

TRAFFIC IMPACT ANALYSIS
FOR THE PROPOSED
VALLEY HIGH SCHOOL SPORTS COMPLEX

Prepared for
SANTA ANA UNIFIED SCHOOL DISTRICT
&
THE PLANNING CENTER

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I.

INTRODUCTION AND PROJECT DESCRIPTION

This report summarizes the results of a traffic impact analysis that was conducted for the proposed improvements to and expansion of the sports complex at Valley High School and Carr Intermediate School. These adjoining schools are Santa Ana Unified School District facilities that are located on the southwest quadrant of Edinger Avenue and Raitt Street in Santa Ana. The proposed project includes the construction of a new 3,500-seat football stadium with lights, baseball fields, softball fields, soccer fields, outdoor basketball courts, and various amenities such as restroom and concession buildings. The traffic analysis focuses on the football stadium because the volumes of traffic that would be generated by the stadium during an event would be substantially greater than any of the other facilities proposed at the school site.

The methodology for the traffic study, in general, was to 1) establish the existing baseline traffic conditions on the streets that provide access to the school site, 2) project the future baseline traffic conditions for the first year of operation for the proposed stadium (year 2015), 3) estimate the levels of traffic that would be generated by the proposed stadium for a capacity-level event, 4) conduct a comparative analysis of traffic conditions for the “without project” and “with project” scenarios, and 5) identify the mitigation measures required to alleviate the significant traffic impacts associated with the project. The analysis addresses the Friday evening pre-event peak hour for the stadium.

The traffic analysis addresses the impacts at six intersections in the vicinity of the school site. The study area intersections, the type of traffic control at each intersection, and the public agency with jurisdictional responsibility for the intersection are listed in Table 1.

TABLE 1
STUDY AREA INTERSECTIONS

<i>Intersection</i>	<i>Traffic Control</i>	<i>Jurisdiction</i>
Edinger Avenue/Greenville Street	Traffic Signal	City of Santa Ana
Edinger Avenue/Center Street	Traffic Signal	City of Santa Ana
Edinger Avenue/Raitt Street	Traffic Signal	City of Santa Ana
Raitt Street/Glenwood Place	Traffic Signal	City of Santa Ana
Glenwood Place/Greenville Street	Stop Sign on Glenwood Place	City of Santa Ana
Greenville Street/St. Andrew Place	Three-way Stop Signs	City of Santa Ana

The traffic impact analysis is based on an evaluation of the levels of service at the affected study area intersections. Level of service (LOS) is an industry standard by which the operating conditions of a roadway segment or an intersection are measured. LOS is defined on a scale of A through F with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. LOS A is characterized as having free flowing traffic conditions with no restrictions on maneuvering or operating speeds, where traffic volumes and delays are low and travel speeds are high. LOS F is characterized as having forced flow with many stoppages, high levels of delay, and low operating speeds.

The levels of service at the signalized study area intersections were determined by using the Intersection Capacity Utilization (ICU) methodology, which is consistent with the guidelines for traffic impact studies in Orange County and Santa Ana. The levels of service at the unsignalized intersections were determined by using the Highway Capacity Manual (HCM) methodology for

intersections with stop signs.

The levels of service for the intersections in the vicinity of the project were analyzed for several scenarios, including existing conditions (2014), future (year 2015) baseline conditions without the project, existing conditions plus the traffic that would be generated by the 3,500-seat stadium, and year 2015 conditions with the traffic that would be generated by the proposed 3,500-seat stadium. The traffic analysis addresses the conditions during the peak time of traffic generation for the proposed stadium, which is typically a Friday evening prior to a football game or other major event at the stadium. As football games generally begin at 7:00 p.m., the peak hour of site-generated traffic would occur from 6:00 to 7:00 p.m.

II. EXISTING AND FUTURE BASELINE TRAFFIC CONDITIONS

The roadway network in the project vicinity, the existing and future baseline traffic volumes, and the levels of service at the affected study area intersections are described below.

Roadway Network

The major streets that provide access to the project vicinity include Edinger Avenue, Raitt Street, Glenwood Place, Greenville Street, Center Street, and St. Andrew Place. The following paragraphs provide a brief description of the characteristics of these roadways. Figure T-1 in the Appendix illustrates the study area street network and shows the roadway characteristics such as number of lanes, speed limits, types of traffic control at the intersections, and the lane configuration at each intersection.

