APPENDIX A

AIR QUALITY AND GREENHOUSE GAS STUDY

Air Quality Technical Report

for the

Carson Trucking Project

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1.1 Introduction

This report presents an assessment of potential air quality and greenhouse gas (GHG) impacts associated with the proposed Carson Trucking Project. This evaluation addresses the potential for air pollutant emissions during construction and after full buildout of the project, including an assessment of the potential for greenhouse gas impacts.

The Carson Trucking Project is located on an approximately 16-acre site located within the southern portion of the City of Carson (City), south of Interstate 405 (I-405), and east of Interstate 110 (I-110) in Los Angeles County, California. The proposed project would be located between 223rd Street to the north and 236th Street to the south on a portion of the Los Angeles Department of Water and Power (DWP) utility easement. The alignment of the utility easement generally runs in a north-south direction from I-405 to Lomita Boulevard. The eastern and western boundaries of the project site extend to the limits of the easement.

The project site is divided by existing east-to-west cross streets which split the site into four separate blocks:

- Lot A: Between 223rd Street and Watson Center Road
- Lot B: Between Watson Center Road and 230th Street
- Lot C: Between 230th Street and 233rd Street
- Lot D: Between 233rd Street and 236th Street

The site is currently vacant with predominately ruderal vegetation and open dirt areas. The property is owned by the City of Los Angeles and improvements on the lots are limited to electrical power towers and overhead electrical lines operated by DWP, with one area of surface parking.

The project site is in an industrial area and is generally bordered by existing warehouse, light industrial, and office uses. Surrounding land uses include the following:

North: North of 223rd Street are single-family residences. North of 220th Street is Bonita Street Elementary School, and Carnegie Middle School.
Northeast: Single-family residences, commercial automotive, and I-405.
South: A wholesale plant nursery within the DWP easement between Sepulveda Boulevard and 236th Street. Single-family residences are located south of Sepulveda Boulevard.
East: Existing warehouse, light industrial, and office uses. East of Wilmington Avenue is the BP Carson Refinery.
Southeast: Southeast of Wilmington Avenue is the Conoco Phillips Los Angeles Refinery.
Southwest: West of Banning Boulevard are multi-family residences; further to the west is primarily single-family residences with a few neighborhoods of multi-family residences.

The proposed facility would be operational 7 days a week, 24 hours per day. Each individual lot would have a security fence and a security guard station. Ingress and egress from each lot would be controlled, with manned or unmanned gates at the north and/or south end of the lot, depending on the requirements of the user. For unmanned gates, either remote access would be provided and/or users would have a gate code to access a lot. With the exception Lot A (between 223rd Street and Watson Center Road), trucks may enter and exit from either the north or south end of the lot. For Lot A, access at the north end of this lot (on 223rd Street) would be restricted to right-in and right-out only movements because of the existing raised median.

Construction of the project is anticipated to commence in July 2018 and be complete in November 2018.

2.0 Existing Conditions

2.1 Regulatory Requirements

Air quality is defined by ambient air concentrations of specific pollutants identified by the United States Environmental Protection Agency (USEPA) to be of concern with respect to health and welfare of the general public. The USEPA is responsible for enforcing the Federal Clean Air Act (CAA) of 1970 and its 1977 and 1990 Amendments. The CAA required the USEPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the USEPA established both primary and secondary standards for several pollutants (called "criteria" pollutants). Primary standards are designed to protect human health with an adequate margin of safety. Secondary standards are designed to protect property and the public welfare from air pollutants in the atmosphere.

States that are designated nonattainment for the NAAQS are required to develop a State Implementation Plan (SIP), which outlines federally-enforceable rules, regulations, and programs designed to reduce emissions and bring the area into attainment of the NAAQS. In California, the California Air Resources Board (ARB) is the agency responsible for developing the SIP. The responsibility for developing plans and programs for each air basin has been delegated to the local agency responsible for attaining and maintaining air quality standards in that air basin.

The CAA allows states to adopt ambient air quality standards and other regulations provided they are at least as stringent as federal standards. The ARB has established the more stringent California Ambient Air Quality Standards (CAAQS) for the six criteria pollutants through the California Clean Air Act of 1988, and also has established CAAQS for additional pollutants, including sulfates, hydrogen sulfide, vinyl chloride and visibility-reducing particles. Areas that do not meet the NAAQS or the CAAQS for a particular pollutant are considered to be "nonattainment areas" for that pollutant.

The ARB is the state regulatory agency with authority to enforce regulations to both achieve and maintain the NAAQS and CAAQS. The ARB is responsible for the development, adoption, and enforcement of the state's motor vehicle emissions program, as well as the adoption of the CAAQS. The ARB also reviews operations and programs of the local air districts, and requires each air district with jurisdiction over a nonattainment area to develop its own strategy for achieving the NAAQS and CAAQS. The local air district has the primary responsibility for the development and implementation of rules and regulations designed to attain the NAAQS and CAAQS, as well as the permitting of new or modified sources, development of air quality management plans, and adoption and enforcement of air pollution regulations. The project site is located in the South Coast Air Basin (SCAB). The air district responsible for the SCAB is the South Coast Air Quality Management District (SCAQMD).

It is the responsibility of the SCAQMD to ensure that state and federal ambient air quality standards are achieved and maintained in the SCAB. Health-based air quality standards have been established by California and the federal government for the following criteria air pollutants: ozone (O_3), CO, nitrogen dioxide (NO_2), particulate matter with a diameter of 10 microns or less (PM_{10}), particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). These standards were established to protect sensitive receptors from adverse health impacts due to exposure to air pollution. The California Ambient Air Quality Standards (CAAQS) are more stringent than the federal standards. California has also established standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. Hydrogen sulfide and vinyl chloride are currently not monitored in the Basin because these contaminants are not seen as a significant air quality problem. CAAQS and National Ambient Air Quality Standards (NAAQS) for each of these pollutants are shown in Table 1. The SCAB is currently considered a nonattainment area for the NAAQS for O_3 (extreme) and $PM_{2.5}$. The SCAB is also considered a nonattainment area for the CAAQS for NO_2, O_3, PM_{10}, and $PM_{2.5}$. A brief description of the criteria pollutants follows.

<u>Ozone.</u> Ozone is considered a photochemical oxidant, which is a chemical that is formed when reactive organic gases (ROG) and nitrogen oxides, both byproducts of combustion, react in the presence of ultraviolet light. Ozone is present in relatively high concentrations in the Basin. Ozone is considered a respiratory irritant and prolonged exposure can reduce lung function, aggravate asthma, and increase susceptibility to respiratory infections. Children and those with existing respiratory diseases are at greatest risk from exposure to ozone.

Carbon monoxide. Carbon monoxide is a product of combustion, and the main source of carbon monoxide in the Basin is from motor vehicle exhaust. CO is an odorless, colorless gas. CO affects red blood cells in the body by binding to hemoglobin and reducing the amount of oxygen that can be carried to the body's organs and tissues. CO can cause health effects to those with cardiovascular disease, and can also affect mental alertness and vision.

Nitrogen dioxide. NO_2 is also a by-product of fuel combustion, and is formed both directly as a product of combustion and in the atmosphere through the reaction of NO with oxygen. NO_2 is a respiratory irritant and may affect those with existing respiratory illness, including asthma. NO_2 can also increase the risk of respiratory illness.

Fine particulate matter. Fine particulate matter, or PM_{10}, refers to particulate matter with an aerodynamic diameter of 10 microns or less. Particulate matter in this size range has been determined to have the potential to lodge in the lungs and contribute to respiratory problems. PM_{10} arises from a variety of sources, including road dust, diesel exhaust, combustion, tire and break wear, construction operations, and windblown dust. PM_{10} can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases such as asthma and chronic bronchitis. In 1997, the U.S. EPA proposed a new standard for $PM_{2.5}$, which is particulate matter with an aerodynamic diameter of 2.5 microns or less. These finer particulates are considered to have the potential to lodge deeper in the lungs.

Sulfur dioxide. SO_2 is a colorless, reactive gas that is produced from the burning of sulfur-containing fuels such as coal and oil, and by other industrial processes. Generally, the highest concentrations of SO_2 are found near large industrial sources. SO_2 is a respiratory irritant that can cause narrowing of the airways leading to wheezing and shortness of breath. Long-term exposure to SO_2 can cause respiratory illness and aggravate existing cardiovascular disease.

Lead. Lead in the atmosphere occurs as particulate matter. Lead has historically been emitted from vehicles combusting leaded gasoline, as well as from industrial sources. With the phase-out of leaded gasoline, large manufacturing facilities are the sources of the largest amounts of lead emissions. Lead has the potential to cause gastrointestinal, central nervous system, kidney, and blood diseases upon prolonged exposure. Lead is also classified as a probable human carcinogen.

The attainment status of the SCAB for each of the criteria pollutants described above is presented below in Table 2.

Table 1
Ambient Air Quality Standards

POLLUTANT	AVERAGE TIME	CALIFORNIA STANDARDS		NATIONAL STANDARDS		
		Concentration	Measurement Method	Primary	Secondary	Measurement Method
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	--	--	Ethylene Chemiluminescence
	8 hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	
Carbon Monoxide (CO)	8 hours	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m^3)	--	Non-Dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Average	0.030 ppm (56 µg/m^3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	Gas Phase Chemiluminescence
	1 hour	0.18 ppm (338 µg/m^3)		0.100 ppm (188 µg/m^3)	--	
Sulfur Dioxide (SO_2)	24 hours	0.04 ppm (105 µg/m^3)	Ultraviolet Fluorescence	--	--	Pararosaniline
	3 hours	--		--	0.5 ppm (1300 µg/m^3)	
	1 hour	0.25 ppm (655 µg/m^3)		0.075 ppm (196 µg/m^3)	--	
Respirable Particulate Matter (PM_{10})	24 hours	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	150 µg/m^3	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		--	--	
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12 µg/m^3	--	Inertial Separation and Gravimetric Analysis
	24 hours	--		35 µg/m^3	--	
Sulfates	24 hours	25 µg/m^3	Ion Chromatography	--	--	--
Lead (Pb)	30-day Average	1.5 µg/m^3	Atomic Absorption	--	--	Atomic Absorption
	Calendar Quarter	--		1.5 µg/m^3	1.5 µg/m^3	
	Rolling 3-month Average	--		0.15 µg/m^3	0.15 µg/m^3	
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence	--	--	--
Vinyl Chloride	24 hours	0.010 ppm (26 µg/m^3)	Gas Chromatography	--	--	--

ppm= parts per million; µg/m^3 = micrograms per cubic meter; mg/m^3= milligrams per cubic meter
Source: California Air Resources Board, www.arb.ca.gov.

Table 2
South Coast Air Basin
Attainment Classification for Criteria Pollutants

Pollutant	CAAQS Attainment Classification	NAAQS Attainment Classification
1-hr Ozone	Nonattainment	Rescinded
8-hr Ozone	Nonattainment	Extreme Nonattainment
CO	Attainment	Maintenance[1]
NO_2	Nonattainment	Maintenance[1]
SO_2	Attainment	Attainment
PM_{10}	Nonattainment	Maintenance[1]
$PM_{2.5}$	Nonattainment	Nonattainment
Lead	Attainment	Attainment
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Vinyl Chloride	Unclassified	N/A

[1] A maintenance area is defined as an area that has demonstrated that it has attained the NAAQS for a given pollutant, but has implemented a maintenance plan that is in effect for 10 years that requires a demonstration of continued attainment of the NAAQS. Once the area has maintained the NAAQS for a period of 10 years, it can be redesignated as an attainment area.

2.2 Regional Climate

Climate data were collected at the Long Beach climatological station from 1949 through 2016 and are representative of the Carson area. Annual average temperatures in the Carson area range from an average minimum temperature of 54.8ºF to an average maximum temperature of 74.2ºF. December is the coldest month, with average minimum temperatures of 45.3°F. August is the hottest month in the area, with average maximum temperatures reaching 83.9°F (Western Regional Climatic Center 2018). The nearest meteorological monitoring station to the project site is the Long Beach station. Figure 1 presents a wind rose for the Long Beach station showing the prevailing wind directions in the project vicinity.

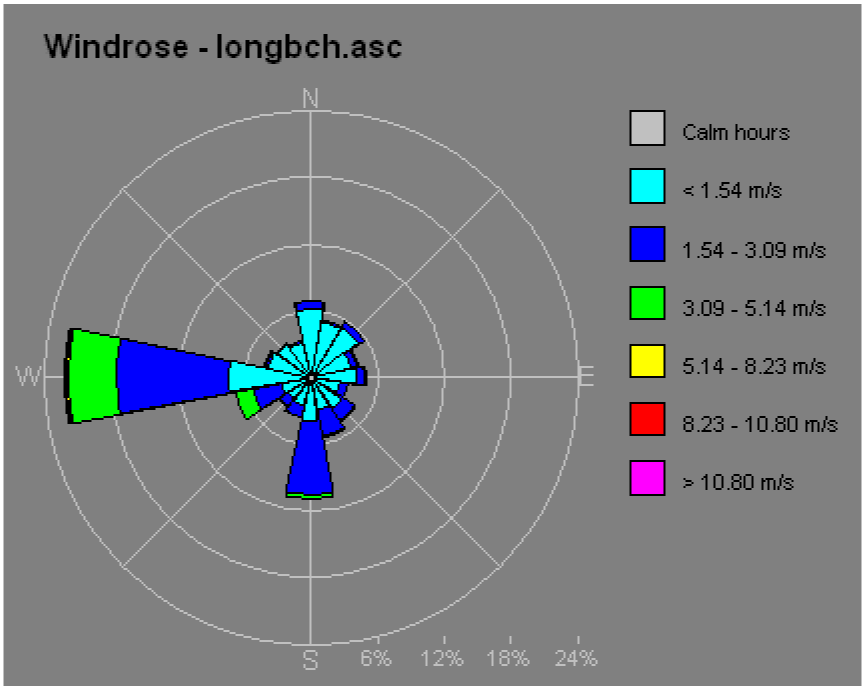

Figure 1 – Wind Rose, Long Beach Meteorological Station

2.3 Existing Air Quality

The closest ambient air quality monitoring station to the project is the Long Beach monitoring station, which measures O_3, PM_{10}, and NO_2. The nearest monitoring station to the site that measures $PM_{2.5}$ is located in Compton. Ambient concentrations of criteria pollutants measured at these monitoring stations during the period 2013-2015 are presented in Table 3. Ambient air concentrations were compared with the CAAQS and NAAQS. The data indicate that the area is in compliance with both CAAQS and NAAQS for CO, NO_2, and SO_2. The state 8-hour CO standard was not exceeded during this three-year period. The maximum measured concentrations of NO_2 each year were less than the 0.18-ppm one-hour state standard and the national annual standard. The SO_2 concentrations were below state and national standards during this period. Exceedances of the ozone standards and PM_{10} and $PM_{2.5}$ standards have been recorded at the Fontana monitoring station.

Table 3
Background Air Quality Data
ppm (unless otherwise indicated)

Pollutant	**Averaging Time**	**2014**	**2015**	**2016**	**NAAQS**	**CAAQS**	**Monitoring Station**
Ozone	8 hour	0.072	0.066	0.059	0.070	0.070	Long Beach
No. of Days in Violation of NAAQS		*1*	*0*	*0*			
No. of Days in Violation of CAAQS		*1*	*0*	*0*			
Ozone	1 hour	0.087	0.087	0.079	-	0.09	Long Beach
No. of Days in Violation		*0*	*0*	*0*			
PM$_{10}$	Annual Arithmetic Mean	29.5	31.3	31.9	-	20 μg/m^3	Long Beach
	24 hour	84	79	75	150 μg/m^3	50 μg/m^3	Long Beach
No. of Days in Violation of NAAQS		*0*	*0*	*0*			
No. of Days in Violation of CAAQS		*3*	*6*	*NA*			
PM$_{2.5}$	Annual Arithmetic Mean	NA	11.7	11.0	12 μg/m^3	12 μg/m^3	Compton
	24 hour	35.8	41.3	36.3	35 μg/m^3	-	Compton
No. of Days in Violation		*1*	*3*	*1*			
NO$_2$	Annual	0.021	0.020	0.018	0.053	0.030	Long Beach
	1 hour	0.1359	0.1018	0.0756	0.100	0.18	Long Beach
No. of Days in Violation		*2*	*1*	*0*			
CO	1 hour	4	3.3	3.3			Long Beach
CO	8 hour	2.6	2.2	2.2	9	9.0	Long Beach
No. of Days in Violation		*0*	*0*	*NA*			
SO$_2$	1 hour	14.7	11.8	12.0	75 ppb	250	Long Beach
No. of Days in Violation		*0*	*0*	*0*			

NA = data not available
Source: www.arb.ca.gov, http://www.aqmd.gov/docs/default-source/air-quality/historical-data-by-year/aq13card.pdf?sfvrsn=4

2.4 Toxic Air Contaminants

Cancer Risk. One of the primary health risks of concern due to exposure to toxic air contaminants (TACs) is the risk of contracting cancer. The carcinogenic potential of TACs is a particular public health concern because it is currently believed by many scientists that there is no “safe” level of exposure to carcinogens; that is, any exposure to a carcinogen poses some risk of causing cancer. Health statistics show that one in four people will contract cancer over their lifetime, or 250,000 in a million, from all causes, including diet, genetic factors, and lifestyle choices.

Noncancer Health Risks. Unlike carcinogens, for most noncarcinogens it is believed that there is a threshold level of exposure to the compound below which it will not pose a health risk. The

California Environmental Protection Agency (CalEPA) and California Office of Environmental Health Hazard Assessment (OEHHA) have developed reference exposure levels (RELs) for noncarcinogenic TACs that are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The noncancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index (HI).

3.0 Thresholds of Significance

The State of California has developed guidelines to address the significance of air quality impacts based on Appendix G of the State CEQA Guidelines which provides guidance that a project would have a significant environmental impact if it would:

1. Conflict or obstruct the implementation of the applicable air quality plan (in this case, the SCAQMD's Air Quality Management Plan);
2. Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
3. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
4. Expose sensitive receptors (including, but not limited to, schools, hospitals, resident care facilities, or day-care centers) to substantial pollutant concentrations; or
5. Create objectionable odors affecting a substantial number of people.

The most recently adopted air quality plan is the 2012 Air Quality Management Plan developed by the SCAQMD. This plan is the SCAB's portion of the SIP. The 2012 AQMP accommodates population growth and transportation projections based on the projections made by the Southern California Association of Governments (SCAG). Projects that are consistent with employment and population forecasts made by the SCAB are consistent with the emissions budgets contained within the AQMP. Also, projects that are consistent with the SIP rules (i.e., the federally-approved rules and regulations adopted by the SCAQMD) are consistent with the SIP. Thus projects would be required to conform with measures adopted in the AQMP, including undergoing New Source Review for sources subject to permitting with the SCAQMD.

To determine whether a project would (a) result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation; or (b) result in a cumulatively considerable net increase of PM_{10} or exceed quantitative thresholds for O_3 precursors, oxides of nitrogen (NO_X) and volatile organic compounds (VOCs), project emissions may be evaluated based on the quantitative emission thresholds established by the SCAQMD in their CEQA Air Quality Handbook (SCAQMD 1993), as updated in 2015 (SCAQMD 2015). The SCAQMD has established quantitative thresholds against which a project's emissions could be evaluated to determine if there is a potential for a significant impact. These thresholds are listed in Table 4.

Table 4
Air Quality Significance Thresholds

Pollutant	Construction	Operation
Criteria Pollutants Mass Daily Thresholds		
NO_x	100 lbs/day	55 lbs/day
ROG	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
TAC, AHM, and Odor Thresholds		
Toxic Air Contaminants (TACs)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases Hazard Index ≥ 1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
GHG	10,000 Metric tons/year CO_2e for industrial facilities	
Ambient Air Quality for Criteria Pollutants		
NO_2 1-hour NO_2 annual	0.18 ppm (state) 0.03 ppm (state) and 0.0534 ppm (federal)	
PM_{10} 24-hour PM_{10} annual average	10.4 µg/m^3 (construction) and 2.5 µg/m^3 (operations) 1.0 µg/m^3	
$PM_{2.5}$ 24-hour	10.4 µg/m^3 (construction) and 2.5 µg/m^3 (operations)	
SO_2 24-hour SO_2 annual average	0.25 ppm (state) and 0.075 ppm (federal – 99th percentile) 0.04 ppm (state)	
Sulfate 24-hour average	25 µg/m^3	
CO 1-hour average CO 8-hour average	20 ppm (state) and 35 ppm (federal) 9.0 ppm (state/federal)	
Lead 30-day average Lead rolling 3-month average	1.5 µg/m^3 0.15 µg/m^3	

µg/m^3 = microgram per cubic meter; pphm = parts per hundred million; mg/m^3 = milligram per cubic meter; ppm = parts per million; TAC = toxic air contaminant; GHG = greenhouse gases; CO_2e = CO_2-equivalent

Should emissions exceed these quantitative thresholds, further evaluation may be warranted to assess whether a significant impact could result.

To further evaluate the potential for significant impacts associated with the project, the SCAQMD's *Final Localized Significance Threshold Methodology* (SCAQMD 2003) can be considered to evaluate whether a project's emissions could cause a localized exceedance of an ambient air quality standard. The Localized Significance Threshold (LST) Methodology provides a look-up table (SCAQMD 2009) for construction and operational emissions based on the emission rate, location, and distance from receptors, and provides a methodology for air dispersion modeling to evaluate whether a construction or operation could cause an exceedance of an ambient air quality standard. The LST lookup tables are applicable only to sources that are five acres or less in size. The look-up tables were therefore appropriate for the Meridian Mixed-Use Project. The LST Methodology only applied to impacts to NO_2, CO, $PM_{2.5}$, and PM_{10} concentrations.

According to the LST Methodology, the project is located in Carson, within Source Receptor Area 4 (South Coastal LA County). LSTs for the Project are shown in Table 4, based on a 5-acre site (the largest size for which LSTs are defined) and the distance to the nearest receptor (assumed to be 25 meters for conservative purposes).

The site is 16 acres in size; however, the site is divided into four smaller parcels of approximately 4 acres each. Accordingly, the LSTs for a 5-acre site are appropriate. For conservative purposes, the LSTs for a 25-meter distance were used to evaluate the potential significance of impacts.

Table 4
Localized Significance Thresholds, lbs/day

	Pollutant					
Distance to Nearest Receptor, meters	**NOx**	**CO**	**PM_{10} - Construction**	**PM_{10} - Operation**	**$PM_{2.5}$ - Construction**	**$PM_{2.5}$ - Operation**
5 acres						
25	123	1,530	14	4	8	2

With regard to evaluating whether a project would have a significant impact on sensitive receptors, air quality regulators typically define sensitive receptors as schools (Preschool-12th Grade), hospitals, resident care facilities, or day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Any project which has the potential to directly impact a sensitive receptor located within 1 mile and results in a health risk greater than the risk significance thresholds discussed above would be deemed to have a potentially significant impact.

The nearest sensitive receptors to the site are located approximately 0.35 miles to the west, in the residential area west of Avalon Blvd.; and to the north of the site in the residential area north of 223rd Street.

With regard to odor impacts, a project that proposes a use which would produce objectionable odors would be deemed to have a significant odor impact if it would affect a considerable number of off-site receptors.

The impacts associated with construction and operation of the Carson Trucking Project were evaluated for significance based on these significance criteria.

4.0 Impacts

The proposed project includes both construction and operational impacts. Construction impacts include emissions associated with the construction of the project. Operational impacts include emissions associated with the project at full buildout. These emissions are mainly attributable to trucks utilizing the project site, which includes truck idling on site.

4.1 Construction

Emissions from the construction phase of the project were estimated based on information from the project applicant for construction equipment requirements and schedule. Construction of the project would commence in July of 2018 and be complete by November 2018. The initial phase would include site preparation activities including mass grading of the site. Following site preparation activities, the project would include trenching for utilities, paving, and landscaping of the truck parking areas. Construction equipment requirements were provided by the applicant.

The construction emissions were evaluated using the CalEEMod Model Version 2016.3.2 (SCAQMD 2016), which is the SCAQMD's recommended model for evaluating air quality impacts from land use projects. Table 5 presents a summary of the assumptions used in the CalEEMod analysis.

Table 5
Construction Equipment and Personnel

Activity and Number of Personnel	Number of Work Days	Quantity and Equipment Type	Duration of Use	Fuel Type
Clearing and Rough Grading (8 people)	20	1 x 180 hp water truck	6	Diesel
	20	1 x 180 hp crew truck with tool trailer	2	Diesel
	20	1 x 180 hp dump truck	6	Diesel
	20	1 x 180 hp bulldozer	8	Diesel
	20	1 x 180 hp front loader	6	Diesel
	20	1 x 180 hp foreman truck	4	Diesel
Trenching and Storm Drains (8 people)	20	1 x 180 hp water truck	6	Diesel
	20	2 x 150 hp backhoe	6	Diesel
	20	1 x 180 hp boom truck	2	Diesel
	20	1 x 180 hp foreman truck	4	Diesel
	20	1 x 180 hp crew truck with tool trailer	2	Diesel
Paving (8 people)	30	1 x 180 hp water truck	6	Diesel
	30	1 x 180 hp foreman truck	4	Diesel
	30	1 x 180 hp crew truck	2	Diesel
	30	1 x 150 hp backhoe	6	Diesel
	30	1 x 180 hp grader	6	Diesel
	30	1 x 10-wheeler dump truck and trailer	6	Diesel
	30	1 x 49 hp compressor	2	Diesel
	8	1 x 180 hp paving machine	8	Diesel
Landscaping (6 people)	20	1 x 180 hp foreman truck	4	Diesel
	20	1 x 180 hp crew truck	4	Diesel
	20	1 x 150 hp backhoe	6	Diesel

Table 6 provides a summary of the emission estimates for construction for the project, assuming standard fugitive dust control measures as required under SCAQMD Rule 403 would be implemented. Refer to Appendix A for CalEEMod outputs. As shown in Table 6, the emissions associated with construction are below both the regional thresholds and the Localized Significance Thresholds. Impacts from construction are less than significant.

Table 6
Estimated Construction Emissions

Emission Source	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Total Construction Emissions, lbs/day						
Site Preparation and Grading						
Fugitive Dust	-	-	-	-	2.68	1.33
Offroad Diesel	2.40	25.01	16.66	0.03	1.20	1.11
Worker Trips	0.18	0.13	1.65	0.01	0.37	0.10
TOTAL	**2.58**	**25.14**	**18.31**	**0.04**	**4.25**	**2.54**
Significance Criteria	75	100	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*

Table 6
Estimated Construction Emissions

Emission Source	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Total Construction Emissions, lbs/day						
Trenching and Utilities						
Offroad Diesel	1.16	11.94	7.86	0.02	0.53	0.49
Worker Trips	0.08	0.06	0.75	0.00	0.17	0.05
TOTAL	**1.24**	**12.00**	**8.61**	**0.02**	**0.70**	**0.54**
Significance Criteria	75	100	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Paving						
Asphalt Offgassing	1.40	-	-	-	-	-
Offroad Diesel	2.43	24.80	14.61	0.03	1.19	1.10
Worker Trips	0.20	0.15	1.90	0.01	0.43	0.12
TOTAL	**4.03**	**24.95**	**16.51**	**0.04**	**1.62**	**1.22**
Significance Criteria	75	100	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Landscaping						
Fugitive Dust	-	-	-	-	0.33	0.04
Offroad Diesel	0.61	6.14	3.61	0.01	0.31	0.29
Worker Trips	0.08	0.06	0.75	0.00	0.17	0.05
TOTAL	**0.69**	**6.20**	**4.36**	**0.01**	**0.81**	**0.38**
Significance Criteria	75	100	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Maximum Daily Emissions, lbs/day						
TOTAL	**4.03**	**25.13**	**18.31**	**0.04**	**4.25**	**2.53**
Significance Criteria	75	100	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Localized Significance Threshold	N/A	123	1,530	N/A	14	8
Significant?	N/A	*No*	*No*	N/A	*No*	*No*

Diesel exhaust particulate matter is known to the state of California as carcinogenic compounds. The risks associated with exposure to substances with carcinogenic effects are typically evaluated based on a lifetime of chronic exposure, which is defined in the California Air Pollution Control Officers' Association (CAPCOA) Air Toxics "Hot Spots" Program Risk Assessment Guidelines (CAPCOA 1993) as 24 hours per day, 7 days per week, 365 days per year, for 70 years. Diesel exhaust particulate matter would be emitted during the construction period assumed for the Project from heavy equipment used in the construction process. Because of the short-term nature of project construction and the fact that heavy equipment exhaust emissions are not significant, exposure to diesel exhaust emissions during construction would be less than significant.

4.2 Operational Impacts

The AQMP is a plan that develops an analysis of how the air basin will attain and maintain the ambient air quality standards, and identifies strategies that will be used to achieve attainment. These strategies are then adopted as rules and regulations in the SCAQMD's Rules and Regulations, and all facilities must comply with applicable rules and regulations.

The AQMP identifies state-wide measures such as increasingly stringent vehicular emission standards that will reduce emissions from mobile sources. All vehicles will be required to comply with ARB emission standards, and will therefore be consistent with the AQMP. Furthermore, sources within the Carson Trucking Project that are governed by the SCAQMD's Rules and Regulations will be required to comply with the applicable SCAQMD Rules and Regulations, and will therefore be in compliance with the applicable portions of the AQMP. The project will therefore not conflict with or obstruct implementation of the applicable air quality plan.

The main operational impacts associated with the Project would be impacts associated with trucks utilizing the site. These impacts include emissions from truck idling. To address whether the Project would result in emissions that would violate any air quality standards or contribute substantially to an existing or proposed air quality violation, the emissions associated with Project-generated traffic are compared with the significance criteria.

It should be noted that the project is designed to accommodate existing trucks within the SCAB. Therefore, the project would not generate new trips and associated new emissions within the SCAB. The project would, however, generate localized emissions due to travel from the freeway to the site, and on-site idling. To estimate emissions from the trucks, the EMFAC2017 model, which is the latest version of the Caltrans emission factor model for on-road traffic, was used. A one-way trip length of 1.6 miles for truck traffic traveling from the I-405 Freeway to the site was used, based on the longest distance from the southern end of the site to the freeway interchange. In addition, it was assumed that each truck (assuming 360 vehicles per day) would idle for 15 minutes at the site.

Emission calculations are shown in Table A-1 in Appendix A. Emission factors representing the vehicle mix for 2018, which is the first full year of operation, were used to estimate emissions. Emissions would decrease on an annual basis from 2018 onward due to phase-out of higher polluting vehicles and implementation of more stringent emission standards that are taken into account in the EMFAC2017 model. Emissions were based on the assumption that 100% of trips would be attributable to heavy-duty trucks.

Table 7 presents a summary of the maximum daily operational emissions estimated for the Project.

Table 7
Maximum Daily Operational Emissions

Emission Source	**ROG**	**NOx**	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
Warehouse Operations						
lbs/day						
Truck Travel	1.69	12.66	0.44	0.26	1.31	0.37
On-Site Idling	0.85	1.06	0.08	0.00	0.00	0.00
TOTAL	**2.54**	**13.72**	**0.54**	**0.26**	**1.31**	**0.37**
Significance Criteria	55	55	550	150	150	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*

Off-site emissions are not compared with the LSTs as, according to the SCAQMD's guidance within the LST Methodology, the LSTs are not appropriate for projects where the majority of emissions are on-road emissions that would mainly occur offsite. Only on-site emissions are considered in the LST analysis for operational emissions. Based on the analysis of on-site operational emissions, the emissions are negligible in comparison with on-road emissions. Impacts would therefore not exceed the threshold in the LST analysis.

Projects that involve increases in traffic have the potential to cause CO "hot spots" to occur due to project-related traffic. To evaluate the potential for a significant adverse air quality impact associated with emissions of CO, a CO "hot spots" evaluation was conducted. The purpose of the CO "hot spots" analysis is to verify that the project would not cause or contribute to a violation of the CO standard at intersections for which a significant impact would occur.

The SCAQMD studied the four most congested intersections within the South Coast Air Basin in 2003 in order to support their CO "attainment" demonstration to the USEPA. The modeled intersections experienced more than 100,000 average daily trips, and the Air District found that even these highly congested intersections would not cause a CO "hotspot" to result. Therefore, the project would not cause a CO "hotspot" due to project-related traffic.

With regard to cumulative impacts, because the project's construction and operational emissions are below the SCAQMD's quantitative thresholds of significance, the project's contribution to cumulative impacts would be less than significant.

4.3 Impacts to Sensitive Receptors

To address the potential for the project to expose sensitive receptors to substantial pollutant concentrations, a Health Risk Assessment (HRA) was conducted. The HRA addresses the potential for significant health risks associated with diesel particulate emissions from truck traffic, focusing on emissions from trucks on site during idling. As discussed above, it was assumed that each truck would idle for 15 minutes per day at the site. This HRA was prepared in accordance with the California Office of Environmental Health Hazard Assessment's (OEHHA) *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2015), the South Coast Air Quality Management District's (SCAQMD) *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality*

Analysis (SCAQMD 2003), and the SCAQMD's *Risk Assessment Procedures for Rules 1401 and 212, Version 7.0* (SCAQMD 2005).

The main toxic air contaminant associated with truck traffic is diesel particulate matter. Exhaust PM_{10} emissions are considered to represent emissions of diesel particulate matter. Exhaust PM_{10} emissions from idling were calculated assuming 360 trucks per day idling for 15 minutes per day, based on EMFAC2017 emission factors for PM_{10}. Emissions were calculated to be 1.11 lbs/year of diesel particulate matter. Emissions were allocated to a total of 36 volume sources at the site. The project was assumed to operate 365 days per year. Detailed emission calculations are provided in Appendix A.

Air dispersion modeling was used to predict the downwind concentration of diesel particulate matter to which receptors could be exposed. Air dispersion modeling is dependent on the emissions of diesel particulate matter, the location of sources, and the site-specific meteorology of the impacted area. The air dispersion modeling was performed in accordance with U.S. EPA, ARB, and SCAQMD modeling guidelines. Results of the air dispersion analysis were used in conjunction with diesel particulate matter emission rates described in Section 3.0 to calculate maximum diesel particulate matter concentrations to which receptors could be exposed.

The AERMOD model was run to estimate ground-level concentrations of TACs. As recommended by the SCAQMD, surface meteorological data from the Long Beach meteorological monitoring station for 2008-2012 (the nearest station to the project site for which AERMOD-processed data are available) were used in the AERMOD model. Figure 1 in Section 2.0 presents the wind rose from the Long Beach station. Modeling was conducted using SCAQMD-recommended model settings, including urban dispersion coefficients, and regulatory default settings.

Health risks were calculated using the ARB's HARP2 Model, as recommended by OEHHA. Based on the results of the HARP2 Model, the cancer risk at the maximally exposed residential receptor would be 0.128 in a million. The chronic hazard at the maximally exposed residential receptor would be 0.0000206. These values are well below the SCAQMD's significance thresholds of 10 in a million for cancer risk and 1.0 for chronic hazards. The Carson Trucking Project would therefore not expose sensitive receptors to substantial pollutant concentrations.

4.4 Odors

The SCAQMD CEQA Air Quality Handbook (SCAQMD 1993) identifies certain land uses as sources of odors. These land uses include the following:

- Agriculture (Farming and Livestock)
- Wastewater Treatment Plant
- Food Processing Plants
- Chemical Plants
- Composting
- Refineries
- Landfills
- Dairies
- Fiberglass Molding

The Project is a truck parking area. The project is not proposing to include any of these operations at the site. The project would therefore not be a source of objectionable odors.

All sources are subject to SCAQMD Rule 402, which prohibits any entity from discharging from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property. While there may be some odors from truck exhaust, odors disperse quickly, and there are no sensitive receptors in the immediate vicinity (i.e., within ¼ mile) of the site. Odors would be regulated by the SCAQMD and any odor issues would be subject to enforcement action. Thus odor impacts would not be significant.

5.0 Global Climate Change

The SCAQMD has adopted a threshold to address significance of GHG emissions from industrial projects. Their threshold is 10,000 MTons CO_2e per year for industrial projects. (SCAQMD 2013.)

GHG emissions associated with Project construction were estimated using the CalEEMod Model. The total emissions are estimated at 104 metric tons of CO_2 total for the duration of construction. Amortized over 30 years, the annual CO_2 emissions would be 3.5 metric tons per year.

Operational emissions were calculated using the EMFAC2017 emission factors for heavy-duty trucks, assuming travel from the I-405 Freeway to the site and idling on site as described in Section 4.0. The annual operational GHG emissions from truck travel and idling would be estimated at 699 metric tons of CO2e annually. Adding the amortized construction emissions, the GHG emissions for the Carson Trucking Project would be approximately 703 metric tons of CO2e per year.

This level is well below the SCAQMD's threshold of 10,000 metric tons of CO2e. Impacts would therefore be less than significant.

6.0 Cumulative Impacts

In analyzing cumulative impacts from a proposed project, the analysis must specifically evaluate a project's contribution to the cumulative increase in pollutants for which the SCAB is listed as "non-attainment" for the State AAQS. A project that has a significant impact on air quality with regard to emissions of PM_{10}, $PM_{2.5}$, NO_x and/or ROGs as determined by the screening criteria outlined above would have a significant cumulative effect. In the event direct impacts from a project are less than significant, a project may still have a cumulatively considerable impact on air quality if the emissions from the project, in combination with the emissions from other proposed, or reasonably foreseeable future projects are in excess of screening levels identified above, and the project's contribution accounts for more than an insignificant proportion of the cumulative total emissions.

With regard to past and present projects, the background ambient air quality, as measured at the monitoring stations maintained and operated by the SCAQMD, measures the concentrations of pollutants from existing sources. Past and present project impacts are therefore included in the background ambient air quality data.

SCAQMD Significance Thresholds. As discussed in Section 4.0, the Carson Trucking Project's emissions would be below the SCAQMD's regional emission thresholds during both construction and operations for all pollutants. Thus the impact would not be cumulatively considerable.

AQMP Compliance. The Carson Trucking Project's impacts would be consistent with the development in the area and would be in compliance with applicable AQMP measures. Impacts would not be cumulatively considerable.

Cumulative Health Effects. As discussed in Section 4.0, health impacts are substantially below the SCAQMD's significance thresholds. No cumulative health impacts would result from the project.

Global Climate Change. The project also relies on federal, state, and local programs to meet the goal established under AB 32. The emissions associated with the Carson Trucking Project are below the SCAQMD's threshold of 10,000 metric tons of CO_2e annually. Therefore, the impact would not be cumulatively considerable.

