44.4	50.3	48.5		51.1	33.7		44.2	24.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.9	9.7	0.2	14.1	9.7		8.7	2.2		15.7	1.2	
Delay (s)	67.5	59.4	44.6	64.4	58.3		59.8	36.0		59.9	25.2	
Level of Service	E	E	D	E	E		E	D		E	C	
Approach Delay (s)		58.0			59.8			37.7			30.4	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	374	114	166	302	83	135	1487	135	302	1550	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3425		1770	6328		1770	6315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3425		1770	6328		1770	6315	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	83	374	114	166	302	83	135	1487	135	302	1550	166
RTOR Reduction (vph)	0	0	98	0	21	0	0	11	0	0	13	0
Lane Group Flow (vph)	83	374	16	166	364	0	135	1611	0	302	1703	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.8	17.0	17.0	15.4	23.6		13.8	46.8		24.8	57.8	
Effective Green, g (s)	8.8	17.0	17.0	15.4	23.6		13.8	46.8		24.8	57.8	
Actuated g/C Ratio	0.07	0.14	0.14	0.13	0.20		0.12	0.39		0.21	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	129	501	224	227	673		203	2467		365	3041	
v/s Ratio Prot	0.05	c0.11		c0.09	0.11		0.08	c0.25		c0.17	0.27	
v/s Ratio Perm			0.01									
v/c Ratio	0.64	0.75	0.07	0.73	0.54		0.67	0.65		0.83	0.56	
Uniform Delay, d1	54.1	49.4	44.7	50.3	43.3		50.9	30.0		45.6	22.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.5	6.0	0.1	11.5	0.9		8.0	1.4		14.2	0.8	
Delay (s)	64.6	55.4	44.8	61.8	44.2		58.8	31.3		59.8	22.8	
Level of Service	E	E	D	E	D		E	C		E	C	
Approach Delay (s)		54.6			49.5			33.4			28.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	426	156	187	333	198	135	1570	177	364	1830	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3341		1770	6310		1770	6297	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3341		1770	6310		1770	6297	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	156	426	156	187	333	198	135	1570	177	364	1830	239
RTOR Reduction (vph)	0	0	133	0	74	0	0	15	0	0	18	0
Lane Group Flow (vph)	156	426	23	187	457	0	135	1732	0	364	2051	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.3	17.4	17.4	15.3	19.4		13.8	43.2		28.1	57.5	
Effective Green, g (s)	13.3	17.4	17.4	15.3	19.4		13.8	43.2		28.1	57.5	
Actuated g/C Ratio	0.11	0.14	0.14	0.13	0.16		0.12	0.36		0.23	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	196	513	229	225	540		203	2271		414	3017	
v/s Ratio Prot	0.09	0.12		c0.11	c0.14		0.08	c0.27		c0.21	0.33	
v/s Ratio Perm			0.01									
v/c Ratio	0.80	0.83	0.10	0.83	0.85		0.67	0.76		0.88	0.68	
Uniform Delay, d1	52.0	49.9	44.5	51.1	48.9		50.9	33.9		44.3	24.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.6	10.9	0.2	22.2	11.7		8.0	2.5		18.7	1.3	
Delay (s)	71.7	60.8	44.7	73.3	60.6		58.8	36.4		63.0	25.4	
Level of Service	E	E	D	E	E		E	D		E	C	
Approach Delay (s)		59.7			63.9			38.0			31.0	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	379	116	166	310	83	139	1487	135	302	1550	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3427		1770	6328		1770	6313	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3427		1770	6328		1770	6313	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	85	379	116	166	310	83	139	1487	135	302	1550	169
RTOR Reduction (vph)	0	0	99	0	20	0	0	11	0	0	14	0
Lane Group Flow (vph)	85	379	17	166	373	0	139	1611	0	302	1705	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.9	17.2	17.2	15.4	23.7		14.0	46.6		24.8	57.4	
Effective Green, g (s)	8.9	17.2	17.2	15.4	23.7		14.0	46.6		24.8	57.4	
Actuated g/C Ratio	0.07	0.14	0.14	0.13	0.20		0.12	0.39		0.21	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	131	507	226	227	676		206	2457		365	3019	
v/s Ratio Prot	0.05	c0.11		c0.09	0.11		0.08	c0.25		c0.17	0.27	
v/s Ratio Perm			0.01									
