# Air Quality Analysis for the Friars Road Mixed-Use Project, San Diego, California

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# Acronyms

| | |
|---|---|
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| μg/m3 | micrograms per cubic meter |
| AAQS | Ambient Air Quality Standards |
| AB | Assembly Bill |
| ARB | Air Resources Board |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CalEEMod | California Emissions Estimator Model |
| CAPCOA | California Air Pollution Control Officers Association |
| CARB | California Air Resources Board |
| CEQA | California Environmental Quality Act |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| DPM | diesel particulate matter |
| $H_2S$ | hydrogen sulfide |
| LLG | Linscott, Law & Greenspan Engineers |
| LOS | Level of Service |
| NAAQS | National Ambient Air Quality Standards |
| $NO_2$ | nitrogen dioxide |
| $NO_X$ | oxides of nitrogen |
| $O_3$ | ozone |
| Pb | lead |
| $PM_{10}$ | particulate matter less than 10 microns |
| $PM_{2.5}$ | particulate matter less than 2.5 microns |
| Ppb | parts per billion |
| Ppm | parts per million |
| RAQS | Regional Air Quality Strategy |
| ROG | reactive organic gases |
| SANDAG | San Diego Association of Governments |
| SDAB | San Diego Air Basin |
| SDAPCD | San Diego Air Pollution Control District |
| SIP | State Implementation Plan |
| $SO_2$ | sulfur dioxide |
| $SO_X$ | oxides of sulfur |
| SR-163 | State Route 163 |
| TAC | toxic air contaminants |
| TCM | Transportation Control Measures |
| TIA | Traffic Impact Analysis |
| U.S. EPA | United States Environmental Protection Agency |
| USC | United States Code |
| VOC | volatile organic compounds |

# Executive Summary

This report evaluates potential local and regional air quality impacts associated with the proposed Friars Road Mixed-Use Project (project) located north of the intersection of Friars Road and Via De La Moda in San Diego, California. The project would include the demolition of three commercial buildings and the construction of a total of 319 residential dwelling units, consisting of 243 apartments, 6 shopkeeper units, and 70 condominiums. The apartments would be constructed in an eight-story building while the condominiums would be constructed in a nine-story building. The project would also include two levels of subterranean parking, common open areas and pools, and a rooftop deck.

The primary goal of the San Diego Air Pollution Control District's Regional Air Quality Strategy (RAQS) is to reduce ozone precursor emissions. The project would be consistent with the land use designations and the zoning of the project site and therefore, with the growth anticipated by the General Plan and San Diego Association of Governments (SANDAG). The proposed project would therefore not result in an increase in emissions that are not already accounted for in the RAQS. Thus, the project would not interfere with implementation of the RAQS or other air quality plans.

Additionally, as calculated in this analysis, project construction emissions would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions are well below these limits, project construction would not result in regional emissions that would exceed the National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS) or contribute to existing violations. Additionally, construction emissions would be temporary, intermittent, and would cease at the end of project construction.

Long-term emissions of regional air pollutants occur from operational sources. Based on emissions estimates, project operational emissions would not exceed the applicable regional emissions thresholds. Therefore, as project emissions are well below these limits, project operations would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations.

Maximum carbon monoxide (CO) concentrations occur at the intersection of Friars Road at State Route 163 (SR-163) northbound ramps and would be less than the CAAQS and NAAQS. All other intersections would carry less peak hour traffic and experience shorter delays than the intersection of Friars Road at SR-163 northbound ramps. Thus, it can be concluded that CO concentrations at these intersections would be less than the CO concentrations calculated in this analysis. There would be no harmful concentrations of CO and localized air quality emissions would not exceed applicable standards with implementation of the project; therefore, sensitive receptors would not be exposed to substantial pollutant concentrations.

The project does not include industrial or agricultural uses that are typically associated with objectionable odors. The project would involve the use of diesel-powered equipment during construction. Diesel exhaust may occasionally be noticeable at adjacent properties; however, construction activities would be temporary and the odors would dissipate quickly in an outdoor environment. Therefore, this impact would be less than significant.

# 1.0 Introduction

The purpose of this report is to assess potential short-term local and regional air quality impacts resulting from development of the project.

Air pollution affects all Southern Californians. Effects can include the following:

- Increased respiratory infections
- Increased discomfort
- Missed days from work and school
- Increased mortality
- Polluted air also damages agriculture and our natural environment.

The project is located within the San Diego Air Basin (SDAB), one of 15 air basins that geographically divide the state of California. The SDAB is currently classified as a federal non-attainment area for ozone, and a state non-attainment area for particulate matter less than 10 microns ($PM_{10}$), particulate matter less than 2.5 microns ($PM_{2.5}$), and ozone.

Air quality impacts can result from the construction and operation of the project. Construction impacts are short-term and result from fugitive dust, equipment exhaust, and indirect effects associated with construction workers and deliveries. Operational impacts can occur on two levels: regional impacts resulting from growth-inducing development, or local hot-spot effects stemming from sensitive receivers being placed close to highly congested roadways. In the case of this project, operational impacts are primarily due to emissions to the basin from mobile sources associated with vehicular travel along the roadways within the project area.

The analysis of impacts is based on federal and state Ambient Air Quality Standards (AAQS) and is assessed in accordance with the guidelines, policies, and standards established by the City of San Diego and the San Diego Air Pollution Control District (SDAPCD). Project compatibility with the adopted air quality plan for the area is also assessed.

# 2.0 Project Description

The proposed project includes demolition of the three existing commercial/office buildings and construction of two multi-family residential buildings with subterranean parking. Common recreational facilities, as well as private usable open space amenities, would be incorporated into the overall design. Access would be at the intersection of Friars Road and Via de la Moda with a signalized intersection and enhanced pedestrian crosswalks.

Demolition would include two three-story buildings and one two-story building, totaling approximately 48,180 square feet, and paved parking areas, driveways, and walkways totaling 486,680 square feet. Construction would include a total of 319 residential dwelling units, consisting of 243 apartments, 6 shopkeeper units, and 70 condominiums. The apartments and shopkeeper units would total 204,242 square feet of habitable space in an eight-story structure over two levels of subterranean parking. The condominium units would total 110,883 square feet of habitable space in a nine-story structure over two levels of subterranean parking. Common areas and open space construction, including decks and balconies, would total 85,634 square feet. Subterranean parking would total 177,745 square feet.

Figure 1 shows the regional location. Figure 2 shows an aerial photograph of the project vicinity. Figure 3 shows the proposed site plan.

# 3.0 Regulatory Framework

Motor vehicles are San Diego County's leading source of air pollution (County of San Diego 2013). In addition to these sources, other mobile sources include construction equipment, trains, and airplanes. Emission standards for mobile sources are established by state and federal agencies, such as the California Air Resources Board (CARB) and the United States Environmental Protection Agency (U.S. EPA). Reducing mobile source emissions requires the technological improvement of existing mobile sources and the examination of future mobile sources, such as those associated with new or modification projects (e.g., retrofitting older vehicles with cleaner emission technologies). The state of California has developed statewide programs to encourage cleaner cars and cleaner fuels. The regulatory framework described below details the federal and state agencies that are in charge of monitoring and controlling mobile source air pollutants and the measures currently being taken to achieve and maintain healthful air quality in the SDAB.

In addition to mobile sources, stationary sources also contribute to air pollution in the SDAB. Stationary sources include gasoline stations, power plants, dry cleaners, and other commercial and industrial uses. Stationary sources of air pollution are regulated by the local air pollution control or management district, in this case the SDAPCD.

The state of California is divided geographically into 15 air basins for managing the air resources of the state on a regional basis. Areas within each air basin are considered to share the same air masses and, therefore, are expected to have similar ambient air quality. If an air basin is not in either federal or state attainment for a particular pollutant, the basin is classified as a moderate, serious, severe, or extreme non-attainment area for that pollutant (there is also a marginal classification for federal non-attainment areas).

Once a non-attainment area has achieved the air quality standards for a particular pollutant, it may be redesignated as an attainment area for that pollutant. To be redesignated, the area must meet air quality standards and prepare a maintenance plan demonstrating the ability of the basin to in continuing to meet and maintain air quality standards, as well as satisfy other requirements of the Clean Air Act (CAA). Areas that are redesignated attainment are called maintenance areas.


Project Location

FIGURE 1

Regional Location

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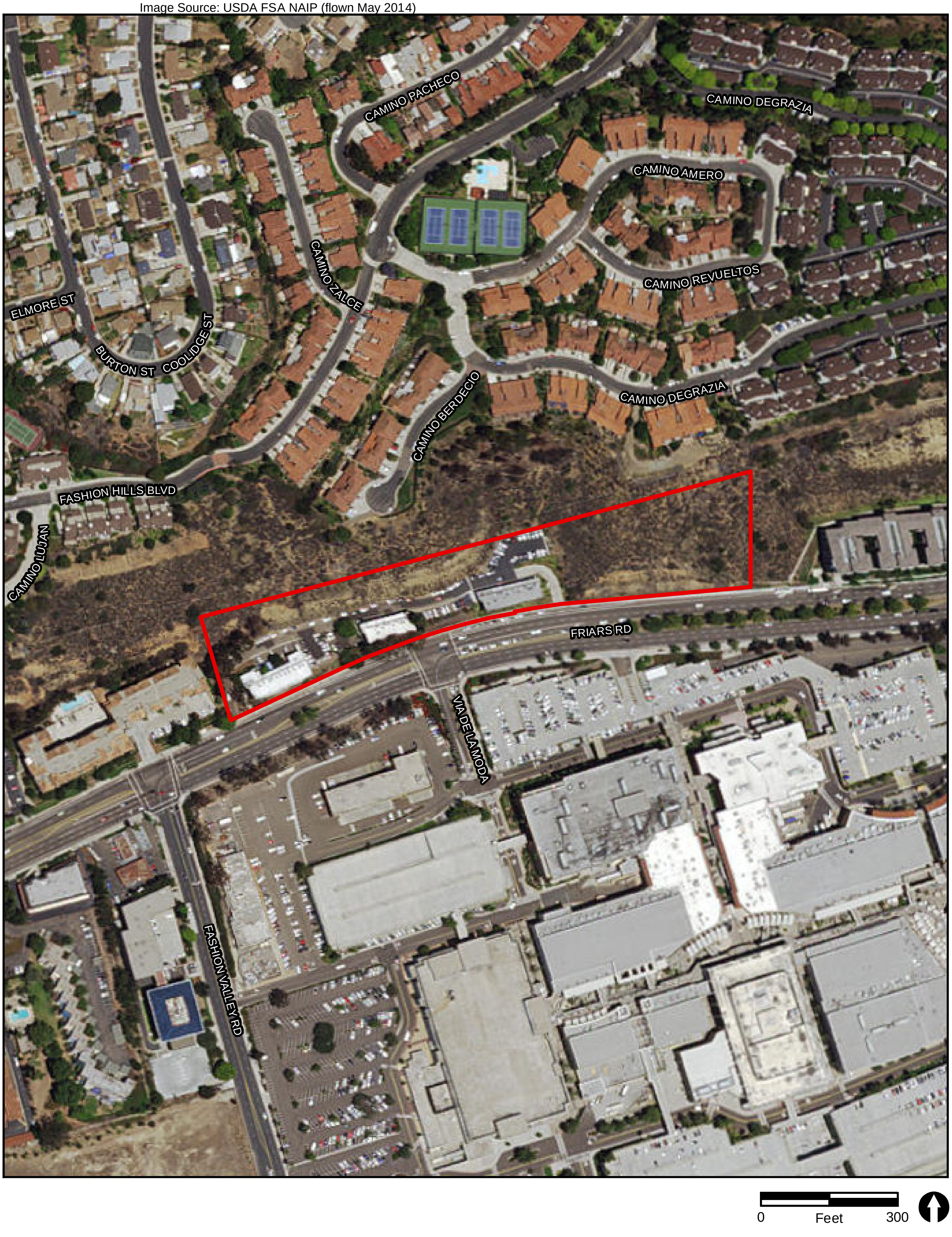
Image Source: USDA FSA NAIP (flown May 2014)




Project Boundary

FIGURE 2

Aerial Photograph of Project Vicinity

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Map Source: Tucker Sadler

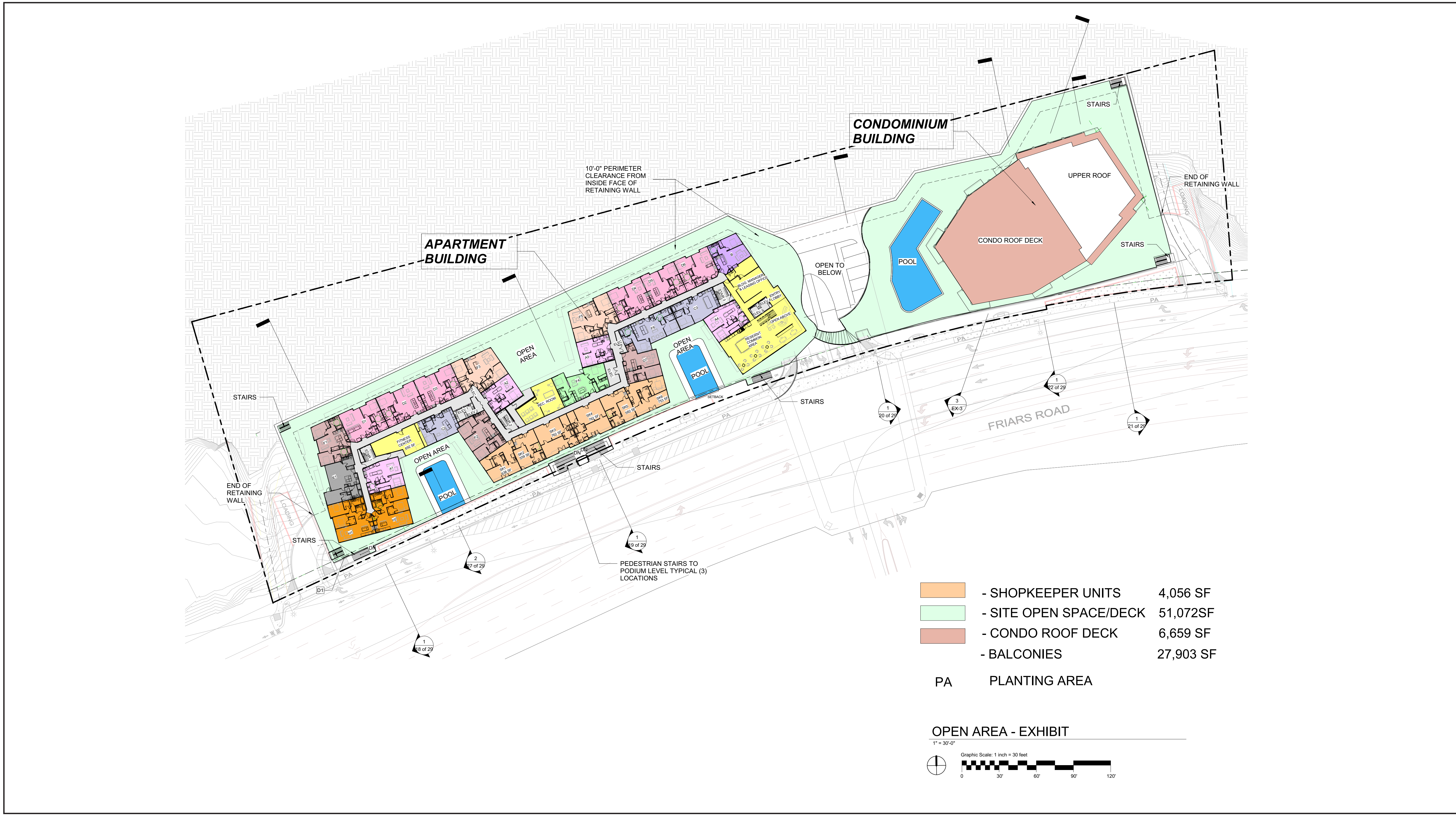


FIGURE 3
Proposed Site Plan

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## 3.1 Federal Regulations

Ambient Air Quality Standards represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect the public health and welfare. The federal CAA was enacted in 1970 and amended in 1977 and 1990 [42 United States Code (USC) 7401] for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity. In 1971, in order to achieve the purposes of Section 109 of the CAA [42 USC 7409], the U.S. EPA developed primary and secondary National Ambient Air Quality Standards (NAAQS).

Six criteria pollutants of primary concern have been designated: ozone, carbon monoxide (CO), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), lead (Pb), and respirable particulate matter ($PM_{10}$ and $PM_{2.5}$). The primary NAAQS ". . . in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health . . . " and the secondary standards ". . . protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air" [42 USC 7409(b)(2)]. The primary NAAQS were established, with a margin of safety, considering long-term exposure for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties). The NAAQS are presented in Table 1 (CARB 2015a).

## 3.2 State Regulations

### 3.2.1 Criteria Pollutants

The U.S. EPA allows states the option to develop different (stricter) standards. The state of California has developed the California Ambient Air Quality Standards (CAAQS) and generally has set more stringent limits on the criteria pollutants (see Table 1). In addition to the federal criteria pollutants, the CAAQS also specify standards for visibility-reducing particles, sulfates, hydrogen sulfide ($H_2S$), and vinyl chloride (see Table 1). Similar to the federal CAA, the state classifies specific geographic areas as either "attainment" or "nonattainment" areas for each pollutant based on the comparison of measured data with the CAAQS. The SDAB is a non-attainment area for the state ozone standards, the state $PM_{10}$ standard, and the state $PM_{2.5}$ standard.

### 3.2.2 Toxic Air Contaminants

The public's exposure to toxic air contaminants (TACs) is a significant public health issue in California. Diesel-exhaust particulate matter emissions have been established as TACs. In 1983, the California Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health (Assembly Bill [AB] 1807: Health and Safety Code Sections 39650–39674). The Legislature established a two-step process to address the potential health effects from TACs. The first step is the risk assessment (or identification) phase. The second step is the risk management (or control) phase of the process.

**Table 1**
**Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[1] | | National Standards[2] | | |
|---|---|---|---|---|---|---|
| | | Concentration[3] | Method[4] | Primary[3,5] | Secondary[3,6] | Method[7] |
| Ozone[8] | 1 Hour | 0.09 ppm (180 $\mu g/m^3$) | Ultraviolet Photometry | – | Same as Primary Standard | Ultraviolet Photometry |
| | 8 Hour | 0.07 ppm (137 $\mu g/m^3$) | | 0.070 ppm (137 $\mu g/m^3$) | | |
| Respirable Particulate Matter ($PM_{10}$)[9] | 24 Hour | 50 $\mu g/m^3$ | Gravimetric or Beta Attenuation | 150 $\mu g/m^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 20 $\mu g/m^3$ | | – | | |
| Fine Particulate Matter ($PM_{2.5}$)[9] | 24 Hour | No Separate State Standard | | 35 $\mu g/m^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 12 $\mu g/m^3$ | Gravimetric or Beta Attenuation | 12 $\mu g/m^3$ | 15 $\mu g/m^3$ | |
| Carbon Monoxide (CO) | 1 Hour | 20 ppm (23 $mg/m^3$) | Non-dispersive Infrared Photometry | 35 ppm (40 $mg/m^3$) | – | Non-dispersive Infrared Photometry |
| | 8 Hour | 9.0 ppm (10 $mg/m^3$) | | 9 ppm (10 $mg/m^3$) | – | |
| | 8 Hour (Lake Tahoe) | 6 ppm (7 $mg/m^3$) | | – | – | |
| Nitrogen Dioxide ($NO_2$)[10] | 1 Hour | 0.18 ppm (339 $\mu g/m^3$) | Gas Phase Chemi-luminescence | 100 ppb (188 $\mu g/m^3$) | – | Gas Phase Chemi-luminescence |
| | Annual Arithmetic Mean | 0.030 ppm (57 $\mu g/m^3$) | | 0.053 ppm (100 $\mu g/m^3$) | Same as Primary Standard | |
| Sulfur Dioxide ($SO_2$)[11] | 1 Hour | 0.25 ppm (655 $\mu g/m^3$) | Ultraviolet Fluorescence | 75 ppb (196 $\mu g/m^3$) | – | Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method) |
| | 3 Hour | – | | – | 0.5 ppm (1,300 $\mu g/m^3$) | |
| | 24 Hour | 0.04 ppm (105 $\mu g/m^3$) | | 0.14 ppm (for certain areas)[10] | – | |
| | Annual Arithmetic Mean | – | | 0.030 ppm (for certain areas)[10] | – | |
| Lead[12,13] | 30 Day Average | 1.5 $\mu g/m^3$ | Atomic Absorption | – | – | High Volume Sampler and Atomic Absorption |
| | Calendar Quarter | – | | 1.5 $\mu g/m^3$ (for certain areas)[12] | Same as Primary Standard | |
| | Rolling 3-Month Average | – | | 0.15 $\mu g/m^3$ | | |
| Visibility Reducing Particles[14] | 8 Hour | See footnote 13 | Beta Attenuation and Transmittance through Filter Tape | No National Standards | | |
| Sulfates | 24 Hour | 25 $\mu g/m^3$ | Ion Chroma-tography | | | |
| Hydrogen Sulfide | 1 Hour | 0.03 ppm (42 $\mu g/m^3$) | Ultraviolet Fluorescence | | | |
| Vinyl Chloride[12] | 24 Hour | 0.01 ppm (26 $\mu g/m^3$) | Gas Chroma-tography | | | |

**Table 1**
**Ambient Air Quality Standards**

SOURCE: CARB 2015a
NOTE: ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter; – = not applicable.

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, particulate matter ($PM_{10}$, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For $PM_{10}$, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of the Air Resources Board (ARB) to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m³ to 12.0 µg/m³. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m³, as was the annual secondary standards of 15 µg/m³. The existing 24-hour $PM_{10}$ standards (primary and secondary) of 150 µg/m³ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour $SO_2$ standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 $SO_2$ national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

The California Air Toxics Program establishes the process for the identification and control of TACs and includes provisions to make the public aware of significant toxic exposures and for reducing risk. Additionally, the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly Bill) was enacted in 1987 and requires stationary sources to report the types and quantities of certain substances routinely released into the air. The goals of the Air Toxics "Hot Spots" Act are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels. The Children's Environmental Health Protection Act, California Senate Bill 25 (Chapter 731, Escutia, Statutes of 1999), focuses on children's exposure to air pollutants. The act requires CARB to review its air quality standards from a children's health perspective, evaluate the statewide air monitoring network, and develop any additional air toxic control measures needed to protect children's health. Locally, toxic air pollutants are regulated through the SDAPCD's Regulation XII. Of particular concern statewide are diesel-exhaust particulate matter emissions. Diesel-exhaust particulate matter was established as a TAC in 1998, and is estimated to represent a majority of the cancer risk from TACs statewide (based on the statewide average). Diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB and are listed as carcinogens either under the state's Proposition 65 or under the federal Hazardous Air Pollutants program.

Following the identification of diesel particulate matter (DPM) as a TAC in 1998, CARB has worked on developing strategies and regulations aimed at reducing the risk from DPM. The overall strategy for achieving these reductions is found in the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB 2000). A stated goal of the plan is to reduce the statewide cancer risk arising from exposure to DPM by 85 percent by 2020.

In April 2005, CARB published the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB 2005). The handbook makes recommendations directed at protecting sensitive land uses from air pollutant emissions while balancing a myriad of other land use issues (e.g., housing, transportation needs, economics, etc.). It notes that the handbook is not regulatory or binding on local agencies and recognizes that application takes a qualitative approach. As reflected in the CARB Handbook, there is currently no adopted standard for the significance of health effects from mobile sources. Therefore, the CARB has provided guidelines for the siting of land uses near heavily traveled roadways. Of pertinence to this study, the CARB guidelines indicate that siting new sensitive land uses within 500 feet of a freeway or urban roads with 100,000 or more vehicles/day should be avoided when possible.

As an ongoing process, CARB will continue to establish new programs and regulations for the control of diesel particulate and other air-toxics emissions as appropriate. The continued development and implementation of these programs and policies will ensure that the public's exposure to DPM will continue to decline.

### 3.2.3 State Implementation Plan

The State Implementation Plan (SIP) is a collection of documents that set forth the state's strategies for achieving the NAAQS. In California, the SIP is a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. The CARB is the lead agency for all purposes related to the SIP under state law. Local air districts and other agencies, such as the Department of Pesticide Regulation and the Bureau of Automotive Repair, prepare SIP elements and submit them to CARB for review and approval. The CARB then forwards SIP revisions to the U.S. EPA for approval and publication in the Federal Register. All of the items included in the California SIP are listed in the Code of Federal Regulations (CFR) at 40 CFR 52.220.

The SDAPCD is responsible for preparing and implementing the portion of the SIP applicable to the SDAB. The SDAPCD adopts rules, regulations, and programs to attain state and federal air quality standards, and appropriates money (including permit fees) to achieve these objectives.

### 3.2.4 The California Environmental Quality Act

Section 15125(d) of the California Environmental Quality Act (CEQA) Guidelines requires discussion of any inconsistencies between the project and applicable general plans and regional plans, including the applicable air quality attainment or maintenance plan (or SIP).

## 3.3 San Diego Air Pollution Control District

The SDAPCD is the agency that regulates air quality in the SDAB. The SDAPCD prepared the Regional Air Quality Strategy (RAQS) in response to the requirements set forth in the California CAA AB 2595 (County of San Diego 1992). Attached, as part of the RAQS, are the Transportation Control Measures (TCM) for the air quality plan prepared by the San Diego Association of Governments (SANDAG) in accordance with AB 2595 and adopted by SANDAG on March 27, 1992, as Resolution Number 92-49 and Addendum. The RAQS and TCM set forth the steps needed to accomplish attainment of state AAQS. The required triennial updates of the RAQS and corresponding TCM were adopted in 1995, 1998, 2001, 2004, and 2009.

The SDAPCD has also established a set of rules and regulations initially adopted on January 1, 1969 and periodically reviewed and updated. These rules and regulations are available for review on the agency's website.

# 4.0 Environmental Setting

## 4.1 Geographic Setting

The project is located in the SDAB between approximately 5 miles east of the Pacific Ocean. This portion of the SDAB is subject to frequent offshore breezes. The project site is located within the Linda Vista Community Plan, in the Mission Valley area, which is a part of the San Diego River floodplain, and is generally bounded by Friars Road and the northern slopes of the valley on the north, the eastern banks of the San Diego River on the east, the southern slopes of the valley on the south, and Interstate 5 on the west.

The eastern portion of the SDAB is surrounded by mountains to the north, east, and south. These mountains tend to restrict airflow and concentrate pollutants in the valleys and low-lying areas below.

## 4.2 Climate

The project area, like the rest of San Diego County's coastal areas, has a Mediterranean climate characterized by warm, dry summers and mild, wet winters. The mean annual temperature for the project area is 63 degrees Fahrenheit (°F). The average annual precipitation is 10 inches, falling primarily from November to April. Winter low temperatures in the project area average about 49°F, and summer high temperatures average about 74°F. The average relative humidity is 69 percent and is based on the yearly average humidity at Lindbergh Field (Western Regional Climate Center 2015).

The dominant meteorological feature affecting the region is the Pacific High Pressure Zone, which produces the prevailing westerly to northwesterly winds. These winds tend to blow pollutants away from the coast toward the inland areas. Consequently, air quality near the coast is generally better than that which occurs at the base of the coastal mountain range.

Fluctuations in the strength and pattern of winds from the Pacific High Pressure Zone interacting with the daily local cycle produce periodic temperature inversions that influence the dispersal or containment of air pollutants in the SDAB. Beneath the inversion layer pollutants become "trapped" as their ability to disperse diminishes. The mixing depth is the area under the inversion layer. Generally, the morning inversion layer is lower than the afternoon inversion layer. The greater the change between the morning and afternoon mixing depths the greater the ability of the atmosphere to disperse pollutants.

Throughout the year, the height of the temperature inversion in the afternoon varies between approximately 1,500 and 2,500 feet above mean sea level. In winter, the morning inversion layer is about 800 feet above mean sea level. In summer, the morning inversion layer is about 1,100 feet above mean sea level. Therefore, air quality generally tends to be better in the winter than in the summer.

The prevailing westerly wind pattern is sometimes interrupted by regional "Santa Ana" conditions. A Santa Ana occurs when a strong high pressure develops over the Nevada-Utah area and overcomes the prevailing westerly coastal winds, sending strong, steady, hot, dry northeasterly winds over the mountains and out to sea.

Strong Santa Ana's tend to blow pollutants out over the ocean, producing clear days. However, at the onset or during breakdown of these conditions, or if the Santa Ana is weak, local air quality may be adversely affected. In these cases, emissions from the South Coast Air Basin to the north are blown out over the ocean, and low pressure over Baja California draws this pollutant-laden air mass southward. As the high pressure weakens, prevailing northwesterly winds reassert themselves and send this cloud of contamination ashore in the SDAB. When this event does occur, the combination of transported and locally produced contaminants produce the worst air quality measurements recorded in the basin.

## 4.3 Existing Air Quality

Air quality at a particular location is a function of the kinds, amounts, and dispersal rates of pollutants being emitted into the air locally and throughout the basin. The major factors affecting pollutant dispersion are wind speed and direction, the vertical dispersion of pollutants (which is affected by inversions), and the local topography.

Air quality is commonly expressed as the number of days in which air pollution levels exceed state standards set by the CARB or federal standards set by the U.S. EPA. The SDAPCD maintains ten air-quality monitoring stations located throughout the greater San Diego metropolitan region. Air pollutant concentrations and meteorological information are continuously recorded at these stations. Measurements are then used by scientists to help forecast daily air pollution levels.

The San Diego – Kearny Villa Road monitoring station located at 6125A Kearny Villa Road, approximately 6 miles northeast of the project site, and the San Diego – Beardsley Street monitoring station located at 1110A Beardsley Street, approximately 5 miles south of the project site are the nearest stations to the project area. The San Diego – Kearny Villa Road monitoring station measures ozone, $NO_2$, $PM_{10}$, and $PM_{2.5}$ and the San Diego – Beardsley Street monitoring station measures ozone, CO, $NO_2$, $PM_{10}$, and $PM_{2.5}$. Table 2 provides a summary of measurements collected at the San Diego – Kearny Villa Road and San Diego – Beardsley Street monitoring stations for the years 2010 through 2014.

**Table 2**
**Summary of Air Quality Measurements Recorded at the San Diego – Kearny Villa Road and San Diego – Beardsley Street Monitoring Stations**

| Pollutant/Standard | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| San Diego – Kearny Villa Road | | | | | |
| Ozone | | | | | |
| Days State 1-hour Standard Exceeded (0.09 ppm) | 0 | 0 | 1 | 0 | 1 |
| Days State 8-hour Standard Exceeded (0.07 ppm) | 0 | 2 | 3 | 1 | 4 |
| Days Federal 8-hour Standard Exceeded (0.075 ppm) | 0 | 1 | 1 | 0 | 1 |
| Max. 1-hr (ppm) | 0.073 | 0.093 | 0.099 | 0.081 | 0.099 |

| Table 2<br>Summary of Air Quality Measurements Recorded at the<br>San Diego – Kearny Villa Road and San Diego – Beardsley Street Monitoring Stations | | | | | |
|---|---|---|---|---|---|
| Pollutant/Standard | 2010 | 2011 | 2012 | 2013 | 2014 |
| Max 8-hr (ppm) | 0.061 | 0.084 | 0.077 | 0.071 | 0.082 |
| Nitrogen Dioxide | | | | | |
| Days State 1-hour Standard Exceeded (0.18 ppm) | Na | Na | 0 | 0 | 0 |
| Days Federal 1-hour Standard Exceeded (0.100 ppm) | Na | Na | 0 | 0 | 0 |
| Max 1-hr (ppm) | Na | Na | 0.057 | 0.067 | 0.051 |
| Annual Average (ppm) | Na | Na | Na | 0.011 | 0.010 |
| $PM_{10}$* | | | | | |
| Measured Days State 24-hour Standard Exceeded (50 μg/m$^3$) | Na | Na | 0 | 0 | 0 |
| Calculated Days State 24-hour Standard Exceeded (50 μg/m$^3$) | Na | Na | Na | 0.0 | 0.0 |
| Measured Days Federal 24-hour Standard Exceeded (150 μg/m$^3$) | Na | Na | 0 | 0 | 0 |
| Calculated Days Federal 24-hour Standard Exceeded (150 μg/m$^3$) | Na | Na | Na | 0.0 | 0.0 |
| Max. Daily (μg/m$^3$) | Na | Na | 35.0 | 38.0 | 39.0 |
| State Annual Average (μg/m$^3$) | Na | Na | Na | 20.0 | 19.5 |
| Federal Annual Average (μg/m$^3$) | Na | Na | 14.7 | 19.9 | 19.4 |
| $PM_{2.5}$* | | | | | |
| Measured Days Federal 24-hour Standard Exceeded (35 μg/m$^3$) | Na | Na | 0 | 0 | 0 |
| Calculated Days Federal 24-hour Standard Exceeded (35 μg/m$^3$) | Na | Na | Na | 0.0 | 0.0 |
| Max. Daily (μg/m$^3$) | Na | Na | 20.1 | 22.0 | 20.2 |
| State Annual Average (μg/m$^3$) | Na | Na | Na | 8.3 | 8.2 |
| Federal Annual Average (μg/m$^3$) | Na | Na | Na | 8.3 | 8.1 |
| San Diego – Beardsley Street | | | | | |
| Ozone | | | | | |
| Days State 1-hour Standard Exceeded (0.09 ppm) | 0 | 0 | 0 | 0 | 0 |
| Days State 8-hour Standard Exceeded (0.07 ppm) | 0 | 0 | 0 | 0 | 2 |
| Days Federal 8-hour Standard Exceeded (0.075 ppm) | 0 | 0 | 0 | 0 | 0 |
| Max. 1-hr (ppm) | 0.078 | 0.082 | 0.071 | 0.063 | 0.093 |
| Max 8-hr (ppm) | 0.066 | 0.061 | 0.065 | 0.053 | 0.073 |
| Carbon Monoxide | | | | | |
| Days Federal 8-hour Standard Exceeded (35 ppm) | 0 | 0 | 0 | Na | Na |
| Days State 8-hour Standard Exceeded (20 ppm) | 0 | 0 | 0 | Na | Na |
| Max. 1-hr (ppm) | 2.80 | 2.80 | 2.60 | 3.00 | Na |
| Max. 8-hr (ppm) | 2.17 | 2.44 | 1.81 | Na | Na |
| Nitrogen Dioxide | | | | | |
| Days State 1-hour Standard Exceeded (0.18 ppm) | 0 | 0 | 0 | 0 | 0 |
| Days Federal 1-hour Standard Exceeded (0.100 ppm) | 0 | 0 | 0 | 0 | 0 |
| Max 1-hr (ppm) | 0.077 | 0.067 | 0.065 | 0.072 | 0.075 |
| Annual Average (ppm) | Na | 0.014 | 0.013 | 0.014 | 0.013 |
| $PM_{10}$* | | | | | |
| Measured Days State 24-hour Standard Exceeded (50 μg/m$^3$) | 0 | 0 | 0 | 1 | 0 |
| Calculated Days State 24-hour Standard Exceeded (50 μg/m$^3$) | 0.0 | 0.0 | 0.0 | 6.0 | 0 |
| Measured Days Federal 24-hour Standard Exceeded (150 μg/m$^3$) | 0 | 0 | 0 | 0 | 0 |
| Calculated Days Federal 24-hour Standard Exceeded (150 μg/m$^3$) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Max. Daily (μg/m$^3$) | 40.0 | 49.0 | 47.0 | 92.0 | 41.0 |
| State Annual Average (μg/m$^3$) | 23.4 | 24.0 | 22.2 | 25.4 | 23.8 |
| Federal Annual Average (μg/m$^3$) | 22.8 | 23.3 | 21.8 | 24.9 | 23.3 |

| Table 2<br>Summary of Air Quality Measurements Recorded at the<br>San Diego – Kearny Villa Road and San Diego – Beardsley Street Monitoring Stations | | | | | |
|---|---|---|---|---|---|
| Pollutant/Standard | 2010 | 2011 | 2012 | 2013 | 2014 |
| $PM_{2.5}$* | | | | | |
| Measured Days Federal 24-hour Standard Exceeded (35 μg/m³) | 0 | 0 | 1 | 1 | 1 |
| Calculated Days Federal 24-hour Standard Exceeded (35 μg/m³) | 0.0 | 0.0 | 1.0 | 1.1 | 1.0 |
| Max. Daily (μg/m³) | 31.0 | 34.7 | 39.8 | 37.4 | 37.2 |
| State Annual Average (μg/m³) | Na | 10.9 | Na | 10.4 | 10.2 |
| Federal Annual Average (μg/m³) | 10.4 | 10.8 | 11.0 | 10.3 | 10.1 |

SOURCE: CARB 2015b.
* Calculated days value. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

## 4.3.1 Ozone

Nitrogen oxides and hydrocarbons (reactive organic gases [ROG]) are known as the chief “precursors” of ozone. These compounds react in the presence of sunlight to produce ozone, which is the primary air pollution problem in the SDAB. Because sunlight plays such an important role in its formation, ozone pollution—or smog—is mainly a concern during the daytime in summer months. The SDAB is currently designated a federal and state non-attainment area for ozone. During the past 25 years, San Diego had experienced a decline in the number of days with unhealthy levels of ozone despite the region’s growth in population and vehicle miles traveled (County of San Diego 2013).

About half of smog-forming emissions come from automobiles. Population growth in San Diego has resulted in a large increase in the number of automobiles expelling ozone-forming pollutants while operating on area roadways. In addition, the occasional transport of smog-filled air from the South Coast Air Basin only adds to the SDAB’s ozone problem. Stricter automobile emission controls, including more efficient automobile engines, have played a large role in why ozone levels have steadily decreased.

In order to address adverse health effects due to prolonged exposure, the U.S. EPA phased out the national 1-hour ozone standard and replaced it with the more protective 8-hour ozone standard. The SDAB is currently a non-attainment area for the 8-hour standards.

Not all of the ozone within the SDAB is derived from local sources. Under certain meteorological conditions, such as during Santa Ana wind events, ozone and other pollutants are transported from the Los Angeles Basin and combine with ozone formed from local emission sources to produce elevated ozone levels in the SDAB.

Local agencies can control neither the source nor the transportation of pollutants from outside the air basin. The SDAPCD’s policy, therefore, has been to control local sources effectively enough to reduce locally produced contamination to clean air standards. Through the use of air pollution control measures outlined in the RAQS, the SDAPCD has effectively reduced ozone levels in the SDAB.

Actions that have been taken in the SDAB to reduce ozone concentrations include:

- **TCMs if vehicle travel and emissions exceed attainment demonstration levels.** TCMs are strategies that will reduce transportation-related emissions by reducing vehicle use or improving traffic flow.

- **Enhanced motor vehicle inspection and maintenance program.** The smog check program is overseen by the Bureau of Automotive Repair. The program requires most vehicles to pass a smog test once every two years before registering in the state of California. The smog check program monitors the amount of pollutants automobiles produce. One focus of the program is identifying "gross polluters," or vehicles that exceed two times the allowable emissions for a particular model. Regular maintenance and tune-ups, changing the oil, and checking tire inflation can improve gas mileage and lower air pollutant emissions. It can also reduce traffic congestion due to preventable breakdowns, further lowering emissions.

- **Air Quality Improvement Program.** This program, established by AB 118, is a voluntary incentive program administered by the CARB to fund clean vehicle and equipment projects, research on biofuels production, and the air quality impacts of alternative fuels, and workforce training.

## 4.3.2 Carbon Monoxide

The SDAB is classified as a state attainment area and as a federal maintenance area for CO. Until 2003, no violations of the state standard for CO had been recorded in the SDAB since 1991, and no violations of the national standard had been recorded in the SDAB since 1989. The violations that took place in 2003 were likely the result of massive wildfires that occurred throughout the county. No violations of the state or federal CO standards have occurred since 2003.

Small-scale, localized concentrations of CO above the state and national standards have the potential to occur at intersections with stagnation points such as those that occur on major highways and heavily traveled and congested roadways. Localized high concentrations of CO are referred to as "CO hot spots" and are a concern at congested intersections, where automobile engines burn fuel less efficiently and their exhaust contains more CO.

## 4.3.3 $PM_{10}$

$PM_{10}$ is particulate matter with an aerodynamic diameter of 10 microns or less. Ten microns is about one-seventh of the diameter of a human hair. Particulate matter is a complex mixture of very tiny solid or liquid particles composed of chemicals, soot, and dust. Sources of $PM_{10}$ emissions in the SDAB consist mainly of urban activities, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

Under typical conditions (i.e., no wildfires), particles classified under the $PM_{10}$ category are mainly emitted directly from activities that disturb the soil including travel on roads and construction, mining, or agricultural operations. Other sources include windblown dust, salts, brake dust, and tire wear. For several reasons hinging on the area's dry climate and coastal location, the SDAB has special difficulty in developing adequate tactics to meet present state particulate standards. The SDAB is designated as federal unclassified and state nonattainment for $PM_{10}$.

### 4.3.4 $PM_{2.5}$

Airborne, inhalable particles with aerodynamic diameters of 2.5 microns or less ($PM_{2.5}$) have been recognized as an air quality concern requiring regular monitoring. Federal $PM_{2.5}$ standards include an annual arithmetic mean of 15 $\mu g/m^3$ and a 24-hour concentration of 35 $\mu g/m^3$. State $PM_{2.5}$ standards established in 2002 are an annual arithmetic mean of 12 $\mu g/m^3$.

The SDAB was classified as an attainment area for the previous federal 24-hour $PM_{2.5}$ standard of 65 $\mu g/m^3$ and has also been classified as an attainment area for the revised federal 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ (U.S. EPA 2004, 2009). The SDAB is a non-attainment area for the state $PM_{2.5}$ standard.

### 4.3.5 Other Criteria Pollutants

The national and state standards for $NO_2$, oxides of sulfur ($SO_X$), and the previous standard for lead are being met in the SDAB, and the latest pollutant trends suggest that these standards will not be exceeded in the foreseeable future. As discussed above, new standards for these pollutants have been adopted, and new designations for the SDAB will be determined in the future. The SDAB is also in attainment of the state standards for vinyl chloride, $H_2S$, sulfates, and visibility-reducing particulates.

# 5.0 Thresholds of Significance

Thresholds used to evaluate potential impacts to air quality are based on applicable criteria in the CEQA Guidelines Appendix G and the City of San Diego Significance Determination Thresholds. The project would have a significant air quality impact if it would (City of San Diego 2011):

1. Conflict or obstruct the implementation of the applicable air quality plan;
2. Result in a violation of any air quality standard or contributes substantially to an existing or projected air quality violation;
3. Expose sensitive receptors to substantial pollutant concentrations, including toxins;
4. Result in a substantial alteration of air movement in the area of the project; or
5. Create objectionable odors affecting a substantial number of people.

Vehicle emissions are regulated at the federal and state levels. Air quality management districts and air pollution control districts do not set vehicle emission standards. The

SDAPCD is responsible for preparing and implementing the portion of the SIP applicable to the SDAB. The SIP contains the state's strategies for achieving the NAAQS. The SDAPCD also prepared the RAQS in response to requirements set forth in the California CAA (AB 2595).

The SDAPCD has also established a set of rules and regulations initially adopted on January 1, 1969, and periodically reviewed and updated. The rules and regulations define requirements regarding stationary sources of air pollutants and fugitive dust.

The SDAPCD does not provide specific numerics for determining the significance of mobile source-related impacts, or for evaluating CEQA projects or projects that do not require an APCD permit to operate (e.g., non-stationary sources). However, it does specify Air Quality Impact Analysis trigger levels for new or modified stationary sources (SDAPCD Rules 20.2 and 20.3). The APCD does not consider these trigger levels to represent adverse air quality impacts, rather, if these trigger levels are exceeded by a project, the SDAPCD requires an air quality analysis to determine if a significant air quality impact would occur. While, these trigger levels do not generally apply to mobile sources or general land development projects, for comparative purposes these levels are used to evaluate the increased emissions that would be discharged to the SDAB if the project were approved.

The SDAPCD trigger levels are also utilized by the City of San Diego in their Significance Determination Thresholds (City of San Diego 2011) as one of the considerations when determining the potential significance of air quality impacts for projects within the city. SDAPCD Rules 20.2 and 20.3 do not specify trigger levels for ROG or $PM_{2.5}$. The threshold for ROG used by the City is based on levels per the SCAQMD and Monterey Bay Air Quality Management District, which have similar federal and state attainment status as San Diego (City of San Diego 2011). The terms ROG and volatile organic compound (VOC) are essentially synonymous and are used interchangeably in this analysis. The $PM_{2.5}$ threshold is equated to $PM_{10}$ as the SDAB is a federal $PM_{2.5}$ and $PM_{10}$ attainment area. The threshold for $PM_{2.5}$ was developed from the SCAQMD Final Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds and the SDAPCD's $PM_{10}$ limit (SCAQMD 2006).

The air quality impact screening levels used in this analysis are shown in Table 3.

**Table 3**
**Air Quality Impact Screening Levels**

| Pollutant | Emission Rate | | |
|---|---|---|---|
| | Pounds/Hour | Pounds/Day | Tons/Year |
| $NO_X$ | 25 | 250 | 40 |
| $SO_X$ | 25 | 250 | 40 |
| CO | 100 | 550 | 100 |
| $PM_{10}$ | -- | 100 | 15 |
| Lead | -- | 3.2 | 0.6 |
| VOC, ROG | -- | 137 | 15 |
| $PM_{2.5}$ | -- | 100[1] | -- |

SOURCE: SDAPCD, Rule 20.2 (12/17/1998); City of San Diego 2011.
NOTE: $NO_X$ = oxides of nitrogen
[1]$PM_{2.5}$ threshold developed from the SCAQMD *Final Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds* (SCAQMD 2006) and the $PM_{10}$ standard of the SDAPCD.

# 6.0 Air Quality Assessment

Air quality impacts can result from the construction and operation of a project. Construction impacts are short term and result from fugitive dust, equipment exhaust, and indirect effects associated with construction workers and deliveries. Operational impacts can occur on two levels: regional impacts resulting from growth-inducing development, or local hot-spot effects stemming from sensitive receivers being placed close to highly congested roadways. In the case of this project, operational impacts are primarily due to emissions to the basin from mobile sources associated with the vehicular travel along the roadways within the project area.

Air emissions were calculated using California Emissions Estimator Model (CalEEMod) 2013.2.2 (California Air Pollution Control Officers Association [CAPCOA] 2013). The CalEEMod program is a tool used to estimate air emissions resulting from land development projects based on California-specific emission factors. The model estimates mass emissions from two basics sources: construction sources and operational sources (i.e., area and mobile sources).

Inputs to CalEEMod include such items as the air basin containing the project, land uses, trip generation rates, trip lengths, vehicle fleet mix (percentage of autos, medium truck, etc.), trip destination (i.e., percent of trips from home to work, etc.), duration of construction phases, construction equipment usage, grading areas, season, and ambient temperature, as well as other parameters. The CalEEMod output files contained in Attachment 1 indicate the specific outputs for each model run. Emissions of $NO_X$, CO, $SO_X$, $PM_{10}$, $PM_{2.5}$, and ROG are calculated. Emission factors are not available for lead, and consequently, lead emissions are not calculated. The SDAB is currently in attainment of the state and federal lead standards. Furthermore, fuel used in construction equipment and most other vehicles is not leaded.

## 6.1 Construction-related Emissions

Construction-related activities are temporary, short-term sources of air emissions. Construction-related pollutants result from dust raised during demolition and grading, emissions from construction vehicles, and chemicals used during construction. Fugitive dust emissions vary greatly during construction and are dependent on the amount and type of activity, silt content of the soil, and the weather. Vehicles moving over paved and unpaved surfaces, demolition, excavation, earth movement, grading, and wind erosion from exposed surfaces are all sources of fugitive dust. Construction operations are subject to the requirements established in Regulation 4, Rules 52, 54, and 55, of the SDAPCD's rules and regulations.

Heavy-duty construction equipment is usually diesel powered. In general, emissions from diesel-powered equipment contain more $NO_X$, $SO_X$, and particulate matter than gasoline-powered engines. However, diesel-powered engines generally produce less CO and less ROG than do gasoline-powered engines. Standard construction equipment includes tractors/loaders/backhoes, rubber-tired dozers, excavators, graders, cranes, forklifts, rollers, paving equipment, generator sets, welders, cement and mortar mixers, and air compressors.

Construction emissions were modeled assuming construction would occur in the following stages: demolition (1 month), site preparation (2 weeks), grading/excavation (6 months), building construction (10 months), paving (1 month), and architectural coatings (3 months). Specific construction equipment parameters are not available at this time. However, CalEEMod can estimate the required construction equipment when project-specific information is unavailable. The estimates are based on surveys, performed by the SCAQMD and the Sacramento Metropolitan Air Quality Management District, of typical construction projects which provide a basis for scaling equipment needs and schedule with a project's size. Air emission estimates in CalEEMod are based on the duration of construction phases; construction equipment type, quantity, and usage; grading area; season; and ambient temperature, among other parameters. A VOC content of 150 grams per liter for exterior architectural coatings and 100 grams per liter for interior architectural coatings was assumed in accordance with SDAPCD Rule 67.0. Table 4 summarizes the construction equipment parameters.