7.0 References

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Appendix A

Emission Calculations
CalEEMod Outputs

Table A-1
Operational Vehicle Emissions - 2018
Carson Parking Project

2018

Truck Trips

Without Pavley or LCFS

Vehicle	No. of trips	Speed (mph)	VMT (mi/trip)	CO		NO_x		VOCs						SOx	
				Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evaporative (g/mi)	Diurnal Evaporative (g/hr)	Running Exhaust (g/mi)	Start-Up (g/start)[a]
Heavy Duty Truck	720	Aggregated	1.6	0.663726		4.983037		0.175057						0.102809	
TOTAL															

Vehicle	PM10				Road Dust PM10 (g/mi)	PM2.5				Road Dust PM10 (g/mi)	CO2		CH4		NO2	
	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Tire Wear (g/mi)	Brake Wear (g/mi)		Running Exhaust (g/mi)	Start-Up (g/start)[a]	Tire Wear (g/mi)	Brake Wear (g/mi)		Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]
Heavy Duty Truck	0.078702		0.035437	0.060775	0.3407	0.0753		0.0089	0.026046	0.0341	1529.23627		0.0081		0.20729435	
TOTAL			**TOTAL**													

	Emissions, lbs/day										GHG Emissions, metric tons/year			
Vehicle	**CO**	**NOx**	**VOCs**	**SOx**	**PM10**	**Road Dust**	**Total PM10**	**PM2.5**	**Road Dust**	**Total PM2.5**	**CO2**	**CH4**	**N2O**	
Heavy Duty Truck	1.69	12.66	0.44	0.26	0.44	0.87	1.31	0.28	0.09	0.37	643	0.00	0.09	
TOTAL	**1.69**	**12.66**	**0.44**	**0.26**	**0.44**	**0.87**	**1.31**	**0.28**	**0.09**	**0.37**	**643**	**0.00**	**0.09**	666.2175

Paved Road Dust

Emission Factor		**Silt Loading**	**Mean vehicle weight**
Emission Factor, grams/mi	k, g/VMT	g/m3	W, tons
0.3407	7.3	0.03	2.4

EMFAC2014 Idling Emission Factors - g/vehicle/day

Idling	CO	NOx	VOCs	SOx	PM10	PM2.5	CO2
g/vehicle/day	51.58	63.90	4.66	0.10	0.18	0.18	10882.09
lbs/vehicle/day	0.11	0.14	0.01	0.00	0.00	0.00	23.99
lbs/vehicle/hour	0.00	0.01	0.00	0.00	0.00	0.00	1.00
LBS/DAY, 360 vehicles, assuming 15 minutes in/out for each vehicle for a total of 0.5 hours on site of idling	**0.85**	**1.06**	**0.08**	**0.00**	**0.00**	**0.00**	**179.93**
Total annual emissions					**1.110048**		**32.83771**

Carson Truck Parking

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	16.00	Acre	16.00	696,960.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2017
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Construction Phase - Estimated construction schedule

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_EF_Parking	100	0
tblAreaCoating	Area_Parking	41818	0
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	100	0
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	0
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	50	0
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	50	0
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15

tblConstructionPhase	NumDays	30.00	20.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	10.00	20.00
tblConsumerProducts	ROG_EF	1.98E-05	2.14E-05
tblFleetMix	HHD	0.03	0.00
tblFleetMix	LDA	0.54	0.00
tblFleetMix	LDT1	0.05	0.00
tblFleetMix	LDT2	0.20	0.00
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.8780e-003	0.00
tblFleetMix	MCY	4.5310e-003	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	1.0690e-003	0.00
tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	1.9140e-003	0.00
tblFleetMix	SBUS	6.9900e-004	0.00
tblFleetMix	UBUS	2.2220e-003	0.00
tblGrading	AcresOfGrading	0.00	16.00
tblGrading	AcresOfGrading	0.00	16.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	130.00	125.00
tblOffRoadEquipment	HorsePower	132.00	130.00
tblOffRoadEquipment	HorsePower	247.00	255.00
tblOffRoadEquipment	HorsePower	247.00	255.00
tblOffRoadEquipment	HorsePower	367.00	361.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00

tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	400.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	97.00	150.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	630.89

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2018	4.0308	25.1347	18.3076	0.0358	7.2394	1.2059	8.4453	3.4997	1.1095	4.6091	0.0000	3,590.4583	3,590.4583	0.9691	0.0000	3,614.6864
Maximum	**4.0308**	**25.1347**	**18.3076**	**0.0358**	**7.2394**	**1.2059**	**8.4453**	**3.4997**	**1.1095**	**4.6091**	**0.0000**	**3,590.4583**	**3,590.4583**	**0.9691**	**0.0000**	**3,614.6864**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	4.0308	25.1347	18.3076	0.0358	3.0484	1.2059	4.2543	1.4245	1.1095	2.5340	0.0000	3,590.4583	3,590.4583	0.9691	0.0000	3,614.6864
Maximum	**4.0308**	**25.1347**	**18.3076**	**0.0358**	**3.0484**	**1.2059**	**4.2543**	**1.4245**	**1.1095**	**2.5340**	**0.0000**	**3,590.4583**	**3,590.4583**	**0.9691**	**0.0000**	**3,614.6864**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**57.89**	**0.00**	**49.63**	**59.29**	**0.00**	**45.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2470	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2470**	**2.0000e-005**	**1.6600e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7500e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2470	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2470**	**2.0000e-005**	**1.6600e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7500e-003**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	7/3/2018	7/30/2018	5	20	
2	Trenching	Trenching	7/31/2018	8/27/2018	5	20	
3	Paving	Paving	8/28/2018	10/8/2018	5	30	
4	Landscaping	Site Preparation	10/9/2018	11/5/2018	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 16

Acres of Paving: 16

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Concrete/Industrial Saws	1	0.00	81	0.73
Grading	Excavators	2	0.00	162	0.38
Grading	Graders	1	0.00	174	0.41
Grading	Off-Highway Trucks	2	6.00	180	0.38
Grading	Off-Highway Trucks	1	2.00	180	0.38
Grading	Off-Highway Trucks	1	4.00	180	0.38
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	0.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Trenching	Off-Highway Trucks	1	6.00	180	0.38
Trenching	Off-Highway Trucks	2	2.00	180	0.38
Trenching	Off-Highway Trucks	1	4.00	180	0.38
Trenching	Tractors/Loaders/Backhoes	2	6.00	150	0.37
Paving	Air Compressors	1	2.00	78	0.48
Paving	Cement and Mortar Mixers	4	0.00	9	0.56
Paving	Graders	1	6.00	174	0.41
Paving	Off-Highway Trucks	1	6.00	180	0.38
Paving	Off-Highway Trucks	1	4.00	180	0.38
Paving	Off-Highway Trucks	1	2.00	180	0.38
Paving	Off-Highway Trucks	1	6.00	400	0.38
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	0.00	130	0.36
Paving	Rollers	1	0.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	6.00	97	0.37

Landscaping	Off-Highway Trucks	2	4.00	180	0.38
Landscaping	Rubber Tired Dozers	3	0.00	255	0.40
Landscaping	Tractors/Loaders/Backhoes	1	6.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	13	33.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Landscaping	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.8705	0.0000	6.8705	3.4018	0.0000	3.4018			0.0000			0.0000
Off-Road	2.3998	25.0076	16.6566	0.0267		1.2030	1.2030		1.1067	1.1067		2,688.9908	2,688.9908	0.8371		2,709.9188
Total	**2.3998**	**25.0076**	**16.6566**	**0.0267**	**6.8705**	**1.2030**	**8.0735**	**3.4018**	**1.1067**	**4.5086**		**2,688.9908**	**2,688.9908**	**0.8371**		**2,709.9188**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1763	0.1271	1.6510	4.0400e-003	0.3689	2.9600e-003	0.3718	0.0978	2.7300e-003	0.1006		402.1776	402.1776	0.0138		402.5213
Total	**0.1763**	**0.1271**	**1.6510**	**4.0400e-003**	**0.3689**	**2.9600e-003**	**0.3718**	**0.0978**	**2.7300e-003**	**0.1006**		**402.1776**	**402.1776**	**0.0138**		**402.5213**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6795	0.0000	2.6795	1.3267	0.0000	1.3267			0.0000			0.0000
Off-Road	2.3998	25.0076	16.6566	0.0267		1.2030	1.2030		1.1067	1.1067	0.0000	2,688.9908	2,688.9908	0.8371		2,709.9188
Total	**2.3998**	**25.0076**	**16.6566**	**0.0267**	**2.6795**	**1.2030**	**3.8825**	**1.3267**	**1.1067**	**2.4334**	**0.0000**	**2,688.9908**	**2,688.9908**	**0.8371**		**2,709.9188**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1763	0.1271	1.6510	4.0400e-003	0.3689	2.9600e-003	0.3718	0.0978	2.7300e-003	0.1006		402.1776	402.1776	0.0138		402.5213
Total	**0.1763**	**0.1271**	**1.6510**	**4.0400e-003**	**0.3689**	**2.9600e-003**	**0.3718**	**0.0978**	**2.7300e-003**	**0.1006**		**402.1776**	**402.1776**	**0.0138**		**402.5213**

3.3 Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1554	11.9366	7.8645	0.0173		0.5324	0.5324		0.4898	0.4898		1,742.7232	1,742.7232	0.5425		1,756.2865
Total	**1.1554**	**11.9366**	**7.8645**	**0.0173**		**0.5324**	**0.5324**		**0.4898**	**0.4898**		**1,742.7232**	**1,742.7232**	**0.5425**		**1,756.2865**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0801	0.0578	0.7505	1.8400e-003	0.1677	1.3400e-003	0.1690	0.0445	1.2400e-003	0.0457		182.8080	182.8080	6.2500e-003		182.9642
Total	**0.0801**	**0.0578**	**0.7505**	**1.8400e-003**	**0.1677**	**1.3400e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**182.8080**	**182.8080**	**6.2500e-003**		**182.9642**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1554	11.9366	7.8645	0.0173		0.5324	0.5324		0.4898	0.4898	0.0000	1,742.7232	1,742.7232	0.5425		1,756.2865
Total	**1.1554**	**11.9366**	**7.8645**	**0.0173**		**0.5324**	**0.5324**		**0.4898**	**0.4898**	**0.0000**	**1,742.7232**	**1,742.7232**	**0.5425**		**1,756.2865**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0801	0.0578	0.7505	1.8400e-003	0.1677	1.3400e-003	0.1690	0.0445	1.2400e-003	0.0457		182.8080	182.8080	6.2500e-003		182.9642
Total	**0.0801**	**0.0578**	**0.7505**	**1.8400e-003**	**0.1677**	**1.3400e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**182.8080**	**182.8080**	**6.2500e-003**		**182.9642**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.4305	24.8001	14.6135	0.0311		1.1922	1.1922		1.1009	1.1009		3,127.3447	3,127.3447	0.9533		3,151.1770
Paving	1.3973					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.8278**	**24.8001**	**14.6135**	**0.0311**		**1.1922**	**1.1922**		**1.1009**	**1.1009**		**3,127.3447**	**3,127.3447**	**0.9533**		**3,151.1770**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2030	0.1464	1.9012	4.6500e-003	0.4248	3.4100e-003	0.4282	0.1127	3.1400e-003	0.1158		463.1136	463.1136	0.0158		463.5093
Total	**0.2030**	**0.1464**	**1.9012**	**4.6500e-003**	**0.4248**	**3.4100e-003**	**0.4282**	**0.1127**	**3.1400e-003**	**0.1158**		**463.1136**	**463.1136**	**0.0158**		**463.5093**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.4305	24.8001	14.6135	0.0311		1.1922	1.1922		1.1009	1.1009	0.0000	3,127.3447	3,127.3447	0.9533		3,151.1770

Paving	1.3973					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.8278**	**24.8001**	**14.6135**	**0.0311**		**1.1922**	**1.1922**		**1.1009**	**1.1009**	**0.0000**	**3,127.3447**	**3,127.3447**	**0.9533**		**3,151.1770**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2030	0.1464	1.9012	4.6500e-003	0.4248	3.4100e-003	0.4282	0.1127	3.1400e-003	0.1158		463.1136	463.1136	0.0158		463.5093
Total	**0.2030**	**0.1464**	**1.9012**	**4.6500e-003**	**0.4248**	**3.4100e-003**	**0.4282**	**0.1127**	**3.1400e-003**	**0.1158**		**463.1136**	**463.1136**	**0.0158**		**463.5093**

3.5 Landscaping - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8484	0.0000	0.8484	0.0916	0.0000	0.0916			0.0000			0.0000
Off-Road	0.6106	6.1351	3.6143	8.1800e-003		0.3101	0.3101		0.2853	0.2853		822.8503	822.8503	0.2562		829.2544
Total	**0.6106**	**6.1351**	**3.6143**	**8.1800e-003**	**0.8484**	**0.3101**	**1.1585**	**0.0916**	**0.2853**	**0.3769**		**822.8503**	**822.8503**	**0.2562**		**829.2544**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0801	0.0578	0.7505	1.8400e-003	0.1677	1.3400e-003	0.1690	0.0445	1.2400e-003	0.0457		182.8080	182.8080	6.2500e-003		182.9642
Total	**0.0801**	**0.0578**	**0.7505**	**1.8400e-003**	**0.1677**	**1.3400e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**182.8080**	**182.8080**	**6.2500e-003**		**182.9642**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3309	0.0000	0.3309	0.0357	0.0000	0.0357			0.0000			0.0000
Off-Road	0.6106	6.1351	3.6143	8.1800e-003		0.3101	0.3101		0.2853	0.2853	0.0000	822.8503	822.8503	0.2562		829.2544
Total	**0.6106**	**6.1351**	**3.6143**	**8.1800e-003**	**0.3309**	**0.3101**	**0.6410**	**0.0357**	**0.2853**	**0.3211**	**0.0000**	**822.8503**	**822.8503**	**0.2562**		**829.2544**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0801	0.0578	0.7505	1.8400e-003	0.1677	1.3400e-003	0.1690	0.0445	1.2400e-003	0.0457		182.8080	182.8080	6.2500e-003		182.9642
Total	**0.0801**	**0.0578**	**0.7505**	**1.8400e-003**	**0.1677**	**1.3400e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**182.8080**	**182.8080**	**6.2500e-003**		**182.9642**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by

Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

<u>Unmitigated</u>

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2470	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003
Unmitigated	0.2470	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2469					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.6000e-004	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003
Total	**0.2470**	**2.0000e-005**	**1.6600e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.5000e-003**	**3.5000e-003**	**1.0000e-005**		**3.7500e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2469					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.6000e-004	2.0000e-005	1.6600e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5000e-003	3.5000e-003	1.0000e-005		3.7500e-003
Total	**0.2470**	**2.0000e-005**	**1.6600e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.5000e-003**	**3.5000e-003**	**1.0000e-005**		**3.7500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Carson Truck Parking

South Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	16.00	Acre	16.00	696,960.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2017
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Construction Phase - Estimated construction schedule

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_EF_Parking	100	0
tblAreaCoating	Area_Parking	41818	0
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	100	0
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	0
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	50	0
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	50	0
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15

tblConstructionPhase	NumDays	30.00	20.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	10.00	20.00
tblConsumerProducts	ROG_EF	1.98E-05	2.14E-05
tblFleetMix	HHD	0.03	0.00
tblFleetMix	LDA	0.54	0.00
tblFleetMix	LDT1	0.05	0.00
tblFleetMix	LDT2	0.20	0.00
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.8780e-003	0.00
tblFleetMix	MCY	4.5310e-003	0.00
tblFleetMix	MDV	0.13	0.00
tblFleetMix	MH	1.0690e-003	0.00
tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	1.9140e-003	0.00
tblFleetMix	SBUS	6.9900e-004	0.00
tblFleetMix	UBUS	2.2220e-003	0.00
tblGrading	AcresOfGrading	0.00	16.00
tblGrading	AcresOfGrading	0.00	16.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	130.00	125.00
tblOffRoadEquipment	HorsePower	132.00	130.00
tblOffRoadEquipment	HorsePower	247.00	255.00
tblOffRoadEquipment	HorsePower	247.00	255.00
tblOffRoadEquipment	HorsePower	367.00	361.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00

tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	402.00	400.00
tblOffRoadEquipment	HorsePower	402.00	180.00
tblOffRoadEquipment	HorsePower	97.00	150.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	630.89

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					

2018	0.1054	0.8080	0.5567	1.1300e-003	0.0904	0.0385	0.1288	0.0384	0.0354	0.0739	0.0000	102.8667	102.8667	0.0282	0.0000	103.5728
Maximum	**0.1054**	**0.8080**	**0.5567**	**1.1300e-003**	**0.0904**	**0.0385**	**0.1288**	**0.0384**	**0.0354**	**0.0739**	**0.0000**	**102.8667**	**102.8667**	**0.0282**	**0.0000**	**103.5728**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.1054	0.8080	0.5567	1.1300e-003	0.0433	0.0385	0.0817	0.0171	0.0354	0.0526	0.0000	102.8666	102.8666	0.0282	0.0000	103.5727
Maximum	**0.1054**	**0.8080**	**0.5567**	**1.1300e-003**	**0.0433**	**0.0385**	**0.0817**	**0.0171**	**0.0354**	**0.0526**	**0.0000**	**102.8666**	**102.8666**	**0.0282**	**0.0000**	**103.5727**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.11**	**0.00**	**36.55**	**55.45**	**0.00**	**28.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**7-1-2018**	**9-30-2018**	0.7613	0.7613
		Highest	0.7613	0.7613

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Area	0.0451	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0451**	**0.0000**	**2.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**4.0000e-004**	**4.0000e-004**	**0.0000**	**0.0000**	**4.2000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0451	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0451**	**0.0000**	**2.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**4.0000e-004**	**4.0000e-004**	**0.0000**	**0.0000**	**4.2000e-004**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	7/3/2018	7/30/2018	5	20	
2	Trenching	Trenching	7/31/2018	8/27/2018	5	20	
3	Paving	Paving	8/28/2018	10/8/2018	5	30	
4	Landscaping	Site Preparation	10/9/2018	11/5/2018	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 16

Acres of Paving: 16

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Concrete/Industrial Saws	1	0.00	81	0.73
Grading	Excavators	2	0.00	162	0.38
Grading	Graders	1	0.00	174	0.41
Grading	Off-Highway Trucks	2	6.00	180	0.38
Grading	Off-Highway Trucks	1	2.00	180	0.38
Grading	Off-Highway Trucks	1	4.00	180	0.38
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	0.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Trenching	Off-Highway Trucks	1	6.00	180	0.38
Trenching	Off-Highway Trucks	2	2.00	180	0.38
Trenching	Off-Highway Trucks	1	4.00	180	0.38
Trenching	Tractors/Loaders/Backhoes	2	6.00	150	0.37
Paving	Air Compressors	1	2.00	78	0.48
Paving	Cement and Mortar Mixers	4	0.00	9	0.56
Paving	Graders	1	6.00	174	0.41
Paving	Off-Highway Trucks	1	6.00	180	0.38

Paving	Off-Highway Trucks	1	4.00	180	0.38
Paving	Off-Highway Trucks	1	2.00	180	0.38
Paving	Off-Highway Trucks	1	6.00	400	0.38
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	0.00	130	0.36
Paving	Rollers	1	0.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Landscaping	Off-Highway Trucks	2	4.00	180	0.38
Landscaping	Rubber Tired Dozers	3	0.00	255	0.40
Landscaping	Tractors/Loaders/Backhoes	1	6.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	13	33.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Landscaping	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					0.0687	0.0000	0.0687	0.0340	0.0000	0.0340	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0240	0.2501	0.1666	2.7000e-004		0.0120	0.0120		0.0111	0.0111	0.0000	24.3941	24.3941	7.5900e-003	0.0000	24.5840
Total	**0.0240**	**0.2501**	**0.1666**	**2.7000e-004**	**0.0687**	**0.0120**	**0.0807**	**0.0340**	**0.0111**	**0.0451**	**0.0000**	**24.3941**	**24.3941**	**7.5900e-003**	**0.0000**	**24.5840**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7500e-003	1.4400e-003	0.0154	4.0000e-005	3.6200e-003	3.0000e-005	3.6500e-003	9.6000e-004	3.0000e-005	9.9000e-004	0.0000	3.4765	3.4765	1.2000e-004	0.0000	3.4795
Total	**1.7500e-003**	**1.4400e-003**	**0.0154**	**4.0000e-005**	**3.6200e-003**	**3.0000e-005**	**3.6500e-003**	**9.6000e-004**	**3.0000e-005**	**9.9000e-004**	**0.0000**	**3.4765**	**3.4765**	**1.2000e-004**	**0.0000**	**3.4795**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0268	0.0000	0.0268	0.0133	0.0000	0.0133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0240	0.2501	0.1666	2.7000e-004		0.0120	0.0120		0.0111	0.0111	0.0000	24.3941	24.3941	7.5900e-003	0.0000	24.5839
Total	**0.0240**	**0.2501**	**0.1666**	**2.7000e-004**	**0.0268**	**0.0120**	**0.0388**	**0.0133**	**0.0111**	**0.0243**	**0.0000**	**24.3941**	**24.3941**	**7.5900e-003**	**0.0000**	**24.5839**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7500e-003	1.4400e-003	0.0154	4.0000e-005	3.6200e-003	3.0000e-005	3.6500e-003	9.6000e-004	3.0000e-005	9.9000e-004	0.0000	3.4765	3.4765	1.2000e-004	0.0000	3.4795
Total	**1.7500e-003**	**1.4400e-003**	**0.0154**	**4.0000e-005**	**3.6200e-003**	**3.0000e-005**	**3.6500e-003**	**9.6000e-004**	**3.0000e-005**	**9.9000e-004**	**0.0000**	**3.4765**	**3.4765**	**1.2000e-004**	**0.0000**	**3.4795**

3.3 Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0116	0.1194	0.0786	1.7000e-004		5.3200e-003	5.3200e-003		4.9000e-003	4.9000e-003	0.0000	15.8097	15.8097	4.9200e-003	0.0000	15.9328
Total	**0.0116**	**0.1194**	**0.0786**	**1.7000e-004**		**5.3200e-003**	**5.3200e-003**		**4.9000e-003**	**4.9000e-003**	**0.0000**	**15.8097**	**15.8097**	**4.9200e-003**	**0.0000**	**15.9328**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	6.5000e-004	7.0100e-003	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5802	1.5802	5.0000e-005	0.0000	1.5816
Total	**8.0000e-004**	**6.5000e-004**	**7.0100e-003**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5802**	**1.5802**	**5.0000e-005**	**0.0000**	**1.5816**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0116	0.1194	0.0786	1.7000e-004		5.3200e-003	5.3200e-003		4.9000e-003	4.9000e-003	0.0000	15.8097	15.8097	4.9200e-003	0.0000	15.9327
Total	**0.0116**	**0.1194**	**0.0786**	**1.7000e-004**		**5.3200e-003**	**5.3200e-003**		**4.9000e-003**	**4.9000e-003**	**0.0000**	**15.8097**	**15.8097**	**4.9200e-003**	**0.0000**	**15.9327**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	6.5000e-004	7.0100e-003	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5802	1.5802	5.0000e-005	0.0000	1.5816

Total	**8.0000e-004**	**6.5000e-004**	**7.0100e-003**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5802**	**1.5802**	**5.0000e-005**	**0.0000**	**1.5816**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0365	0.3720	0.2192	4.7000e-004		0.0179	0.0179		0.0165	0.0165	0.0000	42.5562	42.5562	0.0130	0.0000	42.8805
Paving	0.0210					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0574**	**0.3720**	**0.2192**	**4.7000e-004**		**0.0179**	**0.0179**		**0.0165**	**0.0165**	**0.0000**	**42.5562**	**42.5562**	**0.0130**	**0.0000**	**42.8805**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0200e-003	2.4800e-003	0.0267	7.0000e-005	6.2500e-003	5.0000e-005	6.3000e-003	1.6600e-003	5.0000e-005	1.7100e-003	0.0000	6.0049	6.0049	2.1000e-004	0.0000	6.0100
Total	**3.0200e-003**	**2.4800e-003**	**0.0267**	**7.0000e-005**	**6.2500e-003**	**5.0000e-005**	**6.3000e-003**	**1.6600e-003**	**5.0000e-005**	**1.7100e-003**	**0.0000**	**6.0049**	**6.0049**	**2.1000e-004**	**0.0000**	**6.0100**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0365	0.3720	0.2192	4.7000e-004		0.0179	0.0179		0.0165	0.0165	0.0000	42.5561	42.5561	0.0130	0.0000	42.8804
Paving	0.0210					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0574**	**0.3720**	**0.2192**	**4.7000e-004**		**0.0179**	**0.0179**		**0.0165**	**0.0165**	**0.0000**	**42.5561**	**42.5561**	**0.0130**	**0.0000**	**42.8804**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0200e-003	2.4800e-003	0.0267	7.0000e-005	6.2500e-003	5.0000e-005	6.3000e-003	1.6600e-003	5.0000e-005	1.7100e-003	0.0000	6.0049	6.0049	2.1000e-004	0.0000	6.0100
Total	**3.0200e-003**	**2.4800e-003**	**0.0267**	**7.0000e-005**	**6.2500e-003**	**5.0000e-005**	**6.3000e-003**	**1.6600e-003**	**5.0000e-005**	**1.7100e-003**	**0.0000**	**6.0049**	**6.0049**	**2.1000e-004**	**0.0000**	**6.0100**

3.5 Landscaping - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					8.4800e-003	0.0000	8.4800e-003	9.2000e-004	0.0000	9.2000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.1100e-003	0.0614	0.0361	8.0000e-005		3.1000e-003	3.1000e-003		2.8500e-003	2.8500e-003	0.0000	7.4648	7.4648	2.3200e-003	0.0000	7.5229
Total	**6.1100e-003**	**0.0614**	**0.0361**	**8.0000e-005**	**8.4800e-003**	**3.1000e-003**	**0.0116**	**9.2000e-004**	**2.8500e-003**	**3.7700e-003**	**0.0000**	**7.4648**	**7.4648**	**2.3200e-003**	**0.0000**	**7.5229**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	6.5000e-004	7.0100e-003	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5802	1.5802	5.0000e-005	0.0000	1.5816
Total	**8.0000e-004**	**6.5000e-004**	**7.0100e-003**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5802**	**1.5802**	**5.0000e-005**	**0.0000**	**1.5816**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.3100e-003	0.0000	3.3100e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.1100e-003	0.0614	0.0361	8.0000e-005		3.1000e-003	3.1000e-003		2.8500e-003	2.8500e-003	0.0000	7.4648	7.4648	2.3200e-003	0.0000	7.5229
Total	**6.1100e-003**	**0.0614**	**0.0361**	**8.0000e-005**	**3.3100e-003**	**3.1000e-003**	**6.4100e-003**	**3.6000e-004**	**2.8500e-003**	**3.2100e-003**	**0.0000**	**7.4648**	**7.4648**	**2.3200e-003**	**0.0000**	**7.5229**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	6.5000e-004	7.0100e-003	2.0000e-005	1.6500e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5802	1.5802	5.0000e-005	0.0000	1.5816
Total	**8.0000e-004**	**6.5000e-004**	**7.0100e-003**	**2.0000e-005**	**1.6500e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5802**	**1.5802**	**5.0000e-005**	**0.0000**	**1.5816**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			

Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0451	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004
Unmitigated	0.0451	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0451					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004
Total	**0.0451**	**0.0000**	**2.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-004**	**4.0000e-004**	**0.0000**	**0.0000**	**4.2000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0451					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	2.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-004	4.0000e-004	0.0000	0.0000	4.2000e-004
Total	**0.0451**	**0.0000**	**2.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-004**	**4.0000e-004**	**0.0000**	**0.0000**	**4.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e

Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000

Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX B

WATER QUALITY

PRELIMINARY STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP) AND LOW IMPACT DEVELOPMENT (LID) REPORT

Carson Trucking Project

DWP Corridor, East 236th Street to East 223rd Street
Carson, CA

June 2018

PREPARED FOR:

Linear Properties, LLC
One Park Plaza, Suite 950
Irvine, CA 92614
949-300-5700
Attn: Mark Rodriguez

PREPARED BY:

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Attn: Jason Marechal, P.E.

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SECTION PAGE

OWNER CERTIFICATION

PRELIMINARY STANDARD URBAN STORMWATER MITIGATION PLAN AND LID REPORT

This Preliminary Standard Urban Stormwater Mitigation Plan has been prepared for LINEAR PROPERTIES, LLC by Kimley-Horn and Associates, Inc. It is intended to comply with the requirements of the County of Los Angeles National Pollution Discharge Elimination Permit (RWQCB Order R4-2012-0175) issued by the Los Angeles Regional Water Quality Control Board. The undersigned is authorized to approve implementation of the provisions of this plan as appropriate and will strive to have the plan carried out by successors consistent with the County of Los Angeles Low Impact Development (LID) requirements for Stormwater Management and the intent of the NPDES storm water program requirements.

Signature	Date
Name	Title

Linear Properties, LLC
Mark Rodriguez
One Park Plaza, Suite 950
Irvine, CA 92614
(949) 300-5700

I. INTRODUCTION

Prior to issuance of any grading permits, the applicant shall submit a Stormwater Pollution Prevention Plan (SWPPP) program acceptable to the City Engineer to comply with the latest National Pollutant Discharge Elimination System (NPDES) Stormwater Regulations. The project shall incorporate both construction and operational Best Management Practices to minimize construction and urban pollutants in stormwater runoff. If required, the applicant shall obtain a State Water Resources Board General Construction Activities Storm Water Permit. The Engineering Department shall monitor compliance.

This Preliminary LID Plan covers the post-construction operations for the Carson Trucking Project, in the City of Carson, California (see Figure 1, Vicinity Map). It has been developed as required under State Water Resources Control Board (SWRCB) Municipal NPDES Storm Water Permit for the County of Los Angeles and the Incorporated Cities of Los Angeles County, and in accordance with good engineering practices.

This Preliminary SUSMP and LID report shall identify, at a minimum, the routine resources specified in the Countywide Development Planning for Stormwater Management, which details implementation of BMP's whenever they are applicable to a project; the assignment of long-term maintenance responsibilities; and show the Design Plan that will be implemented in order to mitigate post-construction stormwater runoff pollution.

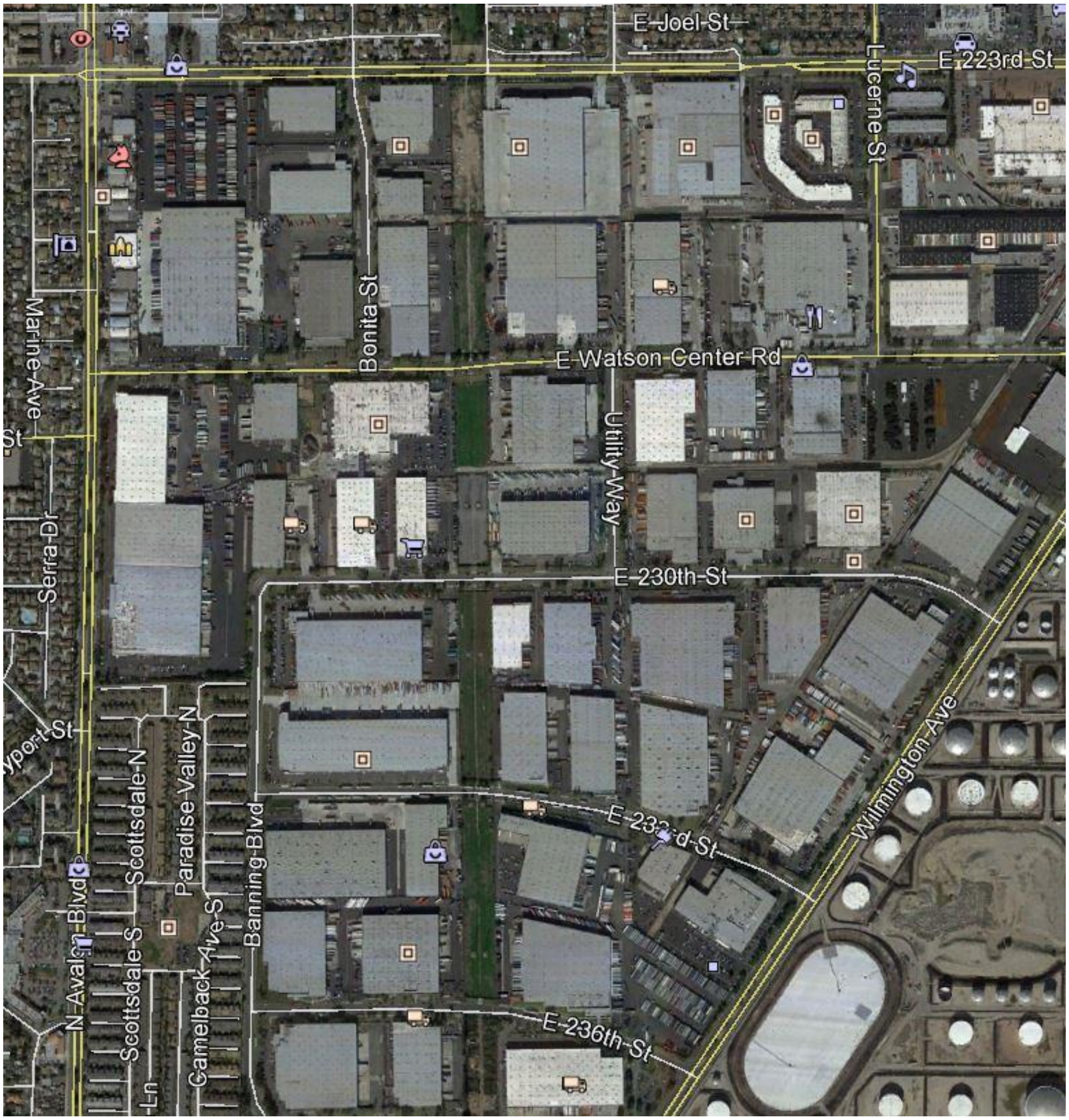


Figure 1 Vicinity Map

II. EXISTING SITE CONDITIONS

The proposed Carson Trucking Project will occupy a 16.2-acre collection of parcels located in the City of Carson, CA. The project site is located in the existing Los Angeles Department of Water and Power (LADWP) right-of-way and is bounded by East 236th Street to the south and East 223rd street to the North. The LADWP right-of-way is crossed by East 233rd Street, East 230th Street, and East Watson Center Road, from south to north, dividing the site into four separate areas. The subareas are labelled 1 to 4 from south to north.

Under existing conditions, each of the four areas drain from the south to north via sheet flow. The south half of subarea 3 is impervious parking lot. The remainder of subarea 3 and all other subareas are undeveloped and fully pervious. Subarea 1 drains to the curb and gutter of 233rd street; the County PD 934, Line E is located in 233rd Street, and crosses the right-of-way, draining from east to west. Subarea 2 drains to the curb and gutter of 230th street; the County PD 595is located in 230th Street, and crosses the right-of-way, draining from west to east. Subarea 3 drains to the curb and gutter of East Watson Center Road; the County PD 547, Line D is located in East Watson Center Road, and crosses the right-of-way, draining from west to east. Subarea 4 drains to the curb and gutter of 223rd Street; the County PD 547, Line E is located in 223rd Street, and terminates approximately 300 feet west of the right-of-way, draining from west to east.

The County storm drain systems connect to Dominguez Creek, which is located approximately one mile east of the site. Dominguez Creek drains to the Los Angeles River, and is thus located within the larger Los Angeles River Watershed. The Los Angeles River ultimately discharges to the Los Angeles Harbor. According to the Los Angeles RWQCB 303(d) list of impaired water segments, Dominguez Creek is listed as impaired for coliform bacteria, copper, lead, toxicity, trash, zinc, and pH.

A soils report is not yet available, but Carson is typically underlain by clay soils, and infiltration is typically infeasible in the City. For the purposes of this report, infiltration is considered infeasible. If further site-specific analysis determines that infiltration is feasible, the stormwater design will be changed to incorporate infiltration.

III. PROPOSED SITE CONDITIONS

The proposed project will re-develop the project site for truck and trailer parking purposes. New landscaping and drainage facilities are also proposed.

Under the proposed conditions, drainage patterns will remain similar to existing conditions, and the project subareas will continue to drain generally from south to north. New storm drain systems in each subarea will be installed and connect to the existing County drains in the intersecting streets. Low flows will be treated by proprietary biofiltration systems and the higher flows will bypass directly to the underground storm drain system.

Since under existing conditions the project site is largely undeveloped, the proposed redevelopment will increase the amount of impervious surfaces as compared to existing conditions. Under proposed conditions, approximately 80%-90% of the site is impervious, similar to the existing condition. This will increase the runoff under most storm events, though the 25-year storm peak flow rates will be detained to match the allowable connection flow rate as defined by the County. The detention will limit the impacts to the downstream storm drain system. Since the County storm drain system drains to the fully engineered and hardened Dominguez Creek and Los Angeles River, hydromodification is not a concern. Hydromodification BMPs are not analyzed or required.

IV. BMP SUMMARY

Based on the pollutants that are anticipated to be generated when the Carson Trucking Project is completed and in use, applicable, required, or suggested treatment and source control best management practices (BMPs) are correspondingly listed for each category. This report is responsible for determining, evaluating, and selecting the appropriate and applicable measures to treat the targeted pollutants to the MEP standard utilizing low impact development (LID) principles.

SOURCE CONTROL BMPS

Source control BMPs are required to be incorporated in all new development and redevelopment projects unless not applicable. The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

The specific source control BMPs for the Carson Trucking Project include:

INCORPORATED SOURCE CONTROL BMP:	YES	N/A	DESCRIPTION
Peak Stormwater Runoff Discharge Rates	☒	☐	The project site's peak discharges will not cause or contribute to downstream erosion. Project runoff will discharge into the County's storm drain system that directly discharges to the paved Dominguez Creek flood control channel.
Conserve Natural Areas	☐	☒	Under existing conditions, the project site is fully or historically developed and/or graded for the utility towers. There are no natural areas to be preserved.
Minimize Stormwater Pollutants of Concern	☒	☐	Biofiltration will minimize the runoff of pollutants of concern.
Protect Slopes & Channels	☐	☒	There are no slopes or channels associated with the project site.
Provide Storm Drain System Stenciling & Signage	☒	☐	The phrase "No Dumping – Only Rain In Drain" or equally effective phrase will be stenciled on catch basins and/or area drains to alert the public as to the destination of pollutants discharged into the stormwater.
Properly Design Outdoor Material Storage Areas	☐	☒	There are no outdoor material storage areas associated with the project site.
Properly Design Trash Storage Areas	☐	☒	There are no trash areas proposed for the project site.
Provide Proof of Ongoing BMP Maintenance	☒	☐	The owner will be responsible for the maintenance of the BMPs onsite, and ensure that they are in good working order.

INCORPORATED SOURCE CONTROL BMP:	YES	N/A	DESCRIPTION
Properly Design Loading/Unloading Dock Areas	☐	☒	There are no significant loading docks proposed for the project site. A modular loading dock system may be utilized in portions of the site.
Properly Design Repair/Maintenance Bays	☐	☒	There are no repair/maintenance bays proposed for the project site.
Properly Design Vehicle/ Equipment/ Accessory Wash Areas	☐	☒	There are no vehicle or equipment wash areas proposed for the project site.
Design Standards for LID Treatment Control BMPs	☒	☐	Post-construction LID BMP design will mitigate stormwater runoff for the volume of runoff produced by the 85th percentile storm event, prior to its discharge to a stormwater conveyance system.

The following source control BMP fact sheets taken from the 2003 California BMP Handbook are provided in Appendix 8 of this report as a reference to the design plans and/or specifications for the Carson Trucking Project:

- SD-10 Site Design & Landscape Planning
- SD-13 Storm Drainage Signage
- SD-32 Trash Storage Areas
- SC-30 Outdoor Loading/Unloading
- SC-34 Waste Handling & Disposal
- SC-41 Building & Grounds Maintenance
- SC-43 Parking/Storage Area Maintenance
- SC-44 Drainage System Maintenance

LID SITE DESIGN BMPS

The following table describes the Low Impact Development site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in stormwater pollution prevention from new developments and redevelopments.

INCORPORATED LID SITE DESIGN BMP:	YES	NO	DESCRIPTION
Conserve natural areas.	☐	☒	Under existing conditions, the project site is fully or historically developed and/or graded for the utility towers. There are no natural areas to be preserved.
Minimizing disturbances to natural drainage patterns.	☐	☒	No natural drainage patterns are present. The project will maintain the existing developed conditions drainage patterns.
Minimizing and disconnecting impervious surfaces.	☒	☐	The project will direct runoff biofiltration units.

INCORPORATED LID SITE DESIGN BMP:	YES	NO	DESCRIPTION
Minimizing soil compaction.	☐	☒	Existing soil already compacted for developed site. Parking lot compaction is typically less intense than building pad compaction.
Directing runoff from impervious areas to pervious areas.	☒	☐	The project will direct runoff to biofiltration units.

LID TREATMENT CONTROL BMPS

The water quality design for the Project complies with the 2002 Los Angeles County SUSMP Manual and the subsequent 2009 Los Angeles County Low Impact Development (LID) Manual. The LID goals of increasing groundwater recharge, enhancing water quality, and preventing degradation to downstream natural drainage courses, as outlined in LID Manual, were used in considering treatment method alternatives.

The LID manual outlines LID BMPs and establishes a hierarchy of treatment methods as flows:

1. BMPs that promote infiltration
2. BMPs that storage and beneficially use stormwater runoff
3. BMPs that utilize the runoff for water conservation uses (Biofiltration)

The highest level on the hierarchy is required to be used unless it is technically infeasible to do so. In the case of Carson Trucking Project, infiltration is considered technically infeasible since soils in this area typically do not support infiltration.

INCORPORATED LID TREATMENT CONTROL BMP:	YES	NO	DESCRIPTION
Bioretention facility	☒	☐	Proprietary Modular Wetland Biofiltration BMP.
Cisterns/Rain Barrels	☐	☒	Biofiltration BMP chosen.
Dry Ponds	☐	☒	Biofiltration BMP chosen.
Dry Wells	☐	☒	Biofiltration BMP chosen.
Engineered Wetlands	☒	☐	Proprietary Modular Wetland Biofiltration BMP.
Green Roofs	☐	☒	Biofiltration BMP chosen.
Infiltration Basin	☐	☒	Biofiltration BMP chosen.
Infiltration Trenches	☐	☒	Biofiltration BMP chosen.
Landscape Irrigation	☐	☒	Biofiltration BMP chosen.
Planter Boxes	☒	☐	Proprietary Modular Wetland Biofiltration BMP.

INCORPORATED LID TREATMENT CONTROL BMP:	YES	NO	DESCRIPTION
Porous pavements	☐	☒	Biofiltration BMP chosen.
Sand Filters	☐	☒	Biofiltration BMP chosen.
Vegetated Buffers	☐	☒	Biofiltration BMP chosen.
Vegetated Swales	☐	☒	Biofiltration BMP chosen.
Wet Ponds	☐	☒	Biofiltration BMP chosen.

DESIGN STANDARDS FOR LID TREATMENT CONTROL BMPS

Treatment Control BMPs must incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, to mitigate (infiltrate, filter, or treat) stormwater runoff. For the proposed treatment control BMPs selected for the project site, a flow-based design standard was utilized. Each of the selected treatment control BMPs have the capacity to treat:

THE FLOW PRODUCED FROM THE 85^TH^ PERCNETILE STORM OR A 0.75 INCH STORM, WHICHEVER IS GREATER, TO A STORMWATER CONVEYANCE SYSTEM.

Detailed calculations for the Project are provided in Appendix 2 of this report. As illustrated in the table below, all treatment control BMPs selected for the project site meet the required minimum treatment flow rate for each of their respective drainage areas.

SUMMARY OF VOLUME/FLOW BASED TREATMENT BMP SIZING

Treatment Control BMP	Sub-Areas*	Required Treatment (cfs)	Selected BMP Size	Model Number	Treatment Design Capacity (cfs)
Modular Wetland	1-South	0.12	4’x8’	MWS-L-4-8	0.12
Modular Wetland	1-North	0.38	8’x16’	MWS-L-8-16	0.46
Modular Wetland	2-South	0.35	8’x12’	MWS-L-8-12	0.35
Modular Wetland	2-North	0.20	8’x8’	MWS-L-8-8	0.23
Modular Wetland	3-South	0.18	8’x8’	MWS-L-8-8	0.23
Modular Wetland	3-North	0.41	8’x16’	MWS-L-8-16	0.46
Modular Wetland	4-South	0.35	8’x12’	MWS-L-8-12	0.35
Modular Wetland	4-North	0.35	8’x12’	MWS-L-8-12	0.35

*Sub-areas are shown on SUSMP Exhibit in Appendix 8

V. HYDROMODIFICATION DISCUSSION

The Project site was considered exempt to hydromodifiation design considerations due to the fact that the project stormwater is directed to the Domiguez Creek flood control facility, a hardened channel that is not susceptible to hydromodification impacts.

VI. INSPECTION/MAINTENANCE RESPONSIBILITY

It has been determined that the Owner (Linear Properties, LLC) shall assume all BMP inspection and maintenance responsibilities for the Carson Trucking Project. The Owner will be responsible for maintenance of all storm drain inlets, collectors, v-ditches or any other related flood control or stormwater control device. Furthermore, all interior streets and/or roadways, landscape, recreation areas, facilities and/or open space within the project limits will be maintained by the Owner. A Master Covenant and Agreement regarding on-site stormwater treatment devices maintenance shall be completed prior to completion and release of the Project by the City of Carson (see Appendix 5).

LONG-TERM FUNDING FOR BMP MAINTENANCE

Long-term funding for BMP maintenance shall be funded by Linear Properties, LLC, or subsequent owners.

RESPONSIBLE PARTY CONTACT INFORMATION

Name: Mark Rodriguez, Linear Properties, LLC
Address: One Park Plaza, Suite 950, Irvine, CA 92614
Phone: 949-300-5700

VII. OPERATION & MAINTENANCE PLAN

Proper O&M is an important element of a stormwater mitigation plan to ensure BMPs remove pollution effectively. Routine maintenance or service also contributes to the efficiency and continuous operation of a system. The post development BMP maintenance responsibility and frequency matrix provided in this section detail the specific party to perform the inspection and maintenance of each BMP for the Carson Trucking Project and details the maintenance and inspection activities to be performed, and the frequency with which each shall be performed. Further Operations and Maintenance details can be found in Appendix 7.