Edinger Avenue

Edinger Avenue is a four lane east-west street that abuts the north side of the Carr Intermediate School campus. Access to the school's parking lot is provided by driveways on the south side of Edinger Avenue. The speed limit on Edinger Avenue is 40 miles per hour (mph) between Greenville Street and Raitt Street (adjacent to the school) and 35 mph east of Raitt Street and west of Greenville Street.

Raitt Street

Raitt Street is a four lane north-south street that abuts the east side of the Valley High School and Carr intermediate School campuses. Access to a new parking lot that would be constructed as a component of the proposed project would be provided by a new driveway on the west side of Raitt Street. The speed limit on Raitt Street is 40 mph.

Glenwood Place

Glenwood Place is a two lane east-west street that abuts the south side of the Valley High School campus. Access to the school's parking lots is provided by several driveways on the north side of Glenwood Place. The speed limit on Glenwood Place is 25 mph.

Greenville Street

Greenville Street is a two lane north-south street that abuts the west side of the Valley High School campus. Access to the school's parking lots is provided by two driveways on the east side of Greenville Street. The speed limit on Greenville Street is 30 mph.

Center Street

Center Street is a two lane north-south street that extends south from Edinger Avenue and abuts the west side of the Carr Intermediate School and Carl Harvey School campuses. Driveways on the east side of Center Street provide access to the school parking lots. Center Street connects to Occidental Street, which is an east-west street that runs along the north side of the Valley High School campus. A driveway on the south side of Occidental Street provides access to a parking lot at Valley High School. The speed limit on Center Street is 25 mph.

St. Andrew Place

St. Andrew Place is a two lane east-west street that intersects with Greenville Street on the west side of the Valley High School campus. The speed limit on St. Andrew Place is 25 mph.

In addition to the streets described above, there is a network of local neighborhood streets on all four sides of the school campus that tie into these primary access streets.

Existing Traffic Volumes

Manual traffic counts were taken at the six study area intersections during the Friday evening peak period in February, 2014. The Friday evening peak hour for this analysis refers to the one-hour time period prior to the beginning of an event at the stadium when patrons would be traveling to the stadium. The traffic analysis addresses the pre-event time period because the ambient traffic volumes are substantially higher during the pre-event period (generally between 6:00 and 7:00 p.m.) as compared to the post-event period (after 9:00 p.m.). Most high school football games in this district begin at 7:00 p.m. Figure T-2 in the Appendix illustrates the existing peak hour traffic volumes and turning movements during the Friday evening peak period.

Existing Intersection Levels of Service

To quantify the existing baseline traffic conditions, the six study area intersections were analyzed to determine their operating conditions during the Friday evening peak period. Based on the hourly traffic volumes, the turning movement counts, and the existing number of lanes at each intersection, the ICU values and corresponding levels of service were determined for each signalized intersection and the average vehicular delay values (seconds per vehicle) and corresponding levels of service were determined for the unsignalized intersections, as summarized in Table 2.

TABLE 2	
EXISTING INTERSECTION LEVELS OF SERVICE	
Intersection	ICU or Delay Values and Levels of Service
SIGNALIZED INTERSECTIONS (ICU)	
Edinger Avenue/Greenville Street	0.488 – A
Edinger Avenue/Center Street	0.494 – A
Edinger Avenue/Raitt Street	0.666 – B
Raitt Street/Glenwood Place	0.333 – A
UNSIGNALIZED INTERSECTIONS (Delay)	
Glenwood Place/Greenville Street	12.9 – B
Greenville Street/St. Andrew Place	10.20 – B

The levels of service shown in Table 2 for the signalized intersections are based on the ICU values that were calculated for each intersection. The ICU value represents the ratio of the volume of traffic passing through the intersection to the overall capacity of the intersection. The average vehicle delay values for the unsignalized intersections were calculated using the Highway Capacity Software. The relationships between the ICU values, delay values, and levels of service are shown in Table 3.