**Table 4**
**Construction Schedule and Equipment**

| Phase | Length (Days) | Equipment |
|---|---|---|
| Demolition | 20 | 3 Tractors/Loaders/Backhoes |
| | | 1 Rubber Tired Dozer |
| | | 1 Concrete/Industrial Saw |
| Site Preparation | 10 | 1 Tractor/Loader/Backhoe |
| | | 1 Scraper |
| | | 1 Grader |
| Grading/Excavation | 130 | 2 Tractors/Loaders/Backhoes |
| | | 1 Rubber Tired Dozer |
| | | 1 Grader |
| Building Construction | 220 | 1 Tractor/Loader/Backhoe |
| | | 1 Crane |
| | | 2 Forklifts |
| | | 1 Generator Set |
| | | 3 Welders |
| Paving | 20 | 1 Tractor/Loader/Backhoe |
| | | 1 Paving Equipment |
| | | 2 Rollers |
| | | 1 Paver |
| | | 1 Cement and Mortar Mixer |
| Architectural Coatings | 65 | 1 Air Compressor |

Table 5 shows the total projected construction maximum daily emission levels for each criteria pollutant. The CalEEMod output files for construction emissions are contained in Attachment 1.

| Table 5<br>Summary of Worst-case Construction Emissions<br>(pounds per day) | | | | | | |
|---|---|---|---|---|---|---|
| Phase | ROG | $NO_X$ | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| Demolition | 3 | 29 | 24 | 0 | 4 | 2 |
| Site Preparation | 3 | 29 | 17 | 0 | 2 | 1 |
| Grading/Excavation | 3 | 28 | 19 | 0 | 8 | 5 |
| Building Construction | 4 | 29 | 30 | 0 | 4 | 2 |
| Paving | 1 | 12 | 12 | 0 | 1 | 1 |
| Architectural Coatings | 70 | 2 | 4 | 0 | 1 | 0 |
| **Maximum Daily Emissions** | **70** | **29** | **30** | **0** | **8** | **5** |
| *Significance Threshold* | *137* | *250* | *550* | *250* | *100* | *100* |

Standard dust control measures would be implemented as a part of project construction in accordance with SDAPCD rules and regulations. Fugitive dust emissions were calculated using CalEEMod default values, and did not take into account the required dust control measures. Thus, the emissions shown in Table 5 are conservative.

For assessing the significance of the air quality emissions resulting during construction of the project, the construction emissions were compared to the trigger levels shown in Table 3. As seen in Table 5, maximum daily construction emissions are projected to be less than the applicable thresholds for all criteria pollutants. Thus, impacts would be less than significant.

## 6.2 Operation-related Emissions

### 6.2.1 Mobile and Area Source Emissions

Mobile source emissions would originate from traffic generated by the project. Area source emissions would result from activities such as the use of natural gas and consumer products. In addition, landscaping maintenance activities associated with the proposed land uses would produce pollutant emissions.

Operational emissions due to implementation of the project were calculated using CalEEMod. CalEEMod estimates vehicle emissions by first calculating trip rate, trip length, trip purpose (e.g., home to work, home to shop, home to other), and trip type percentages for each land use type, based on the land use types and quantities. Vehicle trip generation rates were obtained from the Traffic Impact Analysis prepared for the project (Linscott, Law & Greenspan [LLG] 2016). Trip generation calculations were conducted using trip rates provided in the City of San Diego's Trip Generation Manual. Since the project site is located within 1,500 feet from the Fashion Valley Transit Station, applicable transit credits were applied to both the existing office and the proposed residential land uses when calculating trip generation, per the City of San Diego's Traffic Impact Study Manual. Similarly, since the project site is located across the street from a regional mall (Fashion Valley Mall), applicable mixed-use credits were also applied. With these transit and mixed-use credits, it was calculated that the project would generate 1, 677 trips (LLG 2016). An average regional trip length of 5.8 miles for urban areas was used to determine vehicle miles traveled based on SANDAG regional data (SANDAG 2014). All other CalEEMod default trip characteristics were used.

Area source emissions associated with the project include consumer products, architectural coatings, and landscaping equipment. Hearths (fireplaces) and woodstoves are also a source of area emissions; however, the project would not include hearths or woodstoves.

Consumer products are chemically formulated products used by household and institutional consumers, including, but not limited to, detergents, cleaning compounds, polishes, floor finishes, disinfectants, sanitizers, and aerosol paints but not including other paint products, furniture coatings, or architectural coatings. Emissions due to consumer products are calculated using total building area and product emission factors.

For architectural coatings, ROG off-gassing emissions result from evaporation of solvents contained in surface coatings such as in paints and primers. ROG evaporative emissions are calculated using building surface area, architectural coating emission factors, and a reapplication rate of 10 percent of area per year. A VOC content of 150 grams per liter for exterior architectural coatings and 100 grams per liter for interior architectural coatings was assumed in accordance with SDAPCD Rule 67.0.

Landscaping maintenance includes fuel combustion emission from equipment such as lawn mowers, rototillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers as well as air compressors, generators, and pumps. Emission calculations take into account building area, equipment emission factors, and the number of operational days (summer days).

Table 6 provides a summary of the operational emissions generated by the project. CalEEMod output files for project operation are contained in Attachment 1. As shown, project-generated emissions are projected to be less than the significance thresholds for all criteria pollutants.

**Table 6**
**Summary of Project Operational Emissions**
**(pounds per day)**

| | ROG | $NO_X$ | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| Area Sources | 9 | 0 | 26 | 0 | 0 | 0 |
| Energy Sources | 0 | 1 | 0 | 0 | 0 | 0 |
| Mobile Sources | 5 | 8 | 40 | 0 | 7 | 2 |
| **Total** | **14** | **9** | **67** | **0** | **7** | **2** |
| *Significance Threshold* | *137* | *250* | *550* | *250* | *100* | *100* |

NOTE: Totals may vary due to independent rounding.

### 6.2.2 Localized Carbon Monoxide Impacts

Localized CO concentration is a direct function of motor vehicle activity at signalized intersections (e.g., idling time and traffic flow conditions), particularly during peak commute hours and meteorological conditions. Under specific meteorological conditions (e.g., stable conditions that result in poor dispersion), CO concentrations may reach unhealthy levels with respect to local sensitive land uses. Guidance for the evaluation of CO hot spots is provided in the *Transportation Project-level Carbon Monoxide Protocol* (CO protocol) (University of California, Davis 1997) prepared for the Environmental Program of the California Department of Transportation by the Institute of Transportation Studies, University of California Davis.

The SDAB is a CO maintenance area under the federal CAA. This means that SDAB was previously a non-attainment area and is currently implementing a 10-year plan for continuing to meet and maintain air quality standards. As a result, ambient CO levels have declined significantly. CO hot spots have been found to occur only at signalized intersections that operate at or below level of service (LOS) E with peak-hour trips for that intersection exceeding 3,000 trips. According to the CO Protocol, in maintenance areas, only projects that are likely to worsen air quality necessitate further analysis. The CO Protocol indicates projects may worsen air quality if they worsen traffic flow, defined as increasing average delay at signalized intersections operating at LOS E or F or causing an intersection that would operate at LOS D or better without the project, to operate at LOS E or F. Unsignalized intersections are not evaluated as they are typically signalized as volumes increase and delays increase, and traffic volumes at unsignalized intersections are typically much lower than at signalized intersections.

The traffic study prepared for the project includes anticipated traffic volumes at intersection near the project site. The following signalized intersection is anticipated to operate at LOS E or worse in the near-term (year 2018):

- Friars Road at SR-163 northbound ramps *(LOS D/E during AM/PM Peak Hour)*

The following four signalized intersections are anticipated to operate at LOS E or worse at buildout (year 2035):

- Friars Road at Fashion Valley Road *(LOS C/E during AM/PM Peak Hour)*
- Friars Road at SR-163 southbound ramps *(LOS F/F during AM/PM Peak Hour)*
- Friars Road at SR-163 northbound ramps *(LOS D/F during AM/PM Peak Hour)*
- Riverwalk Drive at Fashion Valley Road *(LOS F/F during AM/PM Peak Hour)*

According to the CO protocol, the three worst intersections would require detailed modeling in order to determine if the CO emissions exceeded the thresholds. If one of the intersections fail then the next worse intersection would be modeled until it is determined that all remaining intersections would not exceed the NAAQS or CAAQS. The three worst intersections were chosen based on traffic volumes, delay, and intersection configuration. Based on a review of these intersections, the following three intersections are included in the detailed modeling:

- Friars Road at SR-163 southbound ramps
- Friars Road at SR-163 northbound ramps
- Riverwalk Drive at Fashion Valley Road

It should be noted that reduced peak hour delays are calculated at some of the study intersections since the reduction in traffic from the removal of the existing uses is greater than the new multi-family residential project traffic at some turning movements. The change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes. Of the intersections listed above, as a result of the project, a decrease in delay would occur during the PM peak hour at the intersection of Friars Road with SR-163 northbound ramps in the near term (year 2018), and a decrease in delay would occur during the PM peak hour at the intersection of Friars Road with SR-163 northbound ramps and during the AM peak hour at the intersection of Friars Road with SR-163 southbound ramps at buildout (year 2035). However, as a worst-case analysis, the peak hour with the greatest traffic volume and the greatest delay was modeled, even in those cases when the project would result in a decrease in delay.

CALINE4, a computer air emission dispersion model, with a graphic interface (CalRoads View), was used to calculate CO concentrations at receivers located at each intersection. These concentrations were derived from inputs including traffic volumes from the traffic analysis and emission factors from EMFAC2014 (CARB 2014). The detailed modeling is based on the 2018 and 2035 peak hour traffic volumes and emission factors from EMFAC2014. The one-hour background concentration of CO for the area, 3.0 ppm, was included in the model. This ambient concentration is considered conservative, as it was the highest recorded hourly concentration over the past five years at the San Diego – Beardsley Street monitoring station. This concentration was assumed for all intersections. The average regional winter low temperature of 49°F was included in the model as reported by the Western Regional Climate Center data for the project area. For a worst-case meteorological setting, the wind angle assumes all wind is blowing at each receptor. The mixing height of pollutants was set at 1,000 feet with a stable atmosphere.

The results of the modeling for these intersections are summarized in Table 7. CALINE4 output is contained in Attachment 2.

**Table 7**
**Maximum CO Concentrations**
**(ppm)**

| Roadway | Operation Year (2018) | | | Cumulative (2035) | | | Standard CAAQS/NAAQS | |
|---|---|---|---|---|---|---|---|---|
| | Peak Hour Volume | 1-Hour Conc. | 8-Hour Conc. | Peak Hour Volume | 1-Hour Conc. | 8-Hour Conc. | 1-Hour | 8-Hour |
| Friars Road at SR-163 southbound ramps | 6,607 | N/A | N/A | 9,011 | 5.9 | 4.1 | | |
| Friars Road at SR-163 northbound ramps | 7,967 | 7.4 | 5.2 | 9,652 | 6.7 | 4.7 | 20/35 | 9.0/9 |
| Riverwalk Drive at Fashion Valley Road | 1,198 | N/A | N/A | 3,700 | 4.7 | 3.3 | | |

[1] 8-hour concentrations developed based on a 0.7 persistence factor.

As shown, the maximum 1-hour concentration would be 6.7 ppm. This concentration is below the federal and state 1-hour standards. In order to determine the 8-hour concentration, the 1-hour value was multiplied by a persistence factor of 0.7, as recommended in the CO Protocol. Based on this calculation, the maximum 8-hour concentration would be 4.7 ppm. Thus, increases of CO due to the project would be below the federal and state 8-hour standards. Therefore, localized air quality emissions would be less than significant.

# 6.3 Impact Analysis

1. *Would the project obstruct or conflict with the implementation of the San Diego RAQS or applicable portions of the SIP?*

The California Clean Air Act requires areas that are designated as non-attainment of state ambient air quality standards for ozone, CO, $SO_2$, and $NO_2$ to prepare and implement plans to attain the standards by the earliest practicable date. The SDAB is designated non-attainment for the state ozone standard. Accordingly, the RAQS was developed to identify feasible emission control measures and provide expeditious progress toward attaining the state standards for ozone. The two pollutants addressed in the RAQS are ROG and $NO_X$, which are precursors to the formation of ozone. Projected increases in motor vehicle usage, population, and growth create challenges in controlling emissions and by extension to maintaining and improving air quality. The RAQS, in conjunction with the TCM, were most recently adopted in 2009 as the air quality plan for the region.

The CARB mobile source emission projections and SANDAG growth projections are based on population, vehicle trends, and land use plans developed in general plans. As such, projects that propose development that is consistent with the growth anticipated by SANDAG's growth projections and/or the general plan would be consistent with the RAQS. In the event that a project would propose development that is less dense than anticipated by the growth projections, the project would likewise be consistent with the RAQS. In the event a project proposes development that is greater than anticipated in the growth projections, further analysis would be warranted to determine if the project would exceed the growth projections used in the RAQS for the specific subregional area.

The project site is zoned CO-1-2 with a Mission Valley Development Intensity District Overlay Zone. CO-1-2 is intended to accommodate a mix of office and residential uses. The purpose of the overlay zone is to guide the intensity of development in the Mission Valley area. The basis for regulating the intensity of development is the finite traffic capacity on the circulation system. Development intensities are the levels at which the future acceptable amount of building square footage or number of dwelling units will be determined for any given parcel. The project would be consistent with these zoning regulations.

The project site is designated as Commercial Employment, Retail, and Services in the General Plan, and is designated as Office Commercial in the Linda Vista Community Plan. According to the General Plan, residential uses are permitted in areas designated

Commercial Employment, Retail, and Services (City of San Diego 2008). The mixed-use project would be consistent with both of these land use designations and therefore, with the growth anticipated by the General Plan and SANDAG.

The project would therefore not result in an increase in emissions that are not already accounted for in the RAQS. Thus, the project would not interfere with implementation of the RAQS or other air quality plans.

2. *Would the project result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation?*

As shown in Table 5, project construction would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions are well below these limits, project construction would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations. Additionally, construction emissions would be temporary, intermittent, and would cease at the end of project construction.

Long-term emissions of regional air pollutants occur from operational sources. As shown in Table 6, project operation would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions are well below these limits, project operations would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations. Therefore, the project would result in a less than significant impact.

3. *Would the project 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 release emissions which exceed quantitative thresholds for ozone precursors)?*

The region is classified as attainment for all criterion pollutants except ozone, $PM_{10}$, and $PM_{2.5}$. The SDAB is non-attainment for the 8-hour federal and state ozone standards. Ozone is not emitted directly, but is a result of atmospheric activity on precursors. $NO_X$ and ROG are known as the chief "precursors" of ozone. These compounds react in the presence of sunlight to produce ozone.

As shown in Tables 5 and 6, emissions of ozone precursors (ROG and $NO_X$), $PM_{10}$, and $PM_{2.5}$ from construction and operation would be below the applicable thresholds. Therefore, the project would not generate emissions in quantities that would result in an exceedance of the NAAQS or CAAQS for ozone, $PM_{10}$, or $PM_{2.5}$, and impacts would be less than significant.

4. *Would the project expose sensitive receptors to substantial pollutant concentration including air toxics such as diesel particulates?*

As shown in Table 7, the maximum 1-hour and 8-hour concentrations of CO would occur at the intersection of Friars Road at SR-163 northbound ramps and would be 6.7 ppm and

4.7 ppm, respectively. These concentrations are less than the CAAQS and NAAQS. All other intersections would carry less peak hour traffic and experience shorter delays than the intersection of Friars Road at SR-163 southbound ramps. Thus, it can be concluded that CO concentrations at these intersections would be less than the CO concentrations shown in Table 7. There would be no harmful concentrations of CO and localized air quality emission would not exceed applicable standards with implementation of the project; therefore, sensitive receptors would not be exposed to substantial pollutant concentrations.

5. *Would the project create objectionable odors affecting a substantial number of people?*

The project would involve the use of diesel-powered construction equipment. Diesel exhaust may be noticeable temporarily at adjacent properties; however, construction activities would be temporary. The project does not include industrial or agricultural uses that are typically associated with objectionable odors. Therefore, this impact would be less than significant.

# 7.0 Conclusions

The primary goal of the RAQS is to reduce ozone precursor emissions. The project would be consistent with the land use designations and the zoning of the project site and therefore, with the growth anticipated by the General Plan and SANDAG. The proposed project would therefore not result in an increase in emissions that are not already accounted for in the RAQS. Thus, the project would not interfere with implementation of the RAQS or other air quality plans.

As shown in Table 5, project construction emissions would not exceed the applicable regional emissions thresholds. These thresholds are designed to provide limits below which project emissions would not significantly change regional air quality. Therefore, as project emissions are well below these limits, project construction would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations. Additionally, construction emissions would be temporary, intermittent, and would cease at the end of project construction.

Long-term emissions of regional air pollutants occur from operational sources. As shown in Table 6, project operational emissions would not exceed the applicable regional emissions thresholds. Therefore, as project emissions are well below these limits, project operations would not result in regional emissions that would exceed the NAAQS or CAAQS or contribute to existing violations.

Maximum CO concentrations occur at the intersection of Friars Road at SR-163 northbound ramps and would be less than the CAAQS and NAAQS. All other intersections would carry less peak hour traffic and experience shorter delays than the intersection of Friars Road at SR-163 northbound ramps. Thus, it can be concluded that CO concentrations at these intersections would be less than the CO concentrations shown in Table 7. There would be no harmful concentrations of CO and localized air quality emission would not exceed applicable standards with implementation of the project; therefore, sensitive receptors would not be exposed to substantial pollutant concentrations.

The project does not include industrial or agricultural uses that are typically associated with objectionable odors. The project would involve the use of diesel-powered construction equipment. Diesel exhaust may be noticeable temporarily at adjacent properties; however, construction activities would be temporary. Therefore, this impact would be less than significant.

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# ATTACHMENTS

# ATTACHMENT 1

# CalEEMod Output – Project Emissions

# 7916 Friars Road Mixed-Use Residential

**San Diego County APCD Air District, Summer**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Apartments Mid Rise | 249.00 | Dwelling Unit | 1.68 | 249,000.00 | 712 |
| Condo/Townhouse High Rise | 70.00 | Dwelling Unit | 1.09 | 70,000.00 | 200 |
| Strip Mall | 1.50 | 1000sqft | 0.03 | 1,500.00 | 0 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.6 | **Precipitation Freq (Days)** | 40 |
| **Climate Zone** | 13 | | | **Operational Year** | 2020 |
| **Utility Company** | San Diego Gas & Electric | | | | |
| **CO2 Intensity (lb/MWhr)** | 556.22 | **CH4 Intensity (lb/MWhr)** | 0.022 | **N2O Intensity (lb/MWhr)** | 0.005 |

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - RPS 33% goal
CalEEMod accounts for 10.2%
Additional 22.8% reduction applied

Land Use - 2.8 acres disturbance

Construction Phase - Approximately 2 years construction

Demolition -

Architectural Coating - SDAPCD VOC content limit = 150 g/L exterior, 100 g/L interior

Vehicle Trips - 1,270 apartment trips
357 condo trips
50 retail space trips
5.8 mile trip length

Woodstoves - No woodstoves or fireplaces

Area Coating - SDAPCD VOC content limit = 150 g/L exterior, 100 g/L interior

Energy Use - 2013 Title 24:
23.3% increased electricity efficiency
3.8% increase natural gas efficiency

Water Mitigation -

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblArchitecturalCoating | EF_Nonresidential_Exterior | 250.00 | 150.00 |
| tblArchitecturalCoating | EF_Nonresidential_Interior | 250.00 | 100.00 |
| tblArchitecturalCoating | EF_Residential_Exterior | 250.00 | 150.00 |
| tblArchitecturalCoating | EF_Residential_Interior | 250.00 | 100.00 |
| tblAreaCoating | Area_EF_Nonresidential_Exterior | 250 | 150 |
| tblAreaCoating | Area_EF_Nonresidential_Interior | 250 | 100 |
| tblAreaCoating | Area_EF_Residential_Exterior | 250 | 150 |
| tblAreaCoating | Area_EF_Residential_Interior | 250 | 100 |
| tblAreaMitigation | UseLowVOCPaintNonresidentialExteriorValue | 150 | 250 |
| tblConstructionPhase | NumDays | 10.00 | 65.00 |
| tblConstructionPhase | NumDays | 6.00 | 130.00 |
| tblConstructionPhase | NumDays | 10.00 | 20.00 |

| | | | |
|---|---|---|---|
| tblConstructionPhase | NumDays | 3.00 | 10.00 |
| tblEnergyUse | T24E | 160.77 | 123.31 |
| tblEnergyUse | T24E | 206.69 | 158.53 |
| tblEnergyUse | T24NG | 3,820.47 | 3,675.29 |
| tblEnergyUse | T24NG | 10,789.48 | 10,349.48 |
| tblFireplaces | NumberGas | 136.95 | 0.00 |
| tblFireplaces | NumberGas | 38.50 | 0.00 |
| tblFireplaces | NumberWood | 87.15 | 0.00 |
| tblFireplaces | NumberWood | 24.50 | 0.00 |
| tblGrading | AcresOfGrading | 65.00 | 3.00 |
| tblGrading | AcresOfGrading | 15.00 | 4.50 |
| tblLandUse | LotAcreage | 6.55 | 1.68 |
| tblProjectCharacteristics | CH4IntensityFactor | 0.029 | 0.022 |
| tblProjectCharacteristics | CO2IntensityFactor | 720.49 | 556.22 |
| tblProjectCharacteristics | N2OIntensityFactor | 0.006 | 0.005 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2020 |
| tblVehicleTrips | CC_TL | 7.30 | 5.80 |
| tblVehicleTrips | CNW_TL | 7.30 | 5.80 |
| tblVehicleTrips | CW_TL | 9.50 | 5.80 |
| tblVehicleTrips | HO_TL | 7.50 | 5.80 |
| tblVehicleTrips | HO_TL | 7.50 | 5.80 |
| tblVehicleTrips | HS_TL | 7.30 | 5.80 |
| tblVehicleTrips | HS_TL | 7.30 | 5.80 |
| tblVehicleTrips | HW_TL | 10.80 | 5.80 |
| tblVehicleTrips | HW_TL | 10.80 | 5.80 |
| tblVehicleTrips | ST_TR | 7.16 | 5.10 |
| tblVehicleTrips | ST_TR | 7.16 | 5.10 |
| tblVehicleTrips | ST_TR | 42.04 | 33.33 |

| | | | |
|---|---|---|---|
| tblVehicleTrips | SU_TR | 6.07 | 5.10 |
| tblVehicleTrips | SU_TR | 6.07 | 5.10 |
| tblVehicleTrips | SU_TR | 20.43 | 33.33 |
| tblVehicleTrips | WD_TR | 6.59 | 5.10 |
| tblVehicleTrips | WD_TR | 6.59 | 5.10 |
| tblVehicleTrips | WD_TR | 44.32 | 33.33 |
| tblWoodstoves | NumberCatalytic | 12.45 | 0.00 |
| tblWoodstoves | NumberCatalytic | 3.50 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 12.45 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 3.50 | 0.00 |

## 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 | | | | | |
| 2017 | 4.3834 | 29.3702 | 29.1060 | 0.0569 | 6.1287 | 1.6438 | 7.6843 | 3.3347 | 1.5369 | 4.7658 | 0.0000 | 5,052.8872 | 5,052.8872 | 0.7507 | 0.0000 | 5,068.6511 |
| 2018 | 69.7670 | 23.9453 | 27.4945 | 0.0569 | 2.1151 | 1.3038 | 3.4189 | 0.5655 | 1.2478 | 1.8133 | 0.0000 | 4,949.5127 | 4,949.5127 | 0.5899 | 0.0000 | 4,961.9011 |
| **Total** | **74.1504** | **53.3155** | **56.6005** | **0.1138** | **8.2438** | **2.9477** | **11.1032** | **3.9002** | **2.7847** | **6.5792** | **0.0000** | **10,002.4000** | **10,002.4000** | **1.3406** | **0.0000** | **10,030.5522** |

**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 | | | | | |
| 2017 | 4.3834 | 29.3702 | 29.1060 | 0.0569 | 6.1287 | 1.6438 | 7.6843 | 3.3347 | 1.5369 | 4.7658 | 0.0000 | 5,052.8872 | 5,052.8872 | 0.7507 | 0.0000 | 5,068.6511 |
| 2018 | 69.7670 | 23.9453 | 27.4945 | 0.0569 | 2.1151 | 1.3038 | 3.4189 | 0.5655 | 1.2478 | 1.8133 | 0.0000 | 4,949.5127 | 4,949.5127 | 0.5899 | 0.0000 | 4,961.9011 |
| **Total** | **74.1504** | **53.3155** | **56.6005** | **0.1138** | **8.2438** | **2.9477** | **11.1032** | **3.9002** | **2.7847** | **6.5792** | **0.0000** | **10,002.4000** | **10,002.4000** | **1.3406** | **0.0000** | **10,030.5522** |

| | **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** |

## 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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Energy | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| Mobile | 4.4313 | 7.4429 | 37.4074 | 0.0989 | 6.5768 | 0.1116 | 6.6884 | 1.7556 | 0.1030 | 1.8586 | | 7,552.8422 | 7,552.8422 | 0.2900 | | 7,558.9320 |
| **Total** | **13.3958** | **8.3208** | **64.0569** | **0.1040** | **6.5768** | **0.3031** | **6.8799** | **1.7556** | **0.2945** | **2.0500** | **0.0000** | **8,330.9297** | **8,330.9297** | **0.3502** | **0.0134** | **8,342.4368** |

**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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Energy | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| Mobile | 4.4313 | 7.4429 | 37.4074 | 0.0989 | 6.5768 | 0.1116 | 6.6884 | 1.7556 | 0.1030 | 1.8586 | | 7,552.8422 | 7,552.8422 | 0.2900 | | 7,558.9320 |
| **Total** | **13.3958** | **8.3208** | **64.0569** | **0.1040** | **6.5768** | **0.3031** | **6.8799** | **1.7556** | **0.2945** | **2.0500** | **0.0000** | **8,330.9297** | **8,330.9297** | **0.3502** | **0.0134** | **8,342.4368** |

| | 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 | Demolition | Demolition | 1/1/2017 | 1/27/2017 | 5 | 20 | |
| 2 | Site Preparation | Site Preparation | 1/28/2017 | 2/10/2017 | 5 | 10 | |
| 3 | Grading | Grading | 2/11/2017 | 8/11/2017 | 5 | 130 | |
| 4 | Building Construction | Building Construction | 8/12/2017 | 6/15/2018 | 5 | 220 | |
| 5 | Paving | Paving | 6/16/2018 | 7/13/2018 | 5 | 20 | |
| 6 | Architectural Coating | Architectural Coating | 7/14/2018 | 10/12/2018 | 5 | 65 | |

**Acres of Grading (Site Preparation Phase): 4.5**

**Acres of Grading (Grading Phase): 3**

**Acres of Paving: 0**

**Residential Indoor: 645,975; Residential Outdoor: 215,325; Non-Residential Indoor: 2,250; Non-Residential Outdoor: 750 (Architectural Coating – sqft)**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Demolition | Concrete/Industrial Saws | 1 | 8.00 | 81 | 0.73 |
| Demolition | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Demolition | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| Site Preparation | Graders | 1 | 8.00 | 174 | 0.41 |
| Site Preparation | Scrapers | 1 | 8.00 | 361 | 0.48 |
| Site Preparation | Tractors/Loaders/Backhoes | 1 | 7.00 | 97 | 0.37 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 2 | 7.00 | 97 | 0.37 |
| Building Construction | Cranes | 1 | 8.00 | 226 | 0.29 |
| Building Construction | Forklifts | 2 | 7.00 | 89 | 0.20 |
| Building Construction | Generator Sets | 1 | 8.00 | 84 | 0.74 |
| Building Construction | Tractors/Loaders/Backhoes | 1 | 6.00 | 97 | 0.37 |
| Building Construction | Welders | 3 | 8.00 | 46 | 0.45 |
| Paving | Cement and Mortar Mixers | 1 | 8.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 1 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| Architectural Coating | Air Compressors | 1 | 6.00 | 78 | 0.48 |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Demolition | 5 | 13.00 | 0.00 | 219.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Site Preparation | 3 | 8.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Grading | 4 | 10.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 8 | 230.00 | 34.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 6 | 15.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 46.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

## 3.2 Demolition - 2017

**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 | | | | | 2.4009 | 0.0000 | 2.4009 | 0.3636 | 0.0000 | 0.3636 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.7216 | 26.5855 | 20.8712 | 0.0245 | | 1.6062 | 1.6062 | | 1.5022 | 1.5022 | | 2,457.468 2 | 2,457.468 2 | 0.6235 | | 2,470.562 0 |
| **Total** | **2.7216** | **26.5855** | **20.8712** | **0.0245** | **2.4009** | **1.6062** | **4.0071** | **0.3636** | **1.5022** | **1.8658** | | **2,457.468 2** | **2,457.468 2** | **0.6235** | | **2,470.562 0** |

### 3.2 Demolition - 2017

**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 | 0.2010 | 2.7362 | 2.0890 | 8.1800e-003 | 0.1908 | 0.0369 | 0.2277 | 0.0523 | 0.0339 | 0.0861 | | 811.2217 | 811.2217 | 5.6200e-003 | | 811.3396 |
| 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 | 0.0413 | 0.0485 | 0.5260 | 1.3500e-003 | 0.1068 | 7.8000e-004 | 0.1076 | 0.0283 | 7.2000e-004 | 0.0290 | | 108.5523 | 108.5523 | 5.2300e-003 | | 108.6622 |
| **Total** | **0.2423** | **2.7847** | **2.6150** | **9.5300e-003** | **0.2976** | **0.0376** | **0.3352** | **0.0806** | **0.0346** | **0.1152** | | **919.7740** | **919.7740** | **0.0109** | | **920.0018** |

**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 | | | | | 2.4009 | 0.0000 | 2.4009 | 0.3636 | 0.0000 | 0.3636 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.7216 | 26.5855 | 20.8712 | 0.0245 | | 1.6062 | 1.6062 | | 1.5022 | 1.5022 | 0.0000 | 2,457.4682 | 2,457.4682 | 0.6235 | | 2,470.5620 |
| **Total** | **2.7216** | **26.5855** | **20.8712** | **0.0245** | **2.4009** | **1.6062** | **4.0071** | **0.3636** | **1.5022** | **1.8658** | **0.0000** | **2,457.4682** | **2,457.4682** | **0.6235** | | **2,470.5620** |

## 3.2 Demolition - 2017

**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 | 0.2010 | 2.7362 | 2.0890 | 8.1800e-003 | 0.1908 | 0.0369 | 0.2277 | 0.0523 | 0.0339 | 0.0861 | | 811.2217 | 811.2217 | 5.6200e-003 | | 811.3396 |
| 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 | 0.0413 | 0.0485 | 0.5260 | 1.3500e-003 | 0.1068 | 7.8000e-004 | 0.1076 | 0.0283 | 7.2000e-004 | 0.0290 | | 108.5523 | 108.5523 | 5.2300e-003 | | 108.6622 |
| **Total** | **0.2423** | **2.7847** | **2.6150** | **9.5300e-003** | **0.2976** | **0.0376** | **0.3352** | **0.0806** | **0.0346** | **0.1152** | | **919.7740** | **919.7740** | **0.0109** | | **920.0018** |

## 3.3 Site Preparation - 2017

**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 | | | | | 0.4772 | 0.0000 | 0.4772 | 0.0515 | 0.0000 | 0.0515 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.5289 | 28.6230 | 17.1310 | 0.0238 | | 1.3967 | 1.3967 | | 1.2850 | 1.2850 | | 2,439.4360 | 2,439.4360 | 0.7474 | | 2,455.1322 |
| **Total** | **2.5289** | **28.6230** | **17.1310** | **0.0238** | **0.4772** | **1.3967** | **1.8739** | **0.0515** | **1.2850** | **1.3365** | | **2,439.4360** | **2,439.4360** | **0.7474** | | **2,455.1322** |

## 3.3 Site Preparation - 2017

**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 | 0.0254 | 0.0298 | 0.3237 | 8.3000e-004 | 0.0657 | 4.8000e-004 | 0.0662 | 0.0174 | 4.4000e-004 | 0.0179 | | 66.8014 | 66.8014 | 3.2200e-003 | | 66.8690 |
| **Total** | **0.0254** | **0.0298** | **0.3237** | **8.3000e-004** | **0.0657** | **4.8000e-004** | **0.0662** | **0.0174** | **4.4000e-004** | **0.0179** | | **66.8014** | **66.8014** | **3.2200e-003** | | **66.8690** |

**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 | | | | | 0.4772 | 0.0000 | 0.4772 | 0.0515 | 0.0000 | 0.0515 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.5289 | 28.6230 | 17.1310 | 0.0238 | | 1.3967 | 1.3967 | | 1.2850 | 1.2850 | 0.0000 | 2,439.4360 | 2,439.4360 | 0.7474 | | 2,455.1322 |
| **Total** | **2.5289** | **28.6230** | **17.1310** | **0.0238** | **0.4772** | **1.3967** | **1.8739** | **0.0515** | **1.2850** | **1.3365** | **0.0000** | **2,439.4360** | **2,439.4360** | **0.7474** | | **2,455.1322** |

## 3.3 Site Preparation - 2017

**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 | 0.0254 | 0.0298 | 0.3237 | 8.3000e-004 | 0.0657 | 4.8000e-004 | 0.0662 | 0.0174 | 4.4000e-004 | 0.0179 | | 66.8014 | 66.8014 | 3.2200e-003 | | 66.8690 |
| **Total** | **0.0254** | **0.0298** | **0.3237** | **8.3000e-004** | **0.0657** | **4.8000e-004** | **0.0662** | **0.0174** | **4.4000e-004** | **0.0179** | | **66.8014** | **66.8014** | **3.2200e-003** | | **66.8690** |

## 3.4 Grading - 2017

**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 | | | | | 6.0466 | 0.0000 | 6.0466 | 3.3129 | 0.0000 | 3.3129 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.6973 | 28.1608 | 18.9679 | 0.0206 | | 1.5550 | 1.5550 | | 1.4306 | 1.4306 | | 2,104.5737 | 2,104.5737 | 0.6448 | | 2,118.1153 |
| **Total** | **2.6973** | **28.1608** | **18.9679** | **0.0206** | **6.0466** | **1.5550** | **7.6016** | **3.3129** | **1.4306** | **4.7435** | | **2,104.5737** | **2,104.5737** | **0.6448** | | **2,118.1153** |

### 3.4 Grading - 2017

**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 | 0.0318 | 0.0373 | 0.4046 | 1.0400e-003 | 0.0822 | 6.0000e-004 | 0.0827 | 0.0218 | 5.5000e-004 | 0.0223 | | 83.5017 | 83.5017 | 4.0300e-003 | | 83.5863 |
| **Total** | **0.0318** | **0.0373** | **0.4046** | **1.0400e-003** | **0.0822** | **6.0000e-004** | **0.0827** | **0.0218** | **5.5000e-004** | **0.0223** | | **83.5017** | **83.5017** | **4.0300e-003** | | **83.5863** |

**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 | | | | | 6.0466 | 0.0000 | 6.0466 | 3.3129 | 0.0000 | 3.3129 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.6973 | 28.1608 | 18.9679 | 0.0206 | | 1.5550 | 1.5550 | | 1.4306 | 1.4306 | 0.0000 | 2,104.573 7 | 2,104.573 7 | 0.6448 | | 2,118.115 3 |
| **Total** | **2.6973** | **28.1608** | **18.9679** | **0.0206** | **6.0466** | **1.5550** | **7.6016** | **3.3129** | **1.4306** | **4.7435** | **0.0000** | **2,104.573 7** | **2,104.573 7** | **0.6448** | | **2,118.115 3** |

## 3.4 Grading - 2017

**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 | 0.0318 | 0.0373 | 0.4046 | 1.0400e-003 | 0.0822 | 6.0000e-004 | 0.0827 | 0.0218 | 5.5000e-004 | 0.0223 | | 83.5017 | 83.5017 | 4.0300e-003 | | 83.5863 |
| **Total** | **0.0318** | **0.0373** | **0.4046** | **1.0400e-003** | **0.0822** | **6.0000e-004** | **0.0827** | **0.0218** | **5.5000e-004** | **0.0223** | | **83.5017** | **83.5017** | **4.0300e-003** | | **83.5863** |

## 3.5 Building Construction - 2017

**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 | 3.3275 | 22.8585 | 16.2492 | 0.0249 | | 1.4621 | 1.4621 | | 1.3998 | 1.3998 | | 2,334.8503 | 2,334.8503 | 0.5189 | | 2,345.7479 |
| **Total** | **3.3275** | **22.8585** | **16.2492** | **0.0249** | | **1.4621** | **1.4621** | | **1.3998** | **1.3998** | | **2,334.8503** | **2,334.8503** | **0.5189** | | **2,345.7479** |

## 3.5 Building Construction - 2017

### 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 | 0.3251 | 2.8815 | 3.5501 | 8.0800e-003 | 0.2257 | 0.0423 | 0.2680 | 0.0644 | 0.0389 | 0.1033 | | 797.4968 | 797.4968 | 5.9300e-003 | | 797.6212 |
| Worker | 0.7307 | 0.8575 | 9.3067 | 0.0239 | 1.8894 | 0.0137 | 1.9031 | 0.5012 | 0.0127 | 0.5138 | | 1,920.5401 | 1,920.5401 | 0.0926 | | 1,922.4848 |
| **Total** | **1.0558** | **3.7390** | **12.8568** | **0.0320** | **2.1151** | **0.0560** | **2.1711** | **0.5656** | **0.0516** | **0.6171** | | **2,718.0369** | **2,718.0369** | **0.0985** | | **2,720.1060** |

### 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 | 3.3275 | 22.8585 | 16.2492 | 0.0249 | | 1.4621 | 1.4621 | | 1.3998 | 1.3998 | 0.0000 | 2,334.8503 | 2,334.8503 | 0.5189 | | 2,345.7479 |
| **Total** | **3.3275** | **22.8585** | **16.2492** | **0.0249** | | **1.4621** | **1.4621** | | **1.3998** | **1.3998** | **0.0000** | **2,334.8503** | **2,334.8503** | **0.5189** | | **2,345.7479** |

## 3.5 Building Construction - 2017

**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 | 0.3251 | 2.8815 | 3.5501 | 8.0800e-003 | 0.2257 | 0.0423 | 0.2680 | 0.0644 | 0.0389 | 0.1033 | | 797.4968 | 797.4968 | 5.9300e-003 | | 797.6212 |
| Worker | 0.7307 | 0.8575 | 9.3067 | 0.0239 | 1.8894 | 0.0137 | 1.9031 | 0.5012 | 0.0127 | 0.5138 | | 1,920.5401 | 1,920.5401 | 0.0926 | | 1,922.4848 |
| **Total** | **1.0558** | **3.7390** | **12.8568** | **0.0320** | **2.1151** | **0.0560** | **2.1711** | **0.5656** | **0.0516** | **0.6171** | | **2,718.0369** | **2,718.0369** | **0.0985** | | **2,720.1060** |

## 3.5 Building Construction - 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 | 2.9004 | 20.5600 | 15.6637 | 0.0249 | | 1.2511 | 1.2511 | | 1.1992 | 1.1992 | | 2,317.2089 | 2,317.2089 | 0.4980 | | 2,327.6664 |
| **Total** | **2.9004** | **20.5600** | **15.6637** | **0.0249** | | **1.2511** | **1.2511** | | **1.1992** | **1.1992** | | **2,317.2089** | **2,317.2089** | **0.4980** | | **2,327.6664** |

## 3.5 Building Construction - 2018

**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 | 0.3060 | 2.6028 | 3.3829 | 8.0600e-003 | 0.2257 | 0.0393 | 0.2649 | 0.0644 | 0.0361 | 0.1005 | | 783.8024 | 783.8024 | 5.8100e-003 | | 783.9244 |
| Worker | 0.6662 | 0.7825 | 8.4479 | 0.0239 | 1.8894 | 0.0135 | 1.9029 | 0.5012 | 0.0125 | 0.5136 | | 1,848.5015 | 1,848.5015 | 0.0861 | | 1,850.3103 |
| **Total** | **0.9722** | **3.3853** | **11.8308** | **0.0320** | **2.1151** | **0.0528** | **2.1678** | **0.5655** | **0.0486** | **0.6141** | | **2,632.3039** | **2,632.3039** | **0.0920** | | **2,634.2347** |

**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 | 2.9004 | 20.5600 | 15.6637 | 0.0249 | | 1.2511 | 1.2511 | | 1.1992 | 1.1992 | 0.0000 | 2,317.2089 | 2,317.2089 | 0.4980 | | 2,327.6664 |
| **Total** | **2.9004** | **20.5600** | **15.6637** | **0.0249** | | **1.2511** | **1.2511** | | **1.1992** | **1.1992** | **0.0000** | **2,317.2089** | **2,317.2089** | **0.4980** | | **2,327.6664** |

## 3.5 Building Construction - 2018

**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 | 0.3060 | 2.6028 | 3.3829 | 8.0600e-003 | 0.2257 | 0.0393 | 0.2649 | 0.0644 | 0.0361 | 0.1005 | | 783.8024 | 783.8024 | 5.8100e-003 | | 783.9244 |
| Worker | 0.6662 | 0.7825 | 8.4479 | 0.0239 | 1.8894 | 0.0135 | 1.9029 | 0.5012 | 0.0125 | 0.5136 | | 1,848.5015 | 1,848.5015 | 0.0861 | | 1,850.3103 |
| **Total** | **0.9722** | **3.3853** | **11.8308** | **0.0320** | **2.1151** | **0.0528** | **2.1678** | **0.5655** | **0.0486** | **0.6141** | | **2,632.3039** | **2,632.3039** | **0.0920** | | **2,634.2347** |

## 3.6 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 | 1.3885 | 14.0727 | 11.8278 | 0.0176 | | 0.8417 | 0.8417 | | 0.7755 | 0.7755 | | 1,749.8334 | 1,749.8334 | 0.5343 | | 1,761.0529 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **1.3885** | **14.0727** | **11.8278** | **0.0176** | | **0.8417** | **0.8417** | | **0.7755** | **0.7755** | | **1,749.8334** | **1,749.8334** | **0.5343** | | **1,761.0529** |

## 3.6 Paving - 2018

**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 | 0.0435 | 0.0510 | 0.5510 | 1.5600e-003 | 0.1232 | 8.8000e-004 | 0.1241 | 0.0327 | 8.1000e-004 | 0.0335 | | 120.5544 | 120.5544 | 5.6200e-003 | | 120.6724 |
| **Total** | **0.0435** | **0.0510** | **0.5510** | **1.5600e-003** | **0.1232** | **8.8000e-004** | **0.1241** | **0.0327** | **8.1000e-004** | **0.0335** | | **120.5544** | **120.5544** | **5.6200e-003** | | **120.6724** |

**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 | 1.3885 | 14.0727 | 11.8278 | 0.0176 | | 0.8417 | 0.8417 | | 0.7755 | 0.7755 | 0.0000 | 1,749.8334 | 1,749.8334 | 0.5343 | | 1,761.0529 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **1.3885** | **14.0727** | **11.8278** | **0.0176** | | **0.8417** | **0.8417** | | **0.7755** | **0.7755** | **0.0000** | **1,749.8334** | **1,749.8334** | **0.5343** | | **1,761.0529** |

## 3.6 Paving - 2018

**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 | 0.0435 | 0.0510 | 0.5510 | 1.5600e-003 | 0.1232 | 8.8000e-004 | 0.1241 | 0.0327 | 8.1000e-004 | 0.0335 | | 120.5544 | 120.5544 | 5.6200e-003 | | 120.6724 |
| **Total** | **0.0435** | **0.0510** | **0.5510** | **1.5600e-003** | **0.1232** | **8.8000e-004** | **0.1241** | **0.0327** | **8.1000e-004** | **0.0335** | | **120.5544** | **120.5544** | **5.6200e-003** | | **120.6724** |

## 3.7 Architectural Coating - 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 | | | | | |
| Archit. Coating | 69.3351 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.2986 | 2.0058 | 1.8542 | 2.9700e-003 | | 0.1506 | 0.1506 | | 0.1506 | 0.1506 | | 281.4485 | 281.4485 | 0.0267 | | 282.0102 |
| **Total** | **69.6338** | **2.0058** | **1.8542** | **2.9700e-003** | | **0.1506** | **0.1506** | | **0.1506** | **0.1506** | | **281.4485** | **281.4485** | **0.0267** | | **282.0102** |

## 3.7 Architectural Coating - 2018

**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 | 0.1332 | 0.1565 | 1.6896 | 4.7900e-003 | 0.3779 | 2.7000e-003 | 0.3806 | 0.1002 | 2.4900e-003 | 0.1027 | | 369.7003 | 369.7003 | 0.0172 | | 370.0621 |
| **Total** | **0.1332** | **0.1565** | **1.6896** | **4.7900e-003** | **0.3779** | **2.7000e-003** | **0.3806** | **0.1002** | **2.4900e-003** | **0.1027** | | **369.7003** | **369.7003** | **0.0172** | | **370.0621** |

**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 | | | | | |
| Archit. Coating | 69.3351 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.2986 | 2.0058 | 1.8542 | 2.9700e-003 | | 0.1506 | 0.1506 | | 0.1506 | 0.1506 | 0.0000 | 281.4485 | 281.4485 | 0.0267 | | 282.0102 |
| **Total** | **69.6338** | **2.0058** | **1.8542** | **2.9700e-003** | | **0.1506** | **0.1506** | | **0.1506** | **0.1506** | **0.0000** | **281.4485** | **281.4485** | **0.0267** | | **282.0102** |

### 3.7 Architectural Coating - 2018

**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 | 0.1332 | 0.1565 | 1.6896 | 4.7900e-003 | 0.3779 | 2.7000e-003 | 0.3806 | 0.1002 | 2.4900e-003 | 0.1027 | | 369.7003 | 369.7003 | 0.0172 | | 370.0621 |
| **Total** | **0.1332** | **0.1565** | **1.6896** | **4.7900e-003** | **0.3779** | **2.7000e-003** | **0.3806** | **0.1002** | **2.4900e-003** | **0.1027** | | **369.7003** | **369.7003** | **0.0172** | | **370.0621** |

## 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 | 4.4313 | 7.4429 | 37.4074 | 0.0989 | 6.5768 | 0.1116 | 6.6884 | 1.7556 | 0.1030 | 1.8586 | | 7,552.842 2 | 7,552.842 2 | 0.2900 | | 7,558.932 0 |
| Unmitigated | 4.4313 | 7.4429 | 37.4074 | 0.0989 | 6.5768 | 0.1116 | 6.6884 | 1.7556 | 0.1030 | 1.8586 | | 7,552.842 2 | 7,552.842 2 | 0.2900 | | 7,558.932 0 |

## 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 1,269.90 | 1,269.90 | 1269.90 | 2,380,786 | 2,380,786 |
| Condo/Townhouse High Rise | 357.00 | 357.00 | 357.00 | 669,297 | 669,297 |
| Strip Mall | 50.00 | 50.00 | 50.00 | 58,325 | 58,325 |
| Total | 1,676.90 | 1,676.90 | 1,676.90 | 3,108,408 | 3,108,408 |

## 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-W | H-S or C-C | H-O or C-NW | Primary | Diverted | Pass-by |
| Apartments Mid Rise | 5.80 | 5.80 | 5.80 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |
| Condo/Townhouse High Rise | 5.80 | 5.80 | 5.80 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |
| Strip Mall | 5.80 | 5.80 | 5.80 | 16.60 | 64.40 | 19.00 | 45 | 40 | 15 |

## 4.4 Fleet Mix

| LDA | LDT1 | LDT2 | MDV | LHD1 | LHD2 | MHD | HHD | OBUS | UBUS | MCY | SBUS | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.513300 | 0.073549 | 0.191092 | 0.130830 | 0.036094 | 0.005140 | 0.012550 | 0.022916 | 0.001871 | 0.002062 | 0.006564 | 0.000586 | 0.003446 |

# 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 | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| NaturalGas Unmitigated | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |

## 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 | lb/day | | | | | | | | | | lb/day | | | | | |
| Strip Mall | 9.41096 | 1.0000e-004 | 9.2000e-004 | 7.8000e-004 | 1.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 1.1072 | 1.1072 | 2.0000e-005 | 2.0000e-005 | 1.1139 |
| Apartments Mid Rise | 3641.06 | 0.0393 | 0.3356 | 0.1428 | 2.1400e-003 | | 0.0271 | 0.0271 | | 0.0271 | 0.0271 | | 428.3595 | 428.3595 | 8.2100e-003 | 7.8500e-003 | 430.9664 |
| Condo/Townhouse High Rise | 2560.48 | 0.0276 | 0.2360 | 0.1004 | 1.5100e-003 | | 0.0191 | 0.0191 | | 0.0191 | 0.0191 | | 301.2324 | 301.2324 | 5.7700e-003 | 5.5200e-003 | 303.0656 |
| **Total** | | **0.0670** | **0.5724** | **0.2440** | **3.6600e-003** | | **0.0463** | **0.0463** | | **0.0463** | **0.0463** | | **730.6990** | **730.6990** | **0.0140** | **0.0134** | **735.1459** |

### 5.2 Energy by Land Use - NaturalGas

**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 | | | | | |
| Strip Mall | 0.0094109 6 | 1.0000e-004 | 9.2000e-004 | 7.8000e-004 | 1.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 1.1072 | 1.1072 | 2.0000e-005 | 2.0000e-005 | 1.1139 |
| Apartments Mid Rise | 3.64106 | 0.0393 | 0.3356 | 0.1428 | 2.1400e-003 | | 0.0271 | 0.0271 | | 0.0271 | 0.0271 | | 428.3595 | 428.3595 | 8.2100e-003 | 7.8500e-003 | 430.9664 |
| Condo/Townhouse High Rise | 2.56048 | 0.0276 | 0.2360 | 0.1004 | 1.5100e-003 | | 0.0191 | 0.0191 | | 0.0191 | 0.0191 | | 301.2324 | 301.2324 | 5.7700e-003 | 5.5200e-003 | 303.0656 |
| **Total** | | **0.0670** | **0.5724** | **0.2440** | **3.6600e-003** | | **0.0463** | **0.0463** | | **0.0463** | **0.0463** | | **730.6990** | **730.6990** | **0.0140** | **0.0134** | **735.1459** |