Structural BMP Maintenance Responsibility / Frequency Matrix

BMP		RESPONSIBILITY	MAINTENANCE FREQUENCY
SD-13	Storm Drainage Signage	Linear Properties, LLC	Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible. Frequency: ANNUALLY
SC-43	Parking/Storage Area Maintenance	Linear Properties, LLC	Parking lots must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1st). Frequency: QUARTERLY
Modular Wetlands		Linear Properties, LLC	Units must be inspected at least two times per year and maintained per recommendations. Manufacturer's specifications may recommend additional maintenance. Frequency: MANUFACTURER'S RECOMMENDATIONS

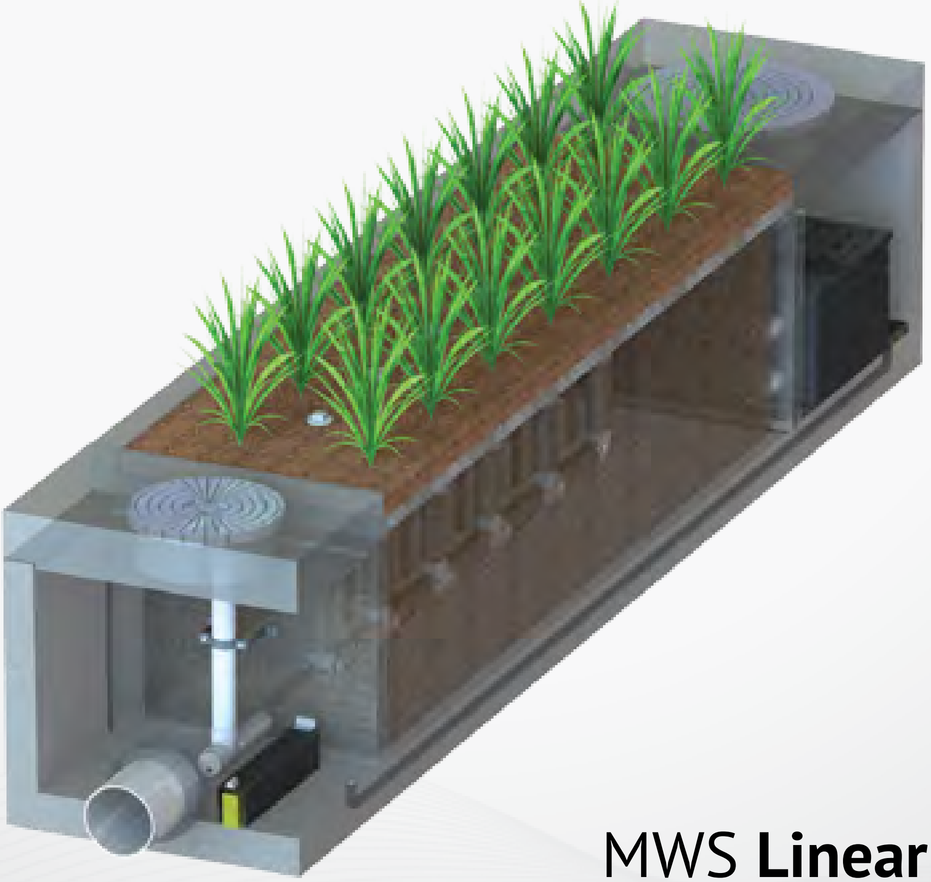
VIII. APPENDICES

APPENDIX 1

LID BMP DETAILS

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



MWS **Linear**

Contents

The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.

Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.

MWS Linear

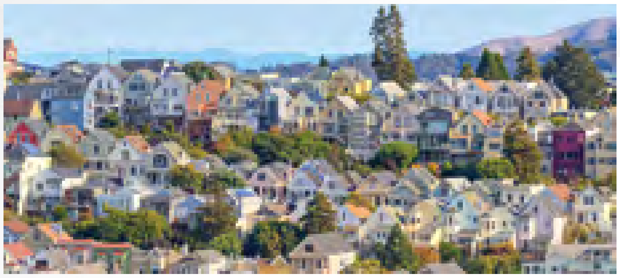
The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and prefilter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.



Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.

Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications are available on our website: www.ModularWetlands.com/Applications

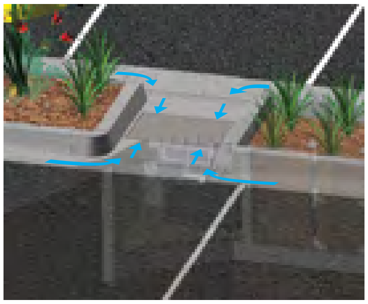
- Agriculture
- Reuse
- Low Impact Development
- Waste Water

Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.

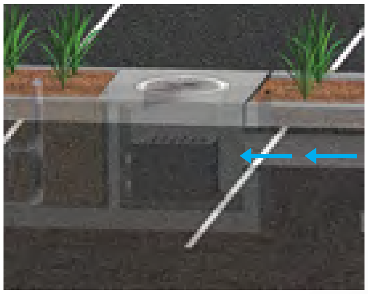
Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

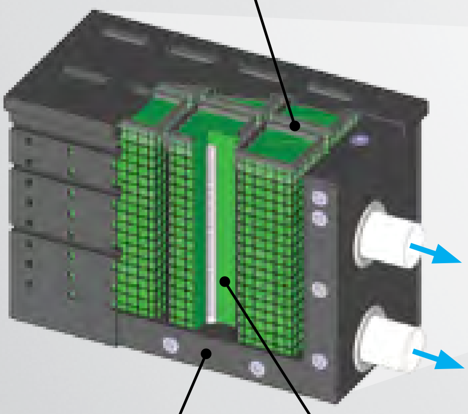
1 Pre-Treatment

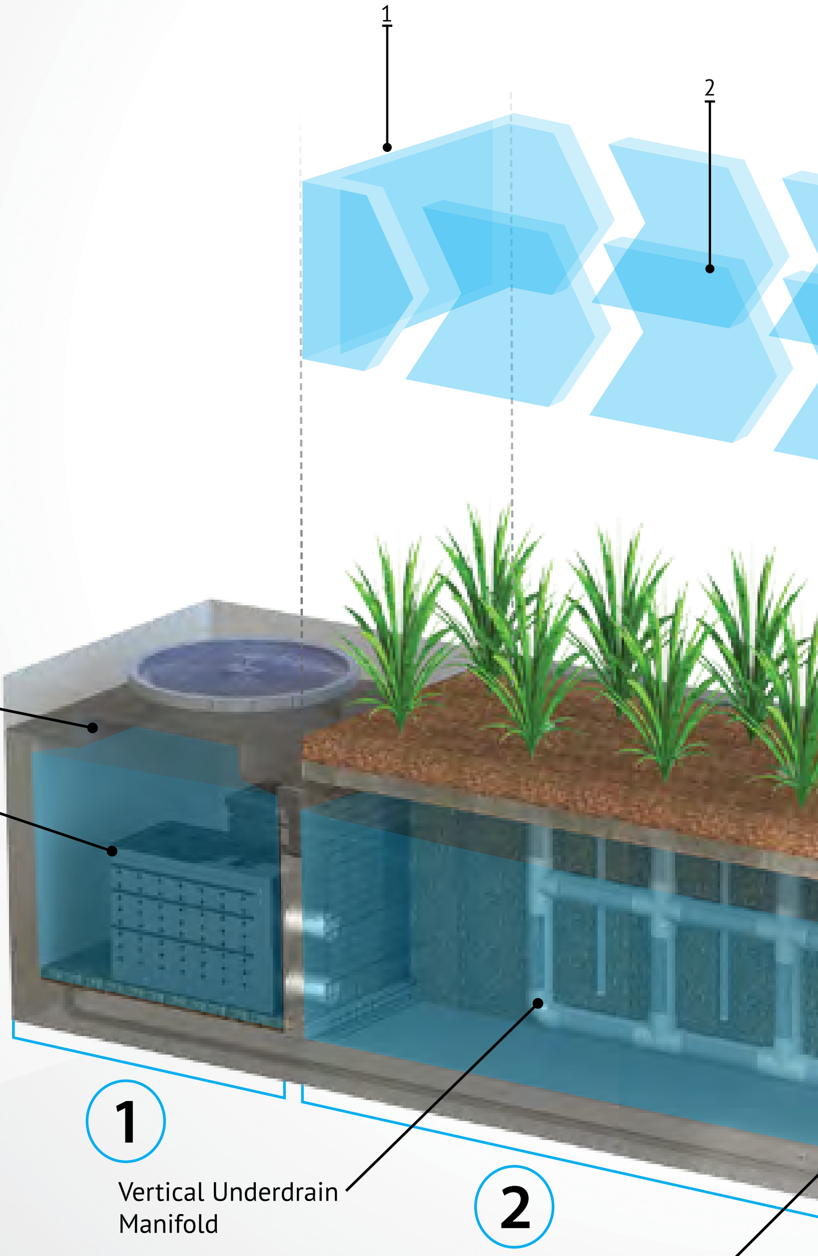
Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

Pre-Filter Cartridges

- Over 25 ft^2 of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber





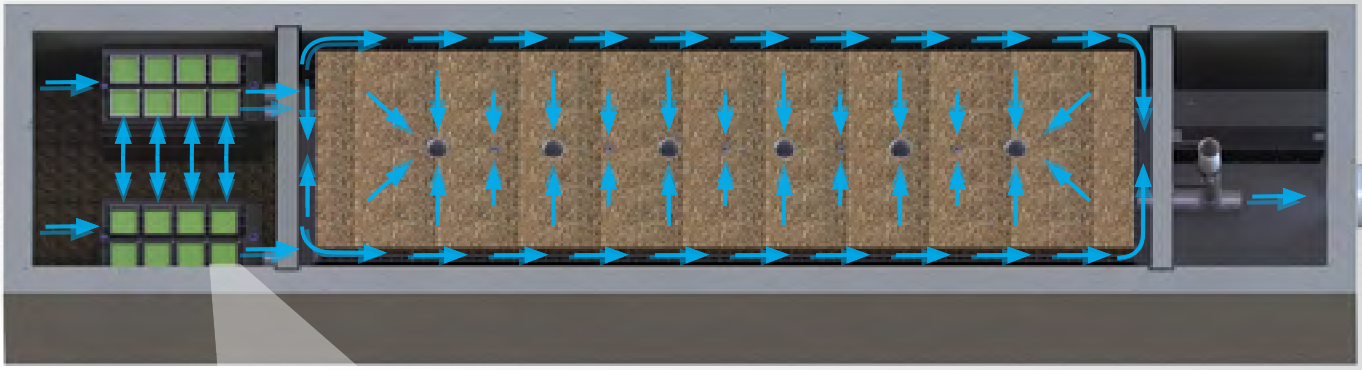


Fig. 2 - Top View

2x to 3x More Surface Area Than Traditional Downward Flow Bioretention Systems.

2 Biofiltration

Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

3 Discharge

Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

Drain-Down Filter

- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

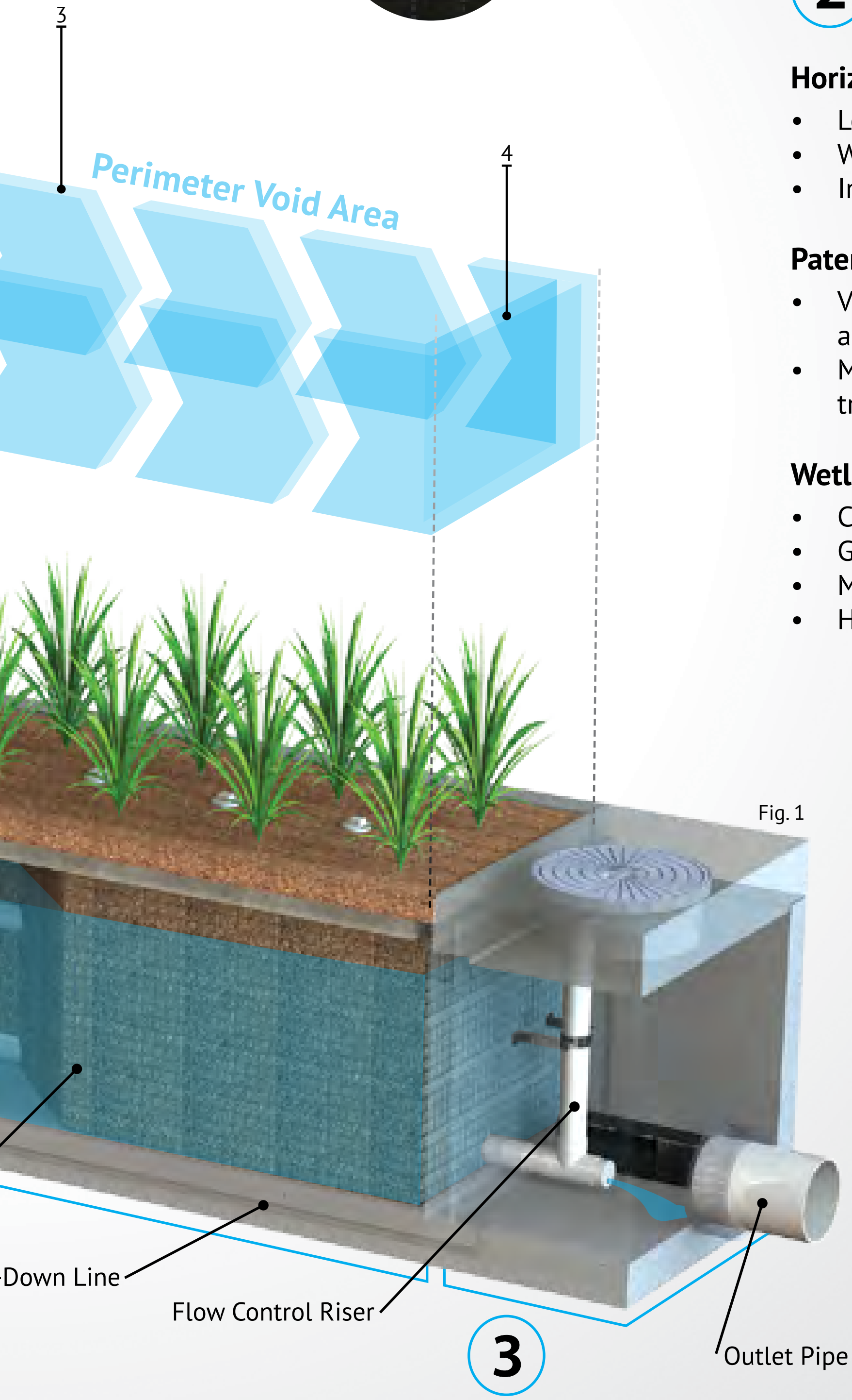
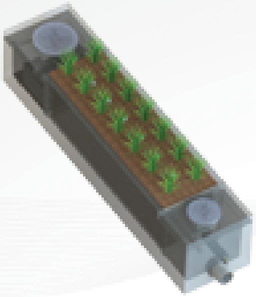


Fig. 1

Orientations

Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

Bypass

Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

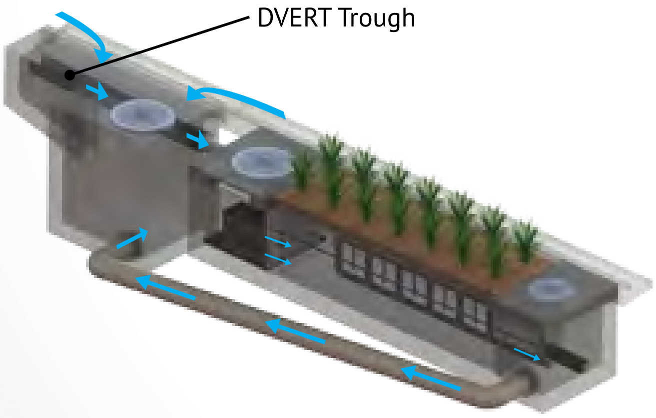
External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.

Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.

State of Washington
TAPE
GULD
Basic
Enhanced/Metals
Phosphorus

Washington State TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%

VA

DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

MA

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.

RI

Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus for discharges to freshwater systems, and 30% Total Nitrogen for discharges to saltwater or tidal systems.

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.

Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.

Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit www.ModularWetlands.com/Plants for more information and various plant lists.

Section [________]
Modular Subsurface Flow Wetland System

PART 1 – GENERAL

01.01.00 Purpose

The purpose of this specification is to establish generally acceptable criteria for Modular Subsurface Flow Wetland Systems used for biofiltration of stormwater runoff including dry weather flows and other contaminated water sources. It is intended to serve as a guide to producers, distributors, architects, engineers, contractors, plumbers, installers, inspectors, agencies and users; to promote understanding regarding materials, manufacture and installation; and to provide for identification of devices complying with this specification.

01.02.00 Description

Modular Subsurface Flow Wetland Systems (MSFWS) are used for filtration of stormwater runoff including dry weather flows. The MSFWS is a pre-engineered biofiltration system composed of a pretreatment chamber containing filtration cartridges, a horizontal flow biofiltration chamber with a peripheral void area and a centralized and vertically extending underdrain, the biofiltration chamber containing a sorptive media mix which does not contain any organic material and a layer of plant establishment media, and a discharge chamber containing an orifice control structure . Treated water flows horizontally in series through the pretreatment chamber cartridges, biofiltration chamber and orifice control structure.

01.03.00 Manufacturer

The manufacturer of the MSFWS shall be one that is regularly engaged in the engineering design and production of systems developed for the treatment of stormwater runoff for at least (10) years, and which have a history of successful production, acceptable to the engineer of work. In accordance with the drawings, the MSFWS(s) shall be a filter device Manufactured by Bio Clean Environmental Services, Inc., or Modular Wetland Systems, Inc., or assigned distributors or licensees. Bio Clean Environmental Services Inc., and Modular Wetland Systems, Inc., can be reached at:

Corporate Headquarters:
Bio Clean Environmental Service, Inc.
2972 San Luis Rey Road
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.net

Corporate Headquarters:
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92049
Phone: (760) 433-7650
www.modularwetlands.net

01.04.00 Submittals

01.04.01 Shop drawings are to be submitted with each order to the contractor and consulting engineer.

01.04.02 Shop drawings are to detail the MSFWS and all components required and the sequence for installation, including:

- System configuration with primary dimensions
- Interior components
- Any accessory equipment called out on shop drawings

01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

01.05.01 Specification requirements for installation of MSFWS.

01.05.02 Manufacturer to supply components of the MSFWS(s):

- Pretreatment chamber components (pre-assembled)
- Concrete Structure(s)
- Biofiltration chamber components (pre-assembled)
- Flow control discharge structure (pre-assembled)

01.06.00 Reference Standards

ASTM C 29	Standard Test Method for Unit Weight and Voids in Aggregate
ASTM C 88	C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C131	C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregates by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 330	C 330 Standard Specification for Lightweight Aggregate for Structural Concrete
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft.-lbf/ft3 (600 kN-m/m3)
ASTM D 1621	10 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
ASTM D 1777	ASTM D1777 - 96(2007) Standard Test Method for Thickness of Textile Materials
ASTM D 4716	Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
AASHTO T 99-01	Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop
AASHTO T 104	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
AASHTO T 260	Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
AASHTO T 288	Standard Method of Test for Determining Minimum Laboratory Soil Resistivity
AASHTO T 289	Standard Method of Test for Determining ph of Soil for Use in Corrosion Testing
AASHTO T 291	Standard Method of Test for Determining Water Soluble Chloride Ion Content in Soil
AASHTO T 290	T 290 Standard Method of Test for Determining Water Soluble Sulfate Ion Content in Soil

PART 2 – COMPONENTS

The Modular Subsurface Flow Wetland Systems (MSFWS) and all of its components shall be self-contained within a concrete structure constructed of concrete with a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615, Grade 60, and supports and H20 loading as indicated by AASHTO. Each Chamber shall have appropriate access hatches for easy maintenance and sized to allow removal of all internal components without disassembly. All water transfer system components shall conform with the following;

- Filter netting shall be 100% Polyester with a number 16 sieve size, and strength tested per ASTM D 3787.
- Drainage cells shall be manufactured of lightweight injection-molded plastic and have a minimum compressive strength test of 6,000 psi and a void area along the surface making contact with the filter media of 75% or greater. The cells shall be at least 2” in thickness and allow water to freely flow in all four directions.

02.01.00 Pretreatment Chamber Components

02.01.01 Filter Cartridges shall operate at a loading rate not to exceed 3 gallons per minute per square foot surface area.

02.01.02 Drain Down System shall include a pervious floor that allows water to drain into the underdrain pipe that is connected to the discharge chamber.

02.02.00 Biofiltration Chamber Components

02.02.01 Media shall consist of ceramic material produced by expanding and vitrifying select material in a rotary kiln. Media must be produced to meet the requirements of ASTM C330, ASTM C331, and AASHTO M195. Aggregates must have a minimum 24-hour water absorption of 10.5% mass. Media shall not contain any organic material. Flow through media shall be horizontal from the outer perimeter of the chamber toward the centralized and vertically extending underdrain. The retention time in the media shall be at least 3 minutes. Downward flow filters are not acceptable alternatives. The thickness of the media shall be at least 19” from influent end to effluent end. The loading rate on the media shall not exceed 1.1 gallons per minute per square foot surface area. Media must be contained within structure that spaces the surface of the media at least 2” from all vertically extending walls of the concrete structure.

02.02.02 Planting shall be native, drought tolerant species recommend by manufacturer and/or landscape architect.

02.02.03 Plant Support Media shall be made of a 3” thick moisture retention cell that is inert and contains no chemicals or fertilizers, is not made of organic material and has an internal void percentage of 80%.

02.03.00 Discharge Chamber

The discharge device shall house a flow control orifice plate that restricts flows greater than designed treatment flow rate. All piping components shall be made of a high-density polyethylene. The discharge chamber shall also contain a drain down filter if specified on the drawing.

PART 3 – PERFORMANCE

03.01.00 General

03.01.01 Function - The MSFWS has no moving internal components and functions based on gravity flow, unless otherwise specified. The MSFWS is composed of a pretreatment chamber, a biofiltration chamber and a discharge chamber. The pretreatment device houses cartridge media filters, which consist of filter media housed in a perforated enclosure. The untreated runoff flows into the system via subsurface piping and or surface inlet. Water entering the system is forced through the filter cartridge enclosures by gravity flow. Then the flow contacts the filter media. The flow through the media is horizontal toward the center of each individual media filter. In the center of the media shall be a round slotted PVC pipe of no greater than 1.5” in diameter. The slotted PVC pipe shall extend downward into the water transfer cavity of the cartridge. The slotted PVC pipe shall be threaded on the bottom to connect to the water transfer cavity. After pollutants have been removed by the filter media the water discharges the pretreatment chamber and flows into the water transfer system and is conveyed to the biofiltration chamber. Once runoff has been filtered by the biofiltration chamber it is collected by the vertical underdrain and conveyed to a discharge chamber equipped with a flow control orifice plate. Finally the treated flow exits the system.

03.01.02 Pollutants - The MSFWS will remove and retain debris, sediments, TSS, dissolved and particulate metals and nutrients including nitrogen and phosphorus species, bacteria, BOD, oxygen demanding substances, organic compounds and hydrocarbons entering the filter during frequent storm events and continuous dry weather flows.

03.01.03 Treatment Flow Rate and Bypass - The MSFWS operates in-line. The MSFWS will treat 100% of the required water quality treatment flow based on a minimum filtration capacities listed in section 03.02.00. The size of the system must match those provided on the drawing to ensure proper performance and hydraulic residence time.

Minimum Treatment Capabilities

- System must be capable of treating flows to the specified treatment flow rate on the drawings. The flow rate shall be controlled by an orifice plate.

PART 4 - EXECUTION

04.01.00 General

The installation of the MSFWS shall conform to all applicable national, state, state highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the (MSFWS) device(s) and appurtenances in accordance with the drawings and these specifications.

04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.

04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations prior to installation of MSFWS components.

04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations, and with a minimum of 6" of gravel under all concrete structures.

04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.02.05 Subsurface Flow Wetland Media shall be carefully loaded into area so not to damage the Wetland Liner or Water Transfer Systems. The entire wetland area shall be filled to a level 9 inches below finished surface.

04.02.06 Planting layer shall be installed per manufacturer's drawings and consist of a minimum 3" grow enhancement media that ensures greater than 95% plant survival rate, and 6" of wetland media. Planting shall consist of native plants recommended by manufacturer and/or landscape architect. Planting shall be drip irrigated for at least the first 3 months to insure long term plant growth. No chemical herbicides, pesticides, or fertilizers shall be used in the planting or care and maintenance of the planted area.

04.03.00 Shipping, Storage and Handling

04.03.01 Shipping – MSFWS shall be shipped to the contractor's address or job site, and is the responsibility of the contractor to offload the unit(s) and place in the exact site of installation.

04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the MSFWS and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The MSFWS(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The MSFWS shall always be handled with care and lifted according to OSHA and NIOSA lifting recommendations and/or contractor's workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

04.04.01 Inspection – After installation, the contractor shall demonstrate that the MSFWS has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the MSFWS and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the MSFWS has been installed per the manufacturer's specifications and recommendations. All components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.

04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal maintenance of once a year and replacement of the Cartridge Filters as needed. The maintenance shall be performed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the MSFWS. A Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the filter.

04.04.03 Material Disposal - All debris, trash, organics, and sediments captured by the MSFWS shall be transported and disposed of at an approved facility for disposal in accordance with local and state requirements. Please refer to state and local regulations for the proper disposal of toxic and non-toxic material.

PART 5 – QUALITY ASSURNACE

05.01.00 Warranty

The Manufacturer shall guarantee the MSFWS against all manufacturing defects in materials and workmanship for a period of (5) years from the date of delivery to the ______. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The MSFWS is limited to recommended application for which it was designed.

05.02.00 Performance Certification

The MSFWS manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certificate" certifying the MSFWS is capable of achieving the specified removal efficiency for suspended solids, phosphorous and dissolved metals.

APPENDIX 2

VOLUME AND FLOW RATE CALCULATIONS

Peak Flow Hydrologic Analysis

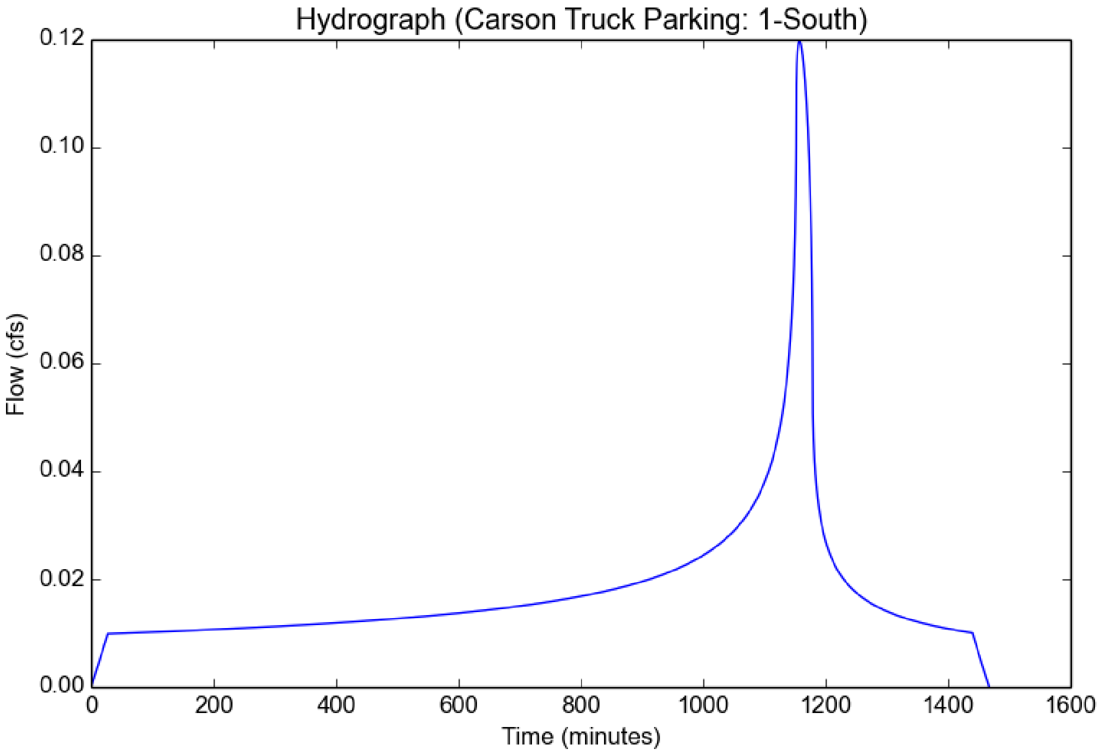
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	1-South
Area (ac)	0.81
Flow Path Length (ft)	300.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.73
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.2161
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.684
Time of Concentration (min)	27.0
Clear Peak Flow Rate (cfs)	0.1197
Burned Peak Flow Rate (cfs)	0.1236
24-Hr Clear Runoff Volume (ac-ft)	0.0366
24-Hr Clear Runoff Volume (cu-ft)	1595.65



Peak Flow Hydrologic Analysis

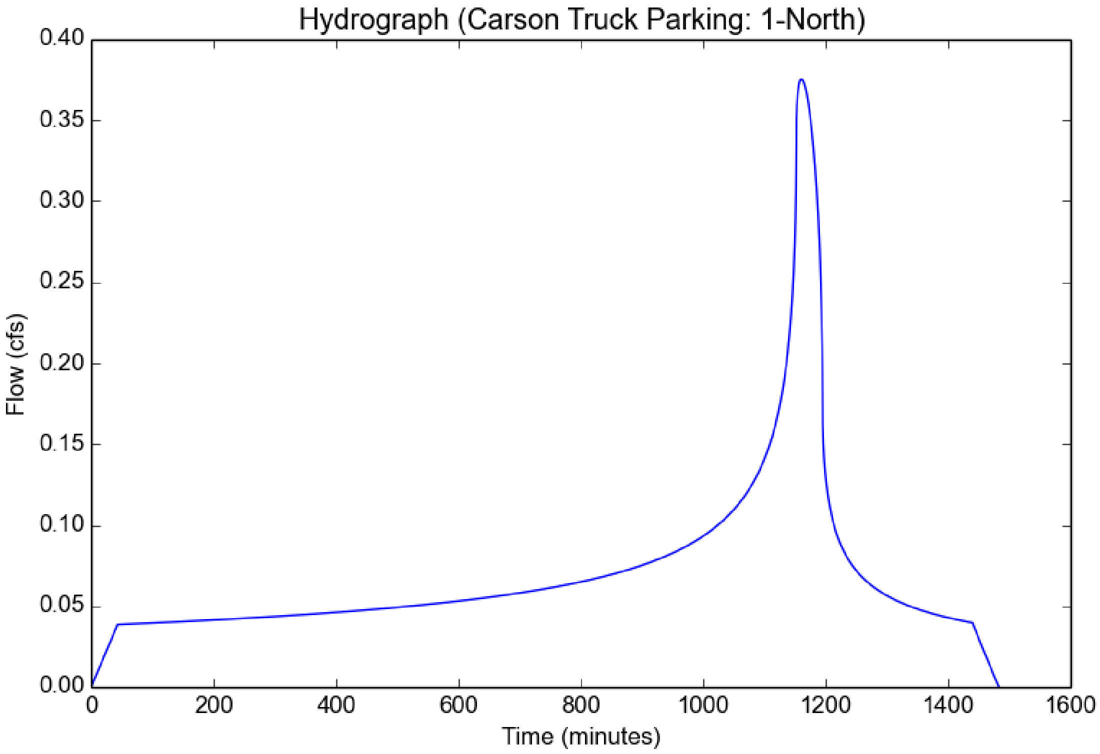
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	1-North
Area (ac)	2.86
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.82
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1736
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.756
Time of Concentration (min)	43.0
Clear Peak Flow Rate (cfs)	0.3754
Burned Peak Flow Rate (cfs)	0.3832
24-Hr Clear Runoff Volume (ac-ft)	0.143
24-Hr Clear Runoff Volume (cu-ft)	6227.1689



Peak Flow Hydrologic Analysis

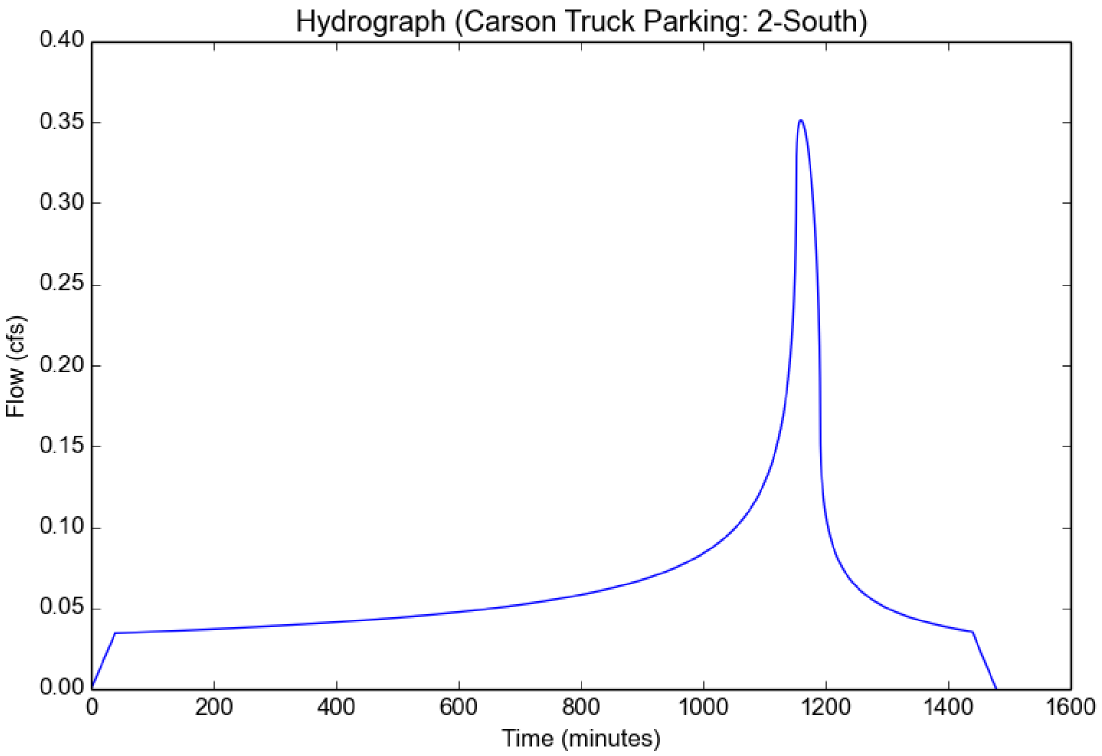
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	2-South
Area (ac)	2.38
Flow Path Length (ft)	650.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.89
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1818
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.812
Time of Concentration (min)	39.0
Clear Peak Flow Rate (cfs)	0.3513
Burned Peak Flow Rate (cfs)	0.3566
24-Hr Clear Runoff Volume (ac-ft)	0.1278
24-Hr Clear Runoff Volume (cu-ft)	5565.8814



Peak Flow Hydrologic Analysis

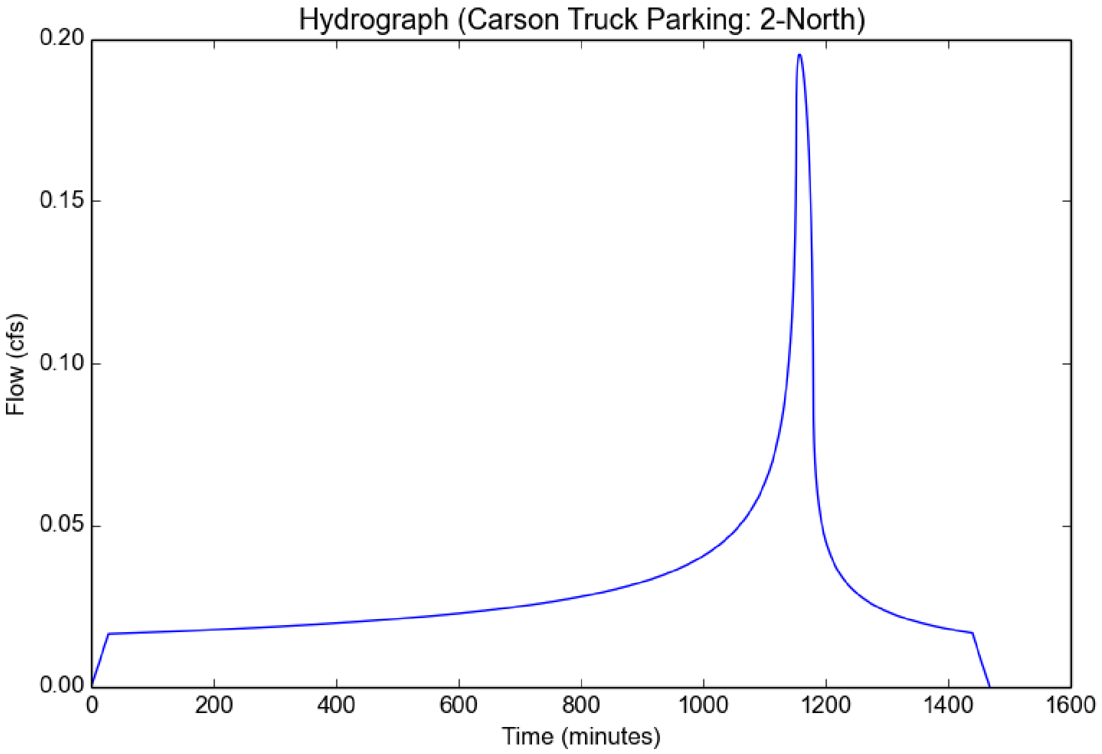
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	2-North
Area (ac)	1.23
Flow Path Length (ft)	350.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.81
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.2124
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.748
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	0.1954
Burned Peak Flow Rate (cfs)	0.2
24-Hr Clear Runoff Volume (ac-ft)	0.0608
24-Hr Clear Runoff Volume (cu-ft)	2649.7417



Peak Flow Hydrologic Analysis

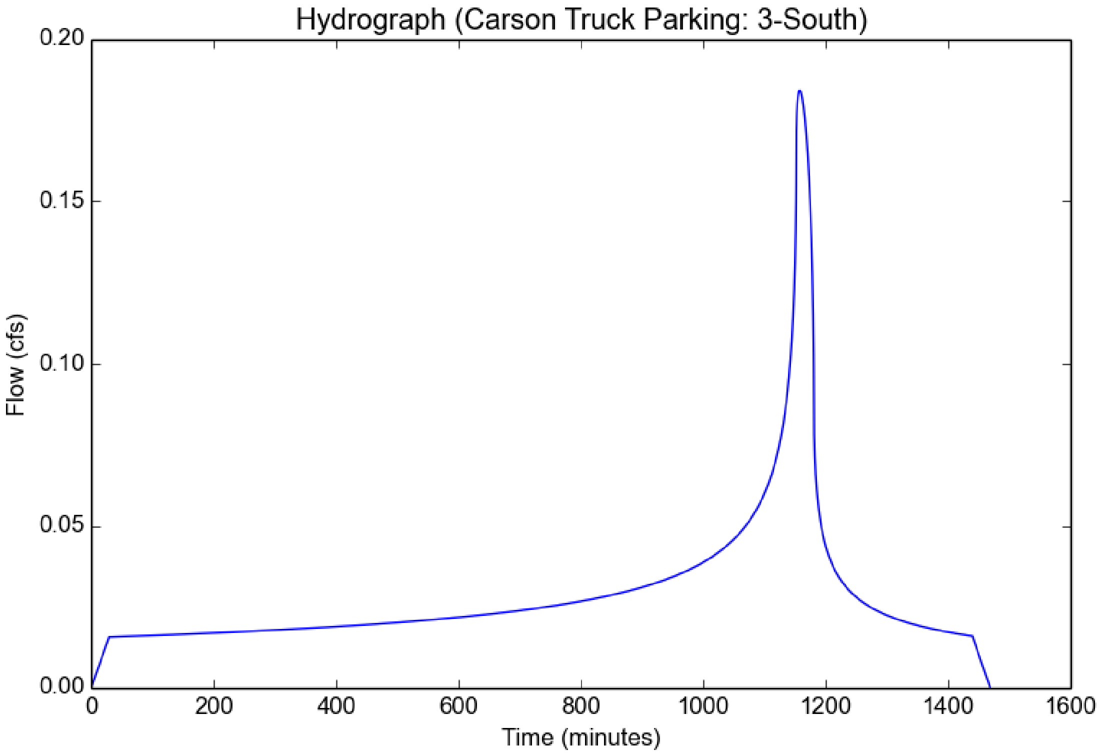
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	3-South
Area (ac)	1.26
Flow Path Length (ft)	350.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.75
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.2089
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.1843
Burned Peak Flow Rate (cfs)	0.1898
24-Hr Clear Runoff Volume (ac-ft)	0.0583
24-Hr Clear Runoff Volume (cu-ft)	2540.1872



Peak Flow Hydrologic Analysis

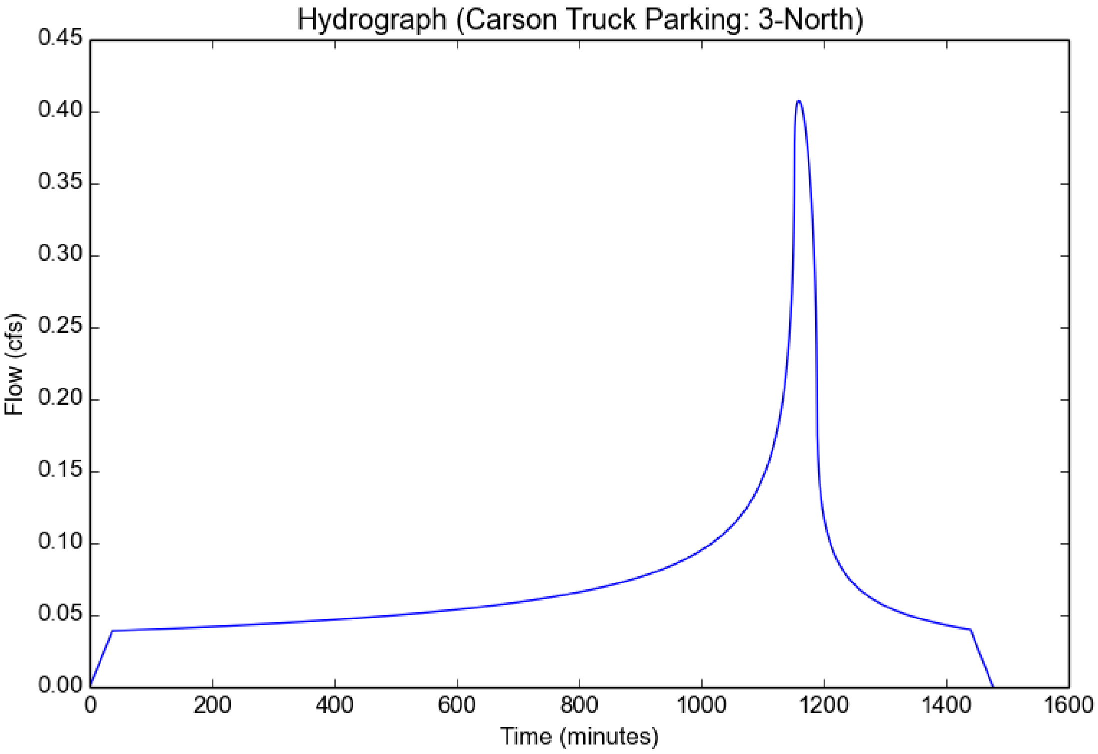
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	3-North
Area (ac)	2.52
Flow Path Length (ft)	650.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.96
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1863
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.868
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	0.4075
Burned Peak Flow Rate (cfs)	0.4117
24-Hr Clear Runoff Volume (ac-ft)	0.1446
24-Hr Clear Runoff Volume (cu-ft)	6299.7073



Peak Flow Hydrologic Analysis

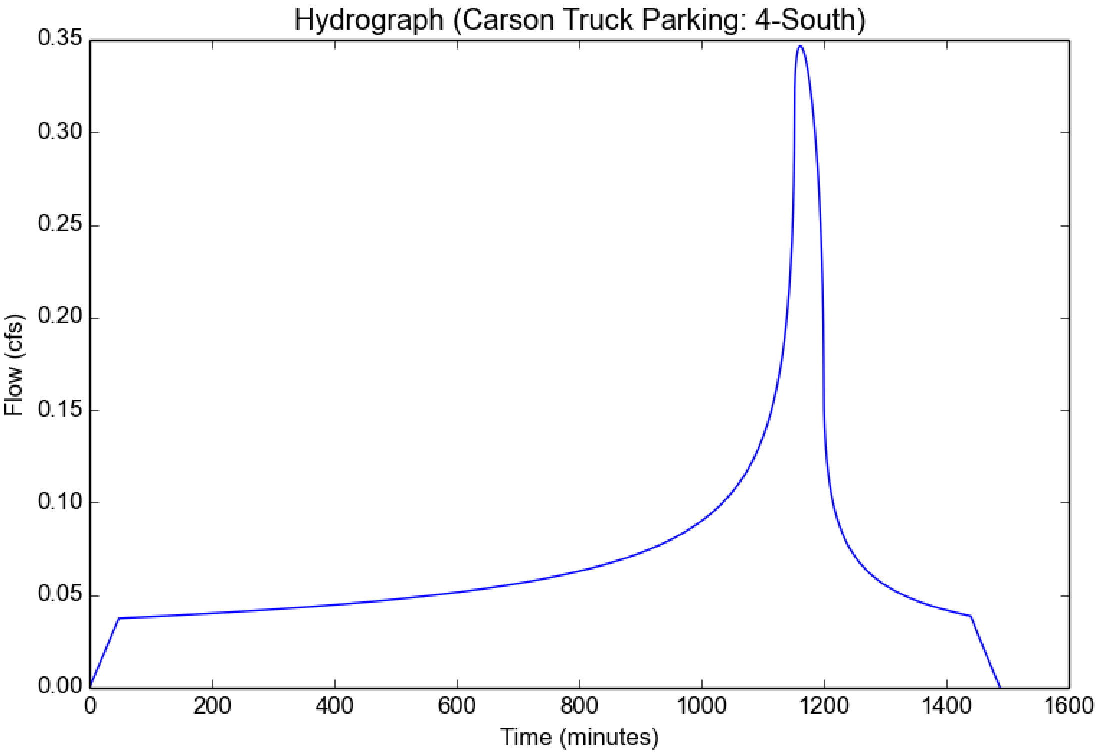
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkin
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	4-South
Area (ac)	2.84
Flow Path Length (ft)	800.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.8
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1649
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.74
Time of Concentration (min)	48.0
Clear Peak Flow Rate (cfs)	0.3465
Burned Peak Flow Rate (cfs)	0.3542
24-Hr Clear Runoff Volume (ac-ft)	0.139
24-Hr Clear Runoff Volume (cu-ft)	6052.788



Peak Flow Hydrologic Analysis

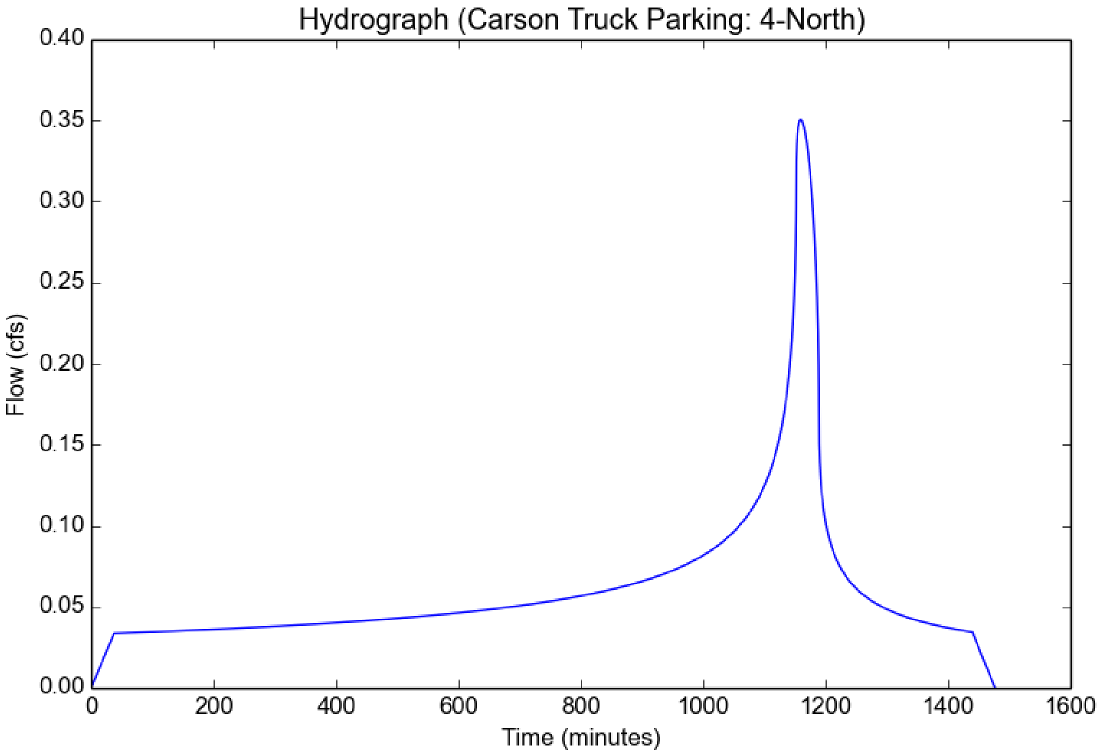
File location: K:/ORA_PLAN/094916001 - Carson Truck Parking/Reports/Preliminary SUSMP/Appendices/Appendix 2 - Calculations/Carson Truck Parkir
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Carson Truck Parking
Subarea ID	4-North
Area (ac)	2.34
Flow Path Length (ft)	600.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.88
Soil Type	14
Design Storm Frequency	85th percentile storm
Fire Factor	0.34
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1863
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.804
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	0.3505
Burned Peak Flow Rate (cfs)	0.3562
24-Hr Clear Runoff Volume (ac-ft)	0.1244
24-Hr Clear Runoff Volume (cu-ft)	5418.4119



APPENDIX 3

MASTER COVENANT AND AGREEMENT

RECORDING REQUESTED BY AND MAIL TO:

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION
900 S. FREMONT AVENUE, 3RD FLOOR
ALHAMBRA, CA 91803-1331

Space above this line is for Recorder's use

MAINTENANCE COVENANT FOR STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP) REQUIREMENTS

Pursuant to Section 106.4.3 of the County of Los Angeles Building Code and Title 12, Chapter 12.80 of the Los Angeles County Code relating to the control of pollutants carried by stormwater runoff, structural and/or treatment control Best Management Practices (BMPs) have been installed on the following property:

LEGAL DESCRIPTION

ASSESSOR'S ID #___________________TRACT NO.___________________LOT NO.__________________________ ADDRESS:

____

REFERENCE

PLAN CHECK NO.: ____________________________________ DISTRICT OFFICE NO.: _______________________________

I (we)____, hereby certify that I (we) am (are) the legal owner(s) of
(Legal Name of Property Owners)
property indicated above, and as such owners for the mutual benefit of future purchasers, their heirs, successors, and assigns, do hereby fix the following protective conditions to which their property, or portions thereof, shall be held, sold and/or conveyed.

