BP CARSON
REFINERY UPGRADE PROJECT

Traffic Impact Analysis

May 2005

AUSTIN-FOUST ASSOCIATES, INC.

DRAFT

BP CARSON REFINERY UPGRADE PROJECT
TRAFFIC IMPACT ANALYSIS

Prepared by:

Austin-Foust Associates, Inc.
2020 North Tustin Avenue
Santa Ana, California 92705-7827
(714) 667-0496

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INTRODUCTION

1.1 INTRODUCTION

This report presents the results of a traffic analysis performed for the proposed modifications to an existing petroleum refinery in the City of Carson. This report has been prepared in support of the CEQA document for the proposed project.

1.2 PROJECT DESCRIPTION

BP is proposing a number of modifications to its Carson Refinery to reduce non-routine air pollutant emissions and to improve operational reliability. The project includes the following proposed modifications: 1) replacing the Refinery's existing sour water collection tank, 2) replacing the No. 51 Vacuum Distillation Unit, 3) replacing the existing pressure relief valves in the No.1 Crude Unit and , 4) replacing the existing pressure relief valves at the Butane Tank Car Loading Rack station.

The Refinery's primary sour water collection tank (Tank 710) is a fixed roof storage tank that has occasionally been the subject of odor complaints. BP is proposing to replace the current fixed roof tank with a pressurized sphere, which would substantially reduce the potential for non-routine hydrogen sulfide (H_2S) or ammonia (NH_3) emissions from the stored sour water. The No. 51 Vacuum Distillation Unit (Vacuum Tower) was constructed in 1953. BP is proposing to replace the existing Vacuum Tower, with a new Vacuum Tower in order to reduce maintenance requirements and increase operational reliability. The pressure relief valves in the Refinery's No. 1 Crude Unit currently discharge to the atmosphere during emergency situations. BP is proposing to replace the existing pressure relief valves with valves that would discharge to an emergency flare system, thereby eliminating uncontrolled direct atmospheric discharges. Finally, the pressure relief valves at the Butane Tank Car Loading Rack currently discharge to the atmosphere during emergency situations. BP is proposing to replace the existing pressure relief valves and route the discharge to the South Area (COKE) Flare, thereby eliminating uncontrolled direct atmospheric discharges.

1.2.1 Project Location

The location of the BP Carson Refinery is shown in Figure 1-1. The Refinery is located at 1801 East Sepulveda Boulevard in the City of Carson, California (Figure 1-2). The Refinery occupies an irregularly shaped parcel of land, between Wilmington Avenue on the west, 223rd Avenue on the north, Alameda Avenue on the east, and Sepulveda Boulevard on the south. The Refinery and adjacent property are zoned MH (manufacturing heavy). The Dominguez Channel, which originates in the area southeast of the Los Angeles International Airport, traverses Refinery property, and eventually flows into the East Channel of the Los Angeles Harbor. The portion of the Refinery that is located north of the Dominguez Channel is referred to as the Northeast Property. The Northeast Property is the former site of the Johns-Manville facility.

1.3 ANALYSIS SCOPE

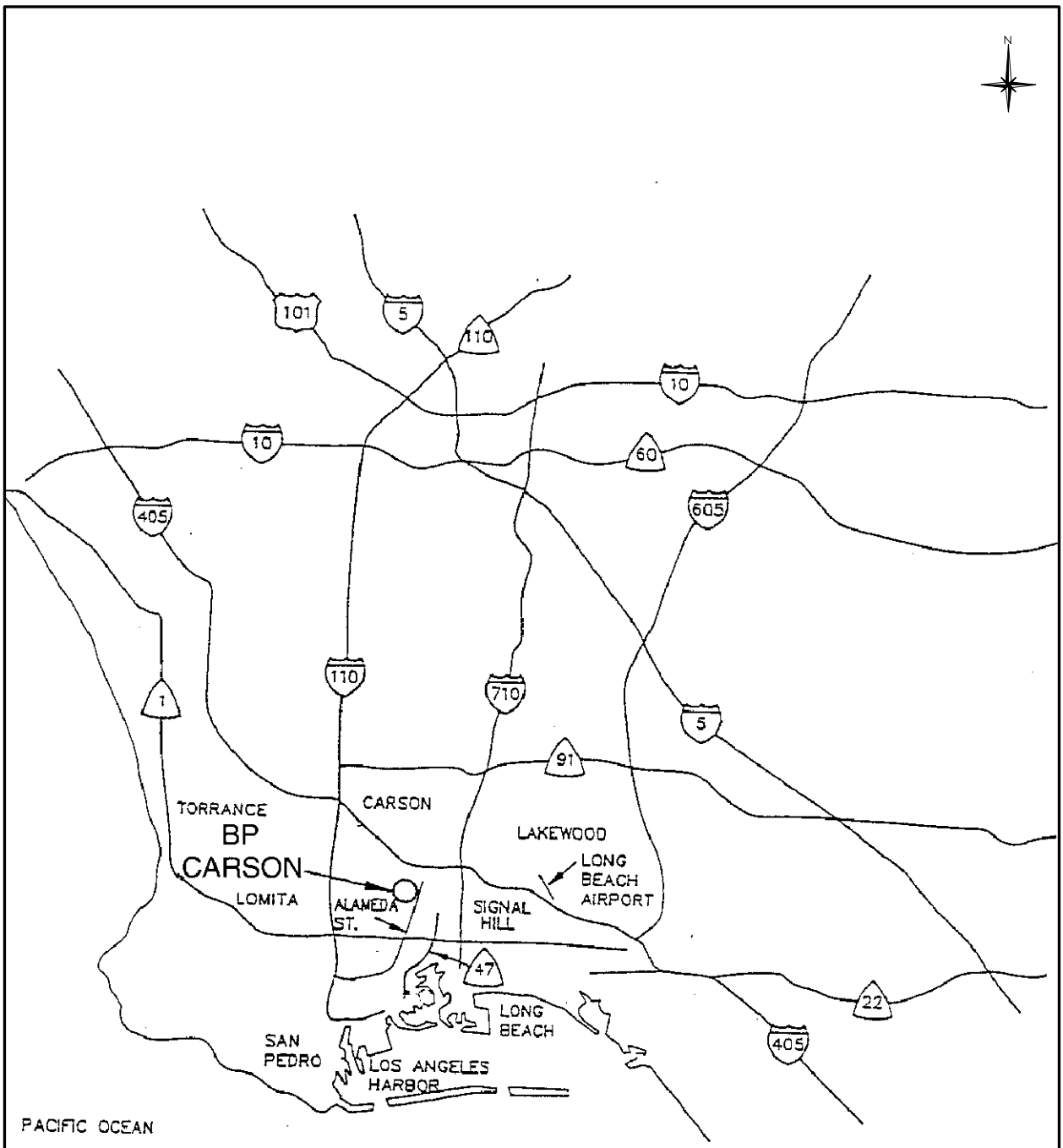
The traffic analysis examines the impacts of adding construction project generated traffic to existing traffic on the surrounding arterial network. The City of Carson follows the Congestion Management Program (CMP) guidelines for Los Angeles County as outlined below, and requires an analysis of conditions for existing and existing-plus-project conditions for this project.

1.4 CONGESTION MANAGEMENT PROGRAM FOR LOS ANGELES COUNTY

The CMP is a state-mandated program enacted by the state legislature with the passage of Assembly Bill 471 (1989), as amended by Assembly Bills 1791 (1990), 1435 (1992), 3093 (1992) and 1963 (1994). The requirements for the CMP became effective with voter approval of Proposition 111 in June 1990.

In passing the CMP statute, the legislature noted increasing concern that urban congestion was impacting the economic vitality of the state and diminishing the quality of life in many communities. The legislature also noted that the current planning process was not well suited to addressing congestion relief. As a new approach to addressing congestion concerns, the CMP was created for the following purposes:

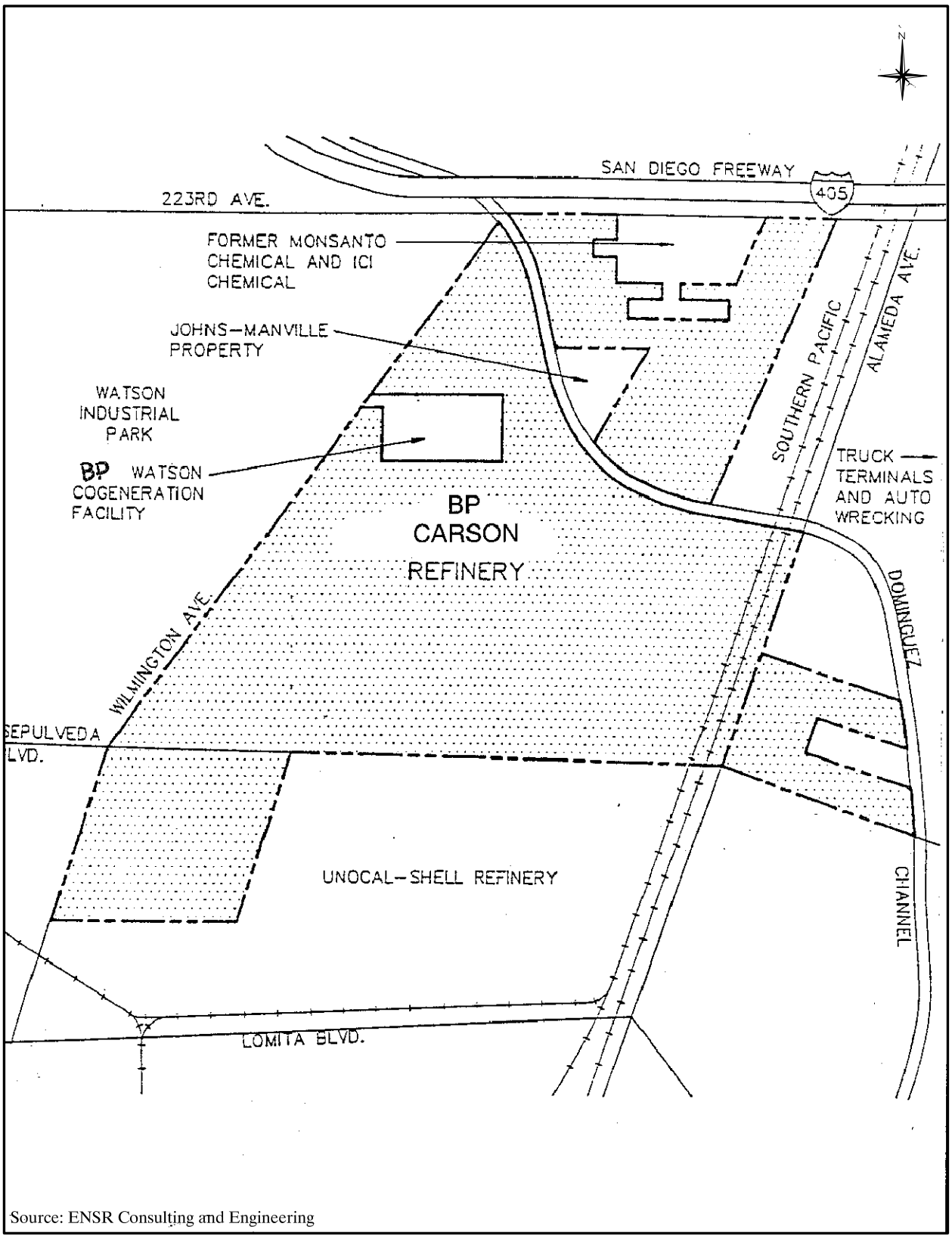
1. To link land use, transportation, and air quality decisions;
2. To develop a partnership among transportation decision makers on devising appropriate transportation solutions that include all modes of travel; and
3. To propose transportation projects which are eligible to compete for state gas tax funds.



Source: ENSR Consulting and Engineering

Figure 1-1

VICINITY MAP



Source: ENSR Consulting and Engineering

Figure 1-2

PROJECT SITE

Since the original passage of CMP legislation in 1989, the federal government also adopted the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. ISTEA contains a requirement for a congestion management system (CMS) which is modeled after California's CMP.

The CMP for Los Angeles County has been developed to meet the requirements of Section 65089 of the California Government Code and the federal requirements for a CMS from the Intermodal Surface Transportation Efficiency Act (ISTEA). It is intended to address regional congestion by linking transportation, land use and air quality decisions.

Assembly Bill 1963, adopted in 1994, required that each CMP include a performance element that includes performance measures, which evaluate current and future multimodal system performance for the movement of people and goods. The level of service indicators for the highway and roadway system meet the requirements for this performance element.

The CMP statute requires designation of a system of highways and roadways, including all state highways and principal arterials. Once designated as part of the CMP system, no highway or roadway can be removed from the system. This statute also requires establishment of level of service standards to measures congestion on the system. Levels of service (LOS) range from A to F, with LOS A representing free-flow conditions and LOS F representing a high level of congestion.

Level of service standards can be set no lower than LOS E, or the current level if worse than E. Three methods of measuring level of service are allowed by statute, for selection by the Congestion Management Agency: (1) Circular 212, (2) the 1985 Highway Capacity Manual, or (3) an alternative method determined by the regional agency to be consistent with the Highway Capacity Manual.

The CMP stature mandates that highway system performance be monitored to determine the degree to which required standards for level of service are being maintained. The CMP for Los Angeles County monitors traffic on over 1,000 miles of roadways, including approximately 500 miles of freeways, 400 miles of state maintained arterials, and 100 miles of locally maintained arterials. This is accomplished through traffic counts, level of service calculations, and collecting information about lane configuration and signal phasing.

Caltrans provides information about Los Angeles County freeways including traffic volumes in each direction during morning and evening peak hours and level of service (LOS) data. Forty-seven cities

and the County of Los Angeles provide traffic counts and LOS data at selected CMP arterial intersections for both morning and evening peak hours. This biennial, multi-jurisdictional effort provides a foundation for assessing the overall performance of the highway system in Los Angeles County.

The CMP uses "level of service" (LOS) as the measuring stick for system performance. The CMP standard for roadway performance is LOS E. For facilities that were already at LOS F (fully impacted) before the first CMP was adopted in 1992, traffic congestion is to be maintained or improved.

For CMP purposes, a substantial change in highway/roadway performance is defined as an increase or decrease in demand of at least 10 percent accompanied by a change in the LOS ranking.

In general, a CMP Traffic Impact Analysis (TIA) is required for all projects required to prepare an Environmental Impact Report (EIR) based on local determination.

CMP TIA guidelines, particularly intersection analyses, are largely geared toward analysis of projects where land use types and design details are known. Where likely land uses are not defined (such as where project descriptions are limited to zoning designation and parcel size with no information on access location), the level of detail in the TIA may be adjusted accordingly. This may apply, for example, to some redevelopment areas and citywide general plans, or community level specific plans. In such cases, where project definition is insufficient for meaningful intersection level of service analysis, CMP arterial segment analysis may substitute for intersection analysis.

Briefly, the steps involved for highway and freeway impact analysis are:

- Local jurisdiction determines that an EIR is necessary for a proposed project and notifies MTA and other affected transit operators through the NOP process.
- Existing traffic volumes and levels of service (LOS) on the CMP highway system within the study area must be documented.
- Traffic generation estimates are made, conforming to the procedures of the current edition of Trip Generation by the Institute of Transportation Engineers (ITE).
- Trip distribution by manual/assignment is made using generalized trip distribution factors.
- An analysis of the project's traffic impacts is conducted utilizing the guidelines identified below under TIA Guidelines.

- The TIA is conducted examining the following minimum geographic area:

  - All CMP arterial monitoring intersections, including monitored freeway on- or off-ramps, where the proposed project will add 50 or more trips during either the AM or PM weekday peak hours (of adjacent street traffic).