## 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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Unmitigated | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |

## 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 | 1.2347 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 6.8587 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.8041 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | | 47.3885 | 47.3885 | 0.0462 | | 48.3589 |
| **Total** | **8.8975** | **0.3054** | **26.4055** | **1.3900e-003** | | **0.1452** | **0.1452** | | **0.1452** | **0.1452** | **0.0000** | **47.3885** | **47.3885** | **0.0462** | **0.0000** | **48.3589** |

### 6.2 Area by SubCategory

**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 | 1.2347 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 6.8587 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.8041 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | | 47.3885 | 47.3885 | 0.0462 | | 48.3589 |
| **Total** | **8.8975** | **0.3054** | **26.4055** | **1.3900e-003** | | **0.1452** | **0.1452** | | **0.1452** | **0.1452** | **0.0000** | **47.3885** | **47.3885** | **0.0462** | **0.0000** | **48.3589** |

## 7.0 Water Detail

### 7.1 Mitigation Measures Water

Apply Water Conservation Strategy

## 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 Vegetation

# 7916 Friars Road Mixed-Use Residential

## San Diego County APCD Air District, Winter

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Apartments Mid Rise | 249.00 | Dwelling Unit | 1.68 | 249,000.00 | 712 |
| Condo/Townhouse High Rise | 70.00 | Dwelling Unit | 1.09 | 70,000.00 | 200 |
| Strip Mall | 1.50 | 1000sqft | 0.03 | 1,500.00 | 0 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.6 | **Precipitation Freq (Days)** | 40 |
| **Climate Zone** | 13 | | | **Operational Year** | 2020 |
| **Utility Company** | San Diego Gas & Electric | | | | |
| **CO2 Intensity (lb/MWhr)** | 556.22 | **CH4 Intensity (lb/MWhr)** | 0.022 | **N2O Intensity (lb/MWhr)** | 0.005 |

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics - RPS 33% goal
CalEEMod accounts for 10.2%
Additional 22.8% reduction applied

Land Use - 2.8 acres disturbance

Construction Phase - Approximately 2 years construction

Demolition -

Architectural Coating - SDAPCD VOC content limit = 150 g/L exterior, 100 g/L interior

Vehicle Trips - 1,270 apartment trips
357 condo trips
50 retail space trips
5.8 mile trip length

Woodstoves - No woodstoves or fireplaces

Area Coating - SDAPCD VOC content limit = 150 g/L exterior, 100 g/L interior

Energy Use - 2013 Title 24:
23.3% increased electricity efficiency
3.8% increase natural gas efficiency

Water Mitigation -

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblArchitecturalCoating | EF_Nonresidential_Exterior | 250.00 | 150.00 |
| tblArchitecturalCoating | EF_Nonresidential_Interior | 250.00 | 100.00 |
| tblArchitecturalCoating | EF_Residential_Exterior | 250.00 | 150.00 |
| tblArchitecturalCoating | EF_Residential_Interior | 250.00 | 100.00 |
| tblAreaCoating | Area_EF_Nonresidential_Exterior | 250 | 150 |
| tblAreaCoating | Area_EF_Nonresidential_Interior | 250 | 100 |
| tblAreaCoating | Area_EF_Residential_Exterior | 250 | 150 |
| tblAreaCoating | Area_EF_Residential_Interior | 250 | 100 |
| tblAreaMitigation | UseLowVOCPaintNonresidentialExteriorValue | 150 | 250 |
| tblConstructionPhase | NumDays | 10.00 | 65.00 |
| tblConstructionPhase | NumDays | 6.00 | 130.00 |
| tblConstructionPhase | NumDays | 10.00 | 20.00 |

| | | | |
|---|---|---|---|
| tblConstructionPhase | NumDays | 3.00 | 10.00 |
| tblEnergyUse | T24E | 160.77 | 123.31 |
| tblEnergyUse | T24E | 206.69 | 158.53 |
| tblEnergyUse | T24NG | 3,820.47 | 3,675.29 |
| tblEnergyUse | T24NG | 10,789.48 | 10,349.48 |
| tblFireplaces | NumberGas | 136.95 | 0.00 |
| tblFireplaces | NumberGas | 38.50 | 0.00 |
| tblFireplaces | NumberWood | 87.15 | 0.00 |
| tblFireplaces | NumberWood | 24.50 | 0.00 |
| tblGrading | AcresOfGrading | 65.00 | 3.00 |
| tblGrading | AcresOfGrading | 15.00 | 4.50 |
| tblLandUse | LotAcreage | 6.55 | 1.68 |
| tblProjectCharacteristics | CH4IntensityFactor | 0.029 | 0.022 |
| tblProjectCharacteristics | CO2IntensityFactor | 720.49 | 556.22 |
| tblProjectCharacteristics | N2OIntensityFactor | 0.006 | 0.005 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2020 |
| tblVehicleTrips | CC_TL | 7.30 | 5.80 |
| tblVehicleTrips | CNW_TL | 7.30 | 5.80 |
| tblVehicleTrips | CW_TL | 9.50 | 5.80 |
| tblVehicleTrips | HO_TL | 7.50 | 5.80 |
| tblVehicleTrips | HO_TL | 7.50 | 5.80 |
| tblVehicleTrips | HS_TL | 7.30 | 5.80 |
| tblVehicleTrips | HS_TL | 7.30 | 5.80 |
| tblVehicleTrips | HW_TL | 10.80 | 5.80 |
| tblVehicleTrips | HW_TL | 10.80 | 5.80 |
| tblVehicleTrips | ST_TR | 7.16 | 5.10 |
| tblVehicleTrips | ST_TR | 7.16 | 5.10 |
| tblVehicleTrips | ST_TR | 42.04 | 33.33 |

| | | | |
|---|---|---|---|
| tblVehicleTrips | SU_TR | 6.07 | 5.10 |
| tblVehicleTrips | SU_TR | 6.07 | 5.10 |
| tblVehicleTrips | SU_TR | 20.43 | 33.33 |
| tblVehicleTrips | WD_TR | 6.59 | 5.10 |
| tblVehicleTrips | WD_TR | 6.59 | 5.10 |
| tblVehicleTrips | WD_TR | 44.32 | 33.33 |
| tblWoodstoves | NumberCatalytic | 12.45 | 0.00 |
| tblWoodstoves | NumberCatalytic | 3.50 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 12.45 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 3.50 | 0.00 |

## 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 | | | | | |
| 2017 | 4.4745 | 29.4642 | 30.0674 | 0.0554 | 6.1287 | 1.6439 | 7.6843 | 3.3347 | 1.5369 | 4.7658 | 0.0000 | 4,929.7542 | 4,929.7542 | 0.7507 | 0.0000 | 4,945.5180 |
| 2018 | 69.7741 | 24.1012 | 28.4049 | 0.0554 | 2.1151 | 1.3042 | 3.4193 | 0.5655 | 1.2482 | 1.8137 | 0.0000 | 4,830.7689 | 4,830.7689 | 0.5901 | 0.0000 | 4,843.1608 |
| **Total** | **74.2486** | **53.5654** | **58.4722** | **0.1108** | **8.2438** | **2.9482** | **11.1036** | **3.9002** | **2.7851** | **6.5795** | **0.0000** | **9,760.5231** | **9,760.5231** | **1.3408** | **0.0000** | **9,788.6788** |

### 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 | | | | | |
| 2017 | 4.4745 | 29.4642 | 30.0674 | 0.0554 | 6.1287 | 1.6439 | 7.6843 | 3.3347 | 1.5369 | 4.7658 | 0.0000 | 4,929.7542 | 4,929.7542 | 0.7507 | 0.0000 | 4,945.5180 |
| 2018 | 69.7741 | 24.1012 | 28.4049 | 0.0554 | 2.1151 | 1.3042 | 3.4193 | 0.5655 | 1.2482 | 1.8137 | 0.0000 | 4,830.7689 | 4,830.7689 | 0.5901 | 0.0000 | 4,843.1608 |
| **Total** | **74.2486** | **53.5654** | **58.4722** | **0.1108** | **8.2438** | **2.9482** | **11.1036** | **3.9002** | **2.7851** | **6.5795** | **0.0000** | **9,760.5231** | **9,760.5231** | **1.3408** | **0.0000** | **9,788.6788** |

| | **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** |

## 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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Energy | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| Mobile | 4.7426 | 7.8972 | 40.9610 | 0.0941 | 6.5768 | 0.1122 | 6.6890 | 1.7556 | 0.1035 | 1.8591 | | 7,193.8458 | 7,193.8458 | 0.2904 | | 7,199.9434 |
| **Total** | **13.7071** | **8.7750** | **67.6105** | **0.0991** | **6.5768** | **0.3036** | **6.8804** | **1.7556** | **0.2950** | **2.0506** | **0.0000** | **7,971.9333** | **7,971.9333** | **0.3506** | **0.0134** | **7,983.4482** |

**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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Energy | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| Mobile | 4.7426 | 7.8972 | 40.9610 | 0.0941 | 6.5768 | 0.1122 | 6.6890 | 1.7556 | 0.1035 | 1.8591 | | 7,193.8458 | 7,193.8458 | 0.2904 | | 7,199.9434 |
| **Total** | **13.7071** | **8.7750** | **67.6105** | **0.0991** | **6.5768** | **0.3036** | **6.8804** | **1.7556** | **0.2950** | **2.0506** | **0.0000** | **7,971.9333** | **7,971.9333** | **0.3506** | **0.0134** | **7,983.4482** |

| | 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 | Demolition | Demolition | 1/1/2017 | 1/27/2017 | 5 | 20 | |
| 2 | Site Preparation | Site Preparation | 1/28/2017 | 2/10/2017 | 5 | 10 | |
| 3 | Grading | Grading | 2/11/2017 | 8/11/2017 | 5 | 130 | |
| 4 | Building Construction | Building Construction | 8/12/2017 | 6/15/2018 | 5 | 220 | |
| 5 | Paving | Paving | 6/16/2018 | 7/13/2018 | 5 | 20 | |
| 6 | Architectural Coating | Architectural Coating | 7/14/2018 | 10/12/2018 | 5 | 65 | |

**Acres of Grading (Site Preparation Phase): 4.5**

**Acres of Grading (Grading Phase): 3**

**Acres of Paving: 0**

**Residential Indoor: 645,975; Residential Outdoor: 215,325; Non-Residential Indoor: 2,250; Non-Residential Outdoor: 750 (Architectural Coating – sqft)**

### OffRoad Equipment

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Demolition | Concrete/Industrial Saws | 1 | 8.00 | 81 | 0.73 |
| Demolition | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Demolition | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| Site Preparation | Graders | 1 | 8.00 | 174 | 0.41 |
| Site Preparation | Scrapers | 1 | 8.00 | 361 | 0.48 |
| Site Preparation | Tractors/Loaders/Backhoes | 1 | 7.00 | 97 | 0.37 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 2 | 7.00 | 97 | 0.37 |
| Building Construction | Cranes | 1 | 8.00 | 226 | 0.29 |
| Building Construction | Forklifts | 2 | 7.00 | 89 | 0.20 |
| Building Construction | Generator Sets | 1 | 8.00 | 84 | 0.74 |
| Building Construction | Tractors/Loaders/Backhoes | 1 | 6.00 | 97 | 0.37 |
| Building Construction | Welders | 3 | 8.00 | 46 | 0.45 |
| Paving | Cement and Mortar Mixers | 1 | 8.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 1 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| Architectural Coating | Air Compressors | 1 | 6.00 | 78 | 0.48 |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Demolition | 5 | 13.00 | 0.00 | 219.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Site Preparation | 3 | 8.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Grading | 4 | 10.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 8 | 230.00 | 34.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 6 | 15.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 46.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

## 3.2 Demolition - 2017

**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 | | | | | 2.4009 | 0.0000 | 2.4009 | 0.3636 | 0.0000 | 0.3636 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.7216 | 26.5855 | 20.8712 | 0.0245 | | 1.6062 | 1.6062 | | 1.5022 | 1.5022 | | 2,457.468 2 | 2,457.468 2 | 0.6235 | | 2,470.562 0 |
| **Total** | **2.7216** | **26.5855** | **20.8712** | **0.0245** | **2.4009** | **1.6062** | **4.0071** | **0.3636** | **1.5022** | **1.8658** | | **2,457.468 2** | **2,457.468 2** | **0.6235** | | **2,470.562 0** |

## 3.2 Demolition - 2017

**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 | 0.2230 | 2.8244 | 2.7152 | 8.1700e-003 | 0.1908 | 0.0369 | 0.2278 | 0.0523 | 0.0340 | 0.0862 | | 809.3164 | 809.3164 | 5.6900e-003 | | 809.4359 |
| 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 | 0.0436 | 0.0544 | 0.5085 | 1.2700e-003 | 0.1068 | 7.8000e-004 | 0.1076 | 0.0283 | 7.2000e-004 | 0.0290 | | 101.9393 | 101.9393 | 5.2300e-003 | | 102.0492 |
| **Total** | **0.2667** | **2.8788** | **3.2237** | **9.4400e-003** | **0.2976** | **0.0377** | **0.3353** | **0.0806** | **0.0347** | **0.1153** | | **911.2556** | **911.2556** | **0.0109** | | **911.4851** |

**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 | | | | | 2.4009 | 0.0000 | 2.4009 | 0.3636 | 0.0000 | 0.3636 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.7216 | 26.5855 | 20.8712 | 0.0245 | | 1.6062 | 1.6062 | | 1.5022 | 1.5022 | 0.0000 | 2,457.4682 | 2,457.4682 | 0.6235 | | 2,470.5620 |
| **Total** | **2.7216** | **26.5855** | **20.8712** | **0.0245** | **2.4009** | **1.6062** | **4.0071** | **0.3636** | **1.5022** | **1.8658** | **0.0000** | **2,457.4682** | **2,457.4682** | **0.6235** | | **2,470.5620** |

## 3.2 Demolition - 2017

**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 | 0.2230 | 2.8244 | 2.7152 | 8.1700e-003 | 0.1908 | 0.0369 | 0.2278 | 0.0523 | 0.0340 | 0.0862 | | 809.3164 | 809.3164 | 5.6900e-003 | | 809.4359 |
| 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 | 0.0436 | 0.0544 | 0.5085 | 1.2700e-003 | 0.1068 | 7.8000e-004 | 0.1076 | 0.0283 | 7.2000e-004 | 0.0290 | | 101.9393 | 101.9393 | 5.2300e-003 | | 102.0492 |
| **Total** | **0.2667** | **2.8788** | **3.2237** | **9.4400e-003** | **0.2976** | **0.0377** | **0.3353** | **0.0806** | **0.0347** | **0.1153** | | **911.2556** | **911.2556** | **0.0109** | | **911.4851** |

## 3.3 Site Preparation - 2017

**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 | | | | | 0.4772 | 0.0000 | 0.4772 | 0.0515 | 0.0000 | 0.0515 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.5289 | 28.6230 | 17.1310 | 0.0238 | | 1.3967 | 1.3967 | | 1.2850 | 1.2850 | | 2,439.4360 | 2,439.4360 | 0.7474 | | 2,455.1322 |
| **Total** | **2.5289** | **28.6230** | **17.1310** | **0.0238** | **0.4772** | **1.3967** | **1.8739** | **0.0515** | **1.2850** | **1.3365** | | **2,439.4360** | **2,439.4360** | **0.7474** | | **2,455.1322** |

## 3.3 Site Preparation - 2017

**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 | 0.0269 | 0.0335 | 0.3129 | 7.8000e-004 | 0.0657 | 4.8000e-004 | 0.0662 | 0.0174 | 4.4000e-004 | 0.0179 | | 62.7319 | 62.7319 | 3.2200e-003 | | 62.7995 |
| **Total** | **0.0269** | **0.0335** | **0.3129** | **7.8000e-004** | **0.0657** | **4.8000e-004** | **0.0662** | **0.0174** | **4.4000e-004** | **0.0179** | | **62.7319** | **62.7319** | **3.2200e-003** | | **62.7995** |

**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 | | | | | 0.4772 | 0.0000 | 0.4772 | 0.0515 | 0.0000 | 0.0515 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.5289 | 28.6230 | 17.1310 | 0.0238 | | 1.3967 | 1.3967 | | 1.2850 | 1.2850 | 0.0000 | 2,439.4360 | 2,439.4360 | 0.7474 | | 2,455.1322 |
| **Total** | **2.5289** | **28.6230** | **17.1310** | **0.0238** | **0.4772** | **1.3967** | **1.8739** | **0.0515** | **1.2850** | **1.3365** | **0.0000** | **2,439.4360** | **2,439.4360** | **0.7474** | | **2,455.1322** |

## 3.3 Site Preparation - 2017

**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 | 0.0269 | 0.0335 | 0.3129 | 7.8000e-004 | 0.0657 | 4.8000e-004 | 0.0662 | 0.0174 | 4.4000e-004 | 0.0179 | | 62.7319 | 62.7319 | 3.2200e-003 | | 62.7995 |
| **Total** | **0.0269** | **0.0335** | **0.3129** | **7.8000e-004** | **0.0657** | **4.8000e-004** | **0.0662** | **0.0174** | **4.4000e-004** | **0.0179** | | **62.7319** | **62.7319** | **3.2200e-003** | | **62.7995** |

## 3.4 Grading - 2017

**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 | | | | | 6.0466 | 0.0000 | 6.0466 | 3.3129 | 0.0000 | 3.3129 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.6973 | 28.1608 | 18.9679 | 0.0206 | | 1.5550 | 1.5550 | | 1.4306 | 1.4306 | | 2,104.573 7 | 2,104.573 7 | 0.6448 | | 2,118.115 3 |
| **Total** | **2.6973** | **28.1608** | **18.9679** | **0.0206** | **6.0466** | **1.5550** | **7.6016** | **3.3129** | **1.4306** | **4.7435** | | **2,104.573 7** | **2,104.573 7** | **0.6448** | | **2,118.115 3** |

## 3.4 Grading - 2017

**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 | 0.0336 | 0.0418 | 0.3912 | 9.8000e-004 | 0.0822 | 6.0000e-004 | 0.0827 | 0.0218 | 5.5000e-004 | 0.0223 | | 78.4148 | 78.4148 | 4.0300e-003 | | 78.4994 |
| **Total** | **0.0336** | **0.0418** | **0.3912** | **9.8000e-004** | **0.0822** | **6.0000e-004** | **0.0827** | **0.0218** | **5.5000e-004** | **0.0223** | | **78.4148** | **78.4148** | **4.0300e-003** | | **78.4994** |

**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 | | | | | 6.0466 | 0.0000 | 6.0466 | 3.3129 | 0.0000 | 3.3129 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.6973 | 28.1608 | 18.9679 | 0.0206 | | 1.5550 | 1.5550 | | 1.4306 | 1.4306 | 0.0000 | 2,104.5737 | 2,104.5737 | 0.6448 | | 2,118.1153 |
| **Total** | **2.6973** | **28.1608** | **18.9679** | **0.0206** | **6.0466** | **1.5550** | **7.6016** | **3.3129** | **1.4306** | **4.7435** | **0.0000** | **2,104.5737** | **2,104.5737** | **0.6448** | | **2,118.1153** |

## 3.4 Grading - 2017

**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 | 0.0336 | 0.0418 | 0.3912 | 9.8000e-004 | 0.0822 | 6.0000e-004 | 0.0827 | 0.0218 | 5.5000e-004 | 0.0223 | | 78.4148 | 78.4148 | 4.0300e-003 | | 78.4994 |
| **Total** | **0.0336** | **0.0418** | **0.3912** | **9.8000e-004** | **0.0822** | **6.0000e-004** | **0.0827** | **0.0218** | **5.5000e-004** | **0.0223** | | **78.4148** | **78.4148** | **4.0300e-003** | | **78.4994** |

## 3.5 Building Construction - 2017

**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 | 3.3275 | 22.8585 | 16.2492 | 0.0249 | | 1.4621 | 1.4621 | | 1.3998 | 1.3998 | | 2,334.8503 | 2,334.8503 | 0.5189 | | 2,345.7479 |
| **Total** | **3.3275** | **22.8585** | **16.2492** | **0.0249** | | **1.4621** | **1.4621** | | **1.3998** | **1.3998** | | **2,334.8503** | **2,334.8503** | **0.5189** | | **2,345.7479** |

## 3.5 Building Construction - 2017

**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 | 0.3749 | 2.9498 | 4.8212 | 8.0300e-003 | 0.2257 | 0.0427 | 0.2684 | 0.0644 | 0.0393 | 0.1037 | | 791.3631 | 791.3631 | 6.0900e-003 | | 791.4909 |
| Worker | 0.7721 | 0.9621 | 8.9969 | 0.0225 | 1.8894 | 0.0137 | 1.9031 | 0.5012 | 0.0127 | 0.5138 | | 1,803.5407 | 1,803.5407 | 0.0926 | | 1,805.4854 |
| **Total** | **1.1470** | **3.9119** | **13.8181** | **0.0305** | **2.1151** | **0.0565** | **2.1715** | **0.5656** | **0.0520** | **0.6175** | | **2,594.9039** | **2,594.9039** | **0.0987** | | **2,596.9763** |

**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 | 3.3275 | 22.8585 | 16.2492 | 0.0249 | | 1.4621 | 1.4621 | | 1.3998 | 1.3998 | 0.0000 | 2,334.8503 | 2,334.8503 | 0.5189 | | 2,345.7479 |
| **Total** | **3.3275** | **22.8585** | **16.2492** | **0.0249** | | **1.4621** | **1.4621** | | **1.3998** | **1.3998** | **0.0000** | **2,334.8503** | **2,334.8503** | **0.5189** | | **2,345.7479** |

## 3.5 Building Construction - 2017

**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 | 0.3749 | 2.9498 | 4.8212 | 8.0300e-003 | 0.2257 | 0.0427 | 0.2684 | 0.0644 | 0.0393 | 0.1037 | | 791.3631 | 791.3631 | 6.0900e-003 | | 791.4909 |
| Worker | 0.7721 | 0.9621 | 8.9969 | 0.0225 | 1.8894 | 0.0137 | 1.9031 | 0.5012 | 0.0127 | 0.5138 | | 1,803.5407 | 1,803.5407 | 0.0926 | | 1,805.4854 |
| **Total** | **1.1470** | **3.9119** | **13.8181** | **0.0305** | **2.1151** | **0.0565** | **2.1715** | **0.5656** | **0.0520** | **0.6175** | | **2,594.9039** | **2,594.9039** | **0.0987** | | **2,596.9763** |

## 3.5 Building Construction - 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 | 2.9004 | 20.5600 | 15.6637 | 0.0249 | | 1.2511 | 1.2511 | | 1.1992 | 1.1992 | | 2,317.2089 | 2,317.2089 | 0.4980 | | 2,327.6664 |
| **Total** | **2.9004** | **20.5600** | **15.6637** | **0.0249** | | **1.2511** | **1.2511** | | **1.1992** | **1.1992** | | **2,317.2089** | **2,317.2089** | **0.4980** | | **2,327.6664** |

## 3.5 Building Construction - 2018

**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 | 0.3515 | 2.6632 | 4.6159 | 8.0200e-003 | 0.2257 | 0.0397 | 0.2653 | 0.0644 | 0.0365 | 0.1009 | | 777.7596 | 777.7596 | 5.9700e-003 | | 777.8850 |
| Worker | 0.7017 | 0.8780 | 8.1253 | 0.0225 | 1.8894 | 0.0135 | 1.9029 | 0.5012 | 0.0125 | 0.5136 | | 1,735.8005 | 1,735.8005 | 0.0861 | | 1,737.6093 |
| **Total** | **1.0532** | **3.5411** | **12.7412** | **0.0305** | **2.1151** | **0.0532** | **2.1682** | **0.5655** | **0.0490** | **0.6145** | | **2,513.5601** | **2,513.5601** | **0.0921** | | **2,515.4943** |

**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 | 2.9004 | 20.5600 | 15.6637 | 0.0249 | | 1.2511 | 1.2511 | | 1.1992 | 1.1992 | 0.0000 | 2,317.2089 | 2,317.2089 | 0.4980 | | 2,327.6664 |
| **Total** | **2.9004** | **20.5600** | **15.6637** | **0.0249** | | **1.2511** | **1.2511** | | **1.1992** | **1.1992** | **0.0000** | **2,317.2089** | **2,317.2089** | **0.4980** | | **2,327.6664** |

## 3.5 Building Construction - 2018

**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 | 0.3515 | 2.6632 | 4.6159 | 8.0200e-003 | 0.2257 | 0.0397 | 0.2653 | 0.0644 | 0.0365 | 0.1009 | | 777.7596 | 777.7596 | 5.9700e-003 | | 777.8850 |
| Worker | 0.7017 | 0.8780 | 8.1253 | 0.0225 | 1.8894 | 0.0135 | 1.9029 | 0.5012 | 0.0125 | 0.5136 | | 1,735.8005 | 1,735.8005 | 0.0861 | | 1,737.6093 |
| **Total** | **1.0532** | **3.5411** | **12.7412** | **0.0305** | **2.1151** | **0.0532** | **2.1682** | **0.5655** | **0.0490** | **0.6145** | | **2,513.5601** | **2,513.5601** | **0.0921** | | **2,515.4943** |

## 3.6 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 | 1.3885 | 14.0727 | 11.8278 | 0.0176 | | 0.8417 | 0.8417 | | 0.7755 | 0.7755 | | 1,749.8334 | 1,749.8334 | 0.5343 | | 1,761.0529 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **1.3885** | **14.0727** | **11.8278** | **0.0176** | | **0.8417** | **0.8417** | | **0.7755** | **0.7755** | | **1,749.8334** | **1,749.8334** | **0.5343** | | **1,761.0529** |

## 3.6 Paving - 2018

**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 | 0.0458 | 0.0573 | 0.5299 | 1.4600e-003 | 0.1232 | 8.8000e-004 | 0.1241 | 0.0327 | 8.1000e-004 | 0.0335 | | 113.2044 | 113.2044 | 5.6200e-003 | | 113.3224 |
| **Total** | **0.0458** | **0.0573** | **0.5299** | **1.4600e-003** | **0.1232** | **8.8000e-004** | **0.1241** | **0.0327** | **8.1000e-004** | **0.0335** | | **113.2044** | **113.2044** | **5.6200e-003** | | **113.3224** |

**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 | 1.3885 | 14.0727 | 11.8278 | 0.0176 | | 0.8417 | 0.8417 | | 0.7755 | 0.7755 | 0.0000 | 1,749.8334 | 1,749.8334 | 0.5343 | | 1,761.0529 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| **Total** | **1.3885** | **14.0727** | **11.8278** | **0.0176** | | **0.8417** | **0.8417** | | **0.7755** | **0.7755** | **0.0000** | **1,749.8334** | **1,749.8334** | **0.5343** | | **1,761.0529** |

## 3.6 Paving - 2018

**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 | 0.0458 | 0.0573 | 0.5299 | 1.4600e-003 | 0.1232 | 8.8000e-004 | 0.1241 | 0.0327 | 8.1000e-004 | 0.0335 | | 113.2044 | 113.2044 | 5.6200e-003 | | 113.3224 |
| **Total** | **0.0458** | **0.0573** | **0.5299** | **1.4600e-003** | **0.1232** | **8.8000e-004** | **0.1241** | **0.0327** | **8.1000e-004** | **0.0335** | | **113.2044** | **113.2044** | **5.6200e-003** | | **113.3224** |

## 3.7 Architectural Coating - 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 | | | | | |
| Archit. Coating | 69.3351 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.2986 | 2.0058 | 1.8542 | 2.9700e-003 | | 0.1506 | 0.1506 | | 0.1506 | 0.1506 | | 281.4485 | 281.4485 | 0.0267 | | 282.0102 |
| **Total** | **69.6338** | **2.0058** | **1.8542** | **2.9700e-003** | | **0.1506** | **0.1506** | | **0.1506** | **0.1506** | | **281.4485** | **281.4485** | **0.0267** | | **282.0102** |

## 3.7 Architectural Coating - 2018

**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 | 0.1403 | 0.1756 | 1.6251 | 4.4900e-003 | 0.3779 | 2.7000e-003 | 0.3806 | 0.1002 | 2.4900e-003 | 0.1027 | | 347.1601 | 347.1601 | 0.0172 | | 347.5219 |
| **Total** | **0.1403** | **0.1756** | **1.6251** | **4.4900e-003** | **0.3779** | **2.7000e-003** | **0.3806** | **0.1002** | **2.4900e-003** | **0.1027** | | **347.1601** | **347.1601** | **0.0172** | | **347.5219** |

**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 | | | | | |
| Archit. Coating | 69.3351 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 0.2986 | 2.0058 | 1.8542 | 2.9700e-003 | | 0.1506 | 0.1506 | | 0.1506 | 0.1506 | 0.0000 | 281.4485 | 281.4485 | 0.0267 | | 282.0102 |
| **Total** | **69.6338** | **2.0058** | **1.8542** | **2.9700e-003** | | **0.1506** | **0.1506** | | **0.1506** | **0.1506** | **0.0000** | **281.4485** | **281.4485** | **0.0267** | | **282.0102** |

### 3.7 Architectural Coating - 2018

**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 | 0.1403 | 0.1756 | 1.6251 | 4.4900e-003 | 0.3779 | 2.7000e-003 | 0.3806 | 0.1002 | 2.4900e-003 | 0.1027 | | 347.1601 | 347.1601 | 0.0172 | | 347.5219 |
| **Total** | **0.1403** | **0.1756** | **1.6251** | **4.4900e-003** | **0.3779** | **2.7000e-003** | **0.3806** | **0.1002** | **2.4900e-003** | **0.1027** | | **347.1601** | **347.1601** | **0.0172** | | **347.5219** |

## 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 | 4.7426 | 7.8972 | 40.9610 | 0.0941 | 6.5768 | 0.1122 | 6.6890 | 1.7556 | 0.1035 | 1.8591 | | 7,193.8458 | 7,193.8458 | 0.2904 | | 7,199.9434 |
| Unmitigated | 4.7426 | 7.8972 | 40.9610 | 0.0941 | 6.5768 | 0.1122 | 6.6890 | 1.7556 | 0.1035 | 1.8591 | | 7,193.8458 | 7,193.8458 | 0.2904 | | 7,199.9434 |

### 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 1,269.90 | 1,269.90 | 1269.90 | 2,380,786 | 2,380,786 |
| Condo/Townhouse High Rise | 357.00 | 357.00 | 357.00 | 669,297 | 669,297 |
| Strip Mall | 50.00 | 50.00 | 50.00 | 58,325 | 58,325 |
| Total | 1,676.90 | 1,676.90 | 1,676.90 | 3,108,408 | 3,108,408 |

### 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-W | H-S or C-C | H-O or C-NW | Primary | Diverted | Pass-by |
| Apartments Mid Rise | 5.80 | 5.80 | 5.80 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |
| Condo/Townhouse High Rise | 5.80 | 5.80 | 5.80 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |
| Strip Mall | 5.80 | 5.80 | 5.80 | 16.60 | 64.40 | 19.00 | 45 | 40 | 15 |

| LDA | LDT1 | LDT2 | MDV | LHD1 | LHD2 | MHD | HHD | OBUS | UBUS | MCY | SBUS | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.513300 | 0.073549 | 0.191092 | 0.130830 | 0.036094 | 0.005140 | 0.012550 | 0.022916 | 0.001871 | 0.002062 | 0.006564 | 0.000586 | 0.003446 |

## 5.0 Energy Detail

### 4.4 Fleet Mix

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 | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |
| NaturalGas Unmitigated | 0.0670 | 0.5724 | 0.2440 | 3.6500e-003 | | 0.0463 | 0.0463 | | 0.0463 | 0.0463 | | 730.6990 | 730.6990 | 0.0140 | 0.0134 | 735.1459 |

## 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 | lb/day | | | | | | | | | | lb/day | | | | | |
| Condo/Townhouse High Rise | 2560.48 | 0.0276 | 0.2360 | 0.1004 | 1.5100e-003 | | 0.0191 | 0.0191 | | 0.0191 | 0.0191 | | 301.2324 | 301.2324 | 5.7700e-003 | 5.5200e-003 | 303.0656 |
| Strip Mall | 9.41096 | 1.0000e-004 | 9.2000e-004 | 7.8000e-004 | 1.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 1.1072 | 1.1072 | 2.0000e-005 | 2.0000e-005 | 1.1139 |
| Apartments Mid Rise | 3641.06 | 0.0393 | 0.3356 | 0.1428 | 2.1400e-003 | | 0.0271 | 0.0271 | | 0.0271 | 0.0271 | | 428.3595 | 428.3595 | 8.2100e-003 | 7.8500e-003 | 430.9664 |
| **Total** | | **0.0670** | **0.5724** | **0.2440** | **3.6600e-003** | | **0.0463** | **0.0463** | | **0.0463** | **0.0463** | | **730.6990** | **730.6990** | **0.0140** | **0.0134** | **735.1459** |

### 5.2 Energy by Land Use - NaturalGas

**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 | | | | | |
| Strip Mall | 0.0094109 6 | 1.0000e-004 | 9.2000e-004 | 7.8000e-004 | 1.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 7.0000e-005 | 7.0000e-005 | | 1.1072 | 1.1072 | 2.0000e-005 | 2.0000e-005 | 1.1139 |
| Apartments Mid Rise | 3.64106 | 0.0393 | 0.3356 | 0.1428 | 2.1400e-003 | | 0.0271 | 0.0271 | | 0.0271 | 0.0271 | | 428.3595 | 428.3595 | 8.2100e-003 | 7.8500e-003 | 430.9664 |
| Condo/Townhouse High Rise | 2.56048 | 0.0276 | 0.2360 | 0.1004 | 1.5100e-003 | | 0.0191 | 0.0191 | | 0.0191 | 0.0191 | | 301.2324 | 301.2324 | 5.7700e-003 | 5.5200e-003 | 303.0656 |
| **Total** | | **0.0670** | **0.5724** | **0.2440** | **3.6600e-003** | | **0.0463** | **0.0463** | | **0.0463** | **0.0463** | | **730.6990** | **730.6990** | **0.0140** | **0.0134** | **735.1459** |

## 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 | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |
| Unmitigated | 8.8975 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | 0.0000 | 47.3885 | 47.3885 | 0.0462 | 0.0000 | 48.3589 |

## 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 | 1.2347 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 6.8587 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.8041 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | | 47.3885 | 47.3885 | 0.0462 | | 48.3589 |
| **Total** | **8.8975** | **0.3054** | **26.4055** | **1.3900e-003** | | **0.1452** | **0.1452** | | **0.1452** | **0.1452** | **0.0000** | **47.3885** | **47.3885** | **0.0462** | **0.0000** | **48.3589** |

### 6.2 Area by SubCategory

**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 | 1.2347 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Consumer Products | 6.8587 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.8041 | 0.3054 | 26.4055 | 1.3900e-003 | | 0.1452 | 0.1452 | | 0.1452 | 0.1452 | | 47.3885 | 47.3885 | 0.0462 | | 48.3589 |
| **Total** | **8.8975** | **0.3054** | **26.4055** | **1.3900e-003** | | **0.1452** | **0.1452** | | **0.1452** | **0.1452** | **0.0000** | **47.3885** | **47.3885** | **0.0462** | **0.0000** | **48.3589** |

## 7.0 Water Detail

### 7.1 Mitigation Measures Water

Apply Water Conservation Strategy

## 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 Vegetation

# ATTACHMENT 2

# CALINE4 Output

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: C:\Lakes\CALRoads View\7916_Riverwalk_Fa
              RUN: CALINE4 RUN      (WORST CASE ANGLE)
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

        U=   0.5 M/S            Z0= 100. CM            ALT=     0. (M)
      BRG= WORST CASE           VD=  0.0 CM/S
     CLAS=     7 (G)            VS=  0.0 CM/S
     MIXH= 1000. M             AMB=  3.0 PPM
    SIGTH=    5. DEGREES      TEMP=  9.4 DEGREE (C)


 II.  LINK VARIABLES

     LINK      *  LINK COORDINATES (M)   *              EF     H     W
  DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
---------------*-------------------------*----------------------------
A.  LINK A     * ***** ***** ***** ***** *  AG   1169   5.4    0.0  15.0
B.  LINK B     * ***** ***** ***** ***** *  AG   1095   5.4    0.0  15.0
C.  LINK C     * ***** ***** ***** ***** *  AG    965   5.4    0.0  15.0
D.  LINK D     * ***** ***** ***** ***** *  AG   1050   5.4    0.0  15.0
E.  LINK E     * ***** ***** ***** ***** *  AG   1050   5.4    0.0  15.0
F.  LINK F     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
G.  LINK G     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
H.  LINK H     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
I.  LINK I     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
J.  LINK J     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
K.  LINK K     * ***** ***** ***** ***** *  AG    705   5.4    0.0  10.0
L.  LINK L     * ***** ***** ***** ***** *  AG   1005   5.4    0.0  10.0
M.  LINK M     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
N.  LINK N     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
O.  LINK O     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
P.  LINK P     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0


III.  RECEPTOR LOCATIONS

           *    COORDINATES (M)
  RECEPTOR  *    X      Y      Z
-----------*--------------------
1. RECPT  1 * 484013 ******   1.8
```

```
  2. RECPT  2 * 484046 ******   1.8
  3. RECPT  3 * 484052 ******   1.8
  4. RECPT  4 * 484020 ******   1.8
```

1

```
           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   2

               JOB: C:\Lakes\CALRoads View\7916_Riverwalk_Fa
               RUN: CALINE4 RUN      (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide
```

IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

| RECEPTOR | BRG (DEG) | PRED CONC (PPM) | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CONC/LINK (PPM) | | | | | | | |
| 1. RECPT 1 | 85. | 4.5 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2. RECPT 2 | 176. | 4.5 | 0.7 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| 3. RECPT 3 | 273. | 4.7 | 0.3 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 |
| 4. RECPT 4 | 67. | 4.5 | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |

| RECEPTOR | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|
| | CONC/LINK | | | | | | | |
| 1. RECPT 1 | 0.0 | 0.0 | 0.3 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2. RECPT 2 | 0.0 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3. RECPT 3 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.1 | 0.1 | 0.2 |
| 4. RECPT 4 | 0.0 | 0.1 | 0.5 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |

1

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: C:\Lakes\CALRoads View\7916\7916.clv
              RUN: CALINE4 RUN      (WORST CASE ANGLE)
        POLLUTANT: Carbon Monoxide
```

I.  SITE VARIABLES

```
       U=   0.5 M/S             Z0= 100. CM           ALT=     0. (M)
     BRG= WORST CASE            VD=  0.0 CM/S
    CLAS=     7 (G)             VS=  0.0 CM/S
    MIXH= 1000. M              AMB=  3.0 PPM
   SIGTH=    5. DEGREES       TEMP=  9.4 DEGREE (C)
```

II.  LINK VARIABLES

| LINK DESCRIPTION | X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| A.  LINK A | ***** | ***** | ***** | ***** | AG | 3332 | 5.4 | 0.0 | 15.0 |
| B.  LINK B | ***** | ***** | ***** | ***** | AG | 3332 | 5.4 | 0.0 | 15.0 |
| C.  LINK C | ***** | ***** | ***** | ***** | AG | 3332 | 5.4 | 0.0 | 15.0 |
| D.  LINK D | ***** | ***** | ***** | ***** | AG | 3332 | 5.4 | 0.0 | 15.0 |
| E.  LINK E | ***** | ***** | ***** | ***** | AG | 3332 | 5.4 | 0.0 | 15.0 |
| F.  LINK F | ***** | ***** | ***** | ***** | AG | 3847 | 5.4 | 0.0 | 15.0 |
| G.  LINK G | ***** | ***** | ***** | ***** | AG | 3847 | 5.4 | 0.0 | 15.0 |
| H.  LINK H | ***** | ***** | ***** | ***** | AG | 3847 | 5.4 | 0.0 | 15.0 |
| I.  LINK I | ***** | ***** | ***** | ***** | AG | 3847 | 5.4 | 0.0 | 15.0 |
| J.  LINK J | ***** | ***** | ***** | ***** | AG | 3847 | 5.4 | 0.0 | 15.0 |
| K.  LINK K | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| L.  LINK L | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| M.  LINK M | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| N.  LINK N | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| O.  LINK O | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| P.  LINK P | ***** | ***** | ***** | ***** | AG | 1452 | 5.4 | 0.0 | 10.5 |
| Q.  LINK Q | ***** | ***** | ***** | ***** | AG | 1668 | 5.4 | 0.0 | 10.5 |
| R.  LINK R | ***** | ***** | ***** | ***** | AG | 872 | 5.4 | 0.0 | 10.5 |
| S.  LINK S | ***** | ***** | ***** | ***** | AG | 1227 | 5.4 | 0.0 | 15.0 |
| T.  LINK T | ***** | ***** | ***** | ***** | AG | 1227 | 5.4 | 0.0 | 15.0 |
| U.  LINK U | ***** | ***** | ***** | ***** | AG | 3355 | 5.4 | 0.0 | 15.0 |
| V.  LINK V | ***** | ***** | ***** | ***** | AG | 3355 | 5.4 | 0.0 | 15.0 |
| W.  LINK W | ***** | ***** | ***** | ***** | AG | 2269 | 5.4 | 0.0 | 15.0 |
| X.  LINK X | ***** | ***** | ***** | ***** | AG | 2269 | 5.4 | 0.0 | 15.0 |
| Y.  LINK Y | ***** | ***** | ***** | ***** | AG | 2269 | 5.4 | 0.0 | 15.0 |

1

```
           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   2

               JOB: C:\Lakes\CALRoads View\7916\7916.clv
               RUN: CALINE4 RUN      (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide


  III.  RECEPTOR LOCATIONS

              *    COORDINATES (M)
    RECEPTOR  *    X      Y      Z
  ------------*---------------------
  1. RECPT  1 * 484720 ******   1.8
  2. RECPT  2 * 484738 ******   1.8
  3. RECPT  3 * 484765 ******   1.8
  4. RECPT  4 * 484747 ******   1.8


   IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

              *       * PRED  *              CONC/LINK
              *  BRG  * CONC  *                (PPM)
   RECEPTOR   * (DEG) * (PPM) *   A    B    C    D    E    F    G    H
 -------------*-------*-------*---------------------------------------
  1. RECPT  1 *   72. *   5.7 *  0.0  0.0  0.0  0.0  0.0  0.0  0.2  0.3
  2. RECPT  2 *   43. *   5.8 *  0.0  0.0  0.0  0.0  0.2  1.1  0.3  0.0
  3. RECPT  3 *  253. *   5.9 *  0.0  0.0  0.1  0.7  0.6  0.3  0.0  0.0
  4. RECPT  4 *  176. *   5.6 *  0.0  0.0  0.0  0.0  0.1  0.4  0.0  0.0


              *                                    CONC/LINK
   RECEPTOR   *  I    J    K    L    M    N    O    P    Q    R    S    T    U    V    W    X    Y
  ------------*-------------------------------------------------------------------------------------
  1. RECPT  1 *  0.2  0.1  0.0  0.0  0.0  0.0  0.0  0.0  0.3  0.2  0.0  0.0  0.1  1.3  0.0  0.0  0.0
  2. RECPT  2 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.3  0.0  0.0  0.3  0.0  0.5  0.2  0.0  0.0  0.0
  3. RECPT  3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.4  0.0  0.0  0.3  0.0  0.0  0.0  0.0  0.3  0.3
  4. RECPT  4 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.2  0.5  0.0  0.3  0.0  0.0  0.9  0.0  0.0  0.0

1
```

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   1

              JOB: C:\Lakes\CALRoads View\7916_Friars_NBRam
              RUN: CALINE4 RUN      (WORST CASE ANGLE)
        POLLUTANT: Carbon Monoxide


  I.  SITE VARIABLES

       U=   0.5 M/S            Z0= 100. CM           ALT=     0. (M)
     BRG= WORST CASE           VD=  0.0 CM/S
    CLAS=     7 (G)            VS=  0.0 CM/S
    MIXH= 1000. M             AMB=  3.0 PPM
   SIGTH=    5. DEGREES      TEMP=  9.4 DEGREE (C)


  II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ---------------*-------------------------*------------------------------
 A.  LINK A     * ***** ***** ***** ***** *  AG   3847   5.4    0.0  15.0
 B.  LINK B     * ***** ***** ***** ***** *  AG   3847   5.4    0.0  15.0
 C.  LINK C     * ***** ***** ***** ***** *  AG   3847   5.4    0.0  15.0
 D.  LINK D     * ***** ***** ***** ***** *  AG   4453   5.4    0.0  15.0
 E.  LINK E     * ***** ***** ***** ***** *  AG   4453   5.4    0.0  15.0
 F.  LINK F     * ***** ***** ***** ***** *  AG   4453   5.4    0.0  15.0
 G.  LINK G     * ***** ***** ***** ***** *  AG   2999   5.4    0.0  15.0
 H.  LINK H     * ***** ***** ***** ***** *  AG   2999   5.4    0.0  15.0
 I.  LINK I     * ***** ***** ***** ***** *  AG   2999   5.4    0.0  15.0
 J.  LINK J     * ***** ***** ***** ***** *  AG   3355   5.4    0.0  15.0
 K.  LINK K     * ***** ***** ***** ***** *  AG   3355   5.4    0.0  15.0
 L.  LINK L     * ***** ***** ***** ***** *  AG   1844   5.4    0.0  15.0
 M.  LINK M     * ***** ***** ***** ***** *  AG   1844   5.4    0.0  15.0
 N.  LINK N     * ***** ***** ***** ***** *  AG   1844   5.4    0.0  15.0
 O.  LINK O     * ***** ***** ***** ***** *  AG   1844   5.4    0.0  15.0
 P.  LINK P     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 Q.  LINK Q     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 R.  LINK R     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 S.  LINK S     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 T.  LINK T     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 U.  LINK U     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0
 V.  LINK V     * ***** ***** ***** ***** *  AG   2806   5.4    0.0  15.0


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           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   2