v/c Ratio	0.65	0.75	0.07	0.73	0.55		0.67	0.66		0.83	0.56	
Uniform Delay, d1	54.0	49.3	44.5	50.3	43.4		50.8	30.1		45.6	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.6	6.0	0.1	11.5	1.0		8.4	1.4		14.2	0.8	
Delay (s)	64.6	55.3	44.6	61.8	44.3		59.3	31.5		59.8	23.1	
Level of Service	E	E	D	E	D		E	C		E	C	
Approach Delay (s)		54.5			49.5			33.7			28.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	162	438	162	187	342	198	139	1570	177	364	1830	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3345		1770	6310		1770	6295	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3345		1770	6310		1770	6295	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	162	438	162	187	342	198	139	1570	177	364	1830	243
RTOR Reduction (vph)	0	0	138	0	70	0	0	15	0	0	18	0
Lane Group Flow (vph)	162	438	24	187	470	0	139	1732	0	364	2055	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.4	18.1	18.1	15.3	20.0		14.0	42.8		27.8	56.6	
Effective Green, g (s)	13.4	18.1	18.1	15.3	20.0		14.0	42.8		27.8	56.6	
Actuated g/C Ratio	0.11	0.15	0.15	0.13	0.17		0.12	0.36		0.23	0.47	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	533	238	225	557		206	2250		410	2969	
v/s Ratio Prot	0.09	0.12		c0.11	c0.14		0.08	c0.27		c0.21	0.33	
v/s Ratio Perm			0.02									
v/c Ratio	0.82	0.82	0.10	0.83	0.84		0.67	0.77		0.89	0.69	
Uniform Delay, d1	52.1	49.4	43.9	51.1	48.5		50.8	34.2		44.6	24.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	23.3	9.9	0.2	22.2	11.2		8.4	2.6		20.1	1.3	
Delay (s)	75.4	59.3	44.1	73.3	59.7		59.3	36.8		64.7	26.2	
Level of Service	E	E	D	E	E		E	D		E	C	
Approach Delay (s)		59.5			63.2			38.5			32.0	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	490	170	250	450	170	330	1570	200	310	1810	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3394		1770	6299		1770	6299	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3394		1770	6299		1770	6299	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	490	170	250	450	170	330	1570	200	310	1810	230
RTOR Reduction (vph)	0	0	144	0	33	0	0	19	0	0	19	0
Lane Group Flow (vph)	100	490	26	250	587	0	330	1751	0	310	2021	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.6	18.1	18.1	18.6	27.1		24.2	43.3		24.0	43.1	
Effective Green, g (s)	9.6	18.1	18.1	18.6	27.1		24.2	43.3		24.0	43.1	
Actuated g/C Ratio	0.08	0.15	0.15	0.16	0.23		0.20	0.36		0.20	0.36	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	533	238	274	766		356	2272		354	2262	
v/s Ratio Prot	0.06	c0.14		c0.14	0.17		c0.19	0.28		0.18	c0.32	
v/s Ratio Perm			0.02									
v/c Ratio	0.71	0.92	0.11	0.91	0.77		0.93	0.77		0.88	0.89	
Uniform Delay, d1	53.8	50.2	44.0	49.9	43.5		47.0	34.0		46.6	36.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.1	20.9	0.2	32.2	4.6		29.5	2.6		20.7	5.9	
Delay (s)	68.9	71.1	44.2	82.1	48.1		76.5	36.6		67.3	42.2	
Level of Service	E	E	D	F	D		E	D		E	D	
Approach Delay (s)		64.8			57.9			42.8			45.5	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	220	550	210	290	520	380	220	2150	310	370	2130	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3315		1770	6287		1770	6307	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3315		1770	6287		1770	6307	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	220	550	210	290	520	380	220	2150	310	370	2130	250
RTOR Reduction (vph)	0	0	175	0	110	0	0	22	0	0	17	0
Lane Group Flow (vph)	220	550	35	290	790	0	220	2438	0	370	2363	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	14.0	20.0	20.0	20.0	26.0		16.0	41.0		23.0	48.0	
Effective Green, g (s)	14.0	20.0	20.0	20.0	26.0		16.0	41.0		23.0	48.0	
Actuated g/C Ratio	0.12	0.17	0.17	0.17	0.22		0.13	0.34		0.19	0.40	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	589	263	295	718		236	2148		339	2522	