    If CMP arterial segments are being analyzed rather than intersections, the study area must include all segments where the proposed project will add 50 or more peak hour trips (total of both directions). Within the study area, the TIA must analyze at least one segment between monitored CMP intersections.

  - Mainline freeway-monitoring locations where the project will add 150 or more trips, in either direction, during either the AM or PM weekday peak hours.

NOTE: If, based on these criteria, no CMP facilities for study are identified; no further highway/freeway system analysis is required. If CMP facilities are identified for further study, then:

- Determine if significant impacts occur on the CMP system as a result of the project. For purposes of the CMP, a significant impact occurs when the proposed project increases traffic demand on a CMP facility by two percent of capacity (V/C $\geq$ 0.02) causing or worsening LOS "F" (V/C > 1.00). The lead agency may apply more stringent criteria if desired.

As an example, for the City of Los Angeles only, LADOT's Significant Impact Criteria, as shown in the following table, indicates that a project would have a significant impact if an increase in V/C ratio at a study location attributable to the project is 0.01 or more and the resulting V/C ratio on that study segment is greater than 0.90 for arterials or 0.93 for freeways. Since LADOT's Significant Impact Criteria are more stringent that that of the CMP, LADOT's criteria would apply.

LADOT'S SIGNFICANT IMPACT CRITERIA

V/C Ratio With Project Traffic	**Maximum Increase In V/C Ratio**
< or equal to 0.90	N/A
> 0.90 on arterials > 0.93 on freeways	< 0.010

- Investigate measures which will mitigate significant CMP system impacts identified in the TIA. Such mitigation measures must consider significant impact of the proposed development on neighboring jurisdictions.

- Develop cost estimates, including the fair share costs to mitigate impacts of the proposed project, and indicate the responsible agency.

- Develop appropriate mitigation measures. Selection of final mitigation measures remains at the discretion of the local jurisdiction. Once a mitigation program is selected the jurisdiction self-monitors implementation through the existing mitigation monitoring requirements of CEQA.

1.4.1 Traffic Impact Analysis (TIA) Guidelines

Intersection Level of Service (LOS) Analysis – The LA County CMP recognizes that individual jurisdictions have wide ranging experience with LOS analysis, reflecting the variety of community characteristics, traffic controls and street standards throughout the County. As a result, the CMP acknowledges the possibility that no single set of assumptions should be mandated for all TIAs within the County.

However, in order to promote consistency in the TIAs prepared by different jurisdictions, CMP TIAs must conduct intersection LOS calculations using either of the following methods:

(a) The intersection capacity utilization (ICU) method as specified for CMP highway monitoring; or

(b) The critical movement analysis (CMA)/Circular 212 method

Variation from the standard assumptions under either of these methods for circumstances at particular intersections must be fully documented.

Arterial Segment Analysis – For TIAs involving arterial segment analysis, volume-to-capacity ratios must be calculated for each segment and LOS values assigned using the V/C-LOS equivalency specified for arterial intersection. A capacity of 800 vehicles per hour per through traffic lane must be used, unless localized conditions necessitate alternative values to approximate current intersection congestion levels.

Freeway Segment (Mainline) Analysis – For the purpose of CMP TIAs, a simplified analysis of freeway impacts is required. This analysis consists of a demand-to-capacity calculation for the affected segments.

1.4.2 Traffic Count Requirements

- Traffic counts must be less than one year old;
- Traffic counts must be taken on Tuesdays, Wednesdays or Thursdays (these need not be consecutive days);
- Traffic counts must exclude holidays, and the first weekdays before and after the holiday;
- Traffic counts must be taken on days when local schools or colleges are in session;
- Traffic counts must be taken on day of good weather, and avoiding atypical conditions (e.g., road construction, detours, or major traffic incidents);
- Traffic counts must be taken for both the AM and PM peak;
- Unless demonstrated otherwise by actual local conditions, peak period traffic counts will include, 7-9 AM and 4-6 PM.

1.4.3 Intersection Level of Service Calculations

1. The CMP for Los Angeles County requires use of the ICU method to calculate V/C ratios and LOS. The parameters include:

   Capacity: 1600 vehicles/lane for all through and turn lanes
   2880 total for dual turn lanes

   Clearance: 0.10 (no phasing adjustment)

   RTOR: No adjustments for right-turns on red (City of Los Angeles only)

2. Adjustments for exclusive and optional turn lanes, right-turns on red, and other factors are left to the discretion of local agencies to reflect observed operations; however, these adjustments must be applied consistently each year.

3. Levels of service must be assigned based on overall intersection V/C ratios, as follows:

V/C Ratio	LOS
0.00 – 0.60	A
> 0.60 – 0.70	B
> 0.70 – 0.80	C
> 0.80 – 0.90	D
> 0.90 – 1.00	E
> 1.00	F

The following study conditions shall be analyzed for each study intersection.

1.4.4 Background Traffic Conditions

The following sections describe the procedures for documenting and estimating background, or non-project related, traffic conditions. Note that for the purpose of a TIA, these background estimates must include traffic from all sources without regard to the exemptions specified in the CMP statute (e.g., traffic generated by the provision of low and very low income housing, or trips originating outside Los Angeles County).

1.4.5 Proposed Project Traffic Generation

Traffic generation estimates must conform to the procedures of the current edition of Trip Generation, by the Institute of Transportation Engineers (ITE). If an alternative methodology is used, the basis for this methodology must be fully documented.

Increases in site traffic generation may be reduced for existing land uses to be removed, if the existing use was operating during the year the traffic counts were collected. Current traffic generation should be substantiated by actual driveway counts; however, if infeasible, traffic may be estimated based on a methodology consistent with that used for the proposed use.

Regional transportation impact analysis also requires consideration of trip lengths. Total site traffic generation must therefore be divided into work and non work-related trip purposes in order to reflect observed trip length differences.

1.4.6 Trip Distribution

For trip distribution by direct/manual assignment, generalized trip distribution factors are to be provided based on regional modeling efforts and local jurisdiction experience.

Existing Traffic Conditions – Existing traffic volumes and levels of service (LOS) on the CMP highway system within the study area must be documented. Traffic counts must be less than one year old at the time the study is initiated, and collected in accordance with CMP highway monitoring requirements.

Selection of Horizon Year and Background Traffic Growth – Horizon year(s) selection is left to the lead agency, based on individual characteristics of the project being analyzed. In general, the horizon year should reflect a realistic estimate of the project completion date. For large development phased over several years, review of intermediate milestones prior to buildout should also be considered.

At a minimum, horizon year background traffic growth estimates must use the generalized growth factors identified in the current CMP for Los Angeles County. These growth factors are based on regional modeling efforts, and estimate the general effect of cumulative development and other socioeconomic changes on traffic throughout the region. Beyond this minimum, selection among the various methodologies available to estimate horizon year background traffic in greater detail is left to the lead agency. Suggested approaches include consultation with the jurisdiction in which the intersection under study is located, in order to obtain more detailed traffic estimates based on on-going development in the vicinity.

Identification of Mitigation – Once the project has been determined to cause a significant impact, the lead analysis must investigate measures which will mitigate the impact of the project. Mitigation measures proposed must clearly indicate the following:

(a) Cost estimates, indicating the fair share costs to mitigate the impact of the proposed project. If the improvement from a proposed mitigation measure will exceed the impact of the project, the TIA must indicate the proportion of total mitigation costs, which is attributable to the project. This fulfills the statutory requirement to exclude the costs of mitigating inter-regional trips.

(b) Implementation responsibilities. Where the agency responsible for implementing mitigation is not the lead agency, the TIA must document consultation with the implementing agency regarding project impacts, mitigation feasibility and responsibility.

Final selection of mitigation measures remains at the discretion of the lead agency. The TIA must, however, provide a summary of impacts and mitigation measures. Once a mitigation program is selected, the jurisdiction self-monitors implementation through the mitigation monitoring requirements contained in CEQA.

Project Contribution to Planned Regional Improvements – If the TIA concludes that project impacts will be mitigated by anticipated regional transportation improvements, such as rail transit or high occupancy vehicle facilities, the TIA must document:

(a) Any project contribution to the improvement, and

(b) The means by which trips generated at the site will access the regional facility

1.5 INTERSECTION CAPACITY UTILIZATION/ROADWAY LEVEL OF SERVICE

The traffic study utilizes the ICU methodology to evaluate the project traffic impacts. The ICU values are presented in an ICU table (actual ICU calculations are included in Appendix A) and are a means of representing peak hour volume/capacity ratios which are a measure of the level of service (LOS) for each location examined. The ICU is the proportion of an hour required to accommodate all traffic if all approaches operate at capacity. If an intersection is operating at 80 percent of capacity, then 20 percent of the signal cycle is not used. The signal could show red on all indications 20 percent of the time and the signal would still adequately accommodate approaching traffic.

The ICU analysis consists of: 1) determining the proportion of signal time needed to serve each conflicting movement of traffic; 2) summing the times for the movements; and, 3) comparing the total time required to the total time available. For example, if for north-south traffic the northbound traffic is 1,700 vehicles per hour, the southbound traffic is 1,200 vehicles per hour, and the capacity of both directions is 3,400 vehicles per hour (i.e., two travel lanes in each direction), then the northbound traffic is critical and requires 50 percent of the signal time. If for the east-west traffic 30 percent of the signal time is required, then it can be seen that the ICU is 80 percent (50 percent + 30 percent). When left-turn phases exist, they are incorporated into the analysis. The critical movements are usually the heavy left-turn movements and the opposing through movements.

Impacts of the project at all critical CMP locations were evaluated using the following guidelines:

1. All CMP arterial monitoring intersections, including monitored freeway on- or off-ramp intersections where the proposed project will add 50 or more trips during either the AM or PM weekday peak hours.

2. Mainline freeway monitoring locations where the project will add 150 or more trips in either direction, during either the AM or PM weekday peak hours.

The LOS for all intersections are calculated using the ICU methodology using the following capacities:

Capacity:	1600 vehicles per hour per lane for through and single-turn lanes 2880 vehicles (total) per hour for dual turn lanes.
Clearance interval: 0.10	

Twelve critical study area intersections in the vicinity of the BP Carson Refinery have been identified for analysis and include:

1.	Wilmington & I-405 NB on/off	7.	Alameda & 223rd/Wardlow Access
2.	Wilmington & I-405 SB on/off	8.	Alameda & Sepulveda
3.	Wilmington & 223rd Street	9.	405 SB on/off & 223rd/Wardlow
4.	Wilmington & Watsoncntr	10.	223rd & Alameda/Wardlow access
5.	Wilmington & Sepulveda	11.	Gate 16 & 223rd
6.	Alameda & I-405 NB	12.	Gate 60 & 223rd

Table 1-1 summarizes the definitions of the various levels of service.

Level of service (LOS) analyses for roadway segments in this study is estimated based on the average daily traffic (ADT) volume. Experience has shown that, taking intersection capacity constraints into account, and using a typical 10 percent peak hour distribution, a divided arterial (opposing traffic flows separated by a raised or painted median) can accommodate approximately 8,000 vehicles per lane per day, and an undivided arterial (opposing flows separated only by a centerline) can accommodate approximately 6,000 vehicles per lane per day.

In order for the layman to try to visualize the traffic conditions represented by the various levels of service the following descriptions have been generally accepted by the industry.

The LOS for roadway segments is based on the following level of service criteria:

Local Arterials		**Freeway Demand/Capacity Ratio**			
V/C Ratio	**LOS**	**D/C Ratio**	**LOS**	**D/C Ratio**	**LOS**
.00 - .60	A	.00 - .35	A	1.01 - 1.25	F (0)
.61 - .70	B	.36 - .54	B	1.26 - 1.35	F (1)
.71 - .80	C	.55 - .77	C	1.36 - 1.45	F (2)
.81 - .90	D	.78 - .93	D	Above 1.45	F (3)
.91 – 1.00	E	.94 – 1.00	E		
Above 1.00	F				

V/C – volume to capacity ratio
D/C – demand to capacity ratio

Table 1-1

LEVELS OF SERVICE FOR URBAN AND SUBURBAN ARTERIAL STREETS

Level Of Service	Description
A	Free flow (relatively). If signalized, conditions are such that no approach phase is fully utilized by traffic and no vehicle waits through more than one red indication. Very slight or no delay.
B	Stable flow. If signalized, an occasional approach phase is fully utilized; vehicle platoons are formed. This level is suitable operation for rural design purposes. Slight delay.
C	Stable flow or operation. If signalized, drivers occasionally may have to wait through more than one red indication. This level is suitable operation for urban design purposes. Acceptable delay.
D	Approaching unstable flow or operation; queues may develop, but are quickly cleared. Tolerable delay.
E	Unstable flow or operation; the intersection has reached ultimate capacity; this condition is not uncommon in peak
F	Forced flow or operation. Intersection operates above its capacity. Traffic is congested.

Source: Highway Capacity Manual, HRB Special Report 87.

Table 1-2 summarizes roadway segments included in the traffic analysis.

As indicated in the CMP for Los Angeles County, any impact that is determined to be significant will need to be mitigated. The criteria for determining a significant impact is a V/C (D/C) increase of two percent (V/C ≥.02) or more which causes or worsens LOS "F" (V/C > 1.00).

The City of Carson uses, as part of their TIA guidelines, the following modified table that provides upper threshold capacities for levels of service acceptable to the City.

Description	V/C Ratio	LOS
Local or residential street	.79	C
Other surface streets	.89	D
Freeway ramps	.94	E
Special situations with prior approval	.94	E

Source: City of Carson

The traffic analysis material presented here is set out as follows:

Chapter 2.0 - Project Setting

Chapter 3.0 - Traffic Impact Analysis

1.6 DEFINITIONS

Certain terms used throughout this report are defined below to clarify their intended meaning:

ADT - Average Daily Traffic.

ICU - Intersection Capacity Utilization. A factor used to measure the volume to capacity ratio for an intersection and determine the level of service.

LOS Level of Service. A scale used to evaluate circulation system performance based on intersection ICU values or volume/capacity ratios of arterial segments. The levels range from "A" to "F", with LOS "A" representing free flow traffic and LOS "F" representing severe traffic congestion.

Peak Hour - This typically refers to the hour during the AM peak period (typically 7 AM - 9 AM) or the PM peak period (typically 3 PM - 6 PM) in which the greatest number of vehicle trips are generated by a given land use or are traveling on a given roadway.

Table 1-2

ROADWAY SEGMENTS

Avalon
- Lomita to Sepulveda
- Sepulveda to 223rd
- 223rd to Carson

Wilmington
- Lomita to Sepulveda
- Sepulveda to 223rd
- 223rd to Carson

Alameda
- Lomita to Sepulveda
- Sepulveda to 223rd
- 223rd to Carson

Carson
- Avalon to 405 Fwy
- 405 Fwy to Wilmington
- Wilmington to Alameda

223rd
- Avalon to Wilmington
- Wilmington to Alameda
- e/o Wilmington

Sepulveda
- Avalon to Wilmington
- Wilmington to Alameda
- e/o Wilmington

Lomita
- Avalon to Wilmington
- Wilmington to Alameda

VPD - Vehicles per Day. This has the same meaning as ADT but is generally used in a trip generation context rather than in reference to the highway volume of an arterial segment.

VPH - Vehicles per Hour.

V/C - Volume to Capacity Ratio. This is typically described as a percentage of capacity utilized by existing or projected traffic on a segment of arterial or an intersection turn movement.

1.7 REFERENCES

1. Highway Capacity Manual. Special Report 209, Third Edition. Updated 2000.

2. Highway Capacity Manual, Seventh Edition. Updated 2004.

3. "Eastern Transportation Corridor Average Vehicle Occupancy Program Annual Monitoring Report", Austin-Foust Associates, Inc., June 2001.