That owner(s) shall maintain the drainage devices such as paved swales, bench drains, inlets, catch basins, downdrains, pipes, and water quality devices on the property indicated above and as shown on plans permitted by the Los Angeles County Department of Public Works and as outlined in the attached "OPERATION AND MAINTENANCE GUIDELINES", in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

That owner(s) shall conduct maintenance inspection of all Structural or Treatment Control BMPs on the property at least once a year and retain proof of the inspection. Said maintenance inspection shall verify the legibility of all required stencils and signs and shall repaint and label as necessary.

That owner(s) shall provide printed educational materials with any sale of the property that provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s):

By:_____________________________________ Date:_____________________________________

By:_____________________________________ Date:_____________________________________

(PLEASE ATTACH NOTARY)

APPENDIX 4

RECORD OF INSPECTIONS

BMP Inspection and Maintenance Log

Inspection Date	BMP Inspected	Maintenance Performed? (Y/N)	Inspector

APPENDIX 5

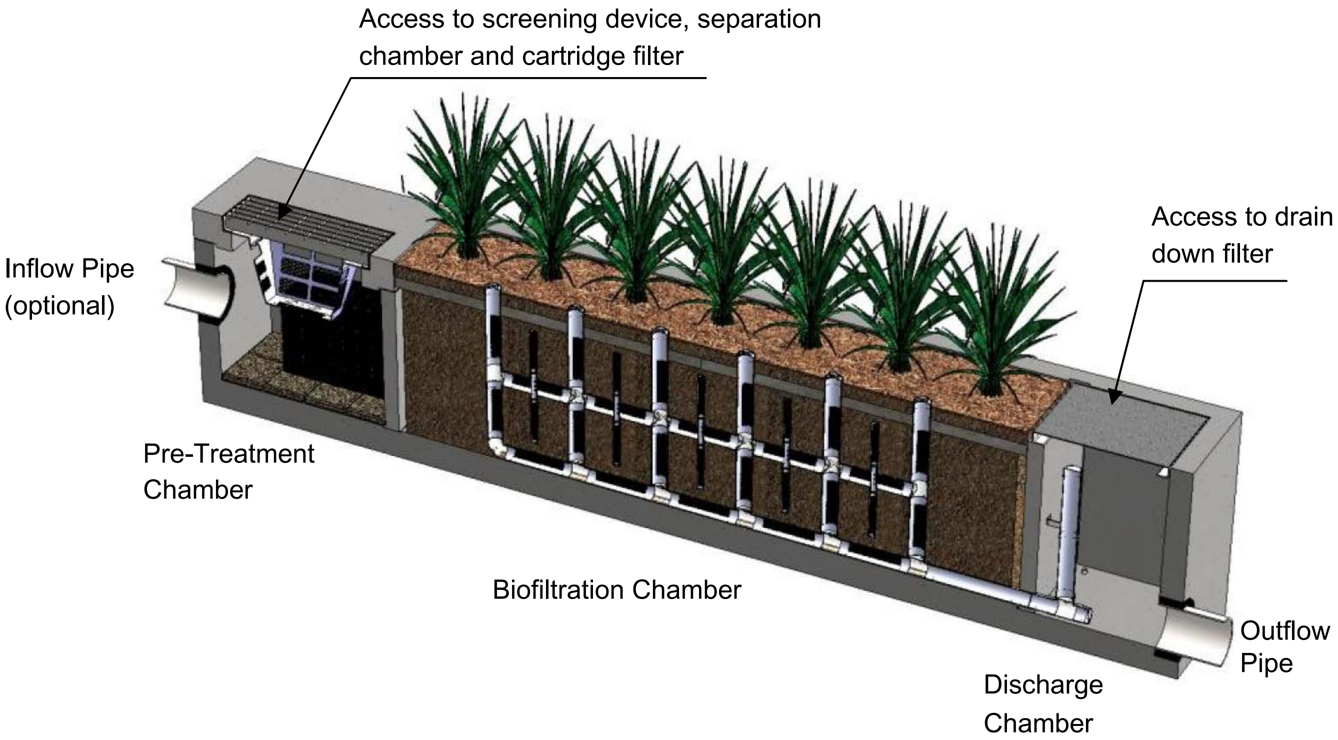
LID TREATMENT CONTROL BMP OPERATION AND MAINTENANCE PLAN SUPPLEMENT

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

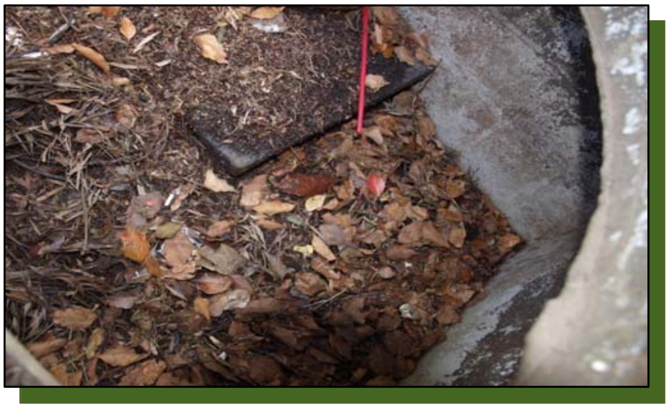
Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

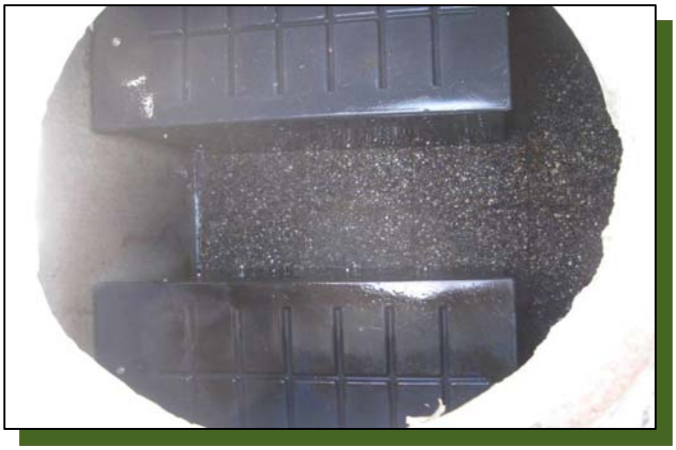
Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



2027/11/07

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name ____________________

Project Address ____________________ (city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone (   )   –

Inspector Name ____________________ Date ____ / ____ / ______ Time __________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ____________________ Additional Notes ____________________

For Office Use Only

(Reviewed By)

(Date)

Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): __________ Size (22', 14' or etc.): __________

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ____________________

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name ____________________

Project Address ____________________
(city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone (   )   –

Inspector Name ____________________ Date ___/___/______ Time ________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ____________________ Additional Notes ____________________

For Office Use Only

(Reviewed By)

(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

APPENDIX 6

SOURCE CONTROL BMP FACT SHEETS

Outdoor Loading / Unloading SC-30

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Loading and unloading of material may include package products, barrels, and bulk products. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.

- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.

- Limit exposure of materials with the potential to contaminate stormwater.

- Prevent stormwater runon.

- Regularly check equipment for leaks.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Suggested Protocols

Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Do not conduct loading and unloading during wet weather, whenever possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- A seal or door skirt between delivery vehicles and building can reduce or prevent exposure to rain.
- Design loading/unloading area to prevent stormwater runon which would include grading or berming the area, and positioning roof downspouts so they direct stormwater away from the loading/unloading areas.
- If feasible, load and unload all materials and equipment in covered areas such as building overhangs at loading docks.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm he loading/ unloading area to a drain that is connected to a dead-end sump.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g. fork lift operators) and contractors on proper spill containment and cleanup.
- Employees trained in spill containment and cleanup should be present during the loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.

- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your spill prevention Control and countermeasure (SPCC) Plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Space, material characteristics and/or time limitations may preclude all transfers from being performed indoors or under cover.

Requirements

Costs

- Should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Regular broom dry-sweeping of area.
- Conduct major clean-out of loading and unloading area and sump prior to October 1 of each year.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

As appropriate loading or unloading of liquids should occur indoors so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
    - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
    - Transfer area should be designed to prevent runon of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

  - Transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer (if allowed). A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles, Use drip pans when making and breaking connections.

  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Waste Handling & Disposal SC-34

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

CASQA
CALIFORNIA STORMWATER
QUALITY ASSOCIATION

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing runon and runoff.

Approach

Pollution Prevention

- Reduction in the amount of waste generated can be accomplished using the following source controls such as:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater runon and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Place waste containers under cover if possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be

disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Runon/Runoff Prevention

- Prevent stormwater runon from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent the waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff pollution prevention measures and proper disposal methods.
- Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.
- Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:
    - Vehicles equipped with baffles for liquid waste
    - Trucks with sealed gates and spill guards for solid waste

Other Considerations

- Hazardous waste cannot be re-used or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

- Capital and operation and maintenance costs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

- Minimize the runoff of polluted stormwater from land application of municipal waste on-site by:
  - Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, there is a closed drainage system.
  - Avoiding application of waste to the site when it is raining or when the ground is saturated with water.
  - Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
  - Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
  - Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins.
  - Performing routine maintenance to ensure the erosion control or site stabilization measures are working.

References and Resources

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Associations (BASMAA). On-line: http://www.basmaa.org

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.
- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in he catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.
- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures when soils are exposed.

- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

- Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.

- Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Follow manufacturers' recommendations and label directions. Pesticides must never be applied if precipitation is occuring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.

- Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.

- Do not use pesticides if rain is expected.

- Do not mix or prepare pesticides for application near storm drains.

- Use the minimum amount needed for the job.

- Calibrate fertilizer distributors to avoid excessive application.

- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

- Apply pesticides only when wind speeds are low.

- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.

- Irrigate slowly to prevent runoff and then only as much as is needed.

- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.

- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.

- Train employees and contractors in proper techniques for spill containment and cleanup.

- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup

- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Overall costs should be low in comparison to other BMPs.

Maintenance

- Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASSMA) http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook).

- Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.

- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.

- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

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- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

- Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- If water is used follow the procedures below:
  - Block the storm drain or contain runoff.
  - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- When cleaning heavy oily deposits:
  - Use absorbent materials on oily spots prior to sweeping or washing.
  - Dispose of used absorbents appropriately.

Surface Repair

- Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.
- Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control, to avoid runoff.

- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.

- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.

- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.

- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, nad implement accordingly.

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot to minimize cleaning with water.

- Clean out oil/water/sand separators regularly, especially after heavy storms.

- Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basma.org

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.

- Keep accurate logs of the number of catch basins cleaned.

- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.

- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.

- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.

- Conduct routine maintenance at each pump station.

- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.

- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

    - Is there evidence of spills such as paints, discoloring, etc?

  - Are there any odors associated with the drainage system?

  - Record locations of apparent illegal discharges/illicit connections?

  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.

  - Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.

- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Illegal dumping hot spots

  - Types and quantities (in some cases) of wastes

  - Patterns in time of occurrence (time of day/night, month, or year)

  - Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)

  - Responsible parties

- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.

- Allow only properly trained individuals to handle hazardous materials/wastes.

- Have staff involved in detection and removal of illicit connections trained in the following:

  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

  - OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Design Objectives

Maximize Infiltration

Provide Retention

Slow Runoff

Minimize Impervious Land Coverage

Prohibit Dumping of Improper Materials

☑ Contain Pollutants

Collect and Convey

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

APPENDIX 7

PUBLIC EDUCATION MATERIALS

Storm Drains are for Rain...

More than 200,000 times each month, lawns and gardens throughout LA County are sprayed with pesticides. Overwatering or rain causes pesticides on leaves and grass to flow into the storm drain and to the ocean — untreated.

Please use pesticides wisely, not before a rain, and water carefully.

...not pesticides.

1(888)CLEAN LA
www.888CleanLA.com

PROJECT
Pollution
PREVENTION

Pesticide Tips:

You can keep your lawn and garden green and at the same time solve the pollution problem by taking these easy steps...

- Never dispose of lawn or garden chemicals in storm drains. This is called illegal dumping. Take them to a household hazardous waste roundup. Call 1(888)CLEAN LA or visit www.888CleanLA.com to locate a roundup or collection facility near you.
- More is not better. Use pesticides sparingly. “Spot” apply, rather than “blanket” apply.
- Read labels! Use only as directed.
- Use non-toxic products for your garden and lawn whenever possible.
- If you must store pesticides, make sure they are in a sealed, water-proof container that cannot leak.
- When watering your lawn, use the least amount of water possible so it doesn’t run into the street and carry pesticide chemicals with it. Don’t use pesticides before a rain storm. You will not only lose the pesticide, but also will be harming the environment.

PROJECT
Pollution
PREVENTION

Printed on recycled paper

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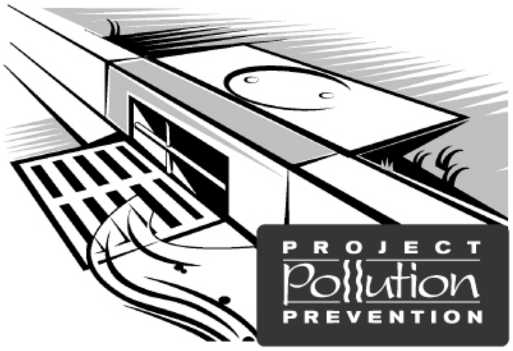

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PROJECT
Pollution
PREVENTION

Printed on recycled paper

Don't Paint the Town Red!

Storm drains are for rain…
they're not for paint disposal.

More than **197,000** times each month, L.A. County residents wash their dirty paint brushes under an outdoor faucet.

This dirty rinse water flows into the street, down the storm drain and straight to the ocean — **untreated**.

Remember to clean water-based paint brushes in the sink, rinse oil-based paint brushes with paint thinner, and take old paint and paint-related products to a Household Hazardous Waste/E-Waste collection event.

1 (888) CLEAN LA
www.888CleanLA.com

Tips for Paint Clean-Up:

L.A. County residents can help solve the stormwater pollution problem by taking these easy steps when working with paint and paint-related products…

- Never dispose of paint or paint-related products in the gutters or storm drains. This is called illegal dumping. Take them to a Household Hazardous Waste/E-Waste collection event. Call 1 (888) CLEAN LA or visit www.888CleanLA.com to locate an event near you.
- Buy only what you need. Reuse leftover paint for touch-ups or donate it to a local graffiti abatement program. Recycle or use excess paint.
- Clean water-based paint brushes in the sink.
- Oil-based paints should be cleaned with paint thinner. Filter and reuse paint thinner. Set the used thinner aside in a closed jar to settle-out paint particles.
- Store paints and paint-related products in rigid, durable and watertight containers with tight-fitting covers.

PROJECT
Pollution
PREVENTION

A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Are You a Litter Bug and Don't Know It?

Take our quiz!

Have you ever...

- Dropped a cigarette butt or trash on the ground?
- Failed to pick up after your dog while out on a walk?
- Overwatered your lawn after applying fertilizers/pesticides?
- Disposed of used motor oil in the street, gutter or garbage?

If you answered **yes** to any of these actions, then **YOU ARE A LITTER BUG**!

Each of these behaviors contribute to stormwater pollution, which contaminates our ocean and waterways, kills marine life and causes beach closures.

You can become part of the solution!
To find out how, flip this card over.

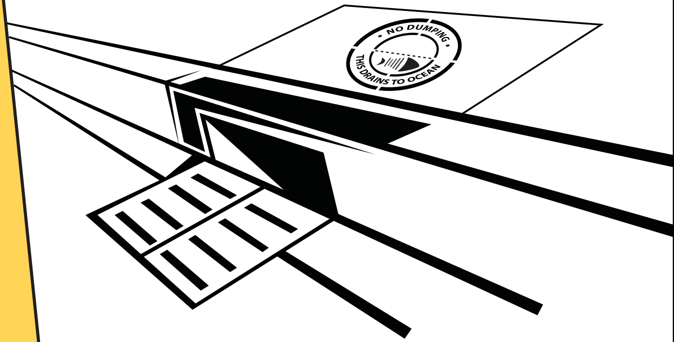
For more information, call or visit:

1 (888) CLEAN LA
www.888CleanLA.com

PROJECT Pollution PREVENTION

Follow these simple steps to prevent stormwater pollution:

- Put your garbage where it belongs — in the trash can.
- Pick up after your dog when out on a walk.
- Reduce pesticide and fertilizer use; don't overwater after application or apply if rain is forecast.
- Dispose of used motor oil at an oil recycling center or at a free Household Hazardous Waste/E-Waste collection event.



A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Storm Drains are for Rain...

More than 50% of the automotive oil sold to do-it-yourself oil changers is not recycled. There are more than 600 State-certified used oil collection centers within Los Angeles County.

Never dispose of automotive fluids in the street or gutter. Take them to your local auto parts store, gas station or repair shop, or a household hazardous waste Roundup for recycling.

...not automotive fluids.

PROJECT Pollution PREVENTION

1(888)CLEAN LA
www.888CleanLA.com

Car Care Tips:

You can keep your car running smoothly and efficiently, and at the same time help prevent stormwater pollution by taking these easy steps…

- When changing vehicle fluids — motor oil, transmission, brake and radiator fluids — drain them into separate drip pans to avoid spills. Do not combine these fluids. Do not dispose of these fluids in the street, gutter or garbage. It is illegal.
- If a spill occurs, use kitty litter, sawdust or cornmeal for cleanup. Do not hose or rinse with water.
- Recycle all used vehicle fluids. Call 1(888)CLEAN LA or visitwww.888CleanLA.com for the location of an auto parts store or gas station that recycles these fluids, or for the location of a local household hazardous waste Roundup.
- Regularly check and maintain your car to keep it running safely and efficiently. Water runoff from streets, parking lots and driveways picks up oil and grease drippings, asbestos from brake linings, zinc from tires and organic compounds and metals from spilled fuels and carries them to the ocean.

Printed on recycled paper

PROJECT Pollution PREVENTION

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Printed on recycled paper

PROJECT Pollution PREVENTION

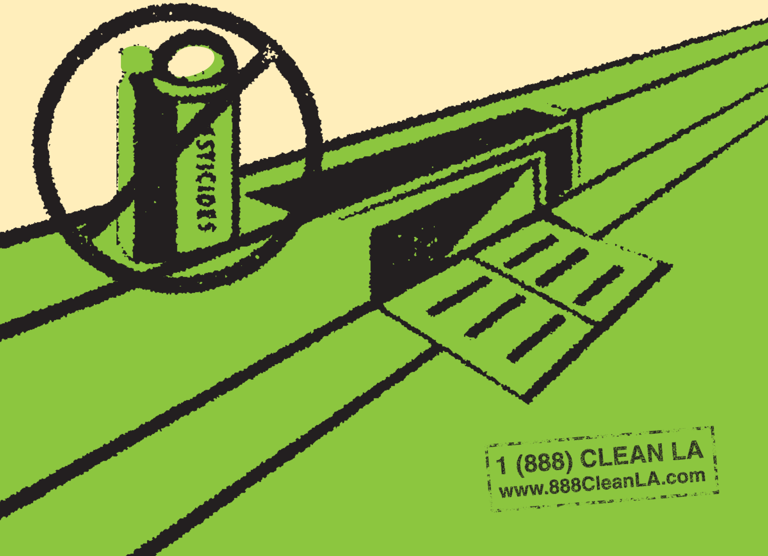
A Yard is a Terrible Thing to Waste!

Storm drains are for rain…**not yard waste.**

Residential yard waste represents about **13 percent** of the total waste generated in L.A. County.

Pesticides, fertilizer and yard waste such as leaves and mowed grass wash from the ground and streets into storm drains and flow straight to the ocean — **untreated.**

Remember to use pesticides and fertilizer wisely and pick-up yard waste.



1 (888) CLEAN LA
www.888CleanLA.com

Tips For Yard Care:

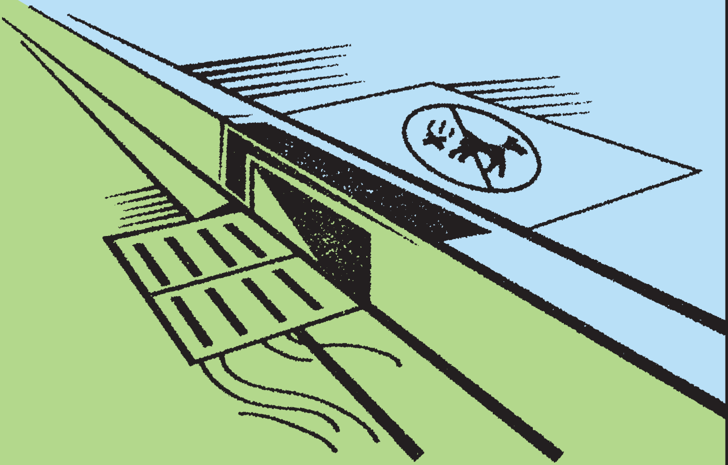
L.A. County residents can help solve the stormwater pollution problem by taking these easy steps…

- Do not over-fertilize and do not use fertilizer or pesticides near ditches, gutters or storm drains.
- Do not use fertilizer or pesticides before a rain.
- Follow the directions on the label carefully.
- Use pesticides sparingly — more is not better. “Spot” apply, rather than “blanket” apply.
- When watering your lawn, use the least amount of water possible so it doesn’t run into the street carrying pesticides and other chemicals with it.
- Use non-toxic products for your garden and lawn whenever possible.
- If you must store pesticides or fertilizer, make sure they are in a sealed, water-proof container in a covered area to prevent runoff.
- Do not blow, sweep, hose or rake leaves or other yard trimmings into the street, gutter or storm drain.

PROJECT Pollution PREVENTION

A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Pick Up After Your Pooch!



Storm drains are for rain…
they're not pooper scoopers.

L.A. County residents walk a dog without picking up the droppings more than **62,000** times per month.

Disease-causing dog waste washes from the ground and streets into storm drains and flows straight to the ocean — untreated.

Remember to bring a bag and clean up after your dog.

1 (888) CLEAN LA
www.888CleanLA.com

Tips for Dog Owners:

Dog owners can help solve the stormwater pollution problem by taking these easy steps…

- Clean up after your dog every single time.
- Take advantage of the complimentary waste bags offered in dispensers at local parks.
- Ensure you always have extra bags in your car so you are prepared when you travel with your dog.
- Carry extra bags when walking your dog and make them available to other pet owners who are without.
- Teach children how to properly clean up after a pet. Encourage them to throw the used bags in the nearest trash receptacle if they are away from home.
- Put a friendly message on the bulletin board at the local dog park to remind pet owners to clean up after their dogs.
- Tell friends and neighbors about the ill effects of animal waste on the environment. Encourage them to clean up after their pets as well.

PROJECT POLLUTION PREVENTION

Storm Drains are for Rain...

More than 50% of the automotive oil sold to do-it-yourself oil changers is not recycled. There are more than 600 State-certified used oil collection centers within Los Angeles County.

Never dispose of automotive fluids, recyclable products, or household hazardous wastes into the street or gutter. Take them to your local auto repair station, recycling center or a household hazardous waste roundup.

1(888)CLEAN LA
www.888CleanLA.com

...they're not recycling centers.

PROJECT Pollution PREVENTION

Recycling Tips:

You can help keep your community clean, protect our area waterways and make the beaches safe for ocean swimmers by putting recyclable materials where they belong — at a recycling center or household hazardous waste roundup. Never throw or pour anything into the streets or gutters…

- When changing vehicle fluids – transmission, hydraulic and motor oil, brake and radiator fluid – drain them into a drip pan to avoid spills. Do not combine these fluids. Do not dispose of them in the street, gutter or in the garbage. It is illegal.
- Recycle all used vehicle fluids. Call 1(888)CLEAN LA or visit www.888CleanLA.com for the location of a center that recycles these fluids, or for the location of a local household hazardous waste Roundup.
- Other materials that should be taken to a household hazardous waste Roundup are: paint and paint-related materials, household cleaners, batteries, pesticides and fertilizers, pool chemicals, and aerosol products.
- Aluminum, glass, plastic and newspapers should be placed in your curbside recycling bin or taken to a local recycling center.

Printed on recycled paper

PROJECT Pollution PREVENTION

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More than 50% of the automotive oil sold to do-it-yourself oil changers is not recycled. There are more than 600 State-certified used oil collection centers within Los Angeles County.

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- Other materials that should be taken to a household hazardous waste Roundup are: paint and paint-related materials, household cleaners, batteries, pesticides and fertilizers, pool chemicals, and aerosol products.
- Aluminum, glass, plastic and newspapers should be placed in your curbside recycling bin or taken to a local recycling center.

Printed on recycled paper

PROJECT Pollution PREVENTION

Storm Drains are for Rain...

Stormdrains take runoff directly to creeks and the ocean without treatment. Pool chemicals can harm our natural creeks and waterways. Anything going into our stormdrains that isn't rainwater contributes to stormwater pollution, which contaminates our creeks and ocean, kills marine life and causes beach closures.

...not pool chemicals

LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works

PROJECT
Pollution
PREVENTION

Swimming Pool Tips

Follow these simple steps to prevent stormwater pollution...

- Make sure all chemicals are dissipated before draining a pool or spa
- Do not drain pools within 5 days of adding chemicals
- Never backwash a filter into the street or stormdrain
- Cleanup chemical spills with absorbent, don't wash it down the drain
- Dispose of leftover chemicals and paints through a licensed hazardous waste disposal provider

PROJECT
Pollution
PREVENTION

APPENDIX 8

SUSMP SITE PLAN

765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488

APPENDIX C

NOISE ASSESSMENT

Noise Impact Assessment Technical Report

CARSON TRUCKING
CARSON, CA

October 6, 2016

Prepared for:
Kimley-Horn and Associates
765 The City Drive, Suite 200
Orange, CA 92868

Prepared by:
dBF Associates, Inc.

3129 Tiger Run Court, Suite 202
Carlsbad, CA 92010
619-609-0712

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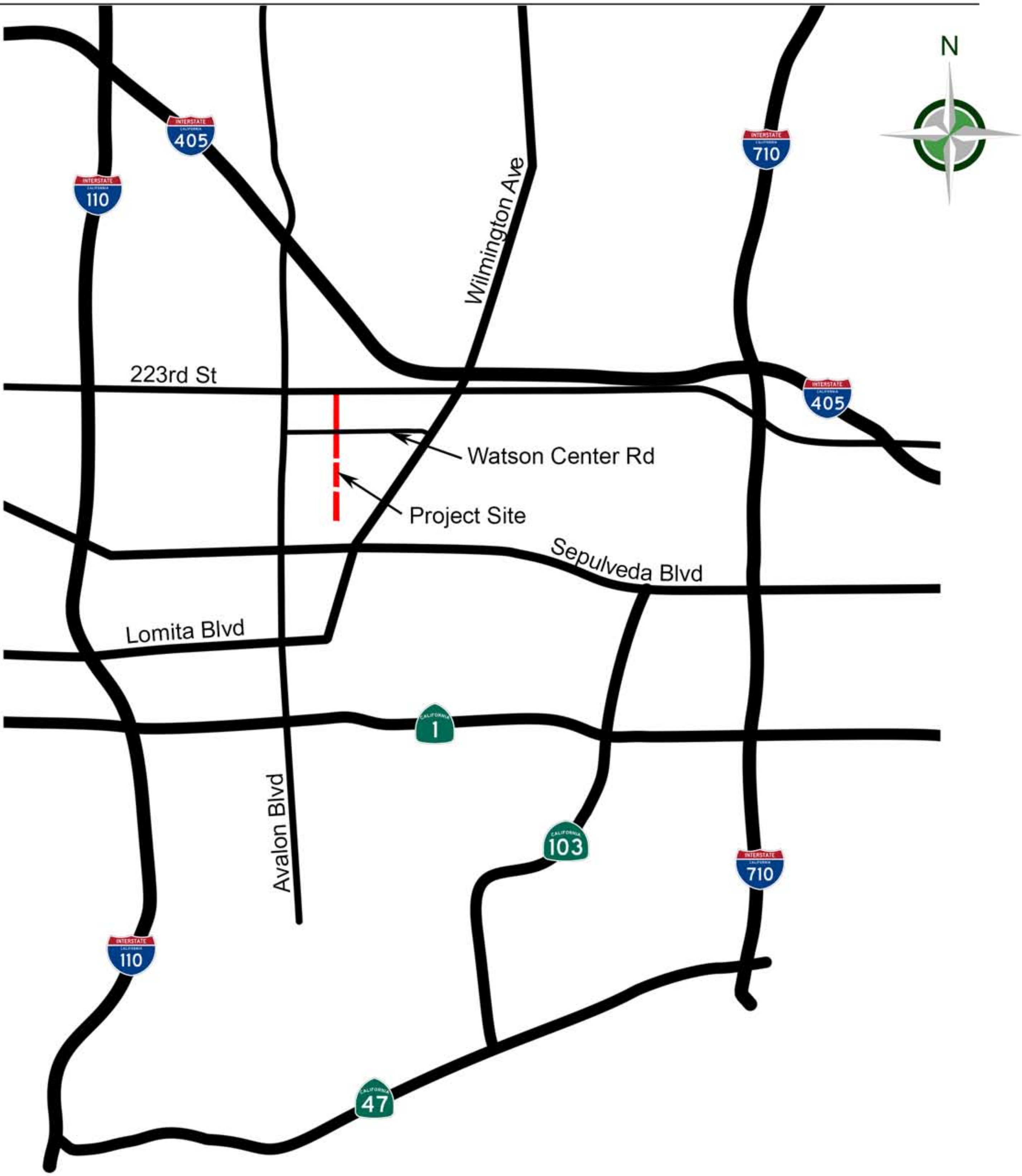
1.0 INTRODUCTION AND SUMMARY

This Noise Impact Assessment Technical Report assesses potential operational and construction noise impacts associated with the proposed Carson Trucking project. The applicant proposes to develop a parking facility in four lots within the existing Los Angeles Department of Water and Power utility easement between 223rd Street and 236th Street in the City of Carson, California. The project vicinity is shown on Figure 1.

An analysis was performed to determine potential noise impacts resulting from implementation of the project. A project site reconnaissance was performed to identify noise-sensitive receptors and to conduct noise measurements. Noise-sensitive land uses potentially affected by the project consist of single-family residential properties along the north side of 223rd Street and along the south side of Sepulveda Boulevard. Sound level measurements were conducted to estimate existing ambient noise levels near noise-sensitive locations in the project vicinity.

Implementation of the project would generate traffic noise increases at noise-sensitive receptors in the project area. Traffic noise impacts as a result of the project would be less than significant.

Construction of the project would generate a temporary increase in noise at noise-sensitive receptors in the project area. Construction noise impacts as a result of the project would be less than significant.



dBF Associates, Inc.

FIGURE 1
Vicinity Map

1.1 PROJECT DESCRIPTION

1.1.1 Project Location and Existing Land Uses

The approximately 16-acre site is located within the southern portion of the City of Carson (City), south of Interstate 405 (I-405), and east of Interstate 110 (I-110) in Los Angeles County, California. The proposed project would be located between 223rd Street to the north and 236th Street to the south on a portion of the Los Angeles Department of Water and Power (DWP) utility easement. The alignment of the utility easement generally runs in a north-south direction from I-405 to Lomita Boulevard. The eastern and western boundaries of the project site extend to the limits of the easement.

The project site is divided by existing east-to-west cross streets which split the site into four separate blocks. The four blocks are referred to in the Initial Study as Lot A, Lot B, Lot C, and Lot D, starting from the north end of the project site.

- Lot A: Between 223rd Street and Watson Center Road
- Lot B: Between Watson Center Road and 230th Street
- Lot C: Between 230th Street and 233rd Street
- Lot D: Between 233rd Street and 236th Street

The approximate dimensions for each lot are identified below:

- Lot A: Approximately 5.1 acres; 1,406 feet (length) by 160 feet (width)
- Lot B: Approximately 3.8 acres; 984 feet (length) by 160 feet (width)
- Lot C: Approximately 3.6 acres; 985 feet (length) by 160 feet (width)
- Lot D: Approximately 3.7 acres; 1,010 feet (length) by 160 feet (width)

The site is currently vacant with predominately ruderal vegetation and open dirt areas. The property is owned by the City of Los Angeles, and improvements on the lots are limited to electrical power towers and overhead electrical lines operated by DWP, with one area of surface parking. Each lot is fenced and is gated at the north and south ends of each lot. Specific characteristics of each lot are identified below:

- Lot A: Four electrical power towers; chain link/wrought iron fencing
- Lot B: Two electrical power towers; chain link/wrought iron fencing on the north, east, and west perimeters with a block wall with gate to the south. Lot B currently has a surface parking lot at the south half of the site (between an abandoned railroad right-of-way to the north and 230th Street to the south).
- Lot C: Two electrical power towers; chain link/wrought iron fencing
- Lot D: Four electrical power towers; chain link/wrought iron fencing

1.1.2 Surrounding Land Uses

The project site is in an industrial area and is generally bordered by existing warehouse, light industrial, and office uses. Surrounding land uses include the following:

To the North: Lot A is bordered by East 223rd Street. 223rd Street is classified on the City's General Plan Circulation Element as a Major Highway and a truck route. North of East 223rd Street are single-family residences. North of 220th Street is Bonita Street Elementary School and Carnegie Middle School.

To the Northeast: Outside of the warehouse and industrial center to the northeast are single-family residences, commercial automotive, and I-405.

To the East: Existing warehouse distribution and manufacturing facilities are located adjacent to the project site. East of Wilmington Avenue is the BP Carson Refinery.

To the South: South of East 236th Street is a wholesale plant nursery within the LADWP easement between Sepulveda Boulevard and East 236th Street. Single-family residences are located south of the nursery, south of Sepulveda Boulevard.

Southeast: Southeast of Wilmington Avenue is the Conoco Phillips Los Angeles Refinery.

To the West: The area adjacent to the project site to the west and east are warehouse distribution and manufacturing uses. West of Banning Boulevard are multi-family residences; further to the west are single-family residences with a few neighborhoods of multi-family residences.

1.1.2.1 Land Use Designations

The project site has a General Plan land use designation of heavy industrial and zoning designation of Manufacturing, Heavy (MH) with Design (D) Overlay. The proposed project is consistent with the General Plan designation. A truck yard is a conditionally permitted use in the MH zone, and is subject to the regulations set forth in Chapter 8, Section 9148.8, Truck Terminal and Truck Yard Facilities.

1.1.2.2 Site Development

As proposed, the project would allow for the construction and operation of a trailer truck and container storage parking facility which would include four paved parking lot areas to provide temporary parking and storage for trucks and truck-mounted containers. Trucks and trailers would be parked while waiting to be moved to and from the Port of Los Angeles, Port of Long Beach, or other locations. The contents of one trailer to another trailer would be permitted on the project site. The general maintenance of truck tractors and equipment would not be allowed.

Each lot is proposed to provide the approximately the following number of trailer parking spaces:

- Lot A: 200 spaces
- Lot B: 140 spaces
- Lot C: 138 spaces
- Lot D: 128 spaces
- Total: 606 spaces

1.1.2.3 Lighting

Site lighting would be used to provide adequate lighting for circulation, safety, and security. The project site lighting would use free standing light poles with cut off style high efficiency lighting to prevent off-site waste light. The project site includes 24-foot-high parking lights 130 feet apart throughout the length of the four lots (A, B, C, and D).

1.1.2.4 Hours of Operation and Lot Access

The proposed parking facility would be operational 7 days a week, 24 hours per day. Each individual lot would have a security fence and a security guard station. Ingress and egress from each lot would be controlled, with manned or unmanned gates at the north and/or south end of the lot, depending on the requirements of the user. For unmanned gates, either remote access would be provided and/or users would have a gate code to access a lot. With the exception of Lot A (between 223rd Street and Watson Center Road), trucks may enter and exit from either the north or south end of the lot. For Lot A, access at the north end of this lot (on 223rd Street) would be restricted to right-in and right-out only movements because of the existing raised median.

1.1.2.5 Grading and Construction

For purposes of the CEQA analysis, the Initial Study assumes that construction of the project commences and is completed in 2017. Project construction is expected to be completed over a 4.5-month time period. Construction activities for the project would include site preparation and grading, and paving.

1.2 NOISE DESCRIPTORS

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Human environments are characterized by a generally consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, sensitivity of the individual, and change from ambient conditions.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound’s pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound’s loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound’s loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels: if a sound’s intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the sensitivity of the human ear within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the “A-weighting” frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Community noise levels usually change continuously during the day. The equivalent continuous A-weighted sound pressure level (Leq) is normally used to describe community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the “acoustic floor” for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

Another sound measure known as the Community Noise Equivalent Level (CNEL) is an adjusted average A-weighted sound level for a 24-hour day. It is calculated by adding a 5-dB adjustment to sound levels during evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dB adjustment to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). These adjustments compensate for the increased sensitivity to noise during the typically quieter evening and nighttime hours. The CNEL is used by the State of California and the City of Rialto (City) to evaluate land-use compatibility with regard to noise.