               JOB: C:\Lakes\CALRoads View\7916_Friars_NBRam
               RUN: CALINE4 RUN      (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide
```

III.  RECEPTOR LOCATIONS

| RECEPTOR | COORDINATES (M) X | Y | Z |
|---|---|---|---|
| 1. RECPT 1 | 485045 | ****** | 1.8 |
| 2. RECPT 2 | 485085 | ****** | 1.8 |
| 3. RECPT 3 | 485083 | ****** | 1.8 |
| 4. RECPT 4 | 485058 | ****** | 1.8 |

IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

| RECEPTOR | BRG (DEG) | PRED CONC (PPM) | CONC/LINK (PPM) A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. RECPT 1 | 94. | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 |
| 2. RECPT 2 | 248. | 6.6 | 0.4 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3. RECPT 3 | 331. | 6.4 | 0.0 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4. RECPT 4 | 352. | 6.7 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| RECEPTOR | CONC/LINK I | J | K | L | M | N | O | P | Q | R | S | T | U | V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. RECPT 1 | 1.3 | 0.5 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 |
| 2. RECPT 2 | 0.6 | 1.3 | 0.1 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 |
| 3. RECPT 3 | 0.2 | 0.2 | 0.0 | 0.3 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | 0.5 |
| 4. RECPT 4 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 1.4 |

1

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           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   1

               JOB: C:\Lakes\CALRoads View\7916_Riverwalk_Fa
               RUN: CALINE4 RUN      (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide

   I.  SITE VARIABLES

        U=   0.5 M/S            Z0= 100. CM           ALT=     0. (M)
      BRG= WORST CASE           VD=  0.0 CM/S
     CLAS=     7 (G)            VS=  0.0 CM/S
     MIXH= 1000. M             AMB=  3.0 PPM
    SIGTH=    5. DEGREES      TEMP=  9.4 DEGREE (C)

  II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *             EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ---------------*-------------------------*-----------------------------
 A.  LINK A     * ***** ***** ***** ***** *  AG   1169   5.4    0.0  15.0
 B.  LINK B     * ***** ***** ***** ***** *  AG   1095   5.4    0.0  15.0
 C.  LINK C     * ***** ***** ***** ***** *  AG    965   5.4    0.0  15.0
 D.  LINK D     * ***** ***** ***** ***** *  AG   1050   5.4    0.0  15.0
 E.  LINK E     * ***** ***** ***** ***** *  AG   1050   5.4    0.0  15.0
 F.  LINK F     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
 G.  LINK G     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
 H.  LINK H     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
 I.  LINK I     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
 J.  LINK J     * ***** ***** ***** ***** *  AG    561   5.4    0.0  10.0
 K.  LINK K     * ***** ***** ***** ***** *  AG    705   5.4    0.0  10.0
 L.  LINK L     * ***** ***** ***** ***** *  AG   1005   5.4    0.0  10.0
 M.  LINK M     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
 N.  LINK N     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
 O.  LINK O     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0
 P.  LINK P     * ***** ***** ***** ***** *  AG    850   5.4    0.0  10.0

 III.  RECEPTOR LOCATIONS

            *    COORDINATES (M)
   RECEPTOR *    X      Y      Z
 -----------*--------------------
 1. RECPT  1 * 484013 ******   1.8
 2. RECPT  2 * 484046 ******   1.8
 3. RECPT  3 * 484052 ******   1.8
 4. RECPT  4 * 484020 ******   1.8

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: C:\Lakes\CALRoads View\7916_Riverwalk_Fa
RUN: CALINE4 RUN (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE )

| RECEPTOR | BRG (DEG) | PRED CONC (PPM) | CONC/LINK (PPM) A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. RECPT 1 | 85. | 4.5 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2. RECPT 2 | 176. | 4.5 | 0.7 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| 3. RECPT 3 | 273. | 4.7 | 0.3 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 |
| 4. RECPT 4 | 67. | 4.5 | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |

| RECEPTOR | CONC/LINK I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|
| 1. RECPT 1 | 0.0 | 0.0 | 0.3 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2. RECPT 2 | 0.0 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3. RECPT 3 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.1 | 0.1 | 0.2 |
| 4. RECPT 4 | 0.0 | 0.1 | 0.5 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |

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RECON

# Archaeological Resources Report for the Friars Road Multi-Family Project Site, San Diego, California

*Prepared for*
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RECON Number 7916
October 27, 2015


Richard D. Shultz, Project Archaeologist

## ARCHAEOLOGICAL RESOURCE REPORT FORM

## I. PROJECT DESCRIPTION AND LOCATION

The Friars Road Multi-Family Project (proposed project) is located on the north side of Friars Road, between Ulric Street to the northeast, and Fashion Valley Road to the southwest, in the city of San Diego (Figure 1). The project site is within the unsectioned Pueblo Lands of San Diego land grant, Township 16 South, Range 3 West of the U.S. Geological Survey (USGS) 7.5-minute topographical map, La Jolla quadrangle (Figure 2). The 5.43-acre project area is further defined as Assessor's Parcel Numbers (APN) 437-250-22, -23, and -24, outlined on City of San Diego, Engineering and Development, City 800' scale map, Number 218-1713 (Figure 3).

The project site is currently occupied by 1970s-era commercial buildings sited along the southern toe of the Linda Vista Terrace, overlooking Mission Valley to the south (Figure 4). The proposed project would include the demolition of the three existing commercial/office buildings and the construction of 319 residential dwelling units consisting of 249 apartments in an eight-story building over two levels of subterranean parking and 70 condominiums in a nine-story structure over two levels of subterranean parking. Access would be at the intersection of Friars Road and Via de la Moda with a signalized intersection and enhanced pedestrian crosswalks.

## II. SETTING

### Natural Environment (Past and Present)

The proposed project is located along the southern toe of Linda Vista Terrace in a developed portion of San Diego, overlooking Mission Valley to the south, immediately north of Fashion Valley Mall (see Figures 2 and 3). Elevations within the survey area range from approximately 50 feet above mean sea level (AMSL) to 190 feet AMSL. Geologically, the project area encompasses three formational structures: Stadium Conglomerate is the dominate structure along the upper steep slope backing the project area; Friars Formation is recorded in the western margin of the project area, at the lower levels of the adjacent slope; and Quaternary Alluvium and Slope Wash are found along the lowest elevations of the project area (Kennedy and Peterson 1975).

Two soil types occur within the project area, Terrace escarpments and Olivenhain–Urban land complex, 2 to 9 percent slopes, as mapped by the U.S. Department of Agriculture (USDA; 1973). Terrace escarpments consist of steep to very steep escarpments, and escarpment-like landscapes. The terrace escarpments occur on the nearly even fronts of terraces or alluvial fans. The escarpment-like landscapes occur between narrow floodplains and adjoining uplands and the very steep sides of drainage ways that are entrenching into fairly level uplands (USDA 1973). This soil type occurs on the majority of the project area.

Olivenhain–Urban land complex, 2 to 9 percent slopes, occurs on marine terraces and consists of soils that have been altered by cut and fill operations for development. Before alterations were made, the slopes were 2 to 9 percent. These urban soils have been leveled and leave behind steep escarpments that are easily eroded (USDA 1973). This soil type occurs on the southwest corner of the survey area.

Vegetation within the project area is described by four vegetation communities and land cover types: Diegan coastal sage scrub, disturbed Diegan coastal sage scrub, eucalyptus woodland, and urban/developed (RECON 2015). Within the project area, the Diegan coastal sage scrub is located along the northern boundary with a majority of this vegetation community within the eastern half of the project site. In this location Diegan coastal sage scrub is dominated by California sagebrush (*Artemisia californica*), coastal California buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), and San Diego viguiera (*Bahiopsis* [=*Viguiera*] *laciniata*). Disturbed Diegan coastal sage scrub occurs within the project area immediately north of the urban/developed lands and north of Friars Road on steep slopes. This vegetation community occurs on slopes where past grading and ground disturbance have occurred. California sagebrush, California buckwheat, and crimson fountain grass (*Pennisetum setaceum*) are the dominant shrub species. Other species that occur in the disturbed Diegan coastal sage scrub include annual non-native species such as red brome (*Bromus madritensis*) and short-pod mustard (*Hirschfeldia incana*). Eucalyptus woodland typically consists of dense stands of eucalyptus (*Eucalyptus* sp.) with a closed canopy. This vegetation type consists of several gum trees (*Eucalyptus* sp.) that occur as a narrow strip immediately adjacent to the urban/developed lands within the western half of the project area. These trees are part of the horticultural landscaping planted as part of the existing project. Urban/developed areas consist of areas that no longer support native vegetation due to physical alteration. This may include the construction of buildings, hardscaping, pavement, and/or landscaping. Urban/developed land consists of business lots, roadways, and development throughout the site. Associated landscaping plantings occur around the buildings and parking lots and include crystalline iceplant (*Mesembryanthemum crystallinum*), common oleander (*Nerium oleander*), and baby sun-rose (*Aptenia cordifolia*) (RECON 2015).

**Ethnography/History**

The prehistoric cultural sequence in San Diego County is generally conceived as comprising three basic periods: the Paleoindian, dated between about 11,500 and 8,500 years ago and manifested by the artifacts of the San Dieguito Complex; the Archaic, lasting from about 8,500 to 1,500 years ago (A.D. 500) and manifested by the cobble and core technology of the La Jollan Complex; and the Late Prehistoric, lasting from about 1,500 years ago to historic contact (i.e. A.D. 500 to 1769) and represented by the Cuyamaca Complex. This latest complex is marked by the appearance of ceramics, small arrow points, and cremation burial practices.

The Paleoindian Period in San Diego County is most closely associated with the San Dieguito Complex, as identified by Rogers (1938, 1939, 1945). The San Dieguito assemblage consists of well-made scraper planes, choppers, scraping tools, crescentics, elongated bifacial knives, and leaf-shaped points. The San Dieguito Complex is thought to represent an early emphasis on hunting (Warren et al. 1993: iii-33).

The Archaic Period in coastal San Diego County is represented by the La Jollan Complex, a local manifestation of the widespread Millingstone Horizon. This period brings an apparent shift toward a more generalized economy and an increased emphasis on seed resources, small game, and shellfish. Along with an economic focus on gathering plant resources, the settlement system appears to have been more sedentary. The La Jollan assemblage is dominated by rough, cobble-based choppers and scrapers, and slab and basin metates. Elko series projectile points appeared by about 3,500 years ago. Large deposits of marine shell at coastal sites argue for the importance of shellfish gathering to the coastal Archaic economy.

Near the coast and in the Peninsular Mountains, beginning approximately 1,500 years ago, patterns began to emerge which suggest the ethnohistoric Kumeyaay. The Late Prehistoric Period is characterized by higher population densities and elaborations in social, political, and technological systems. Economic systems diversify and intensify during this period, with the continued elaboration of trade networks, the use of shell-bead currency, and the appearance of more labor-intensive but effective technological innovations. The late prehistoric archaeology of the San Diego coast and foothills is characterized by the Cuyamaca Complex. Described by D. L. True (1970) based on an excavation in the Cuyamaca Rancho State Park, the Cuyamaca Complex is characterized by the presence of steatite arrowshaft straighteners, steatite pendants, steatite comales (heating stones), Tizon Brown Ware pottery, ceramic figurines reminiscent of Hohokam styles, ceramic Yuman "bow pipes," ceramic rattles, miniature pottery various cobble-based tools (e.g., scrapers, choppers, hammerstones), bone awls, manos, metates, mortars and pestles, and Desert Side-Notched (more common) and Cottonwood Series projectile points.

*Ethnohistory*

The Kumeyaay (also known as Kamia, Ipai, Tipai, and Diegueño) occupied the southern two-thirds of San Diego County. The Kumeyaay lived in semi-sedentary, politically autonomous villages or rancherias. This settlement system typically consisted of two or more seasonal villages with temporary camps radiating away from these central places (Cline 1984a and 1984b). Their economic system consisted of hunting and gathering, with a focus on small game, acorns, grass seeds, and other plant resources. The most basic social and economic unit was the patrilocal extended family. A wide range of tools was made of locally available and imported materials. A simple shoulder-height bow was utilized for hunting. Numerous other flaked stone tools were made including scrapers, choppers, flake-based cutting tools, and biface knives. Preferred stone types were locally available metavolcanics, cherts, and quartz. Obsidian was imported from the deserts to the north and east. Ground stone objects include mortars, manos, metates, and pestles typically made of locally available, fine-grained granite. Both portable and bedrock types are known. The Kumeyaay made fine baskets using either coiled or twined construction. The Kumeyaay also made pottery, utilizing the paddle-and-anvil technique. Most were a plain brown utility ware called Tizon Brown Ware but some were decorated (Meighan 1954; May 1976, 1978).

*Spanish/Mexican/American Periods*

The Spanish Period (1769–1821) represents a time of European exploration and settlement. Military and naval forces, along with a religious contingent founded the San Diego Presidio, the pueblo of San Diego, and the San Diego Mission in 1769 (Rolle 1998). The mission system used forced Native American labor and introduced horses, cattle, other agricultural goods, and implements. Native American culture in the coastal strip of California rapidly deteriorated despite repeated attempts to revolt against the Spanish colonists (Cook 1976). One of the hallmarks of the Spanish colonial scheme was the rancho system. In an attempt to encourage settlement and development of the colonies, large land grants were made to meritorious or well-connected individuals.

In 1821, Mexico declared its independence from Spain. During the Mexican Period (1822–1848), the mission system was secularized by the Mexican government and these lands allowed for the dramatic expansion of the rancho system. The southern California economy became increasingly based on cattle ranching.

The Mexican period ended when Mexico signed the Treaty of Guadalupe Hidalgo on February 2, 1848, concluding the Mexican-American War (1846–1848; Rolle 1998). Just prior to the signing of the Treaty of Guadalupe Hidalgo, gold was discovered in the northern California Sierra-Nevada foothills, the news was published on March 15, 1848, and the

California Gold Rush began. The great influx of Americans and Europeans eliminated many remaining vestiges of Native American culture.

The American homestead system encouraged settlement beyond the coastal plain into areas where Native Americans had retreated to avoid the worst of Spanish and Mexican influences (Carrico 1987; Cook 1976). A rural community cultural pattern existed in San Diego County from approximately 1870 to 1930. These communities were composed of an aggregate of people who lived on scattered farmsteads tied together through a common school district, church, post office, and country store (Hector and Van Wormer 1986).

Mission Valley is part of a number of drainage systems that flow across San Diego County, and its proximity to the natural harbor of San Diego bay, and the adjacent highlands have attracted populations for millennia. During the historic-period, the San Diego River floodplain served as a major source of fresh water, first to the Missionaries, and later to the growing San Diego metropolitan area. The original Mission San Diego de Alcala was, in 1769, established on a hill overlooking the river delta, where it would drain into False Bay (Mission Bay) or San Diego Bay, depending upon riverbed conditions. Not incidentally, the Kumeyaay village of Cosoy was situated in this location. For a variety of factors, missionaries and Indian converts moved the Mission 5.5 miles inland to its present location in the 1774. Recognizing the need for a continuous water supply for their agricultural fields the Missionaries constructed, between 1807 and 1816, a diversionary dam and flume system to support the Mission. Following this lead cattle ranching, dairying, field cultivation, truck farming, and other agricultural activities continued as prominent land uses in Mission Valley until the 1960s (City of San Diego 2013:5; Papageorge 1971).

Along with industrialized water extraction for City needs, the abundant sand, gravel, and rocks associated with the adjacent terrace deposits attracted attention from sand and rock mining operators in the early decades of the twentieth century. By mid-century, other interests were looking at development opportunities in the Valley. Improvement of the road networks in the area allowed for commercial plans to be considered. Thus, by the late 1950s the May Company purchased land and sought rezoning and building permits from the City in order to develop the Mission Valley Shopping Center (City of San Diego 2013:5; Papageorge 1971). By the 1970s, several large commercial projects including the Town and Country Hotel, San Diego Jack Murphy Stadium, and Fashion Valley Shopping Center, had been undertaken and completed, substantially reorienting development from City Center to Mission Valley. Today Friars Road–originally Mission Trail–and Camino del Rio South serve as the major corridors along the northern and southern margins of the river valley.

## III. AREA OF POTENTIAL EFFECT (APE)

The Area of Potential Effect (APE) encompasses the entirety of the three parcels (APN 437-250-22, -23, and -24), comprising approximately 5.43 acres.

## IV. STUDY METHODS

The archaeological resources survey included both an archival search and an on-site foot survey of the property. A records search with a one-mile radius buffer was requested from the South Coastal Information Center at San Diego State University, a member of the California Office of Historic Preservation California Historical Resources Information System, in order to determine if previously recorded prehistoric or historic cultural resources occur on the property. Historic aerial photographs were also checked in order to see past development within and near the project area.

The field survey was conducted on 17 July 2015 by RECON archaeologist Richard D. Shultz, accompanied by Tuchon Phoenix, a Native American representative from Red Tail Monitoring and Research. Because the majority of the project area either has been developed or is dominated by extremely steep slope, the survey team targeted areas that allowed safe access or had some potential to allow the identification of archaeological resources. Survey intervals were constrained by the built environment, the steepness of the canyon slopes, and vegetation. Survey intervals were opportunistic (judgmental) rather than systematic.

An attempt to survey the eastern parcel (APN 437-250-24) was made; however, due to slope angle, combined with a hillside landform composed of round rock clasts, and a vegetation community dominated by cacti, reconnaissance of this portion of the project area was limited (Photographs 1-3). Due to the type of landform and its geological structure, it is unlikely that archaeological materials would have been present in this parcel. The northwestern corner of APN 437-250-22 has a lesser gradient and a corresponding slightly higher potential to contain archaeological materials. This area was also surveyed to the extent possible–east of the minor drainage in the middle of the parcel, the slope gradient greatly increases and was unsurveyable. APN 437-250-23 is immediately backed by a historically cut slope face and was unsurveyable due to steepness of slope (see Photograph 1). Areas immediately surrounding the existing buildings (APN 437-250-22,-23, and -24) are dominated by hardscaping, providing no opportunity to identify subsurface materials.

## V. RESULTS OF STUDY

The record search indicates that there have been numerous surveys, monitoring projects, and several recorded cultural resources within a one-mile radius of the project area (Confidential Appendix). One previously recorded prehistoric cultural resource is shown to be mapped within the APE. No historic-period resources are identified within a one-mile radius of the project area. Additionally, historic aerial photographs were consulted to identify land use changes in the area immediately surrounding the proposed project area.

CA-SDI-11,767 (SDMM-W-175) is described as a 200-by-100 foot (east-west by north-south), multicomponent site of San Dieguito-II, San Dieguito-III, Littoral-II, and Yuman-III occupations (generally Early Archaic to Late Prehistoric), with a depth of approximately 3 feet. The archaeological deposit is portrayed as situated along a cultivated river terrace at an elevation of 25 to 35 feet AMSL. A portion of the eastern-most extent of the plotted boundary of CA-SDI-11,767 extends 30 meters (100 feet) within the northwestern corner of the APE. The landform of this part of the project area does not match the landform described in the site record. The northwestern corner of the project area lies at an elevation between 110 and 160 feet AMSL and is composed of the Linda Vista Terrace, which is unlikely to be confused with a river terrace. The center of the site, as mapped and most likely location given the setting described, should be approximately 250 meters (825 feet) west-southwest of the western APE boundary. Due to mapping methodologies employed in the era of hand-drawn maps held on file at local information centers, mapped boundaries illustrated on USGS base maps were often much larger than actual scale. Thus, while the site form describes CA-SDI-11,767 as 200-by-100 feet in area, the corresponding base map indicates the site is some 2,000-by-1,000 feet, much larger than described. Enlargement of the mapped size of the site appears to have caused it to extend into the proposed project area, while the described size actually places the site approximately 250 meters (825 feet) west-southwest of the project.

A review of mid-century aerial photographs documents some of the land use practices in and around the area of the proposed project. The 1953 aerial photograph (USDA 1953) shows that the southern periphery of the Linda Vista Terrace between Via las Cumbres and an unnamed, incised canyon 530 meters (1,740 feet) of Ulrich Street (the same canyon is the location of the eastern driveway and parking lot of the current project area) had been cut back several feet. The purpose of this exposure is unknown; rock mining was a land use practice in Mission Valley at the time, and Fashion Valley Mall and changes to Friars Road were not established until the late 1960s, so it seems probable that the abundant small cobble clasts that make up Linda Vista Terrace had been quarried. The river margin terrace on the northern edge of Friars Road is shown to have been under agricultural conditions on the 1953 and 1964 aerial photographs (USDA 1953, 1964). By 1969, Fashion Valley Mall had been developed, and subsequently Friars Road had been widened and realigned.

Agricultural practices, possible rock mining activities, mass grading, and commercial building developments, along with road widening and alignment changes, have likely degraded, if not obliterated, much of CA-SDI-11,767. In fact, this is stated as such on the site form base map obtained in the records search, which indicates: "W-175 (DESTROYED)." A portion of this site was later identified south of Friars Road, within the eastern margin of the Stardust (Riverwalk) golf course, approximately 360 meters (1,180 feet) southwest of the proposed project area (Clevenger and Baker 1990; Huey and Baker 1992). This location is much closer to the center of the original mapped position, and probably represents remnants of the site after 40 years of infrastructural development in the area.

Apart from the steep slopes backing the project area, very little original ground surface in APN 437-250-22, and -23, and -24 was observed; visibility was limited for most of the APE due to past development actions (cut and fill), building construction, and the high degree of ornamental plantings and landscaping. No archaeological materials associated with CA-SDI-11,767 were identified during the survey. Even with terrain and survey conditions mentioned above, ground visibility in this area was adequate enough to allow for visual identification of archaeological materials if present (Photographs 4 and 5). Almost certainly this site was situated on a river terrace, as initially recorded, located between Friars Road to the south, and the toe of the Linda Vista Terrace to the north, as described, and probably near the mouth of the incised canyon that trends north towards San Miguel School (now Francis Parker), approximately 250 meters (825 feet) west-southwest of the western boundary of the proposed project.

## VI. RECOMMENDATIONS

The archaeological resources investigation summarized herein satisfy the study and documentation requirements identified by City of San Diego Development Services staff, and are consistent with the goals and policies of the City of San Diego as published in the Land Development Manual. As such, efforts to identify and document historical resources in the APE for the proposed project reveal that the possibility of significant archaeological resources being present on the project area is considered low. While one previously recorded prehistoric archaeological deposit was identified in records search files as being within the proposed project area, grading for road construction, realignment, and widening, commercial developments, and mining and agricultural practices likely have resulted in the loss of this resource. Additionally, generous mapping techniques of the past likely erroneously placed site boundaries in areas where the site was not actually located–such as up and along the 30-degree slope face of the Linda Vista Terrace immediately north of the site.

Because there is little potential for encountering prehistoric or historic-period resources during construction, no further work is recommended for activities associated with the proposed project.

## VII. SOURCES CONSULTED DATE

| | |
|---|---|
| National Register of Historic Places ☑ | Month and Year: July 2015 |
| California Register of Historical Resources ☑ | Month and Year: July 2015 |
| City of San Diego Historical Resources Register ☑ | Month and Year: July 2015 |
| Archaeological/Historical Site Records:<br>South Coastal Information Center ☑ | Month and Year: July 2015 |
| Other Sources Consulted:<br>None | |

## VIII. CERTIFICATION

| | |
|---|---|
| Preparer: Richard D. Shultz, M.A. | Title: Principal Investigator |
| Signature: | Date: 18 August 2015 |

## IX. ATTACHMENTS

Bibliography
Attached

National Archaeological Data Base Information
Attached

Maps (include all of the following maps.)

Figure 1. Project Location
Figure 2. USGS Quadrangle
Figure 3. City of San Diego 800’ Map
Figure 4. Project Location on Aerial Photograph

Photographs

Photograph 1: Existing conditions, view west from APN 437-250-24
Photograph 2: Existing conditions, view east from APN 437-250-24
Photograph 3: Detail of survey conditions in APN 437-250-24
Photograph 4: Existing conditions; view west from APN 437-250-22
Photograph 5: Exposed soils in APN 437-250-22

Personnel Qualifications (Include resumes if not already on file with the City.)
Resumes are already on file with the City.

Record Search Cover Letter

## X. CONFIDENTIAL APPENDICES (Bound separately)

Record search results.
Maps from record search results from South Coastal Information Center (Under separate cover).

New or updated historical resource records
None.

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**NATIONAL ARCHAEOLOGICAL DATA BASE INFORMATION**

| | |
|---|---|
| Authors: | Richard D. Shultz, M.A. |
| Consulting Firm: | RECON Environmental, Inc.<br>1927 Fifth Avenue<br>San Diego, CA 92101-2358 |
| Report Date: | 18 August 2015 |
| Report Title: | Archaeological Resources Report for the Friars Road Multi-Family Project Site, San Diego, California |
| Prepared for: | Jeffrey Holbrook<br>LCG Friars, LLC<br>27132B Paseo Espada, Suite 1206<br>San Juan Capistrano, CA 92675 |
| Contract Number: | RECON 7916A |
| USGS Quadrangle Map: | La Jolla Quadrangle |
| Acreage: | 5.43 acres |
| Keywords: | Negative survey, Mission Valley, Linda Vista Terrace, Friars Road, CA-SDI-11,767 |

**ABSTRACT**

An archaeological resources survey was conducted on the proposed Friars Road Multi-Family Project, in Mission Valley, city of San Diego, California. The survey included a record search at the South Coastal Information Center (SCIC). RECON archaeologist Richard D. Shultz completed the field investigation on 17 July 2015, accompanied by Tuchon Phoenix, a Native American observer from Red Tail Monitoring and Research. The files at the SCIC showed one prehistoric site, and no historic sites, recorded on the project area. The project area and vicinity have been graded, filled, and leveled in the past for agriculture, road alignments, and commercial development from the 1940s to 1970s. Because the project area is mostly developed or is on steep slopes, the survey focused on areas of exposed soils. No prehistoric or historic-period archaeological resources were identified during the field survey. The possibility of significant historical resources being present in the project area is considered low. RECON recommends no further work necessary for ground disturbing activities associated with the proposed project.


Project Location

FIGURE 1

Regional Location

RECON

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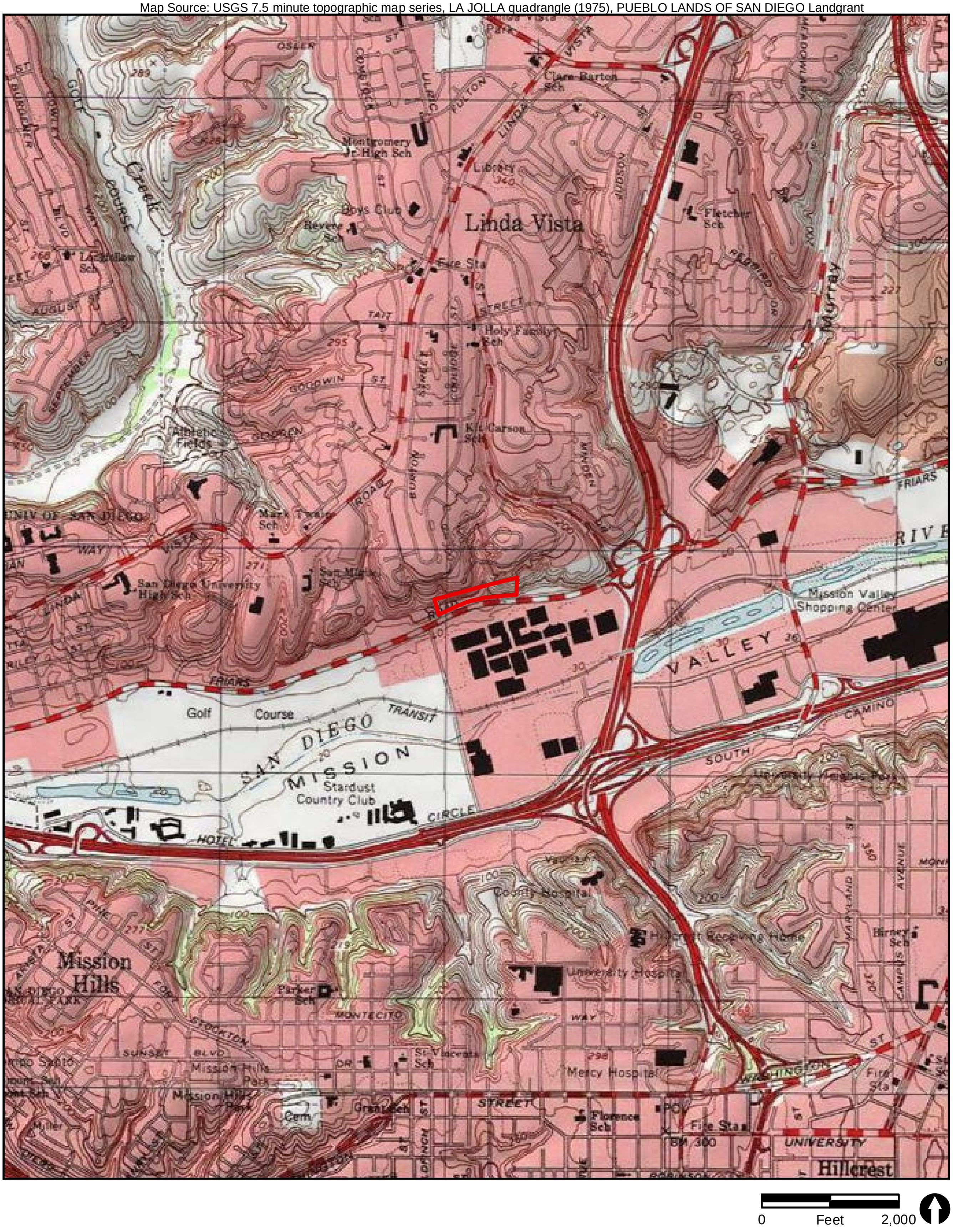
Map Source: USGS 7.5 minute topographic map series, LA JOLLA quadrangle (1975), PUEBLO LANDS OF SAN DIEGO Landgrant




Project Boundary

# FIGURE 2
Project Location on USGS Map

RECON

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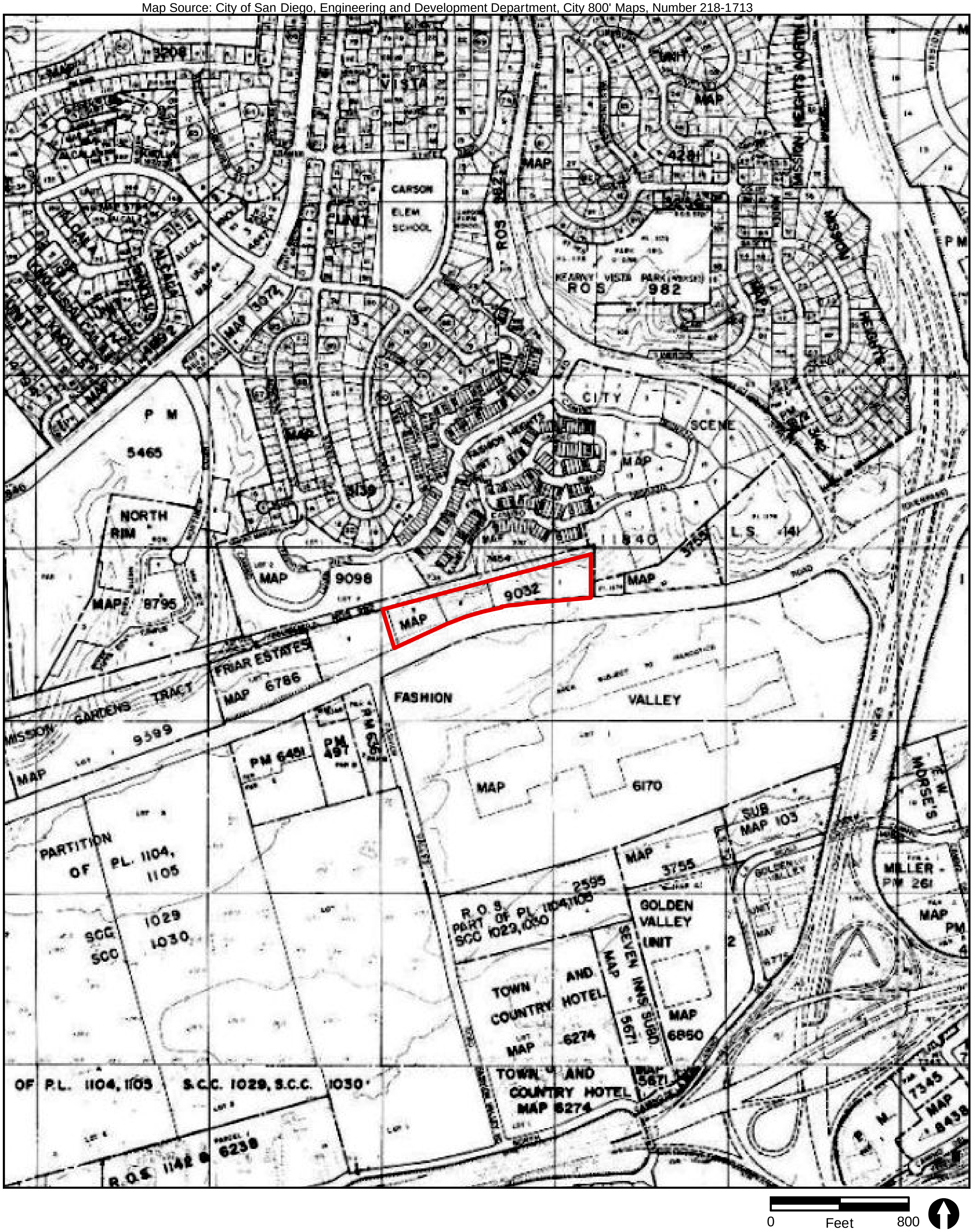
Map Source: City of San Diego, Engineering and Development Department, City 800' Maps, Number 218-1713




Project Boundary

# FIGURE 3
Project Location on City 800' Map

RECON

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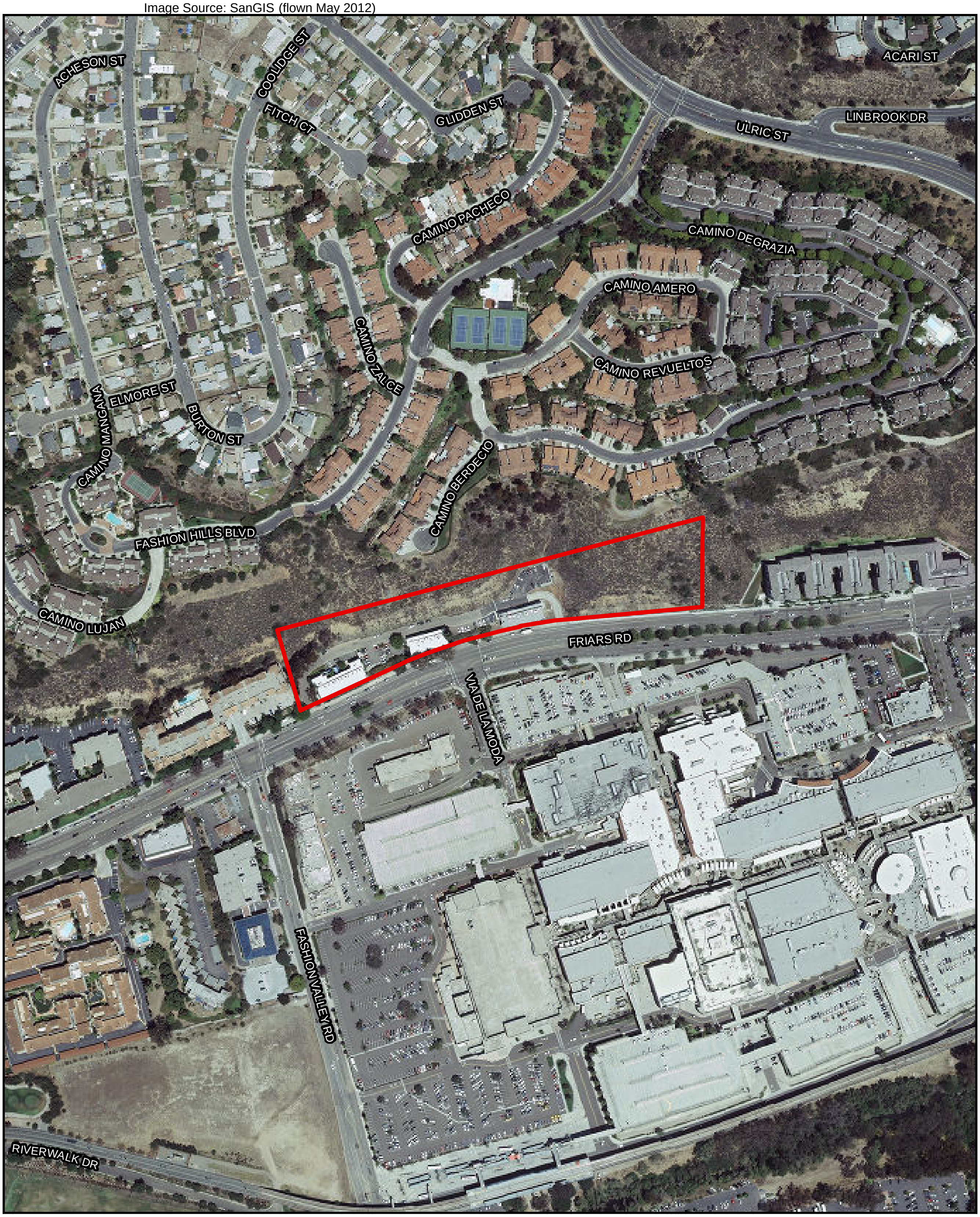
Image Source: SanGIS (flown May 2012)




0 Feet 400

Project Boundary

RECON

# FIGURE 4

Project Location on Aerial Photograph

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PHOTOGRAPH 1
Existing Conditions, View West from APN 437-250-24

PHOTOGRAPH 2
Existing Conditions, View East from APN 437-250-24

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PHOTOGRAPH 3
Detail of Survey Conditions in APN 437-250-24

PHOTOGRAPH 4
Existing conditions,
View West from APN 437-250-22

PHOTOGRAPH 5
Exposed Soils in APN 437-250-22

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# Noise Analysis for the Friars Road Mixed-Use Project San Diego, California

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RECON Number 7916
December 14, 2016

Jessica Fleming

Jessica Fleming, Environmental Analyst

# TABLE OF CONTENTS



**FIGURES**

# TABLE OF CONTENTS (CONT.)

## TABLES



## ATTACHMENTS

# Acronyms

| | |
|---|---|
| ADT | average daily traffic |
| Caltrans | California Department of Transportation |
| CCR | California Code of Regulations |
| CNEL | community noise equivalent level |
| dB | decibel |
| dB(A) | A-weighted decibel |
| FTA | Federal Transit Administration |
| $L_{eq}$ | one-hour equivalent noise level |
| LLG | Linscott, Law & Greenspan Engineers |
| $L_{pw}$ | sound power level |
| mph | mile per hour |
| SEL | sound exposure level |

# Executive Summary

The proposed Friars Road Mixed-Use project site is located north of the intersection of Friars Road and Via De La Moda in the city of San Diego, California. The project would include the demolition of three commercial buildings and the construction of a total of 319 residential dwelling units, consisting of 243 apartments, 6 shopkeeper units, and 70 condominiums. The apartments would be constructed in an eight story building while the condominiums would be constructed in a nine-story building. The project would also include two levels of subterranean parking, common open areas and pools, and a rooftop deck.

This report discusses potential noise impacts from the construction and operation of the project. As part of this assessment, noise levels due to vehicle traffic were calculated and evaluated against City of San Diego (City) noise and land use compatibility guidelines. In addition to compatibility, the potential for noise to impact adjacent receivers from future on-site sources and construction activity was assessed. Where impacts were identified, measures have been identified to comply with the City's noise standards. A summary of the findings is provided below.

# Construction Noise

Hourly average construction noise levels at the adjacent western, northern, and eastern residential properties would be 64, 70, and 56 one-hour equivalent A-weighted decibels (dB(A) $L_{eq}$), respectively. While construction may be heard over other noise sources in the area, noise levels of this order would not be a substantial increase in ambient noise levels during construction.

Although the existing adjacent residences would be exposed to construction noise levels that could be heard above ambient conditions, the exposure would be temporary. Additionally, construction activities are not anticipated to exceed 75 dB(A)$L_{eq}$ at the nearest residential uses. Because construction activities associated with the project would comply with the applicable regulation for construction, temporary increases in noise levels from construction activities would be less than significant.

# Traffic Noise

## On-Site Traffic Noise

Exterior noise levels were modeled at the proposed exterior use areas to determine compatibility with the General Plan standards. These areas include the two first-floor pool areas, the open space on the north side of the apartment building, and the rooftop deck of the condominium building. Exterior noise levels at the exterior use areas are not projected to exceed the City's multi-family compatibility level of 70 community noise equivalent level (CNEL). Thus, exterior noise impacts would be less than significant.

Exterior noise levels are projected to exceed 60 CNEL at all receivers except those located on the north side of the proposed buildings shielded from Friars Road. Exterior noise levels would range up to 73 CNEL at the apartment building and 74 at the condominium building. As required by Title 24 of the California Code of Regulations, where exterior noise levels exceed 60 CNEL, interior noise studies shall be prepared for the units in these buildings demonstrating that interior noise levels due to exterior sources do not exceed 45 CNEL in habitable rooms. Conformance with Title 24 would be verified as a part of the City's ministerial plan check process.

## Off-Site Traffic Noise

The project would increase traffic volumes on local roadways. Noise level increases would be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic.

The increase in noise due to the addition of project traffic was calculated by comparing the existing and future traffic volumes with and without the project. When comparing the existing to the existing plus project traffic volumes and the future to the future plus project traffic volumes, noise increases would be 0.1 decibel (dB) or less and would not be audible. Additionally, when comparing the future plus project traffic volumes to the existing traffic volumes, noise increases would range from 0.6 to 2.2 dB. These increases, which are due to regional growth, would not be perceivable and would be considered less than significant.