4. State of California Department of Transportation Manual on Uniform Traffic Control Devices. Updated 2004.

5. State of California Vehicle Code. Published 2004.

6. "ARCO Watson Refinery Modernization Project", Preliminary Draft EIR, Dames & Moore, January 1985.

7. "ARCO Watson Cogeneration Project", Application for certification, Fluor Engineering, Inc., May 1985.

8. "ARCO Clean Fuels Project", Draft Report for South Coast Air Quality Management District, ENSR, September 1992.

9. "ARCO Clean Fuels Project Traffic Analysis", Austin-Foust Associates, Inc., April 1993.

10. "ARCO MTBE Phase Out Project", Austin-Foust Associates, Inc., June 2000.

11. "1999 Congestion Management Program for Los Angeles County," Los Angeles County Metropolitan Transportation Authority, November 1999.

12. "BP Corporation-Fifth Train Project Traffic Analysis", Austin-Foust Associates, Inc., September 2001.

Chapter 2.0
PROJECT SETTING

This chapter describes the project site in relation to the transportation setting. The existing circulation system is discussed, and existing traffic volumes and levels of service are summarized.

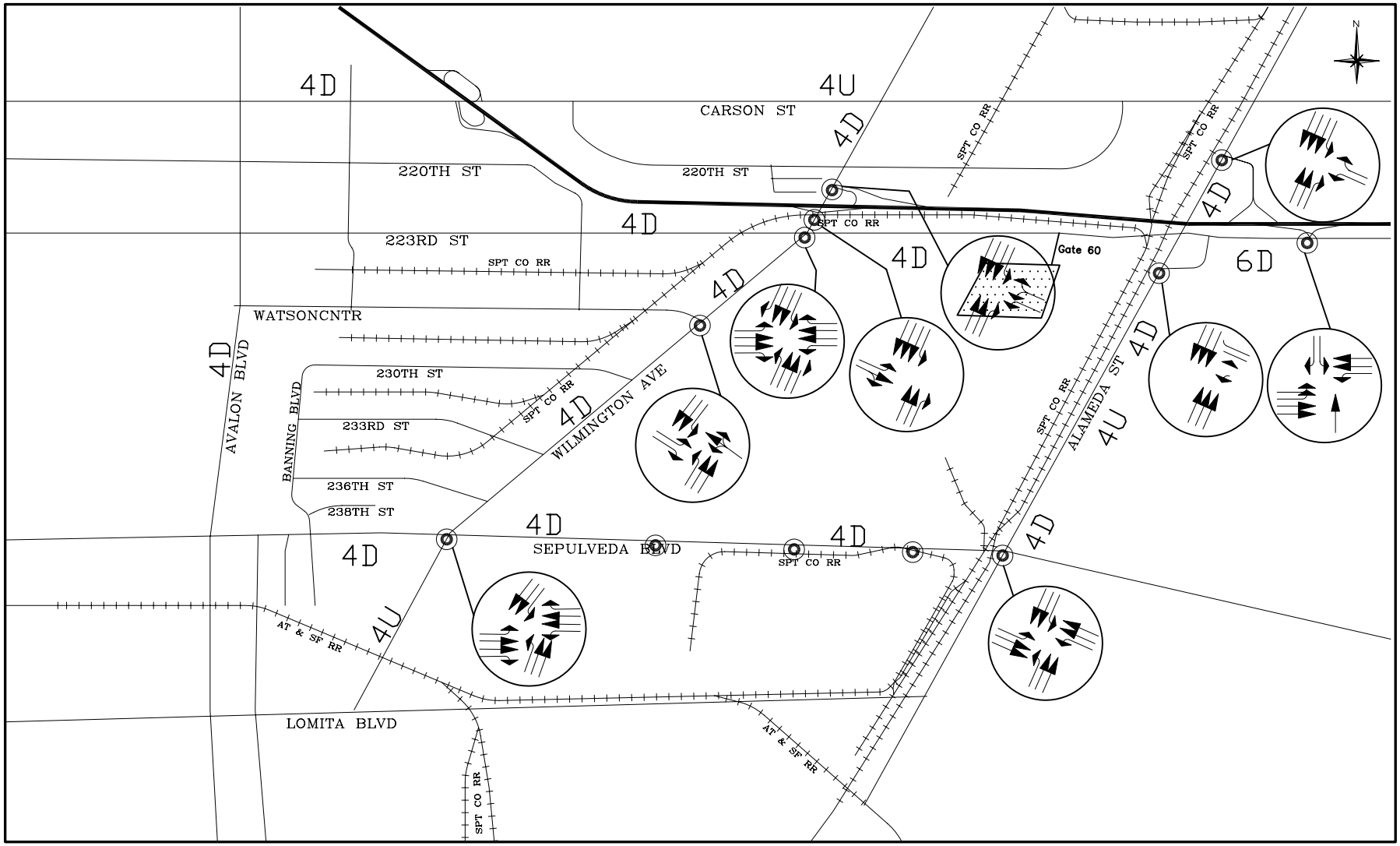
2.1 SURROUNDING HIGHWAY NETWORK

Regional facilities in the vicinity of the project can be seen in previously referenced figures in Chapter 1.0, and provide excellent accessibility to the entire southern California region. Four major freeways bound the project vicinity. The project is centrally located between two north-south freeways, the Harbor Freeway (Route 110) and the Long Beach Freeway (Route 710). The San Diego Freeway (Interstate 405) lies immediately north of the project site and runs diagonally through the region. The Gardena Freeway (Route 91) lies further to the north of the site and runs east west.

In addition to the freeway system, Pacific Coast Highway (Route 1) is immediately south of the project vicinity, paralleling the Pacific Ocean coastline. Freeway interchanges to the regional arterial highway network provide access at regular intervals.

The refinery is located at 1801 East Sepulveda Boulevard in the City of Carson, California less than one-quarter of a mile south of the San Diego Freeway (I-405). The irregularly shaped parcel that comprises the refinery is generally located between Wilmington Avenue on the west, 223rd Avenue on the north, Alameda Street on the east, and Sepulveda Boulevard on the south. Construction traffic generated by the proposed project will access the site via Gate 60 located on 223rd Avenue.

Wilmington Avenue and Alameda Street are north south four-lane divided roadways. Sepulveda Boulevard and 223rd Avenue are east west four-lane divided roadways in the project vicinity as illustrated in Figure 2-1.



LEGEND

- SIGNAL
- INTERSECTION LANES
- 4D NUMBER OF THROUGH LANES (D=Divided; U= Undivided)

Figure 2-1

EXISTING CHARACERISTICS AND INTERSECTION LANE CONFIGURATIONS

In addition to the vehicular system, the project vicinity is exceptionally well serviced by an extensive network of railroad facilities. This system provides an alternative mode of transportation for the distribution of goods and materials. The area is served by the Southern Pacific, Union Pacific, Santa Fe, Pacific Electric, and Harbor Belt Line railroads, with several main lines occurring near the refinery.

2.2 EXISTING TRAFFIC CONDITIONS

Existing (2004) AM and PM peak hour turning movement volumes for the adjacent street system at study area intersections and existing average daily traffic (ADT) volumes on selected roadway segments were collected by Austin-Foust Associates, Inc. (AFA) in the vicinity of the project site. Key intersections and roadway segments were counted and compared with the year 2000 counts collected for the /MTBE Phase-out project (2000). These comparisons indicate a three percent increase in volumes for the year 2004, which is consistent with the MTA forecasts for this area. Hence, intersection volumes at locations not counted were increased by three percent to represent year 2004 volumes.

Intersection capacity utilization (ICU) values are presented in Table 2-1 (actual ICU calculations are included in Appendix A). All intersections are presently operating at an acceptable level of service during the AM and PM peak hour under existing conditions. Existing roadway capacity utilization values are presented in Table 2-2. Demand-to-capacity (D/C) ratios for freeway mainlines are summarized in Table 2-3.

Figure 2-2 illustrates the existing ADT volumes on roadway segments surrounding the project site. Existing AM and PM peak hour turn volumes are illustrated in Figures 2-3 and 2-4.

2.2.1 Bus Routes

The proposed construction is entirely within the project site. No rail lines or airports are affected by the proposed modifications. There are no bus routes that will be affected during construction in the vicinity of the project site. Figure 2-5 illustrates bus routes in the vicinity of the site.

2.2.2 Bike Routes

There are no bikeways that would be affected by the proposed refinery construction.

Table 2-1

ICU SUMMARY – EXISTING CONDITIONS

Intersection	**AM**	**PM**
1. Wilmington & I-405 NB on/off	.69	.70
2. Wilmington & I-405 SB on/off	.85	.74
3. Wilmington & 223rd	.74	.83
4. Wilmington & Watson Center	.58	.70
5. Wilmington & Sepulveda	.65	.90
6. Alameda & I-405 NB	.41	.54
7. Alameda & 223/Wardlow Access	.31	.48
8. Alameda & Sepulveda	.52	.85
9. I-405 SB on/off & 223/Wardlow	.38	.49
10. 223rd & Alameda/Wardlow Access	.45	.84
11. Gate 16 & 223rd	.42	.74
12. Gate 60 & 223rd	.38	.75

Level of service ranges: .00 - .60 A (free flowing)
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

Table 2-2

EXISTING ROADWAY SYSTEM

Jurisdiction	Impacted Roadway Segments On	Between	Road Class	Median	No. of Lanes	Design Capacity	Current ADT	V/C	Current LOS	Truck %
Carson	Avalon	Lomita to Sepulveda	Primary	Divided	4	32,000	24,760	.77	C	5%
Carson	Avalon	Sepulveda to 223rd	Primary	Divided	4	32,000	24,760	.77	C	5%
Carson	Avalon	223rd to Carson	Primary	Divided	4	32,000	24,760	.77	C	5%
Carson	Wilmington	Lomita to Sepulveda	Primary	Divided	4	24,000	19,130	.79	C	5%
Carson	Wilmington	Sepulveda to 223rd	Primary	Divided	4	32,000	32,530	1.02	F	5%
Carson	Wilmington	223rd to Carson	Primary	Divided	4	32,000	25,900	.80	C	5%
Carson	Alameda	Lomita to Sepulveda	Primary	Divided	4	32,000	29,356	.92	E	5%
Carson	Alameda	Sepulveda to 223rd	Primary	Divided	4	32,000	29,356	.92	E	5%
Carson	Alameda	223rd to Carson	Primary	Divided	4	32,000	27,630	.86	D	5%
Carson	Carson	Avalon to 405 Fwy	Primary	Divided	4	32,000	30,400	.95	E	5%
Carson	Carson	405 Fwy to Wilmington	Primary	Undivided	4	24,000	14,650	.61	B	5%
Carson	Carson	Wilmington to Alameda	Primary	Undivided	4	24,000	9,000	.37	A	5%
Carson	223rd	Avalon to Wilmington	Primary	Divided	4	32,000	20,700	.65	B	5%
Carson	223rd	Wilmington to Alameda	Primary	Undivided	4	32,000	20,100	.63	B	5%
Carson	223rd	e/o Wilmington	Primary	Undivided	4	32,000	21,300	.67	B	5%
Carson	Sepulveda	Avalon to Wilmington	Primary	Divided	4	32,000	18,000	.56	A	5%
Carson	Sepulveda	Wilmington to Alameda	Primary	Divided	4	32,000	18,000	.56	A	5%
Carson	Sepulveda	e/o Wilmington	Primary	Divided	4	32,000	16,900	.53	A	5%
Carson	Lomita	Avalon to Wilmington	Secondary	Undivided	4	24,000	16,900	.70	B	5%
Carson	Lomita	Wilmington to Alameda	Secondary	Undivided	4	24,000	7,880	.33	A	5%

Major Highways - Carry high traffic volumes and are the primary thoroughfares linking adjacent cities. Driveway access to these roadways is typically limited to provide efficient high volume traffic flow

Primary Highways - Carry high traffic volumes and provide limited access. They function to link the major highways to the secondary highways as well as carry vehicles entering and exiting the city. Driveway access is also typically limited, where feasible.

Secondary Highways - Carry traffic along the perimeters of major developments and are also through streets enabling traffic to cross large areas of the city.

Table 2-3

EXISTING FREEWAY MAINLINE DEMAND-TO-CAPACITY RATIOS SUMMARY

		AM Peak Hour			PM Peak Hour		
Intersection	**Capacity**	**Demand**	**D/C**	**LOS**	**Demand**	**D/C**	**LOS**
Wilmington & I-405 NB on/off ramp	10,000	6,696	.67	C	7,560	.76	C
Wilmington & I-405 SB on/off ramp	10,000	6,048	.61	C	6,720	.67	C
Alameda & I-405 NB ramps	10,000	2,550	.26	A	2,890	.29	A
I-405 SB on/off ramps & 223rd/Wardlow	10,000	3,450	.35	A	3,910	.39	B

FREEWAY DEMAND/CAPACITY RATIO

D/C Ratio	**LOS**	**D/C Ratio**	**LOS**
.00 - .35	A	1.01 – 1.25	F (0)
.36 - .54	B	1.26 – 1.35	F (1)
.55 - .77	C	1.36 – 1.45	F (2)
.78 - .93	D	Above 1.45	F (3)
.94 – 1.00	E		

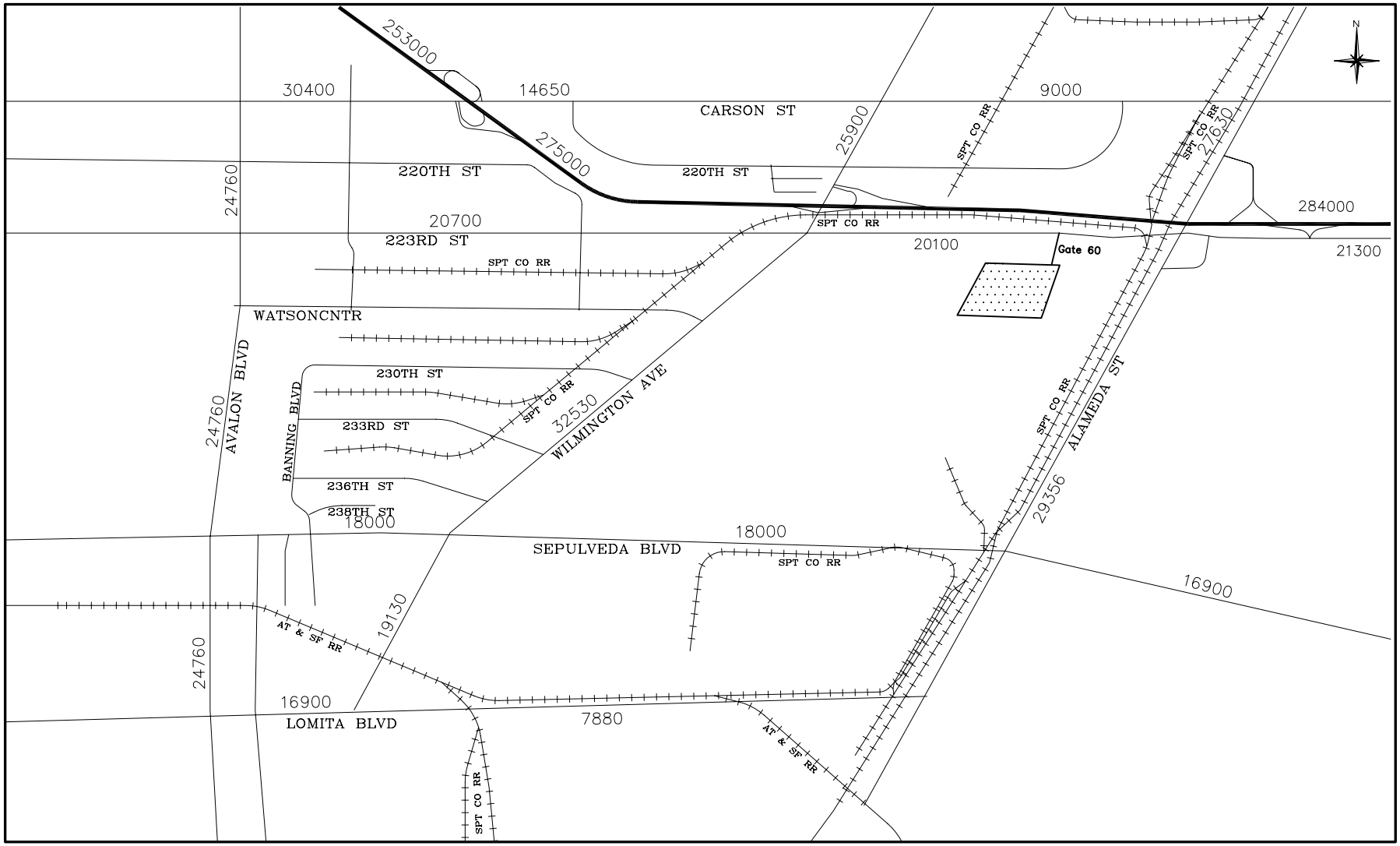


Figure 2-2

EXISTING AVERAGE DAILY TRAFFIC (ADT)