Table 1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud Threshold of Pain
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud Very Loud
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)		70	Reference Loudness Moderately Loud
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud Quiet
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud Just Audible
		10	1/64 as loud
		0	1/128 as loud Threshold of Hearing

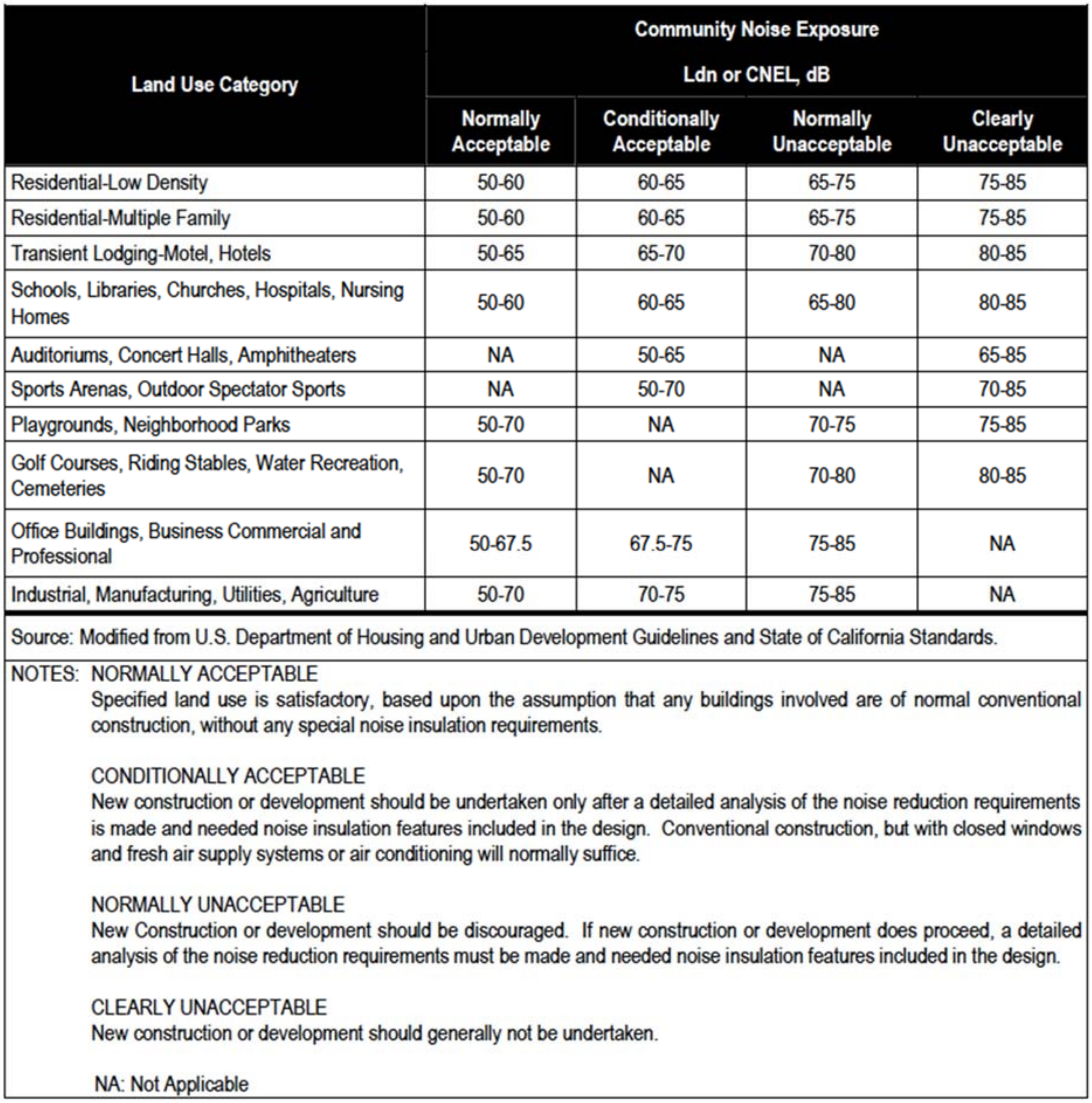
Source: Compiled by dBF Associates, Inc.

2.0 IMPACT CRITERIA

This section presents the guidelines, criteria, and regulations used to assess noise impacts associated with the proposed project.

2.1 CARSON GENERAL PLAN

The Noise Element of the Carson General Plan [City of Carson 2002] identifies noise levels compatible with various land uses, as shown in its Table N-2: Noise and Land Use Compatibility Matrix, reproduced below.



Land Use Category	Community Noise Exposure Ldn or CNEL, dB			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential-Low Density	50-60	60-65	65-75	75-85
Residential-Multiple Family	50-60	60-65	65-75	75-85
Transient Lodging-Motel, Hotels	50-65	65-70	70-80	80-85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-65	65-80	80-85
Auditoriums, Concert Halls, Amphitheaters	NA	50-65	NA	65-85
Sports Arenas, Outdoor Spectator Sports	NA	50-70	NA	70-85
Playgrounds, Neighborhood Parks	50-70	NA	70-75	75-85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	NA	70-80	80-85
Office Buildings, Business Commercial and Professional	50-67.5	67.5-75	75-85	NA
Industrial, Manufacturing, Utilities, Agriculture	50-70	70-75	75-85	NA

Source: Modified from U.S. Department of Housing and Urban Development Guidelines and State of California Standards.

NOTES: NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New Construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

NA: Not Applicable

Exterior noise levels up to 60 dBA CNEL are considered Normally Acceptable at Residential-Low Density land uses; exterior noise levels up to 65 dBA CNEL are considered Conditionally Acceptable. Exterior noise levels up to 67.5 dBA CNEL are considered Normally Acceptable at Commercial land uses; exterior noise levels up to 75 dBA CNEL are considered Conditionally Acceptable. Exterior noise levels up to 70 dBA CNEL are considered Normally Acceptable at Industrial land uses; exterior noise levels up to 75 dBA CNEL are considered Conditionally Acceptable.

Sound level variations of less than 3 dBA are not detectable by the typical human ear. As such, project-generated noise level increases of less than 3 dBA are considered not significant.

2.2 CARSON MUNICIPAL CODE

Chapter 5 of the Carson Municipal Code is the Noise Control Ordinance, which identifies construction noise limits:

> The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule:
>
> 1. At Residential Structures.
>
>   …
>
>   b) Maximum noise level for repetitively scheduled and relatively long-term operation of twenty-one (21) days or more for construction equipment:

	Single-family Residential	Multi-family Residential
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	65 dBA	70 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	55 dBA	60 dBA

Construction of the project would require more than 21 days. Construction of the project would occur between the hours of 7:00 a.m. and 8:00 p.m. Construction of the project would not occur on Sundays or legal holidays.

3.0 EXISTING NOISE ENVIRONMENT

Many land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise, such as residential dwellings, transient lodging (hotels/motels), dormitories, hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise. The existing sound level at any given location depends on the distance to a roadway, proximity to commercial and neighborhood noise sources, and intervening structures and topography.

Noise-sensitive land uses potentially affected by the project consist of single-family residential properties along the north side of 223rd Street, west of Lucerne Street; along the south side of Sepulveda Boulevard, west of Wilmington Avenue; and along the the west side of Wilmington Avenue, south of Sepulveda Boulevard. Non-noise-sensitive land uses potentially affected by the project include commercial and industrial properties along project access roadways.

Noise sources in the project area consist of vehicular traffic on 223rd Street, Watson Center Road, 230th Street, 233rd Street, Sepulveda Boulevard, Wilmington Avenue; and industrial operations.

3.1 SOUND LEVEL MEASUREMENTS

A project site visit and ambient noise level survey was conducted on Tuesday, September 27, 2016 to observe the existing noise environment near noise-sensitive areas in the project area. Sound level measurement locations (MLs) were selected along project access roadways. Attended short-term (15-minute) measurements were conducted during the daytime period (7:00 a.m. – 7:00 p.m.).

The data collection device was a RION Model NL-31 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (SLM). The meter was field-calibrated with a Larson Davis Model CAL200 acoustic calibrator. The meter was set for “slow” time response and A-weighting for all measurements. The microphone was equipped with a windscreen and placed five feet above the ground to simulate the average height of the human ear. Weather conditions during the measurements were approximately 85°F, 55% relative humidity, calm wind, and 25% cloud cover. The results of the measurements are summarized in Table 2 and correspond to the locations depicted on Figure 2.

All sound level measurements were in accordance with ISO 1996-1, -2, and -3. The accuracy of the equipment is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology (NIST).

Noise sources observed during the site visit included vehicular traffic on the adjacent roadways, occasional distant industrial activity, occasional faint train horns, and occasional distant jet aircraft.

Table 2. Sound Level Measurements (dBA)

Measurement	Location	Time	Leq	Lmin	Lmax	L10	L50	L90	Traffic
ML1	223rd Street, between Cliff Street and Edgar Street 52 feet north of centerline	9/27/2016 12:00 – 12:15 PM	68.1	50.9	75.7	72.0	65.9	59.3	EB: 100 / 5 / 5 WB: 153 / 8 / 0
ML2	Wilmington Avenue, between 230th Street and 233rd Street 57 feet west of centerline	9/27/2016 12:20 – 12:35 PM	73.2	50.2	82.5	77.4	70.7	59.1	NB: 55 / 10 / 25 SB: 65 / 18 / 20
ML3	~922 Sepulveda Boulevard 50 feet south of centerline	9/27/2016 12:40 – 12:55 PM	67.3	46.5	76.4	71.8	63.4	51.5	EB: 80 / 8 / 5 WB: 73 / 5 / 3

Note: Traffic presented in terms of Cars / Medium Trucks / Heavy Trucks.

FIGURE 2

Sound Level Measurement Locations

4.0 IMPACTS

4.1 SIGNIFICANCE CRITERIA

The proposed project could have a significant effect with respect to noise if:

- Project-generated traffic increases the noise level at a low-density residential land use by 3 dBA or more to above 65 dBA CNEL,
- Project-generated traffic increases the noise level at a commercial or industrial land use by 3 dBA or more to above 75 dBA CNEL, or
- Project construction noise exceeds 65 dBA at a single-family residence.

4.2 TRAFFIC NOISE ASSESSMENT

An analysis was conducted of the project’s effect on traffic noise conditions. Without-project traffic noise levels were compared to with-project traffic noise levels. Acoustical calculations were performed using the FHWA TNM version 2.5 to estimate noise levels at a general reference distance of 50 feet from the roadway centerlines. The modeling effort considered the peak-hour traffic volume, average estimated vehicle speed, and estimated vehicle mix, i.e., percentage of cars, medium trucks, and heavy trucks. The peak-hour noise level is considered equivalent to the CNEL for roadway traffic.

The model was calibrated using measured sound levels and concurrent traffic counts. Predicted levels were within 3 dBA of measured levels. No calibration correction was applied.

Sound levels caused by line sources (i.e., variable or moving sound sources such as traffic) generally decrease at a rate of 3 to 4.5 dBA when the distance from the road is doubled, depending on the ground surface hardness between the source and the receiving property. The model assumed “pavement” propagation conditions, which corresponds to a drop-off rate of 3 dBA per doubling of distance. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures (walls and buildings), barriers, and topography. The noise attenuating effects of changes in elevation, topography, and intervening structures were not included in the model. Therefore, the modeling effort is considered a worst-case representation of the roadway noise.

The existing and project-generated peak-hour volumes on project roadway segments were obtained from the project traffic impact analysis (TIA) [KHA 2016]. The roadway speed limits were obtained during the site visit. The average existing vehicle mixes were estimated from classification counts conducted during the sound level measurements:

- Wilmington Avenue: 14.5% medium trucks, 32.5% heavy trucks
- 223rd Street: 4.5% medium trucks, 3.0% heavy trucks
- Sepulveda Boulevard: 7.0% medium trucks, 8.0% heavy trucks

The existing vehicle mixes on Watson Center Road, 230th Street, and 233rd Street were assumed to be the same as on 223rd Street. The existing vehicle mix on Alameda Street was assumed to be the same as on Sepulveda Boulevard.

The project vehicle mix of 100% trucks (50% 3-axle; 50% 4-axle) was obtained from the TIA [KHA 2016]. Unladen tractors, despite having 3 axles, typically produce noise levels similar to medium (2-axle) trucks; therefore, for the purpose of this project, 3-axle trucks were modeled as medium trucks.

The project-generated ADT volumes are given in terms of passenger car equivalents (PCE); different PCE factors are assigned to cars, 2-axle trucks, 3-axle trucks, and 4+-axle trucks. The PCE-to-actual-vehicles relationship (factors) for this project are: one 3-axle truck = two PCE vehicles, and one 4-axle truck = three PCE vehicles. Table 3 shows the posted vehicle speed, existing traffic, and project-generated traffic on each modeled roadway segment. Table 4 shows traffic noise levels, without and with the project.

Project-generated traffic noise level increases along project roadway segments would be lower than the thresholds of significance. The project-generated traffic noise impact is less than significant.

Table 3. Modeled Traffic Speeds, A.M. Peak-Hour Volumes, and Vehicle Mixes

Roadway	Segment	Speed	Existing			Project	
			Cars	MT	HT	MT	HT
Wilmington Avenue	North of 223rd Street	45 mph	1,365	373	837	5	5
	223rd Street - Watson Center Road	45 mph	1,038	284	636	6	6
	Watson Center Road - 230th Street	45 mph	995	272	610	12	12
	230th Street - 233rd Street	45 mph	960	262	588	13	13
	233rd Street - Sepulveda Boulevard	45 mph	861	235	527	15	15
	South of Sepulveda Boulevard	45 mph	1,233	338	757	16	16
223rd Street	West of Wilmington Avenue	45 mph	1,653	80	54	2	2
	East of Wilmington Avenue	45 mph	1,515	74	49	0	0
Watson Center Road	West of Wilmington Avenue	40 mph	331	16	11	11	11
230th Street	West of Wilmington Avenue	40 mph	224	11	7	4	4
233rd Street	West of Wilmington Avenue	40 mph	286	14	9	6	6
Sepulveda Boulevard	West of Wilmington Avenue	40 mph	1,103	91	104	2	2
	Wilmington Avenue - Alameda Street	40 mph	1,133	93	107	16	16
	East of Alameda Street	40 mph	1,053	87	99	16	16
Alameda Street	North of Sepulveda Boulevard	50 mph	2,309	190	217	0	0
	South of Sepulveda Boulevard	50 mph	1,979	163	186	16	16

Table 4. Traffic Noise Levels along Project Roadways (dBA CNEL)

Roadway	Segment	Existing	Existing + Project	Project-Generated Noise Increase	Threshold of Significance	Impact?
Wilmington Avenue	North of 223rd Street	78.2	78.2	+ 0.0	75 / +3	No
	223rd Street - Watson Center Road	77.0	77.1	+ 0.1	75 / +3	No
	Watson Center Road - 230th Street	76.8	76.9	+ 0.1	75 / +3	No
	230th Street - 233rd Street	76.6	76.7	+ 0.1	75 / +3	No
	233rd Street - Sepulveda Boulevard	76.2	76.4	+ 0.2	75 / +3	No
	South of Sepulveda Boulevard	77.9	77.9	+ 0.0	65 / +3	No
223rd Street	West of Wilmington Avenue	71.9	72.0	+ 0.1	65 / +3	No
	East of Wilmington Avenue	71.6	71.6	+ 0.0	75 / +3	No
Watson Center Road	West of Wilmington Avenue	66.9	67.1	+ 0.2	75 / +3	No
230th Street	West of Wilmington Avenue	65.3	65.7	+ 0.4	75 / +3	No
233rd Street	West of Wilmington Avenue	65.6	66.1	+ 0.5	75 / +3	No
Sepulveda Boulevard	West of Wilmington Avenue	71.0	71.1	+ 0.1	65 / +3	No
	Wilmington Avenue - Alameda Street	71.1	71.1	+ 0.0	75 / +3	No
	East of Alameda Street	70.9	70.9	+ 0.0	75 / +3	No
Alameda Street	North of Sepulveda Boulevard	74.8	74.8	+ 0.0	75 / +3	No
	South of Sepulveda Boulevard	74.1	74.3	+ 0.2	75 / +3	No
23903 South Sepulveda Boulevard		76.6	76.7	+ 0.1	65 / +3	No

Notes:

All noise levels are reported at 50 feet from centerlines of roadways, except where noted.

4.3 CONSTRUCTION NOISE ASSESSMENT

Project construction would result in a temporary increase in noise levels in the project vicinity. Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Typical noise sources and noise levels associated with construction are shown in Figure 3.

Noise levels associated with the construction phase of the project were estimated based on information from the project developer for construction equipment requirements and schedule. It was assumed that construction of the project would require approximately 4.5 months to complete. The initial phase of construction would involve clearing and rough grading of the site, followed by trenching and storm drains, paving, and landscaping.

Trenching is expected to produce the highest construction noise levels, and would require one water truck, one backhoe, one boom truck, one foreman truck, and one crew truck with a tool trailer. All construction activity would occur between the hours of 7:00 a.m. to 8:00 p.m. Monday through Saturday.

The construction activity closest to a residence would be for Lot A, near 223rd Street. The center of Lot A is approximately 850 feet from the residence at 944 East Joel Street. The loudest piece of trenching equipment is the backhoe, which produces approximately 90 dBA at 50 feet. Using point source sound propagation characteristics (-6 dBA per doubling of distance), the trenching noise level could be 65 dBA at 850 feet. The project construction noise level is expected to be lower than the threshold of significance. The project construction noise impact is less than significant.

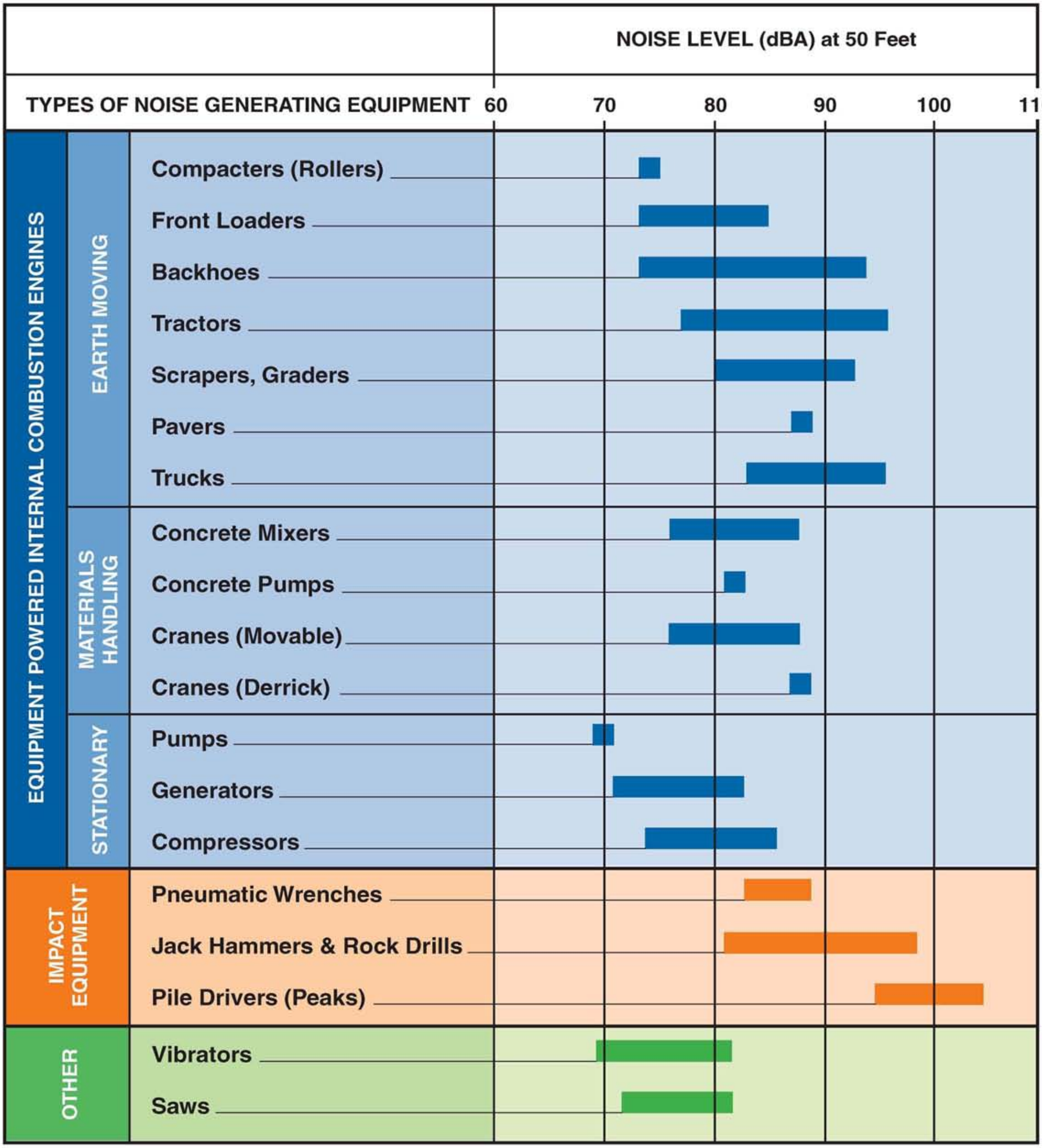


FIGURE 3

Typical Construction Equipment Noise Levels

4.4 MITIGATION

This section discusses the possible mitigation measures that can be implemented to either reduce or mitigate impacts generated by the proposed project.

4.4.1 Traffic Noise

No impacts were identified. No mitigation is necessary.

4.4.2 Construction Noise

No impacts were identified. No mitigation is necessary.

However, to avoid unnecessary annoyance from construction noise, the following construction noise control measures should be implemented:

- Perform all construction in a manner to minimize noise and vibration. The contractor should be required to select construction processes and techniques that create the lowest noise levels.
- Equip all internal combustion engines with a muffler of a type recommended by the manufacturer.
- Turn off idling equipment.
- Perform noisier operations during the times least sensitive to receptors.
- Implement a noise control monitoring program to limit the impacts.
- The construction contractor should be required by contract specification to comply with all local noise ordinances and obtain all necessary permits and variances.

5.0 REFERENCES

City of Carson. General Plan. Noise Element. 2002.

Municipal Code.

Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control, Third Edition. Acoustical Society of America. Woodbury, NY.

International Organization for Standardization (ISO). 1996a. Description and Measurement of Environmental Noise, Basic Quantities and Procedures Part 1. ISO 1996/1.

1996b. Description and Measurement of Environmental Noise, Basic Quantities and Procedures, Acquisition of Data Pertinent to Land Use, Part 2. ISO 1996/2.

1996c. Description and Measurement of Environmental Noise, Basic Quantities and Procedures, Application to Noise Limits, Part 3. ISO 1996/3.

Kimley-Horn and Associates, Inc. 2016. Traffic Impact Analysis for the Carson Truck Operations Project in the City of Carson. September 20.

APPENDIX D

TRAFFIC IMPACT ANALYSIS

Traffic Impact Study

For:

Carson Truck Operations Project
In the City of Carson

Prepared for:
Linear Properties, LLC

June, 2018

Kimley»Horn

TRAFFIC IMPACT STUDY
FOR THE
CARSON TRUCK OPERATIONS PROJECT

IN THE
CITY OF CARSON

Prepared for:

Linear Properties, LLC

Prepared by:

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765 The City Drive, Suite 200
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June, 2018

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TRAFFIC IMPACT STUDY
FOR THE
CARSON TRUCK OPERATIONS PROJECT
IN THE CITY OF CARSON

INTRODUCTION

The purpose of this report is to evaluate the traffic-related impacts associated with the proposed Carson Truck Operations Project in the City of Carson. The scope of the analysis in this report is in accordance with direction provided by the City of Carson Community Development Department staff. The analysis will focus on the project's impact at six study intersections.

PROJECT DESCRIPTION

Existing Site

The project site is located on a portion of an existing Los Angeles Department of Water and Power (LADWP) utility easement, approximately 160 feet wide, located between Avalon Boulevard and Wilmington Avenue in the southern portion of the City of Carson. The LADWP's utility easement generally runs in a north-south alignment from the I-405 Freeway to Lomita Blvd; the project site consists of the portion of the easement located between 223rd Street and 236th Street, broken into four separate blocks by the east-west streets that cross the easement. A regional vicinity map is provided on Figure 1. An aerial of the project site and surrounding area is provided on Figure 2.

For purposes of this study, the individual blocks of the project site will be referred to as Lots A through D, starting from the north end of the site. The project site consists of the following four lots:

- Lot A – Between 223rd Street and Watson Center Road (approximately 1,406 feet in length),
- Lot B – Between Watson Center Road and 230th Street (approximately 984 feet),
- Lot C – Between 230th Street and 233rd Street (approximately 985 feet), and
- Lot D – Between 233rd Street and 236th Street (approximately 1,010 feet).

The lots are predominately vacant with the exception of two or more transmission towers in each lot. A portion of Lot B (between Watson Center Road and 230th Street) has an area of paved parking. Access to each lot is currently provided via a curb cut onto the street at each end of the lot. Each entry is currently gated and un-manned.

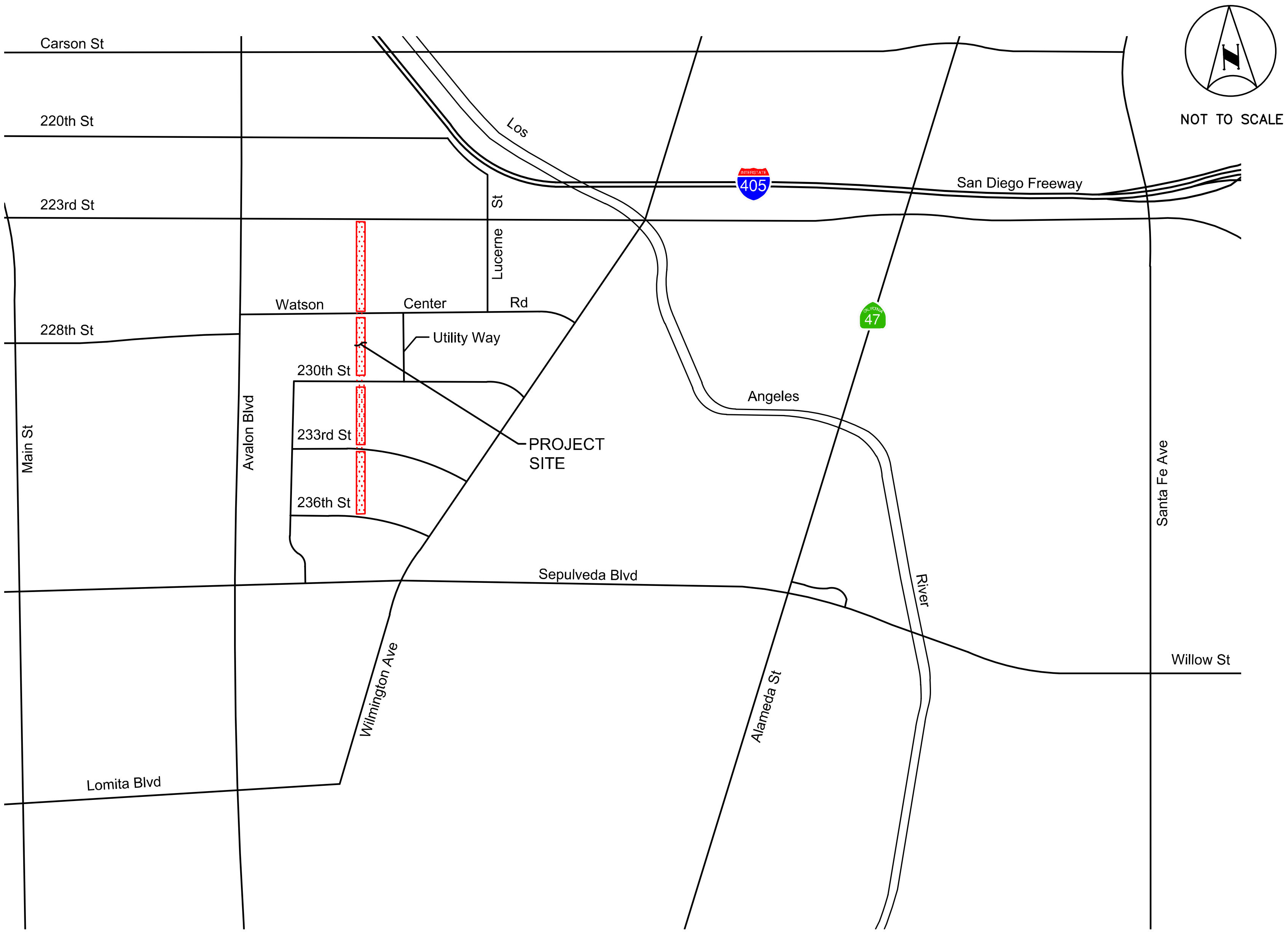
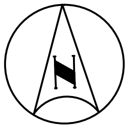


FIGURE 1
VICINITY MAP

Kimley»Horn



NOT TO SCALE

FIGURE 2
PROJECT SITE AERIAL

Proposed Project

The project will consist of four paved parking lots that will provide temporary parking and storage for truck trailers. A site plan depicting the layout of the lots is provided on Figure 3. Each lot would provide a 70-foot-wide center drive aisle through the project with 90-degree trailer parking stalls on each side. The project will provide the following number of trailer parking spaces:

- Lot A: 191 stalls
- Lot B: 129 stalls
- Lot C: 130 stalls
- Lot D: 115 stalls
- *Total: 565 stalls*

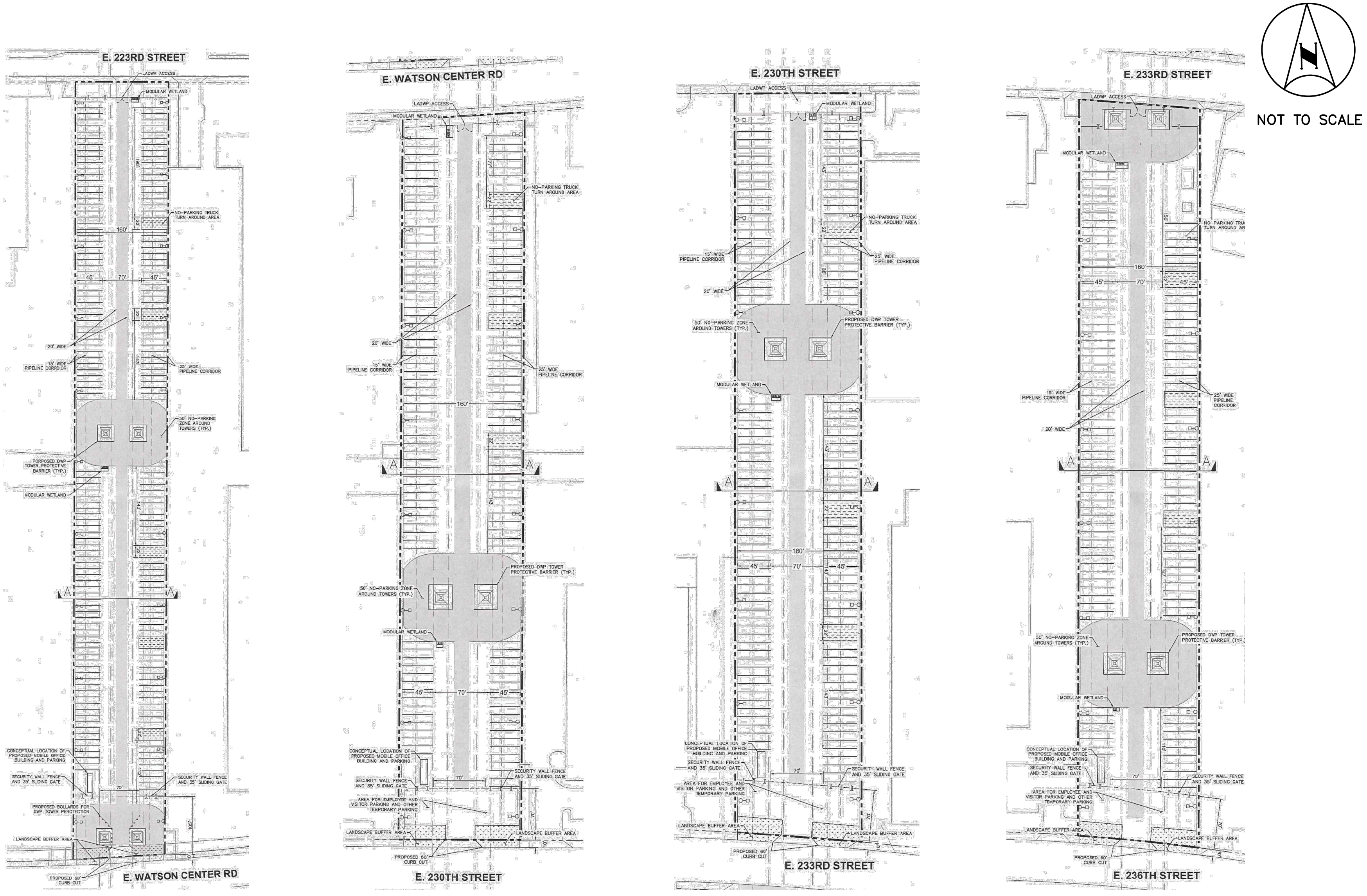
The parking stalls as depicted are 11 feet wide and 45 feet in length. Each lot will have three to five truck turn-around areas of 22 feet in width each along the east side of the lot to allow trucks to turn around, in the event that all parking stalls are occupied.

Access to each lot will be provided by a 40-foot-wide driveway (with a 60-foot curb cut) at the south end of the lot. There will be no project driveway on 223rd Street. All traffic for each lot will enter and exit the lot via the driveway on the south end of the lot as follows:

- Lot A traffic will enter and exit the lot via the driveway on Watson Center Road;
- Lot B traffic will enter and exit the lot via the driveway on 230th Street;
- Lot C traffic will enter and exit the lot via the driveway on 233rd Street;
- Lot D traffic will enter and exit the lot via the driveway on 236th Street.

The project will be operational 24 hours a day, seven days a week. Entry and exit from each lot will be controlled by manned or unmanned gates at the south end of the lot.

The project completion year is anticipated to be Year 2019.



LOT A - 191 STALLS

LOT B - 129 STALLS

LOT C - 130 STALLS

LOT D - 115 STALLS

FIGURE 3
PROJECT SITE PLAN

Kimley»Horn

ANALYSIS METHODOLOGY

This traffic study includes documentation of existing conditions, analysis of cumulative traffic conditions and evaluation of project-related impacts at the following study intersections:

1. Wilmington Avenue at 223rd Street
2. Wilmington Avenue at Watson Center Road
3. Wilmington Avenue at 230th Street
4. Wilmington Avenue at 233rd Street
5. Wilmington Avenue at Sepulveda Boulevard
6. Sepulveda Boulevard at Alameda Street

For each of the study intersections, the following analysis scenarios will be evaluated for the weekday morning and evening peak hours:

- Existing Conditions
- Existing Plus Project
- Opening Year (2019) Without Project
- Opening Year (2019) With Project

Intersection Capacity Utilization (ICU) Methodology

All of the study intersections for this analysis are signalized, except the intersection of Wilmington Avenue at 230th Street. Peak hour operating conditions at signalized intersections are evaluated using the Intersection Capacity Utilization (ICU) methodology, in accordance with the City of Carson and Los Angeles County Congestion Management Program (CMP) requirements. The ICU methodology provides a comparison of the number of vehicles passing through an intersection to the theoretical hourly vehicular capacity of that intersection during a given hour.

The ICU calculation assumes a per-lane capacity of 1,600 vehicles per hour (vph) for each travel lane through the intersection. A separate "unofficial" de facto right-turn lane is assumed where there is no separately striped right-turn lane, if the width of the outside through lane is 19 feet or more, and parking is prohibited during the peak period. A clearance factor of 0.05 (5%) of the total intersection capacity is included in the ICU calculation to account for the effect of the yellow and all-red phases of the signal cycle.

The ICU calculation returns a volume-to-capacity (V/C) ratio that translates into a corresponding Level of Service (LOS) measure, ranging from LOS A, representing uncongested, free-flowing conditions; to LOS F, representing over-capacity conditions. A summary description of each Level of Service and the corresponding V/C ratio is provided on the following chart:

LEVEL OF SERVICE DESCRIPTIONS
SIGNALIZED INTERSECTIONS

Level of Service	ICU Value	Description
A	0.00 - 0.60	EXCELLENT – No vehicle waits longer than one red light and no approach phase is fully used.
B	0.61 - 0.70	VERY GOOD – An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71 - 0.80	GOOD – Occasionally drivers may have to wait through more than one red light; back-ups may develop behind turning vehicles.
D	0.81 - 0.90	FAIR – Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive back-ups.
E	0.91 - 1.00	POOR – Represents the most vehicles that the intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.00	FAILURE – Back-ups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Peak hour operating conditions at unsignalized intersections are evaluated using the Highway Capacity Manual (HCM) delay methodology, as discussed in the next section.

Highway Capacity Manual (HCM) Methodology

Unsignalized study intersections are analyzed using the Highway Capacity Manual (HCM) methodology. For unsignalized intersections, the HCM methodology analysis determines the average total delay for each vehicle making any movement from the stop-controlled minor street, as well as left turns from the major street. Delay values are calculated based on the relationship between traffic on the major street and the availability of acceptable gaps in the traffic stream through which conflicting traffic movements can be made.

The HCM delay forecast translates to a Level of Service designation, ranging from LOS A to LOS F. A summary description of each Level of Service and the corresponding delay is provided in the following chart.

LEVEL OF SERVICE DESCRIPTIONS HCM METHODOLOGY			
LOS	Average Delay (sec / vehicle)		Description
	Signalized	Unsignalized	
A	< 10.0	< 10.0	LOS A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.
B	> 10.0 - 20.0	> 10.0 - 15.0	LOS B represents stable flow, but the presence of others in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver.
C	> 20.0 - 35.0	> 15.0 - 25.0	LOS C is in the range of stable flow, but marks the beginning of operation in which individual users become affected by interaction with others in the traffic stream.
D	> 35.0 - 55.0	> 25.0 - 35.0	LOS D represents high-density, but stable flow. Speed and freedom to maneuver are restricted, and the driver experiences a generally poor level of comfort and convenience.
E	> 55.0 - 80.0	> 35.0 - 50.0	LOS E represents operating conditions at or near the capacity of the intersection. All speeds are reduced to a low, but relatively uniform level. Small increases in flow will cause breakdowns in traffic movement.
F	> 80.0	> 50.0	LOS F represents forced, or breakdown flow. This condition occurs when the amount of traffic approaching the intersection exceeds the volume which can pass through the intersection, resulting in queues and congestion.

Traffic Impact Criteria

The minimum acceptable level of service for signalized intersections in the City of Carson is LOS D. The project impact at an intersection would be considered to be significant if the project's traffic results in a change in Level of Service from LOS D or better to LOS E or F, or if there is an increase in intersection capacity utilization (ICU) value of 0.020 or more, when the "Without Project" intersection level of service is already at LOS E or F (ICU = 0.901 or more). For unsignalized intersections operating at an unacceptable Level of Service, a signal warrant analysis will be conducted.

EXISTING TRANSPORTATION SYSTEM

Roadway System

Regional access to the project site is provided by the San Diego Freeway (I-405), located immediately to the north of the project site. Local access to the project site is provided by several arterial and commuter roadways.

Sepulveda Boulevard runs east-west in the vicinity of the project, providing interchange access to the I-110 Freeway to west, and the I-710 Freeway to the east. This roadway provides two travel lanes in each direction with a raised landscaped median in the project vicinity. Parking is prohibited along both sides of the street, and the posted speed limit in the project vicinity is 40 miles per hour (mph). Sepulveda Boulevard is classified as a Major Highway and is designated as a truck route on the City of Carson Circulation Element of the General Plan.

Wilmington Avenue is a generally northeast-southwest street located to the east of the project site. It has two lanes in each direction with a raised center median. Parking is prohibited along both sides of the street and the posted speed limit is 40 mph. Wilmington Avenue is classified as a Major Highway and is designated as a truck route on the City's Circulation Element.

223rd Street is an east-west street which runs along the north edge of the project site. It has two lanes in each direction with a raised center median. Parking is prohibited along both sides of the street and the posted speed limit is 45 mph. 223rd Street is classified as a Major Highway and is designated as a truck route on the City's Circulation Element.

Watson Center Road is an east-west street which crosses through the project site, and would provide access to Lot A. It has two lanes in each direction. Parking is allowed along both sides of the street from 4:00 AM to 10:00 PM, with signage indicating that the street is a Tow Away area with No Stopping allowed between 10:00 PM and 4:00 AM. The posted speed limit is 40 mph. Watson Center Road is classified as a Collector on the City's Circulation Element.

230th Street is an east-west street which crosses through the project site and provides access to the adjacent businesses along the street. 230th Street would provide access to Lot B. It has one lane in each direction with a center stripe. Parking is allowed along both sides of the street from 4:00 AM to 10:00 PM, with truck parking limited to one hour.

233rd Street is an east-west street which crosses through the project site and provides access to the adjacent businesses along the street. 233rd Street would provide access to Lot C. It has one lane in each direction with a center stripe. Parking is allowed along both sides of the street, with truck parking limited to one hour.

236th Street is an east-west street which runs along the south edge of the project site and provides access to the adjacent businesses along the street. 236th Street would provide access to Lot D. It has one lane in each direction with a center stripe. Parking is allowed along both sides of the street, with truck parking limited to one hour.

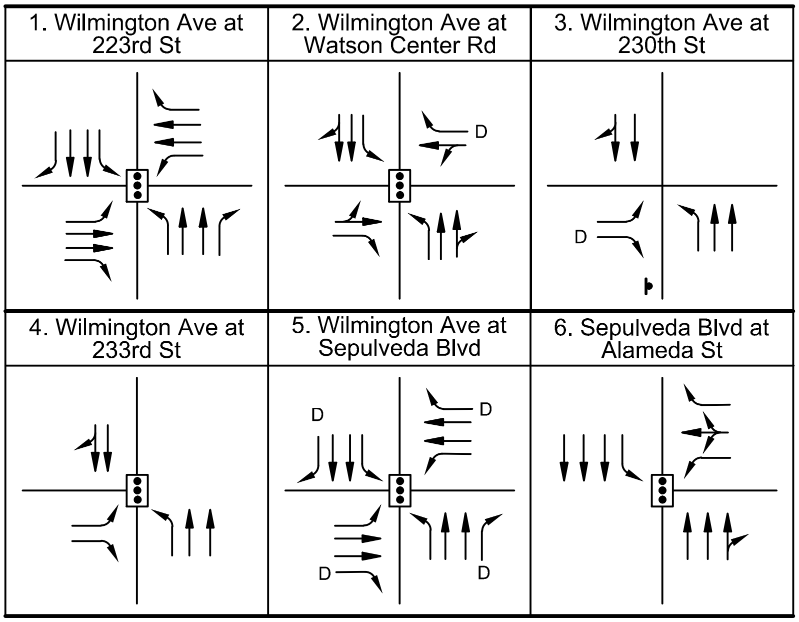
EXISTING TRAFFIC CONDITIONS

Existing Traffic Volumes

Existing lane configurations and traffic control at the study intersections are shown on Figure 4. Existing morning and evening peak hour traffic volumes were collected at the study intersections in April, 2016. At the time of the data collection, the intersection of Wilmington Avenue at 223rd Street was under construction. Although all turning movements were still available at the intersection, lane restrictions caused back-up and delay in the remaining open lanes. Based on prior (pre-construction) counts in the area, adjustments were applied to account for traffic that had detoured to alternate paths due to the construction.