v/s Ratio Prot	0.12	0.16		c0.16	c0.24		0.12	c0.39		c0.21	0.37	
v/s Ratio Perm			0.02									
v/c Ratio	1.07	0.93	0.13	0.98	1.10		0.93	1.14		1.09	0.94	
Uniform Delay, d1	53.0	49.3	42.6	49.8	47.0		51.5	39.5		48.5	34.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	81.9	22.0	0.2	47.4	64.6		40.2	67.2		75.6	8.2	
Delay (s)	134.9	71.4	42.8	97.3	111.6		91.7	106.7		124.1	42.8	
Level of Service	F	E	D	F	F		F	F		F	D	
Approach Delay (s)		79.5			108.1			105.4			53.7	
Approach LOS		E			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	83.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	495	172	250	458	170	334	1570	200	310	1810	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3396		1770	6299		1770	6298	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3396		1770	6299		1770	6298	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	102	495	172	250	458	170	334	1570	200	310	1810	233
RTOR Reduction (vph)	0	0	146	0	32	0	0	19	0	0	19	0
Lane Group Flow (vph)	102	495	26	250	596	0	334	1751	0	310	2024	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.6	18.1	18.1	18.6	27.1		24.4	43.3		24.0	42.9	
Effective Green, g (s)	9.6	18.1	18.1	18.6	27.1		24.4	43.3		24.0	42.9	
Actuated g/C Ratio	0.08	0.15	0.15	0.16	0.23		0.20	0.36		0.20	0.36	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	533	238	274	766		359	2272		354	2251	
v/s Ratio Prot	0.06	c0.14		c0.14	0.18		c0.19	0.28		0.18	c0.32	
v/s Ratio Perm			0.02									
v/c Ratio	0.72	0.93	0.11	0.91	0.78		0.93	0.77		0.88	0.90	
Uniform Delay, d1	53.9	50.3	44.0	49.9	43.6		47.0	34.0		46.6	36.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.7	22.5	0.2	32.2	5.0		30.3	2.6		20.7	6.3	
Delay (s)	70.6	72.8	44.2	82.1	48.6		77.2	36.6		67.3	42.8	
Level of Service	E	E	D	F	D		E	D		E	D	
Approach Delay (s)		66.1			58.2			43.0			46.0	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	49.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	562	216	290	529	380	224	2150	310	370	2130	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3317		1770	6287		1770	6305	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3317		1770	6287		1770	6305	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	226	562	216	290	529	380	224	2150	310	370	2130	254
RTOR Reduction (vph)	0	0	180	0	109	0	0	22	0	0	17	0
Lane Group Flow (vph)	226	562	36	290	800	0	224	2438	0	370	2367	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	14.0	20.0	20.0	20.0	26.0		16.0	41.0		23.0	48.0	
Effective Green, g (s)	14.0	20.0	20.0	20.0	26.0		16.0	41.0		23.0	48.0	
Actuated g/C Ratio	0.12	0.17	0.17	0.17	0.22		0.13	0.34		0.19	0.40	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	589	263	295	718		236	2148		339	2522	
v/s Ratio Prot	c0.13	0.16		c0.16	c0.24		0.13	c0.39		c0.21	0.38	
v/s Ratio Perm			0.02									
v/c Ratio	1.10	0.95	0.14	0.98	1.11		0.95	1.14		1.09	0.94	
Uniform Delay, d1	53.0	49.5	42.6	49.8	47.0		51.6	39.5		48.5	34.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	91.1	25.9	0.2	47.4	69.5		44.0	67.2		75.6	8.4	
Delay (s)	144.1	75.5	42.9	97.3	116.5		95.6	106.7		124.1	42.9	
Level of Service	F	E	D	F	F		F	F		F	D	
Approach Delay (s)		83.9			111.9			105.8			53.8	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	85.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	495	172	250	458	170	334	1570	200	310	1810	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.86	1.00	1.00	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	6408	1583	1770	6298	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	6408	1583	1770	6298	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	102	495	172	250	458	170	334	1570	200	310	1810	233
RTOR Reduction (vph)	0	0	144	0	0	137	0	0	120	0	19	0