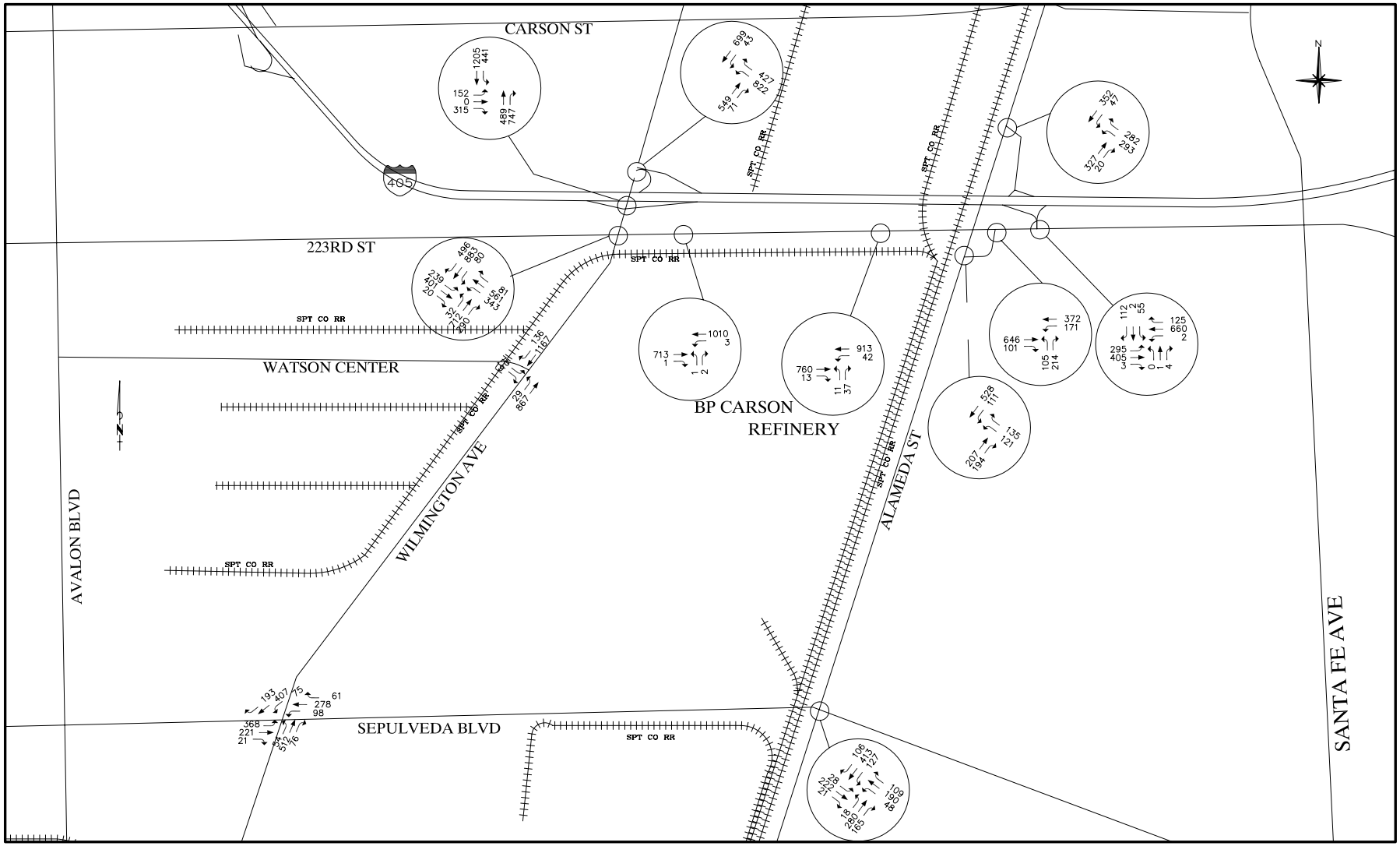


Figure 2-3

EXISTING AM
PEAK HOUR TURN VOLUMES

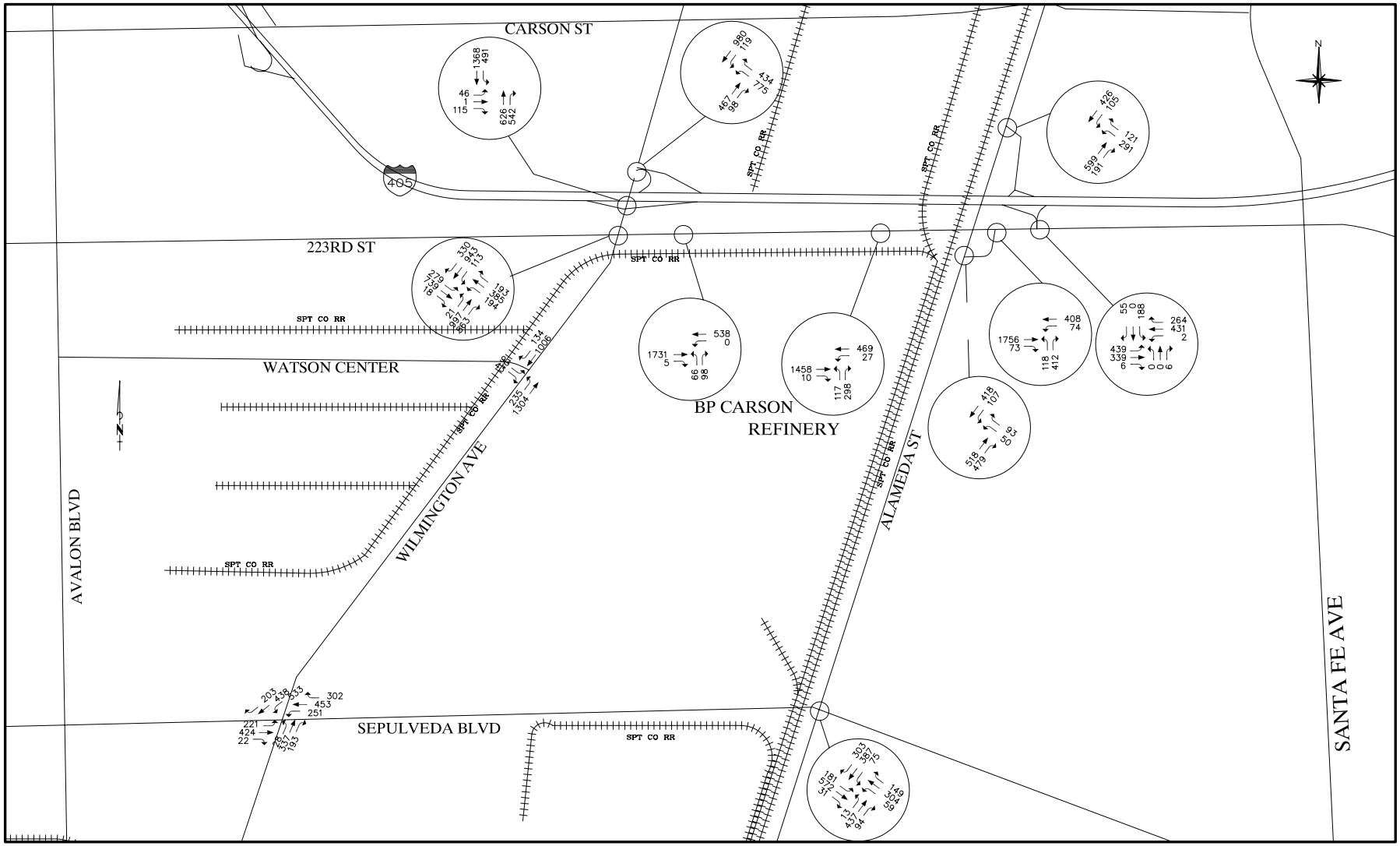


Figure 2-4

EXISTING PM
PEAK HOUR TURN VOLUMES

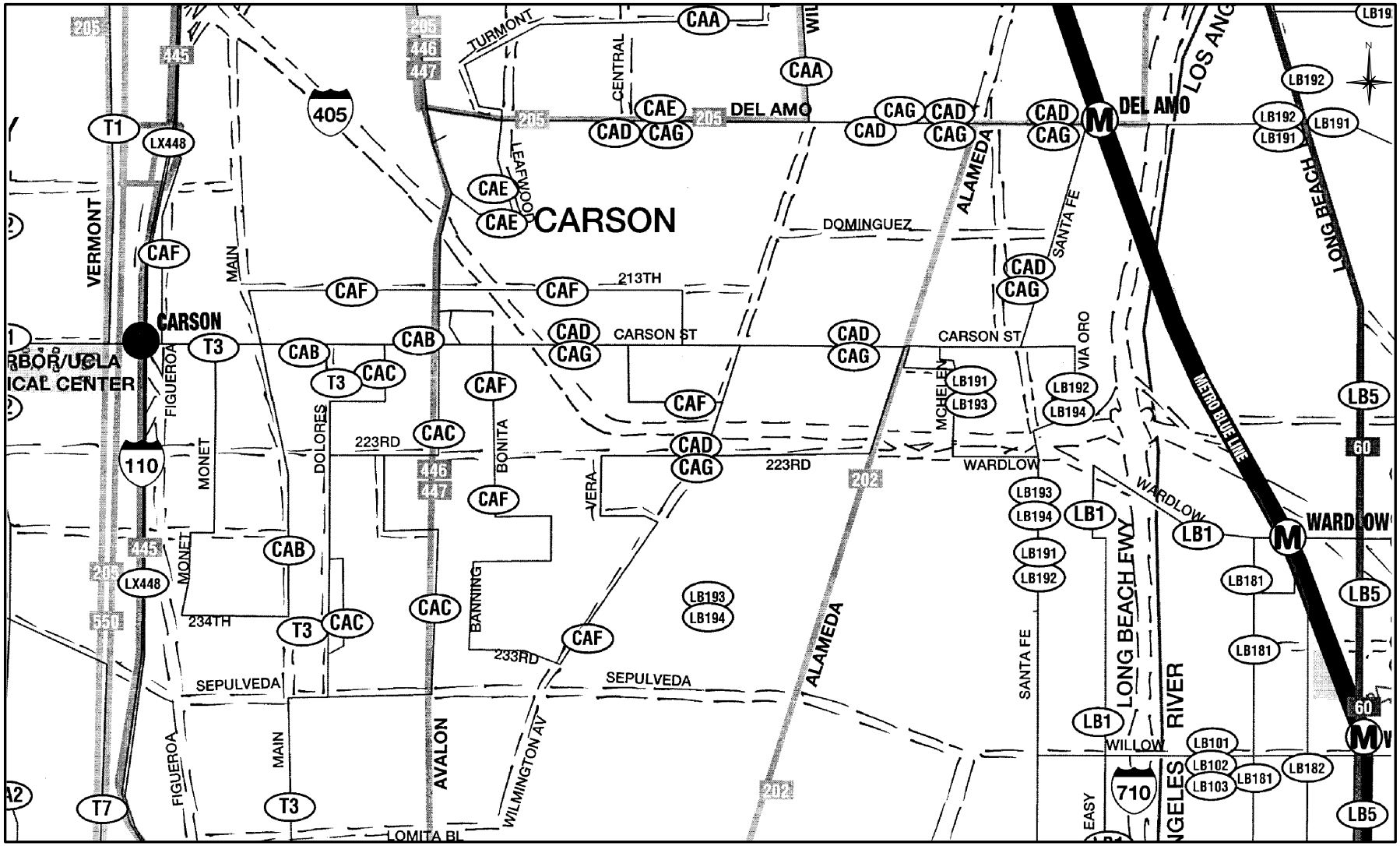


Figure 2-5

PROJECT VICINITY MTA BUS ROUTES

2.2.3 Railway Routes

Rail spurs provide rail access to parcels within the city and main lines and branch lines converge on the city from all directions. The Union Pacific, Southern Pacific (SP), and Santa Fe (AT&SF) railroads have main lines serving the project study area. The Southern Pacific line, which follows Alameda Street, and the Union Pacific line, which follows Downey Road, are direct connections to the port facilities in San Pedro. The Santa Fe line eventually connects with the harbor facilities after making connections in West Los Angeles. The Southern Pacific line crossing Wilmington Avenue is grade separated from vehicular traffic. The Southern Pacific line crossing Sepulveda Boulevard at Alameda Street is an at-grade crossing with safety gates and signals. Project traffic is not forecast to be affected by nor cause additional delay at these railroad crossings.

Chapter 3.0
TRAFFIC IMPACT ANALYSIS

This chapter describes the potential impacts of the proposed development upon the surrounding arterial network. Traffic generated by development of the proposed project is added to the existing volumes presented in the previous chapter and the resulting capacity impacts are assessed.

3.1 TRIP GENERATION

As discussed in Chapter 1.0, the proposed project consists of modifications to the BP Carson Refinery. The construction of modifications to the Carson Refinery will generate additional traffic from personnel travel as well as the transportation of construction materials and equipment to the refinery.

The construction effort is summarized in Table 3-1 and is anticipated to require a maximum of 199 workers per day during the peak construction period (August 2006). A detailed description of the component sub-projects' associated manpower requirements is contained in Appendix C. Construction activities at the BP Carson Refinery are anticipated to occur five days a week (Monday through Friday). The workshift is scheduled to begin at 6:00 AM and end at 4:00 PM. Traffic attributable to the project construction traffic will arrive at the site before the AM peak period would begin and will not affect the AM peak hour ICU values. Traffic for the project will leave at 4:00 PM and be completely discharged by the beginning of the PM peak period of the adjacent street (4:30 PM – 5:30 PM) and may affect the PM peak hour ICU values. Therefore, this analysis examines impacts from traffic attributable to the proposed project only during the PM peak hour.

Austin-Foust Associates, Inc (AFA) has conducted vehicle occupancy counts for the Transportation Corridor Agencies (TCA) Transportation Corridors (Reference 3). These studies indicate a typical vehicle occupancy rate of 1.15 persons per vehicle. A "worst-case" analysis would assume a vehicle occupancy rate of 1.0 persons per vehicle. For purposes of this analysis, a vehicle occupancy rate of 1.0 persons per vehicle was used. This results in a forecast of 199 construction worker vehicles entering and exiting the site during the peak one-month construction period (199 workers / 1.0 workers/vehicle = 199 vehicles). These same 199 peak daily construction worker vehicles will be departing at 4:00 PM.