TABLE 3		
RELATIONSHIP BETWEEN ICU VALUES, DELAY VALUES, & LEVELS OF SERVICE		
Level of Service	ICU Value Signalized Intersections	Delay Value (seconds) Unsignalized Intersections
A	0.00 to 0.60	0.0 to 10.0
B	> 0.60 to 0.70	> 10.0 to 15.0
C	> 0.70 to 0.80	> 15.0 to 25.0

D	> 0.80 to 0.90	> 25.0 to 35.0
E	> 0.90 to 1.00	> 35.0 to 50.0
F	> 1.00	> 50.0

As shown in Table 2, three of the study area intersections currently operate at LOS A and three of the intersections operate at LOS B during the Friday evening peak period.

Year 2015 Traffic Conditions Without Project

As the proposed stadium is expected to be operational in the year 2015, the existing traffic volumes were expanded by a growth factor of one percent (one percent per year for one year) to account for general regional growth and the cumulative impacts of traffic associated with other development projects in the area. The projected traffic volumes for the year 2015 with ambient growth are shown on Figure T-3 in the Appendix for the Friday evening pre-event peak hour. The traffic volumes shown on Figure T-3 represent the year 2015 traffic volumes without the proposed stadium project.

Based on the projected peak hour traffic volumes, the turning movement counts, and the existing lane configuration, the future baseline levels of service were calculated for each study area intersection for the year 2015 scenario without the proposed project, as summarized in Table 4. For the target year of 2015, three of the study area intersections are projected to operate at LOS A and three of the intersections are projected to operate at LOS B during the Friday evening peak period.

TABLE 4	
2015 INTERSECTION LEVELS OF SERVICE WITHOUT PROJECT	
Intersection	ICU or Delay Values and Levels of Service
SIGNALIZED INTERSECTIONS (ICU)	
Edinger Avenue/Greenville Street	0.492 – A
Edinger Avenue/Center Street	0.500 – A
Edinger Avenue/Raitt Street	0.673 – B
Raitt Street/Glenwood Place	0.336 – A
UNSIGNALIZED INTERSECTIONS (Delay)	
Glenwood Place/Greenville Street	13.0 – B
Greenville Street/St. Andrew Place	10.26 – B

III. TRAFFIC IMPACT ANALYSIS

This section summarizes the analysis of the project's impacts on study area traffic conditions. First is a discussion of project generated traffic volumes. This is followed by an analysis of the impacts of the proposed stadium project on traffic volumes and intersection levels of service. Then the impacts associated with construction, parking, and safety are presented.

Standards of Significance

According to the significance criteria used by the City of Santa Ana, a signalized intersection would be significantly impacted if the project would result in a change in the ICU value of 0.01 or greater at an intersection that would operate at LOS E or F. The impacts would not be significant at locations that are projected to operate at LOS A, B, C, or D after project completion. The City does not have a definition of significance for unsignalized intersections. For this traffic analysis, it has been assumed that an unsignalized intersection would be significantly impacted if the average delay at the intersection resulted in LOS E or F and if the overall ICU value for the intersection would change by 0.01 or greater as a result of the project.

Project Generated Traffic

The volume of traffic that would be generated by the proposed stadium was determined in order to estimate the impacts of the project on the study area streets and intersections. The trip generation rates and the anticipated volumes of traffic that would be generated by the stadium when operated at capacity are shown in Table 5.

TABLE 5				
PROJECT GENERATED TRAFFIC – STADIUM				
Facility	Evening Hour – Pre-Event			Daily Traffic
	Inbound	Outbound	Total	
TRIP GENERATION RATES				
Stadium (vehicle trips per seat)	0.19	0.01	0.20	0.47
GENERATED TRAFFIC VOLUMES				
Existing Stadium (2,400 seats)	456	24	480	1,130
Expansion (1,100 seats)	209	11	220	520
Proposed Stadium (3,500 seats)	665	35	700	1,650

NOTE: The traffic impact analysis is based on the total traffic generated by the proposed 3,500-seat stadium because the existing stadium does not have lights and the analysis is for a Friday evening event.

The trip generation rates shown in Table 5 are based on the results of a trip generation study that was conducted in Costa Mesa for a high school football game between Costa Mesa High School and Estancia High School that was held at the Orange Coast College stadium.