# On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any residential complex, such as vehicles arriving and leaving, children at play, and landscape maintenance machinery. None of these noise sources are anticipated to violate the noise level limits of the municipal code or result in a substantial permanent increase in existing noise levels. Additionally, all heating, ventilating, and air conditioning equipment would be located within mechanical equipment enclosures located on the roof of each building. Because the equipment would be enclosed, it would not generate noise levels in excess of the noise level limits of the municipal code. Thus, impacts due to on-site generated noise would be less than significant.

# 1.0 Introduction

## 1.1 Project Description

The project includes demolition of the three existing commercial/office buildings and construction of two multi-family residential buildings with subterranean parking. Common recreational facilities, as well as private usable open space amenities, would be incorporated into the overall design. Access would be at the intersection of Friars Road and Via de la Moda with a signalized intersection and enhanced pedestrian crosswalks.

Demolition would include two three-story buildings and one two-story building, totaling approximately 48,180 square feet, and paved parking areas, driveways, and walkways totaling 486,680 square feet. Construction would include a total of 319 residential dwelling units, consisting of 243 apartments, 6 shopkeeper units, and 70 condominiums. The apartments and shopkeeper units would total 204,242 square feet of habitable space in an eight-story structure over two levels of subterranean parking. The condominium units would total 110,883 square feet of habitable space in a nine-story structure over two levels of subterranean parking. Common areas and open space construction, including decks and balconies, would total 85,634 square feet. Subterranean parking would total 177,745 square feet. The project would include usable open space areas on the podium level (over the subterranean parking) including two southern-facing pool areas adjacent to the apartments and open space areas surrounding the condominiums. A minimum 3.5-foot solid wall would run along the southern edge of the podium level.

Figure 1 shows the regional location. Figure 2 shows an aerial photograph of the project vicinity. Figure 3 shows the proposed site plan.


Project Location



FIGURE 1
Regional Location

Image Source: USDA FSA NAIP (flown May 2014)


0 Feet 300

Project Boundary

Noise Measurement Location

FIGURE 2

Aerial Photograph of Project Vicinity and Noise Measurement Locations

RECON

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Map Source: Tucker Sadler

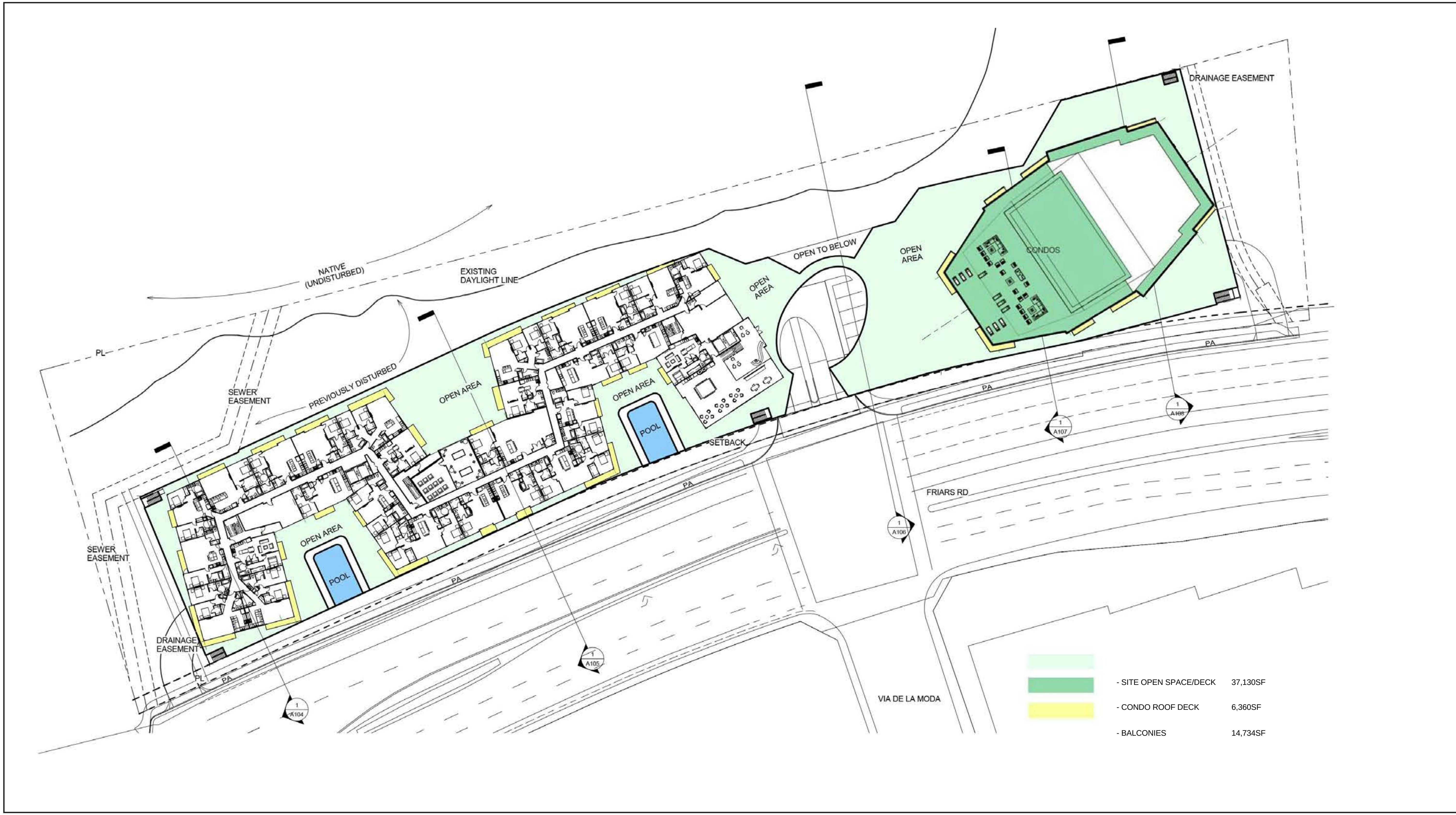


FIGURE 3
Proposed Site Plan

RECON

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## 1.2 Fundamentals of Noise

Sound levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Additionally, in technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as $L_{pw}$, is the energy converted into sound by the source. The $L_{pw}$ is used to estimate how far a noise will travel and to predict the sound levels at various distances from the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an ear drum or microphone and is the sound pressure level. Noise measurement instruments only measure sound pressure, and noise level limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are designated with the notation dB(A).

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. The noise descriptors used for this study are the one-hour equivalent noise level ($L_{eq}$), the community noise equivalent level (CNEL), and the sound exposure level (SEL). The CNEL is a 24-hour equivalent sound level. The CNEL calculation applies an additional 5 dB(A) penalty to noise occurring during evening hours, between 7:00 P.M. and 10:00 P.M., and an additional 10 dB(A) penalty is added to noise occurring during the night, between 10:00 P.M. and 7:00 A.M. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night. The SEL is a noise level over a stated period of time or event and normalized to one second.

Sound from a small, localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop-off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. A soft site (such as soft dirt, grass, or scattered bushes and trees) receives an additional ground attenuation value of 1.5 dB(A) per doubling of distance. Thus, a point source over a soft site would attenuate at 7.5 dB(A) per doubling of distance.

Human perception of noise has no simple correlation with acoustical energy. A change in noise levels is generally perceived as follows: 3 dB(A) barely perceptible, 5 dB(A) readily perceptible, and 10 dB(A) perceived as a doubling or halving of noise (Caltrans 2013).

# 2.0 Existing Conditions

Existing noise levels at the project site were measured on November 6, 2015, using a Larson-Davis LxT Sound Expert Sound Level Meter, serial number 3898. The following parameters were used:

| | |
|---|---|
| Filter: | A-weighted |
| Response: | Slow |
| Time History Period: | 5 seconds |
| Height of Instrument: | 5 feet above ground level |

The meter was calibrated before and after each measurement. Four 15-minute measurements were made on the project site, as described below. The locations of the measurements are shown on Figure 2, and the noise measurement data are contained in Attachment 1.

Measurement 1 was located at the western portion of the project site, approximately 25 feet north of Friars Road. The main source of noise at this location was vehicle traffic on Friars Road. Vehicle traffic on Via de la Moda and vehicles in the Fashion Valley Mall parking lot were also audible. Traffic volumes on Friars Road were counted during Measurement 1 and the results are shown in Table 1. The average measured noise level during Measurement 1 was 67.6 dB(A) $L_{eq}$.

Measurement 2 was located near the center of the development footprint, north of the intersection of Friars Road with Via de la Moda, approximately 25 feet north of Friars Road. The noise sources at Measurement 2 were the same as those at Measurement 1. Traffic volumes on Friars Road were counted during Measurement 2 and the results are shown in Table 1. The average measured noise level during Measurement 2 was 68.1 dB(A) $L_{eq}$.

Measurement 3 was located on the project site at the east end of the existing parking lot, approximately 75 feet north of Friars Road. The noise sources at Measurement 3 were the same as those at Measurements 1 and 2. Traffic volumes on Friars Road were counted during Measurement 3 and the results are shown in Table 1. The average measured noise level during Measurement 3 was 60.6 dB(A) $L_{eq}$.

Measurement 4 was located at the top of the slope at the end of Camino Berdecio north of the project site. The main source of noise at this location was vehicle traffic on Friars Road. Vehicles in the Fashion Valley Mall parking lot were also audible. There was no vehicle traffic on Camino Berdecio during the measurement period. The average measured noise level during Measurement 4 was 62.4 dB(A) $L_{eq}$.

**Table 1**
**15-minute Traffic Counts**

| Measurement | Roadway | Direction | Autos | Medium Trucks | Heavy Trucks | Buses | Motorcycles |
|---|---|---|---|---|---|---|---|
| 1 | Friars Road | Eastbound | 187 | 3 | 0 | 1 | 1 |
| | | Westbound | 226 | 4 | 0 | 1 | 1 |
| 2 | Friars Road | Eastbound | 287 | 5 | 0 | 1 | 1 |
| | | Westbound | 292 | 0 | 0 | 7 | 2 |
| 3 | Friars Road | Eastbound | 370 | 2 | 0 | 2 | 1 |
| | | Westbound | 256 | 2 | 0 | 3 | 0 |

NOTE: Traffic counts were not conducted during Measurement 4.

To verify whether the computer-modeled parameters to be used were reasonable, existing noise levels were modeled using the existing topography and the field traffic counts. The model output should be within 3 dB(A) of the measured value if the model is accurately representing the existing physical conditions. SoundPLAN output for the modeling of the measured conditions is contained in Attachment 2. The modeled noise levels were within 3 dB(A) of the measured noise levels for all measurement locations. Thus, the modeled parameters result in good agreement between the measured and modeled noise levels.

# 3.0 Applicable Standards

## 3.1 General Plan

The City's Noise Element of the General Plan specifies compatibility standards for different categories of land use. The noise land use compatibility guidelines are intended to be used for future development within San Diego to prevent future incompatibilities. The City's land use/noise compatibility guidelines are shown in Table 2. For multi-family residential uses, exterior noise levels up to 60 CNEL are considered "compatible" and exterior noise levels up to 70 CNEL are considered "conditionally compatible." The City's interior noise level standard for residential uses is 45 CNEL.

**Table 2**
**City of San Diego Land Use - Noise Compatibility Guidelines**

| Land Use Category | Exterior Noise Exposure [dB(A) CNEL] | | | | |
|---|---|---|---|---|---|
| | | 60 | 65 | 70 | 75 |
| *Parks and Recreational* | | | | | |
| Parks, Active and Passive Recreation | | | | | |
| Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities | | | | | |
| *Agricultural* | | | | | |
| Crop Raising and Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries and Greenhouses; Animal Raising, Maintaining and Keeping; Commercial Stables | | | | | |
| *Residential* | | | | | |
| Single Dwelling Units; Mobile Homes | | 45 | | | |
| Multiple Dwelling Units<br>**For uses affected by aircraft noise, refer to Policies NE-D.2. & NE-D.3.* | | 45 | 45 | | |
| *Institutional* | | | | | |
| Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12 Educational Facilities; Libraries; Museums; Child Care Facilities | | 45 | | | |
| Other Educational Facilities including Vocational/Trade Schools and Colleges and Universities | | 45 | 45 | | |
| Cemeteries | | | | | |
| *Retail Sales* | | | | | |
| Building Supplies/Equipment; Food, Beverage, and Groceries; Pets and Pet Supplies; Sundries, Pharmaceutical, and Convenience Sales; Wearing Apparel and Accessories | | | 50 | 50 | |
| *Commercial Services* | | | | | |
| Building Services; Business Support; Eating and Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly and Entertainment (includes public and religious assembly); Radio and Television Studios; Golf Course Support | | | 50 | 50 | |
| Visitor Accommodations | | 45 | 45 | 45 | |
| *Offices* | | | | | |
| Business and Professional; Government; Medical, Dental, and Health Practitioner; Regional and Corporate Headquarters | | | 50 | 50 | |
| *Vehicle and Vehicular Equipment Sales and Services Use* | | | | | |
| Commercial or Personal Vehicle Repair and Maintenance; Commercial or Personal Vehicle Sales and Rentals; Vehicle Equipment and Supplies Sales and Rentals; Vehicle Parking | | | | | |
| *Wholesale, Distribution, Storage Use Category* | | | | | |
| Equipment and Materials Storage Yards; Moving and Storage Facilities; Warehouse; Wholesale Distribution | | | | | |
| *Industrial* | | | | | |
| Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking and Transportation Terminals; Mining and Extractive Industries | | | | | |
| Research and Development | | | | 50 | |

| | | | |
|---|---|---|---|
| | **Compatible** | **Indoor Uses** | Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. |
| | | **Outdoor Uses** | Activities associated with the land use may be carried out. |
| **45, 50** | **Conditionally Compatible** | **Indoor Uses** | Building structure must attenuate exterior noise to the indoor noise level indicated by the number for occupied areas. |
| | | **Outdoor Uses** | Feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable. |
| | **Incompatible** | **Indoor Uses** | New construction should not be undertaken. |
| | | **Outdoor Uses** | Severe noise interference makes outdoor activities unacceptable. |

SOURCE: City of San Diego 2015.

## 3.2 San Diego Significance Determination Thresholds

The noise section of the City of San Diego's Significance Determination Thresholds for the California Environmental Quality Act (CEQA) identifies thresholds for traffic noise. These noise levels are summarized in Table 3 below.

**Table 3**
**Traffic Noise Significance Thresholds**
**(dB[A] CNEL)**

| Structure or Proposed Use that would be Impacted by Traffic Noise | Interior Space | Exterior Useable Space[1] | General Indication of Potential Significance |
|---|---|---|---|
| Single-family detached | 45 dB | 65 dB | Structure or outdoor useable area is <50 feet from the center of the closest (outside) lane on a street with existing or future ADTs >7,500 |
| Multi-family, school, library, hospital, day care center, hotel, motel, park, convalescent home | Development Services Department ensures 45 dB pursuant to Title 24 | 65 dB | |
| Office, church, business, professional uses | n/a | 70 dB | Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >20,000 |
| Commercial, retail, industrial, outdoor spectator sports uses | n/a | 75 dB | Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >40,000 |

ADT = Average Daily Trips
[1] If a project is currently at or exceeds the significance thresholds for traffic noise described above and noise levels would result in less than a 3 dB increase, then the impact is not considered significant.

As shown in Table 3, exposure of multi-family residential uses to noise levels in excess of 65 CNEL would be considered to be a significant impact.

## 3.3 Construction Noise Level Limits

Section 59.5.0404 of the City's Noise Abatement and Control Ordinance states that:

A. It shall be unlawful for any person, between the hours of 7:00 P.M. of any day and 7:00 A.M. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, to erect, construct, demolish, excavate for, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. . . .

B. . . . it shall be unlawful for any person, including the City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels during the 12-hour period from 7:00 A.M. to 7:00 P.M.

The project construction would be restricted to between the hours of 7:00 A.M. and 7:00 P.M. and construction noise levels may not exceed 75 dB(A) $L_{eq(12)}$ as assessed at or beyond the property line of a property zoned residential.

## 3.4 California Code of Regulations

Interior noise levels for dwellings other than detached single-family dwellings are regulated also by Title 24 of the California Code of Regulations (CCR), California Noise Insulation Standards. Title 24, Chapter 12, Section 1207, of the California Building Code requires that interior noise levels attributable to exterior sources not exceed 45 CNEL in any habitable room within a residential structure. A habitable room is a room used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable rooms for this regulation. Additionally, acoustical studies must be prepared for proposed residential structures located where the noise level exceeds 60 CNEL. The studies must demonstrate that the design of the building would reduce interior noise to 45 CNEL in habitable rooms. If compliance requires windows to be inoperable or closed, the structure must include ventilation or air-conditioning (24 CCR 1207 2010).

# 4.0 Analysis Methodology

## 4.1 Construction Noise Analysis

Project construction noise would be generated by diesel engine-driven construction equipment used for site preparation and grading, removal of existing structures and pavement, loading, unloading, and placing materials and paving. Diesel engine-driven trucks also would bring materials to the site and remove the soils from excavation.

Construction equipment with a diesel engine typically generates maximum noise levels from 80 to 90 dB(A) $L_{eq}$ at a distance of 50 feet (FTA 2006). Table 4 summarizes typical construction equipment noise levels.

| Table 4<br>Typical Construction Equipment Noise Levels | |
|---|---|
| Equipment | Noise Level at 50 Feet [dB(A) $L_{eq}$] |
| Air Compressor | 81 |
| Backhoe | 80 |
| Compactor | 82 |
| Concrete Mixer | 85 |
| Crane, Derrick | 88 |
| Dozer | 85 |
| Grader | 85 |
| Jack Hammer | 88 |
| Loader | 85 |
| Paver | 89 |
| Pump | 76 |
| Roller | 74 |
| Scraper | 89 |
| Truck | 88 |
| SOURCE: FTA 2006. | |

During excavating, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Although maximum noise levels may be 85 to 90 dB(A) at a distance of 50 feet during most construction activities, hourly average noise levels from the grading phase of construction would be 82 dB(A) $L_{eq}$ at 50 feet from the center of construction activity when assessing the loudest pieces of equipment working simultaneously.

## 4.2 Traffic Noise Analysis

Noise generated by future traffic was modeled using SoundPLAN. The SoundPLAN program (Navcon Engineering 2015) uses the Federal Highway Administration's Traffic Noise Model algorithms and reference levels to calculate noise levels at selected receiver locations. The model uses various input parameters, such as projected hourly average traffic rates; vehicle mix, distribution, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. Receivers, roadways, and barriers were input into the model using three-dimensional coordinates. The locations of future buildings were obtained from project plans and drawings.

The main source of traffic noise at the project site is vehicle traffic on Friars Road. Traffic noise levels were calculated based on the peak traffic hour volumes, which were assumed to be 10 percent of the total average daily traffic (ADT). Calculations were completed for a peak daytime hour, and the resulting noise levels were weighted and combined into CNEL values. Typically, the predicted CNEL and the maximum daytime hourly $L_{eq}$ calculated are equal.

For modeling purposes, “pavement” ground conditions were used for the analysis of future conditions, since a large portion of the site is paved. The average annual temperature in the project area is 61 degrees Fahrenheit. The average relative humidity was 69 percent based on the yearly average humidity at Lindbergh Field (Western Regional Climate Center 2015).

Future (year 2035) traffic volumes on roadways in the vicinity of the project site were obtained from the Traffic Impact Analysis prepared for the project (LLG 2016). Friars Road is a six-lane Major Arterial with a speed limit of 45 miles per hour (mph) adjacent to the project site. A vehicle classification mix of 94.5 percent automobiles, 3 percent medium trucks, 1 percent heavy trucks, 1 percent buses, and 0.5 percent motorcycles was modeled. Based on the field traffic counts, this is a conservative vehicle mix. Table 5 summarizes the future traffic volumes and vehicle classification mixes for Friars Road.

**Table 5**
**Future Friars Road Vehicle Traffic Parameters**

| Roadway Segment | Future ADT | Peak Hour Volume | Vehicle Classification Mix | | | | |
|---|---|---|---|---|---|---|---|
| | | | Autos | Medium Trucks | Heavy Trucks | Buses | Motor-cycles |
| West of Fashion Valley Road | 34,627 | 3,463 | 94.5 | 3.0 | 1.0 | 1.0 | 0.5 |
| Fashion Valley Road to Via De La Moda | 30,018 | 3,002 | 94.5 | 3.0 | 1.0 | 1.0 | 0.5 |
| Via De La Moda to Avenida De Las Tiendas | 44,970 | 4,497 | 94.5 | 3.0 | 1.0 | 1.0 | 0.5 |
| Avenida De Las Tiendas to Avenida Del Rio | 58,920 | 5,892 | 94.5 | 3.0 | 1.0 | 1.0 | 0.5 |
| Avenida Del Rio to Ulric Street | 64,890 | 6,489 | 94.5 | 3.0 | 1.0 | 1.0 | 0.5 |

mph = miles per hour
SOURCE: LLG 2016.

Vehicle traffic contours across the project site were calculated using SoundPLAN. Contours were calculated at the first floor level where the exterior use areas and first floor of residential units would be located. Exterior traffic noise levels were then calculated at the open space areas, the rooftop deck, and the building façade of the first through eighth levels of the apartment building and the first through ninth levels of the condominium building. Floor elevations were obtained from project elevation drawings (Tucker Sadler Architects 2015). Noise levels were modeled at the building façade to determine the need for an interior noise analysis demonstrating that interior noise levels would not exceed 45 CNEL. Additionally, exterior noise levels were modeled at the proposed exterior use areas. These areas include the two first floor pool areas, the open space on the north side of the apartment building, and the rooftop deck of the condominium building.

# 5.0 Future Acoustical Environment and Impacts

## 5.1 Construction Noise

Noise associated with the demolition, grading, building, and paving for the project would potentially result in short-term impacts to surrounding residential properties. A variety of noise-generating equipment would be used during the construction phase of the project such as scrapers, backhoes, front-end loaders, and concrete saws, along with others. The exact number and pieces of construction equipment required are not known at this time. In the absence of specifics, it was assumed that the loudest noise levels would occur during grading activities. Although maximum noise levels may be 85 to 90 dB(A) $L_{eq}$ at a distance of 50 feet during most construction activities, hourly average noise levels would be 82 dB(A) $L_{eq}$ at 50 feet from the center of construction activity when assessing the loudest pieces of equipment working simultaneously.

Construction noise is considered a point source and would attenuate at approximately 6 dB(A) for every doubling of distance. Construction activities, such as grading, generate the loudest noise levels. There are residential uses immediately adjacent to the project site. The residential uses to the west, north, and east are approximately 390, 200, and 990 feet from the center of the grading footprint, respectively. Grading would occur over the entire grading footprint and would not be situated at any one location for a long period of time. Assuming the acoustic center of the construction activity would be the center of the grading footprint, hourly average construction noise levels at the adjacent western, northern, and eastern residential properties would be 64, 70, and 56 dB(A) $L_{eq}$, respectively. Construction activities would generally occur over an 8-hour period between 7:00 A.M. and 7:00 P.M. on weekdays. While construction may be heard over other noise sources in the area, noise levels of this order would not be a substantial increase in ambient noise levels during construction.

Although the existing adjacent residences would be exposed to construction noise levels that could be heard above ambient conditions, the exposure would be temporary. Additionally, construction activities are not anticipated to exceed 75 dB(A)$L_{eq}$ at the nearest residential uses. Because construction activities associated with the project would comply with the applicable regulation for construction, temporary increases in noise levels from construction activities would be less than significant.

## 5.2 Traffic Noise

### 5.2.1 On-Site Traffic Noise

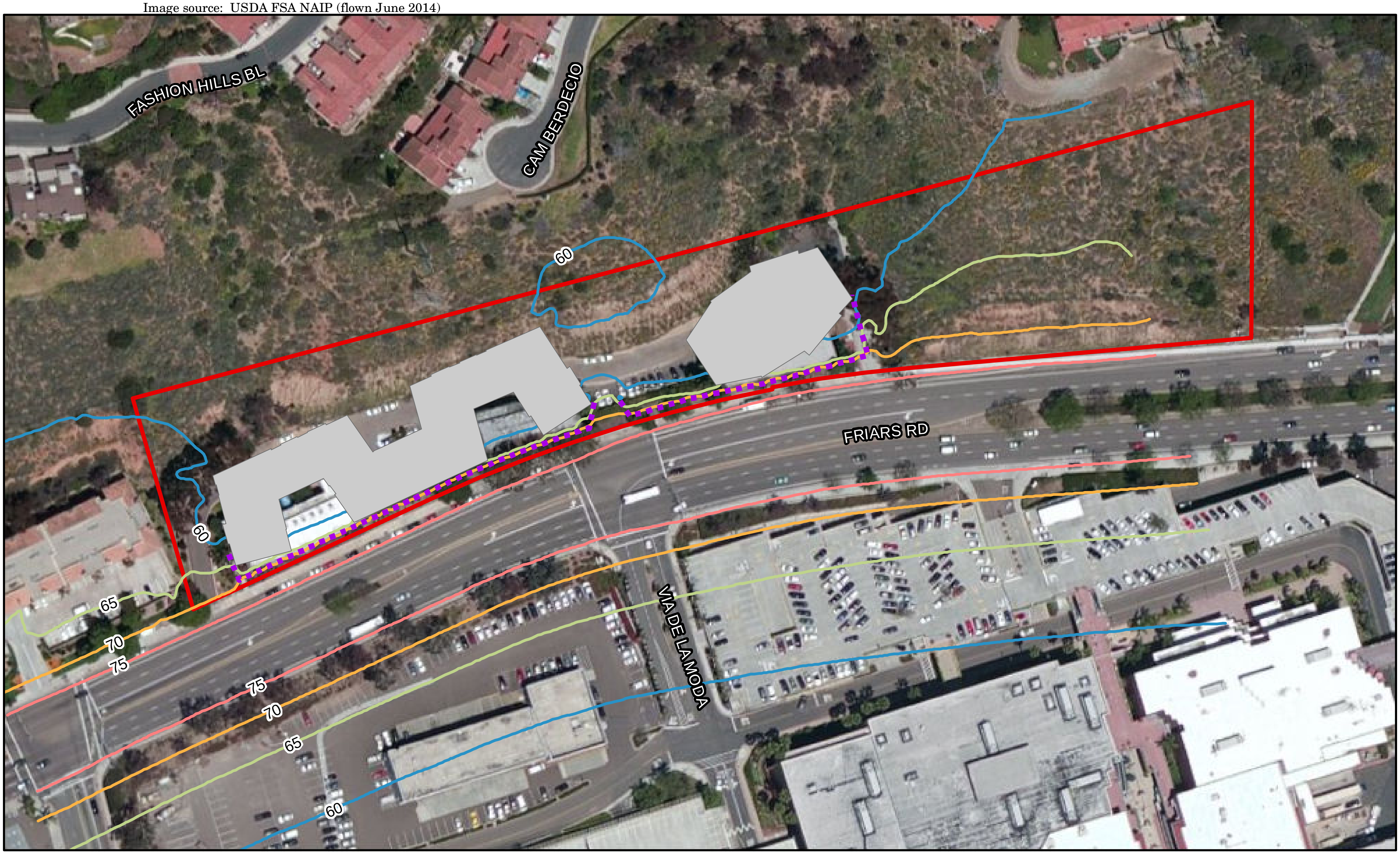
Traffic noise contours were developed using the SoundPLAN program. Noise level contours, modeled at the first floor level where the exterior use areas and first floor of residential units would be located, are shown in Figure 4. These contours take into account topography, the proposed buildings, and the proposed 3.5-foot solid wall that would run along the southern edge of the pool decks. SoundPLAN data are contained in Attachment 3.

Exterior noise levels were also calculated at a series of 35 modeled receiver locations. As discussed, noise levels were modeled at the building façade to determine the need for an interior noise analysis to demonstrate that interior noise levels would not exceed 45 CNEL. Exterior noise levels were modeled at the proposed exterior use areas to determine compatibility with the General Plan standards (see Table 2) and City Significance Determination Thresholds (Table 3). These areas include the two first floor pool areas, the open space on the north side of the apartment building, and the rooftop deck of the condominium building. Modeled receiver locations are shown in Figure 5. Table 6 summarizes the projected future noise levels at the 35 modeled receivers.

As shown, noise levels at the exterior use areas are projected to reach up to 63 CNEL. Therefore, noise levels at exterior use areas would not exceed the City's significance threshold for traffic noise of 65 CNEL at multi-family residential uses or the City's multi-family conditionally compatibility level of 70 CNEL. Exterior noise impacts would be less than significant.

The interior noise level standard for residential uses is 45 CNEL. As shown in Table 6, exterior noise levels are projected to exceed 60 CNEL at all receivers except those located on the north side of the proposed buildings shielded from Friars Road. Exterior noise levels would range up to 73 CNEL at the apartment building and 74 at the condominium building. As required by Title 24 of the CCR, where exterior noise levels exceed 60 CNEL, interior noise studies shall be prepared for the units in these buildings demonstrating that interior noise levels due to exterior sources do not exceed 45 CNEL in habitable rooms.

Image source: USDA FSA NAIP (flown June 2014)




Project Boundary
Proposed Buildings
Modeled 3.5-foot Wall

**Traffic Noise Contours**

60 CNEL
65 CNEL
70 CNEL
75 CNEL

0 Feet 150

RECON

\\serverfs01\gis\JOBS4\7916\common_gis\fig4_nos.mxd 4/6/2016 sab

FIGURE 4

Future Vehicle Traffic Noise Contours

Image source: Tucker Sadler




Project Boundary

Modeled Noise Receiver

RECON

\\serverfs01\gis\JOBS4\7916\common_gis\fig5_nos.mxd 11/12/2015 fmm

FIGURE 5

Modeled Receivers

| Table6<br>Future Exterior Vehicle Traffic Noise Levels (CNEL) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Receiver | Location | 1st Floor | 2nd Floor | 3rd Floor | 4th Floor | 5th Floor | 6th Floor | 7th Floor | 8th Floor | 9th Floor | Roof Deck |
| 1 | Apartment Building Façade | 52 | 62 | 64 | 65 | 65 | 65 | 65 | 65 | -- | -- |
| 2 | Apartment Building Façade | 65 | 72 | 72 | 72 | 71 | 71 | 71 | 70 | -- | -- |
| 3 | Apartment Building Façade, First Floor Open Area and Pool | 62 | 70 | 70 | 70 | 70 | 70 | 69 | 69 | -- | -- |
| 4 | Apartment Building Façade, First Floor Open Area and Pool | 56 | 60 | 66 | 68 | 68 | 67 | 67 | 67 | -- | -- |
| 5 | Apartment Building Façade, First Floor Open Area and Pool | 61 | 70 | 70 | 70 | 70 | 69 | 69 | 69 | -- | -- |
| 6 | Apartment Building Façade, First Floor Open Area and Pool | 59 | 68 | 69 | 69 | 69 | 69 | 68 | 68 | -- | -- |
| 7 | Apartment Building Façade | 71 | 73 | 73 | 72 | 72 | 72 | 71 | 71 | -- | -- |
| 8 | Apartment Building Façade | 71 | 73 | 73 | 73 | 72 | 72 | 71 | 71 | -- | -- |
| 9 | Apartment Building Façade | 71 | 73 | 73 | 73 | 72 | 72 | 72 | 71 | -- | -- |
| 10 | Apartment Building Façade, First Floor Open Area and Pool | 61 | 70 | 70 | 70 | 70 | 70 | 69 | 69 | -- | -- |
| 11 | Apartment Building Façade, First Floor Open Area and Pool | 56 | 60 | 65 | 67 | 68 | 67 | 67 | 67 | -- | -- |
| 12 | Apartment Building Façade, First Floor Open Area and Pool | 62 | 70 | 71 | 71 | 70 | 70 | 70 | 70 | -- | -- |
| 13 | Apartment Building Façade, First Floor Open Area and Pool | 59 | 67 | 69 | 69 | 69 | 69 | 68 | 68 | -- | -- |
| 14 | Apartment Building Façade | 63 | 72 | 73 | 72 | 72 | 72 | 71 | 71 | -- | -- |
| 15 | Apartment Building Façade | 51 | 58 | 62 | 63 | 64 | 65 | 65 | 65 | -- | -- |
| 16 | Apartment Building Façade | 24 | 24 | 26 | 27 | 28 | 31 | 38 | 45 | -- | -- |
| 17 | Apartment Building Façade, First Floor Open Area | 26 | 30 | 28 | 28 | 30 | 31 | 33 | 37 | -- | -- |
| 18 | Apartment Building Façade | 26 | 25 | 27 | 27 | 29 | 31 | 36 | 47 | -- | -- |
| 19 | Condominium Building Façade | 63 | 70 | 71 | 71 | 70 | 70 | 70 | 70 | 69 | -- |
| 20 | Condominium Building Façade | 59 | 66 | 70 | 70 | 70 | 69 | 69 | 69 | 69 | -- |
| 21 | Condominium Building Façade | 67 | 74 | 74 | 73 | 73 | 73 | 72 | 72 | 71 | -- |
| 22 | Condominium Building Façade | 64 | 73 | 73 | 73 | 72 | 72 | 72 | 71 | 71 | -- |
| 23 | Condominium Building Façade | 60 | 68 | 71 | 71 | 71 | 71 | 71 | 70 | 70 | -- |
| 24 | Condominium Building Façade | 45 | 49 | 57 | 60 | 62 | 63 | 64 | 65 | 65 | -- |
| 25 | Condominium Building Façade | 26 | 29 | 27 | 28 | 29 | 31 | 33 | 35 | 43 | -- |
| 26 | Condominium Building Façade | 38 | 39 | 41 | 44 | 47 | 50 | 52 | 53 | 54 | -- |
| 27 | Condominium Building Façade | 48 | 51 | 53 | 58 | 59 | 61 | 61 | 61 | 61 | -- |
| 28 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 63 |
| 29 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 |
| 30 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 |
| 31 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 52 |
| 32 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 48 |
| 33 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 49 |
| 34 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 |
| 35 | Condominium Roof Deck | -- | -- | -- | -- | -- | -- | -- | -- | -- | 63 |

NOTES:
Apartment building is eight stories and condominium building is nine stories.
Exterior useable space includes two first floor pool areas (Receivers 4 through 6 and 10 through 13), the open space on the north side of the apartment building (Receiver 17), and the rooftop deck of the condominium building (Receivers 28 through 35).

### 5.2.2 Off-Site Traffic Noise

The project would increase traffic volumes on local roadways. Noise level increases would be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic. The project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway; thus, the primary factor affecting off-site noise levels would be increased traffic volumes.

A significant impact would occur if the project resulted in or created a significant increase in the existing ambient noise levels. Studies have shown that the average human ear can barely perceive a change in sound level of 3 dB(A). A change of at least 5 dB(A) is considered a readily perceivable change in a normal environment. A 10 dB(A) increase is subjectively heard as a doubling in loudness and would cause a community response. The City's Significance Determination Thresholds state that if a project is currently at or exceeds the significance thresholds for traffic noise and noise levels result in less than a 3 dB(A) increase, the impact would not be considered significant (City of San Diego 2011).

Therefore, based on these concepts of increase and perception, if an area is already exposed to noise levels in excess of the land use compatibility guidelines (see Table 2) and noise levels were to result in greater than a 3 dB(A) increase, then the impact would be considered significant. If an area is currently exposed to noise levels that do not exceed the land use compatibility guidelines and noise levels were to result in greater than a 5 dB(A) increase, then the impact would be considered significant.

The increase in noise due to the addition of project traffic was calculated by comparing the existing and future traffic volumes with and without the project. The results are shown in Table 7. As shown, when comparing the existing to the existing plus project traffic volumes and the future to the future plus project traffic volumes, noise increases would be 0.1 dB or less and would not be audible. Additionally, when comparing the future plus project traffic volumes to the existing traffic volumes, noise increases would range from 0.6 to 2.2 dB.

These increases, which are due to regional growth, would not be perceivable and would be considered less than significant.

## 5.3 On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any residential complex, such as vehicles arriving and leaving, children at play, and landscape maintenance machinery. None of these noise sources are anticipated to violate the noise level limits of the municipal code or result in a substantial permanent increase in existing noise levels. Heating, ventilation, and air conditioning (HVAC) units would be required for the building. It is not known at this time which manufacturer, brand, or model of unit or units would be selected for use in the project. However, all equipment would be located within mechanical equipment enclosures located on the roof of each building. Because the equipment would be enclosed, it is not anticipated to generate noise levels in excess of the noise level limits of the municipal code. Impacts due to on-site generated noise would be less than significant.

**Table 7**
**Traffic Volumes with and without Project and Ambient Noise Increases**

| Roadway | Segment | Existing ADT | Existing + Project ADT | Δ dB | Year 2035 ADT | Year 2035 + Project ADT | Δ dB | Δ dB 2035 Over Existing |
|---|---|---|---|---|---|---|---|---|
| Friars Road | West of Fashion Valley Road | 25,337 | 25,504 | 0.0 | 34,476 | 34,627 | 0.0 | 1.4 |
| | Fashion Valley Road to Via De La Moda | 25,980 | 26,279 | 0.0 | 29,669 | 30,018 | 0.0 | 0.6 |
| | Via De La Moda to Avenida De Las Tiendas | 31,416 | 31,987 | 0.1 | 44,450 | 44,970 | 0.0 | 1.6 |
| | Avenida De Las Tiendas to Avenida Del Rio | 42,743 | 43,314 | 0.1 | 58,400 | 58,920 | 0.0 | 1.4 |
| | Avenida Del Rio to Ulric Street | 42,743 | 43,314 | 0.1 | 64,370 | 64,890 | 0.0 | 1.8 |
| Fashion Valley Road | Friars Road to Riverwalk Drive | 10,268 | 10,400 | 0.1 | 16,985 | 17,184 | 0.0 | 2.2 |
| SOURCE: LLG 2015 | | | | | | | | |

# 6.0 Conclusions and Noise Abatement Measures

## 6.1 Construction Noise

Hourly average construction noise levels at the adjacent western, northern, and eastern residential properties would be 64, 70, and 56 dB(A) $L_{eq}$, respectively. While construction may be heard over other noise sources in the area, noise levels of this order would not be a substantial increase in ambient noise levels during construction.

Although the existing adjacent residences would be exposed to construction noise levels that could be heard above ambient conditions, the exposure would be temporary. Additionally, construction activities are not anticipated to exceed 75 dB(A)$L_{eq}$ at the nearest residential uses. Because construction activities associated with the project would comply with the applicable regulation for construction, temporary increases in noise levels from construction activities would be less than significant.

## 6.2 Traffic Noise

### 6.2.1 On-Site Traffic Noise

Exterior noise levels were modeled at the proposed exterior use areas to determine compatibility with the General Plan standards and City Significance Thresholds. Exterior use areas include the two first floor pool areas, the open space on the north side of the apartment building, and the rooftop deck of the condominium building. As shown in Table 6, noise levels at the exterior use areas are projected to reach up to 63 CNEL. Therefore, noise levels at exterior use areas would not exceed the City's significance threshold for traffic noise of 65 CNEL at multi-family residential uses or the City's multi-family conditionally compatibility level of 70 CNEL. Exterior noise impacts would be less than significant.

Exterior noise levels are projected to exceed 60 CNEL at all receivers except those located on the north side of the proposed buildings shielded from Friars Road. Exterior noise levels would range up to 73 CNEL at the apartment building and 74 at the condominium building. As required by Title 24 of the CCR, where exterior noise levels exceed 60 CNEL, interior noise studies shall be prepared for the units in these buildings demonstrating that interior noise levels due to exterior sources do not exceed 45 CNEL in habitable rooms. Conformance with Title 24 would be verified as a part of the City's ministerial plan check process.

### 6.2.2 Off-Site Traffic Noise

The project would increase traffic volumes on local roadways. Noise level increases would be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic.

The increase in noise due to the addition of project traffic was calculated by comparing the existing and future traffic volumes with and without the project. As calculated, when comparing the existing to the existing plus project traffic volumes and the future to the future plus project traffic volumes, noise increases would be 0.1 dB or less and would not be audible. Additionally, when comparing the future plus project traffic volumes to the existing traffic volumes, noise increases would range from 0.6 to 2.2 dB. These increases, which are due to regional growth, would not be perceivable and would be considered less than significant.

## 6.3 On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any residential complex, such as vehicles arriving and leaving, children at play, and landscape maintenance machinery. None of these noise sources are anticipated to violate the noise level limits of the municipal code or result in a substantial permanent increase in existing noise levels. Additionally, all HVAC equipment would be located within mechanical equipment enclosures located on the roof of each building. Because the equipment would be enclosed, it is not anticipated to generate noise levels in excess of the noise level limits of the municipal code. Thus, impacts due to on-site generated noise would be less than significant.

# 7.0 References Cited

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# ATTACHMENTS