Table 3-1

CONSTRUCTION MANPOWER SUMMARY

Date	Tank 710	No. 51 Vacuum	No. 1 Crude Relief	Butane Tank Car Rack	Total
July 2005	0	33	0	0	33
August 2005	14	42	0	0	56
September 2005	22	42	0	0	64
October 2005	22	42	0	0	64
November 2005	22	42	0	0	64
December 2005	22	42	0	0	64
January 2006	22	66	0	0	88
February 2006	34	66	0	0	100
March 2006	43	58	0	0	101
April 2006	43	58	0	0	101
May 2006	43	58	0	0	101
June 2006	43	58	72	0	173
July 2006	43	66	72	0	181
August 2006	22	66	89	22	199
September 2006	22	33	72	22	149
October 2006	18	26	22	11	109

The AM and PM peak hour of the adjacent street system occurs during the typical AM peak period of 7:00 AM to 9:00 AM and 3:00 PM to 6:00 PM as indicated in the CMP Guidelines.

3.2 TRIP DISTRIBUTION

Impacts from project construction traffic at the BP Refinery were analyzed using the on-site parking location accessible via Gate 60. It is expected that most of the construction personnel would commute to the site in private automobiles even though BP would encourage construction contractor's employees to organize carpools. Construction personnel would enter the construction parking lot from 223rd Street at Gate 60.

Distribution of project-generated traffic was derived from observation of existing travel patterns in the vicinity of the project site. Distribution patterns for the proposed project are illustrated in Figure 3-1.

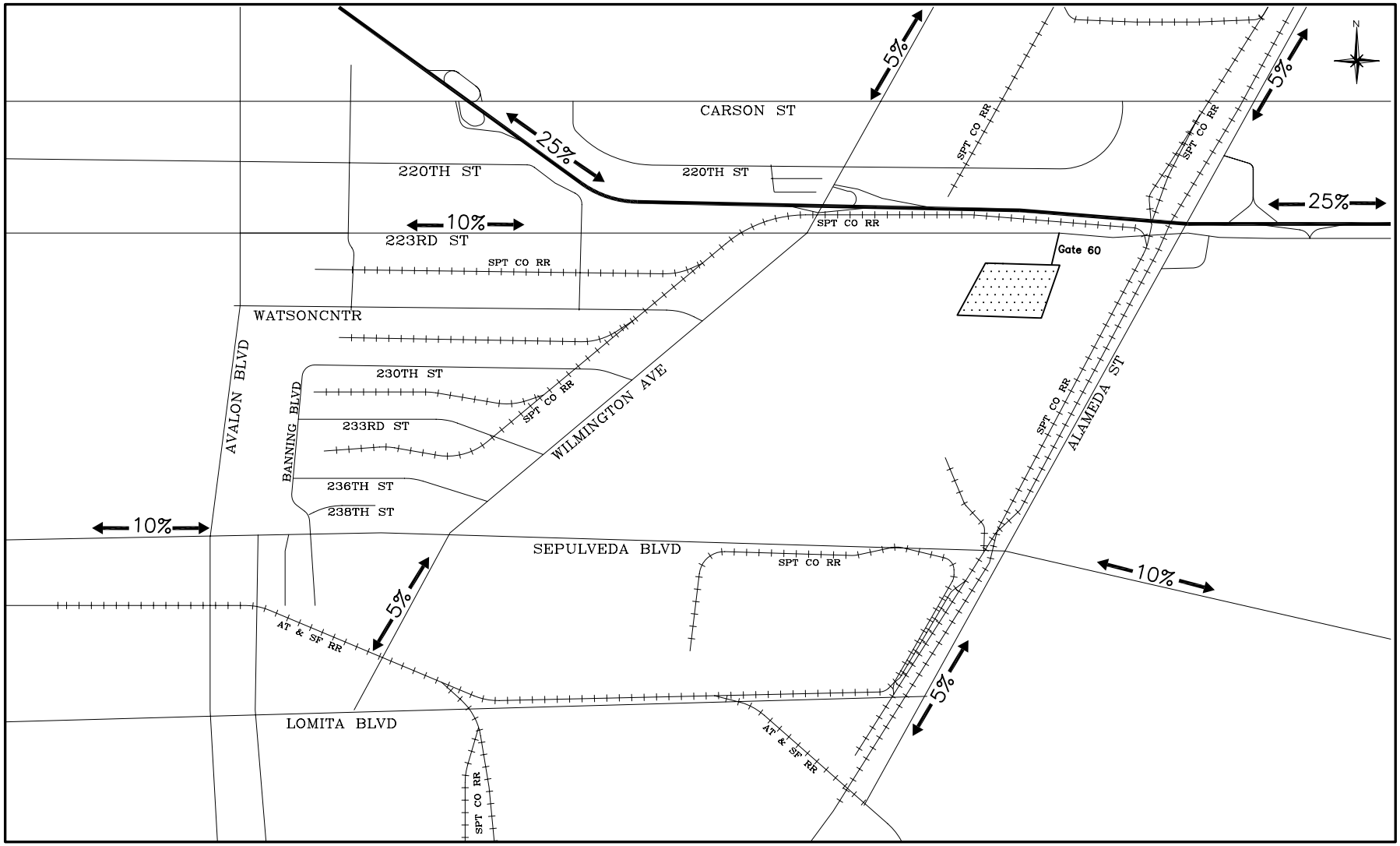


Figure 3-1

PROJECT TRIP DISTRIBUTION

Half of the project related traffic (50 percent) is forecast to use the existing freeway system to access the project study area. The remaining 50 percent is forecast to use 223rd Street (10 percent), Sepulveda Boulevard (20 percent), Wilmington Avenue (10 percent) and Alameda Street (10 percent). Approximately five percent of project related trips are forecast to use Alameda Street north of 223rd Street and five percent are forecast to use Alameda Street south of Sepulveda Boulevard. On a daily basis, 24 project trips are forecast to use Alameda Street north of 223rd Street and south of Sepulveda Boulevard.

Materials required to support the construction effort would be delivered to the refinery by truck and rail. Peak truck and rail usage would correspond to the peak manpower periods. Construction materials, heavy construction equipment, piping, and new equipment would be delivered throughout the construction period. All truck deliveries would be made through the construction parking lot. Railroad cars carrying heavy equipment would enter the project site from a rail line along Alameda Street.

The average daily truck traffic during construction is forecast to be three trucks per day. Since these would mainly consist of material deliveries, they would be spread throughout the workday with few deliveries occurring during the peak hour. Therefore, their contribution to overall traffic impacts would be negligible. Figure 3-2 illustrates the PM peak hour construction traffic assignment for the project. As a conservative or "worst case" analysis, the maximum expected employees at the construction site was assumed to occur five days per week.

3.3 EXISTING PLUS PROJECT TRAFFIC IMPACTS

The BP Carson Refinery Remodel Project would generate short-term impacts on traffic and circulation in the project vicinity during the construction period. The project would temporarily affect the present pattern of circulation of the labor force as well as rail and truck traffic associated with the construction and operation phases of the project.

Construction traffic related to the project would utilize existing parking areas at the refinery during construction. It would not affect the existing refinery facilities or the shipping and receiving facilities at the project site.

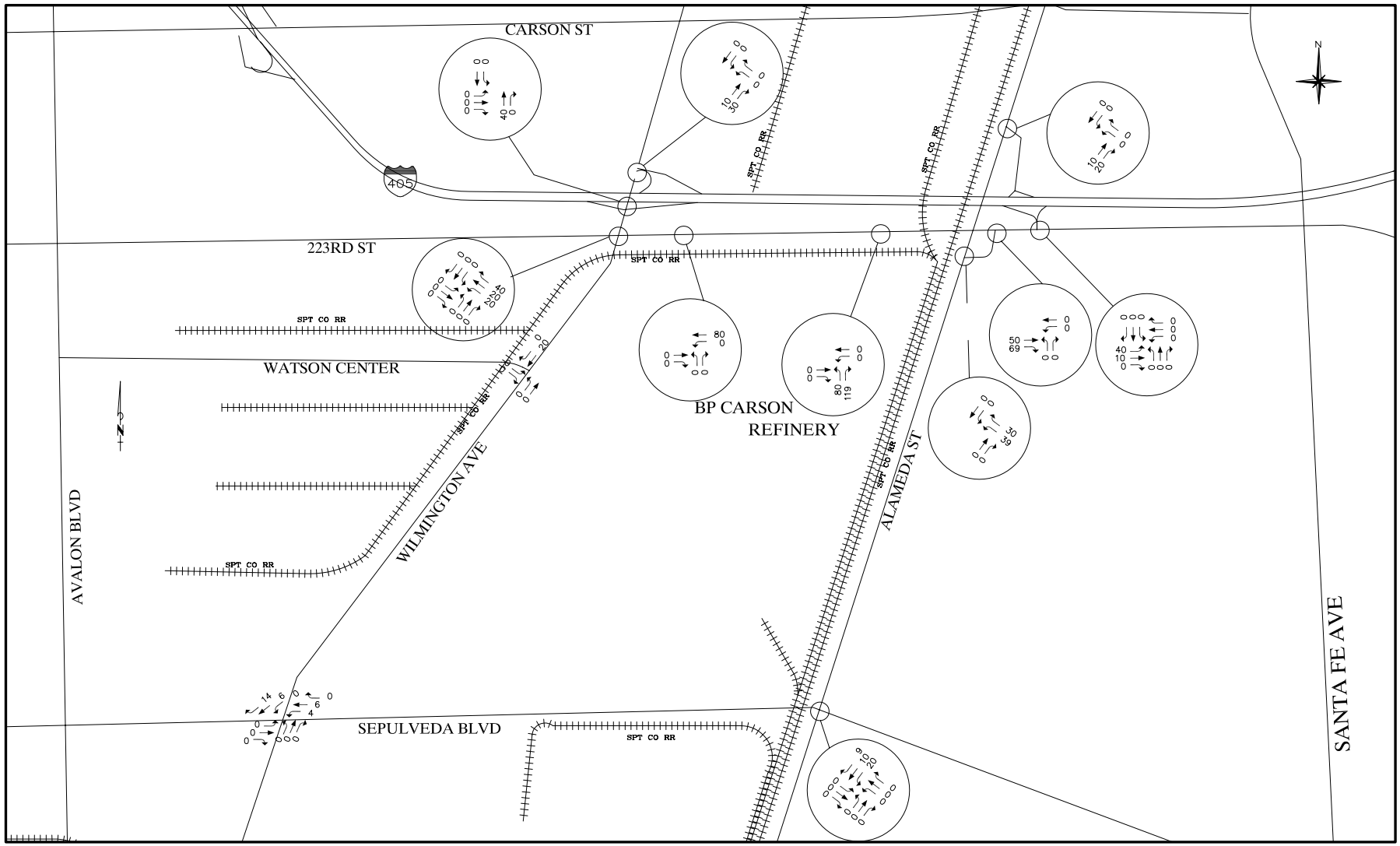


Figure 3-2

PROJECT PM
PEAK HOUR TURN VOLUMES

Roadways in the vicinity of the project would be impacted by the project's construction-related traffic. However, project related construction traffic would contribute less than two percent of the daily traffic volume on these roadways.

The project is proposed to be constructed over a period of 16 months (July 2005 through October 2006). To assess project impacts, project volumes were added to the existing intersection volumes and roadway segment ADT volumes and evaluated.

Existing-plus-project PM peak hour turn volumes are illustrated in Figure 3-3. Corresponding ICUs based on existing lane configurations are summarized in Table 3-2 (actual ICU calculations are included in Appendix A). An examination of this table reveals that project construction traffic does not increase the PM peak hour level of service at study locations above the impact significance thresholds established by the SCAQMD or the thresholds established as acceptable by the City of Carson except at the intersection of Gate 60 and 223rd Street during the PM peak hour. At this intersection, the PM peak hour ICU would increase by 0.07, causing the LOS to change from C to D.

Mitigation is presented below that would reduce the change in ICU to 0.01 and would not cause a change in LOS; this would reduce the impacts to less than significant. Existing-plus-project roadway capacity utilization values are presented in Table 3-3. Demand-to-capacity ratios for freeway mainlines are summarized in Table 3-4. These tables indicate that project construction traffic does not increase the level of service for roadway segments and freeway mainlines beyond acceptable thresholds.

3.4 ON-SITE CIRCULATION AND PARKING

Sufficient on-site parking is available to accommodate the increased parking demand from construction workers at the refinery. The total number of on-site parking spaces exceeds the maximum forecast number of construction worker vehicles and provides ample maneuvering space on-site for heavy trucks.

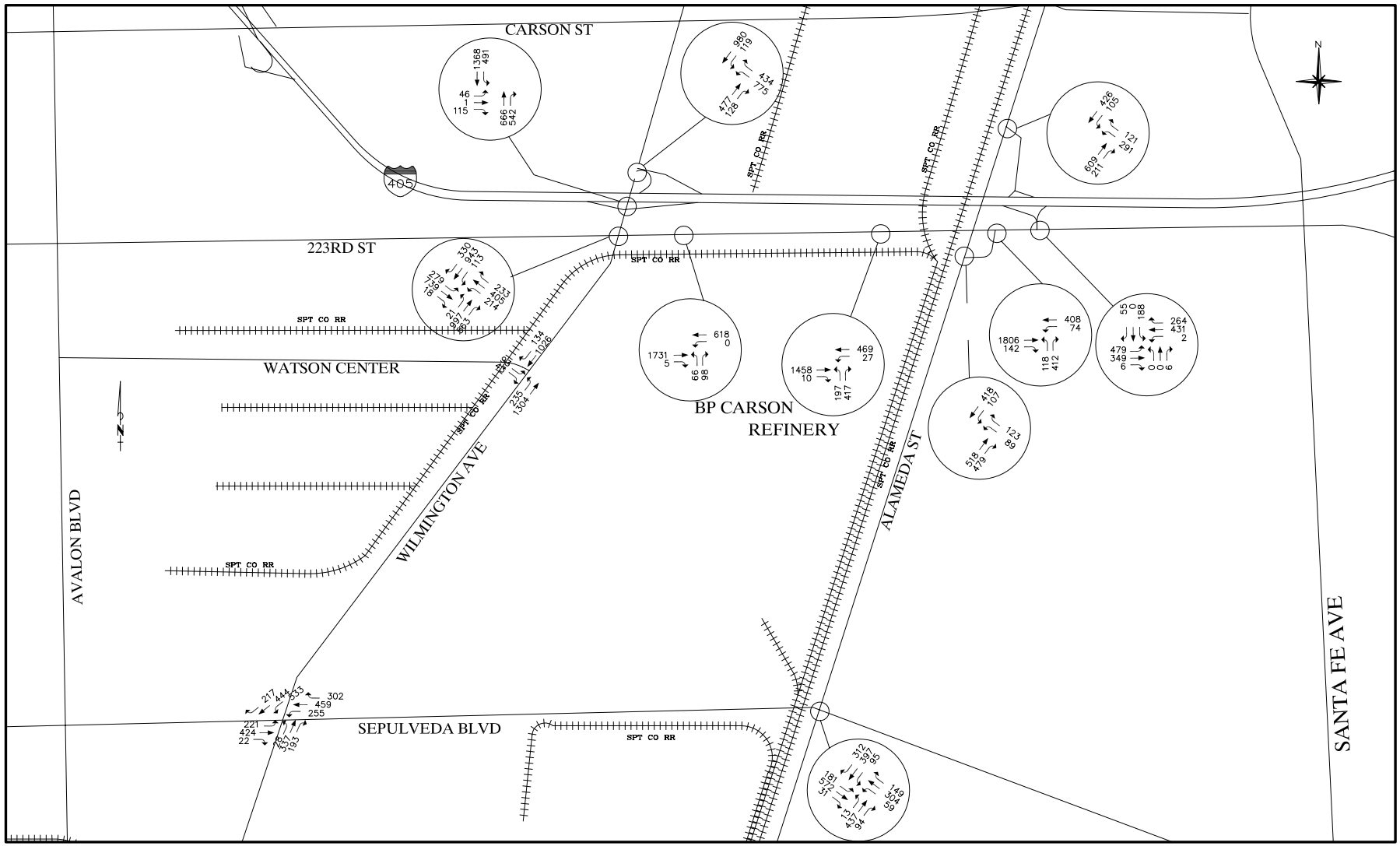


Figure 3-3

EXISTING+PROJECT PM
PEAK HOUR TURN VOLUMES

Table 3-2

EXISTING + PROJECT LEVEL OF SERVICE SUMMARY
- BP Carson Refinery

Intersection	Existing PM	Existing + Project PM	Percent Change	W/MIT
1. Wilmington & I-405 NB on/off	.70	.70	NC	--
2. Wilmington & I-405 SB on/off	.74	.74	NC	--
3. Wilmington & 223rd	.83	.84	.01	--
4. Wilmington & Watson Center	.70	.70	NC	--
5. Wilmington & Sepulveda	.90	.90	NC	--
6. Alameda & I-405 NB	.54	.54	NC	--
7. Alameda & 223/Wardlow Access	.48	.48	NC	--
8. Alameda & Sepulveda	.85	.86	.01	--
9. I-405 SB on/off & 223/Wardlow	.49	.50	.01	--
10. 223rd & Alameda/Wardlow Access	.84	.85	.01	--
11. Gate 16 & 223rd	.74	.74	NC	--
12. Gate 60 & 223rd	.75	.82	.07	.76