Table 5 indicates that the proposed 3,500-seat stadium would generate an estimated 700 vehicle trips during the peak hour (665 inbound and 35 outbound). The peak hour for this analysis represents the one-hour time period prior to the beginning of an event at the stadium when patrons are traveling to the stadium, which would typically occur on a Friday evening between 6:00 and 7:00 p.m. Approximately the same level of traffic would be generated at the end of an event when patrons are exiting (with the inbound and outbound traffic volumes reversed). The

stadium may also generate traffic at other times of the day; however, such traffic activity would be minor as compared to a capacity-level event represented by the traffic volumes shown in Table 5. The estimated daily traffic volume generated by the stadium on the day of a capacity-level event would be 1,650 vehicle trips per day.

The traffic volumes that would be generated by the existing 2,400-seat stadium are shown in the table to illustrate that the project would result in a net increase of 1,100 seats. The traffic impact analysis for the Friday evening scenario is based on the total traffic volumes, as opposed to the net increase in traffic volumes, because the existing stadium does not have lights and does not, therefore, accommodate evening events. It should also be pointed out that football games in the District rarely have a patronage level of 3,500 spectators. The traffic analysis, therefore, is conservative because it is based on a worst-case scenario where the stadium would be filled to capacity.

To quantify the increase in traffic at each intersection resulting from a capacity-level event at the proposed stadium, the project generated traffic volumes shown in Table 5 were geographically distributed onto the street network for the traffic impact analysis. The volumes of traffic that would be generated by the stadium are shown on Figure T-4 in the Appendix. The assumed directional distribution percentages shown on Figure T-4 are based on the layout of the existing street network, the existing travel patterns, the school attendance boundaries, the driveway locations, and the anticipated geographical distribution of the event patrons.

The volumes of traffic for the existing conditions scenario plus the project generated traffic are shown on Figure T-5 and the total volumes of traffic projected for the year 2015 scenario with the proposed stadium are shown on Figure T-6. These projected traffic volumes are for the Friday evening pre-event peak hour. The existing and projected daily traffic volumes are shown on Figure T-7. This figure is included to provide data for the air quality and/or noise analyses.

Intersection Impact Analysis

The impact analysis for the six study area intersections was conducted by comparing the ICU values (for the signalized intersections), the delay values (for the unsignalized intersections), and the levels of service (LOS) for the “without project” and “with project” scenarios. For the existing conditions scenario, the analysis compares the existing conditions to the conditions with the proposed stadium. Similarly, for the year 2015 scenario, the analysis compares the year 2015 baseline conditions without the project to the year 2015 scenario with the proposed stadium. The year 2015 was used as the target year for future conditions as that is anticipated to be the first year that the stadium would be operational. The peak hour for the analysis represents the time period during which the stadium would generate the heaviest volumes of traffic (typically between 6:00 and 7:00 p.m.), which does not coincide with the peak period for the ambient traffic volumes, which generally occurs between 4:00 and 6:00 p.m.

The comparative levels of service at the study area intersections for the existing conditions scenario are summarized in Table 6 for the Friday evening peak hour. The table shows the before and after ICU values, delay values, and levels of service that would occur at each study area intersection. Table 6 also shows the increases in the ICU or delay values that would occur as a result of the project and if there would be a significant impact.

TABLE 6
PROJECT IMPACT ON INTERSECTION LEVELS OF SERVICE
EXISTING CONDITIONS AS BASELINE

Intersection	ICU or Delay Value & Level of Service		Increase In ICU/Delay Value	Significant Impact
	Existing Conditions	Existing plus Project		
SIGNALIZED INTERSECTIONS (ICU)				
Edinger Avenue/Greenville Street	0.488 – A	0.513 – A	0.025	No
Edinger Avenue/Center Street	0.494 – A	0.538 – A	0.044	No
Edinger Avenue/Raitt Street	0.666 – B	0.740 – C	0.074	No
Raitt Street/Glenwood Place	0.333 – A	0.373 – A	0.040	No
UNSIGNALIZED INTERSECTIONS (Delay)				
Glenwood Place/Greenville Street	12.9 – B	15.8 - C	2.9	No
Greenville Street/St. Andrew Place	10.20 – B	11.44 – B	1.24	No

The intersection of Edinger Avenue and Greenville Street, for example, as shown in Table 6, operates with an ICU value of 0.488 and LOS A for existing conditions and would operate with an ICU value of 0.513 and LOS A for the existing plus project scenario. This represents an increase in the ICU value of 0.025. This impact would be less than significant according to the criteria outlined previously because the intersection would operate at LOS A. Table 6 indicates that none of the study area intersections would be significantly impacted by the traffic that would be generated by the proposed stadium for the existing conditions baseline scenario.