The intersection count data included vehicle classifications for passenger vehicles and trucks. A Passenger Car Equivalent (PCE) factor of 3.0 was applied to the truck volumes to address the impacts of truck traffic on intersection operation.

A growth rate was applied to the 2016 volumes to grow the volumes to Year 2018. Based on the Los Angeles County Congestion Management Program (CMP), the general traffic volume growth factor for the Carson area is estimated to be 0.5% per year. Therefore, a growth rate of 1% (0.5% per year for two years) was applied to grow volumes to Year 2018. The resulting (adjusted) existing peak hour traffic volumes are shown on Figure 5. Copies of the traffic count data forms and the manual adjustment worksheets are provided in *Appendix A.*



LEGEND:

Ⓧ = Study Intersection

🟥 = Project Site

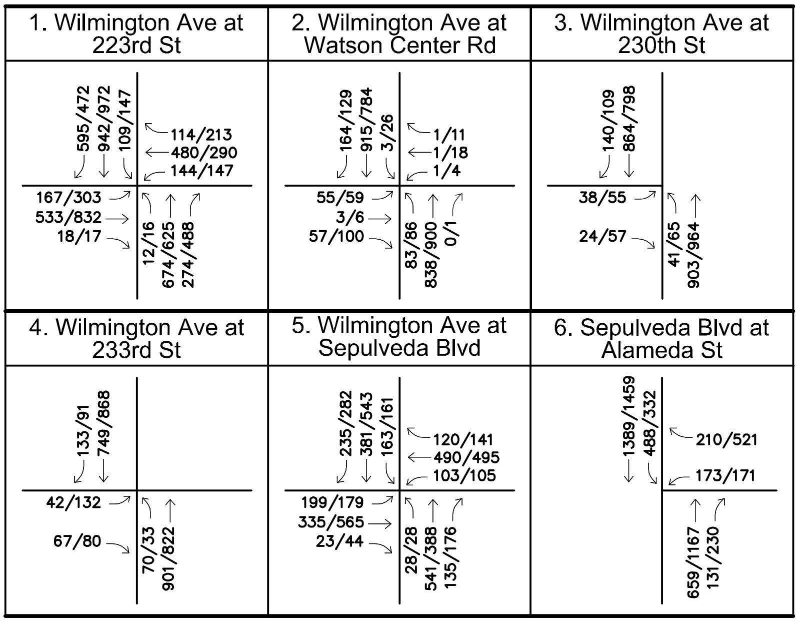
= Turn or Through Lane

= Signal

= Stop Sign

D = Defacto Right Turn Lane

FIGURE 4
EXISTING LANE CONFIGURATION
AND TRAFFIC CONTROL



LEGEND:

Ⓧ = Study Intersection

▨ = Project Site

XX/YY = AM/PM Peak Hour Turning Movement Volumes

FIGURE 5
EXISTING
PEAK HOUR TRAFFIC VOLUMES

Kimley»Horn

Existing Intersection Operating Conditions

Existing intersection operations were evaluated using the ICU and HCM methodologies described earlier. The results of the analysis are summarized on Table 1. This table shows that all study intersections currently operate at an acceptable LOS C or better during both peak hours, with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street. The unsignalized intersection currently operates at LOS F during both peak hours.

The Level of Service for an unsignalized intersection is reported based on the individual intersection movement with the highest delay, which in this case, would be the eastbound left-turn movement from the minor street (230th Street). Eastbound traffic experiences delay during the peak hours while waiting for an acceptable gap in traffic on Wilmington Avenue. While the side street left-turn movement operates at a deficient Level of Service, the overall intersection delay would be acceptable. Any queuing that occurs on the side street is contained on the minor intersection approach, and does not impact the progression of traffic on the main arterial.

Intersection analysis worksheets are provided in *Appendix B*.

PROJECT TRAFFIC

Project Trip Generation

While parking areas do not, in and of themselves, generate additional trips on the regional network, the provision of available parking for truck trailers on the project site will draw trips to the area, and add trips to the intersections and roadways serving the site.

The Institute of Transportation Engineers (ITE) Trip Generation Manual does not provide trip generation rates for a truck operations / trailer parking / storage area. Trip generation estimates were developed based on day-to-day information for the planned operations for the facility provided by the applicant, consisting of the following assumptions:

- There will be 175 tractor-trailer movements into the site and 175 tractor-trailer movements out of the site each day.
    - This represents a roughly 30% turnover of spaces each day.
- After dropping off a trailer, the tractor will leave the site; conversely, in order to pick up a trailer, a tractor will travel to the site.
    - This means that there will be 175 tractor trips (without trailers) to the site and away from the site per day.
    - This is a conservative assumption, in that some percentage of the tractors may wait on site after dropping a trailer to pick up a different trailer on the same trip.
- 56% of the trips are assumed to take place during typical daytime working hours, distributed evenly per hour between 7:00 AM and 5:00 PM.
- The remaining 44% are assumed to take place during typical non-working hours, distributed evenly per hour between 5:00 PM and 7:00 AM.
- The typical PM peak hour occurs between the period of 4:00 PM to 6:00 PM. At 5:00 PM, the project activity is assumed to decrease. For a worst-case scenario, a peak rate of 5.6% is assumed for the PM peak analyses.

Using this combination of trip-making assumptions, trip generation estimates for the project are summarized on Table 2. A PCE factor of 2.0 was applied to the tractors and a PCE factor of 3.0 was applied to the tractor-trailers.

TABLE 1
SUMMARY OF INTERSECTION OPERATION
EXISTING CONDITIONS

ICU Methodology

Int. #	Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
			V/C	LOS	V/C	LOS
1	Wilmington Ave at 223rd St	S	0.686	B	0.799	C
2	Wilmington Ave at Watson Center Rd	S	0.476	A	0.454	A
4	Wilmington Ave at 233rd St	S	0.383	A	0.503	A
5	Wilmington Ave at Sepulveda Blvd	S	0.598	A	0.538	A
6	Sepulveda Blvd at Alameda St	S	0.419	A	0.517	A

HCM Methodology

Int. #	Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
3	Wilmington Ave at 230th St	U	117.9	F	143.1	F

LOS shown in **Bold** indicates unacceptable Level of Service.
ICU = Intersection Capacity Utilization
HCM = Highway Capacity Manual
LOS = Level of Service
Intersection operation is expressed in volume-to-capacity (v/c) ratio for the ICU methodology.
Intersection operation is expressed in average seconds of delay (del/veh) for the HCM methodology.

TABLE 2
SUMMARY OF PROJECT TRIP GENERATION

	Trip Generation Estimates						
		AM Peak Hour			PM Peak Hour		
Land Use	Daily	In	Out	Total	In	Out	Total
Tractor + Trailer	350	10	10	20	10	10	20
PCE (4+-Axle Truck)[1]	1,050	30	30	60	30	30	60
Tractor Only	350	10	10	20	10	10	20
PCE (3-Axle Truck)[2]	700	20	20	40	20	20	40
Total Project Trips (PCE)	1,750	50	50	100	50	50	100

[1] PCE Factor for 4+-Axle Truck = 3.0
[2] PCE Factor for 3-Axle Truck = 2.0

Project Trip Distribution

The distribution assumptions for the project trips are also based on operational information provided by the applicant, consisting of:

- The distribution of the tractor-trailers is assumed to be 50% north on Wilmington Avenue (toward the freeway) and 50% south on Wilmington Avenue (toward the Port and railyards)
- It is assumed that the tractors will travel to the Port of Long Beach after dropping a trailer, and will arrive from the Port to pick up a trailer.

  These are conservative assumptions, in that some percentage of the tractor-trailer or tractor trips may be associated with one of the many warehouse operations in the immediate area.
- Finally, these assumptions are also conservative, in that some of the trips to and from the project site may already be traveling through the project study area, on their way to and from their current origins and destinations. For a worse-case analysis, no adjustment in the project trip generation has been made to off-set this potential.

Project trucks are required to use designated truck routes to the greatest extent possible to get to and from their destinations. In the project vicinity, the designated truck routes are 223rd Street, Wilmington Avenue, Sepulveda Boulevard, Alameda Street, and Avalon Boulevard. There will be no project driveway on 223rd Street. All traffic for each lot will enter and exit the lot via the driveway on the south end of that lot. Anticipated travel paths for project trucks are shown on Figure 6. Trucks coming to and from the ports will use Wilmington Avenue, Sepulveda Boulevard, and Alameda Street. Trucks destined to and from the freeway system will use Wilmington Avenue.

Using the trip generation and trip distribution assumptions outlined above, the resulting project-related peak hour trips at the study intersections are shown on Figure 7.

EXISTING PLUS PROJECT CONDITIONS

The Existing Plus Project analysis scenario is a hypothetical scenario that assumes completion of the project and full absorption of the project traffic on the surrounding street network at the current time. The Existing Plus Project scenario is required by the California Environmental Quality Act (CEQA).

Project-related peak hour trips were added to the existing peak hour volumes to evaluate Existing Plus Project conditions. The resulting peak hour traffic volumes are shown on Figure 7. The Intersection Level of Service analysis was conducted for the morning and evening peak hours, and the results are shown on Table 3. As this table indicates, with the addition of project traffic, all study intersections would continue to operate at an acceptable LOS C or better, with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street. This intersection would continue to operate at the same deficient Level of Service (LOS F in both peak hours), based on the individual intersection movement with the highest level of delay (the eastbound left-turn movement).

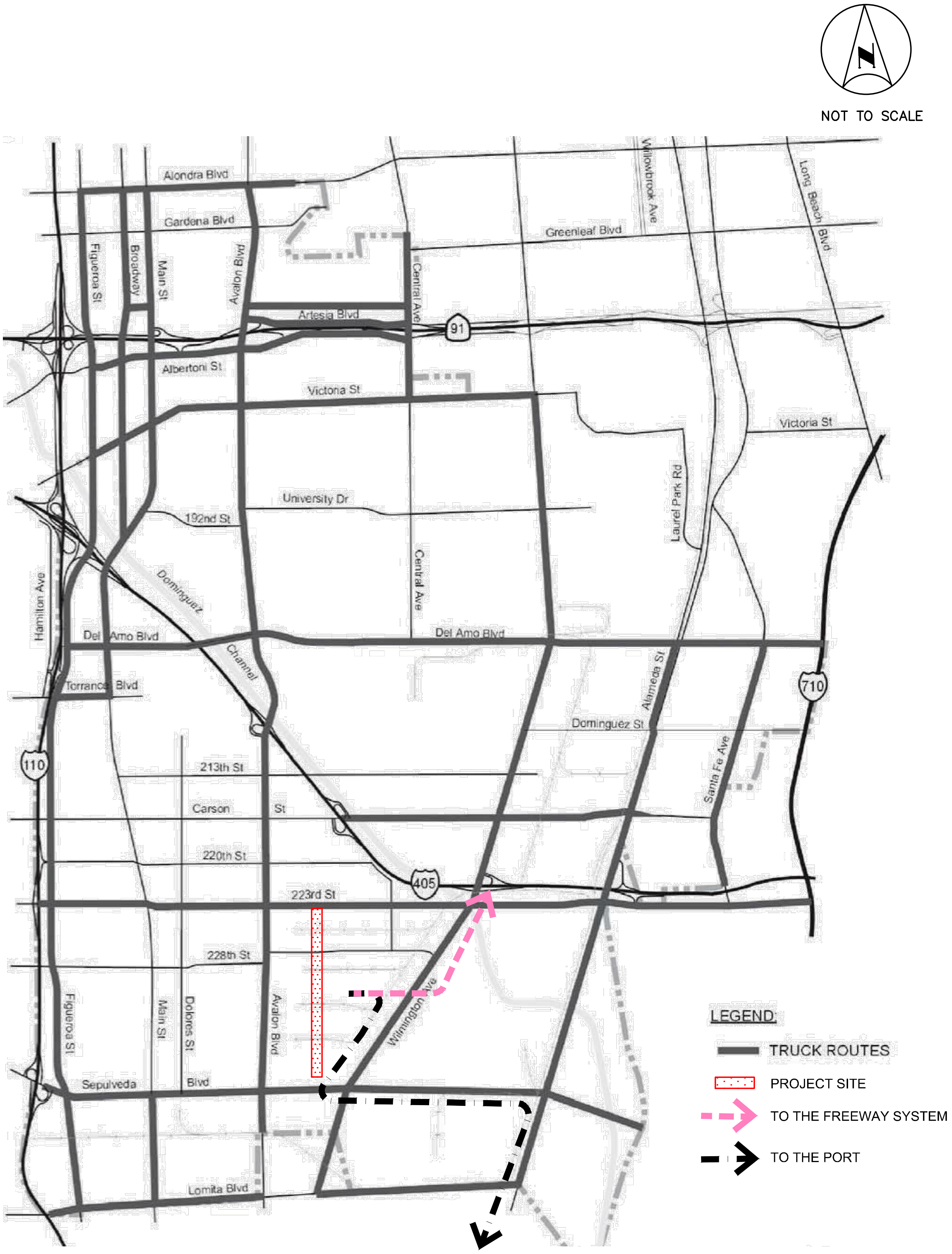


FIGURE 6
PROJECT TRUCK TRAFFIC PATH OF TRAVEL

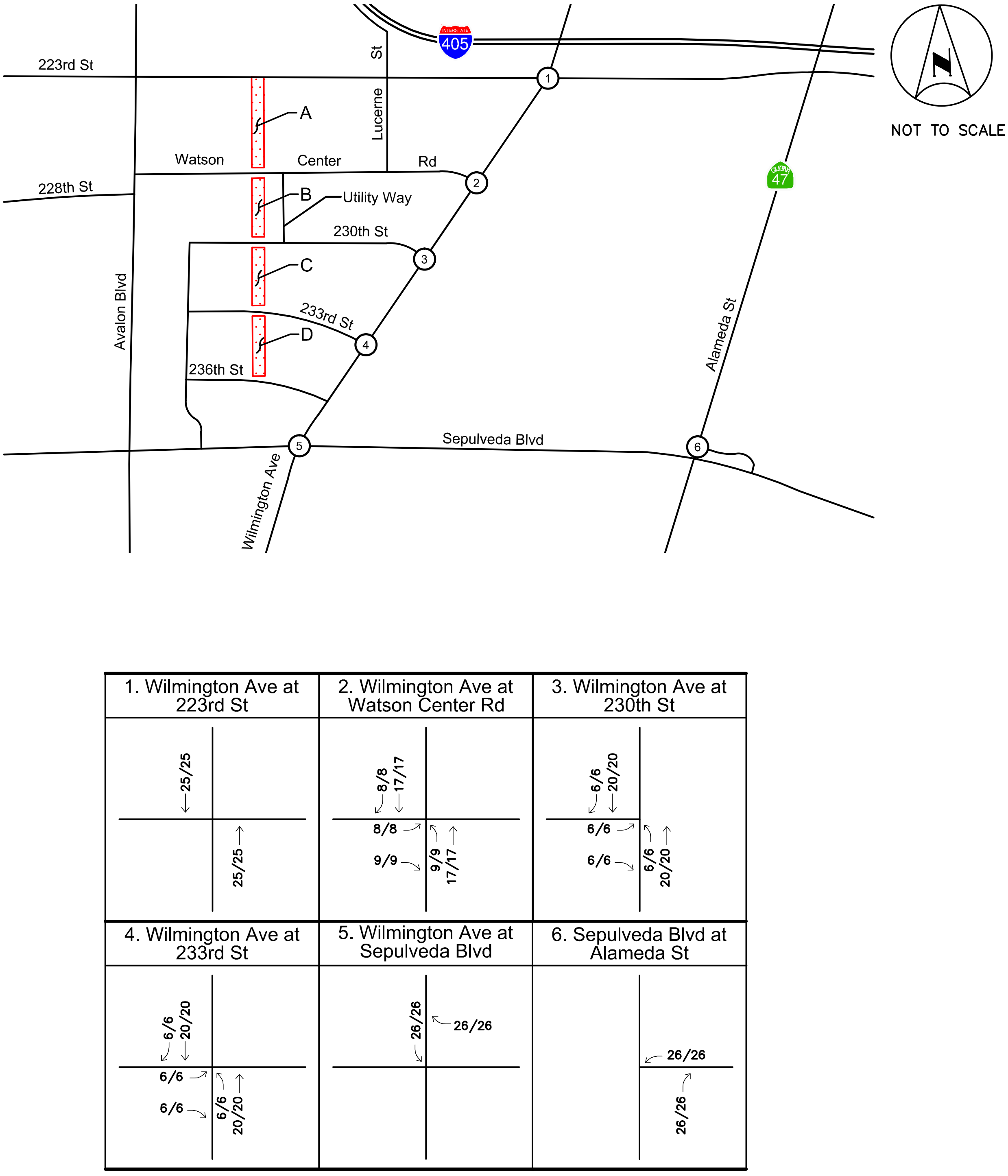
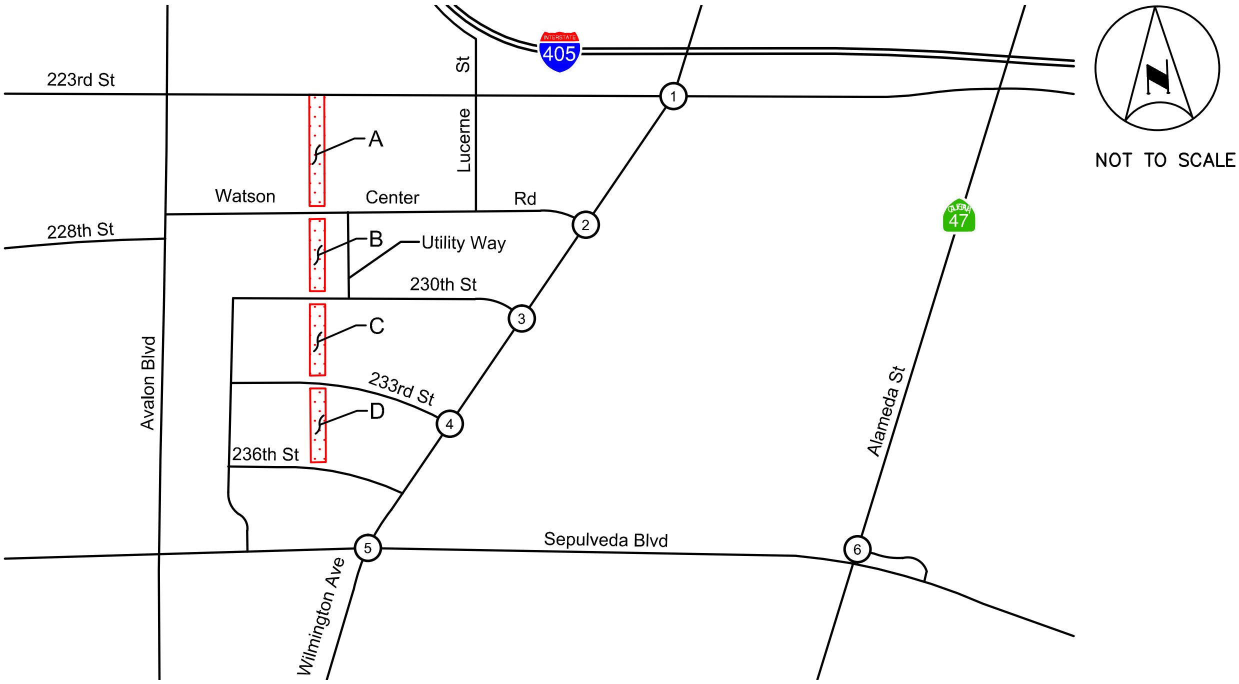
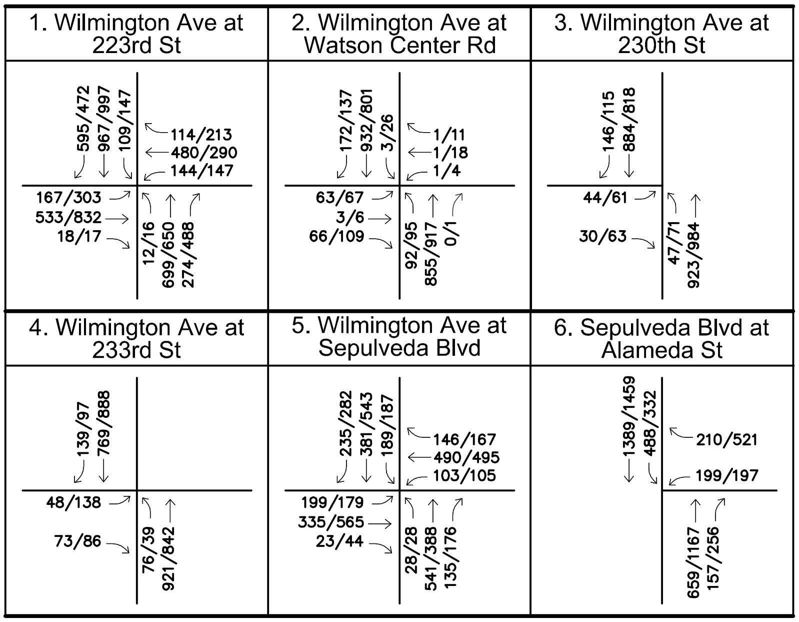


FIGURE 7
PROJECT-RELATED
PEAK HOUR TRAFFIC VOLUMES





LEGEND:

Ⓧ = Study Intersection

▨ = Project Site

XX/YY = AM/PM Peak Hour Turning Movement Volumes

FIGURE 8
EXISTING PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES

TABLE 3
SUMMARY OF INTERSECTION OPERATION
EXISTING PLUS PROJECT CONDITIONS

ICU Methodology

Int. #	Intersection	AM Peak Hour						PM Peak Hour					
		Without Project		With Project		Project Impact	Impact Sig?	Without Project		With Project		Project Impact	Impact Sig?
		V/C	LOS	V/C	LOS			V/C	LOS	V/C	LOS		
1	Wilmington Ave at 223rd St	0.686	B	0.688	B	0.002	No	0.799	C	0.799	C	0.000	No
2	Wilmington Ave at Watson Center Rd	0.476	A	0.494	A	0.018	No	0.454	A	0.473	A	0.019	No
4	Wilmington Ave at 233rd St	0.383	A	0.399	A	0.016	No	0.503	A	0.518	A	0.015	No
5	Wilmington Ave at Sepulveda Blvd	0.598	A	0.615	B	0.017	No	0.538	A	0.555	A	0.017	No
6	Sepulveda Blvd at Alameda St	0.419	A	0.425	A	0.006	No	0.517	A	0.517	A	0.000	No

HCM Methodology

Int. #	Intersection	AM Peak Hour						PM Peak Hour					
		Without Project		With Project		Project Impact	Impact Sig?	Without Project		With Project		Project Impact	Impact Sig?
		Delay	LOS	Delay	LOS			Delay	LOS	Delay	LOS		
3	Wilmington Ave at 230th St	117.9	F	162.2	F	44.3	No	143.1	F	196.9	F	53.8	No

LOS shown in Bold indicates unacceptable Level of Service.
ICU = Intersection Capacity Utilization
HCM = Highway Capacity Manual
LOS = Level of Service
Intersection operation is expressed in volume-to-capacity (v/c) ratio for the ICU methodology.
Intersection operation is expressed in average seconds of delay (del/veh) ratio for the HCM methodology.

FUTURE TRAFFIC CONDITIONS

Future traffic conditions with and without the project were analyzed for Opening Year (Cumulative) scenarios. First, ambient traffic growth was added to existing traffic volume to establish the Opening Year Base conditions, to address the impacts of background growth. Second, traffic from approved and pending projects (Cumulative Projects) in the surrounding area was added, to develop Cumulative traffic forecasts. A summary of this "build-up" process is provided below.

Ambient Growth

Based on the Los Angeles County CMP, the general traffic volume growth factor for the Carson area is estimated to be 0.5% per year. The proposed project is anticipated to be completed by Year 2019; therefore, the growth rate to the project opening year is assumed for one year.

Cumulative Projects Traffic

Information about cumulative projects (approved and pending projects) was obtained from the City of Carson Community Development Department, Planning Division and Building Safety Division, and the City of Los Angeles. Ten approved and pending projects in the vicinity of the project site were identified. The cumulative projects are listed on Table 4, along with the project location, approved/ proposed land use, and estimated peak hour trips. The cumulative project locations are shown graphically on Figure 9. Cumulative project turning movement volumes at the study intersections are shown on Figure 10.

Opening Year 2019 Without Project Conditions

The ambient growth rate and cumulative project traffic volumes were added to existing traffic volumes to develop the Opening Year Without Project peak hour forecasts. Forecasted peak hour volumes for the Opening Year Without Project scenario are shown on Figure 11. Each intersection was re-analyzed with these traffic volumes, and the results are shown on Table 5. The results show that with the addition of ambient traffic growth and cumulative project traffic, all study intersections would operate at an acceptable LOS D or better, with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street. This intersection would continue to operate at LOS F during both peak hours. Opening Year Without Project intersection analysis worksheets are provided in *Appendix B*.

TABLE 4
SUMMARY OF CUMULATIVE PROJECTS

#	Location	Land Use	Quantity	Unit	Trip Generation Estimates						
						AM Peak Hour			PM Peak Hour		
					Daily	In	Out	Total	In	Out	Total
1	440 Sepulveda Blvd	Apartment	11	DU	73	1	4	5	4	2	6
2	616 E Carson Street	Residential Condominium/Townhouse	152	DU	883	11	55	66	53	26	79
		Shopping Center	13.000	KSF	555	8	5	13	23	25	48
3	21521-21601 S Avalon Blvd	Apartment	357	DU	2,374	36	146	182	144	77	221
		Shopping Center	30.700	KSF	1,311	18	11	29	55	59	114
4	21801 Vera Street	Single-Family Detached Housing	18	DU	171	3	10	13	11	7	18
5	21721 Moneta Avenue	Apartment	13	DU	86	1	5	6	5	3	8
6	1802 E Carson Street	Coffee/Donut Shop w/ Drive-Thru	1.500	KSF	1,228	77	74	151	32	32	64
7	16100 S Avalon Blvd	Warehousing	44.000	KSF	157	10	3	13	4	11	15
8	21900 S Wilmington Avenue	Warehousing	400.000	KSF	1,424	95	25	120	32	96	128
9	402 E Sepulveda Blvd	Apartment	65	DU	432	7	27	34	26	14	40
		Shopping Center	3.000	KSF	128	2	1	3	5	6	11
10	2254 E 223rd Street	Warehousing	120.486	KSF	429	29	8	37	10	29	39
Total Project Trips					9,251	298	374	672	404	387	791

KSF = Thousand Square Feet, DU = Dwelling Units

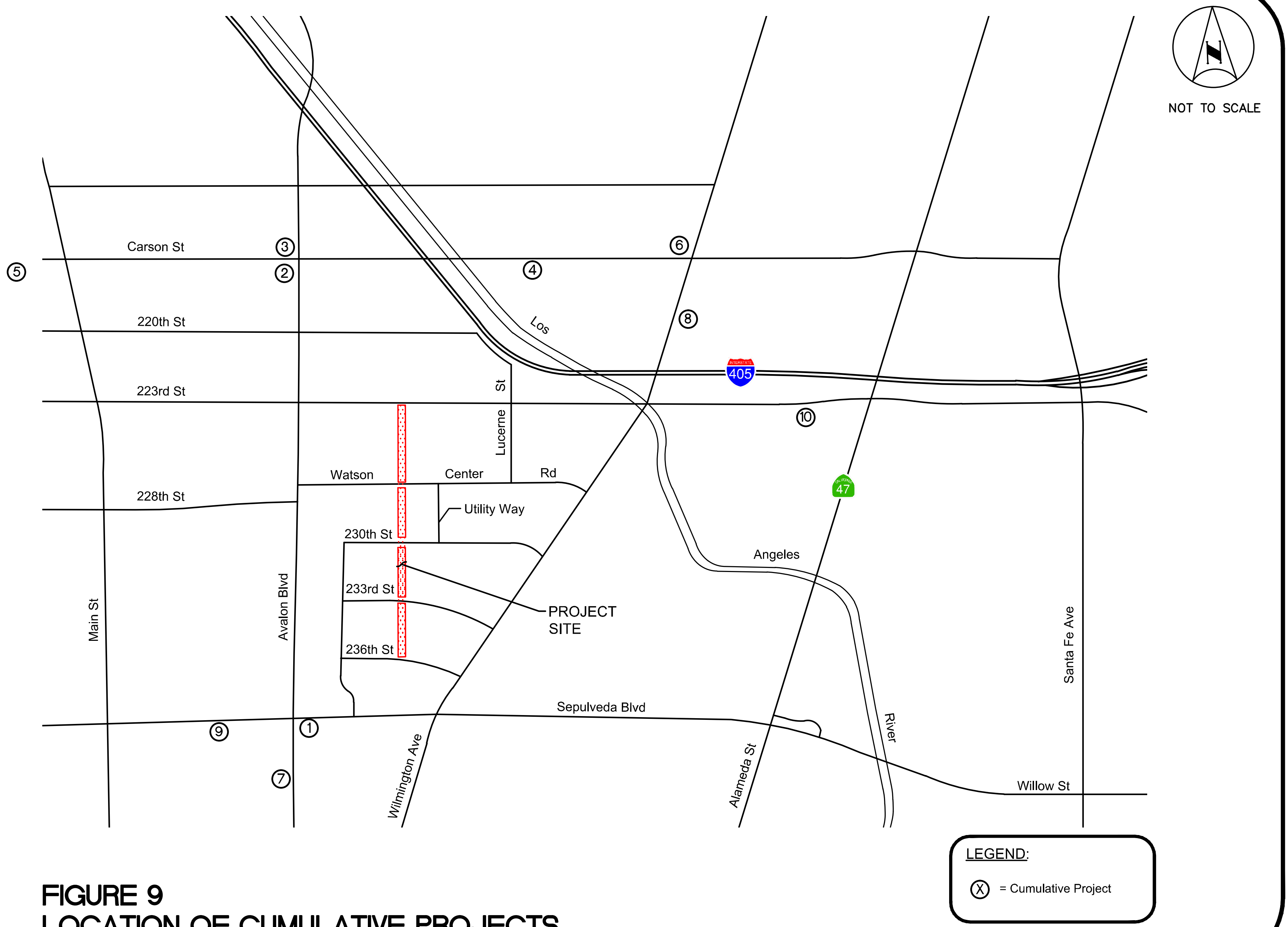
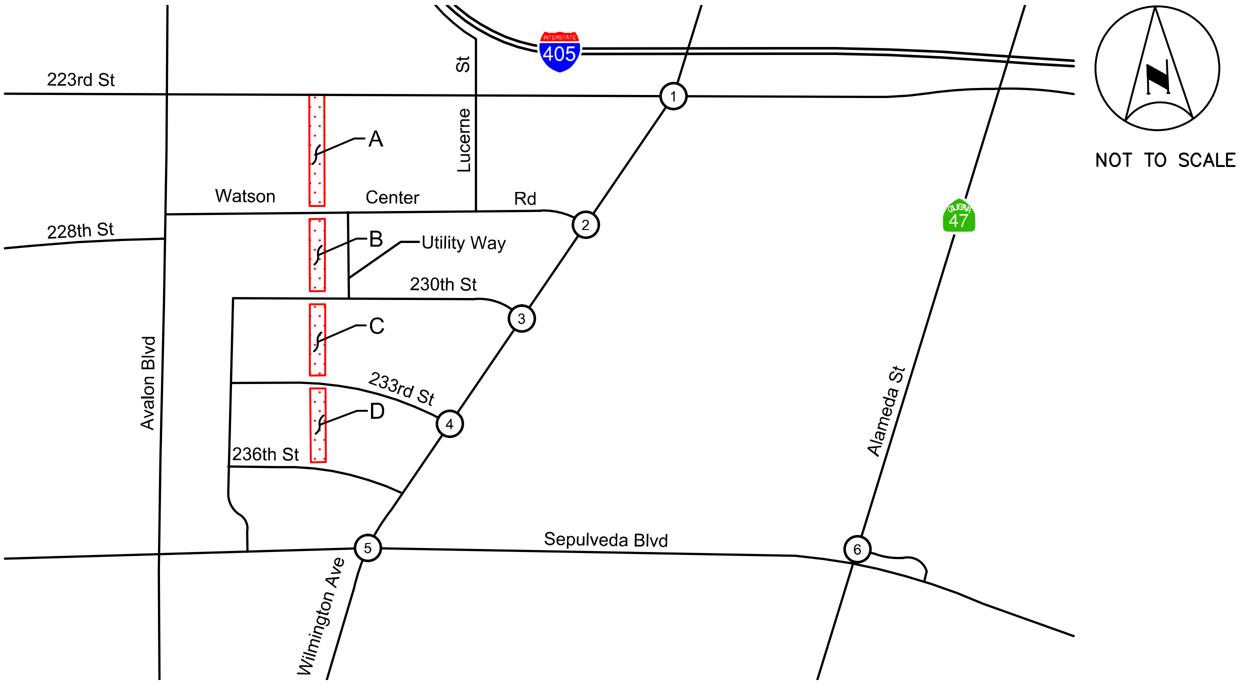
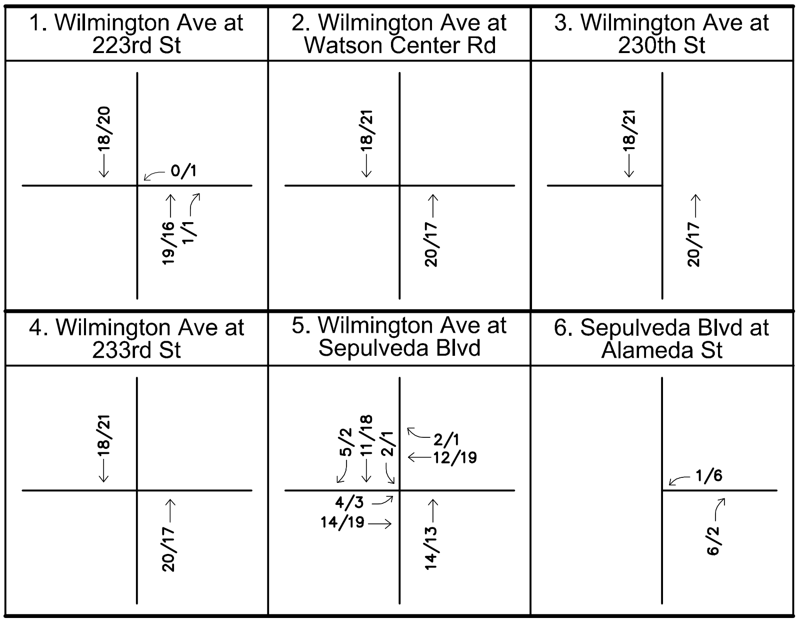


FIGURE 9
LOCATION OF CUMULATIVE PROJECTS





LEGEND:

Ⓧ = Study Intersection

▨ = Project Site

XX/YY = AM/PM Peak Hour Turning Movement Volumes

FIGURE 10
CUMULATIVE PROJECT
PEAK HOUR TRAFFIC VOLUMES

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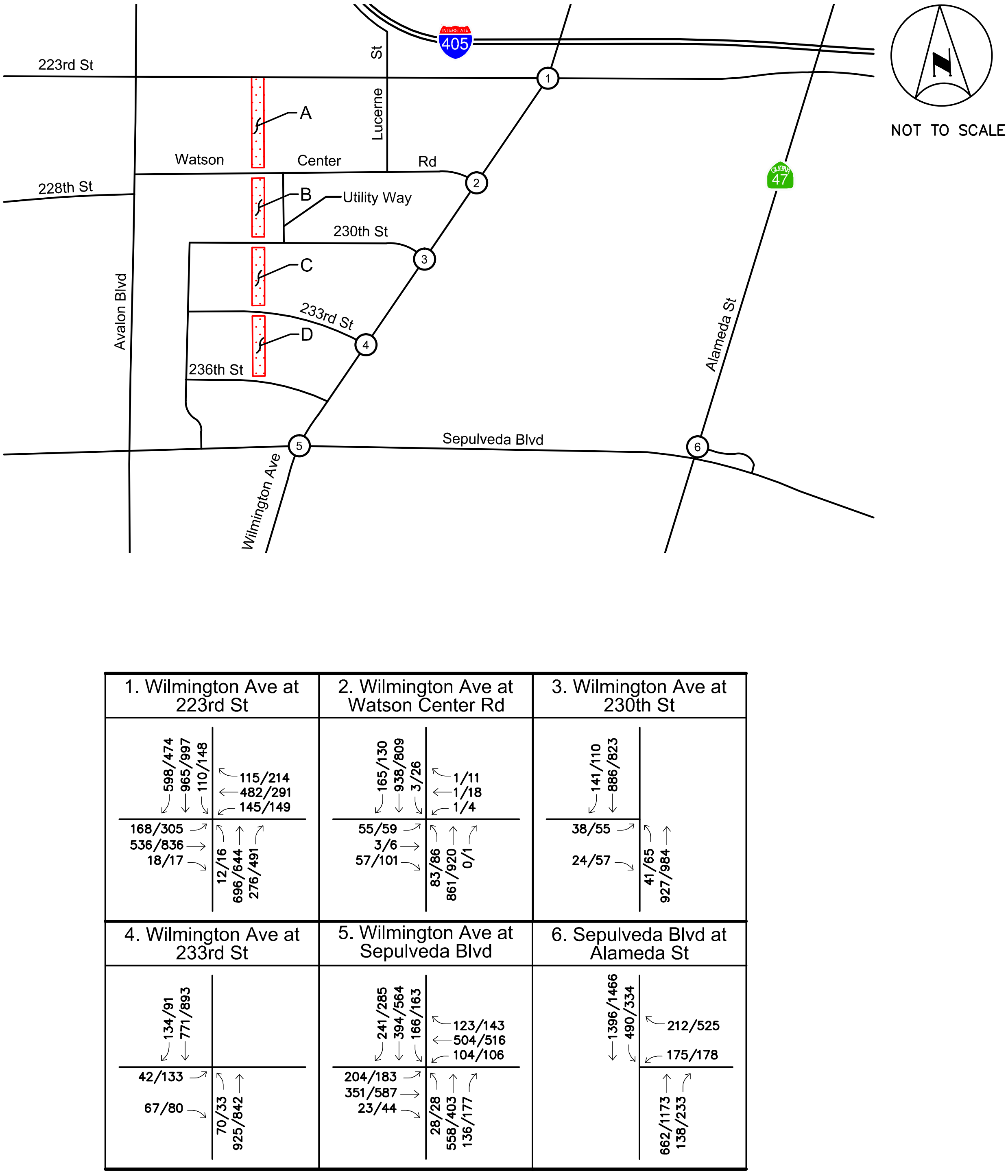


LEGEND:

Ⓧ = Study Intersection

▨ = Project Site

XX/YY = AM/PM Peak Hour Turning Movement Volumes

FIGURE 11
OPENING YEAR 2019 WITHOUT PROJECT PEAK HOUR TRAFFIC VOLUMES

Kimley»Horn

TABLE 5
SUMMARY OF INTERSECTION OPERATION
OPENING YEAR 2019 WITHOUT PROJECT

ICU Methodology

Int. #	Intersection	AM Peak Hour		PM Peak Hour	
		V/C	LOS	V/C	LOS
1	Wilmington Ave at 223rd St	0.663	B	0.804	D
2	Wilmington Ave at Watson Center Rd	0.483	A	0.463	A
4	Wilmington Ave at 233rd St	0.390	A	0.511	A
5	Wilmington Ave at Sepulveda Blvd	0.613	B	0.553	A
6	Sepulveda Blvd at Alameda St	0.421	A	0.519	A

HCM Methodology

Int. #	Intersection	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
3	Wilmington Ave at 230th St	132.8	F	163.3	F

LOS shown in Bold indicates unacceptable Level of Service.
ICU = Intersection Capacity Utilization
HCM = Highway Capacity Manual
LOS = Level of Service
Intersection operation is expressed in volume-to-capacity (v/c) ratio for the ICU methodology.
Intersection operation is expressed in average seconds of delay (del/veh) for the HCM methodology.

Opening Year 2019 With Project Conditions

Project traffic was added to Opening Year Without Project traffic volumes at the study intersections. The Opening Year With Project traffic volumes are shown on Figure 12. The results of the Opening Year With Project scenario analysis are summarized on Table 6.

The results indicate that with the addition project traffic, all study intersections would continue to operate at an acceptable LOS D or better, with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street. This intersection would continue to operate at the same deficient Level of Service (LOS F in both peak hours). Opening Year With Project intersection analysis worksheets are provided in *Appendix B*.

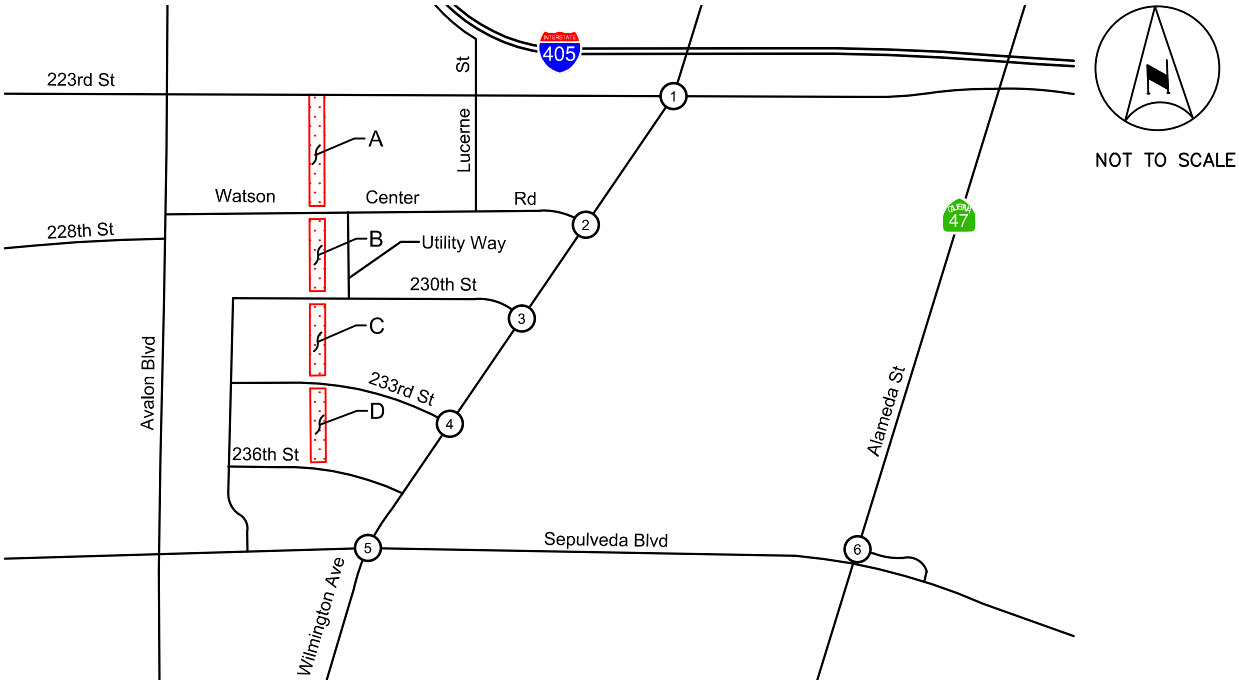
Signal Warrant Analysis

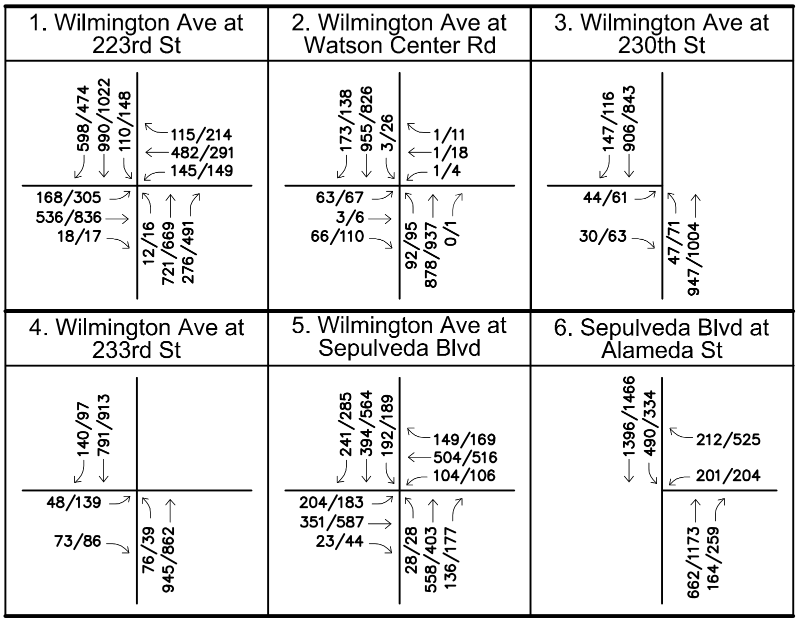
The unsignalized intersection of Wilmington Avenue at 230th Street currently operates at LOS F in both peak hours and would continue to do so with the addition of cumulative and project traffic. The intersection was evaluated to determine if a signal would be warranted.