NC – no change

Level of service ranges: .00 - .60 A
.61 - .70 B
.70 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

Table 3-3

EXISTING+PROJECT ROADWAY SYSTEM

Jurisdiction	Impacted Roadway Segments On	Between	Road Class	Median	No. of Lanes	Design Capacity	Existing ADT	Project ADT	-- Existing + Project -- ADT	V/C	LOS
Carson	Avalon	Lomita to Sepulveda	Primary	Divided	4	32,000	24,760	0	24,760	.77	C
Carson	Avalon	Sepulveda to 223rd	Primary	Divided	4	32,000	24,760	0	24,760	.77	C
Carson	Avalon	223rd to Carson	Primary	Divided	4	32,000	24,760	0	24,760	.77	C
Carson	Wilmington	Lomita to Sepulveda	Primary	Divided	4	24,000	19,130	22	19,152	.79	C
Carson	Wilmington	Sepulveda to 223rd	Primary	Divided	4	32,000	32,530	32	32,562	1.02	F
Carson	Wilmington	223rd to Carson	Primary	Divided	4	32,000	25,900	62	25,962	.80	C
Carson	Alameda	Lomita to Sepulveda	Primary	Divided	4	32,000	29,356	16	29,372	.92	E
Carson	Alameda	Sepulveda to 223rd	Primary	Divided	4	32,000	29,356	61	29,417	.92	E
Carson	Alameda	223rd to Carson	Primary	Divided	4	32,000	27,630	48	27,678	.86	D
Carson	Carson	Avalon to 405 Fwy	Primary	Divided	4	32,000	30,400	0	30,400	.95	E
Carson	Carson	405 Fwy to Wilmington	Primary	Undivided	4	24,000	14,650	0	14,650	.61	A
Carson	Carson	Wilmington to Alameda	Primary	Undivided	4	24,000	9,000	0	9,000	.37	A
Carson	223rd	Avalon to Wilmington	Primary	Divided	4	32,000	20,700	32	20,729	.65	B
Carson	223rd	Wilmington to Alameda	Primary	Undivided	4	32,000	20,100	126	20,226	.63	B
Carson	223rd	e/o Alameda	Primary	Undivided	4	32,000	21,300	78	21,378	.67	B
Carson	Sepulveda	Avalon to Wilmington	Primary	Divided	4	32,000	18,000	22	18,022	.56	A
Carson	Sepulveda	Wilmington to Alameda	Primary	Divided	4	32,000	18,000	16	18,016	.56	A
Carson	Sepulveda	e/o Alameda	Primary	Divided	4	32,000	16,900	32	16,932	.53	A
Carson	Lomita	Avalon to Wilmington	Secondary	Undivided	4	24,000	16,900	0	16,900	.70	B
Carson	Lomita	Wilmington to Alameda	Secondary	Undivided	4	24,000	7,880	0	7,880	.33	A

Major Highways - Carry high traffic volumes and are the primary thoroughfares linking adjacent cities. Driveway access to these roadways is typically limited to provide efficient high volume traffic flow

Primary Highways - Carry high traffic volumes and provide limited access. They function to link the major highways to the secondary highways as well as carry vehicles entering and exiting the city. Driveway access is also typically limited, where feasible.

Secondary Highways - Carry traffic along the perimeters of major developments and are also through streets enabling traffic to cross large areas of the city.

Table 3-4

FREEWAY MAINLINE DEMAND-TO-CAPACITY RATIOS SUMMARY

		Existing						Existing + Project					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	**Capacity**	**Demand**	**D/C**	**LOS**	**Demand**	**D/C**	**LOS**	**Demand**	**D/C**	**LOS**	**Demand**	**D/C**	**LOS**
Wilmington & I-405 NB on/off ramp	10,000	6,696	.67	C	7,560	.76	C	6,696	.67	C	7,560	.76	C
Wilmington & I-405 SB on/off ramp	10,000	6,048	.61	C	6,720	.67	C	6,048	.61	C	6,741	.67	C
Alameda & I-405 NB ramps	10,000	2,550	.26	A	2,890	.29	A	2,550	.26	A	2,897	.29	A
I-405 SB on/off ramps & 223rd/Wardlow	10,000	3,450	.35	A	3,910	.39	B	3,450	.35	A	3,933	.39	B

FREEWAY DEMAND/CAPACITY RATIO

D/C Ratio	LOS	D/C Ratio	LOS
.00 - .35	A	1.01 – 1.25	F (0)
.36 - .54	B	1.26 – 1.35	F (1)
.55 - .77	C	1.36 – 1.45	F (2)
.78 - .93	D	Above 1.45	F (3)
.94 – 1.00	E		

3.5 PROPOSED TRAFFIC MITIGATION MEASURES

Project construction traffic is expected to result in a significant adverse impact at the intersection of Gate 60 and 223rd Street during the PM peak hour. The following measures would reduce impacts to less than significant.

1. Access to and from the construction site shall be limited to those access points identified and evaluated in the traffic study. The two existing exit lanes laving the refinery at Gate 60 and 223rd Street will be re-striped to provide an exclusive right-turn lane and a shared left-turn and right-turn lane. If plans change such that different access points are proposed, these proposed changes shall be evaluated by a registered Traffic Engineer and submitted to the City of Carson Traffic Engineer for review.

2. Sufficient parking shall be provided on-site to accommodate all the construction employees. No on-street parking off the site shall be permitted.

3. Delivery of construction materials to the site shall be scheduled for off-peak periods (i.e. 9:00 AM until 3:00 PM) and/or after 7:00 PM and before 7:00 AM. If more than two (2) truck deliveries per day are scheduled within the AM and PM peak periods, a supplemental analysis shall be prepared by a registered Traffic Engineer and submitted to the City of Carson Traffic Engineer for review.

4. Truck operators for delivery of over-sized equipment and materials shall be scheduled for non-peak AM and PM periods (i.e., no such deliveries 7:00 AM – 9:00 AM and 4:00 PM – 6 PM).

APPENDIX A

INTERSECTION CAPACITY UTILIZATION

1. Wilmington & I-405 NB on/off

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	549	.17*	467	.15*
NBR	1	1600	71	.04	98	.06
SBL	1	1600	43	.03*	119	.07*
SBT	3	4800	699	.15	980	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		822		775	
WBT	0	3200	0	.39*	0	.38*
WBR	0.5		427		434	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.69**		**.70**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	549	.17*	477	.15*
NBR	1	1600	71	.04	128	.08
SBL	1	1600	43	.03*	119	.07*
SBT	3	4800	699	.15	980	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		822		775	
WBT	0	3200	0	.39*	0	.38*
WBR	0.5		427		434	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.69**		**.70**

2. Wilmington & I-405 SB on/off

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	489	.15*	626	.20*
NBR	1	1600	747	.47	542	.34
SBL	1.5		441	{.26}*	491	{.29}*
SBT	2.5	6400	1205	.26	1368	.29
SBR	0	0	0		0	
EBL	1	1600	152	.10*	46	.03*
EBT	0	0	0		1	
EBR	1	1600	315	.20	115	.07
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.24*	NBR	.12*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.85**		**.74**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	489	.15*	666	.21*
NBR	1	1600	747	.47	542	.34
SBL	1.5		441	{.26}*	491	{.29}*
SBT	2.5	6400	1205	.26	1368	.29
SBR	0	0	0		0	
EBL	1	1600	152	.10*	46	.03*
EBT	0	0	0		1	
EBR	1	1600	315	.20	115	.07
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.24*	NBR	.11*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.85**		**.74**

3. Wilmington & 223rd

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	32	.02*	21	.01
NBT	2	3200	712	.22	997	.31*
NBR	1	1600	290	.18	563	.35
SBL	1	1600	80	.05	113	.07*
SBT	2	3200	883	.28*	943	.29
SBR	1	1600	496	.31	330	.21
EBL	1	1600	239	.15	279	.17
EBT	2	3200	401	.13*	739	.23*
EBR	1	1600	20	.01	18	.01
WBL	1	1600	343	.21*	194	.12*
WBT	2	3200	561	.18	385	.12
WBR	1	1600	81	.05	193	.12
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.74**		**.83**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	32	.02*	21	.01
NBT	2	3200	712	.22	997	.31*
NBR	1	1600	290	.18	563	.35
SBL	1	1600	80	.05	113	.07*
SBT	2	3200	883	.28*	943	.29
SBR	1	1600	496	.31	330	.21
EBL	1	1600	239	.15	279	.17
EBT	2	3200	401	.13*	739	.23*
EBR	1	1600	20	.01	18	.01
WBL	1	1600	343	.21*	214	.13*
WBT	2	3200	561	.18	405	.13
WBR	1	1600	81	.05	233	.15
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.74**		**.84**

4. Wilmington & Watsoncntr

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	29	.02*	235	.15*
NBT	2	3200	867	.27	1304	.41
NBR	0	0	2		5	
SBL	1	1600	7	.00	24	.02
SBT	2	3200	1167	.41*	1006	.36*
SBR	0	0	136		134	
EBL	0	0	75	{.05}*	93	{.06}*
EBT	1	1600	1	.05	3	.06
EBR	1	1600	19	.01	43	.03
WBL	0	0	0		9	
WBT	1	1600	0	.00*	8	.03*
WBR	0	0	0		30	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION **.58** **.70**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	29	.02*	235	.15*
NBT	2	3200	867	.27	1304	.41
NBR	0	0	2		5	
SBL	1	1600	7	.00	24	.02
SBT	2	3200	1167	.41*	1026	.36*
SBR	0	0	136		134	
EBL	0	0	75	{.05}*	93	{.06}*
EBT	1	1600	1	.05	3	.06
EBR	1	1600	19	.01	43	.03
WBL	0	0	0		9	
WBT	1	1600	0	.00*	8	.03*
WBR	0	0	0		30	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION **.58** **.70**

5. Wilmington & Sepulveda

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	54	.03	28	.02
NBT	2	3200	512	.18*	337	.17*
NBR	0	0	76		193	
SBL	1	1600	75	.05*	533	.33*
SBT	2	3200	407	.19	438	.20
SBR	0	0	193		203	
EBL	1	1600	368	.23*	221	.14
EBT	2	3200	221	.08	424	.14*
EBR	0	0	21		22	
WBL	1	1600	98	.06	251	.16*
WBT	2	3200	278	.09*	453	.14
WBR	d	1600	61	.04	302	.19
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.65**		**.90**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	54	.03	28	.02
NBT	2	3200	512	.18*	337	.17*
NBR	0	0	76		193	
SBL	1	1600	75	.05*	533	.33*
SBT	2	3200	407	.19	444	.21
SBR	0	0	193		217	
EBL	1	1600	368	.23*	221	.14
EBT	2	3200	221	.08	424	.14*
EBR	0	0	21		22	
WBL	1	1600	98	.06	255	.16*
WBT	2	3200	278	.09*	459	.14
WBR	d	1600	61	.04	302	.19
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.65**		**.90**

6. Alameda & I-405 NB

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	327	.10*	599	.19*
NBR	1	1600	20	.01	191	.12
SBL	1	1600	47	.03*	105	.07*
SBT	2	3200	352	.11	426	.13
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	293	.18*	291	.18*
WBT	0	0	0		0	
WBR	1	1600	282	.18	121	.08
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.41**		**.54**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	327	.10*	609	.19*
NBR	1	1600	20	.01	211	.13
SBL	1	1600	47	.03*	105	.07*
SBT	2	3200	352	.11	426	.13
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	293	.18*	291	.18*
WBT	0	0	0		0	
WBR	1	1600	282	.18	121	.08
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.41**		**.54**

7. Alameda & 223/Wardlow Access

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	207	.06*	518	.16*
NBR	0	0	194	.12	479	.30
SBL	1	1600	111	.07*	107	.07*
SBT	3	4800	528	.11	418	.09
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	121	.08*	50	.03*
WBT	0	0	0		0	
WBR	1	1600	135	.08	93	.06
Right Turn Adjustment					NBR	.12*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.31**		**.48**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	207	.06*	518	.16*
NBR	0	0	194	.12	479	.30
SBL	1	1600	111	.07*	107	.07*
SBT	3	4800	528	.11	418	.09
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	121	.08*	89	.06*
WBT	0	0	0		0	
WBR	1	1600	135	.08	123	.08
Right Turn Adjustment					NBR	.09*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.31**		**.48**

8. Alameda & Sepulveda

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	13	.01
NBT	2	3200	280	.14*	437	.17*
NBR	0	0	165		94	
SBL	1	1600	127	.08*	75	.05*
SBT	2	3200	413	.13	387	.12
SBR	1	1600	106	.07	303	.19
EBL	0	0	28		181	
EBT	1	1600	222	.17*	572	.49*
EBR	0	0	21		31	
WBL	0.5		48	{.03}*	59	{.04}*
WBT	1	3200	190	.11	304	.16
WBR	0.5		109		149	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.52**		**.85**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	13	.01
NBT	2	3200	280	.14*	437	.17*
NBR	0	0	165		94	
SBL	1	1600	127	.08*	95	.06*
SBT	2	3200	413	.13	397	.12
SBR	1	1600	106	.07	312	.20
EBL	0	0	28		181	
EBT	1	1600	222	.17*	572	.49*
EBR	0	0	21		31	
WBL	0.5		48	{.03}*	59	{.04}*
WBT	1	3200	190	.11	304	.16
WBR	0.5		109		149	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.52**		**.86**