The comparative levels of service for the year 2015 analysis scenario are shown in Table 7. Table 7 indicates that none of the study area intersections would be significantly impacted by the traffic that would be generated by the proposed stadium for the year 2015 baseline scenario.

TABLE 7
PROJECT IMPACT ON INTERSECTION LEVELS OF SERVICE
YEAR 2015 AS BASELINE

Intersection	ICU or Delay Value & Level of Service		Increase In ICU/Delay Value	Significant Impact
	2015 Without Project	2015 With Project		
SIGNALIZED INTERSECTIONS (ICU)				
Edinger Avenue/Greenville Street	0.492 – A	0.517 – A	0.025	No
Edinger Avenue/Center Street	0.500 – A	0.543 – A	0.043	No
Edinger Avenue/Raitt Street	0.673 – B	0.747 – C	0.074	No
Raitt Street/Glenwood Place	0.336 – A	0.376 – A	0.040	No
UNSIGNALIZED INTERSECTIONS (Delay)				
Glenwood Place/Greenville Street	13.0 – B	16.0 - C	3.0	No
Greenville Street/St. Andrew Place	10.26 – B	11.52 – B	1.26	No

Tables 6 and 7 indicate that the proposed stadium would not have a significant impact at any of the study area intersections during the evening peak hour based on the significance criteria presented previously because the intersections would continue to operate at LOS A, B, and C. As there would be no significant impacts, no capacity-related mitigation measures would be

required. It should be noted that this conclusion is based on the assumption that an event would begin at 7:00 p.m. If a capacity-level event were scheduled to begin at 6:00 p.m. on a Monday through Friday, the site-generated traffic would coincide with the peak commuter traffic and the event would likely result in a significant impact.

The traffic impacts associated with the stadium would not occur on a daily basis, but would occur only when a major event were to be held at the facility, which is typically a high school football game. Such events would occur on a Thursday or Friday evening or on a Saturday afternoon on approximately 10 occasions throughout the year. The analysis addressed the Friday evening scenario because the ambient traffic volumes would typically be higher on Friday as compared to Thursday evening or Saturday afternoon.

In addition to the high school events that would be held at the stadium in the fall (primarily football games), the stadium would also be used for track and field events in the spring and possibly for Pop Warner football on Sundays. As the attendance at these activities would be substantially lower than the capacity-level events that were addressed in the analysis above, it is concluded that such activities would result in a less than significant traffic impact. The stadium could also be used occasionally for non-athletic events such as graduation ceremonies.

Congestion Management Program

The Orange County Congestion Management Program (CMP) guidelines indicate that a project may have a significant impact and that a traffic study would be required if the project would generate 2,400 or more vehicle trips per day or if the project would contribute 1,600 or more trips per day directly onto the CMP highway system. As the proposed stadium is estimated to generate 1,650 vehicle trips per day, it is below the designated CMP threshold of 2,400 daily trips. While the segment of Edinger Avenue between Main Street and the State Route 55 Freeway is on the CMP highway system, the segment of Edinger Avenue adjacent to the project site is not on the CMP system. The 1,600-trip threshold cited above is not applicable, therefore, because the project traffic would not contribute directly to a CMP highway link. Furthermore, the traffic that would be generated by the stadium would occur only on an occasional basis; i.e., when major events were held at the facility. The project would not, therefore, conflict with an applicable congestion management program or level of service standard established by the congestion management agency. The impacts would be less than significant relative to CMP roads or highways and no mitigation measures would be necessary.

Construction Traffic Impacts

Construction of the proposed stadium and other components of the sports complex would generate various levels of truck and automobile traffic throughout the duration of the construction period. The construction-related traffic includes construction workers traveling to and from the site as well as trucks hauling construction materials to the site and demolition/excavation material away from the site. The construction activities would generate an estimated 50 to 60 workers' trips per day and approximately 20 to 30 truck trips per day. The truck trips would be spread out throughout the workday and would generally occur during non-peak traffic periods. This level of construction-related traffic would not result in a significant traffic impact on the study area roadway network as it would be negligible compared to the volumes of traffic currently generated by the existing high school.