Traffic signal warrants, based on the California Manual on Uniform Traffic Control Devices (MUTCD), are used to determine whether or not the traffic volumes on a minor street are great enough to warrant the installation of a traffic signal. This signal warrant analysis was conducted using Warrant 3 (Peak Hour Warrant).

The results of the signal warrant analysis indicate that the intersection currently satisfies the Peak Hour Warrant. Thus, while the project alone does not result in the need for a traffic signal, it would be a component of the cumulative levels of traffic that would warrant a new traffic signal. Signal Warrant worksheets are provided *Appendix C*.

The California Manual on Uniform Traffic Control Devices (MUTCD) specifically states that, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." The reference document goes on to state a number of other factors to be taken into account when considering a signal for a specific location, including whether or not a signal would improve the overall safety of the intersection, whether it would benefit or disrupt progressive traffic flow, and consideration of site-specific characteristics such as queuing, signal spacing, and overall delay to the main street through movements.





LEGEND:

ⓧ = Study Intersection

▨ = Project Site

XX/YY = AM/PM Peak Hour Turning Movement Volumes

FIGURE 12
OPENING YEAR 2019 WITH PROJECT PEAK HOUR TRAFFIC VOLUMES

TABLE 6
SUMMARY OF INTERSECTION OPERATION
OPENING YEAR 2019 WITH PROJECT

ICU Methodology

		AM Peak Hour						PM Peak Hour					
		Without Project		With Project		Project	Impact	Without Project		With Project		Project	Impact
Int. #	Intersection	V/C	LOS	V/C	LOS	Impact	Sig?	V/C	LOS	V/C	LOS	Impact	Sig?
1	Wilmington Ave at 223rd St	0.663	B	0.661	B	-0.002	No	0.804	D	0.804	D	0.000	No
2	Wilmington Ave at Watson Center Rd	0.483	A	0.502	A	0.019	No	0.463	A	0.482	A	0.019	No
4	Wilmington Ave at 233rd St	0.390	A	0.406	A	0.016	No	0.511	A	0.527	A	0.016	No
5	Wilmington Ave at Sepulveda Blvd	0.613	B	0.629	B	0.016	No	0.553	A	0.570	A	0.017	No
6	Sepulveda Blvd at Alameda St	0.421	A	0.427	A	0.006	No	0.519	A	0.519	A	0.000	No

HCM Methodology

		AM Peak Hour						PM Peak Hour					
		Without Project		With Project		Project	Impact	Without Project		With Project		Project	Impact
Int. #	Intersection	Delay	LOS	Delay	LOS	Impact	Sig?	Delay	LOS	Delay	LOS	Impact	Sig?
3	Wilmington Ave at 230th St	132.8	F	184.5	F	51.7	No	163.3	F	225.3	F	62.0	No

LOS shown in Bold indicates unacceptable Level of Service.
ICU = Intersection Capacity Utilization
HCM = Highway Capacity Manual
LOS = Level of Service
Intersection operation is expressed in volume-to-capacity (v/c) ratio for the ICU methodology.
Intersection operation is expressed in average seconds of delay (del/veh) ratio for the HCM methodology.

The decision to install a traffic signal should be based on engineering judgment, and not solely upon satisfying a warrant. One future option, if deemed appropriate, would be to implement peak hour left-turn restrictions for the eastbound (stop-controlled) approach. Drivers would have the option to divert up to Watson Center Drive to take advantage of the signal at Wilmington Avenue to make eastbound left-turn movements during the peak hours.

The intersection should be monitored for delay, queuing, and accidents once the project is completed to observe actual peak hour operation. If a signal is warranted within five years after the project completion, as determined by a detailed signal warrant analysis, the project would be required to contribute on a fair-share basis to the cost of installing a traffic signal at this intersection.

SUMMARY OF FINDINGS AND CONCLUSIONS

- The project site is located on a portion of an existing LADWP utility easement, approximately 160 feet wide, located between Avalon Boulevard and Wilmington Avenue in the southern portion of the City of Carson.

- The project will consist of four paved parking areas that will provide temporary parking and storage for trucks and truck trailers. Each lot would provide a single 70-foot two-way drive aisle through the project with truck / trailer parking stalls on either side.

- Project traffic will enter and exit each lot via a driveway at the south end of the lot. There will no project driveway on 223rd Street. Project trucks will use designated truck routes to get to and from the project.

- Trip generation estimates were developed based on day-to-day information for the planned operations for the facility provided by the applicant.

- Six intersections in the project vicinity were evaluated for project traffic impacts.

- All study intersections are currently operating at an acceptable LOS C or better in both peak hours, with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street.

- The project Opening Year is anticipated to be late Year 2019. Ambient traffic growth and traffic from ten cumulative projects were added to existing traffic volumes to develop Opening Year 2019 peak hour forecasts.

- Under Opening Year without Project conditions, all intersections would operate at an acceptable LOS D or better, in both peak hours with the exception of the unsignalized intersection of Wilmington Avenue at 230th Street.

- With the addition of project traffic, the unsignalized intersection would continue to operate at the same deficient Level of Service (LOS F).

- The results of a signal warrant analysis indicate that the intersection of Wilmington Avenue at 230th Street currently warrants signalization based on the peak hour warrant.

- The intersection should be monitored for delay, queuing, and accidents once the project is completed to observe actual peak hour operation, and a decision about signalization or other corrective actions could be made based on those observations.

- The Applicant shall contribute a fair-share cost of installing a traffic signal at the intersection of Wilmington Avenue at 230th Street if a signal is warranted within five years after project occupancy, as determined by a detailed warrant analysis.

APPENDIX A

TRAFFIC DATA COLLECTION WORKSHEETS

ITM Peak Hour Summary

Prepared by:

NDS

National Data & Surveying Services

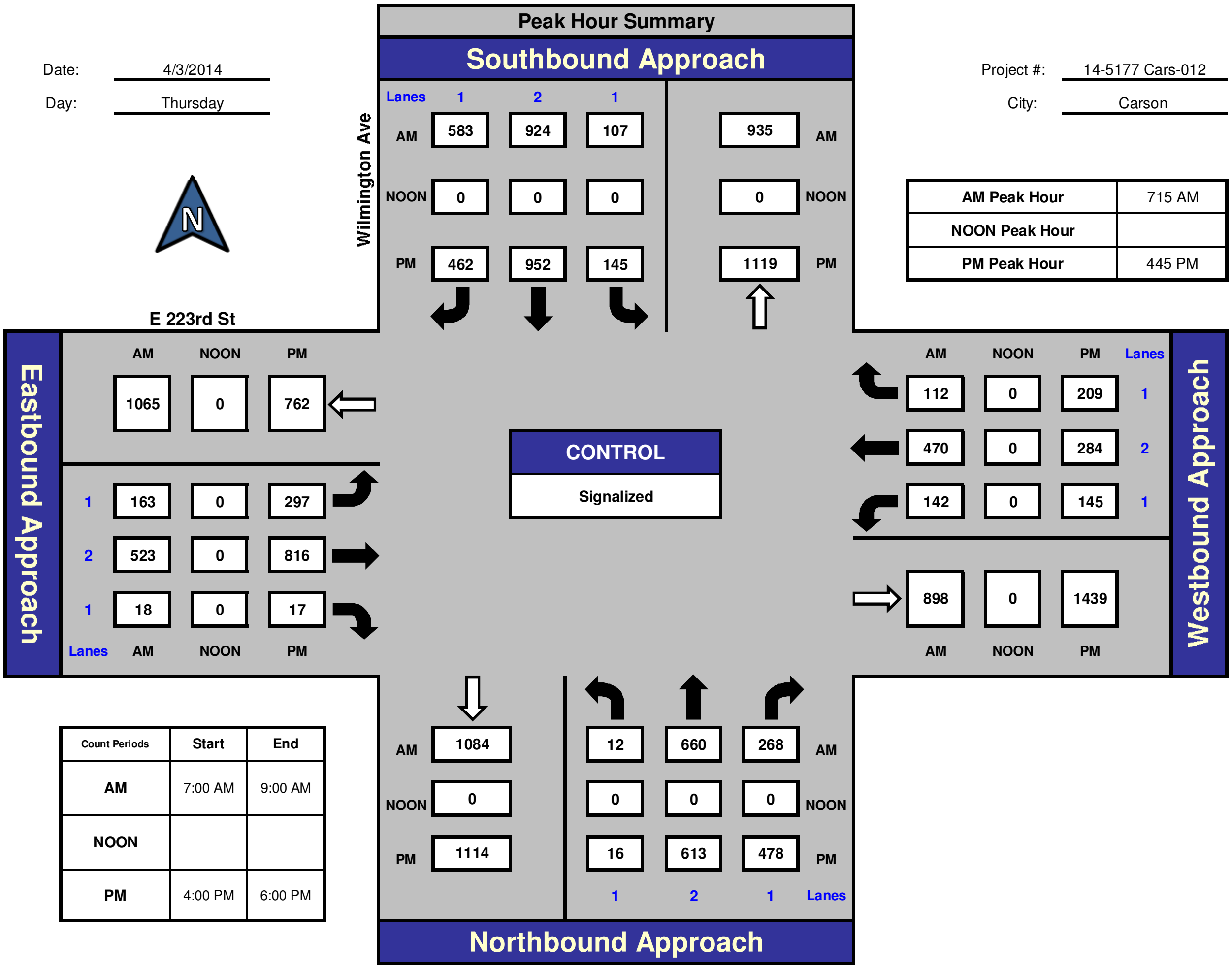
Wilmington Ave and E 223rd St , Carson

Date: 4/3/2014

Day: Thursday

Project #: 14-5177 Cars-012

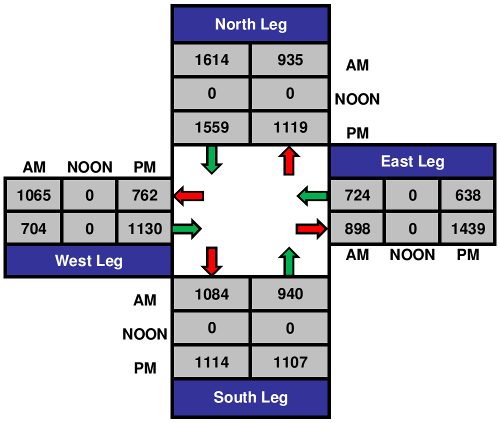
City: Carson



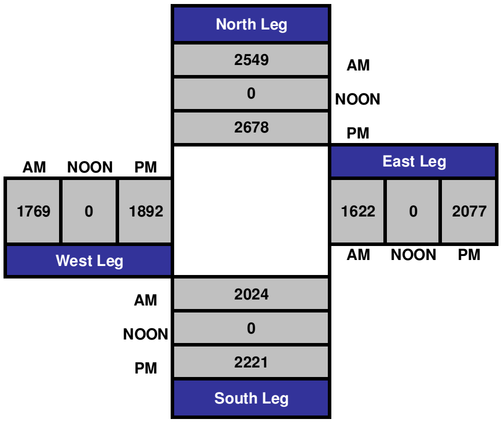
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Wilmington Ave and Watson Center Rd , Carson

Date: 4/19/2016

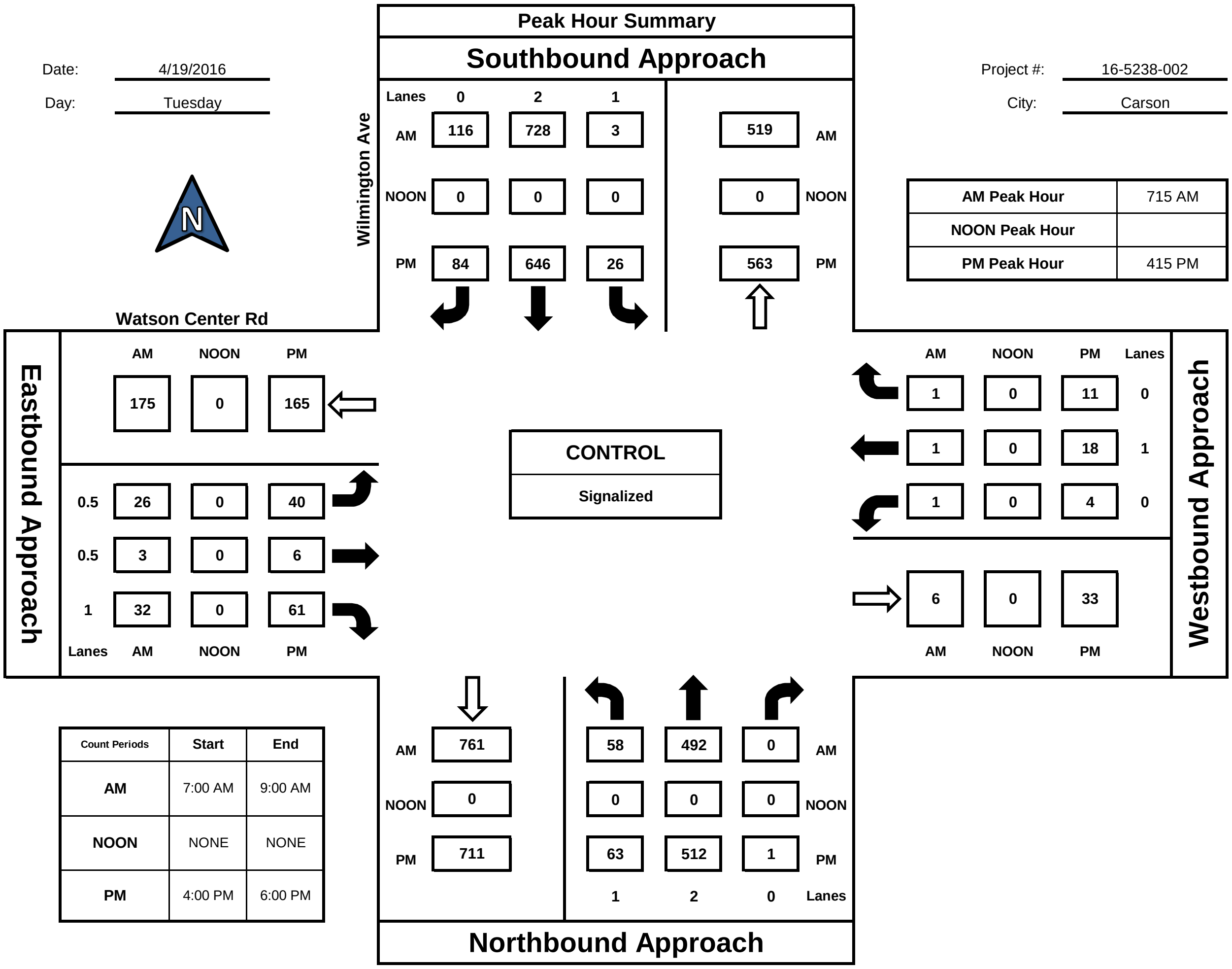
Day: Tuesday

Project #: 16-5238-002

City: Carson

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Peak Hour Summary



Southbound Approach

Lanes	0	2	1	
AM	116	728	3	519
NOON	0	0	0	0
PM	84	646	26	563

Westbound Approach

	AM	NOON	PM	Lanes
	1	0	11	0
	1	0	18	1
	1	0	4	0
	6	0	33	

Eastbound Approach

Lanes	AM	NOON	PM
	175	0	165
0.5	26	0	40
0.5	3	0	6
1	32	0	61

Northbound Approach

AM	761	58	492	0
NOON	0	0	0	0
PM	711	63	512	1
Lanes		1	2	0

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs

North Leg

847	519	AM
0	0	NOON
756	563	PM

West Leg

AM	NOON	PM
175	0	165
61	0	107

East Leg

AM	NOON	PM
3	0	33
6	0	33

South Leg

AM	761	550
NOON	0	0
PM	711	576

Total Volume Per Leg

	North Leg	South Leg	West Leg	East Leg
AM	1366	1311	236	9
NOON	0	0	0	0
PM	1319	1287	272	66

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Wilmington Ave and 230th St , Carson

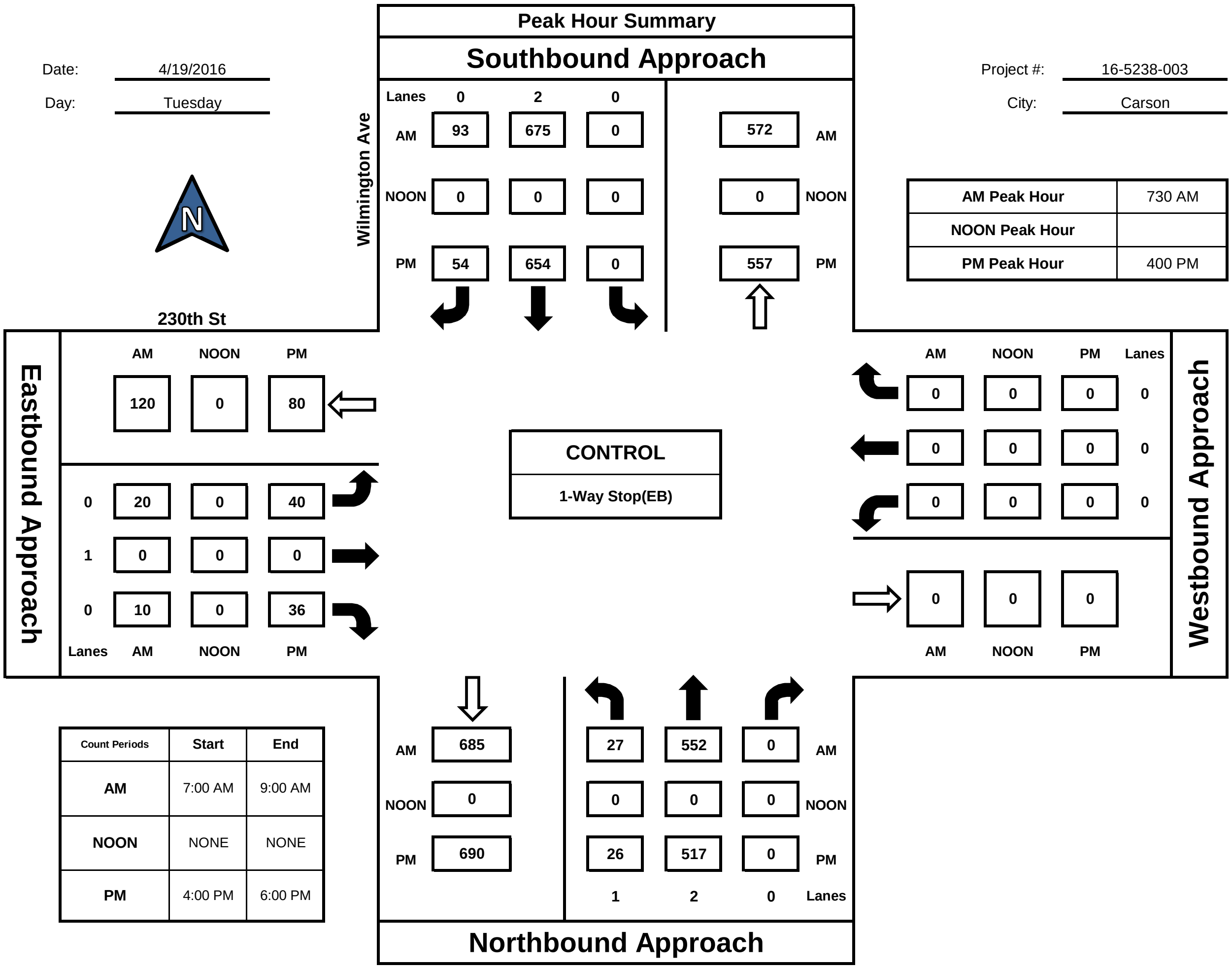
Date: 4/19/2016

Day: Tuesday

Project #: 16-5238-003

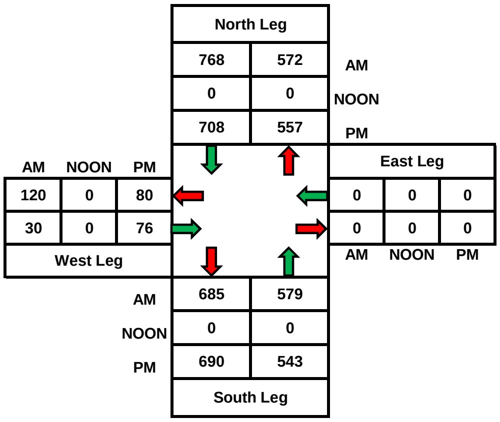
City: Carson

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	400 PM

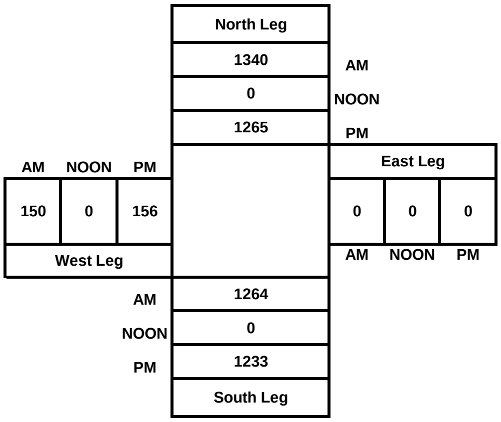


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Wilmington Ave and 233rd St , Carson

Date: 4/19/2016
Day: Tuesday

Project #: 16-5238-004
City: Carson

Peak Hour Summary

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Wilmington Ave

233rd St

Southbound Approach

Lanes	0	2	0		
AM	100	578	0	578	AM
NOON	0	0	0	0	NOON
PM	48	701	0	496	PM

Eastbound Approach

	AM	NOON	PM
	147	0	63

Lanes	AM	NOON	PM
1	24	0	113
0	0	0	0
1	34	0	61

CONTROL

Signalized

Westbound Approach

AM	NOON	PM	Lanes
0	0	0	0
0	0	0	0
0	0	0	0

AM	NOON	PM
0	0	0

Northbound Approach

AM	612	47	554	0	AM
NOON	0	0	0	0	NOON
PM	762	15	383	0	PM
		1	2	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs

North Leg

678	578	AM
0	0	NOON
749	496	PM

West Leg

AM	NOON	PM
147	0	63
58	0	174

East Leg

AM	NOON	PM
0	0	0
0	0	0

South Leg

AM	612	601
NOON	0	0
PM	762	398

Total Volume Per Leg

North Leg

1256	AM
0	NOON
1245	PM

West Leg

AM	NOON	PM
205	0	237

East Leg

AM	NOON	PM
0	0	0

South Leg

AM	1213
NOON	0
PM	1160

ITM Peak Hour Summary

Prepared by:

NDS

National Data & Surveying Services

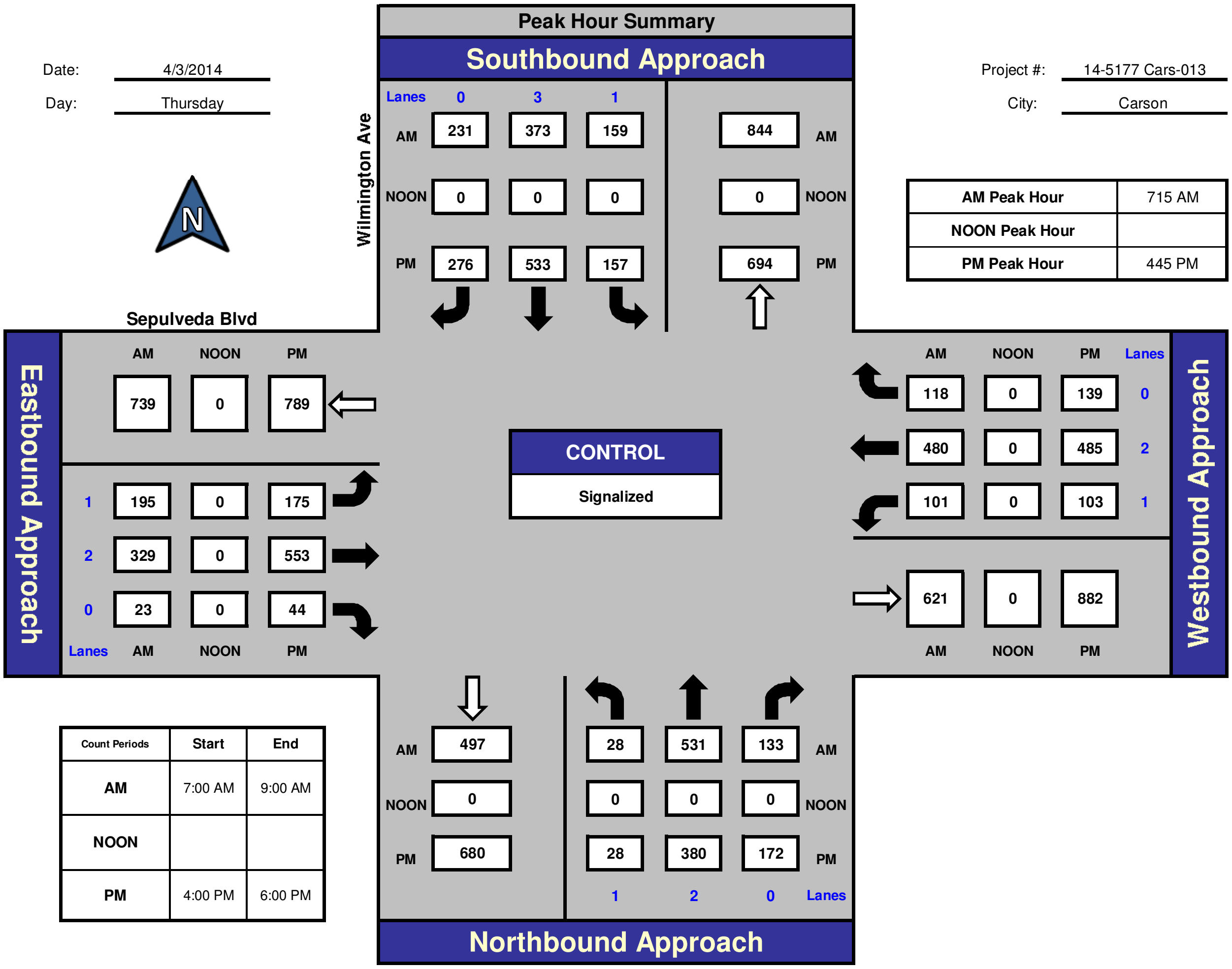
Wilmington Ave and Sepulveda Blvd , Carson

Date: 4/3/2014

Day: Thursday

Project #: 14-5177 Cars-013

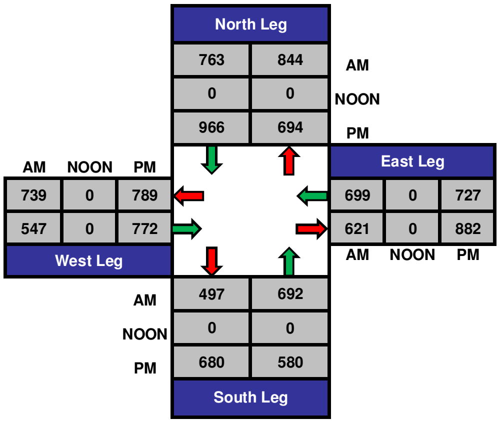
City: Carson



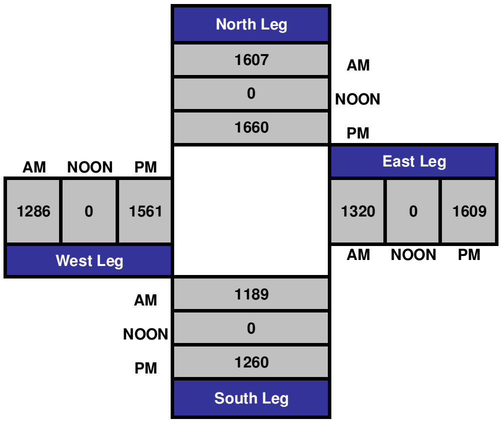
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Alameda St and Sepulveda Blvd(Slip Ramp) , Carson

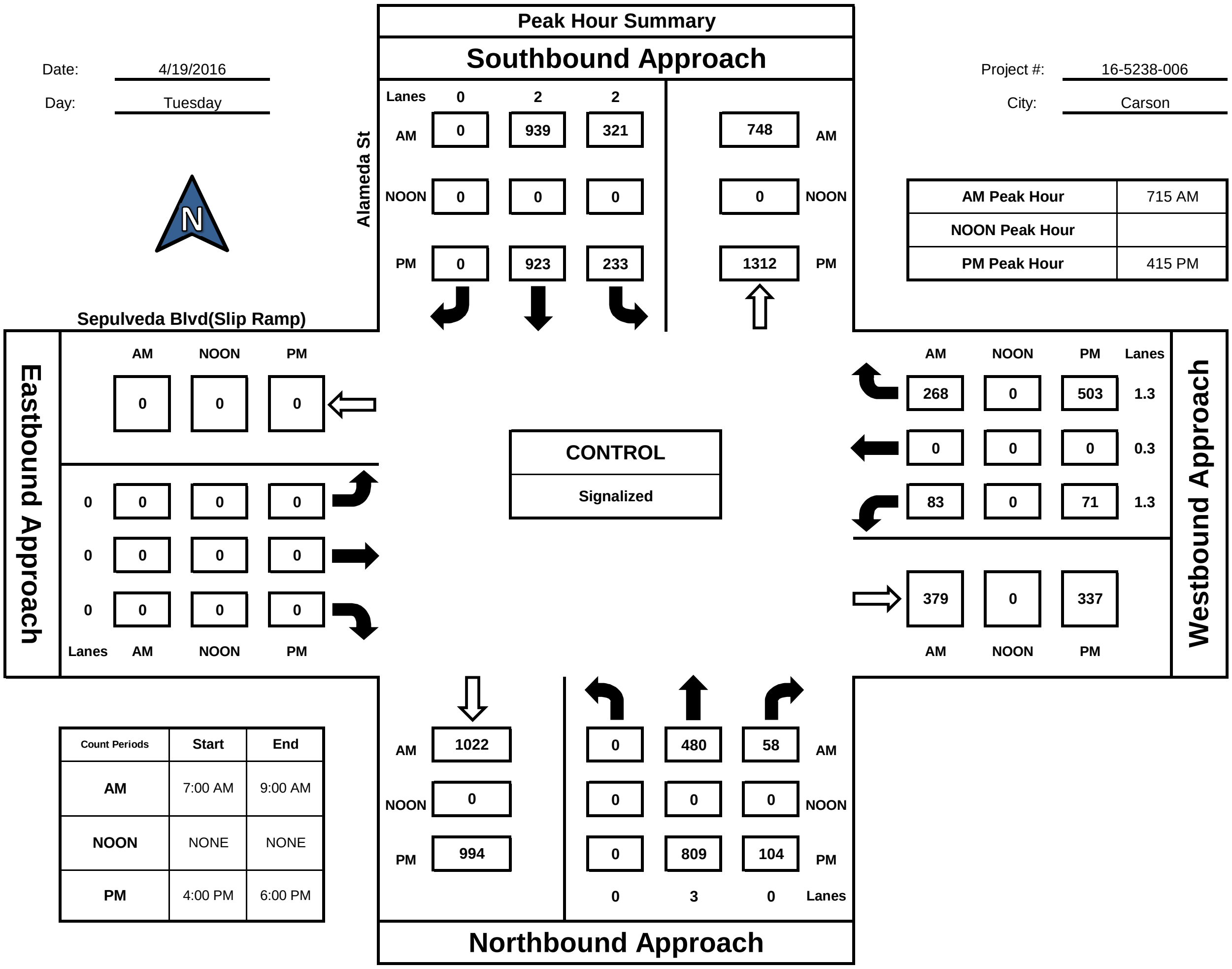
Date: 4/19/2016

Day: Tuesday

Project #: 16-5238-006

City: Carson

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	415 PM



Southbound Approach

Lanes	0	2	2		
AM	0	939	321	748	AM
NOON	0	0	0	0	NOON
PM	0	923	233	1312	PM

Eastbound Approach

	AM	NOON	PM
	0	0	0

Lanes	AM	NOON	PM
0	0	0	0
0	0	0	0
0	0	0	0

CONTROL

Signalized

Westbound Approach

AM	NOON	PM	Lanes
268	0	503	1.3
0	0	0	0.3
83	0	71	1.3

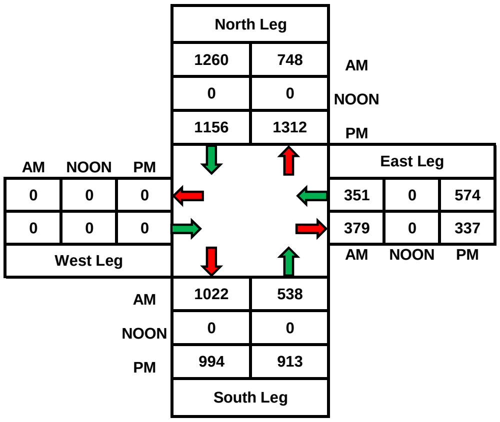
AM	NOON	PM
379	0	337

Northbound Approach

AM	1022	0	480	58	AM
NOON	0	0	0	0	NOON
PM	994	0	809	104	PM
		0	3	0	Lanes

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



North Leg

1260	748	AM
0	0	NOON
1156	1312	PM

East Leg

AM	NOON	PM
351	0	574
379	0	337

West Leg

AM	NOON	PM
0	0	0
0	0	0

South Leg

AM	1022	538
NOON	0	0
PM	994	913

Total Volume Per Leg

North Leg

2008	AM
0	NOON
2468	PM

East Leg

AM	NOON	PM
730	0	911

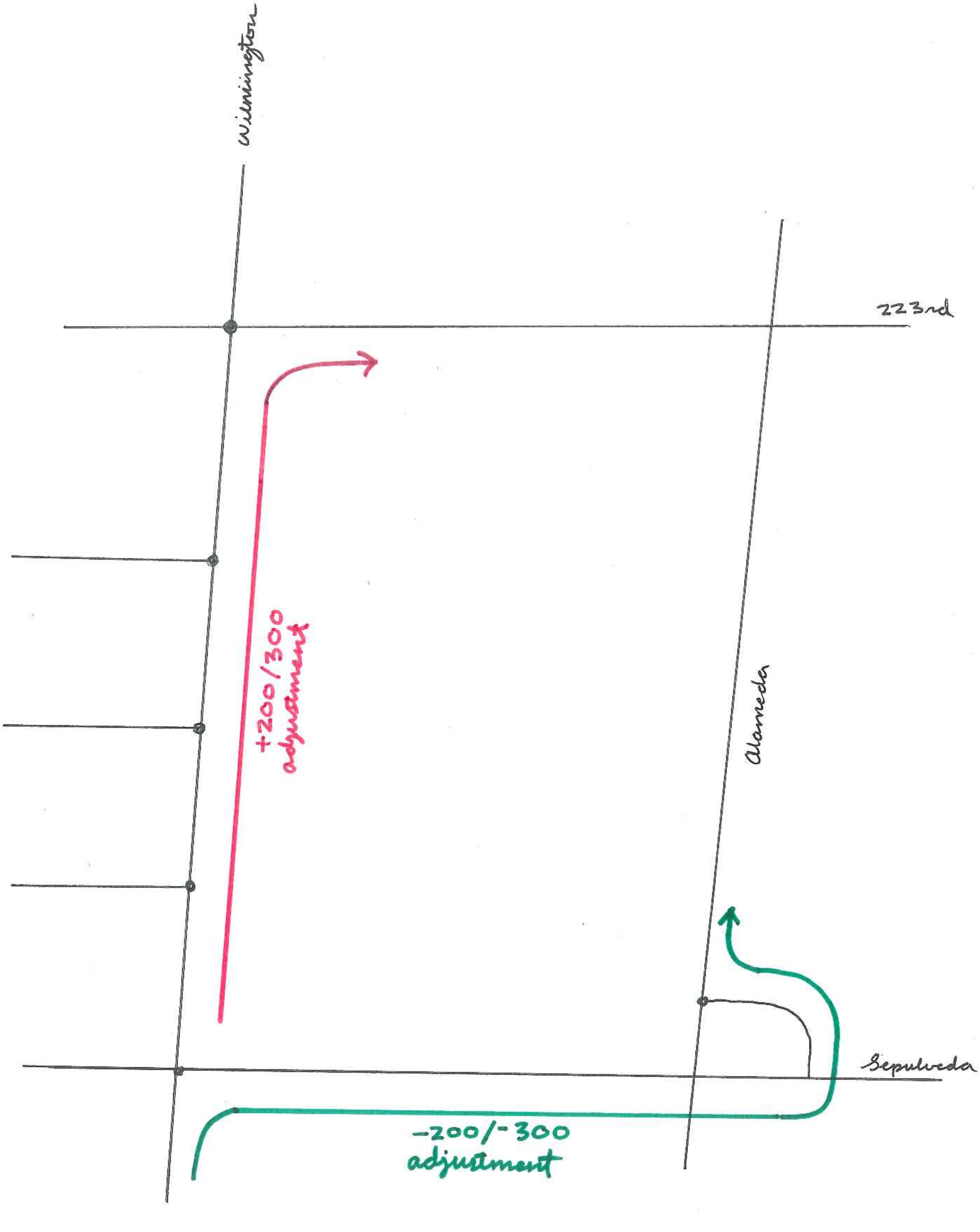
West Leg

AM	NOON	PM
0	0	0

South Leg

AM	1560
NOON	0
PM	1907

Manual Adjustment
Assumptions



APPENDIX B

INTERSECTION ANALYSIS WORKSHEETS

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations AM.vistro Scenario 1 Ex AM

Report File: K:\...\1 EX AM.pdf 6/8/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Right	0.686	-	B
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.476	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.602	117.9	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	NB Thru	0.383	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	NB Thru	0.598	-	A
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.419	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.686

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	12	674	274	109	942	595	167	533	18	144	480	114
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	674	274	109	942	595	167	533	18	144	480	114
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	169	69	27	236	149	42	133	5	36	120	29
Total Analysis Volume [veh/h]	12	674	274	109	942	595	167	533	18	144	480	114
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.21	0.17	0.07	0.29	0.37	0.10	0.17	0.01	0.09	0.15	0.07
Intersection LOS	B											
Intersection V/C	0.686											

Intersection Level Of Service Report

Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.476

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↑↱			↰ ↑ ↑↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Base Volume Input [veh/h]	83	638	0	3	915	164	55	3	57	1	1	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	838	0	3	915	164	55	3	57	1	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	210	0	1	229	41	14	1	14	0	0	0
Total Analysis Volume [veh/h]	83	838	0	3	915	164	55	3	57	1	1	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.26	0.00	0.00	0.34	0.34	0.03	0.04	0.04	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.476											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	117.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.602

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	41	703	864	140	38	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	41	903	864	140	38	24
Peak Hour Factor	0.7200	0.7200	0.9100	0.9100	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	314	237	38	10	6
Total Analysis Volume [veh/h]	57	1254	949	154	41	26
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.60	0.05
d_M, Delay for Movement [s/veh]	11.30	0.00	0.00	0.00	117.92	12.97
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.30	0.00	0.00	0.00	2.58	0.17
95th-Percentile Queue Length [ft/ln]	7.45	0.00	0.00	0.00	64.48	4.30
d_A, Approach Delay [s/veh]	0.49		0.00		77.19	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	2.34					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.383

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	70	701	749	133	42	67
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	70	901	749	133	42	67
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	225	187	33	11	17
Total Analysis Volume [veh/h]	70	901	749	133	42	67
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.28	0.28	0.28	0.03	0.04
Intersection LOS	A					
Intersection V/C	0.383					

Intersection Level Of Service Report

Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.598

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	541	135	163	381	235	199	335	23	103	490	120
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	541	135	163	381	235	199	335	23	103	490	120
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	135	34	41	95	59	50	84	6	26	123	30
Total Analysis Volume [veh/h]	28	541	135	163	381	235	199	335	23	103	490	120
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.17	0.08	0.10	0.12	0.15	0.12	0.10	0.01	0.06	0.15	0.08
Intersection LOS	A											
Intersection V/C	0.598											

Intersection Level Of Service Report

Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.419

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	659	131	488	1389	173	410
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	-200
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	659	131	488	1389	173	210
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	165	33	122	347	43	53
Total Analysis Volume [veh/h]	659	131	488	1389	173	210
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.16	0.00	0.29	0.05	0.08
Intersection LOS	A					
Intersection V/C	0.419					

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations PM.vistro Scenario 1 Ex PM

Report File: K:\...\1 EX PM.pdf 6/8/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	NB Right	0.799	-	C
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.454	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.794	143.1	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	SB Right	0.503	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	EB Thru	0.538	-	A
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.517	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.799

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	16	625	488	147	972	472	303	832	17	147	290	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	625	488	147	972	472	303	832	17	147	290	213
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	156	122	37	243	118	76	208	4	37	73	53
Total Analysis Volume [veh/h]	16	625	488	147	972	472	303	832	17	147	290	213
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.20	0.31	0.09	0.30	0.30	0.19	0.26	0.01	0.09	0.09	0.13
Intersection LOS	C											
Intersection V/C	0.799											