9. I-405 SB on/off & 223/Wardlow

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	1	.00*	0	.00*
NBR	0	0	4		6	
SBL	1	1600	55	.03*	188	.12*
SBT	0	0	2		0	
SBR	1	1600	112	.07	55	.03
EBL	2	3200	295	.09*	439	.14*
EBT	2	3200	405	.13	339	.11
EBR	1	1600	3	.00	6	.00
WBL	1	1600	2	.00	2	.00
WBT	3	4800	660	.16*	431	.13*
WBR	0	0	125		264	.17
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.38**		**.49**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	1	.00*	0	.00*
NBR	0	0	4		6	
SBL	1	1600	55	.03*	188	.12*
SBT	0	0	2		0	
SBR	1	1600	112	.07	55	.03
EBL	2	3200	295	.09*	479	.15*
EBT	2	3200	405	.13	349	.11
EBR	1	1600	3	.00	6	.00
WBL	1	1600	2	.00	2	.00
WBT	3	4800	660	.16*	431	.13*
WBR	0	0	125		264	.17
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.38**		**.50**

10. 223rd & Wardlow Access

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	105		118	
NBT	2	3200	0	.10*	0	.17*
NBR	0	0	214		412	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	646	.20*	1756	.55*
EBR	1	1600	101	.06	73	.05
WBL	2	3200	171	.05*	74	.02*
WBT	3	4800	372	.08	408	.09
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.45**		**.84**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	105		118	
NBT	2	3200	0	.10*	0	.17*
NBR	0	0	214		412	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	646	.20*	1806	.56*
EBR	1	1600	101	.06	142	.09
WBL	2	3200	171	.05*	74	.02*
WBT	3	4800	372	.08	408	.09
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.45**		**.85**

11. 223rd & Gate 16

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	1		66	
NBT	1	1600	0	.00	0	.10*
NBR	0	0	2		98	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	713	.22	1731	.54*
EBR	0	0	1		5	
WBL	0	0	3		0	
WBT	2	3200	1010	.32*	538	.17
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.42**		**.74**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	1		66	
NBT	1	1600	0	.00	0	.10*
NBR	0	0	2		98	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	713	.22	1731	.54*
EBR	0	0	1		5	
WBL	0	0	3		0	
WBT	2	3200	1010	.32*	618	.19
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.42**		**.74**

12. 23rd & Gate 62 60

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	11	.01*	117	.07*
NBT	0	0	0		0	
NBR	1	1600	37	.02	298	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	760	.24*	1458	.46*
EBR	1	1600	13	.01	10	.01
WBL	1	1600	42	.03*	27	.02*
WBT	3	4800	913	.19	469	.10
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.10*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.38**		**.75**

Existing+Prj

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	11	.01*	197	.12*
NBT	0	0	0		0	
NBR	1	1600	37	.02	417	.26
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	760	.24*	1458	.46*
EBR	1	1600	13	.01	10	.01
WBL	1	1600	42	.03*	27	.02*
WBT	3	4800	913	.19	469	.10
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.12*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.38**		**.82**

Existing+Prj w/MIT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		11	.01*	197	
NBT	0	3200	0		0	(.18)*
NBR	1.5		37	(.00)	417	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	760	.24*	1458	.46*
EBR	1	1600	13	.01	10	.01
WBL	1	1600	42	.03*	27	.02*
WBT	3	4800	913	.19	469	.10
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.38**		**.76**

APPENDIX B

TRAFFIC COUNT DATA

TRAFFIC DATA SERVICES, INC

SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S ST : WILMINGTON AVE
E/W ST: I-405 NB ON/OFF RAMPS
CITY: CARSON

FILENAME: 1141701
DATE: 11/22/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
LANES:		2	1	1	3					1.5		0.5	
6:00 AM		62	18	10	91					152		80	413
15 AM		76	17	8	86					168		83	438
30 AM		118	14	19	130					220		113	614
45 AM		126	16	8	142					237		91	620
7:00 AM		91	15	4	121					200		99	530
15 AM		99	17	8	138					206		95	563
30 AM		147	30	14	193					255		138	777
45 AM		137	12	6	191					187		82	615
8:00 AM		129	21	11	186					192		103	642
15 AM		136	8	12	129					188		104	577
30 AM		99	19	12	120					145		88	483
45 AM		119	20	7	144					130		76	496
PEAK HOUR BEGINS AT: 730 AM													PHF: 0.84
VOLUMES =	0	549	71	43	699	0	0	0	0	822	0	427	2611

FILENAME: 1141701P
DATE: 11/22/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
30 PM		132	17	37	205					160		76	627
45 PM		122	22	49	174					195		142	704
4:00 PM		107	35	38	174					166		127	647
15 PM		98	23	48	183					174		104	630
30 PM		122	29	68	220					197		141	777
45 PM		148	26	89	267					196		108	834
5:00 PM		102	22	91	229					186		94	724
15 PM		95	21	63	264					196		91	730
30 PM		103	15	48	212					213		60	651
45 PM		110	17	41	189					186		65	608
6:00 PM													
15 PM													
PEAK HOUR BEGINS AT: 1630 PM													PHF: 0.92
VOLUMES =	0	467	98	311	980	0	0	0	0	775	0	434	3065

COMMENTS:

TRAFFIC DATA SERVICES, INC

SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S ST : WILMINGTON AVE
E/W ST: I-405 SB ON/OFF RAMPS
CITY: CARSON

FILENAME: 1141702
DATE: 11/22/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
LANES:		2	1	1	3		0.5	1	0.5				
6:00 AM		63	101	37	195		17	0	30				443
15 AM		56	128	50	204		38	0	56				532
30 AM		110	201	78	291		37	0	75				792
45 AM		63	142	83	253		24	0	93				658
7:00 AM		66	178	95	275		22	0	80				716
15 AM		104	225	95	334		30	0	77				865
30 AM		150	168	110	302		30	0	84				844
45 AM		129	184	111	299		46	0	83				852
8:00 AM		106	170	125	270		46	0	71				788
15 AM		109	153	109	269		40	0	61				741
30 AM		92	117	78	183		30	0	52				552
45 AM		88	108	62	164		25	0	61				508
PEAK HOUR BEGINS AT: 715 AM													PHF: 0.97
VOLUMES =	0	489	747	441	1205	0	152	0	315	0	0	0	3349

FILENAME: 1141702P
DATE: 11/22/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
30 PM		141	117	100	254		16	0	36				664
45 PM		136	118	109	306		20	2	40				731
4:00 PM		135	151	96	370		16	0	28				796
15 PM		106	128	85	243		8	0	24				594
30 PM		174	141	130	378		14	0	37				874
45 PM		179	155	121	341		19	0	28				843
5:00 PM		139	125	112	319		7	0	29				731
15 PM		134	121	128	330		6	1	21				741
30 PM		115	134	140	414		8	0	19				830
45 PM		142	138	119	327		11	0	24				761
6:00 PM													
15 PM													
PEAK HOUR BEGINS AT: 1630 PM													PHF: 0.91
VOLUMES =	0	626	542	491	1368	0	46	1	115	0	0	0	3189

COMMENTS:

TRAFFIC DATA SERVICES, INC

SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S ST : WILMINGTON AVE
E/W ST: 223RD ST
CITY: CARSON

FILENAME: 1141703A
DATE: 11/29/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
LANES:	1	2	1	1	2	1	1	2	1	1	2	1	
6:00 AM	0	122	36	13	165	64	45	23	0	20	22	6	516
15 AM	2	100	22	12	155	50	43	42	1	16	27	9	479
30 AM	5	177	37	14	230	111	63	43	2	65	88	14	849
45 AM	1	138	40	19	236	103	64	47	2	53	60	10	773
7:00 AM	6	197	65	22	200	113	42	60	4	86	117	20	932
15 AM	4	161	59	14	232	132	59	94	4	72	127	29	987
30 AM	8	187	94	17	234	122	69	98	9	110	130	24	1102
45 AM	9	158	58	21	224	129	65	133	5	88	157	14	1061
8:00 AM	11	206	79	28	193	113	46	76	2	73	147	14	988
15 AM	0	119	44	17	181	78	57	84	3	47	90	13	733
30 AM	7	145	59	25	152	99	50	61	4	42	76	14	734
45 AM	3	153	49	26	162	84	48	54	5	16	65	17	682
PEAK HOUR BEGINS AT: 715 AM													PHF: 0.94
VOLUMES =	32	712	290	80	883	496	239	401	20	343	561	81	4138

FILENAME: 1141703P
DATE: 11/22/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
30 PM	6	177	115	28	172	86	63	131	3	33	101	25	940
45 PM	3	229	86	33	190	84	62	147	1	29	61	24	949
4:00 PM	0	209	120	39	241	88	73	185	5	43	75	23	1101
15 PM	3	214	160	23	145	61	74	155	4	39	78	32	988
30 PM	6	310	195	34	241	108	72	156	4	106	154	71	1457
45 PM	1	181	101	20	256	71	81	133	1	43	60	43	991
5:00 PM	3	235	114	29	210	96	76	251	10	38	64	46	1172
15 PM	11	271	153	30	236	55	50	199	3	7	107	33	1155
30 PM	7	211	108	28	276	128	69	233	5	36	58	27	1186
45 PM	10	212	105	21	154	92	76	148	6	34	54	14	926
6:00 PM													
15 PM													
PEAK HOUR BEGINS AT: 1630 PM													PHF: 0.82
VOLUMES =	21	997	563	113	943	330	279	739	18	194	385	193	4775

COMMENTS:

TRAFFIC DATA SERVICES, INC

SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S ST : ARCO
E/W ST: 223RD ST
CITY: CARSON

FILENAME: 1141704A
DATE: 11/29/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
LANES:	0.5		0.5					2	0	1	2		
6:00 AM	2		5					65	6	13	45		136
15 AM	2		3					69	3	13	72		162
30 AM	1		3					76	5	8	118		211
45 AM	0		3					111	4	15	179		312
7:00 AM	2		6					110	4	19	166		307
15 AM	1		6					180	5	11	235		438
30 AM	4		12					210	2	8	214		450
45 AM	2		3					201	3	17	242		468
8:00 AM	4		16					169	3	6	222		420
15 AM	2		11					144	3	13	144		317
30 AM	2		5					116	5	6	134		268
45 AM	4		5					117	2	10	133		271
PEAK HOUR BEGINS AT:													PHF: 0.95
715 AM													
VOLUMES =	11	0	37	0	0	0	0	760	13	42	913	0	1776

FILENAME: 1141704Q
DATE: 11/29/2004
DAY: MONDAY

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	Total
30 PM	4		20					264	4	4	104		400
45 PM	3		18					302	3	3	110		439
4:00 PM	6		18					266	5	5	97		397
15 PM	6		44					354	7	8	99		518
30 PM	57		146					389	3	8	107		710
45 PM	43		112					315	4	7	112		593
5:00 PM	12		27					385	1	4	99		528
15 PM	5		13					369	2	8	151		548
30 PM	9		8					391	2	9	113		532
45 PM	2		8					309	1	6	101		427
6:00 PM													
15 PM													
PEAK HOUR BEGINS AT:													PHF: 0.84
1630 PM													
VOLUMES =	117	0	298	0	0	0	0	1458	10	27	469	0	2379

COMMENTS:

AUSTIN FOUST ASSOCIATES, INC.
TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

File- 11417.001

LOCATION- WILMINGTON S/O 223RD
CARSON

Volumes for - MONDAY 1/22/2004

	A M							P M					
TIME	NB		SB		TOTAL		TIME	NB		SB		TOTAL	
12:00 AM	28		44		72		12:00 PM	256		224		480	
:15 AM	16		25		41		:15 PM	212		225		437	
:30 AM	55		19		74		:30 PM	245		216		461	
:45 AM	20	119	17	105	37	224	:45 PM	204	917	204	869	408	1786
1:00 AM	31		18		49		1:00 PM	194		190		384	
:15 AM	27		29		56		:15 PM	218		228		446	
:30 AM	73		26		99		:30 PM	234		232		466	
:45 AM	20	151	34	107	54	258	:45 PM	222	868	232	882	454	1750
2:00 AM	45		26		71		2:00 PM	267		229		496	
:15 AM	38		21		59		:15 PM	260		238		498	
:30 AM	43		26		69		:30 PM	284		244		528	
:45 AM	34	160	24	97	58	257	:45 PM	278	1089	259	970	537	2059
3:00 AM	44		24		68		3:00 PM	290		258		548	
:15 AM	34		33		67		:15 PM	287		255		542	
:30 AM	38		40		78		:30 PM	346		230		576	
:45 AM	39	155	59	156	98	311	:45 PM	278	1201	260	1003	538	2204
4:00 AM	48		23		71		4:00 PM	352		292		644	
:15 AM	60		68		128		:15 PM	410		240		650	
:30 AM	85		92		177		:30 PM	371		312		683	
:45 AM	114	307	142	325	256	632	:45 PM	311	1444	288	1132	599	2576
5:00 AM	90		134		224		5:00 PM	419		262		681	
:15 AM	139		162		301		:15 PM	340		278		618	
:30 AM	218		232		450		:30 PM	361		266		627	
:45 AM	178	625	289	817	467	1442	:45 PM	292	1412	246	1052	538	2464
6:00 AM	216		186		402		6:00 PM	278		242		520	
:15 AM	206		248		454		:15 PM	235		236		471	
:30 AM	255		255		510		:30 PM	216		182		398	
:45 AM	218	895	311	1000	529	1895	:45 PM	189	918	172	832	361	1750
7:00 AM	243		279		522		7:00 PM	206		168		374	
:15 AM	263		274		537		:15 PM	160		146		306	
:30 AM	294		341		635		:30 PM	170		128		298	
:45 AM	276	1076	330	1224	606	2300	:45 PM	138	674	129	571	267	1245
8:00 AM	249		296		545		8:00 PM	130		116		246	
:15 AM	270		250		520		:15 PM	106		96		202	
:30 AM	240		218		458		:30 PM	114		106		220	
:45 AM	198	957	218	982	416	1939	:45 PM	90	440	105	423	195	863
9:00 AM	220		204		424		9:00 PM	136		95		231	
:15 AM	173		169		342		:15 PM	115		83		198	
:30 AM	186		211		397		:30 PM	88		107		195	
:45 AM	204	783	151	735	355	1518	:45 PM	85	424	92	377	177	801
10:00 AM	177		202		379		10:00 PM	124		73		197	
:15 AM	208		186		394		:15 PM	71		58		129	
:30 AM	188		204		392		:30 PM	67		58		125	
:45 AM	216	789	200	792	416	1581	:45 PM	64	326	64	253	128	579
11:00 AM	212		202		414		11:00 PM	68		40		108	
:15 AM	211		207		418		:15 PM	54		29		83	
:30 AM	236		259		495		:30 PM	30		31		61	
:45 AM	208	867	233	901	441	1768	:45 PM	42	194	32	132	74	326
TOTALS		6884		7241		14125			9,907		8,496		18,403
							ADT'S		16,791		15,737		32,528

AUSTIN FOUST ASSOCIATES, INC.
TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