Non-Motorized Transportation and Transit

The proposed project would generate a demand for non-motorized travel as some event patrons would travel to and from the school as pedestrians or on bicycles. The streets in the school vicinity have sidewalks along both sides of the street and the signalized intersections are equipped with painted crosswalks, pedestrian signals, and pedestrian push buttons to activate the signals. Bike racks are available at the school and bus loading/unloading zones are provided on site. With regard to public transit, the Orange County Transportation Authority (OCTA) operates several bus lines in the vicinity of the school site. Route 145 operates on Greenville Street adjacent to Valley High School and on Center Street north of Edinger Avenue. Route 70 operates on Edinger Avenue adjacent to Carr Intermediate School. In addition, Route 72 runs along Warner Avenue, Route 57 runs along Bristol Street, and Route 47 runs along Fairview Street, all within approximately one-half mile of the project site. The proposed sports complex would not adversely affect the performance of these transit or non-motorized transportation facilities and would not conflict with any plans or policies relative to these transportation modes.

Vehicular and Pedestrian Safety

The increased levels of traffic, the increased number of pedestrians and bicycles, and the increased number of vehicular turning movements at the school entrances, at the nearby intersections, and in the general vicinity of the schools would result in an increased number of traffic conflicts and a corresponding increase in the probability of an accident occurring. These impacts would not be significant, however, because the streets, intersections, and driveways are designed to accommodate the anticipated levels of vehicular and pedestrian activity and have historically been accommodating school-related traffic on a regular basis. In addition, the proposed sports complex would be compatible with the design and operation of a high school and intermediate school. Most of the streets in the vicinity of the school site have sidewalks adjacent to the street and the signalized intersections are equipped with painted crosswalks and pedestrian signals. These features would enhance pedestrian safety and facilitate pedestrian access to the school. The project would not, therefore, substantially increase hazards due to a design feature or incompatible uses.

Parking Impacts

The Santa Ana Municipal Code (Section 41-1373) indicates that the parking requirement for a stadium is one space for each four fixed seats. Based on this parking rate, the proposed 3,500-seat stadium at Valley High School would require 875 parking spaces (3,500 divided by 4).

The Valley High School/Carr Intermediate School complex currently has a total of 742 on-site parking spaces. In conjunction with the proposed project, the existing parking lot on the south side of Edinger Avenue at Carr Intermediate would be expanded by 68 stalls and a new parking lot with 126 stalls would be constructed on the west side of Raitt Street near the stadium. These additional 194 parking stalls would result in a total of 936 on-site parking spaces at the schools. As the 936 on-site parking spaces would exceed the requirement of 875 spaces, the project would not result in a significant parking impact. It is probable that some patrons would elect to park in the on-street spaces on the streets near the stadium. This is not considered to be a significant impact because sufficient parking capacity would be available within the school campuses.

As the parking spaces that are available at the school site could accommodate the parking demand of 875 spaces for the proposed 3,500-seat stadium, the project would not result in a significant parking impact.

IV. SUMMARY OF IMPACTS AND CONCLUSIONS

The key findings of the traffic impact analysis are presented below.

- The proposed 3,500-seat stadium would generate an estimated 700 vehicle trips during the peak hour (665 inbound and 35 outbound). The peak hour for this analysis represents the one-hour time period prior to the beginning of an event at the stadium when patrons are traveling to the stadium, which would typically occur on a Friday evening between 6:00 and 7:00 p.m. Approximately the same level of traffic would be generated at the end of an event when patrons are exiting (with the inbound and outbound traffic volumes reversed).
- An analysis of six intersections in the vicinity of the school indicates that the traffic generated by the stadium would not result in a significant impact at any of the intersections according to the City of Santa Ana significance criteria.
- As there would be no significant traffic impacts, no capacity-related mitigation measures would be necessary.
- Based on a parking requirement of one space for each four seats (Santa Ana Municipal Code), the proposed 3,500-seat stadium would require 875 parking spaces (3,500 divided by 4). The Valley High School/Carr Intermediate School complex currently has 742 on-site parking spaces and 194 additional spaces would be provided in conjunction with the proposed project, which would result in a total of 936 on-site parking spaces. As the number of available parking spaces exceeds the parking requirement, the project would not result in a significant parking impact.

APPENDIX
TRAFFIC FIGURES