Intersection Level Of Service Report

Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.454

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↑↱			↰ ↑ ↑↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Base Volume Input [veh/h]	86	600	1	26	784	129	59	6	100	4	18	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	86	900	1	26	784	129	59	6	100	4	18	11
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	225	0	7	196	32	15	2	25	1	5	3
Total Analysis Volume [veh/h]	86	900	1	26	784	129	59	6	100	4	18	11
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.28	0.28	0.02	0.29	0.29	0.04	0.04	0.06	0.00	0.01	0.01
Intersection LOS	A											
Intersection V/C	0.454											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	143.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.794

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	65	664	798	109	55	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	964	798	109	55	57
Peak Hour Factor	0.8930	0.8930	0.8630	0.8630	0.9050	0.9050
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	270	231	32	15	16
Total Analysis Volume [veh/h]	73	1080	925	126	61	63
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.01	0.01	0.00	0.79	0.13
d_M, Delay for Movement [s/veh]	11.15	0.00	0.00	0.00	143.06	13.30
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.37	0.00	0.00	0.00	3.90	0.43
95th-Percentile Queue Length [ft/ln]	9.31	0.00	0.00	0.00	97.41	10.81
d_A, Approach Delay [s/veh]	0.71		0.00		77.13	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	4.46					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.503

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	33	522	868	91	132	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	822	868	91	132	80
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	206	217	23	33	20
Total Analysis Volume [veh/h]	33	822	868	91	132	80
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.26	0.30	0.30	0.08	0.05
Intersection LOS	A					
Intersection V/C	0.503					

Intersection Level Of Service Report
Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.538

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	388	176	161	543	282	179	565	44	105	495	141
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	388	176	161	543	282	179	565	44	105	495	141
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	97	44	40	136	71	45	141	11	26	124	35
Total Analysis Volume [veh/h]	28	388	176	161	543	282	179	565	44	105	495	141
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.12	0.11	0.10	0.17	0.18	0.11	0.18	0.03	0.07	0.15	0.09
Intersection LOS	A											
Intersection V/C	0.538											

Intersection Level Of Service Report

Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.517

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	1167	230	332	1459	171	821
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	-300
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1167	230	332	1459	171	521
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	292	58	83	365	43	130
Total Analysis Volume [veh/h]	1167	230	332	1459	171	521
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.29	0.29	0.00	0.30	0.05	0.14
Intersection LOS	A					
Intersection V/C	0.517					

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations PM.vistro
Scenario 2 Ex + Proj PM

Report File: K:\...\3 EX WP PM.pdf
6/8/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Thru	0.799	-	C
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.473	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.959	196.9	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	SB Thru	0.518	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	EB Thru	0.555	-	A
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.517	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.799

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	16	625	488	147	972	472	303	832	17	147	290	213
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	25	0	0	23	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	650	488	147	997	472	303	832	17	147	290	213
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	163	122	37	249	118	76	208	4	37	73	53
Total Analysis Volume [veh/h]	16	650	488	147	997	472	303	832	17	147	290	213
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.20	0.31	0.09	0.31	0.30	0.19	0.26	0.01	0.09	0.09	0.13
Intersection LOS	C											
Intersection V/C	0.799											

Intersection Level Of Service Report
Intersection 2: Wilmington Ave / Watson Center Rd

Control Type: Signalized
Analysis Method: ICU 1
Analysis Period: 15 minutes
Delay (sec / veh): -
Level Of Service: A
Volume to Capacity (v/c): 0.473

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Base Volume Input [veh/h]	86	600	1	26	784	129	59	6	100	4	18	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	17	0	0	15	8	8	0	9	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	917	1	26	801	137	67	6	109	4	18	11
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	229	0	7	200	34	17	2	27	1	5	3
Total Analysis Volume [veh/h]	95	917	1	26	801	137	67	6	109	4	18	11
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.29	0.29	0.02	0.29	0.29	0.04	0.05	0.07	0.00	0.01	0.01
Intersection LOS	A											
Intersection V/C	0.473											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	196.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.959

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	65	664	798	109	55	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	71	984	818	115	61	63
Peak Hour Factor	0.8930	0.8930	0.8630	0.8630	0.9050	0.9050
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	275	237	33	17	17
Total Analysis Volume [veh/h]	80	1102	948	133	67	70
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.01	0.01	0.00	0.96	0.14
d_M, Delay for Movement [s/veh]	11.42	0.00	0.00	0.00	196.89	13.66
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.43	0.00	0.00	0.00	4.84	0.50
95th-Percentile Queue Length [ft/ln]	10.63	0.00	0.00	0.00	120.96	12.51
d_A, Approach Delay [s/veh]	0.77		0.00		103.26	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	6.28					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.518

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	33	522	868	91	132	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	39	842	888	97	138	86
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	211	222	24	35	22
Total Analysis Volume [veh/h]	39	842	888	97	138	86
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.26	0.31	0.31	0.09	0.05
Intersection LOS	A					
Intersection V/C	0.518					

Intersection Level Of Service Report

Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.555

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	388	176	161	543	282	179	565	44	105	495	141
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	26	0	0	0	0	0	0	0	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	388	176	187	543	282	179	565	44	105	495	167
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	97	44	47	136	71	45	141	11	26	124	42
Total Analysis Volume [veh/h]	28	388	176	187	543	282	179	565	44	105	495	167
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.12	0.11	0.12	0.17	0.18	0.11	0.18	0.03	0.07	0.15	0.10
Intersection LOS	A											
Intersection V/C	0.555											

Intersection Level Of Service Report
Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.517

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	1167	230	332	1459	171	821
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	26	0	0	26	0
Diverted Trips [veh/h]	0	0	0	0	0	-300
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1167	256	332	1459	197	521
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	292	64	83	365	49	130
Total Analysis Volume [veh/h]	1167	256	332	1459	197	521
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.30	0.30	0.00	0.30	0.06	0.15
Intersection LOS	A					
Intersection V/C	0.517					

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations AM.vistro Scenario 2 Ex + Proj AM

Report File: K:\...\3 EX WP AM.pdf 6/8/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Right	0.658	-	B
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Right	0.494	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.765	162.2	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	NB Thru	0.399	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	NB Thru	0.615	-	B
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.425	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.658

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	12	674	274	109	942	595	167	533	18	144	480	114
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	25	0	0	23	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	699	274	109	967	595	167	533	18	144	480	114
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	175	69	27	242	149	42	133	5	36	120	29
Total Analysis Volume [veh/h]	12	699	274	109	967	595	167	533	18	144	480	114
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.22	0.17	0.07	0.30	0.37	0.10	0.17	0.01	0.09	0.15	0.07
Intersection LOS	B											
Intersection V/C	0.658											

Intersection Level Of Service Report
Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.494

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↑↱			↰ ↑ ↑↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Base Volume Input [veh/h]	83	638	0	3	915	164	55	3	57	1	1	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	17	0	0	15	8	8	0	9	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	92	855	0	3	932	172	63	3	66	1	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	214	0	1	233	43	16	1	17	0	0	0
Total Analysis Volume [veh/h]	92	855	0	3	932	172	63	3	66	1	1	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.27	0.00	0.00	0.35	0.35	0.04	0.04	0.04	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.494											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	162.2
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.765

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	41	703	864	140	38	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	47	923	884	146	44	30
Peak Hour Factor	0.7200	0.7200	0.9100	0.9100	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	320	243	40	12	8
Total Analysis Volume [veh/h]	65	1282	971	160	47	32
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.01	0.01	0.00	0.76	0.07
d_M, Delay for Movement [s/veh]	11.56	0.00	0.00	0.00	162.20	13.26
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.35	0.00	0.00	0.00	3.39	0.22
95th-Percentile Queue Length [ft/ln]	8.84	0.00	0.00	0.00	84.77	5.49
d_A, Approach Delay [s/veh]	0.56		0.00		101.87	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	3.44					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.399

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	70	701	749	133	42	67
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	76	921	769	139	48	73
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	230	192	35	12	18
Total Analysis Volume [veh/h]	76	921	769	139	48	73
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.29	0.28	0.28	0.03	0.05
Intersection LOS	A					
Intersection V/C	0.399					

Intersection Level Of Service Report
Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.615

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↑ ↱			↰ ↑ ↑ ↱			↰ ↑ ↑ ↱			↰ ↑ ↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	541	135	163	381	235	199	335	23	103	490	120
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	26	0	0	0	0	0	0	0	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	541	135	189	381	235	199	335	23	103	490	146
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	135	34	47	95	59	50	84	6	26	123	37
Total Analysis Volume [veh/h]	28	541	135	189	381	235	199	335	23	103	490	146
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.17	0.08	0.12	0.12	0.15	0.12	0.10	0.01	0.06	0.15	0.09
Intersection LOS	B											
Intersection V/C	0.615											

Intersection Level Of Service Report
Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.425

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	659	131	488	1389	173	410
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	26	0	0	26	0
Diverted Trips [veh/h]	0	0	0	0	0	-200
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	659	157	488	1389	199	210
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	165	39	122	347	50	53
Total Analysis Volume [veh/h]	659	157	488	1389	199	210
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.17	0.00	0.29	0.06	0.09
Intersection LOS	A					
Intersection V/C	0.425					

Truck Operations Project

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Report File: K:\...\5 OY AM.pdf 6/4/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Right	0.663	-	B
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.483	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.645	132.8	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	NB Thru	0.390	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	NB Thru	0.613	-	B
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.421	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.663

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	12	677	275	110	947	598	168	536	18	145	482	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	19	1	0	18	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	696	276	110	965	598	168	536	18	145	482	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	174	69	28	241	150	42	134	5	36	121	29
Total Analysis Volume [veh/h]	12	696	276	110	965	598	168	536	18	145	482	115
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.22	0.17	0.07	0.30	0.37	0.11	0.17	0.01	0.09	0.15	0.07
Intersection LOS	B											
Intersection V/C	0.663											

Intersection Level Of Service Report
Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.483

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↑↱			↰ ↑ ↑↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Base Volume Input [veh/h]	83	641	0	3	920	165	55	3	57	1	1	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	0	0	18	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	861	0	3	938	165	55	3	57	1	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	215	0	1	235	41	14	1	14	0	0	0
Total Analysis Volume [veh/h]	83	861	0	3	938	165	55	3	57	1	1	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.27	0.00	0.00	0.34	0.34	0.03	0.04	0.04	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.483											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	132.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.645

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	41	707	868	141	38	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	18	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	41	927	886	141	38	24
Peak Hour Factor	0.7200	0.7200	0.9100	0.9100	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	322	243	39	10	6
Total Analysis Volume [veh/h]	57	1288	974	155	41	26
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.64	0.06
d_M, Delay for Movement [s/veh]	11.46	0.00	0.00	0.00	132.77	13.14
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.31	0.00	0.00	0.00	2.76	0.18
95th-Percentile Queue Length [ft/ln]	7.63	0.00	0.00	0.00	68.90	4.39
d_A, Approach Delay [s/veh]	0.49		0.00		86.34	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	2.53					
Intersection LOS	F					

Intersection Level Of Service Report

Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.390

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	70	705	753	134	42	67
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	18	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	70	925	771	134	42	67
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	231	193	34	11	17
Total Analysis Volume [veh/h]	70	925	771	134	42	67
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.29	0.28	0.28	0.03	0.04
Intersection LOS	A					
Intersection V/C	0.390					

Intersection Level Of Service Report
Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.613

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	544	136	164	383	236	200	337	23	104	492	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	14	0	2	11	5	4	14	0	0	12	2
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	558	136	166	394	241	204	351	23	104	504	123
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	140	34	42	99	60	51	88	6	26	126	31
Total Analysis Volume [veh/h]	28	558	136	166	394	241	204	351	23	104	504	123
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.17	0.09	0.10	0.12	0.15	0.13	0.11	0.01	0.07	0.16	0.08
Intersection LOS	B											
Intersection V/C	0.613											

Intersection Level Of Service Report

Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.421

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration	↑↑↱		↰↑↑↑		↰↔↱	
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	662	132	490	1396	174	412
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	6	0	0	1	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	-200
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	662	138	490	1396	175	212
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	166	35	123	349	44	53
Total Analysis Volume [veh/h]	662	138	490	1396	175	212
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.17	0.00	0.29	0.05	0.08
Intersection LOS	A					
Intersection V/C	0.421					

Truck Operations Project

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Report File: K:\...\5 OY PM.pdf 6/4/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Thru	0.804	-	D
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.463	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.848	163.3	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	SB Thru	0.511	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	EB Thru	0.553	-	A
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.519	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.804

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	16	628	490	148	977	474	305	836	17	148	291	214
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	16	1	0	20	0	0	0	0	1	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	644	491	148	997	474	305	836	17	149	291	214
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	161	123	37	249	119	76	209	4	37	73	54
Total Analysis Volume [veh/h]	16	644	491	148	997	474	305	836	17	149	291	214
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.20	0.31	0.09	0.31	0.30	0.19	0.26	0.01	0.09	0.09	0.13
Intersection LOS	D											
Intersection V/C	0.804											

Intersection Level Of Service Report
Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.463

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Base Volume Input [veh/h]	86	603	1	26	788	130	59	6	101	4	18	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	0	0	21	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	86	920	1	26	809	130	59	6	101	4	18	11
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	230	0	7	202	33	15	2	25	1	5	3
Total Analysis Volume [veh/h]	86	920	1	26	809	130	59	6	101	4	18	11
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.29	0.29	0.02	0.29	0.29	0.04	0.04	0.06	0.00	0.01	0.01
Intersection LOS	A											
Intersection V/C	0.463											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	163.3
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.848

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	65	667	802	110	55	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	21	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	984	823	110	55	57
Peak Hour Factor	0.8930	0.8930	0.8630	0.8630	0.9050	0.9050
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	275	238	32	15	16
Total Analysis Volume [veh/h]	73	1102	954	127	61	63
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.01	0.01	0.00	0.85	0.13
d_M, Delay for Movement [s/veh]	11.34	0.00	0.00	0.00	163.30	13.51
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.38	0.00	0.00	0.00	4.15	0.44
95th-Percentile Queue Length [ft/ln]	9.59	0.00	0.00	0.00	103.73	11.08
d_A, Approach Delay [s/veh]	0.70		0.00		87.20	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	4.89					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.511

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	33	525	872	91	133	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	21	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	842	893	91	133	80
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	211	223	23	33	20
Total Analysis Volume [veh/h]	33	842	893	91	133	80
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.26	0.31	0.31	0.08	0.05
Intersection LOS	A					
Intersection V/C	0.511					

Intersection Level Of Service Report

Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.553

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	390	177	162	546	283	180	568	44	106	497	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	13	0	1	18	2	3	19	0	0	19	1
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	403	177	163	564	285	183	587	44	106	516	143
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	101	44	41	141	71	46	147	11	27	129	36
Total Analysis Volume [veh/h]	28	403	177	163	564	285	183	587	44	106	516	143
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.13	0.11	0.10	0.18	0.18	0.11	0.18	0.03	0.07	0.16	0.09
Intersection LOS	A											
Intersection V/C	0.553											

Intersection Level Of Service Report
Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	1173	231	334	1466	172	825
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	2	0	0	6	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	-300
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1173	233	334	1466	178	525
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	293	58	84	367	45	131
Total Analysis Volume [veh/h]	1173	233	334	1466	178	525
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.29	0.29	0.00	0.31	0.06	0.15
Intersection LOS	A					
Intersection V/C	0.519					

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations AM.vistro Scenario 4 OY + Cum + Proj AM
Report File: K:\...\7 OY WP AM.pdf 6/4/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Right	0.661	-	B
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.502	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	0.819	184.5	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	NB Thru	0.406	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	NB Thru	0.629	-	B
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.427	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.661

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	12	677	275	110	947	598	168	536	18	145	482	115
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	19	1	0	18	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	25	0	0	23	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	721	276	110	990	598	168	536	18	145	482	115
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	180	69	28	248	150	42	134	5	36	121	29
Total Analysis Volume [veh/h]	12	721	276	110	990	598	168	536	18	145	482	115
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.23	0.17	0.07	0.31	0.37	0.11	0.17	0.01	0.09	0.15	0.07
Intersection LOS	B											
Intersection V/C	0.661											

Intersection Level Of Service Report

Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.502

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue						Watson Center Road		
Base Volume Input [veh/h]	83	641	0	3	920	165	55	3	57	1	1	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	0	0	18	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	17	0	0	15	8	8	0	9	0	0	0
Diverted Trips [veh/h]	0	200	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	92	878	0	3	955	173	63	3	66	1	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	220	0	1	239	43	16	1	17	0	0	0
Total Analysis Volume [veh/h]	92	878	0	3	955	173	63	3	66	1	1	1
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.27	0.00	0.00	0.35	0.35	0.04	0.04	0.04	0.00	0.00	0.00
Intersection LOS	A											
Intersection V/C	0.502											

Intersection Level Of Service Report
Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	184.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.819

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	41	707	868	141	38	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	18	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	47	947	906	147	44	30
Peak Hour Factor	0.7200	0.7200	0.9100	0.9100	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	329	249	40	12	8
Total Analysis Volume [veh/h]	65	1315	996	162	47	32
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.01	0.01	0.00	0.82	0.07
d_M, Delay for Movement [s/veh]	11.74	0.00	0.00	0.00	184.52	13.44
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.36	0.00	0.00	0.00	3.60	0.22
95th-Percentile Queue Length [ft/ln]	9.08	0.00	0.00	0.00	90.00	5.61
d_A, Approach Delay [s/veh]	0.55		0.00		115.22	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	3.77					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.406

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	70	705	753	134	42	67
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	20	18	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	200	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	76	945	791	140	48	73
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	236	198	35	12	18
Total Analysis Volume [veh/h]	76	945	791	140	48	73
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.30	0.29	0.29	0.03	0.05
Intersection LOS	A					
Intersection V/C	0.406					

Intersection Level Of Service Report
Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.629

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	544	136	164	383	236	200	337	23	104	492	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	14	0	2	11	5	4	14	0	0	12	2
Site-Generated Trips [veh/h]	0	0	0	26	0	0	0	0	0	0	0	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	558	136	192	394	241	204	351	23	104	504	149
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	140	34	48	99	60	51	88	6	26	126	37
Total Analysis Volume [veh/h]	28	558	136	192	394	241	204	351	23	104	504	149
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.17	0.09	0.12	0.12	0.15	0.13	0.11	0.01	0.07	0.16	0.09
Intersection LOS	B											
Intersection V/C	0.629											

Intersection Level Of Service Report
Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.427

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	662	132	490	1396	174	412
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	6	0	0	1	0
Site-Generated Trips [veh/h]	0	26	0	0	26	0
Diverted Trips [veh/h]	0	0	0	0	0	-200
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	662	164	490	1396	201	212
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	166	41	123	349	50	53
Total Analysis Volume [veh/h]	662	164	490	1396	201	212
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.17	0.00	0.29	0.06	0.09
Intersection LOS	A					
Intersection V/C	0.427					

Truck Operations Project

Vistro File: K:\...\Carson Truck Operations PM.vistro Scenario 4 OY + Cum + Proj PM

Report File: K:\...\7 OY WP PM.pdf 6/4/2018

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Wilmington Ave / 223rd St	Signalized	ICU 1	SB Thru	0.804	-	D
2	Wilmington Ave / Watson Center Rd	Signalized	ICU 1	SB Thru	0.482	-	A
3	Wilmington Ave / 230th St	Two-way stop	HCM 2010	EB Left	1.025	225.3	F
4	Wilmington Ave / 233rd St	Signalized	ICU 1	SB Thru	0.527	-	A
5	Wilmington Ave / Sepulveda Blvd	Signalized	ICU 1	EB Thru	0.570	-	A
6	Sepulveda Blvd / Alameda St	Signalized	ICU 1	SB Thru	0.519	-	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: Wilmington Ave / 223rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.804

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			223rd Street			223rd Street		
Base Volume Input [veh/h]	16	628	490	148	977	474	305	836	17	148	291	214
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	16	1	0	20	0	0	0	0	1	0	0
Site-Generated Trips [veh/h]	0	25	0	0	23	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	669	491	148	1022	474	305	836	17	149	291	214
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	167	123	37	256	119	76	209	4	37	73	54
Total Analysis Volume [veh/h]	16	669	491	148	1022	474	305	836	17	149	291	214
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.21	0.31	0.09	0.32	0.30	0.19	0.26	0.01	0.09	0.09	0.13
Intersection LOS	D											
Intersection V/C	0.804											

Intersection Level Of Service Report
Intersection 2: Wilmington Ave / Watson Center Rd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.482

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑ ↱			↰↑ ↱			↰↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Watson Center Road			Watson Center Road		
Base Volume Input [veh/h]	86	603	1	26	788	130	59	6	101	4	18	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	0	0	21	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	17	0	0	15	8	8	0	9	0	0	0
Diverted Trips [veh/h]	0	300	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	2	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	937	1	26	826	138	67	6	110	4	18	11
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	234	0	7	207	35	17	2	28	1	5	3
Total Analysis Volume [veh/h]	95	937	1	26	826	138	67	6	110	4	18	11
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.29	0.29	0.02	0.30	0.30	0.04	0.05	0.07	0.00	0.01	0.01
Intersection LOS	A											
Intersection V/C	0.482											

Intersection Level Of Service Report

Intersection 3: Wilmington Ave / 230th St

Control Type:	Two-way stop	Delay (sec / veh):	225.3
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.025

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑↑		↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		230th Street	
Base Volume Input [veh/h]	65	667	802	110	55	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	21	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	71	1004	843	116	61	63
Peak Hour Factor	0.8930	0.8930	0.8630	0.8630	0.9050	0.9050
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	281	244	34	17	17
Total Analysis Volume [veh/h]	80	1124	977	134	67	70
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.13	0.01	0.01	0.00	1.03	0.15
d_M, Delay for Movement [s/veh]	11.61	0.00	0.00	0.00	225.28	13.89
Movement LOS	B	A	A	A	F	B
95th-Percentile Queue Length [veh/ln]	0.44	0.00	0.00	0.00	5.12	0.51
95th-Percentile Queue Length [ft/ln]	10.95	0.00	0.00	0.00	127.91	12.84
d_A, Approach Delay [s/veh]	0.77		0.00		117.27	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	6.93					
Intersection LOS	F					

Intersection Level Of Service Report

Intersection 4: Wilmington Ave / 233rd St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.527

Intersection Setup

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↰↑ ↑		↑ ↑↱		↰↱	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Wilmington Avenue		Wilmington Avenue		233rd Street	
Base Volume Input [veh/h]	33	525	872	91	133	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	17	21	0	0	0
Site-Generated Trips [veh/h]	6	20	18	6	6	6
Diverted Trips [veh/h]	0	300	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	2	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	39	862	913	97	139	86
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	216	228	24	35	22
Total Analysis Volume [veh/h]	39	862	913	97	139	86
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.27	0.32	0.32	0.09	0.05
Intersection LOS	A					
Intersection V/C	0.527					

Intersection Level Of Service Report
Intersection 5: Wilmington Ave / Sepulveda Blvd

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.570

Intersection Setup

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↑↱			↰↑↑↱			↰↑↑↱			↰↑↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Wilmington Avenue			Wilmington Avenue			Sepulveda Blvd			Sepulveda Blvd		
Base Volume Input [veh/h]	28	390	177	162	546	283	180	568	44	106	497	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	13	0	1	18	2	3	19	0	0	19	1
Site-Generated Trips [veh/h]	0	0	0	26	0	0	0	0	0	0	0	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	403	177	189	564	285	183	587	44	106	516	169
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	101	44	47	141	71	46	147	11	27	129	42
Total Analysis Volume [veh/h]	28	403	177	189	564	285	183	587	44	106	516	169
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.13	0.11	0.12	0.18	0.18	0.11	0.18	0.03	0.07	0.16	0.11
Intersection LOS	A											
Intersection V/C	0.570											

Intersection Level Of Service Report

Intersection 6: Sepulveda Blvd / Alameda St

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name	Alameda Street		Alameda Street			
Approach	Northbound		Southbound		Westbound	
Lane Configuration	↑↑↱		↰↑↑↑		↰↔↱	
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Alameda Street		Alameda Street			
Base Volume Input [veh/h]	1173	231	334	1466	172	825
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	2	0	0	6	0
Site-Generated Trips [veh/h]	0	26	0	0	26	0
Diverted Trips [veh/h]	0	0	0	0	0	-300
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1173	259	334	1466	204	525
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	293	65	84	367	51	131
Total Analysis Volume [veh/h]	1173	259	334	1466	204	525
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Split	Split
Signal group	2	0	0	6	7	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.30	0.30	0.00	0.31	0.06	0.15
Intersection LOS	A					
Intersection V/C	0.519					

APPENDIX C

SIGNAL WARRANT WORKSHEETS

TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS (2000 MUTCD)

MAJOR STREET: **Wilmington Ave** NB SB # OF APPROACH LANES: **2**

MINOR STREET: **230th St** EB WB # OF APPROACH LANES: **1**

CITY, STATE: **Carson, CA**

COMMENTS: Existing
0

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): **N**
85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N) **Y**

			MAJOR ST TWO-WAY TRAFFIC	MINOR ST TRAFFIC HEAVY LEG	WARRANT 1 - Condition A, Part 1			WARRANT 1 - Condition B, Part 1			WARRANT 1 - Condition A, Part 2			WARRANT 1 - Condition B, Part 2			WARRANT 2 Four-Hour	WARRANT 3 Peak Hour
					MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET		
THRESHOLD VALUES					**420**	**105**		**630**	**53**		**336**	**84**		**504**	**42**			
06:00 AM	TO	07:00 AM	0	0														
07:00 AM	TO	08:00 AM	1,948	62	Y			Y	Y	**Y**	Y			Y	Y	**Y**	**Y**	
08:00 AM	TO	09:00 AM	0	0														
09:00 AM	TO	10:00 AM	0	0														
10:00 AM	TO	11:00 AM	0	0														
11:00 AM	TO	12:00 PM	0	0														
12:00 PM	TO	01:00 PM	0	0														
01:00 PM	TO	02:00 PM	0	0														
02:00 PM	TO	03:00 PM	0	0														
03:00 PM	TO	04:00 PM	0	0														
04:00 PM	TO	05:00 PM	1,936	112	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	**Y**	**Y**
05:00 PM	TO	06:00 PM	0	0														
06:00 PM	TO	07:00 PM	0	0														
07:00 PM	TO	08:00 PM	0	0														
08:00 PM	TO	09:00 PM	0	0														
09:00 PM	TO	10:00 PM	0	0														
			3,884	174	2	1	**1**	2	2	**2**	2	1	**1**	2	2	**2**	**2**	**1**
					8 HOURS NEEDED			8 HOURS NEEDED			8 HOURS NEEDED for both Condition A & B						4 HRS NEEDED	1 HR NEEDED
					NOT SATISFIED			**NOT SATISFIED**			**NOT SATISFIED**						**NOT SATISFIED**	**SATISFIED**

06/08/18
Kimley-Horn and Associates

TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS (2000 MUTCD)

MAJOR STREET: **Wilmington Ave** NB SB # OF APPROACH LANES: **2**

MINOR STREET: **230th St** EB WB # OF APPROACH LANES: **1**

CITY, STATE: **Carson, CA**

COMMENTS: Opening Year 2019
0

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): **N**
85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N) **Y**

			MAJOR ST TWO-WAY TRAFFIC	MINOR ST TRAFFIC HEAVY LEG	WARRANT 1 - Condition A, Part 1			WARRANT 1 - Condition B, Part 1			WARRANT 1 - Condition A, Part 2			WARRANT 1 - Condition B, Part 2			WARRANT 2 Four-Hour	WARRANT 3 Peak Hour
					MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET		
THRESHOLD VALUES					**420**	**105**		**630**	**53**		**336**	**84**		**504**	**42**			
06:00 AM	TO	07:00 AM	0	0														
07:00 AM	TO	08:00 AM	1,995	62	Y			Y	Y	**Y**	Y			Y	Y	**Y**	**Y**	
08:00 AM	TO	09:00 AM	0	0														
09:00 AM	TO	10:00 AM	0	0														
10:00 AM	TO	11:00 AM	0	0														
11:00 AM	TO	12:00 PM	0	0														
12:00 PM	TO	01:00 PM	0	0														
01:00 PM	TO	02:00 PM	0	0														
02:00 PM	TO	03:00 PM	0	0														
03:00 PM	TO	04:00 PM	0	0														
04:00 PM	TO	05:00 PM	0	0														
05:00 PM	TO	06:00 PM	1,982	112	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	**Y**	**Y**
06:00 PM	TO	07:00 PM	0	0														
07:00 PM	TO	08:00 PM	0	0														
08:00 PM	TO	09:00 PM	0	0														
09:00 PM	TO	10:00 PM	0	0														
			3,977	174	2	1	**1**	2	2	**2**	2	1	**1**	2	2	**2**	**2**	**1**
					8 HOURS NEEDED			8 HOURS NEEDED			8 HOURS NEEDED for both Condition A & B						4 HRS NEEDED	1 HR NEEDED
					NOT SATISFIED			**NOT SATISFIED**			**NOT SATISFIED**						**NOT SATISFIED**	**SATISFIED**

06/08/18
Kimley-Horn and Associates

TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS (2000 MUTCD)

MAJOR STREET: **Wilmington Ave** NB SB # OF APPROACH LANES: **2**

MINOR STREET: **230th St** EB WB # OF APPROACH LANES: **1**

CITY, STATE: **Carson, CA**

COMMENTS: Opening Year 2019 With Project
0

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N): **N**
85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N) **Y**

			MAJOR ST TWO-WAY TRAFFIC	MINOR ST TRAFFIC HEAVY LEG	WARRANT 1 - Condition A, Part 1			WARRANT 1 - Condition B, Part 1			WARRANT 1 - Condition A, Part 2			WARRANT 1 - Condition B, Part 2			WARRANT 2 Four-Hour	WARRANT 3 Peak Hour
					MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET		
THRESHOLD VALUES					**420**	**105**		**630**	**53**		**336**	**84**		**504**	**42**			
06:00 AM	TO	07:00 AM	0	0														
07:00 AM	TO	08:00 AM	2,047	74	Y			Y	Y	**Y**	Y			Y	Y	**Y**	**Y**	
08:00 AM	TO	09:00 AM	0	0														
09:00 AM	TO	10:00 AM	0	0														
10:00 AM	TO	11:00 AM	0	0														
11:00 AM	TO	12:00 PM	0	0														
12:00 PM	TO	01:00 PM	0	0														
01:00 PM	TO	02:00 PM	0	0														
02:00 PM	TO	03:00 PM	0	0														
03:00 PM	TO	04:00 PM	0	0														
04:00 PM	TO	05:00 PM	0	0														
05:00 PM	TO	06:00 PM	2,034	124	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	Y	Y	**Y**	**Y**	**Y**
06:00 PM	TO	07:00 PM	0	0														
07:00 PM	TO	08:00 PM	0	0														
08:00 PM	TO	09:00 PM	0	0														
09:00 PM	TO	10:00 PM	0	0														
			4,081	198	2	1	**1**	2	2	**2**	2	1	**1**	2	2	**2**	**2**	**1**
					8 HOURS NEEDED			8 HOURS NEEDED			8 HOURS NEEDED for both Condition A & B						4 HRS NEEDED	1 HR NEEDED
					NOT SATISFIED			**NOT SATISFIED**			**NOT SATISFIED**						**NOT SATISFIED**	**SATISFIED**

06/08/18
Kimley-Horn and Associates

APPENDIX E

NATIVE AMERICAN TRIBAL CORRESPONDENCE

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

June 28, 2018

Leila Carver
City of Carson

Sent by E-mail: lcarver@carson.ca.us

RE: Proposed Linear Properties Truck Yard Project (within DWP Utility Corridor Easement), City of Carson; Los Angeles County, California

Dear Ms. Carver:

Attached is a consultation list of tribes with traditional lands or cultural places located within the boundaries of the above referenced project. The NAHC recommends contacting all the tribes on the list as a “best practice” for consultation.

Government Code §65352.3 requires local governments to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of avoiding, protecting, and/or mitigating impacts to cultural places in creating or amending general plans, including specific plans, and open space.

In accordance with Public Resources Code Section 21080.3.1(d), formal notification must include a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. As of July 1, 2015, Public Resources Code Sections 21080.3.1 and 21080.3.2 require public agencies to consult with California Native American tribes identified by the NAHC for the purpose mitigating impacts to tribal cultural resources:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section. (Public Resources Code Section 21080.3.1(d))

The law **does not preclude** agencies from initiating consultation with the tribes that are culturally and traditionally affiliated with their jurisdictions. The NAHC believes that in fact that this is the best practice to ensure that tribes are consulted commensurate with the intent of the law.

The NAHC requests that lead agencies include in their notifications information regarding any cultural resources assessment that has been completed on a potential “area of project affect” (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

    - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;

- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- If the probability is low, moderate, or high that cultural resources are located in the APE.
- Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measurers.

     All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. The request form can be found at http://nahc.ca.gov/wp-content/uploads/2015/04/Sacred-Lands-File-NA-Contact-Form.pdf.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the case that they do, having the information beforehand well help to facilitate the consultation process. It will also provide documentation of your compliance with state statutes in preparing your environmental documents.

Lead agencies or agencies potentially undertaking a project are encouraged to send more than one written notice to tribes that are traditionally and culturally affiliated to a potential APE during the 30-day notification period to ensure that the information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst
(916) 373-3714

Native American Heritage Commission
Tribal Consultation List
Los Angeles County
6/28/2018

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrieleno

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Gabrielino

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Sections 65352.3, 65362.4 et seq. and Public Resources Code Sections 21080.3.1 for the proposed Linear Properties Truck Yard Project, Los Angeles County.

June 29, 2018

ANTHONY MORALES, CHAIRPERSON
GABRIELENO/TONGVA SAN GABRIEL BAND OF MISSION INDIANS – KIZH NATION
P.O. BOX 693
SAN GABRIEL, CA 91778

Subject: ***Notification of the Proposed Carson Trucking Project, Pursuant to Assembly Bill AB 52***

Dear Chairperson Morales,

Pursuant to California Assembly Bill (AB) 52, the City of Carson (City) is providing you with notification of the Carson Trucking Project (proposed project), located in the City of Carson, Los Angeles County, California.

Project Location and Description

The approximately 16-acre site is located within the southern portion of the City of Carson, south of Interstate 405 (I-405), and east of Interstate 110 (I-110) in Los Angeles County. Regionally, the City and project site are bordered by the Cities of Long Beach, Compton, Torrance, and Los Angeles. Additionally, unincorporated Los Angeles County borders the northwest of Carson. The project site is in an industrial area and is generally bordered by existing warehouse, light industrial, and office uses.

Figure 1, Regional and Local Vicinity Map, and Figure 2, Aerial View depicts the project site in a regional and local context, respectively. The proposed project would be located between East 223rd Street to the north and East 236th Street to the south on a portion of the City of Los Angeles Department of Water and Power (LADWP) utility easement. The alignment of the utility easement generally runs in a north-south direction from I-405 to Lomita Boulevard. The eastern and western boundaries of the project site extend to the limits of the easement.

The project site is divided by existing east-to-west cross streets which split the site into four separate blocks. The four blocks are referred to in the Project Initial Study as Lot A, Lot B, Lot C, and Lot D, starting from the north end of the project site.

- Lot A: Between East 223rd Street and East Watson Center Road (APN 7315-004-271; Easement #7315-004-821)

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- Lot D: Between East 233rd Street and East 236th Street (APN 7315-036-271 and -272)

As proposed, the project would allow for the construction and operation of a trailer truck and container storage parking facility which would include four paved parking lot areas to provide temporary parking and storage for trucks and truck-mounted containers.

If you have any comments or concerns regarding potential impacts to tribal cultural resources (as defined in Public Resources Code § 21074) in relation to the proposed project, please provide a written request for consultation to the address above or via email to lcarver@carson.ca.us within 30 days of receipt of this notice and include the name of a designated lead contact person.

Sincerely,

Leila Carver, PTP, Planner

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map.

June 29, 2018

SANDONNE GOAD, CHAIRPERSON
GABRIELINO/TONGVA NATION
106 ½ JUDGE JOHN AISO STREET #231
LOS ANGELES, CA 90012

Subject: ***Notification of the Proposed Carson Trucking Project, Pursuant to Assembly Bill AB 52***

Dear Chairperson Goad,

Pursuant to California Assembly Bill (AB) 52, the City of Carson (City) is providing you with notification of the Truck Yard Project (proposed project), located in the City of Carson, Los Angeles County, California.

Project Location and Description

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Sincerely,

Lela M. Carver

Leila Carver, PTP, Planner

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map.

INCORPORATED FEB. 20, 1968

June 29, 2018

ROBERT DORAME, CHAIRPERSON
GABRIELINO TONGVA INDIANS OF CALIFORNIA TRIBAL COUNCIL
P.O. BOX 490
BELLFLOWER, CA 90707

Subject: ***Notification of the Proposed Carson Trucking Project, Pursuant to Assembly Bill AB 52***

Dear Chairperson Dorame,

Pursuant to California Assembly Bill (AB) 52, the City of Carson (City) is providing you with notification of the Truck Yard Project (proposed project), located in the City of Carson, Los Angeles County, California.

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Sincerely,

Leila Carver, PTP, Planner

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map.

June 29, 2018

ANDREW SALAS, CHAIRPERSON
GABRIELANO BAND OF MISSION INDIANS – KIZH NATION
P.O. BOX 393
COVINA, CA 91723

Subject: ***Notification of the Proposed Carson Trucking Project, Pursuant to Assembly Bill AB 52***

Dear Chairperson Salas,

Pursuant to California Assembly Bill (AB) 52, the City of Carson (City) is providing you with notification of the Carson Trucking Project (proposed project), located in the City of Carson, Los Angeles County, California.

Project Location and Description

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Sincerely,

Carver

Leila Carver, PTP, Planner

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map.

June 29, 2018

CHARLES ALVAREZ, CHAIRPERSON
GABRIELINO-TONGVA TRIBE
23454 VANOWEN STREET
WEST HILLS, CA 91307

Subject: Notification of the Proposed Carson Trucking Project, Pursuant to Assembly Bill AB 52

Dear Chairperson Alvarez,

Pursuant to California Assembly Bill (AB) 52, the City of Carson (City) is providing you with notification of the Truck Yard Project (proposed project), located in the City of Carson, Los Angeles County, California.

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Sincerely,

Lela M. Carver

Leila Carver, PTP, Planner

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map.

June 29, 2018

CHARLES ALVAREZ, CHAIRPERSON
GABRIELINO-TONGVA TRIBE
23454 VANOWEN STREET
WEST HILLS, CA 91307

Subject: Notification of the Proposed Carson Trucking Project, Pursuant to Senate Bill 18

Dear Chairperson Alvarez,

Pursuant to Senate Bill (SB) 18, the City of Carson (City) is providing you with notification of the Birch Specific Plan Project (proposed project), located in the City of Carson, Los Angeles County, California.

Because the proposed project includes a General Plan Amendment, the City is providing notification to Native American tribes/groups identified on the Native American Heritage Commission's (NAHC) official SB 18 California Tribal Consultation List. The NAHC identified your organization on this contact list and the City is providing this letter as notification of the opportunity to consult on the proposed project.

Project Location and Description

The approximately 16-acre site is located within the southern portion of the City of Carson, south of Interstate 405 (I-405), and east of Interstate 110 (I-110) in Los Angeles County. Regionally, the City and project site are bordered by the Cities of Long Beach, Compton, Torrance, and Los Angeles. Additionally, unincorporated Los Angeles County borders the northwest of Carson. The project site is in an industrial area and is generally bordered by existing warehouse, light industrial, and office uses.

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The City of Carson is requesting your response within 90 days from receipt of this letter indicating whether or not your organization would like to consult on the proposed project. If so, please provide a written request for consultation to the address above or via email to lcarver@carson.ca.us.

Respectfully,

Sincerely,
Lela M. Carver

Leila Carver, PTP

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map

June 29, 2018

ANTHONY MORALES, CHAIRPERSON
GABRIELENO/TONGVA SAN GABRIEL BAND OF MISSION INDIANS – KIZH NATION
P.O. BOX 693
SAN GABRIEL, CA 91778

Subject: Notification of the Proposed Carson Trucking Project, Pursuant to Senate Bill 18

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Lela M. Carver

Leila Carver, PTP

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map

June 29, 2018

ROBERT DORAME, CHAIRPERSON
GABRIELINO TONGVA INDIANS OF CALIFORNIA TRIBAL COUNCIL
P.O. BOX 490
BELLFLOWER, CA 90707

Subject:* *Notification of the Proposed Carson Trucking Project, Pursuant to Senate Bill 18

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Leila M. Carver

Leila Carver, PTP

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map

INCORPORATED FEB. 20, 1968

June 29, 2018

CHARLES ALVAREZ, CHAIRPERSON
GABRIELINO-TONGVA TRIBE
23454 VANOWEN STREET
WEST HILLS, CA 91307

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easement generally runs in a north-south direction from I-405 to Lomita Boulevard. The eastern and western boundaries of the project site extend to the limits of the easement.

The project site is divided by existing east-to-west cross streets which split the site into four separate blocks. The four blocks are referred to in the Project Initial Study as Lot A, Lot B, Lot C, and Lot D, starting from the north end of the project site.

- Lot A: Between East 223rd Street and East Watson Center Road (APN 7315-004-271; Easement #7315-004-821)
- Lot B: Between East Watson Center Road and East 230th Street (APN 7315-033-273; Easement #7315-033-802)
- Lot C: Between East 230th Street and East 233rd Street (APN 7315-034-271; Easement #7315-034-027
- Lot D: Between East 233rd Street and East 236th Street (APN 7315-036-271 and -272)

As proposed, the project would allow for the construction and operation of a trailer truck and container storage parking facility which would include four paved parking lot areas to provide temporary parking and storage for trucks and truck-mounted containers.

The City of Carson is requesting your response within 90 days from receipt of this letter indicating whether or not your organization would like to consult on the proposed project. If so, please provide a written request for consultation to the address above or via email to lcarver@carson.ca.us.

Respectfully,

Sincerely,
Lela M. Carver

Leila Carver, PTP

c: Ethan Edwards, AICP, Planner

Enclosure:
Figure 1. Project Location Map

June 29, 2018

ANTHONY MORALES, CHAIRPERSON
GABRIELENO/TONGVA SAN GABRIEL BAND OF MISSION INDIANS – KIZH NATION
P.O. BOX 693
SAN GABRIEL, CA 91778

Subject: Notification of the Proposed Carson Trucking Project, Pursuant to Senate Bill 18

Dear Chairperson Morales,

Pursuant to Senate Bill (SB) 18, the City of Carson (City) is providing you with notification of the Birch Specific Plan Project (proposed project), located in the City of Carson, Los Angeles County, California.

Because the proposed project includes a General Plan Amendment, the City is providing notification to Native American tribes/groups identified on the Native American Heritage Commission's (NAHC) official SB 18 California Tribal Consultation List. The NAHC identified your organization on this contact list and the City is providing this letter as notification of the opportunity to consult on the proposed project.

Project Location and Description

The approximately 16-acre site is located within the southern portion of the City of Carson, south of Interstate 405 (I-405), and east of Interstate 110 (I-110) in Los Angeles County. Regionally, the City and project site are bordered by the Cities of Long Beach, Compton, Torrance, and Los Angeles. Additionally, unincorporated Los Angeles County borders the northwest of Carson. The project site is in an industrial area and is generally bordered by existing warehouse, light industrial, and office uses.

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Respectfully,

Sincerely,

Lela M. Carver

Leila Carver, PTP

c: Ethan Edwards, AICP, Planner

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