File- 11417.002

LOCATION- 223RD-E/O WILMINGTON
CARSON

Volumes for - MONDAY 1/22/2004

	A M							P M					
TIME	EB		WB		TOTAL		TIME	EB		WB		TOTAL	
12:00 AM	16		8		24		12:00 PM	173		156		329	
:15 AM	6		2		8		:15 PM	172		129		301	
:30 AM	22		10		32		:30 PM	194		126		320	
:45 AM	11	55	14	34	25	89	:45 PM	133	672	112	523	245	1195
1:00 AM	10		9		19		1:00 PM	140		106		246	
:15 AM	11		9		20		:15 PM	171		102		273	
:30 AM	18		10		28		:30 PM	164		129		293	
:45 AM	14	53	4	32	18	85	:45 PM	154	629	109	446	263	1075
2:00 AM	12		9		21		2:00 PM	172		84		256	
:15 AM	16		13		29		:15 PM	171		141		312	
:30 AM	8		4		12		:30 PM	248		130		378	
:45 AM	8	44	8	34	16	78	:45 PM	214	805	123	478	337	1283
3:00 AM	14		15		29		3:00 PM	291		102		393	
:15 AM	5		7		12		:15 PM	304		130		434	
:30 AM	16		18		34		:30 PM	298		114		412	
:45 AM	18	53	12	52	30	105	:45 PM	281	1174	132	478	413	1652
4:00 AM	24		10		34		4:00 PM	328		134		462	
:15 AM	12		13		25		:15 PM	355		146		501	
:30 AM	26		24		50		:30 PM	356		244		600	
:45 AM	39	101	33	80	72	181	:45 PM	346	1385	180	704	526	2089
5:00 AM	38		33		71		5:00 PM	401		156		557	
:15 AM	85		44		129		:15 PM	441		160		601	
:30 AM	142		72		214		:30 PM	380		120		500	
:45 AM	88	353	74	223	162	576	:45 PM	304	1526	134	570	438	2096
6:00 AM	100		66		166		6:00 PM	282		136		418	
:15 AM	122		70		192		:15 PM	212		80		292	
:30 AM	107		122		229		:30 PM	154		62		216	
:45 AM	164	493	156	414	320	907	:45 PM	148	796	60	338	208	1134
7:00 AM	158		178		336		7:00 PM	127		76		203	
:15 AM	205		210		415		:15 PM	108		47		155	
:30 AM	256		218		474		:30 PM	95		44		139	
:45 AM	245	864	202	808	447	1672	:45 PM	80	410	40	207	120	617
8:00 AM	182		152		334		8:00 PM	88		42		130	
:15 AM	212		160		372		:15 PM	62		44		106	
:30 AM	174		137		311		:30 PM	58		36		94	
:45 AM	124	692	112	561	236	1253	:45 PM	51	259	46	168	97	427
9:00 AM	144		98		242		9:00 PM	56		47		103	
:15 AM	136		97		233		:15 PM	34		37		71	
:30 AM	112		110		222		:30 PM	48		22		70	
:45 AM	122	514	88	393	210	907	:45 PM	32	170	28	134	60	304
10:00 AM	115		86		201		10:00 PM	58		36		94	
:15 AM	152		119		271		:15 PM	42		30		72	
:30 AM	119		110		229		:30 PM	37		26		63	
:45 AM	107	493	105	420	212	913	:45 PM	17	154	24	116	41	270
11:00 AM	152		112		264		11:00 PM	44		22		66	
:15 AM	144		100		244		:15 PM	20		16		36	
:30 AM	133		100		233		:30 PM	24		14		38	
:45 AM	144	573	130	442	274	1015	:45 PM	12	100	18	70	30	170
TOTALS		4288		3493		7781			8,080		4,232		12,312
							ADT'S		12,368		7,725		20,093

AUSTIN FOUST ASSOCIATES, INC.
TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

File- 11417.003

LOCATION- ALAMEDA-N/O SEPULV EDA
CARSON

Volumes for - MONDAY 2/4/2004

	A M							P M					
TIME	NB		SB		TOTAL		TIME	NB		SB		TOTAL	
12:00 AM	20		19		39		12:00 PM	225		220		445	
:15 AM	17		45		62		:15 PM	185		208		393	
:30 AM	24		30		54		:30 PM	191		225		416	
:45 AM	26	87	29	123	55	210	:45 PM	168	769	163	816	331	1585
1:00 AM	25		23		48		1:00 PM	168		216		384	
:15 AM	30		10		40		:15 PM	158		182		340	
:30 AM	30		20		50		:30 PM	250		208		458	
:45 AM	26	111	32	85	58	196	:45 PM	210	786	227	833	437	1619
2:00 AM	24		16		40		2:00 PM	258		199		457	
:15 AM	22		20		42		:15 PM	228		212		440	
:30 AM	20		42		62		:30 PM	258		276		534	
:45 AM	33	99	22	100	55	199	:45 PM	256	1000	246	933	502	1933
3:00 AM	28		35		63		3:00 PM	268		238		506	
:15 AM	32		42		74		:15 PM	278		221		499	
:30 AM	30		56		86		:30 PM	346		254		600	
:45 AM	50	140	59	192	109	332	:45 PM	366	1258	282	995	648	2253
4:00 AM	52		46		98		4:00 PM	393		254		647	
:15 AM	50		52		102		:15 PM	382		233		615	
:30 AM	56		74		130		:30 PM	441		298		739	
:45 AM	60	218	71	243	131	461	:45 PM	458	1674	276	1061	734	2735
5:00 AM	70		86		156		5:00 PM	498		276		774	
:15 AM	112		119		231		:15 PM	471		226		697	
:30 AM	123		170		293		:30 PM	424		185		609	
:45 AM	120	425	230	605	350	1030	:45 PM	288	1681	178	865	466	2546
6:00 AM	102		198		300		6:00 PM	258		152		410	
:15 AM	144		256		400		:15 PM	190		80		270	
:30 AM	158		314		472		:30 PM	170		100		270	
:45 AM	172	576	334	1102	506	1678	:45 PM	107	725	82	414	189	1139
7:00 AM	166		344		510		7:00 PM	106		112		218	
:15 AM	184		372		556		:15 PM	93		84		177	
:30 AM	242		417		659		:30 PM	112		57		169	
:45 AM	215	807	376	1509	591	2316	:45 PM	102	413	85	338	187	751
8:00 AM	173		286		459		8:00 PM	83		50		133	
:15 AM	160		292		452		:15 PM	63		56		119	
:30 AM	180		280		460		:30 PM	58		78		136	
:45 AM	169	682	278	1136	447	1818	:45 PM	57	261	58	242	115	503
9:00 AM	224		185		409		9:00 PM	66		46		112	
:15 AM	199		193		392		:15 PM	54		40		94	
:30 AM	210		210		420		:30 PM	33		59		92	
:45 AM	175	808	202	790	377	1598	:45 PM	53	206	35	180	88	386
10:00 AM	180		200		380		10:00 PM	43		48		91	
:15 AM	215		207		422		:15 PM	53		52		105	
:30 AM	170		264		434		:30 PM	56		34		90	
:45 AM	220	785	236	907	456	1692	:45 PM	52	204	31	165	83	369
11:00 AM	202		204		406		11:00 PM	50		34		84	
:15 AM	242		208		450		:15 PM	34		40		74	
:30 AM	208		224		432		:30 PM	32		29		61	
:45 AM	210	862	242	878	452	1740	:45 PM	28	144	20	123	48	267
TOTALS		5600		7670		13270			9,121		6,965		16,086
							ADT'S		14,721		14,635		29,356

APPENDIX C

PROJECT DESCRIPTION

Tank 710 Replacement
No. 51 Vacuum Distillation Unit Replacement
No. 1 Crude Unit Relief Valves Modifications
Butane Tank Car Loading Rack Relief Valves Modifications

Tank 710 Replacement

Sulfur and nitrogen compounds are converted to H_2S and NH_3 in the process of refining crude oil. The H_2S and NH_3 are concentrated in the off-gas streams from the refinery process units. Process water absorbs H_2S and NH_3 when it contacts these off-gas streams. This water containing H_2S and NH_3 is called sour water.

Tank 710 currently serves as the primary collection point for sour water from multiple process units at the Carson Refinery. It is a fixed roof, cylindrical shaped tank, 90 feet in diameter and 48 feet tall, with a capacity of 55,000 barrels (bbl). A blanket of gas/vapor in the space above the sour water in the tank is maintained at a slight positive pressure to keep air out of the sour water system. Vapors above the sour water discharge to a vapor recovery system when an increase in the sour water surface level displaces them. The tank is also equipped with a system to skim hydrocarbons that might be present from the surface of the sour water in the tank.

The sour water is pumped from Tank 710 to Tanks 774 and 775, which are feed tanks for the sour water strippers. The sour water strippers remove the H_2S and NH_3 from the sour water. BP is proposing to replace the existing tank with a pressurized 75 ft.-9 in.-diameter spherical tank with a capacity of 40,600 bbl. The new sphere will receive the sour water currently received by the existing tank. The sour water throughput will not change. The sphere will be sealed, which will prevent vapor leaks, and capable of holding a pressure of at least 15 psig. The space above the sour water in the sphere will be filled with natural gas.

The new sphere will be connected to the Refinery's vapor recovery system and to the South Area Flare. Because the sour water throughput will not increase and the vapor space will be the same as or less than the vapor space of the existing tank, the load on the vapor recovery system will not increase. The sphere will be designed to vent to the South Area Flare only during a fire. Routine venting to the flare system will not occur.

The new sphere will be constructed at the same location as the existing Tank 710. BP intends to remove Tank 710 from service and demolish it prior to the start of construction of the new sphere. During the period between removal of the existing tank from service and completion of construction of the new sphere, sour water will be routed directly to Tank 774, which is equipped with a skimming system to remove hydrocarbons. Sour water will then flow from Tank 774 to Tank 775 to feed the sour

water strippers. Tanks 774 and 775 each have the same capacity as the existing Tank 710 and, as noted above, currently operate in sour water service.

Construction of the new sphere is scheduled to begin during August 2005 and the tank would go into operation in November 2006. Construction activities are expected to require a maximum of approximately 43 workers. Construction activities are anticipated to take place four days per week, Monday through Friday, from 6:00 AM to 4:30 PM.

It is anticipated that the new spherical sour water collection tank can be operated with existing Refinery staffing. The storage sphere could operate up to 24 hours per day for 365 days per year.

No. 51 Vacuum Distillation Unit Replacement

The Refinery's No. 51 Vacuum Distillation Unit (Vacuum Tower) distills feedstocks from the crude distillation units into gas oils, vacuum tower bottoms and off-gas. The feedstocks from the crude units are routed to a feed surge drum, through a gas-fired heater and then to the Vacuum Tower. The Vacuum Tower separates the feedstocks into various components (products) that boil at different temperatures. These products are processed further in various Refinery process units. The Vacuum Tower operates under a vacuum to achieve the separation at a lower temperature than would be required at atmospheric pressure.

The existing No. 51 Vacuum Distillation Unit was constructed in 1953 and started operations in 1954. As a result of its age, maintenance requirements have increased. BP is proposing to replace the existing Vacuum Tower with a new Vacuum Tower to reduce maintenance requirements and to improve reliability. The proposed new No. 51 Vacuum Tower will be functionally similar to the existing tower but will have somewhat different dimensions. The existing vacuum column, which will be abandoned in-place, is 26 ft.-0 in. in diameter at its widest part and 88 ft.-2 in. tall. The new vacuum column will be 31 ft.-6 in. in diameter at its widest part and 136 ft.-6 in. tall.

The new Vacuum Tower will also improve some product yields. Vacuum residue currently produced by the existing tower will be upgraded to heavy gas oil, and heavy gas oil currently produced will be upgraded to diesel. The increased diesel production will replace diesel feed for the downstream hydrocracker that is currently imported by pipeline to the Refinery. The decreased heavy gas oil production rate will be replaced by heavy gas oil feed, imported to the Refinery by pipeline, for the

downstream fluid feed hydrodesulfurization unit. The vacuum tower bottoms production rate will decrease, resulting in reduced bottoms feed to the cooker unit. The sour water generation rate from the Vacuum Tower will increase slightly, but the increase will be accommodated within the current capacities of the sour water strippers and the Refinery's sulfur plant.

Neither the feed rate to the Vacuum Tower nor the firing rate of the feed heater will increase, and no modifications are planned to upstream or downstream units at the Refinery. Construction of the new Vacuum Tower is scheduled to begin during July 2005 and to be completed during October 2006. Construction activities are expected to require a maximum of approximately 66 workers. Construction activities are anticipated to take place four days per week, Monday through Friday, from 6:00 AM to 4:30 PM.

It is anticipated that the new Vacuum Tower can be operated with existing Refinery staffing. The Vacuum Tower could operate up to 24 hours per day for 365 days per year.

No. 1 Crude Unit Relief Valves Modifications

During emergencies, pressure relief valves open to relieve excess pressures in refinery process units. The Carson Refinery's No. 1 Crude Unit was built in 1980 with its pressure relief valves designed to discharge to the atmosphere. Thus, atmospheric emissions could occur when these valves open during emergency conditions. BP is proposing modifications to the No. 1 Crude Unit relief system to collect hydrocarbon releases during emergency conditions and burn the hydrocarbons in the Refinery's existing No. 5 Flare. Burning the hydrocarbons in the flare will reduce emissions substantially during emergency conditions

The existing atmospheric relief valves will be replaced with new relief valves, which will discharge to a new unit relief header that will be added to the No. 1 Crude Unit. The new header will send the releases to a new horizontally-mounted unit flare knockout drum (10 ft. diameter by 20 ft. long), where liquids will be removed and pumped to existing tankage with a new pump. The vapor from the new knockout drum will leave the unit through an existing 24-in. diameter relief header, supplemented by a new 24-in. diameter relief header, which will be tied into an existing 30-inch diameter relief header. This 30-in. diameter relief header routes the relief vapor to the existing No. 5 Flare system. BP anticipates that the existing No. 5 Flare system capacity is adequate for the No. 1 Crude Unit relief system flows in combination with additional flows that could occur simultaneously due to a common failure.

BP is also proposing to implement modifications to reduce the quantity of hydrocarbons released from the No. 1 Crude Unit to the No. 5 Flare system during an emergency. These modifications include changing selected pump drivers, modifying power sources and adding highly reliable trip systems.

Construction of the No. 1 Crude Unit Relief Valves modifications is scheduled to begin during June 2006 and to be completed during October 2006. Construction activities are expected to require a maximum of approximately 89 workers. Construction activities are anticipated to take place four days per week, Monday through Friday, from 6:00 AM to 4:30 PM.

After construction is completed, the No. 1 Crude Unit Relief Valves modifications will not require additional staffing at the Refinery.

Butane Tank Car Loading Rack Pressure Relief Valve Modifications

BP also proposes to replace the pressure relief valves on the Butane Unloading Surge Drum, a Low Line Knockout Drum, and a Butane Repressurizing Vaporizer, all of which are located at the Butane Tank Car Loading Rack. The Butane Unloading Surge Drum, Low Line Knockout Drum, and Butane Repressurizing Vaporizer all have pressure activated relief valves that discharge directly to the atmosphere in the event of an emergency release. This project will replace the three relief valves on the Butane Unloading Surge Drum, the Low Line Knockout Drum, and the Butane Repressurizing Vaporizer and route the discharges to the South Area (Coker) Flare

When the Butane Tank Car Loading Rack started operations, the pressure relief valves were designed to discharge to the atmosphere when the internal pressure exceeded the maximum allowable pressure to prevent damage to the equipment. Thus, emissions release directly to the atmosphere could occur during a pressure relief event. The emissions from the Butane Tank Car Loading Rack consist of hydrocarbons (butane) and contains no toxic air contaminants.

Proposed modifications to the Butane Tank Car Loading Rack pressure relief valve system include collecting hydrocarbons that could be released from the pressure relief valve system to the atmosphere and routing the collected hydrocarbons to the refinery's existing South Area Flare. Burning the hydrocarbons in the flare will reduce emissions substantially as compared to the current atmospheric discharges from the pressure relief valves.

Construction for the modifications to the pressure relief valve system at the Butane Tank Car Loading Rack is scheduled to begin during August 2006 and to be completed during October 2006. Construction activities are expected to require a maximum of approximately 22 workers. Construction activities are anticipated to take place four to six days per week, from 6:00 a.m. to 4:30 p.m.

Once construction is completed, operation of the modified pressure relief valves will not require additional staffing at the refinery.