# ATTACHMENT 1

# Noise Measurement Data

**MEASUREMENT 1** **Leq =** **67.6**

| Record # | Date | Time | LAeq | | LApeak | LASmax | LASmin |
|---|---|---|---|---|---|---|---|
| **2** | 2015/11/06 | 13:23:48 | 67.6 | 5757602.8 | 84.9 | 70.7 | 63.8 |
| **3** | 2015/11/06 | 13:23:53 | 71.4 | 13783395.9 | 86.5 | 72.6 | 70.1 |
| **4** | 2015/11/06 | 13:23:58 | 72.1 | 16383582.6 | 85.6 | 72.5 | 70.9 |
| **5** | 2015/11/06 | 13:24:03 | 71.4 | 13836769.3 | 86.9 | 72.7 | 69.7 |
| **6** | 2015/11/06 | 13:24:08 | 63.3 | 2134484.8 | 79.1 | 69.7 | 60.3 |
| **7** | 2015/11/06 | 13:24:13 | 58.7 | 742465.7 | 74.3 | 60.3 | 57.9 |
| **8** | 2015/11/06 | 13:24:18 | 62.8 | 1924000.8 | 78.0 | 63.9 | 59.7 |
| **9** | 2015/11/06 | 13:24:23 | 58.2 | 660267.7 | 76.9 | 62.3 | 57.2 |
| **10** | 2015/11/06 | 13:24:28 | 57.4 | 551601.2 | 70.8 | 58.3 | 56.7 |
| **11** | 2015/11/06 | 13:24:33 | 63.4 | 2205931.7 | 76.9 | 64.7 | 58.2 |
| **12** | 2015/11/06 | 13:24:38 | 63.6 | 2293452.0 | 90.6 | 64.8 | 62.2 |
| **13** | 2015/11/06 | 13:24:43 | 61.3 | 1357560.2 | 80.6 | 64.0 | 60.5 |
| **14** | 2015/11/06 | 13:24:48 | 66.6 | 4567765.8 | 82.1 | 68.9 | 62.5 |
| **15** | 2015/11/06 | 13:24:53 | 71.2 | 13218850.6 | 84.4 | 71.4 | 68.9 |
| **16** | 2015/11/06 | 13:24:58 | 70.0 | 9985149.1 | 83.5 | 71.1 | 68.8 |
| **17** | 2015/11/06 | 13:25:03 | 66.4 | 4338494.2 | 81.0 | 68.9 | 65.2 |
| **18** | 2015/11/06 | 13:25:08 | 65.8 | 3802143.8 | 79.0 | 66.1 | 65.2 |
| **19** | 2015/11/06 | 13:25:13 | 65.3 | 3397372.7 | 80.4 | 66.6 | 63.4 |
| **20** | 2015/11/06 | 13:25:18 | 67.0 | 5001256.5 | 81.3 | 68.3 | 63.4 |
| **21** | 2015/11/06 | 13:25:23 | 65.4 | 3485257.0 | 78.2 | 67.0 | 64.8 |
| **22** | 2015/11/06 | 13:25:28 | 64.7 | 2921998.1 | 79.0 | 65.1 | 64.1 |
| **23** | 2015/11/06 | 13:25:33 | 64.9 | 3073755.9 | 78.4 | 65.3 | 64.5 |
| **24** | 2015/11/06 | 13:25:38 | 65.5 | 3542858.4 | 80.2 | 66.3 | 64.9 |
| **25** | 2015/11/06 | 13:25:43 | 69.8 | 9482194.8 | 84.7 | 71.4 | 66.3 |
| **26** | 2015/11/06 | 13:25:48 | 73.5 | 22297212.9 | 89.0 | 74.9 | 71.3 |
| **27** | 2015/11/06 | 13:25:53 | 67.6 | 5702080.3 | 83.5 | 72.9 | 65.5 |
| **28** | 2015/11/06 | 13:25:58 | 65.7 | 3722974.4 | 80.0 | 66.4 | 64.8 |
| **29** | 2015/11/06 | 13:26:03 | 64.7 | 2959368.4 | 82.3 | 66.5 | 63.5 |
| **30** | 2015/11/06 | 13:26:08 | 60.8 | 1194022.8 | 75.4 | 63.5 | 60.1 |
| **31** | 2015/11/06 | 13:26:13 | 62.2 | 1643905.2 | 75.9 | 63.3 | 60.3 |
| **32** | 2015/11/06 | 13:26:18 | 64.8 | 3036370.3 | 80.3 | 65.2 | 63.2 |
| **33** | 2015/11/06 | 13:26:23 | 64.4 | 2733901.3 | 80.3 | 65.3 | 64.2 |
| **34** | 2015/11/06 | 13:26:28 | 65.5 | 3542634.3 | 79.5 | 67.4 | 63.6 |
| **35** | 2015/11/06 | 13:26:33 | 70.1 | 10137736.7 | 83.2 | 70.9 | 67.4 |
| **36** | 2015/11/06 | 13:26:38 | 69.8 | 9520635.2 | 83.5 | 70.8 | 69.3 |
| **37** | 2015/11/06 | 13:26:43 | 69.9 | 9760297.2 | 82.2 | 70.7 | 69.3 |
| **38** | 2015/11/06 | 13:26:48 | 73.3 | 21422006.1 | 86.3 | 75.5 | 69.2 |
| **39** | 2015/11/06 | 13:26:53 | 62.8 | 1892154.3 | 77.6 | 69.2 | 62.6 |
| **40** | 2015/11/06 | 13:26:58 | 63.4 | 2211080.2 | 77.4 | 64.2 | 63.1 |
| **41** | 2015/11/06 | 13:27:03 | 67.4 | 5495207.9 | 82.8 | 69.1 | 63.4 |
| **42** | 2015/11/06 | 13:27:08 | 67.7 | 5909728.6 | 82.2 | 69.3 | 66.7 |
| **43** | 2015/11/06 | 13:27:13 | 69.3 | 8588724.7 | 82.1 | 69.8 | 66.8 |
| **44** | 2015/11/06 | 13:27:18 | 68.8 | 7537653.6 | 81.8 | 69.4 | 68.4 |
| **45** | 2015/11/06 | 13:27:23 | 63.4 | 2200538.2 | 77.6 | 68.4 | 61.2 |
| **46** | 2015/11/06 | 13:27:28 | 65.9 | 3907617.8 | 80.3 | 67.1 | 61.2 |
| **47** | 2015/11/06 | 13:27:33 | 60.3 | 1070904.7 | 77.8 | 65.1 | 58.7 |
| **48** | 2015/11/06 | 13:27:38 | 60.0 | 992301.0 | 76.9 | 61.9 | 57.4 |
| **49** | 2015/11/06 | 13:27:43 | 63.8 | 2381784.1 | 78.6 | 64.0 | 62.0 |
| **50** | 2015/11/06 | 13:27:48 | 62.9 | 1953368.0 | 83.8 | 64.0 | 61.2 |
| **51** | 2015/11/06 | 13:27:53 | 56.7 | 466307.3 | 70.6 | 61.1 | 56.4 |
| **52** | 2015/11/06 | 13:27:58 | 54.9 | 311082.6 | 67.5 | 56.4 | 54.3 |
| **53** | 2015/11/06 | 13:28:03 | 56.4 | 440749.8 | 70.9 | 57.8 | 54.2 |
| **54** | 2015/11/06 | 13:28:08 | 62.2 | 1668330.3 | 76.3 | 63.4 | 57.8 |
| **55** | 2015/11/06 | 13:28:13 | 63.8 | 2374904.8 | 78.9 | 63.9 | 63.3 |
| **56** | 2015/11/06 | 13:28:18 | 63.1 | 2046802.7 | 77.6 | 63.8 | 62.5 |
| **57** | 2015/11/06 | 13:28:23 | 61.8 | 1498255.7 | 78.5 | 62.8 | 61.1 |
| **58** | 2015/11/06 | 13:28:28 | 67.6 | 5694952.6 | 84.9 | 68.7 | 62.8 |
| **59** | 2015/11/06 | 13:28:33 | 63.2 | 2081891.9 | 78.9 | 68.5 | 62.0 |
| **60** | 2015/11/06 | 13:28:38 | 68.6 | 7300762.6 | 83.1 | 70.2 | 62.2 |
| **61** | 2015/11/06 | 13:28:43 | 73.0 | 19794087.8 | 85.6 | 73.8 | 70.2 |
| **62** | 2015/11/06 | 13:28:48 | 73.0 | 19851441.7 | 86.8 | 74.1 | 72.0 |
| **63** | 2015/11/06 | 13:28:53 | 70.1 | 10215827.0 | 83.5 | 72.0 | 68.5 |
| **64** | 2015/11/06 | 13:28:58 | 63.8 | 2383366.2 | 85.0 | 68.6 | 61.2 |
| **65** | 2015/11/06 | 13:29:03 | 63.9 | 2433869.2 | 78.3 | 65.7 | 60.2 |
| **66** | 2015/11/06 | 13:29:08 | 66.8 | 4771578.9 | 79.2 | 67.1 | 65.7 |
| **67** | 2015/11/06 | 13:29:13 | 63.6 | 2313029.3 | 76.9 | 66.6 | 63.0 |
| **68** | 2015/11/06 | 13:29:18 | 63.7 | 2326150.5 | 77.7 | 64.7 | 62.7 |
| **69** | 2015/11/06 | 13:29:23 | 65.2 | 3311489.2 | 78.1 | 66.0 | 64.3 |
| **70** | 2015/11/06 | 13:29:28 | 61.7 | 1467213.2 | 78.9 | 64.3 | 60.0 |
| **71** | 2015/11/06 | 13:29:33 | 62.9 | 1932323.3 | 79.3 | 64.6 | 59.7 |
| **72** | 2015/11/06 | 13:29:38 | 70.3 | 10626290.5 | 87.1 | 72.0 | 64.6 |
| **73** | 2015/11/06 | 13:29:43 | 64.5 | 2837863.4 | 81.6 | 71.2 | 59.8 |
| **74** | 2015/11/06 | 13:29:48 | 55.6 | 361739.4 | 71.6 | 59.7 | 55.2 |
| **75** | 2015/11/06 | 13:29:53 | 54.9 | 308980.0 | 69.9 | 56.3 | 53.8 |
| **76** | 2015/11/06 | 13:29:58 | 67.2 | 5284317.4 | 83.7 | 69.8 | 56.3 |
| **77** | 2015/11/06 | 13:30:03 | 68.1 | 6485117.9 | 82.8 | 70.8 | 65.6 |
| **78** | 2015/11/06 | 13:30:08 | 64.0 | 2492177.5 | 77.3 | 65.6 | 63.5 |
| **79** | 2015/11/06 | 13:30:13 | 68.1 | 6484126.8 | 81.6 | 68.9 | 64.6 |
| **80** | 2015/11/06 | 13:30:18 | 66.1 | 4077460.0 | 81.0 | 68.7 | 63.5 |
| **81** | 2015/11/06 | 13:30:23 | 59.3 | 844942.7 | 74.7 | 63.5 | 58.0 |
| **82** | 2015/11/06 | 13:30:28 | 59.2 | 823775.5 | 75.4 | 60.0 | 57.9 |
| **83** | 2015/11/06 | 13:30:33 | 61.5 | 1410206.9 | 87.5 | 62.8 | 59.9 |
| **84** | 2015/11/06 | 13:30:38 | 62.4 | 1732990.7 | 76.3 | 63.0 | 61.6 |
| **85** | 2015/11/06 | 13:30:43 | 68.2 | 6627645.2 | 83.2 | 69.7 | 61.7 |
| **86** | 2015/11/06 | 13:30:48 | 69.8 | 9610233.0 | 83.3 | 70.5 | 68.7 |
| **87** | 2015/11/06 | 13:30:53 | 63.7 | 2359833.3 | 86.1 | 68.7 | 62.1 |
| **88** | 2015/11/06 | 13:30:58 | 65.1 | 3249413.4 | 80.9 | 66.7 | 62.1 |
| **89** | 2015/11/06 | 13:31:03 | 71.4 | 13668378.9 | 86.7 | 73.3 | 66.7 |
| **90** | 2015/11/06 | 13:31:08 | 72.7 | 18624653.2 | 87.5 | 73.7 | 71.6 |
| **91** | 2015/11/06 | 13:31:13 | 70.5 | 11285994.3 | 82.9 | 71.6 | 70.4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **92** | 2015/11/06 | 13:31:18 | 68.0 | 6238593.2 | 82.0 | 70.4 | 66.6 |
| **93** | 2015/11/06 | 13:31:23 | 65.0 | 3141701.5 | 78.2 | 66.6 | 64.7 |
| **94** | 2015/11/06 | 13:31:28 | 62.2 | 1644646.1 | 75.9 | 65.0 | 60.5 |
| **95** | 2015/11/06 | 13:31:33 | 58.5 | 704810.6 | 72.2 | 60.5 | 57.8 |
| **96** | 2015/11/06 | 13:31:38 | 59.3 | 851679.3 | 72.0 | 59.8 | 57.8 |
| **97** | 2015/11/06 | 13:31:43 | 59.0 | 797614.3 | 72.4 | 59.7 | 58.6 |
| **98** | 2015/11/06 | 13:31:48 | 57.4 | 549350.4 | 75.6 | 58.9 | 56.3 |
| **99** | 2015/11/06 | 13:31:53 | 61.9 | 1562600.8 | 75.7 | 63.2 | 56.3 |
| **100** | 2015/11/06 | 13:31:58 | 67.4 | 5515508.3 | 82.4 | 68.9 | 63.1 |
| **101** | 2015/11/06 | 13:32:03 | 69.3 | 8447096.6 | 82.5 | 70.3 | 68.0 |
| **102** | 2015/11/06 | 13:32:08 | 67.2 | 5243647.4 | 85.1 | 70.5 | 63.5 |
| **103** | 2015/11/06 | 13:32:13 | 69.4 | 8728478.9 | 86.2 | 71.3 | 67.0 |
| **104** | 2015/11/06 | 13:32:18 | 68.4 | 6868335.5 | 82.2 | 70.7 | 65.5 |
| **105** | 2015/11/06 | 13:32:23 | 72.5 | 17981486.5 | 84.8 | 74.5 | 69.5 |
| **106** | 2015/11/06 | 13:32:28 | 69.2 | 8273199.4 | 84.8 | 73.0 | 66.9 |
| **107** | 2015/11/06 | 13:32:33 | 71.9 | 15485859.1 | 84.7 | 74.4 | 67.2 |
| **108** | 2015/11/06 | 13:32:38 | 73.3 | 21149152.5 | 86.5 | 76.8 | 68.1 |
| **109** | 2015/11/06 | 13:32:43 | 66.2 | 4193848.7 | 80.7 | 68.1 | 65.3 |
| **110** | 2015/11/06 | 13:32:48 | 66.5 | 4487923.5 | 79.7 | 67.7 | 65.9 |
| **111** | 2015/11/06 | 13:32:53 | 66.3 | 4241438.0 | 78.6 | 66.6 | 65.9 |
| **112** | 2015/11/06 | 13:32:58 | 64.2 | 2643946.5 | 77.4 | 65.9 | 63.6 |
| **113** | 2015/11/06 | 13:33:03 | 61.9 | 1534130.7 | 75.2 | 64.1 | 60.2 |
| **114** | 2015/11/06 | 13:33:08 | 59.7 | 931095.3 | 73.0 | 60.4 | 59.3 |
| **115** | 2015/11/06 | 13:33:13 | 60.5 | 1117296.8 | 76.9 | 61.3 | 59.1 |
| **116** | 2015/11/06 | 13:33:18 | 59.9 | 972449.3 | 81.6 | 61.6 | 59.1 |
| **117** | 2015/11/06 | 13:33:23 | 63.7 | 2361763.8 | 78.1 | 65.1 | 60.0 |
| **118** | 2015/11/06 | 13:33:28 | 63.8 | 2381782.0 | 80.9 | 65.7 | 62.4 |
| **119** | 2015/11/06 | 13:33:33 | 60.2 | 1057149.4 | 73.8 | 62.5 | 59.1 |
| **120** | 2015/11/06 | 13:33:38 | 63.5 | 2222949.3 | 84.1 | 64.6 | 59.1 |
| **121** | 2015/11/06 | 13:33:43 | 68.2 | 6537690.4 | 83.0 | 69.1 | 64.6 |
| **122** | 2015/11/06 | 13:33:48 | 68.4 | 6965678.2 | 81.2 | 68.7 | 68.1 |
| **123** | 2015/11/06 | 13:33:53 | 69.0 | 7859195.9 | 82.6 | 69.7 | 68.0 |
| **124** | 2015/11/06 | 13:33:58 | 66.5 | 4481660.0 | 79.8 | 68.0 | 66.4 |
| **125** | 2015/11/06 | 13:34:03 | 67.0 | 4998472.2 | 79.5 | 67.4 | 66.6 |
| **126** | 2015/11/06 | 13:34:08 | 65.4 | 3474101.0 | 78.5 | 66.6 | 65.0 |
| **127** | 2015/11/06 | 13:34:13 | 65.5 | 3535136.8 | 79.8 | 66.5 | 65.0 |
| **128** | 2015/11/06 | 13:34:18 | 70.5 | 11305599.8 | 84.4 | 71.7 | 66.5 |
| **129** | 2015/11/06 | 13:34:23 | 67.8 | 6077169.1 | 81.0 | 69.5 | 66.9 |
| **130** | 2015/11/06 | 13:34:28 | 64.4 | 2779148.4 | 86.8 | 66.9 | 64.1 |
| **131** | 2015/11/06 | 13:34:33 | 64.7 | 2976862.0 | 82.8 | 67.1 | 63.8 |
| **132** | 2015/11/06 | 13:34:38 | 63.4 | 2170118.2 | 77.7 | 63.8 | 62.9 |
| **133** | 2015/11/06 | 13:34:43 | 65.0 | 3158907.4 | 79.4 | 65.5 | 63.8 |
| **134** | 2015/11/06 | 13:34:48 | 65.8 | 3823671.9 | 78.9 | 66.3 | 64.8 |
| **135** | 2015/11/06 | 13:34:53 | 66.5 | 4505515.7 | 80.3 | 67.1 | 65.8 |
| **136** | 2015/11/06 | 13:34:58 | 63.7 | 2353726.4 | 78.9 | 67.0 | 62.0 |
| **137** | 2015/11/06 | 13:35:03 | 61.7 | 1470894.6 | 78.0 | 63.1 | 60.9 |
| **138** | 2015/11/06 | 13:35:08 | 64.1 | 2572414.1 | 79.6 | 64.4 | 63.1 |
| **139** | 2015/11/06 | 13:35:13 | 70.2 | 10581954.4 | 86.0 | 72.4 | 64.0 |
| **140** | 2015/11/06 | 13:35:18 | 73.7 | 23383332.4 | 86.7 | 74.9 | 71.9 |
| **141** | 2015/11/06 | 13:35:23 | 69.2 | 8253529.5 | 83.4 | 71.8 | 68.0 |
| **142** | 2015/11/06 | 13:35:28 | 67.8 | 5958819.3 | 81.2 | 68.7 | 67.0 |
| **143** | 2015/11/06 | 13:35:33 | 68.6 | 7264033.3 | 81.6 | 69.0 | 67.2 |
| **144** | 2015/11/06 | 13:35:38 | 69.6 | 9051010.8 | 83.2 | 71.0 | 67.1 |
| **145** | 2015/11/06 | 13:35:43 | 70.0 | 9951002.2 | 83.9 | 71.5 | 67.9 |
| **146** | 2015/11/06 | 13:35:48 | 65.8 | 3836658.1 | 78.8 | 67.9 | 65.6 |
| **147** | 2015/11/06 | 13:35:53 | 66.8 | 4778600.1 | 80.1 | 67.2 | 65.6 |
| **148** | 2015/11/06 | 13:35:58 | 64.4 | 2759634.7 | 83.5 | 67.1 | 62.7 |
| **149** | 2015/11/06 | 13:36:03 | 58.8 | 765585.2 | 76.9 | 62.7 | 57.8 |
| **150** | 2015/11/06 | 13:36:08 | 56.2 | 420759.3 | 68.8 | 57.8 | 55.9 |
| **151** | 2015/11/06 | 13:36:13 | 59.6 | 908861.3 | 73.7 | 61.2 | 56.5 |
| **152** | 2015/11/06 | 13:36:18 | 62.8 | 1922858.7 | 76.0 | 63.3 | 61.3 |
| **153** | 2015/11/06 | 13:36:23 | 65.8 | 3766570.0 | 80.5 | 66.7 | 63.3 |
| **154** | 2015/11/06 | 13:36:28 | 63.8 | 2409551.8 | 79.0 | 66.6 | 62.3 |
| **155** | 2015/11/06 | 13:36:33 | 72.1 | 16234514.3 | 86.8 | 73.3 | 63.9 |
| **156** | 2015/11/06 | 13:36:38 | 70.1 | 10274915.5 | 84.1 | 71.8 | 67.9 |
| **157** | 2015/11/06 | 13:36:43 | 65.0 | 3175811.4 | 82.3 | 67.8 | 62.9 |
| **158** | 2015/11/06 | 13:36:48 | 65.6 | 3625323.5 | 81.4 | 67.7 | 63.3 |
| **159** | 2015/11/06 | 13:36:53 | 62.8 | 1900561.1 | 76.0 | 63.8 | 61.3 |
| **160** | 2015/11/06 | 13:36:58 | 67.9 | 6148116.2 | 82.5 | 70.2 | 63.7 |
| **161** | 2015/11/06 | 13:37:03 | 71.1 | 12830206.4 | 85.1 | 72.0 | 69.6 |
| **162** | 2015/11/06 | 13:37:08 | 63.7 | 2343593.1 | 77.9 | 69.6 | 61.5 |
| **163** | 2015/11/06 | 13:37:13 | 57.9 | 616239.5 | 80.5 | 61.4 | 56.7 |
| **164** | 2015/11/06 | 13:37:18 | 58.5 | 706574.1 | 77.9 | 59.5 | 56.7 |
| **165** | 2015/11/06 | 13:37:23 | 61.5 | 1400030.9 | 75.3 | 62.6 | 59.5 |
| **166** | 2015/11/06 | 13:37:28 | 65.9 | 3916311.2 | 81.6 | 66.8 | 62.5 |
| **167** | 2015/11/06 | 13:37:33 | 63.2 | 2112774.4 | 77.3 | 65.9 | 62.7 |
| **168** | 2015/11/06 | 13:37:38 | 62.4 | 1728944.9 | 75.9 | 62.8 | 62.1 |
| **169** | 2015/11/06 | 13:37:43 | 61.4 | 1372388.6 | 74.1 | 62.4 | 61.1 |
| **170** | 2015/11/06 | 13:37:48 | 61.5 | 1397010.2 | 73.9 | 62.2 | 60.4 |
| **171** | 2015/11/06 | 13:37:53 | 59.1 | 814525.5 | 71.5 | 60.4 | 58.7 |
| **172** | 2015/11/06 | 13:37:58 | 62.2 | 1675548.3 | 75.1 | 63.6 | 59.6 |
| **173** | 2015/11/06 | 13:38:03 | 68.8 | 7514212.7 | 83.2 | 70.1 | 63.6 |
| **174** | 2015/11/06 | 13:38:08 | 72.6 | 18016805.7 | 85.9 | 73.6 | 70.1 |
| **175** | 2015/11/06 | 13:38:13 | 77.5 | 56266939.8 | 90.8 | 78.6 | 73.5 |
| **176** | 2015/11/06 | 13:38:18 | 73.5 | 22399603.2 | 88.0 | 76.6 | 72.5 |
| **177** | 2015/11/06 | 13:38:23 | 77.1 | 50929683.6 | 91.6 | 78.7 | 72.5 |
| **178** | 2015/11/06 | 13:38:28 | 69.0 | 7902584.8 | 85.9 | 75.3 | 68.1 |
| **179** | 2015/11/06 | 13:38:33 | 70.4 | 10940446.2 | 85.2 | 72.3 | 67.8 |
| **180** | 2015/11/06 | 13:38:38 | 65.2 | 3276244.3 | 86.1 | 67.8 | 64.2 |
| **181** | 2015/11/06 | 13:38:43 | 64.9 | 3124935.1 | 81.6 | 65.3 | 64.2 |
| **182** | 2015/11/06 | 13:38:48 | 64.2 | 2641360.6 | 78.4 | 64.9 | 64.6 |

**MEASUREMENT 2 Leq = 68.1**

| Record # | Date | Time | LAeq | | LApeak | LASmax | LASmin |
|---|---|---|---|---|---|---|---|
| 2 | 2015/11/06 | 13:57:45 | 59.8 | 950989.5 | 80.0 | 60.8 | 59.1 |
| 3 | 2015/11/06 | 13:57:50 | 63.0 | 1974647.1 | 79.4 | 65.2 | 60.4 |
| 4 | 2015/11/06 | 13:57:55 | 66.7 | 4714569.9 | 80.6 | 67.2 | 65.0 |
| 5 | 2015/11/06 | 13:58:00 | 65.9 | 3876562.7 | 81.9 | 66.8 | 65.1 |
| 6 | 2015/11/06 | 13:58:05 | 64.3 | 2673093.6 | 77.6 | 66.4 | 63.0 |
| 7 | 2015/11/06 | 13:58:10 | 64.0 | 2509780.2 | 84.7 | 64.6 | 62.4 |
| 8 | 2015/11/06 | 13:58:15 | 62.7 | 1849964.8 | 78.6 | 64.6 | 61.8 |
| 9 | 2015/11/06 | 13:58:20 | 61.2 | 1325541.8 | 80.7 | 61.9 | 60.7 |
| 10 | 2015/11/06 | 13:58:25 | 65.0 | 3170242.8 | 79.5 | 66.0 | 60.8 |
| 11 | 2015/11/06 | 13:58:30 | 68.7 | 7467824.8 | 87.1 | 69.8 | 66.0 |
| 12 | 2015/11/06 | 13:58:35 | 69.0 | 7939599.3 | 83.4 | 69.9 | 68.4 |
| 13 | 2015/11/06 | 13:58:40 | 68.5 | 7087011.0 | 93.4 | 69.2 | 68.0 |
| 14 | 2015/11/06 | 13:58:45 | 65.6 | 3596063.3 | 86.5 | 68.2 | 64.2 |
| 15 | 2015/11/06 | 13:58:50 | 65.4 | 3476708.0 | 79.5 | 66.1 | 64.1 |
| 16 | 2015/11/06 | 13:58:55 | 65.6 | 3630632.6 | 83.2 | 66.5 | 65.0 |
| 17 | 2015/11/06 | 13:59:00 | 66.5 | 4481604.9 | 88.1 | 67.4 | 66.0 |
| 18 | 2015/11/06 | 13:59:05 | 65.4 | 3440768.3 | 79.9 | 66.1 | 64.9 |
| 19 | 2015/11/06 | 13:59:10 | 64.6 | 2914482.6 | 79.4 | 65.3 | 63.8 |
| 20 | 2015/11/06 | 13:59:15 | 62.3 | 1689235.2 | 80.4 | 64.3 | 61.4 |
| 21 | 2015/11/06 | 13:59:20 | 61.2 | 1320578.3 | 82.4 | 62.2 | 60.5 |
| 22 | 2015/11/06 | 13:59:25 | 64.3 | 2681229.8 | 86.1 | 65.3 | 61.6 |
| 23 | 2015/11/06 | 13:59:30 | 65.7 | 3687396.3 | 89.9 | 66.9 | 64.2 |
| 24 | 2015/11/06 | 13:59:35 | 68.0 | 6263631.1 | 89.7 | 69.7 | 64.7 |
| 25 | 2015/11/06 | 13:59:40 | 63.0 | 1988524.6 | 75.3 | 66.3 | 62.4 |
| 26 | 2015/11/06 | 13:59:45 | 62.0 | 1580726.5 | 86.7 | 62.5 | 61.4 |
| 27 | 2015/11/06 | 13:59:50 | 60.2 | 1052510.2 | 77.6 | 62.0 | 59.2 |
| 28 | 2015/11/06 | 13:59:55 | 59.2 | 840468.1 | 72.7 | 59.5 | 58.8 |
| 29 | 2015/11/06 | 14:00:00 | 60.6 | 1155507.5 | 81.6 | 62.0 | 59.4 |
| 30 | 2015/11/06 | 14:00:05 | 67.6 | 5799741.8 | 81.5 | 68.1 | 62.1 |
| 31 | 2015/11/06 | 14:00:10 | 69.0 | 7884405.5 | 82.7 | 69.1 | 68.1 |
| 32 | 2015/11/06 | 14:00:15 | 69.8 | 9546695.2 | 84.2 | 71.4 | 68.8 |
| 33 | 2015/11/06 | 14:00:20 | 71.0 | 12513096.9 | 85.6 | 72.6 | 69.8 |
| 34 | 2015/11/06 | 14:00:25 | 68.4 | 6978906.6 | 80.5 | 70.2 | 68.2 |
| 35 | 2015/11/06 | 14:00:30 | 67.7 | 5929705.7 | 80.5 | 68.9 | 66.9 |
| 36 | 2015/11/06 | 14:00:35 | 65.5 | 3552374.9 | 82.5 | 66.9 | 64.5 |
| 37 | 2015/11/06 | 14:00:40 | 66.0 | 3976647.2 | 79.6 | 66.4 | 64.5 |
| 38 | 2015/11/06 | 14:00:45 | 66.7 | 4665301.3 | 79.2 | 67.1 | 66.0 |
| 39 | 2015/11/06 | 14:00:50 | 67.9 | 6169354.3 | 83.1 | 69.2 | 66.1 |
| 40 | 2015/11/06 | 14:00:55 | 72.5 | 17865238.5 | 86.4 | 73.4 | 69.2 |
| 41 | 2015/11/06 | 14:01:00 | 73.1 | 20232774.9 | 86.2 | 73.9 | 72.1 |
| 42 | 2015/11/06 | 14:01:05 | 68.7 | 7394861.7 | 82.1 | 72.1 | 67.6 |
| 43 | 2015/11/06 | 14:01:10 | 70.3 | 10665021.4 | 84.6 | 70.6 | 68.0 |
| 44 | 2015/11/06 | 14:01:15 | 70.4 | 10870825.2 | 83.5 | 71.3 | 68.6 |
| 45 | 2015/11/06 | 14:01:20 | 62.8 | 1918999.9 | 77.1 | 68.5 | 61.2 |
| 46 | 2015/11/06 | 14:01:25 | 62.2 | 1656770.4 | 74.8 | 62.7 | 61.2 |
| 47 | 2015/11/06 | 14:01:30 | 61.4 | 1383330.6 | 78.2 | 62.4 | 60.5 |
| 48 | 2015/11/06 | 14:01:35 | 59.5 | 896981.7 | 79.1 | 61.0 | 58.3 |
| 49 | 2015/11/06 | 14:01:40 | 58.4 | 696610.0 | 73.3 | 59.3 | 57.4 |
| 50 | 2015/11/06 | 14:01:45 | 60.5 | 1118092.0 | 79.7 | 61.6 | 58.7 |
| 51 | 2015/11/06 | 14:01:50 | 59.2 | 836419.8 | 74.1 | 60.5 | 57.8 |
| 52 | 2015/11/06 | 14:01:55 | 59.8 | 961459.0 | 73.7 | 60.7 | 59.0 |
| 53 | 2015/11/06 | 14:02:00 | 64.6 | 2916444.2 | 77.5 | 65.6 | 59.0 |
| 54 | 2015/11/06 | 14:02:05 | 66.1 | 4116982.4 | 79.2 | 66.7 | 65.5 |
| 55 | 2015/11/06 | 14:02:10 | 66.6 | 4560894.1 | 80.9 | 68.0 | 65.3 |
| 56 | 2015/11/06 | 14:02:15 | 66.9 | 4896938.2 | 80.8 | 67.5 | 65.4 |
| 57 | 2015/11/06 | 14:02:20 | 65.3 | 3414772.8 | 79.6 | 66.8 | 63.6 |
| 58 | 2015/11/06 | 14:02:25 | 62.3 | 1700770.6 | 76.3 | 63.6 | 62.1 |
| 59 | 2015/11/06 | 14:02:30 | 63.6 | 2312854.6 | 80.6 | 65.6 | 61.7 |
| 60 | 2015/11/06 | 14:02:35 | 68.1 | 6456914.3 | 80.7 | 68.5 | 65.6 |
| 61 | 2015/11/06 | 14:02:40 | 68.3 | 6787539.1 | 80.9 | 68.9 | 67.5 |
| 62 | 2015/11/06 | 14:02:45 | 66.0 | 4020210.7 | 79.5 | 67.5 | 65.5 |
| 63 | 2015/11/06 | 14:02:50 | 68.2 | 6547781.9 | 82.7 | 69.5 | 65.7 |
| 64 | 2015/11/06 | 14:02:55 | 69.2 | 8410168.3 | 84.5 | 70.2 | 68.2 |
| 65 | 2015/11/06 | 14:03:00 | 65.4 | 3503938.1 | 79.4 | 68.2 | 64.9 |
| 66 | 2015/11/06 | 14:03:05 | 65.4 | 3453400.3 | 78.8 | 66.3 | 64.6 |
| 67 | 2015/11/06 | 14:03:10 | 64.2 | 2622952.6 | 77.4 | 65.0 | 63.9 |
| 68 | 2015/11/06 | 14:03:15 | 63.0 | 1984405.0 | 78.4 | 64.2 | 62.4 |
| 69 | 2015/11/06 | 14:03:20 | 61.5 | 1401910.0 | 79.3 | 62.7 | 60.5 |
| 70 | 2015/11/06 | 14:03:25 | 69.9 | 9843967.4 | 83.9 | 71.5 | 60.5 |
| 71 | 2015/11/06 | 14:03:30 | 69.2 | 8276179.4 | 82.7 | 70.9 | 68.3 |
| 72 | 2015/11/06 | 14:03:35 | 68.9 | 7675135.6 | 81.6 | 69.4 | 67.9 |
| 73 | 2015/11/06 | 14:03:40 | 67.9 | 6206618.8 | 80.7 | 68.7 | 67.4 |
| 74 | 2015/11/06 | 14:03:45 | 67.9 | 6143063.6 | 83.3 | 69.0 | 66.2 |
| 75 | 2015/11/06 | 14:03:50 | 60.5 | 1123500.7 | 75.8 | 66.2 | 58.4 |
| 76 | 2015/11/06 | 14:03:55 | 64.2 | 2603359.9 | 80.1 | 66.9 | 58.0 |
| 77 | 2015/11/06 | 14:04:00 | 67.5 | 5663714.4 | 82.9 | 68.0 | 66.9 |
| 78 | 2015/11/06 | 14:04:05 | 66.7 | 4679945.4 | 79.8 | 67.2 | 66.5 |
| 79 | 2015/11/06 | 14:04:10 | 67.3 | 5387689.9 | 79.9 | 67.8 | 66.5 |
| 80 | 2015/11/06 | 14:04:15 | 69.9 | 9757331.4 | 83.5 | 70.9 | 67.8 |
| 81 | 2015/11/06 | 14:04:20 | 72.6 | 18131396.0 | 85.6 | 73.0 | 70.9 |
| 82 | 2015/11/06 | 14:04:25 | 68.3 | 6686046.2 | 82.8 | 71.8 | 65.8 |
| 83 | 2015/11/06 | 14:04:30 | 64.5 | 2827413.4 | 84.1 | 66.3 | 62.6 |
| 84 | 2015/11/06 | 14:04:35 | 62.0 | 1596899.5 | 75.1 | 62.8 | 61.6 |
| 85 | 2015/11/06 | 14:04:40 | 63.6 | 2311948.7 | 79.3 | 64.5 | 62.5 |
| 86 | 2015/11/06 | 14:04:45 | 64.6 | 2913970.6 | 79.3 | 65.1 | 64.0 |
| 87 | 2015/11/06 | 14:04:50 | 66.1 | 4072491.9 | 83.4 | 69.6 | 63.1 |
| 88 | 2015/11/06 | 14:04:55 | 64.7 | 2934142.7 | 81.6 | 67.2 | 64.7 |
| 89 | 2015/11/06 | 14:05:00 | 64.0 | 2525212.8 | 81.4 | 64.8 | 63.2 |
| 90 | 2015/11/06 | 14:05:05 | 61.7 | 1474755.0 | 78.8 | 63.1 | 60.9 |
| 91 | 2015/11/06 | 14:05:10 | 60.9 | 1235104.8 | 82.6 | 61.4 | 60.4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **92** | 2015/11/06 | 14:05:15 | 61.9 | 1538802.9 | 76.3 | 62.8 | 60.9 |
| **93** | 2015/11/06 | 14:05:20 | 67.6 | 5737993.7 | 80.8 | 68.7 | 62.8 |
| **94** | 2015/11/06 | 14:05:25 | 67.9 | 6181048.7 | 82.5 | 68.8 | 67.4 |
| **95** | 2015/11/06 | 14:05:30 | 69.6 | 9082181.0 | 82.3 | 70.3 | 67.4 |
| **96** | 2015/11/06 | 14:05:35 | 72.2 | 16531667.1 | 86.8 | 73.1 | 70.3 |
| **97** | 2015/11/06 | 14:05:40 | 69.6 | 9188968.3 | 83.4 | 71.8 | 68.5 |
| **98** | 2015/11/06 | 14:05:45 | 65.4 | 3470239.9 | 79.1 | 68.5 | 64.7 |
| **99** | 2015/11/06 | 14:05:50 | 64.4 | 2757953.0 | 80.8 | 65.2 | 63.6 |
| **100** | 2015/11/06 | 14:05:55 | 67.2 | 5254667.0 | 82.2 | 69.1 | 64.9 |
| **101** | 2015/11/06 | 14:06:00 | 67.7 | 5860259.8 | 81.3 | 69.6 | 65.1 |
| **102** | 2015/11/06 | 14:06:05 | 63.0 | 1987244.7 | 77.4 | 65.0 | 62.5 |
| **103** | 2015/11/06 | 14:06:10 | 66.6 | 4579665.3 | 82.2 | 69.2 | 61.9 |
| **104** | 2015/11/06 | 14:06:15 | 71.7 | 14635268.5 | 84.9 | 72.2 | 69.2 |
| **105** | 2015/11/06 | 14:06:20 | 69.8 | 9548456.3 | 84.3 | 71.1 | 69.3 |
| **106** | 2015/11/06 | 14:06:25 | 68.7 | 7404155.9 | 81.6 | 69.3 | 68.5 |
| **107** | 2015/11/06 | 14:06:30 | 67.5 | 5562477.3 | 86.1 | 68.5 | 67.0 |
| **108** | 2015/11/06 | 14:06:35 | 68.4 | 6954624.9 | 81.4 | 69.2 | 67.0 |
| **109** | 2015/11/06 | 14:06:40 | 67.7 | 5851474.5 | 81.2 | 68.4 | 66.7 |
| **110** | 2015/11/06 | 14:06:45 | 68.3 | 6808832.7 | 83.3 | 69.8 | 67.2 |
| **111** | 2015/11/06 | 14:06:50 | 68.1 | 6489277.6 | 80.7 | 68.5 | 67.5 |
| **112** | 2015/11/06 | 14:06:55 | 65.3 | 3355284.7 | 78.5 | 67.5 | 64.0 |
| **113** | 2015/11/06 | 14:07:00 | 62.6 | 1834495.4 | 75.9 | 64.0 | 62.4 |
| **114** | 2015/11/06 | 14:07:05 | 65.5 | 3536279.6 | 79.3 | 67.0 | 62.3 |
| **115** | 2015/11/06 | 14:07:10 | 66.2 | 4206879.9 | 80.0 | 66.9 | 64.0 |
| **116** | 2015/11/06 | 14:07:15 | 65.0 | 3175638.5 | 83.8 | 66.9 | 63.6 |
| **117** | 2015/11/06 | 14:07:20 | 71.5 | 14096669.4 | 85.6 | 72.9 | 63.6 |
| **118** | 2015/11/06 | 14:07:25 | 69.0 | 8012530.3 | 83.2 | 72.4 | 66.8 |
| **119** | 2015/11/06 | 14:07:30 | 64.1 | 2596901.1 | 89.3 | 67.3 | 62.8 |
| **120** | 2015/11/06 | 14:07:35 | 60.0 | 1005225.8 | 73.4 | 62.8 | 59.2 |
| **121** | 2015/11/06 | 14:07:40 | 65.2 | 3307407.9 | 78.2 | 66.2 | 61.1 |
| **122** | 2015/11/06 | 14:07:45 | 67.1 | 5139796.1 | 83.2 | 67.3 | 66.2 |
| **123** | 2015/11/06 | 14:07:50 | 67.4 | 5481035.4 | 84.2 | 68.3 | 66.0 |
| **124** | 2015/11/06 | 14:07:55 | 62.9 | 1937571.6 | 75.0 | 66.0 | 62.3 |
| **125** | 2015/11/06 | 14:08:00 | 62.1 | 1630141.6 | 77.6 | 62.9 | 61.6 |
| **126** | 2015/11/06 | 14:08:05 | 64.0 | 2515105.4 | 82.3 | 64.9 | 62.9 |
| **127** | 2015/11/06 | 14:08:10 | 62.3 | 1688539.5 | 75.8 | 64.9 | 61.7 |
| **128** | 2015/11/06 | 14:08:15 | 62.1 | 1624862.3 | 76.8 | 62.6 | 61.5 |
| **129** | 2015/11/06 | 14:08:20 | 68.3 | 6738234.8 | 83.8 | 70.6 | 62.5 |
| **130** | 2015/11/06 | 14:08:25 | 73.4 | 21684090.2 | 87.9 | 74.1 | 70.6 |
| **131** | 2015/11/06 | 14:08:30 | 68.0 | 6274930.9 | 81.7 | 72.7 | 67.6 |
| **132** | 2015/11/06 | 14:08:35 | 68.3 | 6753059.6 | 85.2 | 68.7 | 67.5 |
| **133** | 2015/11/06 | 14:08:40 | 69.7 | 9302794.6 | 82.8 | 70.8 | 68.3 |
| **134** | 2015/11/06 | 14:08:45 | 70.1 | 10267661.9 | 82.3 | 70.8 | 69.3 |
| **135** | 2015/11/06 | 14:08:50 | 68.1 | 6521001.0 | 85.3 | 70.6 | 65.9 |
| **136** | 2015/11/06 | 14:08:55 | 63.2 | 2081848.0 | 78.5 | 65.9 | 62.2 |
| **137** | 2015/11/06 | 14:09:00 | 61.9 | 1552789.3 | 79.2 | 62.3 | 61.7 |
| **138** | 2015/11/06 | 14:09:05 | 62.7 | 1883569.7 | 77.2 | 64.1 | 61.5 |
| **139** | 2015/11/06 | 14:09:10 | 62.9 | 1955886.7 | 76.2 | 64.5 | 62.1 |
| **140** | 2015/11/06 | 14:09:15 | 63.1 | 2047482.4 | 75.5 | 63.6 | 62.4 |
| **141** | 2015/11/06 | 14:09:20 | 62.1 | 1624458.5 | 75.0 | 63.5 | 61.6 |
| **142** | 2015/11/06 | 14:09:25 | 60.5 | 1110058.0 | 74.7 | 61.8 | 59.0 |
| **143** | 2015/11/06 | 14:09:30 | 60.7 | 1176170.9 | 82.9 | 65.0 | 56.9 |
| **144** | 2015/11/06 | 14:09:35 | 65.3 | 3382157.9 | 80.4 | 67.5 | 63.1 |
| **145** | 2015/11/06 | 14:09:40 | 70.4 | 11091058.4 | 83.5 | 71.5 | 66.6 |
| **146** | 2015/11/06 | 14:09:45 | 70.8 | 11913179.3 | 94.5 | 74.1 | 66.7 |
| **147** | 2015/11/06 | 14:09:50 | 61.5 | 1413206.5 | 75.3 | 66.7 | 60.4 |
| **148** | 2015/11/06 | 14:09:55 | 60.2 | 1044299.7 | 73.4 | 60.8 | 59.7 |
| **149** | 2015/11/06 | 14:10:00 | 58.8 | 759281.4 | 72.6 | 59.7 | 58.3 |
| **150** | 2015/11/06 | 14:10:05 | 66.1 | 4034870.7 | 80.6 | 67.9 | 59.0 |
| **151** | 2015/11/06 | 14:10:10 | 72.3 | 16901553.9 | 86.6 | 73.9 | 67.7 |
| **152** | 2015/11/06 | 14:10:15 | 73.0 | 20144570.9 | 85.5 | 73.5 | 72.5 |
| **153** | 2015/11/06 | 14:10:20 | 71.4 | 13817822.4 | 86.5 | 73.1 | 70.7 |
| **154** | 2015/11/06 | 14:10:25 | 71.0 | 12662648.9 | 85.3 | 72.0 | 69.7 |
| **155** | 2015/11/06 | 14:10:30 | 67.1 | 5158584.1 | 82.2 | 69.7 | 66.6 |
| **156** | 2015/11/06 | 14:10:35 | 63.6 | 2314783.3 | 83.7 | 66.6 | 62.0 |
| **157** | 2015/11/06 | 14:10:40 | 61.8 | 1524641.2 | 75.8 | 62.6 | 61.1 |
| **158** | 2015/11/06 | 14:10:45 | 60.7 | 1169091.7 | 77.2 | 62.3 | 60.2 |
| **159** | 2015/11/06 | 14:10:50 | 63.5 | 2242610.2 | 80.8 | 64.9 | 60.4 |
| **160** | 2015/11/06 | 14:10:55 | 63.5 | 2242551.1 | 77.3 | 63.9 | 63.1 |
| **161** | 2015/11/06 | 14:11:00 | 62.0 | 1602355.4 | 77.5 | 63.2 | 61.3 |
| **162** | 2015/11/06 | 14:11:05 | 59.8 | 958504.3 | 73.5 | 61.3 | 59.1 |
| **163** | 2015/11/06 | 14:11:10 | 61.8 | 1530477.8 | 75.5 | 63.7 | 59.0 |
| **164** | 2015/11/06 | 14:11:15 | 66.6 | 4611846.2 | 80.2 | 67.4 | 63.7 |
| **165** | 2015/11/06 | 14:11:20 | 70.9 | 12188056.2 | 84.4 | 72.9 | 66.7 |
| **166** | 2015/11/06 | 14:11:25 | 72.7 | 18545349.2 | 85.6 | 74.6 | 69.8 |
| **167** | 2015/11/06 | 14:11:30 | 68.6 | 7193895.3 | 82.4 | 70.1 | 67.4 |
| **168** | 2015/11/06 | 14:11:35 | 68.2 | 6674791.6 | 84.3 | 70.2 | 66.2 |
| **169** | 2015/11/06 | 14:11:40 | 71.1 | 12840601.2 | 84.0 | 71.6 | 70.2 |
| **170** | 2015/11/06 | 14:11:45 | 69.7 | 9423773.8 | 83.8 | 71.1 | 69.2 |
| **171** | 2015/11/06 | 14:11:50 | 70.9 | 12364985.3 | 84.8 | 71.3 | 69.3 |
| **172** | 2015/11/06 | 14:11:55 | 68.6 | 7251143.4 | 82.9 | 70.6 | 67.3 |
| **173** | 2015/11/06 | 14:12:00 | 63.9 | 2476905.6 | 79.7 | 67.3 | 62.5 |
| **174** | 2015/11/06 | 14:12:05 | 61.1 | 1302422.3 | 81.8 | 62.5 | 60.6 |
| **175** | 2015/11/06 | 14:12:10 | 63.8 | 2382416.0 | 79.1 | 65.0 | 61.0 |
| **176** | 2015/11/06 | 14:12:15 | 66.0 | 4018113.7 | 83.9 | 66.7 | 64.9 |
| **177** | 2015/11/06 | 14:12:20 | 64.8 | 3044082.5 | 77.7 | 66.6 | 63.5 |
| **178** | 2015/11/06 | 14:12:25 | 64.9 | 3064493.1 | 80.4 | 66.8 | 63.3 |
| **179** | 2015/11/06 | 14:12:30 | 62.3 | 1688145.0 | 82.6 | 63.3 | 61.8 |
| **180** | 2015/11/06 | 14:12:35 | 64.4 | 2746006.9 | 79.0 | 65.7 | 62.7 |
| **181** | 2015/11/06 | 14:12:40 | 79.4 | 87676211.4 | 97.5 | 83.9 | 65.7 |
| **182** | 2015/11/06 | 14:12:45 | 81.9 | 154213829.4 | 95.7 | 84.6 | 80.4 |

**MEASUREMENT 3** **Leq =** **60.6**

| Record # | Date | Time | LAeq | | LApeak | LASmax | LASmin |
|---|---|---|---|---|---|---|---|
| 2 | 2015/11/06 | 14:29:36 | 61.5 | 1422909.4 | 91.4 | 66.8 | 53.3 |
| 3 | 2015/11/06 | 14:29:41 | 58.3 | 680442.0 | 81.2 | 64.1 | 55.9 |
| 4 | 2015/11/06 | 14:29:46 | 59.3 | 844701.5 | 87.1 | 63.1 | 55.5 |
| 5 | 2015/11/06 | 14:29:51 | 56.6 | 453564.5 | 78.2 | 57.7 | 54.8 |
| 6 | 2015/11/06 | 14:29:56 | 58.7 | 738877.8 | 83.4 | 60.3 | 54.0 |
| 7 | 2015/11/06 | 14:30:01 | 61.9 | 1556942.5 | 74.8 | 62.5 | 60.2 |
| 8 | 2015/11/06 | 14:30:06 | 61.1 | 1292375.7 | 76.4 | 62.5 | 59.4 |
| 9 | 2015/11/06 | 14:30:11 | 59.9 | 977684.9 | 77.1 | 61.9 | 58.6 |
| 10 | 2015/11/06 | 14:30:16 | 60.9 | 1244447.1 | 76.1 | 62.1 | 60.5 |
| 11 | 2015/11/06 | 14:30:21 | 61.1 | 1288987.1 | 80.5 | 63.0 | 58.0 |
| 12 | 2015/11/06 | 14:30:26 | 54.4 | 277684.0 | 69.2 | 57.9 | 52.8 |
| 13 | 2015/11/06 | 14:30:31 | 56.4 | 432141.7 | 74.9 | 56.9 | 52.9 |
| 14 | 2015/11/06 | 14:30:36 | 60.9 | 1224392.8 | 79.0 | 61.5 | 56.7 |
| 15 | 2015/11/06 | 14:30:41 | 56.6 | 459381.5 | 78.9 | 59.9 | 56.1 |
| 16 | 2015/11/06 | 14:30:46 | 56.0 | 393588.5 | 74.8 | 57.9 | 54.8 |
| 17 | 2015/11/06 | 14:30:51 | 54.1 | 254743.5 | 73.9 | 55.2 | 52.3 |
| 18 | 2015/11/06 | 14:30:56 | 53.8 | 241758.2 | 68.7 | 55.5 | 52.2 |
| 19 | 2015/11/06 | 14:31:01 | 56.9 | 491490.3 | 74.5 | 59.7 | 52.1 |
| 20 | 2015/11/06 | 14:31:06 | 60.2 | 1040744.0 | 75.2 | 61.9 | 58.2 |
| 21 | 2015/11/06 | 14:31:11 | 60.8 | 1190866.0 | 76.1 | 62.8 | 58.9 |
| 22 | 2015/11/06 | 14:31:16 | 62.1 | 1615282.6 | 77.2 | 64.0 | 59.9 |
| 23 | 2015/11/06 | 14:31:21 | 62.2 | 1672478.1 | 79.2 | 63.6 | 60.4 |
| 24 | 2015/11/06 | 14:31:26 | 62.4 | 1757135.1 | 77.8 | 63.2 | 61.7 |
| 25 | 2015/11/06 | 14:31:31 | 61.4 | 1382476.7 | 79.6 | 62.8 | 60.2 |
| 26 | 2015/11/06 | 14:31:36 | 62.3 | 1706558.9 | 78.5 | 63.6 | 61.0 |
| 27 | 2015/11/06 | 14:31:41 | 54.1 | 255205.5 | 70.5 | 61.0 | 51.0 |
| 28 | 2015/11/06 | 14:31:46 | 53.6 | 226988.6 | 74.8 | 55.7 | 50.7 |
| 29 | 2015/11/06 | 14:31:51 | 55.9 | 391707.8 | 70.3 | 57.5 | 50.4 |
| 30 | 2015/11/06 | 14:31:56 | 57.5 | 563848.9 | 76.8 | 58.2 | 56.9 |
| 31 | 2015/11/06 | 14:32:01 | 57.1 | 516366.1 | 72.8 | 58.3 | 55.0 |
| 32 | 2015/11/06 | 14:32:06 | 55.7 | 371639.1 | 71.2 | 58.0 | 55.3 |
| 33 | 2015/11/06 | 14:32:11 | 51.8 | 150489.3 | 66.6 | 55.3 | 50.9 |
| 34 | 2015/11/06 | 14:32:16 | 62.5 | 1786219.5 | 78.1 | 64.9 | 53.3 |
| 35 | 2015/11/06 | 14:32:21 | 62.7 | 1880868.2 | 78.5 | 64.0 | 60.6 |
| 36 | 2015/11/06 | 14:32:26 | 63.7 | 2362566.8 | 78.2 | 64.8 | 61.7 |
| 37 | 2015/11/06 | 14:32:31 | 64.1 | 2593481.8 | 78.3 | 65.6 | 62.7 |
| 38 | 2015/11/06 | 14:32:36 | 65.8 | 3781261.6 | 81.2 | 66.3 | 62.6 |
| 39 | 2015/11/06 | 14:32:41 | 62.8 | 1895281.5 | 82.4 | 66.3 | 61.7 |
| 40 | 2015/11/06 | 14:32:46 | 66.4 | 4332523.0 | 84.7 | 69.0 | 62.0 |
| 41 | 2015/11/06 | 14:32:51 | 61.8 | 1509982.3 | 85.0 | 63.2 | 60.5 |
| 42 | 2015/11/06 | 14:32:56 | 56.7 | 469619.8 | 72.3 | 60.5 | 55.8 |
| 43 | 2015/11/06 | 14:33:01 | 62.7 | 1863036.4 | 77.6 | 64.3 | 56.1 |
| 44 | 2015/11/06 | 14:33:06 | 57.7 | 595005.9 | 71.3 | 62.5 | 55.0 |
| 45 | 2015/11/06 | 14:33:11 | 55.2 | 333022.2 | 77.8 | 55.9 | 54.2 |
| 46 | 2015/11/06 | 14:33:16 | 56.6 | 460601.3 | 78.7 | 57.2 | 55.7 |
| 47 | 2015/11/06 | 14:33:21 | 57.0 | 498730.6 | 74.9 | 57.8 | 56.1 |
| 48 | 2015/11/06 | 14:33:26 | 55.5 | 352735.8 | 70.3 | 56.9 | 54.1 |
| 49 | 2015/11/06 | 14:33:31 | 57.4 | 555017.8 | 74.3 | 60.7 | 53.5 |
| 50 | 2015/11/06 | 14:33:36 | 55.5 | 352848.6 | 73.1 | 61.1 | 53.3 |
| 51 | 2015/11/06 | 14:33:41 | 53.4 | 216550.3 | 75.0 | 54.9 | 52.2 |
| 52 | 2015/11/06 | 14:33:46 | 56.7 | 473092.2 | 72.3 | 57.6 | 53.9 |
| 53 | 2015/11/06 | 14:33:51 | 52.3 | 170626.5 | 73.1 | 55.1 | 51.6 |
| 54 | 2015/11/06 | 14:33:56 | 56.9 | 489722.6 | 70.1 | 57.1 | 53.0 |
| 55 | 2015/11/06 | 14:34:01 | 58.3 | 681369.7 | 78.9 | 59.6 | 57.1 |
| 56 | 2015/11/06 | 14:34:06 | 67.8 | 6051101.1 | 82.0 | 69.8 | 59.6 |
| 57 | 2015/11/06 | 14:34:11 | 62.8 | 1906558.6 | 76.7 | 67.5 | 62.5 |
| 58 | 2015/11/06 | 14:34:16 | 62.6 | 1838602.5 | 77.2 | 64.5 | 61.5 |
| 59 | 2015/11/06 | 14:34:21 | 64.2 | 2648283.5 | 79.0 | 65.2 | 62.9 |
| 60 | 2015/11/06 | 14:34:26 | 68.6 | 7241443.3 | 83.2 | 69.3 | 63.8 |
| 61 | 2015/11/06 | 14:34:31 | 67.6 | 5803176.4 | 80.6 | 68.8 | 66.8 |
| 62 | 2015/11/06 | 14:34:36 | 65.1 | 3261423.0 | 81.4 | 68.4 | 63.3 |
| 63 | 2015/11/06 | 14:34:41 | 62.3 | 1692547.3 | 77.0 | 63.9 | 59.8 |
| 64 | 2015/11/06 | 14:34:46 | 68.6 | 7217490.7 | 89.1 | 73.6 | 59.6 |
| 65 | 2015/11/06 | 14:34:51 | 69.3 | 8593886.3 | 88.2 | 74.9 | 62.2 |
| 66 | 2015/11/06 | 14:34:56 | 57.4 | 548161.3 | 77.5 | 62.2 | 56.7 |
| 67 | 2015/11/06 | 14:35:01 | 60.4 | 1098053.4 | 76.4 | 61.7 | 58.9 |
| 68 | 2015/11/06 | 14:35:06 | 56.2 | 418471.2 | 76.3 | 59.2 | 55.8 |
| 69 | 2015/11/06 | 14:35:11 | 58.6 | 722396.0 | 81.3 | 59.5 | 56.3 |
| 70 | 2015/11/06 | 14:35:16 | 54.8 | 303575.7 | 75.6 | 59.4 | 52.0 |
| 71 | 2015/11/06 | 14:35:21 | 52.7 | 187605.0 | 83.9 | 53.6 | 51.9 |
| 72 | 2015/11/06 | 14:35:26 | 52.0 | 156884.3 | 65.1 | 52.7 | 51.3 |
| 73 | 2015/11/06 | 14:35:31 | 54.4 | 275473.3 | 76.7 | 54.6 | 52.7 |
| 74 | 2015/11/06 | 14:35:36 | 56.7 | 468140.1 | 78.2 | 57.8 | 54.1 |
| 75 | 2015/11/06 | 14:35:41 | 50.5 | 112585.1 | 65.7 | 55.8 | 49.3 |
| 76 | 2015/11/06 | 14:35:46 | 51.9 | 154483.8 | 72.8 | 53.6 | 49.2 |
| 77 | 2015/11/06 | 14:35:51 | 54.6 | 290521.2 | 77.9 | 56.3 | 52.4 |
| 78 | 2015/11/06 | 14:35:56 | 63.1 | 2050999.5 | 81.6 | 64.1 | 56.3 |
| 79 | 2015/11/06 | 14:36:01 | 62.9 | 1970068.3 | 91.7 | 64.9 | 61.9 |
| 80 | 2015/11/06 | 14:36:06 | 61.3 | 1342907.3 | 75.2 | 62.3 | 60.6 |
| 81 | 2015/11/06 | 14:36:11 | 62.2 | 1678314.5 | 76.7 | 62.6 | 60.5 |
| 82 | 2015/11/06 | 14:36:16 | 61.9 | 1532339.5 | 77.4 | 63.0 | 61.4 |
| 83 | 2015/11/06 | 14:36:21 | 61.7 | 1474015.5 | 79.2 | 62.2 | 61.2 |
| 84 | 2015/11/06 | 14:36:26 | 61.8 | 1527236.1 | 75.9 | 63.3 | 59.6 |
| 85 | 2015/11/06 | 14:36:31 | 60.1 | 1019352.6 | 74.1 | 63.2 | 59.5 |
| 86 | 2015/11/06 | 14:36:36 | 59.2 | 828818.3 | 75.5 | 60.3 | 58.7 |
| 87 | 2015/11/06 | 14:36:41 | 58.0 | 627314.0 | 72.8 | 59.2 | 57.4 |
| 88 | 2015/11/06 | 14:36:46 | 56.8 | 478714.9 | 78.1 | 57.8 | 56.2 |
| 89 | 2015/11/06 | 14:36:51 | 58.1 | 642235.4 | 72.3 | 58.6 | 56.9 |
| 90 | 2015/11/06 | 14:36:56 | 58.3 | 670282.8 | 76.4 | 59.3 | 57.0 |
| 91 | 2015/11/06 | 14:37:01 | 59.7 | 933388.1 | 77.9 | 60.5 | 56.9 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **92** | 2015/11/06 | 14:37:06 | 58.5 | 704771.0 | 74.4 | 60.9 | 56.4 |
| **93** | 2015/11/06 | 14:37:11 | 58.5 | 710163.6 | 76.3 | 60.9 | 57.1 |
| **94** | 2015/11/06 | 14:37:16 | 55.8 | 379347.7 | 70.2 | 57.1 | 54.7 |
| **95** | 2015/11/06 | 14:37:21 | 53.9 | 246010.8 | 76.9 | 56.5 | 51.8 |
| **96** | 2015/11/06 | 14:37:26 | 61.0 | 1269194.6 | 87.8 | 65.3 | 52.4 |
| **97** | 2015/11/06 | 14:37:31 | 61.5 | 1407536.4 | 75.4 | 65.0 | 61.3 |
| **98** | 2015/11/06 | 14:37:36 | 58.7 | 732956.1 | 71.7 | 61.5 | 58.1 |
| **99** | 2015/11/06 | 14:37:41 | 59.8 | 955118.3 | 73.3 | 60.7 | 57.8 |
| **100** | 2015/11/06 | 14:37:46 | 58.3 | 679389.7 | 71.9 | 60.7 | 56.6 |
| **101** | 2015/11/06 | 14:37:51 | 60.0 | 1001247.2 | 76.3 | 61.7 | 56.5 |
| **102** | 2015/11/06 | 14:37:56 | 59.8 | 960010.9 | 75.3 | 61.2 | 58.5 |
| **103** | 2015/11/06 | 14:38:01 | 57.8 | 599560.2 | 73.3 | 60.5 | 55.8 |
| **104** | 2015/11/06 | 14:38:06 | 58.0 | 635687.4 | 73.3 | 59.9 | 54.9 |
| **105** | 2015/11/06 | 14:38:11 | 64.8 | 3006962.8 | 78.2 | 65.8 | 59.9 |
| **106** | 2015/11/06 | 14:38:16 | 64.7 | 2957009.1 | 83.4 | 67.9 | 62.4 |
| **107** | 2015/11/06 | 14:38:21 | 59.6 | 914514.9 | 75.3 | 62.9 | 56.5 |
| **108** | 2015/11/06 | 14:38:26 | 61.0 | 1267897.6 | 78.8 | 63.5 | 58.7 |
| **109** | 2015/11/06 | 14:38:31 | 59.2 | 825999.9 | 75.2 | 62.5 | 54.5 |
| **110** | 2015/11/06 | 14:38:36 | 57.4 | 546477.7 | 73.7 | 62.5 | 55.2 |
| **111** | 2015/11/06 | 14:38:41 | 60.1 | 1012256.6 | 76.6 | 62.0 | 55.1 |
| **112** | 2015/11/06 | 14:38:46 | 60.0 | 998602.6 | 74.7 | 62.2 | 57.0 |
| **113** | 2015/11/06 | 14:38:51 | 63.6 | 2275397.0 | 77.4 | 65.3 | 60.9 |
| **114** | 2015/11/06 | 14:38:56 | 57.0 | 501344.4 | 72.8 | 60.9 | 57.0 |
| **115** | 2015/11/06 | 14:39:01 | 60.6 | 1150385.2 | 75.4 | 62.1 | 57.1 |
| **116** | 2015/11/06 | 14:39:06 | 60.8 | 1189317.8 | 78.4 | 63.7 | 57.5 |
| **117** | 2015/11/06 | 14:39:11 | 57.2 | 523608.1 | 73.1 | 60.4 | 55.9 |
| **118** | 2015/11/06 | 14:39:16 | 61.8 | 1504693.0 | 74.3 | 62.1 | 57.5 |
| **119** | 2015/11/06 | 14:39:21 | 58.6 | 728594.5 | 76.1 | 61.7 | 58.4 |
| **120** | 2015/11/06 | 14:39:26 | 52.4 | 174745.7 | 68.7 | 58.4 | 51.8 |
| **121** | 2015/11/06 | 14:39:31 | 56.2 | 412430.5 | 72.4 | 57.5 | 51.8 |
| **122** | 2015/11/06 | 14:39:36 | 58.7 | 748965.4 | 72.3 | 59.7 | 56.1 |
| **123** | 2015/11/06 | 14:39:41 | 58.8 | 753799.1 | 72.5 | 59.7 | 58.4 |
| **124** | 2015/11/06 | 14:39:46 | 53.8 | 242487.3 | 69.2 | 58.4 | 50.8 |
| **125** | 2015/11/06 | 14:39:51 | 50.5 | 111986.3 | 66.0 | 51.2 | 49.8 |
| **126** | 2015/11/06 | 14:39:56 | 52.7 | 185848.3 | 81.0 | 53.7 | 50.8 |
| **127** | 2015/11/06 | 14:40:01 | 53.4 | 219630.2 | 81.4 | 56.8 | 51.5 |
| **128** | 2015/11/06 | 14:40:06 | 55.9 | 392333.2 | 72.1 | 58.2 | 52.6 |
| **129** | 2015/11/06 | 14:40:11 | 59.9 | 982254.7 | 73.7 | 61.0 | 57.3 |
| **130** | 2015/11/06 | 14:40:16 | 64.1 | 2555860.1 | 79.1 | 64.8 | 61.0 |
| **131** | 2015/11/06 | 14:40:21 | 60.9 | 1217200.8 | 74.4 | 63.3 | 60.2 |
| **132** | 2015/11/06 | 14:40:26 | 62.6 | 1823167.2 | 76.0 | 63.3 | 60.4 |
| **133** | 2015/11/06 | 14:40:31 | 60.5 | 1124519.6 | 74.7 | 62.7 | 59.3 |
| **134** | 2015/11/06 | 14:40:36 | 59.2 | 838746.9 | 73.2 | 60.0 | 58.3 |
| **135** | 2015/11/06 | 14:40:41 | 57.8 | 600666.6 | 74.0 | 60.5 | 56.5 |
| **136** | 2015/11/06 | 14:40:46 | 59.4 | 868631.4 | 77.0 | 59.8 | 57.3 |
| **137** | 2015/11/06 | 14:40:51 | 57.9 | 618166.2 | 71.9 | 60.0 | 56.0 |
| **138** | 2015/11/06 | 14:40:56 | 56.3 | 426029.4 | 75.6 | 56.9 | 55.9 |
| **139** | 2015/11/06 | 14:41:01 | 56.0 | 395972.5 | 77.8 | 56.6 | 55.5 |