Lane Group Flow (vph)	102	495	28	250	458	33	334	1570	80	310	2024	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	6.9	19.5	19.5	10.9	23.5	23.5	25.8	48.1	48.1	25.5	47.8	
Effective Green, g (s)	6.9	19.5	19.5	10.9	23.5	23.5	25.8	48.1	48.1	25.5	47.8	
Actuated g/C Ratio	0.06	0.16	0.16	0.09	0.20	0.20	0.22	0.40	0.40	0.21	0.40	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	197	575	257	311	693	310	380	2568	634	376	2508	
v/s Ratio Prot	0.03	c0.14		c0.07	c0.13		c0.19	0.25		0.18	c0.32	
v/s Ratio Perm			0.02			0.02			0.05			
v/c Ratio	0.52	0.86	0.11	0.80	0.66	0.11	0.88	0.61	0.13	0.82	0.81	
Uniform Delay, d1	54.9	48.9	42.8	53.5	44.6	39.6	45.6	28.5	22.7	45.1	32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.3	12.5	0.2	13.9	2.4	0.2	19.9	1.1	0.4	13.7	2.9	
Delay (s)	57.2	61.5	43.0	67.4	46.9	39.8	65.5	29.6	23.1	58.8	34.9	
Level of Service	E	E	D	E	D	D	E	C	C	E	C	
Approach Delay (s)		56.8			51.4			34.7			38.1	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	562	216	290	529	380	224	2150	310	370	2130	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.86	1.00	1.00	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	6408	1583	1770	6305	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	1770	6408	1583	1770	6305	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	226	562	216	290	529	380	224	2150	310	370	2130	254
RTOR Reduction (vph)	0	0	182	0	0	247	0	0	164	0	17	0
Lane Group Flow (vph)	226	562	34	290	529	133	224	2150	146	370	2367	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	11.4	19.0	19.0	18.0	25.6	25.6	17.4	42.0	42.0	25.0	49.6	
Effective Green, g (s)	11.4	19.0	19.0	18.0	25.6	25.6	17.4	42.0	42.0	25.0	49.6	
Actuated g/C Ratio	0.10	0.16	0.16	0.15	0.21	0.21	0.14	0.35	0.35	0.21	0.41	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	326	560	250	265	754	337	256	2242	554	368	2606	
v/s Ratio Prot	0.07	c0.16		c0.16	0.15		0.13	0.34		c0.21	c0.38	
v/s Ratio Perm			0.02			0.08			0.09			
v/c Ratio	0.69	1.00	0.14	1.09	0.70	0.39	0.88	0.96	0.26	1.01	0.91	
Uniform Delay, d1	52.6	50.5	43.4	51.0	43.7	40.5	50.2	38.2	27.9	47.5	33.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.3	38.9	0.3	82.8	3.0	0.8	26.5	11.5	1.2	48.3	6.0	
Delay (s)	58.9	89.4	43.7	133.8	46.6	41.3	76.7	49.7	29.1	95.8	39.0	
Level of Service	E	F	D	F	D	D	E	D	C	F	D	
Approach Delay (s)		72.7			66.0			49.6			46.7	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	54.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX D – Derivation of Trip Rates for Skate Park

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Table D-1 Derivation of Trip Rates for Skate Park

Day ofWeek	Count Date	AM Peak Hour			PM Peak Hour			ADT
		In	Out	Total	In	Out	Total	
Weekday								
Monday	2/7/2011	7	6	13	27	30	57	402
Friday	2/4/2011	--	--	--	28	34	62	--
Weekday Average		7			28	32	60	402
Weekday Trip Rate	TSF	0.16	0.14	0.30	0.63	0.73	1.36	9.14
Weekend								
Saturday	2/5/2011	35	34	69	42	36	78	749
Sunday	2/6/2011	51	44	95	21	25	46	713
Weekend Average		43	39	82	32	31	62	731
Weekend Trip Rate	TSF	0.98	0.89	1.86	0.72	0.69	1.41	16.61
Summer Weekday								
Thursday	6/30/2011	1	4	5	12	13	25	--
Tuesday	7/5/2011	5	4	9	19	18	37	414
Wednesday	7/6/2011	8	13	21	8	9	17	536
Thursday	7/7/2011	2	10	12	14	25	39	601
Summer Average		4	8	12	13	16	30	517
Summer Trip Rate	TSF	0.09	0.18	0.27	0.30	0.37	0.67	11.75

Note: Site surveyed is Etnies Skate Park, Lake Forest (44,000 sq. ft. of skate park)

AM Peak Hour of Adjacent Street Traffic = 7 – 9 AM
PM Peak Hour of Adjacent Street Traffic = 4 – 6 PM

Weekend counts show a mid-day peak hour, however peak hour of adjacent street traffic time frame was used in this analysis to maintain consistency.