| **140** | 2015/11/06 | 14:41:06 | 59.3 | 852124.6 | 85.0 | 60.7 | 55.7 |
| **141** | 2015/11/06 | 14:41:11 | 60.1 | 1019259.5 | 75.9 | 61.2 | 59.0 |
| **142** | 2015/11/06 | 14:41:16 | 63.1 | 2021568.6 | 79.3 | 65.8 | 60.7 |
| **143** | 2015/11/06 | 14:41:21 | 59.2 | 826247.3 | 75.9 | 62.1 | 56.0 |
| **144** | 2015/11/06 | 14:41:26 | 60.4 | 1100164.8 | 76.6 | 62.7 | 55.3 |
| **145** | 2015/11/06 | 14:41:31 | 64.6 | 2901802.5 | 78.4 | 65.3 | 62.5 |
| **146** | 2015/11/06 | 14:41:36 | 61.1 | 1279540.8 | 78.5 | 65.0 | 60.0 |
| **147** | 2015/11/06 | 14:41:41 | 57.6 | 573995.5 | 78.0 | 60.0 | 57.0 |
| **148** | 2015/11/06 | 14:41:46 | 58.2 | 664498.1 | 76.1 | 58.7 | 57.0 |
| **149** | 2015/11/06 | 14:41:51 | 59.7 | 934206.7 | 73.9 | 60.4 | 57.8 |
| **150** | 2015/11/06 | 14:41:56 | 60.0 | 995623.0 | 74.2 | 61.0 | 58.8 |
| **151** | 2015/11/06 | 14:42:01 | 59.0 | 795834.6 | 77.3 | 60.6 | 57.8 |
| **152** | 2015/11/06 | 14:42:06 | 58.7 | 745780.9 | 73.7 | 59.4 | 58.0 |
| **153** | 2015/11/06 | 14:42:11 | 56.4 | 437765.4 | 76.9 | 58.1 | 55.4 |
| **154** | 2015/11/06 | 14:42:16 | 58.3 | 670686.2 | 74.3 | 58.7 | 56.6 |
| **155** | 2015/11/06 | 14:42:21 | 55.3 | 339304.8 | 72.8 | 58.0 | 54.7 |
| **156** | 2015/11/06 | 14:42:26 | 57.8 | 597245.9 | 73.0 | 58.4 | 56.3 |
| **157** | 2015/11/06 | 14:42:31 | 57.9 | 613891.6 | 73.8 | 59.6 | 56.0 |
| **158** | 2015/11/06 | 14:42:36 | 58.6 | 718295.3 | 73.7 | 59.3 | 57.1 |
| **159** | 2015/11/06 | 14:42:41 | 55.4 | 350668.1 | 72.8 | 59.0 | 55.4 |
| **160** | 2015/11/06 | 14:42:46 | 53.1 | 203719.1 | 74.7 | 55.9 | 51.8 |
| **161** | 2015/11/06 | 14:42:51 | 50.9 | 122238.7 | 71.9 | 51.9 | 50.2 |
| **162** | 2015/11/06 | 14:42:56 | 60.1 | 1023000.6 | 78.5 | 62.3 | 51.5 |
| **163** | 2015/11/06 | 14:43:01 | 60.3 | 1073210.8 | 78.7 | 62.6 | 60.1 |
| **164** | 2015/11/06 | 14:43:06 | 63.5 | 2229744.8 | 78.6 | 65.5 | 60.2 |
| **165** | 2015/11/06 | 14:43:11 | 62.0 | 1572731.2 | 78.5 | 66.3 | 57.8 |
| **166** | 2015/11/06 | 14:43:16 | 60.4 | 1104767.5 | 78.2 | 62.2 | 57.7 |
| **167** | 2015/11/06 | 14:43:21 | 58.8 | 762621.4 | 74.5 | 60.8 | 56.9 |
| **168** | 2015/11/06 | 14:43:26 | 62.9 | 1936385.8 | 77.8 | 63.9 | 60.3 |
| **169** | 2015/11/06 | 14:43:31 | 61.8 | 1496447.3 | 74.6 | 62.4 | 61.4 |
| **170** | 2015/11/06 | 14:43:36 | 59.9 | 970444.9 | 77.1 | 62.0 | 58.5 |
| **171** | 2015/11/06 | 14:43:41 | 61.2 | 1314806.3 | 84.9 | 63.9 | 58.0 |
| **172** | 2015/11/06 | 14:43:46 | 56.8 | 477341.9 | 83.2 | 60.6 | 54.3 |
| **173** | 2015/11/06 | 14:43:51 | 59.6 | 907509.2 | 77.2 | 61.8 | 54.5 |
| **174** | 2015/11/06 | 14:43:56 | 60.8 | 1201770.1 | 77.7 | 62.0 | 58.0 |
| **175** | 2015/11/06 | 14:44:01 | 55.5 | 357605.9 | 75.3 | 60.1 | 54.2 |
| **176** | 2015/11/06 | 14:44:06 | 57.0 | 501689.8 | 71.8 | 57.7 | 54.7 |
| **177** | 2015/11/06 | 14:44:11 | 56.2 | 415057.6 | 71.7 | 58.7 | 53.3 |
| **178** | 2015/11/06 | 14:44:16 | 54.4 | 275893.2 | 74.5 | 54.7 | 53.2 |
| **179** | 2015/11/06 | 14:44:21 | 55.9 | 386743.1 | 82.3 | 57.8 | 54.4 |
| **180** | 2015/11/06 | 14:44:26 | 52.9 | 194690.2 | 79.9 | 54.9 | 51.6 |
| **181** | 2015/11/06 | 14:44:31 | 57.6 | 574076.1 | 80.6 | 59.2 | 53.1 |
| **182** | 2015/11/06 | 14:44:36 | 50.1 | | 61.3 | 53.6 | 52.4 |

**MEASUREMENT 4** **Leq =** **62.4**

| Record # | Date | Time | LAeq | | LApeak | LASmax | LASmin |
|---|---|---|---|---|---|---|---|
| **2** | 2015/11/06 | 15:14:36 | 58.3 | 668415.5 | 76.1 | 58.7 | 57.3 |
| **3** | 2015/11/06 | 15:14:41 | 59.8 | 962984.5 | 80.7 | 62.6 | 57.4 |
| **4** | 2015/11/06 | 15:14:46 | 58.1 | 639266.0 | 74.4 | 60.3 | 57.8 |
| **5** | 2015/11/06 | 15:14:51 | 57.7 | 587183.2 | 77.1 | 58.7 | 56.8 |
| **6** | 2015/11/06 | 15:14:56 | 58.3 | 680390.6 | 78.0 | 58.7 | 57.3 |
| **7** | 2015/11/06 | 15:15:01 | 59.4 | 866339.4 | 79.1 | 60.2 | 58.6 |
| **8** | 2015/11/06 | 15:15:06 | 58.1 | 647263.8 | 80.9 | 58.9 | 57.8 |
| **9** | 2015/11/06 | 15:15:11 | 58.0 | 629795.7 | 83.0 | 58.4 | 57.4 |
| **10** | 2015/11/06 | 15:15:16 | 58.0 | 633807.4 | 83.5 | 58.8 | 57.7 |
| **11** | 2015/11/06 | 15:15:21 | 58.1 | 652236.4 | 77.5 | 58.4 | 57.8 |
| **12** | 2015/11/06 | 15:15:26 | 58.8 | 755677.9 | 76.1 | 59.2 | 58.3 |
| **13** | 2015/11/06 | 15:15:31 | 58.4 | 694066.8 | 71.6 | 59.0 | 57.8 |
| **14** | 2015/11/06 | 15:15:36 | 56.2 | 414791.5 | 69.0 | 57.8 | 56.0 |
| **15** | 2015/11/06 | 15:15:41 | 56.9 | 487084.3 | 69.6 | 57.3 | 55.9 |
| **16** | 2015/11/06 | 15:15:46 | 58.3 | 675431.7 | 84.4 | 59.0 | 57.3 |
| **17** | 2015/11/06 | 15:15:51 | 59.9 | 979540.7 | 73.0 | 60.2 | 59.0 |
| **18** | 2015/11/06 | 15:15:56 | 59.4 | 873024.2 | 76.3 | 59.8 | 59.2 |
| **19** | 2015/11/06 | 15:16:01 | 58.5 | 700326.1 | 78.3 | 59.3 | 57.9 |
| **20** | 2015/11/06 | 15:16:06 | 58.0 | 636284.1 | 76.3 | 59.1 | 57.4 |
| **21** | 2015/11/06 | 15:16:11 | 62.4 | 1724950.9 | 90.3 | 64.3 | 58.8 |
| **22** | 2015/11/06 | 15:16:16 | 58.7 | 746478.2 | 75.4 | 60.5 | 58.1 |
| **23** | 2015/11/06 | 15:16:21 | 57.6 | 578431.6 | 72.1 | 59.7 | 57.3 |
| **24** | 2015/11/06 | 15:16:26 | 56.4 | 438344.1 | 79.0 | 57.4 | 56.1 |
| **25** | 2015/11/06 | 15:16:31 | 56.9 | 492028.1 | 70.9 | 57.7 | 56.0 |
| **26** | 2015/11/06 | 15:16:36 | 60.0 | 989530.6 | 78.7 | 60.9 | 57.7 |
| **27** | 2015/11/06 | 15:16:41 | 59.8 | 961623.7 | 75.2 | 60.3 | 59.3 |
| **28** | 2015/11/06 | 15:16:46 | 58.5 | 714234.8 | 76.5 | 60.1 | 57.9 |
| **29** | 2015/11/06 | 15:16:51 | 58.9 | 770731.3 | 72.2 | 59.6 | 57.9 |
| **30** | 2015/11/06 | 15:16:56 | 60.8 | 1209325.4 | 73.1 | 61.4 | 59.6 |
| **31** | 2015/11/06 | 15:17:01 | 60.4 | 1104422.1 | 73.3 | 61.0 | 60.1 |
| **32** | 2015/11/06 | 15:17:06 | 60.1 | 1013940.2 | 80.7 | 60.9 | 59.5 |
| **33** | 2015/11/06 | 15:17:11 | 57.9 | 610920.1 | 71.3 | 59.5 | 56.5 |
| **34** | 2015/11/06 | 15:17:16 | 55.9 | 390194.5 | 74.1 | 56.5 | 55.8 |
| **35** | 2015/11/06 | 15:17:21 | 56.6 | 455394.9 | 69.8 | 57.1 | 55.8 |
| **36** | 2015/11/06 | 15:17:26 | 57.0 | 497761.7 | 70.1 | 57.4 | 56.5 |
| **37** | 2015/11/06 | 15:17:31 | 59.0 | 785274.4 | 77.4 | 60.2 | 57.4 |
| **38** | 2015/11/06 | 15:17:36 | 57.8 | 609035.2 | 71.2 | 58.5 | 57.6 |
| **39** | 2015/11/06 | 15:17:41 | 58.3 | 671531.5 | 70.6 | 58.5 | 57.9 |
| **40** | 2015/11/06 | 15:17:46 | 57.0 | 500012.8 | 70.4 | 58.2 | 56.7 |
| **41** | 2015/11/06 | 15:17:51 | 56.7 | 468685.2 | 69.8 | 57.1 | 56.3 |
| **42** | 2015/11/06 | 15:17:56 | 56.4 | 435092.0 | 70.3 | 56.9 | 55.9 |
| **43** | 2015/11/06 | 15:18:01 | 58.8 | 753461.5 | 73.6 | 59.8 | 56.7 |
| **44** | 2015/11/06 | 15:18:06 | 60.6 | 1142825.6 | 75.4 | 61.9 | 59.5 |
| **45** | 2015/11/06 | 15:18:11 | 60.7 | 1187532.8 | 74.6 | 61.9 | 59.7 |
| **46** | 2015/11/06 | 15:18:16 | 59.6 | 921829.8 | 84.5 | 60.5 | 59.2 |
| **47** | 2015/11/06 | 15:18:21 | 60.0 | 1006675.8 | 74.9 | 60.7 | 59.1 |
| **48** | 2015/11/06 | 15:18:26 | 58.7 | 737573.8 | 72.2 | 60.7 | 58.5 |
| **49** | 2015/11/06 | 15:18:31 | 58.8 | 767139.5 | 72.3 | 59.0 | 58.7 |
| **50** | 2015/11/06 | 15:18:36 | 59.8 | 956848.9 | 74.5 | 60.6 | 58.6 |
| **51** | 2015/11/06 | 15:18:41 | 60.7 | 1172840.7 | 73.9 | 61.2 | 60.2 |
| **52** | 2015/11/06 | 15:18:46 | 61.2 | 1331109.5 | 73.8 | 61.9 | 60.5 |
| **53** | 2015/11/06 | 15:18:51 | 60.2 | 1052311.5 | 83.2 | 61.9 | 59.8 |
| **54** | 2015/11/06 | 15:18:56 | 59.9 | 967491.6 | 78.2 | 60.3 | 59.4 |
| **55** | 2015/11/06 | 15:19:01 | 60.8 | 1205569.9 | 74.8 | 61.8 | 59.5 |
| **56** | 2015/11/06 | 15:19:06 | 59.2 | 838009.0 | 72.5 | 60.2 | 58.4 |
| **57** | 2015/11/06 | 15:19:11 | 57.9 | 618698.0 | 70.5 | 58.5 | 57.4 |
| **58** | 2015/11/06 | 15:19:16 | 56.7 | 464073.0 | 70.0 | 57.4 | 56.6 |
| **59** | 2015/11/06 | 15:19:21 | 56.3 | 424849.3 | 69.3 | 57.1 | 55.8 |
| **60** | 2015/11/06 | 15:19:26 | 57.1 | 511234.9 | 70.1 | 57.8 | 56.0 |
| **61** | 2015/11/06 | 15:19:31 | 57.5 | 563854.3 | 71.2 | 58.1 | 57.2 |
| **62** | 2015/11/06 | 15:19:36 | 55.7 | 373999.5 | 68.9 | 57.3 | 55.1 |
| **63** | 2015/11/06 | 15:19:41 | 55.4 | 346958.8 | 68.9 | 55.6 | 55.0 |
| **64** | 2015/11/06 | 15:19:46 | 56.1 | 405167.6 | 70.4 | 56.8 | 55.4 |
| **65** | 2015/11/06 | 15:19:51 | 56.2 | 415359.9 | 71.8 | 56.4 | 56.0 |
| **66** | 2015/11/06 | 15:19:56 | 55.7 | 374468.2 | 69.2 | 56.3 | 55.2 |
| **67** | 2015/11/06 | 15:20:01 | 57.1 | 507862.9 | 70.3 | 57.7 | 56.3 |
| **68** | 2015/11/06 | 15:20:06 | 57.8 | 606727.0 | 73.1 | 58.7 | 56.7 |
| **69** | 2015/11/06 | 15:20:11 | 57.6 | 580135.7 | 71.3 | 58.8 | 56.6 |
| **70** | 2015/11/06 | 15:20:16 | 58.9 | 770217.6 | 73.4 | 59.7 | 57.6 |
| **71** | 2015/11/06 | 15:20:21 | 60.0 | 993635.5 | 73.2 | 60.9 | 59.0 |
| **72** | 2015/11/06 | 15:20:26 | 59.9 | 972142.7 | 73.6 | 60.8 | 58.8 |
| **73** | 2015/11/06 | 15:20:31 | 60.3 | 1065169.9 | 74.5 | 61.0 | 59.8 |
| **74** | 2015/11/06 | 15:20:36 | 59.2 | 826550.0 | 71.5 | 59.8 | 59.1 |
| **75** | 2015/11/06 | 15:20:41 | 59.6 | 915220.5 | 72.1 | 59.9 | 59.1 |
| **76** | 2015/11/06 | 15:20:46 | 58.8 | 751978.5 | 71.6 | 59.6 | 58.4 |
| **77** | 2015/11/06 | 15:20:51 | 58.2 | 653890.2 | 70.6 | 58.4 | 57.9 |
| **78** | 2015/11/06 | 15:20:56 | 57.7 | 593878.1 | 71.3 | 58.4 | 57.3 |
| **79** | 2015/11/06 | 15:21:01 | 56.5 | 446590.2 | 69.2 | 57.6 | 56.5 |
| **80** | 2015/11/06 | 15:21:06 | 56.2 | 414959.5 | 68.1 | 56.7 | 56.0 |
| **81** | 2015/11/06 | 15:21:11 | 56.8 | 478960.1 | 70.3 | 57.4 | 56.0 |
| **82** | 2015/11/06 | 15:21:16 | 56.5 | 447238.7 | 68.9 | 57.1 | 56.0 |
| **83** | 2015/11/06 | 15:21:21 | 56.8 | 484011.9 | 70.0 | 57.4 | 56.0 |
| **84** | 2015/11/06 | 15:21:26 | 56.7 | 466940.5 | 69.5 | 57.3 | 56.4 |
| **85** | 2015/11/06 | 15:21:31 | 56.9 | 494386.1 | 70.0 | 57.3 | 56.4 |
| **86** | 2015/11/06 | 15:21:36 | 57.5 | 557756.1 | 81.5 | 60.2 | 56.3 |
| **87** | 2015/11/06 | 15:21:41 | 57.6 | 581495.3 | 71.4 | 58.6 | 56.3 |
| **88** | 2015/11/06 | 15:21:46 | 58.3 | 678025.7 | 72.1 | 58.6 | 58.1 |
| **89** | 2015/11/06 | 15:21:51 | 57.4 | 543510.3 | 69.3 | 58.3 | 57.1 |
| **90** | 2015/11/06 | 15:21:56 | 55.9 | 387630.0 | 69.5 | 57.5 | 55.3 |
| **91** | 2015/11/06 | 15:22:01 | 55.4 | 343884.1 | 69.0 | 55.6 | 55.1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **92** | 2015/11/06 | 15:22:06 | 57.9 | 615487.0 | 73.4 | 58.7 | 55.6 |
| **93** | 2015/11/06 | 15:22:11 | 57.7 | 592065.0 | 70.9 | 58.0 | 57.3 |
| **94** | 2015/11/06 | 15:22:16 | 58.0 | 638261.1 | 71.4 | 58.7 | 57.2 |
| **95** | 2015/11/06 | 15:22:21 | 58.0 | 627589.6 | 71.8 | 59.0 | 57.2 |
| **96** | 2015/11/06 | 15:22:26 | 57.8 | 599090.1 | 70.4 | 58.3 | 57.2 |
| **97** | 2015/11/06 | 15:22:31 | 56.3 | 422392.3 | 69.2 | 57.4 | 55.9 |
| **98** | 2015/11/06 | 15:22:36 | 55.8 | 383054.3 | 68.4 | 56.6 | 55.2 |
| **99** | 2015/11/06 | 15:22:41 | 55.6 | 363174.6 | 68.3 | 55.8 | 55.2 |
| **100** | 2015/11/06 | 15:22:46 | 56.4 | 438279.8 | 69.2 | 56.9 | 55.8 |
| **101** | 2015/11/06 | 15:22:51 | 57.5 | 557404.4 | 70.0 | 57.8 | 56.8 |
| **102** | 2015/11/06 | 15:22:56 | 57.6 | 578237.1 | 69.8 | 58.1 | 57.1 |
| **103** | 2015/11/06 | 15:23:01 | 56.5 | 448640.2 | 69.2 | 57.1 | 56.2 |
| **104** | 2015/11/06 | 15:23:06 | 55.9 | 390152.0 | 69.5 | 56.2 | 55.6 |
| **105** | 2015/11/06 | 15:23:11 | 56.5 | 445314.8 | 69.2 | 57.3 | 55.8 |
| **106** | 2015/11/06 | 15:23:16 | 57.3 | 536494.2 | 70.8 | 57.9 | 55.8 |
| **107** | 2015/11/06 | 15:23:21 | 57.7 | 595549.7 | 72.0 | 58.8 | 56.9 |
| **108** | 2015/11/06 | 15:23:26 | 59.8 | 948103.7 | 73.8 | 60.6 | 57.6 |
| **109** | 2015/11/06 | 15:23:31 | 58.2 | 657243.3 | 71.8 | 59.4 | 57.2 |
| **110** | 2015/11/06 | 15:23:36 | 56.6 | 455265.7 | 69.6 | 58.8 | 56.2 |
| **111** | 2015/11/06 | 15:23:41 | 57.3 | 532355.4 | 71.3 | 57.9 | 56.2 |
| **112** | 2015/11/06 | 15:23:46 | 58.7 | 746263.2 | 71.8 | 58.9 | 57.9 |
| **113** | 2015/11/06 | 15:23:51 | 58.5 | 707331.1 | 71.3 | 59.0 | 57.9 |
| **114** | 2015/11/06 | 15:23:56 | 57.5 | 561401.2 | 70.7 | 58.2 | 57.2 |
| **115** | 2015/11/06 | 15:24:01 | 57.1 | 508264.5 | 70.1 | 57.4 | 56.8 |
| **116** | 2015/11/06 | 15:24:06 | 57.9 | 610884.7 | 70.5 | 58.3 | 57.0 |
| **117** | 2015/11/06 | 15:24:11 | 58.9 | 784911.7 | 72.3 | 59.2 | 58.3 |
| **118** | 2015/11/06 | 15:24:16 | 58.8 | 753297.4 | 73.0 | 59.6 | 58.2 |
| **119** | 2015/11/06 | 15:24:21 | 59.1 | 805925.7 | 73.1 | 59.6 | 58.6 |
| **120** | 2015/11/06 | 15:24:26 | 58.3 | 676253.9 | 71.8 | 59.1 | 58.0 |
| **121** | 2015/11/06 | 15:24:31 | 58.5 | 713083.3 | 71.3 | 58.7 | 58.3 |
| **122** | 2015/11/06 | 15:24:36 | 59.7 | 930980.0 | 72.8 | 60.1 | 58.5 |
| **123** | 2015/11/06 | 15:24:41 | 59.9 | 975890.0 | 72.9 | 60.5 | 59.3 |
| **124** | 2015/11/06 | 15:24:46 | 63.3 | 2140616.9 | 78.5 | 64.8 | 59.7 |
| **125** | 2015/11/06 | 15:24:51 | 61.7 | 1487619.4 | 75.2 | 63.8 | 61.2 |
| **126** | 2015/11/06 | 15:24:56 | 60.6 | 1161338.8 | 73.5 | 61.6 | 60.0 |
| **127** | 2015/11/06 | 15:25:01 | 60.9 | 1239573.8 | 74.8 | 61.2 | 60.6 |
| **128** | 2015/11/06 | 15:25:06 | 59.1 | 804155.8 | 73.7 | 61.0 | 58.6 |
| **129** | 2015/11/06 | 15:25:11 | 58.0 | 630395.1 | 72.7 | 59.4 | 57.1 |
| **130** | 2015/11/06 | 15:25:16 | 56.7 | 471050.5 | 69.5 | 57.7 | 56.1 |
| **131** | 2015/11/06 | 15:25:21 | 55.8 | 382874.0 | 68.3 | 56.4 | 55.2 |
| **132** | 2015/11/06 | 15:25:26 | 56.5 | 442659.4 | 70.6 | 57.2 | 55.4 |
| **133** | 2015/11/06 | 15:25:31 | 57.0 | 500602.1 | 69.7 | 57.3 | 56.8 |
| **134** | 2015/11/06 | 15:25:36 | 56.6 | 461298.9 | 70.3 | 57.1 | 56.3 |
| **135** | 2015/11/06 | 15:25:41 | 56.4 | 432013.8 | 70.1 | 56.8 | 56.2 |
| **136** | 2015/11/06 | 15:25:46 | 57.0 | 495771.5 | 74.7 | 57.2 | 56.4 |
| **137** | 2015/11/06 | 15:25:51 | 57.1 | 518397.1 | 74.4 | 57.6 | 56.8 |
| **138** | 2015/11/06 | 15:25:56 | 56.9 | 487097.6 | 71.3 | 57.0 | 56.6 |
| **139** | 2015/11/06 | 15:26:01 | 56.5 | 441633.8 | 69.2 | 56.8 | 56.3 |
| **140** | 2015/11/06 | 15:26:06 | 56.9 | 487995.2 | 69.6 | 57.2 | 56.3 |
| **141** | 2015/11/06 | 15:26:11 | 57.8 | 602096.0 | 76.7 | 58.0 | 57.2 |
| **142** | 2015/11/06 | 15:26:16 | 57.4 | 544977.9 | 70.3 | 57.9 | 57.0 |
| **143** | 2015/11/06 | 15:26:21 | 58.8 | 766431.0 | 72.3 | 59.5 | 57.6 |
| **144** | 2015/11/06 | 15:26:26 | 60.7 | 1162070.5 | 73.4 | 61.1 | 59.4 |
| **145** | 2015/11/06 | 15:26:31 | 60.5 | 1133202.6 | 74.1 | 61.1 | 60.2 |
| **146** | 2015/11/06 | 15:26:36 | 60.2 | 1059180.2 | 74.5 | 60.8 | 59.9 |
| **147** | 2015/11/06 | 15:26:41 | 59.9 | 973290.2 | 75.0 | 60.5 | 59.6 |
| **148** | 2015/11/06 | 15:26:46 | 58.6 | 730310.4 | 71.4 | 60.0 | 58.5 |
| **149** | 2015/11/06 | 15:26:51 | 57.7 | 592016.1 | 73.0 | 58.7 | 57.4 |
| **150** | 2015/11/06 | 15:26:56 | 57.2 | 527547.8 | 73.5 | 58.6 | 56.4 |
| **151** | 2015/11/06 | 15:27:01 | 57.2 | 522550.9 | 70.7 | 58.4 | 57.0 |
| **152** | 2015/11/06 | 15:27:06 | 57.0 | 505034.1 | 70.3 | 57.8 | 56.7 |
| **153** | 2015/11/06 | 15:27:11 | 56.8 | 477608.2 | 70.4 | 57.1 | 56.6 |
| **154** | 2015/11/06 | 15:27:16 | 58.3 | 682520.3 | 71.8 | 59.1 | 56.7 |
| **155** | 2015/11/06 | 15:27:21 | 58.3 | 673779.7 | 71.8 | 59.1 | 58.1 |
| **156** | 2015/11/06 | 15:27:26 | 58.9 | 770721.8 | 72.9 | 59.4 | 58.5 |
| **157** | 2015/11/06 | 15:27:31 | 59.8 | 945230.0 | 73.4 | 60.8 | 58.6 |
| **158** | 2015/11/06 | 15:27:36 | 60.4 | 1102158.3 | 75.9 | 61.3 | 59.5 |
| **159** | 2015/11/06 | 15:27:41 | 59.3 | 858052.8 | 78.4 | 60.0 | 59.0 |
| **160** | 2015/11/06 | 15:27:46 | 58.4 | 689833.0 | 74.1 | 59.0 | 57.9 |
| **161** | 2015/11/06 | 15:27:51 | 58.9 | 769527.9 | 76.9 | 59.4 | 58.3 |
| **162** | 2015/11/06 | 15:27:56 | 58.3 | 674654.4 | 71.6 | 59.2 | 57.5 |
| **163** | 2015/11/06 | 15:28:01 | 61.2 | 1329984.1 | 80.3 | 63.1 | 57.9 |
| **164** | 2015/11/06 | 15:28:06 | 59.6 | 922559.6 | 74.9 | 62.1 | 57.9 |
| **165** | 2015/11/06 | 15:28:11 | 61.5 | 1407343.5 | 78.9 | 64.2 | 59.7 |
| **166** | 2015/11/06 | 15:28:16 | 63.6 | 2287304.0 | 79.9 | 65.5 | 59.6 |
| **167** | 2015/11/06 | 15:28:21 | 65.5 | 3537398.0 | 82.8 | 67.5 | 63.9 |
| **168** | 2015/11/06 | 15:28:26 | 73.7 | 23440006.8 | 90.7 | 75.0 | 64.4 |
| **169** | 2015/11/06 | 15:28:31 | 75.5 | 35192370.1 | 89.9 | 77.1 | 72.8 |
| **170** | 2015/11/06 | 15:28:36 | 77.2 | 52571137.7 | 95.7 | 80.5 | 72.4 |
| **171** | 2015/11/06 | 15:28:41 | 77.8 | 59633327.6 | 94.4 | 81.2 | 73.1 |
| **172** | 2015/11/06 | 15:28:46 | 68.3 | 6826354.6 | 82.4 | 73.1 | 67.7 |
| **173** | 2015/11/06 | 15:28:51 | 69.1 | 8058988.2 | 83.8 | 71.2 | 65.2 |
| **174** | 2015/11/06 | 15:28:56 | 63.2 | 2108862.3 | 77.0 | 65.2 | 62.9 |
| **175** | 2015/11/06 | 15:29:01 | 62.6 | 1812980.3 | 76.0 | 63.4 | 61.7 |
| **176** | 2015/11/06 | 15:29:06 | 59.8 | 944323.8 | 76.5 | 61.7 | 59.3 |
| **177** | 2015/11/06 | 15:29:11 | 58.1 | 640737.7 | 71.3 | 59.3 | 57.6 |
| **178** | 2015/11/06 | 15:29:16 | 57.0 | 501077.6 | 70.1 | 57.6 | 56.5 |
| **179** | 2015/11/06 | 15:29:21 | 57.1 | 516162.5 | 69.6 | 57.3 | 56.9 |
| **180** | 2015/11/06 | 15:29:26 | 56.7 | 467408.7 | 70.4 | 57.3 | 56.4 |
| **181** | 2015/11/06 | 15:29:31 | 56.4 | 431810.9 | 68.9 | 56.7 | 56.0 |
| **182** | 2015/11/06 | 15:29:36 | 56.1 | 411984.0 | 74.8 | 56.4 | 56.2 |

# ATTACHMENT 2

# SoundPLAN Data – Measured Conditions

7916 Friars Road Multi-Family Development
SoundPLAN Data - Measurements

| Stationing km | ADT Veh/24h | Traffic values Vehicles type | Vehicle name | day Veh/h | Speed km/h | Control device | Constr. Speed km/h | Affect. veh. % | Road surface | Gradient Min / Max % |
|---|---|---|---|---|---|---|---|---|---|---|
| Friars EB | Traffic direction: | In entry direction | | | | | | | | |
| 0+000 | 26496 | Total | - | 1104 | - | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Automobiles | - | 1079 | 72 | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Medium trucks | - | 11 | 72 | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Heavy trucks | - | - | 72 | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Buses | - | 10 | 72 | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Motorcycles | - | 4 | 72 | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 0+000 | 26496 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -0.8461538 |
| 1+129 | - | | | | | - | - | - | - | - |
| Friars WB | Traffic direction: | In entry direction | | | | | | | | |
| 0+000 | 26496 | Total | - | 1104 | - | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Automobiles | - | 1079 | 72 | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Medium trucks | - | 11 | 72 | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Heavy trucks | - | - | 72 | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Buses | - | 10 | 72 | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Motorcycles | - | 4 | 72 | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 0+000 | 26496 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -0.75 |
| 1+120 | - | | | | | - | - | - | - | - |

7916 Friars Road Multi-Family Development
SoundPLAN Data - Measurements

| No. | Receiver name | Building side | Floor | Limit L(Aeq1h) dB(A) | Level w/o NP L(Aeq1h) dB(A) | Level w. NP L(Aeq1h) dB(A) | Difference L(Aeq1h) dB(A) | Conflict L(Aeq1h) dB(A) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | | GF | - | 65.9 | 0 | -65.9 | - |
| 2 | 2 | | GF | - | 65.8 | 0 | -65.8 | - |
| 3 | 3 | | GF | - | 58.2 | 0 | -58.2 | - |

7916 Friars Road Multi-Family Development
SoundPLAN Data - Measurements

| Source name | Lane | Level w/o NP L(Aeq1h) dB(A) | Level w. NP L(Aeq1h) dB(A) |
|---|---|---|---|
| 1 GF | 65.9 | 0.0 | |
| Friars EB | | 62.0 | 0 |
| Friars WB | | 63.7 | 0 |
| 2 GF | 65.8 | 0.0 | |
| Friars EB | | 61.5 | 0 |
| Friars WB | | 63.8 | 0 |
| 3 GF | 58.2 | 0.0 | |
| Friars EB | | 55.5 | 0 |
| Friars WB | | 54.9 | 0 |

# ATTACHMENT 3

# SoundPLAN Data – Future Vehicle Traffic

| Stationing km | ADT Veh/24h | Traffic values Vehicles type | Vehicle name | day Veh/h | Speed km/h | Control device | Constr. Speed km/h | Affect. veh. % | Road surface | Gradient Min / Max % |
|---|---|---|---|---|---|---|---|---|---|---|
| Friars EB | Traffic direction: | In entry direction | | | | | | | | |
| 0+000 | 41544 | Total | - | 1731 | - | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Automobiles | - | 1636 | 72 | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Medium trucks | - | 52 | 72 | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Heavy trucks | - | 17 | 72 | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Buses | - | 17 | 72 | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Motorcycles | - | 9 | 72 | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+000 | 41544 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -2.06667 |
| 0+277 | 36024 | Total | - | 1501 | - | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Automobiles | - | 1418 | 72 | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Medium trucks | - | 45 | 72 | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Heavy trucks | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Buses | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Motorcycles | - | 8 | 72 | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+277 | 36024 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -3 |
| 0+483 | 53880 | Total | - | 2245 | - | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Automobiles | - | 2123 | 72 | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Medium trucks | - | 67 | 72 | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Heavy trucks | - | 22 | 72 | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Buses | - | 22 | 72 | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Motorcycles | - | 11 | 72 | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+483 | 53880 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | 16.5 |
| 0+885 | 70656 | Total | - | 2944 | - | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Automobiles | - | 2783 | 72 | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Medium trucks | - | 88 | 72 | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Heavy trucks | - | 29 | 72 | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Buses | - | 29 | 72 | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Motorcycles | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+885 | 70656 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | 14 |
| 0+985 | 77808 | Total | - | 3242 | - | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Automobiles | - | 3065 | 72 | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Medium trucks | - | 97 | 72 | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Heavy trucks | - | 32 | 72 | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Buses | - | 32 | 72 | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Motorcycles | - | 16 | 72 | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 0+985 | 77808 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | 0.3 / 4.0 |
| 1+129 | - | | | | | - | - | - | - | - |
| Friars WB | Traffic direction: | In entry direction | | | | | | | | |
| 0+000 | 77808 | Total | - | 3242 | - | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Automobiles | - | 3065 | 72 | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Medium trucks | - | 97 | 72 | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Heavy trucks | - | 32 | 72 | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Buses | - | 32 | 72 | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Motorcycles | - | 16 | 72 | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+000 | 77808 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -5.1 / 0 |
| 0+145 | 70656 | Total | - | 2944 | - | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Automobiles | - | 2783 | 72 | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Medium trucks | - | 88 | 72 | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Heavy trucks | - | 29 | 72 | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Buses | - | 29 | 72 | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Motorcycles | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+145 | 70656 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | 0.0 / 2.7 |
| 0+235 | 53880 | Total | - | 2245 | - | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Automobiles | - | 2123 | 72 | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Medium trucks | - | 67 | 72 | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Heavy trucks | - | 22 | 72 | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Buses | - | 22 | 72 | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Motorcycles | - | 11 | 72 | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+235 | 53880 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | 0.2 / 3.5 |
| 0+643 | 36024 | Total | - | 1501 | - | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Automobiles | - | 1418 | 72 | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Medium trucks | - | 45 | 72 | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Heavy trucks | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Buses | - | 15 | 72 | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Motorcycles | - | 8 | 72 | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+643 | 36024 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -0.25 |
| 0+847 | 41544 | Total | - | 1731 | - | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Automobiles | - | 1636 | 72 | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Medium trucks | - | 52 | 72 | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Heavy trucks | - | 17 | 72 | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Buses | - | 17 | 72 | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Motorcycles | - | 9 | 72 | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 0+847 | 41544 | Auxiliary Vehicle | - | - | - | none | - | - | Average (of DGAC and PCC) | -0.45588 |
| 1+120 | - | | | | | - | - | - | - | - |

7916 Friars Road Multi-Family Development
SoundPLAN Data - Future Traffic

| No. | Receiver name | Building side | Floor | Limit L(Aeq1h) dB(A) | Level w/o NP L(Aeq1h) dB(A) |
|---|---|---|---|---|---|
| 1 | 1 | | 1.Fl | - | 52 |
| 1 | 1 | | 2.Fl | - | 62 |
| 1 | 1 | | 3.Fl | - | 64 |
| 1 | 1 | | 4.Fl | - | 65 |
| 1 | 1 | | 5.Fl | - | 65 |
| 1 | 1 | | 6.Fl | - | 65 |
| 1 | 1 | | 7.Fl | - | 65 |
| 1 | 1 | | 8.Fl | - | 65 |
| 2 | 2 | | 1.Fl | - | 65 |
| 2 | 2 | | 2.Fl | - | 72 |
| 2 | 2 | | 3.Fl | - | 72 |
| 2 | 2 | | 4.Fl | - | 72 |
| 2 | 2 | | 5.Fl | - | 71 |
| 2 | 2 | | 6.Fl | - | 71 |
| 2 | 2 | | 7.Fl | - | 71 |
| 2 | 2 | | 8.Fl | - | 70 |
| 3 | 3 | | 1.Fl | - | 62 |
| 3 | 3 | | 2.Fl | - | 70 |
| 3 | 3 | | 3.Fl | - | 70 |
| 3 | 3 | | 4.Fl | - | 70 |
| 3 | 3 | | 5.Fl | - | 70 |
| 3 | 3 | | 6.Fl | - | 70 |
| 3 | 3 | | 7.Fl | - | 69 |
| 3 | 3 | | 8.Fl | - | 69 |
| 4 | 4 | | 1.Fl | - | 56 |
| 4 | 4 | | 2.Fl | - | 60 |
| 4 | 4 | | 3.Fl | - | 66 |
| 4 | 4 | | 4.Fl | - | 68 |
| 4 | 4 | | 5.Fl | - | 68 |
| 4 | 4 | | 6.Fl | - | 67 |
| 4 | 4 | | 7.Fl | - | 67 |
| 4 | 4 | | 8.Fl | - | 67 |
| 5 | 5 | | 1.Fl | - | 61 |
| 5 | 5 | | 2.Fl | - | 70 |
| 5 | 5 | | 3.Fl | - | 70 |
| 5 | 5 | | 4.Fl | - | 70 |
| 5 | 5 | | 5.Fl | - | 70 |
| 5 | 5 | | 6.Fl | - | 69 |
| 5 | 5 | | 7.Fl | - | 69 |
| 5 | 5 | | 8.Fl | - | 69 |
| 6 | 6 | | 1.Fl | - | 59 |
| 6 | 6 | | 2.Fl | - | 68 |
| 6 | 6 | | 3.Fl | - | 69 |
| 6 | 6 | | 4.Fl | - | 69 |
| 6 | 6 | | 5.Fl | - | 69 |
| 6 | 6 | | 6.Fl | - | 69 |
| 6 | 6 | | 7.Fl | - | 68 |
| 6 | 6 | | 8.Fl | - | 68 |
| 7 | 7 | | 1.Fl | - | 71 |
| 7 | 7 | | 2.Fl | - | 73 |
| 7 | 7 | | 3.Fl | - | 73 |
| 7 | 7 | | 4.Fl | - | 72 |

| | | | | |
|---|---|---|---|---|
| 7 | 7 | 5.Fl | - | 72 |
| 7 | 7 | 6.Fl | - | 72 |
| 7 | 7 | 7.Fl | - | 71 |
| 7 | 7 | 8.Fl | - | 71 |
| 8 | 8 | 1.Fl | - | 71 |
| 8 | 8 | 2.Fl | - | 73 |
| 8 | 8 | 3.Fl | - | 73 |
| 8 | 8 | 4.Fl | - | 73 |
| 8 | 8 | 5.Fl | - | 72 |
| 8 | 8 | 6.Fl | - | 72 |
| 8 | 8 | 7.Fl | - | 71 |
| 8 | 8 | 8.Fl | - | 71 |
| 9 | 9 | 1.Fl | - | 71 |
| 9 | 9 | 2.Fl | - | 73 |
| 9 | 9 | 3.Fl | - | 73 |
| 9 | 9 | 4.Fl | - | 73 |
| 9 | 9 | 5.Fl | - | 72 |
| 9 | 9 | 6.Fl | - | 72 |
| 9 | 9 | 7.Fl | - | 72 |
| 9 | 9 | 8.Fl | - | 71 |
| 10 | 10 | 1.Fl | - | 61 |
| 10 | 10 | 2.Fl | - | 70 |
| 10 | 10 | 3.Fl | - | 70 |
| 10 | 10 | 4.Fl | - | 70 |
| 10 | 10 | 5.Fl | - | 70 |
| 10 | 10 | 6.Fl | - | 70 |
| 10 | 10 | 7.Fl | - | 69 |
| 10 | 10 | 8.Fl | - | 69 |
| 11 | 11 | 1.Fl | - | 56 |
| 11 | 11 | 2.Fl | - | 60 |
| 11 | 11 | 3.Fl | - | 65 |
| 11 | 11 | 4.Fl | - | 67 |
| 11 | 11 | 5.Fl | - | 68 |
| 11 | 11 | 6.Fl | - | 67 |
| 11 | 11 | 7.Fl | - | 67 |
| 11 | 11 | 8.Fl | - | 67 |
| 12 | 12 | 1.Fl | - | 62 |
| 12 | 12 | 2.Fl | - | 70 |
| 12 | 12 | 3.Fl | - | 71 |
| 12 | 12 | 4.Fl | - | 71 |
| 12 | 12 | 5.Fl | - | 70 |
| 12 | 12 | 6.Fl | - | 70 |
| 12 | 12 | 7.Fl | - | 70 |
| 12 | 12 | 8.Fl | - | 70 |
| 13 | 13 | 1.Fl | - | 59 |
| 13 | 13 | 2.Fl | - | 67 |
| 13 | 13 | 3.Fl | - | 69 |
| 13 | 13 | 4.Fl | - | 69 |
| 13 | 13 | 5.Fl | - | 69 |
| 13 | 13 | 6.Fl | - | 69 |
| 13 | 13 | 7.Fl | - | 68 |
| 13 | 13 | 8.Fl | - | 68 |
| 14 | 14 | 1.Fl | - | 64 |
| 14 | 14 | 2.Fl | - | 72 |
| 14 | 14 | 3.Fl | - | 73 |

| | | | | |
|---|---|---|---|---|
| 14 | 14 | 4.Fl | - | 72 |
| 14 | 14 | 5.Fl | - | 72 |
| 14 | 14 | 6.Fl | - | 72 |
| 14 | 14 | 7.Fl | - | 71 |
| 14 | 14 | 8.Fl | - | 71 |
| 15 | 15 | 1.Fl | - | 52 |
| 15 | 15 | 2.Fl | - | 59 |
| 15 | 15 | 3.Fl | - | 63 |
| 15 | 15 | 4.Fl | - | 64 |
| 15 | 15 | 5.Fl | - | 65 |
| 15 | 15 | 6.Fl | - | 65 |
| 15 | 15 | 7.Fl | - | 65 |
| 15 | 15 | 8.Fl | - | 65 |
| 16 | 16 | 1.Fl | - | 24 |
| 16 | 16 | 2.Fl | - | 24 |
| 16 | 16 | 3.Fl | - | 26 |
| 16 | 16 | 4.Fl | - | 27 |
| 16 | 16 | 5.Fl | - | 28 |
| 16 | 16 | 6.Fl | - | 31 |
| 16 | 16 | 7.Fl | - | 38 |
| 16 | 16 | 8.Fl | - | 45 |
| 17 | 17 | 1.Fl | - | 26 |
| 17 | 17 | 2.Fl | - | 30 |
| 17 | 17 | 3.Fl | - | 28 |
| 17 | 17 | 4.Fl | - | 28 |
| 17 | 17 | 5.Fl | - | 30 |
| 17 | 17 | 6.Fl | - | 31 |
| 17 | 17 | 7.Fl | - | 33 |
| 17 | 17 | 8.Fl | - | 37 |
| 18 | 18 | 1.Fl | - | 26 |
| 18 | 18 | 2.Fl | - | 25 |
| 18 | 18 | 3.Fl | - | 27 |
| 18 | 18 | 4.Fl | - | 27 |
| 18 | 18 | 5.Fl | - | 29 |
| 18 | 18 | 6.Fl | - | 31 |
| 18 | 18 | 7.Fl | - | 36 |
| 18 | 18 | 8.Fl | - | 47 |
| 19 | 19 | 1.Fl | - | 64 |
| 19 | 19 | 2.Fl | - | 71 |
| 19 | 19 | 3.Fl | - | 71 |
| 19 | 19 | 4.Fl | - | 71 |
| 19 | 19 | 5.Fl | - | 71 |
| 19 | 19 | 6.Fl | - | 70 |
| 19 | 19 | 7.Fl | - | 70 |
| 19 | 19 | 8.Fl | - | 70 |
| 19 | 19 | 9.Fl | - | 69 |
| 20 | 20 | 1.Fl | - | 59 |
| 20 | 20 | 2.Fl | - | 67 |
| 20 | 20 | 3.Fl | - | 70 |
| 20 | 20 | 4.Fl | - | 70 |
| 20 | 20 | 5.Fl | - | 70 |
| 20 | 20 | 6.Fl | - | 69 |
| 20 | 20 | 7.Fl | - | 69 |
| 20 | 20 | 8.Fl | - | 69 |
| 20 | 20 | 9.Fl | - | 69 |

| | | | | |
|---|---|---|---|---|
| 21 | 21 | 1.Fl | - | 67 |
| 21 | 21 | 2.Fl | - | 74 |
| 21 | 21 | 3.Fl | - | 74 |
| 21 | 21 | 4.Fl | - | 73 |
| 21 | 21 | 5.Fl | - | 73 |
| 21 | 21 | 6.Fl | - | 73 |
| 21 | 21 | 7.Fl | - | 72 |
| 21 | 21 | 8.Fl | - | 72 |
| 21 | 21 | 9.Fl | - | 71 |
| 22 | 22 | 1.Fl | - | 64 |
| 22 | 22 | 2.Fl | - | 73 |
| 22 | 22 | 3.Fl | - | 73 |
| 22 | 22 | 4.Fl | - | 73 |
| 22 | 22 | 5.Fl | - | 72 |
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| 23 | 23 | 1.Fl | - | 60 |
| 23 | 23 | 2.Fl | - | 68 |
| 23 | 23 | 3.Fl | - | 71 |
| 23 | 23 | 4.Fl | - | 71 |
| 23 | 23 | 5.Fl | - | 71 |
| 23 | 23 | 6.Fl | - | 71 |
| 23 | 23 | 7.Fl | - | 71 |
| 23 | 23 | 8.Fl | - | 70 |
| 23 | 23 | 9.Fl | - | 70 |
| 24 | 24 | 1.Fl | - | 45 |
| 24 | 24 | 2.Fl | - | 49 |
| 24 | 24 | 3.Fl | - | 57 |
| 24 | 24 | 4.Fl | - | 60 |
| 24 | 24 | 5.Fl | - | 62 |
| 24 | 24 | 6.Fl | - | 63 |
| 24 | 24 | 7.Fl | - | 64 |
| 24 | 24 | 8.Fl | - | 65 |
| 24 | 24 | 9.Fl | - | 65 |
| 25 | 25 | 1.Fl | - | 26 |
| 25 | 25 | 2.Fl | - | 29 |
| 25 | 25 | 3.Fl | - | 27 |
| 25 | 25 | 4.Fl | - | 28 |
| 25 | 25 | 5.Fl | - | 29 |
| 25 | 25 | 6.Fl | - | 31 |
| 25 | 25 | 7.Fl | - | 33 |
| 25 | 25 | 8.Fl | - | 35 |
| 25 | 25 | 9.Fl | - | 43 |
| 26 | 26 | 1.Fl | - | 40 |
| 26 | 26 | 2.Fl | - | 43 |
| 26 | 26 | 3.Fl | - | 46 |
| 26 | 26 | 4.Fl | - | 51 |
| 26 | 26 | 5.Fl | - | 53 |
| 26 | 26 | 6.Fl | - | 55 |
| 26 | 26 | 7.Fl | - | 55 |
| 26 | 26 | 8.Fl | - | 55 |
| 26 | 26 | 9.Fl | - | 55 |
| 27 | 27 | 1.Fl | - | 49 |

| | | | | |
|---|---|---|---|---|
| 27 | 27 | 2.Fl | - | 52 |
| 27 | 27 | 3.Fl | - | 55 |
| 27 | 27 | 4.Fl | - | 59 |
| 27 | 27 | 5.Fl | - | 61 |
| 27 | 27 | 6.Fl | - | 62 |
| 27 | 27 | 7.Fl | - | 62 |
| 27 | 27 | 8.Fl | - | 62 |
| 27 | 27 | 9.Fl | - | 61 |
| 28 | 28 | Roof Deck | - | 63 |
| 29 | 29 | Roof Deck | - | 60 |
| 30 | 30 | Roof Deck | - | 60 |
| 31 | 31 | Roof Deck | - | 52 |
| 32 | 32 | Roof Deck | - | 48 |
| 33 | 33 | Roof Deck | - | 49 |
| 34 | 34 | Roof Deck | - | 60 |
| 35 | 35 | Roof Deck | - | 63 |

# Biological Resource Report for the Friars Road Mixed-Use Project, San Diego, California

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RECON Number 7916
September 6, 2016


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Beth Procsal, Biologist

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## ATTACHMENTS

# 1.0 Summary

The Friars Road Mixed-Use Project (project) is located in the City of San Diego, California, and is not within or adjacent to the City of San Diego Multi-Habitat Planning Area. The project proposes to demolish the three existing buildings and construct two structures including a multi-family residential building containing 70 condominiums and a mixed-use building containing 243 apartments, 6 shopkeeper units, and two levels of subterranean parking. Off-site grading will occur immediately north and south of the project site. The entire 5.43-acre project site and the 0.51-acre off-site impact areas (cumulatively called the survey area) were evaluated to determine the current condition of the biological resources present.

Two sensitive vegetation communities, Diegan coastal sage scrub and disturbed Diegan coastal sage scrub, were identified within the survey area. Two sensitive plant species were identified within the survey area, San Diego barrel cactus (*Ferocactus viridescens*) and San Diego viguiera (*Bahiopsis* [=*Viguiera*] *laciniata*). One sensitive wildlife species, coastal California gnatcatcher (*Polioptila californica californica*), was also detected. No narrow endemic plant species were observed within the survey area. Although not detected, there is a moderate potential for Cooper's hawk (*Accipiter cooperii*) and other nesting raptors to occur within the eucalyptus woodland within the survey area. Additionally, there is moderate potential for Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*) and Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) to occur within the Diegan coastal sage scrub habitats

The proposed project would have impacts to two sensitive upland vegetation communities, Diegan coastal sage scrub and disturbed Diegan coastal sage scrub. Mitigation for impacts to these habitats would be achieved through one or a combination of mitigation options (e.g., restoration or creation, purchase of off-site habitat, or payment of fees into an authorized mitigation bank).

The proposed project may directly impact nesting birds, including raptors, on-site if construction occurs during the typical bird breeding season (i.e., February 1–September 15). To avoid direct impacts to nesting and migratory birds, including coastal California gnatcatchers and raptors, pre-construction surveys would be conducted within the development footprint during the typical bird breeding season (i.e., February 1–September 15) to determine the presence or absence of breeding birds and ensure that no impacts occur to any nesting birds or their eggs, chicks, or nests. Biological resource protection measures would also be implemented before, during, and after project construction to ensure the protection of nesting birds.

# 2.0 Introduction

This report describes the results of RECON's biological survey conducted within the 5.85-acre survey area located in the city of San Diego, California. The survey area is in the city of San Diego, north of Interstate 8 (I-8) and west of Interstate 163 (Figure 1). The survey area is found on the U.S. Geological Survey (USGS) 7.5-minute topographical map series, La Jolla quadrangle within the Pueblo Lands of San Diego land grant (Figure 2; USGS 1975) and City of San Diego, Engineering and Development, City 800' scale map, Number 218-1713 (Figure 3). The survey area is immediately north of Friars Road and east of Fashion Valley Road (Figure 4). The survey area is not within or adjacent to the Multi-Habitat Planning Area (MHPA; Figure 5). The closest MHPA to the survey area is 1,390 feet to the south.

The proposed project includes the construction of 319 residential dwelling units consisting of 243 apartments, 70 condominiums, 6 shopkeeper units, and two levels of subterranean parking. Common recreational facilities as well as private usable open space amenities will be incorporated into the overall design consistent with community and General Plan objectives. Existing building pads will be lowered to match the grade of Friars Road. Off-site grading will occur on slopes immediately north of the project site to provide slope stabilization including placement of permanent soil nails. Off-site grading will also occur immediately south of the site to accommodate off-site improvements. Access to the development will be made from Friars Road and Via de la Mode with proposed enhanced pedestrian crosswalks.

This report provides all the necessary biological data and background information required for environmental analysis according to guidelines set forth in the City of San Diego's Multiple Species Conservation Plan (MSCP) Subarea Plan (1997) and the City of San Diego Biology Guidelines (2012).

# 3.0 Methods and Survey Limitations

A survey of the project site was conducted by RECON biologists Beth Procsal and Cailin O'Meara on June 12, 2015. The off-site impact areas were surveyed on April 1, 2016. All surveys conducted for this project are summarized in Table 1.

**Table 1**
**Survey Dates, Times, and Weather Conditions**

| Date | Surveyors | Survey Type | Beginning Conditions | Ending Conditions |
|---|---|---|---|---|
| 6/12/2015 | B. Procsal, C. O'Meara | General Survey of Project Site | 7:45 A.M.; 67˚F; wind 0–1 mph; 100% cloud cover | 9:35 A.M.; 70˚F; wind 0–1 mph; 100% cloud cover |
| 4/1/2016 | B. Procsal | General Survey of Off-Site Impact Areas | 7:00 A.M.; 54˚F; wind 0–1 mph; 50% cloud cover | 7:45 A.M.; 54˚F; wind 0–1 mph; 50% cloud cover |


Project Location

# FIGURE 1

Regional Location

RECON

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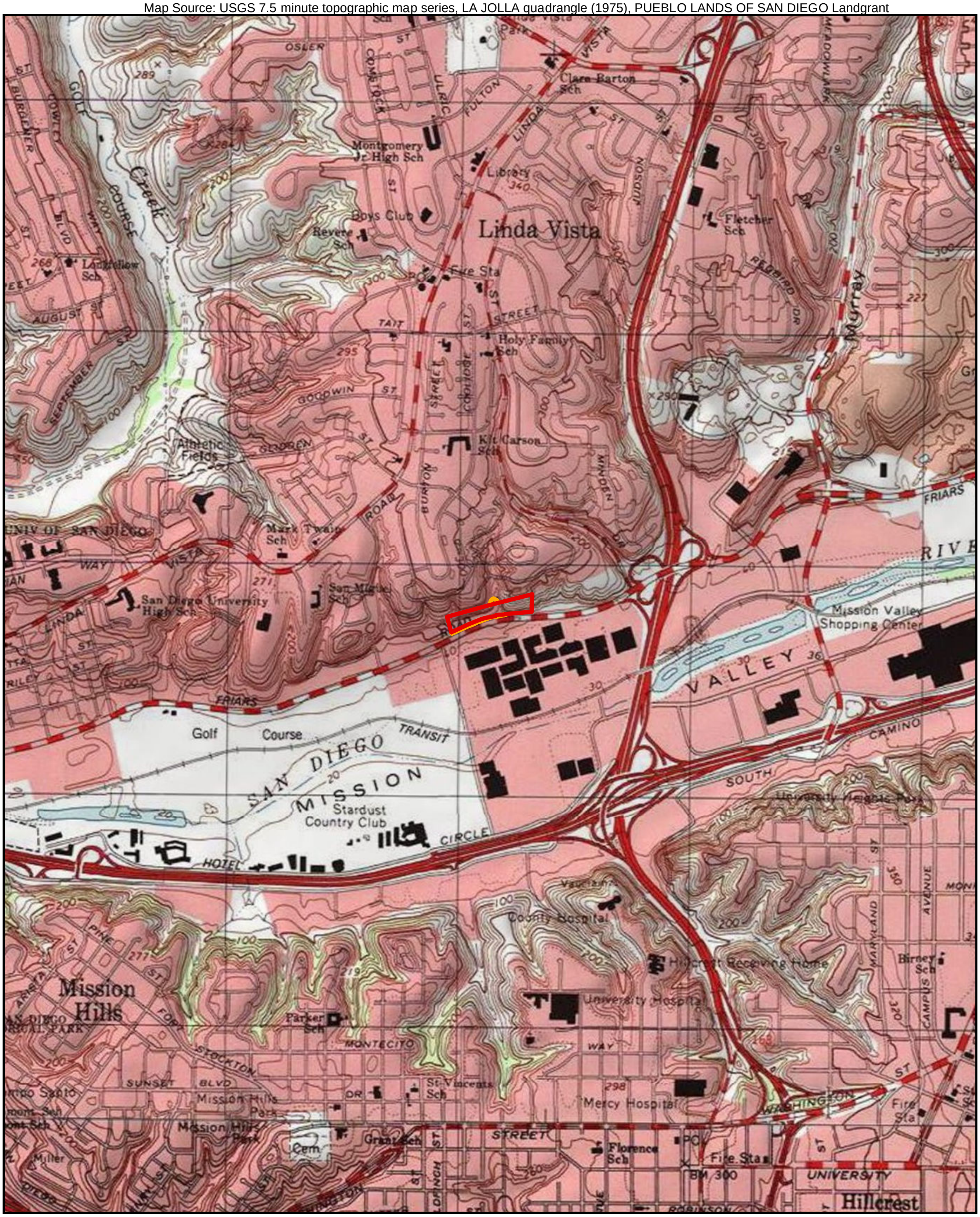
Map Source: USGS 7.5 minute topographic map series, LA JOLLA quadrangle (1975), PUEBLO LANDS OF SAN DIEGO Landgrant




0 Feet 2,000

Project Boundary

Off-site Impact Area

# FIGURE 2

Project Location on USGS Map

RECON

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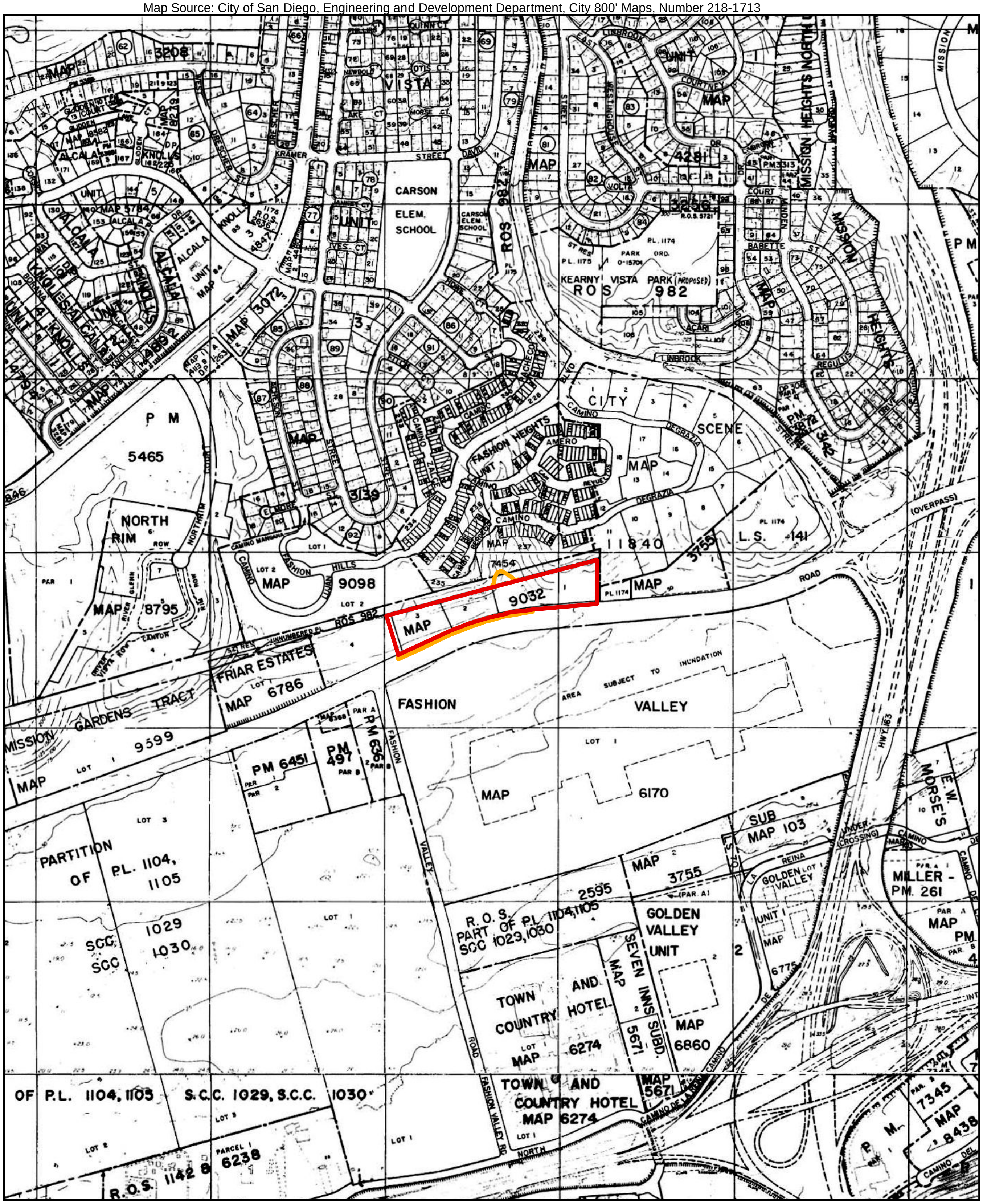
Map Source: City of San Diego, Engineering and Development Department, City 800' Maps, Number 218-1713




0 Feet 800

Project Boundary

Off-site Impact Area

# FIGURE 3

Project Location on City 800' Map

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Image Source: SANDAG (flown Nov 2014)


Project Boundary

Off-site Impact Area

# FIGURE 4

## Project Location on Aerial Photograph

RECON

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Image Source: SANDAG (flown Nov 2014)


Project Boundary

Off-site Impact Area

City of San Diego MHPA

0 Feet 600

FIGURE 5

Project in Relation to MSCP Preserve Area

RECON

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Land cover types were mapped on a 1-inch-equals-150-feet aerial photograph of the survey area. Wildlife species were observed directly or detected from calls, tracks, scat, nests, or other alternative sign, such as burrows, etc. All plant species observed within the survey area were also noted, and plants that could not be identified in the field were identified later using taxonomic keys. One limitation to the survey methods was identified during the survey. The northern portion of the site was not accessible due to steep slopes. This portion of the site was indirectly surveyed with the aid of binoculars.

Floral nomenclature for common plants follows the Jepson Online Interchange (University of California 2014), for ornamental plants Brenzel (2001), and for sensitive plants California Native Plant Society (CNPS; 2015). Vegetation community classifications follow Oberbauer (2008), which is based on Holland's 1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Zoological nomenclature for birds is in accordance with the American Ornithologists' Union Checklist (2013) and Unitt (2004); for mammals with Baker et al. (2003); and for reptiles with Crother (2008). Determination of the potential occurrence for listed, sensitive, or noteworthy species is based upon known ranges and habitat preferences for the species (Jennings and Hayes 1994; Unitt 2004; CNPS 2015; Reiser 2001), and species occurrence records from the California Natural Diversity Database (CNDDB; State of California 2015a, 2015b) and other sites in the vicinity of the survey area.

# 4.0 Existing Conditions

The survey area consists of three existing buildings and a business parking lot with steep slopes occurring immediately north of the parking lot. Elevations within the survey area range from 54 feet above mean sea level (MSL) to 194 feet above MSL. Two soil types, Terrace escarpments and Olivenhain–Urban land complex, 2 to 9 percent slopes, as mapped by the U.S. Department of Agriculture (USDA; 1973), occur within the survey area.

Terrace escarpments consist of steep to very steep escarpments, and escarpment-like landscapes. The terrace escarpments occur on the nearly even fronts of terraces or alluvial fans. The escarpment-like landscapes occur between narrow floodplains and adjoining uplands and the very steep sides of drainage ways that are entrenching into fairly level uplands (USDA 1973). This soil type occurs on the majority of the survey area.

Olivenhain–Urban land complex, 2 to 9 percent slopes, occurs on marine terraces and consists of soils that have been altered by cut and fill operations for development. Before alterations were made, the slopes were 2 to 9 percent. These urban soils have been leveled and leave behind steep escarpments that are easily eroded (USDA 1973). This soil type occurs on the southwest corner of the survey area.

## 4.1 Botany

Four vegetation communities and land cover types occur on-site: Diegan coastal sage scrub, disturbed Diegan coastal sage scrub, eucalyptus woodland, and urban/developed (Table 2;

Figure 6). All plant species observed during the general survey are presented in Attachment 1. The City of San Diego Biology Guidelines define sensitive upland habitats into four tiers of sensitivity (City of San Diego 2012). Upland vegetation communities that are classified as Tier I (rare uplands), Tier II (uncommon uplands), or Tier III (common uplands) are considered sensitive by the City. Tier IV (other uplands) vegetation communities are not considered sensitive (City of San Diego 2012).

According to the City of San Diego Biology Guidelines, Diegan coastal sage scrub and disturbed coastal sage scrub are considered sensitive habitat types, and eucalyptus woodland and urban/developed lands are not considered sensitive habitat/land cover types (City of San Diego 2012).

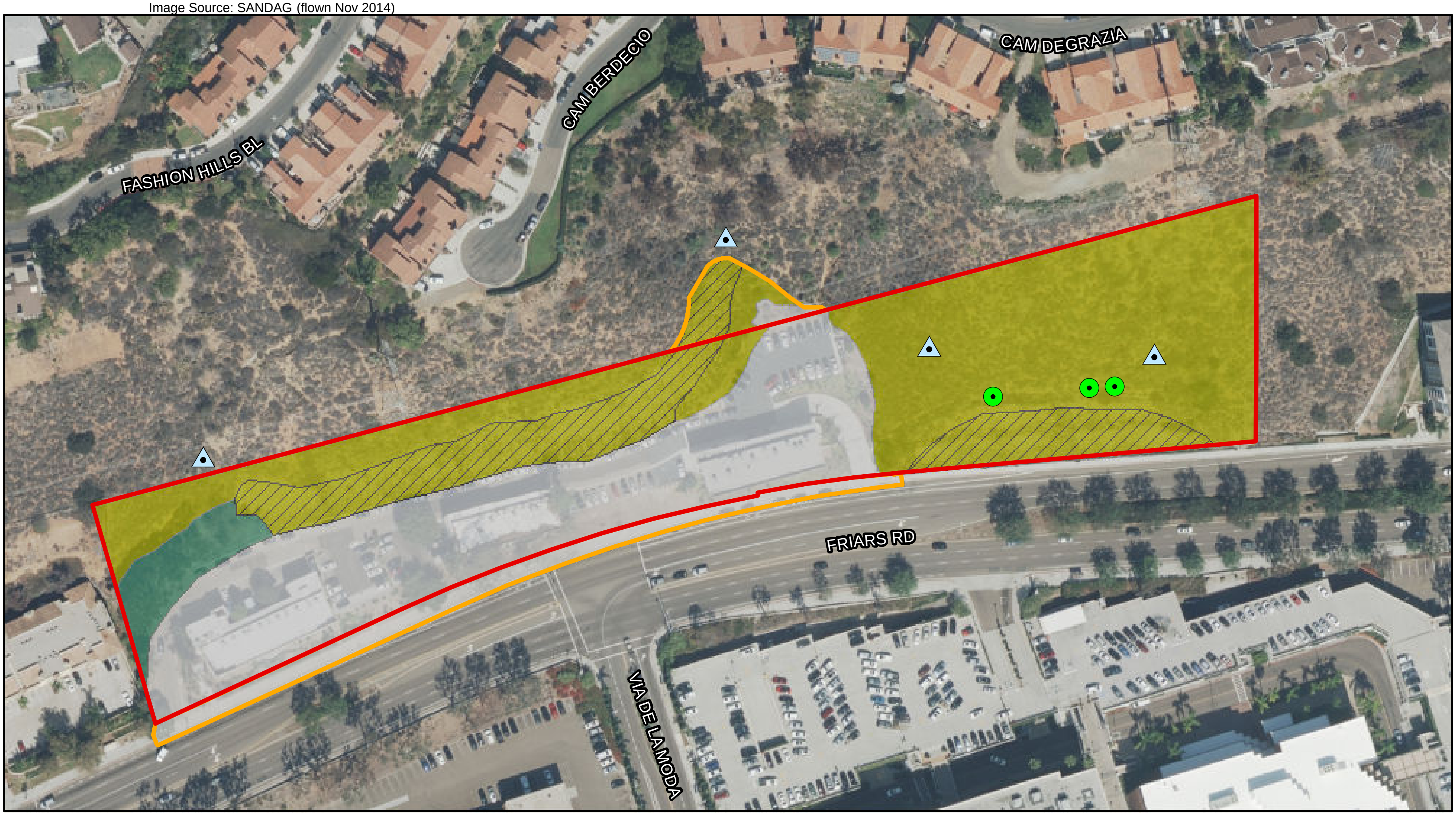
**Table 2**
**Vegetation Communities and Land Cover Types**
**(acres)**

| Habitat and Land Cover Types | City of San Diego Tier | Project Site Existing | Off-Site Impact Areas Existing | **Total Survey Area** |
|---|---|---|---|---|
| Diegan coastal sage scrub | II | 2.31 | 0.06 | 2.37 |
| Disturbed Diegan coastal sage scrub | II | 0.85 | 0.08 | 0.93 |
| Eucalyptus woodland | IV | 0.22 | 0.00 | 0.22 |
| Urban/developed | - | 2.05 | 0.37 | 2. 42 |
| **TOTAL** | - | **5.43** | **0.51** | **5. 94** |

## 4.1.1 Diegan Coastal Sage Scrub (2.37 acres)

Diegan coastal sage scrub, a Tier II land cover type, is a vegetation community composed of low-growing, soft-woody shrubs that have an average height of approximately three to four feet. This community is typically dominated by drought-deciduous species and found on sites with low moisture-availability. These sites often include drier south- and west-facing slopes and occasionally north-facing slopes, where the community can act as a successional phase of chaparral development. Diegan coastal sage scrub is found in coastal areas from Los Angeles County south into Baja California (Oberbauer et al. 2008).

Within the survey area, the Diegan coastal sage scrub is located along the northern boundary with a majority of this vegetation community within the eastern half of the project site. Diegan coastal sage scrub within the survey area is dominated by California sagebrush (*Artemisia californica*), coastal California buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), and San Diego viguiera (*Bahiopsis* [=*Viguiera*] *laciniata*) (Photograph 1). Diegan coastal sage scrub within an off-site impact area is shown in Photograph 2.




Project Boundary
Off-site Impact Area

**Sensitive Species Observations**

Coastal California Gnatcatcher
San Diego Barrel Cactus

**Vegetation Community**

Diegan Coastal Sage Scrub
Disturbed Diegan Coastal Sage Scrub
Eucalyptus Woodland
Urban/Developed

0 Feet 150

RECON

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FIGURE 6

Existing Biological Resources

PHOTOGRAPH 1
Diegan Coastal Sage Scrub Vegetation,
Facing West, Photo Date: 6/12/2015

PHOTOGRAPH 2
Diegan Coastal Sage Scrub Vegetation (Foreground) and Disturbed
Coastal Sage Scrub (Background), Facing North, Photo Date: 4/1/2016

RECON

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### 4.1.2 Disturbed Diegan Coastal Sage Scrub (0.93 acre)

Disturbed Diegan coastal sage scrub typically differs from the pristine form in that there is a higher percentage of bare ground and non-native plant species present. Additionally, soil disturbance may be found within disturbed habitats, which may alter or inhibit how vegetation recovers.

Disturbed Diegan coastal sage scrub, a Tier II land cover type, occurs within the survey area immediately north of the urban/developed lands and north of Friars Road on steep slopes (see Photograph 2; Photograph 3). This vegetation community occurs on slopes where past grading and ground disturbance have occurred. California sagebrush, California buckwheat, and crimson fountain grass (*Pennisetum setaceum*) are the dominant shrub species.

Other species that occur in the disturbed Diegan coastal sage scrub include annual non-native species such as red brome (*Bromus madritensis*) and short-pod mustard (*Hirschfeldia incana*).

### 4.1.3 Eucalyptus Woodland (0.22 acre)

Eucalyptus woodland typically consists of dense stands of eucalyptus (*Eucalyptus* sp.) with a closed canopy. In the overstory, stands may contain one to several species of eucalyptus and typically contain few native tree species, except in cleared pockets. Bark and leaf litter may limit the development of an understory, although stands may also contain well-developed herbaceous and shrubby understories.

Eucalyptus woodland, a Tier IV land cover type, consists of several gum trees (*Eucalyptus* sp.) that occur as a narrow strip immediately adjacent to the urban/developed lands within the western half of the survey area (Photograph 4). These trees are part of the horticultural landscaping planted as part of the existing project.

### 4.1.4 Urban/Developed (2.42 acres)

Urban/developed areas consist of areas that no longer support native vegetation due to physical alteration. This may include the construction of structures, hardscaping, pavement, and/or landscaping.

Urban/developed land consists of business lots, roadways, and development throughout the site (Photograph 5). Associated landscaping plantings occur around the buildings and parking lots and include crystalline iceplant (*Mesembryanthemum crystallinum*), common oleander (*Nerium oleander*), and baby sun-rose (*Aptenia cordifolia*).

PHOTOGRAPH 3
Disturbed Diegan Coastal Sage Scrub Vegetation,
Facing North, Photo Date: 6/12/2015

PHOTOGRAPH 4
Eucalyptus Woodland,
Facing Northwest, Photo Date: 6/12/2015

PHOTOGRAPH 5
Urban/Developed,
Facing Northwest, Photo Date: 6/12/2015

## 4.2 Zoology

The wildlife species observed on-site are typical for occurrence in Diegan coastal sage scrub habitats and urban/disturbed areas in San Diego County. Common wildlife species observed during the survey include honey bee (*Apis* sp.), Anna's hummingbird (*Calypte anna*), song sparrow (*Melospiza melodia*), and Bewick's wren (*Thryomanes bewickii*).

Attachment 2 provides a complete list of wildlife species observed within the survey area.

# 5.0 Sensitive Biological Resources

The applicable federal, state, and local regulations for protecting sensitive biological resources are summarized below, followed by a detailed discussion of the specific sensitive resources with potential to occur on-site.

The assessments of potential species occurrence are based upon on-site conditions, known species ranges and habitat preferences, recorded species occurrences from the CNDDB, and species occurrence records from other sites in the vicinity of the survey area. These sensitive biological resources are discussed in further detail below.

## 5.1 Sensitivity Criteria/Regulatory Setting

For purposes of this report, species will be considered sensitive if they are: (1) covered species under the City of San Diego's MSCP Subarea Plan; (2) listed by state or federal agencies as threatened or endangered or are proposed for listing (State of California 2015a, 2015c, 2015d); (3) on California Rare Plant Rank (CRPR) 1B (considered endangered throughout its range) or California Rare Plant Rank 2 (considered endangered in California but more common elsewhere) of the CNPS Inventory of Rare and Endangered Vascular Plants of California (2015); or (4) designated by the City of San Diego as a narrow endemic species (City of San Diego 2012). Noteworthy plant species are considered to be those on CRPR 3 (more information about the plant's distribution and rarity needed) and California Rare Plant Rank 4 (plants of limited distribution) of the CNPS Inventory (2015). Sensitive vegetation communities are those identified by the City of San Diego (2012). A narrow endemic is a species that is confined to a specific geographic region, soil type, and/or habitat. Due to the specific habitat and soil demands of a species, it may occur in only certain areas in the City where all conditions are present, thereby making it rare.

**Federal Regulations:** The Migratory Bird Treaty Act (MBTA) was established to provide protection to the breeding activities of migratory birds throughout the U.S. The MBTA protects migratory birds and their breeding activities from take and harassment.

**State Regulations:** Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.3 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (raptors) or Strigiformes (owls), or of their nests and eggs (State of California 1991).

**City of San Diego Regulations:** As stated in the City of San Diego 2012 Biology Guidelines, a survey area is considered to contain sensitive biological resources if:

- The site has been identified as part of the MHPA by the City's MSCP Subarea Plan.

- The site supports or could support (e.g., in different seasons/rainfall conditions, etc.) Tier I, II, or III-A & -B vegetation communities (such as grassland, chaparral, coastal sage scrub, etc.). The California Environmental Quality Act (CEQA) determination of significant impacts may be based on what was on-site (e.g., if illegal grading or vegetation removal occurred, etc.), as appropriate.

- The site contains, or comes within 100 feet of, a natural or manufactured drainage (determine whether it is vegetated with wetland vegetation). The site occurs within the 100-year flood plain established by the Federal Emergency Management Agency (FEMA) or the Flood Plain (FP)/ Flood Way (FW) zones.

- The site does not support a vegetation community identified in Tables 2a, 2b or 3 (Tier I, II, IIIA or IIIB) of the Biology Guidelines; however, wildlife species listed as threatened or endangered or other protected species may use the site (e.g., California least terns (*Sternula antillarum browni*) on dredge spoil, wildlife using agricultural land as a wildlife corridor, etc.).

MHPA lands are those that have been included within the City's MSCP Subarea Plan for habitat conservation. These lands have been determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biodiversity of the San Diego region. MHPA lands are considered by the City to be a sensitive biological resource.

Per the City of San Diego Municipal Code 143.0101, the purpose of the Environmentally Sensitive Lands (ESL) Regulations is to protect, preserve, and where damaged, restore these lands of San Diego and viability of the species supported by those lands. ESL regulations are meant to protect the quality of the resources and natural character of the area to be developed, including, but not limited to coastal development in the Coastal Overlay Zone.

## 5.2 Sensitive Vegetation Communities

Two sensitive vegetation communities, Diegan coastal sage scrub and disturbed Diegan coastal sage scrub, occur within the survey area. The location of these sensitive vegetation communities are shown on Figure 6.

## 5.3 Sensitive Plants

Two sensitive plant species, San Diego barrel cactus and San Diego viguiera, occur within the survey area. A comprehensive list of sensitive plant species with potential for occurrence within the survey area is presented in Attachment 3, and includes those species with low potential for occurrence based on species range and habitat conditions.

### 5.3.1 Observed

**San Diego barrel cactus (*Ferocactus viridescens*)** is a covered species under the MSCP and is has a CRPR of 2B.1 species: species rare, threatened, or endangered in California but more common elsewhere. These species are eligible for state listing (CNPS 2015). This globular succulent in the cactus family (Cactaceae) grows up to eight inches tall and flowers in May and June (University of California 2014). This species generally occurs in sandy, rocky or dry hills of coastal sage scrub, grassland, chaparral, and vernal pool habitats below 500 feet in elevation (University of California 2014, Munz 1974). It is the only barrel cactus found in coastal areas. Coast barrel cactus is threatened by urbanization, off-road vehicles, and collecting (University of California 2014). This species was observed within the Diegan coastal sage scrub.

**San Diego viguiera (*Bahiopsis* [=*Viguiera*] *laciniata*).** San Diego viguiera is a CRPR 4.2 species: a watch list of species of limited distribution; fairly threatened in California (20–80 percent occurrences threatened; moderate degree and immediacy of threat) (CNPS 2015). This shrub in the sunflower family (Asteracae) has shiny, resinous leaves and showy yellow flowers that bloom from February to June (Hickman 1993; Munz 1974). San Diego viguiera occurs on dry, shrubby slopes in Diegan coastal sage scrub and chaparral habitats between 200 and 2,500 feet. This species was observed throughout the Diegan coastal sage scrub; it also occurred in lower numbers within the disturbed Diegan coastal sage scrub.

## 5.4 Sensitive Wildlife Species

One sensitive wildlife species, coastal California gnatcatcher, was observed in the survey area. There is also moderate potential for Cooper's hawk, southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), and Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*) to occur within the survey area due to suitable habitats present for each species.

All sensitive wildlife species known to occur in the project vicinity (within one mile of the survey area) that are listed as federal/state threatened or endangered, or that have potential to occur based on species range are evaluated in Attachment 4.

### 5.4.1 Observed

**Coastal California gnatcatcher** is federally listed as threatened, a California Department of Fish and Wildlife (CDFW) species of special concern, and an MSCP covered species (State of California 2015d; City of San Diego 1997). The coastal California gnatcatcher is a non-migratory resident that typically occurs in or near mature coastal sage scrub habitat (Atwood and Bontrager 2001). This species' ideal host shrub is California sagebrush, but it is also found nesting in coast California buckwheat, common encelia (*Encelia californica*), and broom baccharis (*Baccharis sarothroides*) (Unitt 2004).

A pair of coastal California gnatcatchers were observed within the Diegan coastal sage scrub within the eastern half of the survey area. An individual male was observed just outside the project boundary near the northwestern corner and was most likely using the available Diegan coastal sage scrub habitat north of the eucalyptus woodland. Coastal California gnatcatchers were detected by vocalizations within and immediately outside the survey area during the April 2016 survey.

### 5.4.2 Not Observed

The **Cooper's hawk** is a CDFW watch list species (nesting) and an MSCP covered species (State of California 2015d; City of San Diego 1997). Breeding birds are widespread over San Diego County's coastal slope and most abundant in lowland and foothill canyons and in urban areas. It is a common breeder in both oak and willow riparian woodlands and urban environments, with eucalyptus trees used nearly as often as oaks, making this species an urban adapter (Unitt 2004). Breeding occurs from March to June, and nests are typically located high in the tree but under the canopy. There is moderate potential for Cooper's hawk to nest within the eucalyptus woodland present within the survey area, which is also adjacent to coastal sage scrub that provides foraging opportunities immediately north of the project.

The **southern California rufous-crowned sparrow** is a CDFW watch list species and an MSCP covered species (State of California 2015c; City of San Diego 1997). This species is found in sage scrub, broken or burned chaparral habitats, and grasslands with scattered shrubs. The species exhibits a strong preference for moderate to steep, south-facing, dry, rocky slopes with a 50 percent cover of low shrubs (Unitt 2004; Collins 1999). Breeding occurs from March through June, and pair-bonds are formed that may last year-round (Collins 1999). Loss of habitat due to urbanization and habitat fragmentation has decreased the amount of suitable habitat for this species (Unitt 2004). There is moderate potential for southern California rufous-crowned sparrow to nest within the Diegan coastal sage scrub and disturbed Diegan coastal sage scrub habitats present within the survey area.

**Belding's orange-throated whiptail** is a CDFW species of special concern and an MSCP-covered species. It occurs in a variety of habitats and is most common in sandy areas of low, open sage scrub or chaparral, particularly where there is California buckwheat, sage (*Salvia* spp.), or chamise (*Adenostoma fasciculatum*; Lemm 2006). The breeding season for this species occurs from May through July. The decline of this species is attributed to habitat loss and fragmentation (McGurty 1980). There is moderate potential for Belding's orange-throated whiptail to occur within the Diegan coastal sage scrub habitat present within the survey area.

## 5.5 Wildlife Movement Corridor

Wildlife movement corridors are defined as areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, or areas with vegetation cover provide corridors for wildlife travel. Wildlife movement corridors are important, because they provide access to mates, food, and water; allow the dispersal of individuals away from high population density areas; and facilitate the exchange of genetic traits between populations (Beier and Loe 1992). Wildlife movement corridors are considered sensitive by resource and conservation agencies.

The survey area does not currently function as a significant wildlife movement corridor. It is located immediately north of Friars Road and bounded by residential development and roads, which ultimately restrict its use by wildlife. Although the site may function for local wildlife movement, the site is not a significant MSCP regional corridor and does not provide a throughway for wildlife species into major areas of off-site habitats. While there may be some wildlife movement within the native habitats within the site, the survey area, as a whole, does not provide a major movement corridor for wildlife species.

# 6.0 Project Impacts

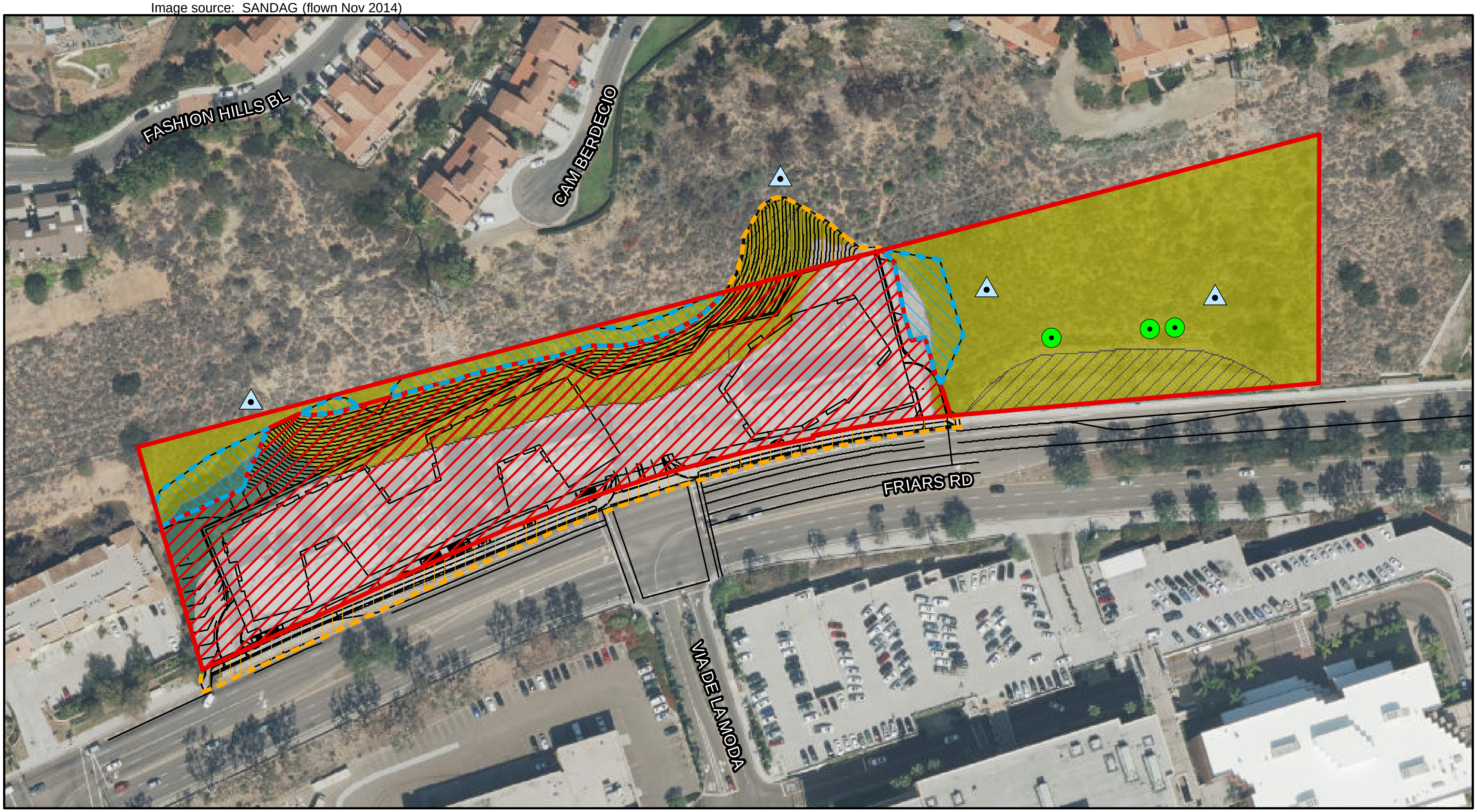
Impacts to biological resources due to the proposed project are discussed below. The biological impacts were assessed according to guidelines set forth in the City of San Diego's Development Services Department California Environmental Quality Act Significance Thresholds (2011) and the MSCP (City of San Diego 1997). Mitigation would be required for impacts that are considered significant under these guidelines.

## 6.1 Direct Impacts

### 6.1.1 Vegetation Communities

The impacts to vegetation communities/land cover types from the proposed project are listed in Table 3 and shown on Figure 7. The proposed project will result in impacts to Diegan coastal sage scrub (0.32 acre) and disturbed Diegan coastal sage scrub (0.63 acre), both Tier II vegetation types; eucalyptus woodland (0.21 acre), a Tier IV vegetation type;

Image source: SANDAG (flown Nov 2014)




Project Boundary

Plan Lines

On-site Impact

Brush Management Zone 2

Off-site Impact Area

**Sensitive Species Observations**

Coastal California Gnatcatcher

San Diego Barrel Cactus

**Vegetation Community**

Diegan Coastal Sage Scrub

Disturbed Diegan Coastal Sage Scrub

Eucalyptus Woodland

Urban/Developed

0 Feet 150

RECON

M:\JOBS4\7916\common_gis\fig7_bio.mxd 8/22/2016 sab

FIGURE 7

Impacts to Biological Resources

and urban/developed (2.27 acres). An additional 0.31 acre of Tier II habitat would be affected due to the implementation of Brush Management Zone 2 (BMZ 2). BMZ 2 impacts are considered impact neutral pursuant to the City's Land Development Code (City of San Diego 2015) and Biology Guidelines (City of San Diego 2012) and do not require mitigation.

Impacts to Diegan coastal sage scrub and disturbed Diegan coastal sage scrub are considered significant and would require mitigation (City of San Diego 2011). Impacts to eucalyptus woodland and urban/developed are not considered significant and do not require mitigation.

**Table 3**
**Impacts to Vegetation Communities and Land Cover Types**
**(acres)**

| Habitat and Land Cover Types | City of San Diego Tier | Existing Survey Area | On-Site Impacts[1] | Off-Site Impacts[1] | BMZ 2 | Total Survey Area Impacts |
|---|---|---|---|---|---|---|
| Diegan coastal sage scrub | II | 2.37 | 0.23 | 0.06 | 0.31 | 0.29 |
| Disturbed Diegan coastal sage scrub | II | 0.93 | 0.55 | 0.08 | - | 0.63 |
| Eucalyptus woodland | IV | 0.22 | 0.19 | 0.00 | 0.03 | 0.19 |
| Urban/developed | - | 2.42 | 2.02 | 0.37 | 0.03 | 2.39 |
| **TOTAL** | **-** | **5.94** | **2.99** | **0.51** | **0.37** | **3.5** |

[1]Acreage does not include 0.31 acre of Zone 2 brush management within Diegan coastal sage scrub occurring outside of the development footprint. Zone 2 BMZ activities are considered impact neutral and do not contribute towards project impacts. An additional 0.03 acre of eucalyptus woodland and 0.03 acre of urban/developed land also occurs within BMZ 2; however, these vegetation community/land cover types are not considered sensitive and impacts to them, inside and outside of BMZ 2, do not require mitigation.

## 6.1.2 Sensitive Plant Species

Two sensitive plant species, San Diego barrel cactus and San Diego viguiera, were detected during the time of the survey within the Diegan coastal sage scrub and the disturbed Diegan coastal sage scrub habitat to be impacted. Direct impacts that may occur to San Diego barrel cactus outside the MHPA are permitted through the MSCP and not considered significant. The MSCP conserves significant amounts of habitat for San Diego barrel cactus.

Impacts to San Diego viguiera would not be considered significant, as this species is ranked by CNPS as a watch list species and is not covered by the MSCP, nor does it have federal or state status. Therefore, impacts to sensitive plant species would be less than significant. No narrow endemic plant species were observed on-site; therefore, no impacts to narrow endemic species are anticipated due to project implementation, including BMZ 2 activities.

## 6.1.3 Sensitive Wildlife Species

**General wildlife.** The project may result in direct impacts to small mammals and reptiles, including coastal whiptail, with low mobility. Large mammal species and most birds will be able to move out of the way during grading. These impacts to general wildlife are considered less than significant and, therefore, would not require mitigation.

**Nesting birds.** The project has potential to result in direct impacts to migratory or nesting birds, including nesting coastal California gnatcatcher, Southern California rufous-crowned sparrow, and Cooper's hawk and other raptors within the survey area if construction occurs during the typical bird breeding season (February 1 to September 15). Direct impacts to nesting and migratory birds would be considered significant and require mitigation. Mitigation measures to avoid direct impacts to migratory or nesting birds and raptors are identified in Section 7.2 Nesting Birds and Raptors.

**CDFW Species of Special Concern and MSCP-Covered Species.** Direct impacts are anticipated to occur to Belding's orange-throated whiptail, if present, during grading activities. Although suitable habitat is present, the site is not expected to support a significant population of these species as they were not observed during surveys of the site. As they are considered adequately covered, with habitat conserved within the MHPA, and the MSCP Subarea Plan Appendix A Conditions of Coverage would be incorporated as mitigation, any potential impacts to these species are not expected to reduce these species' overall populations below self-sustaining levels; therefore, through habitat-based mitigation the project impacts would be considered less than significant.

In order to be consistent with the MSCP Subarea Plan Conditions of Coverage and avoid potential impacts to the Belding's Orange-throated Whiptail, edge effects to the remaining native habitat within the parcel must be minimized to the maximum extent possible.

# 7.0 Mitigation

Mitigation is required for project impacts that are considered significant under CEQA (City of San Diego 2011). All impacts to sensitive biological resources should be avoided to the maximum extent feasible and minimized prior to proposing mitigation whenever possible. Mitigation measures typically include resource avoidance or dedication/off-site acquisition of habitat, on-site preservation, habitat restoration/creation/enhancement, and/or payment fee to the City of San Diego's Habitat Acquisition Fund (City of San Diego 2012). Mitigation is intended to reduce the impacts to below a level of significance.

## 7.1 Sensitive Vegetation Communities

Per the City's 2012 Biology Guidelines and ESL regulations, mitigation requirements for sensitive vegetation communities are based on the assumption that the mitigation would take place either inside the MHPA or outside the MHPA as presented in Tables 4a and 4b, respectively. Mitigation is intended to reduce the impacts to a level of less than significant. If mitigation cannot be accomplished within a MHPA preserve, the mitigation ratio would be higher for all community types. Mitigation can be accomplished through on-site preservation, restoration, or creation; purchase of off-site habitat; or payment of fees into an authorized mitigation bank.

| Table 4a<br>Mitigation Requirements for Impacts to Sensitive Upland Vegetation Communities with Location of Preservation Inside MHPA<br>(acres) | | | | | |
|---|---|---|---|---|---|
| Vegetation Community | ESL Tier | Existing | Impact (outside MHPA) | Mitigation Ratio (inside MHPA) | Total Mitigation Required |
| Diegan coastal sage scrub (includes disturbed Diegan coastal sage scrub) | II | 3.3 | 0.92 | 1:1 | **0.92** |

| Table 4b<br>Mitigation Requirements for Impacts to Sensitive Upland Vegetation Communities with Location of Preservation Outside MHPA<br>(acres) | | | | | |
|---|---|---|---|---|---|
| Vegetation Community | ESL Tier | Existing | Impact (outside MHPA) | Mitigation Ratio (outside MHPA) | Total Mitigation Required |
| Diegan coastal sage scrub (includes disturbed Diegan coastal sage scrub) | II | 3.3 | 0.92 | 1.5:1 | **1.38** |

# 7.2 Nesting Birds and Raptors

To avoid any significant direct impacts to any nesting birds or their eggs, chicks, or nests during the breeding season, the following measures are recommended:

Prior to the issuance of a Notice To Proceed for a subdivision, or any construction permits, such as Demolition, Grading or Building, or beginning any construction- related activity on-site, the Development Services Department (DSD) Director's Environmental Designee (ED) shall review and approve all Construction Documents (CD), (plans, specification, details, etc.) to ensure the Mitigation, Monitoring, and Reporting Program requirements are incorporated into the design.

To avoid any direct impacts to raptors and/or any native/migratory birds, removal of habitat that supports active nests in the proposed area of disturbance should occur outside the breeding season for these species (February 1 to September 15). If removal of habitat in the proposed area of disturbance must occur during the breeding season, a Qualified Biologist shall conduct a pre-construction survey to determine the presence or absence of nesting birds on the proposed area of disturbance. The pre-construction (precon) survey shall be conducted within 10 calendar days prior to the start of construction activities (including removal of vegetation). The applicant shall submit the results of the precon survey to City DSD for review and approval prior to initiating any construction activities.

If nesting birds are detected, a letter report or mitigation plan in conformance with the City's Biology Guidelines and applicable state and federal law (i.e., appropriate follow-up surveys, monitoring schedules, construction, noise barriers, and buffers up to 300 feet, etc.) shall be prepared and include proposed measures to be implemented to ensure that take of birds or eggs or disturbance of breeding activities is avoided. The report or mitigation plan shall be submitted to the City DSD for review and approval and implemented to the satisfaction of the City. The City's Mitigation Monitoring Coordination (MMC) Section and Biologist shall verify and approve that all measures identified in the report or mitigation plan are in place prior to and/or during construction.

If nesting birds are not detected during the precon survey, no further mitigation is required.

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# ATTACHMENTS

# ATTACHMENT 1

## Plant Species Observed in the Survey Area

| Attachment 1<br>Plant Species Observed in the Survey Area | | | |
|---|---|---|---|
| Scientific Name | Common Name | Habitat | Origin |
| **FERNS** | | | |
| **DICKSANIACEAE** | **TREE FERN FAMILY** | | |
| *Dicksonia* sp. | New Zealand tree fern | URB | I |
| **ANGIOSPERMS: MONOCOTS** | | | |
| **AGAVACEAE** | **AGAVE FAMILY** | | |
| *Phormium* sp. | New Zealand flax | URB | I |
| **AMARYLLIDACEAE** | **AMARYLLIS FAMILY** | | |
| *Agapanthus* sp. | Lily of the Nile | URB | I |
| **ARECACEAE** | **PALM FAMILY** | | |
| *Syagrus romanzoffiana* (Cham.) Glassman | queen palm | URB | I |
| **ASPARAGACEAE** | **ASPARAGUS FAMILY** | | |
| *Asparagus* sp. | Asparagus-fern | URB | I |
| **COMMELINACEAE** | **SPIDERWORT FAMILY** | | |
| *Commelina benghalensis* L. | tropical spiderwort | URB | I |
| **IRIDACEAE** | **IRIS FAMILY** | | |
| *Dietes* sp. | African iris | URB | I |
| **LILIACEAE** | **LILY FAMILY** | | |
| *Hemerocallis fulva* | Tawny daylily | URB | I |
| **POACEAE (GRAMINEAE)** | **GRASS FAMILY** | | |
| *Bromus madritensis* L. | red brome | DCSS, CSS, EUC | I |
| *Melinis [=Rhyncholytrum] repens* (Willd.) Zizka | natal grass | URB | I |
| *Pennisetum setaceum* (Forssk.) Chiov. | crimson fountain grass | DCSS, CSS | I |
| **STRELITZIACEAE** | **BRODIAEA FAMILY** | | |
| *Strelitzia* sp. | bird of paradise flower | URB | I |
| **ANGIOSPERMS: DICOTS** | | | |
| **ADOXACEAE** | **ADOXA FAMILY** | | |
| *Sambucus nigra* L. ssp. *caerulea* (Raf.) Bolli [=*Sambucus mexicana*] | blue elderberry | CSS | N |
| **AIZOACEAE** | **FIG-MARIGOLD FAMILY** | | |
| *Aptenia cordifolia* (L. f.) Schwantes | baby sun-rose | URB | I |
| *Carpobrotus edulis* (L.) N.E. Br. | freeway iceplant | URB | I |

| Attachment 1<br>Plant Species Observed in the Survey Area | | | |
|---|---|---|---|
| Scientific Name | Common Name | Habitat | Origin |
| *Mesembryanthemum crystallinum* L. | crystalline iceplant | URB | I |
| **ANACARDIACEAE** | **SUMAC OR CASHEW FAMILY** | | |
| *Malosma laurina* Nutt. ex Abrams | laurel sumac | DCSS | N |
| *Rhus integrifolia* (Nutt.) Benth. & Hook. f. ex Rothr. | lemonade berry | CSS | N |
| *Schinus molle* L. | Peruvian pepper tree | URB, CSS | I |
| **APIACEAE (UMBELLIFERAE)** | **CARROT FAMILY** | | |
| *Foeniculum vulgare Mill.* | *fennel* | URB | I |
| **APOCYNACEAE** | **DOGBANE FAMILY** | | |
| *Nerium oleander* L. | common oleander | URB | I |
| **ASTERACEAE** | **SUNFLOWER FAMILY** | | |
| *Artemisia californica* Less. | California sagebrush | DCSS, CSS | N |
| *Baccharis sarothroides* A. Gray | broom baccharis | DCSS, CSS | N |
| *Bahiopsis* [=*Viguiera*] *laciniata* (A. Gray) E.E. Schilling & Panero | San Diego viguiera, San Diego County viguiera | DCSS, CSS | N |
| *Centaurea melitensis* L. | tocalote, Maltese star-thistle | CSS, EUC | I |
| *Deinandra* [=*Hemizonia*] *fasciculata* (DC.) Greene | fascicled tarweed, golden tarplant | CSS | N |
| *Encelia californica* Nutt. | California encelia | CSS | N |
| *Logfia* [=*Filago*] *gallica* (L.) Coss. & Germ. | daggerleaf cottonrose | URB | I |
| *Stephanomeria exigua* Nutt. | small wreath-plant | CSS, EUC | N |
| *Taraxacum officinale* F.H. Wigg. | common dandelion | URB | I |
| **BIGNONIACEAE** | **BIGNONIA FAMILY** | | |
| *Tecoma capensis* (Thunb.) Lindl. | cape honeysuckle | URB | I |
| **BRASSICACEAE (CRUCIFERAE)** | **MUSTARD FAMILY** | | |
| *Hirschfeldia incana* (L.) Lagr.-Fossat | short-pod mustard | URB, DCSS, CSS | I |
| *Lepidium* sp. | peppergrass | URB | N |
| **CACTACEAE** | **CACTUS FAMILY** | | |
| *Cylindropuntia* [=*Opuntia*] *prolifera* (Engelm.) F.M. Knuth | coast cholla | DCSS, CSS | N |
| *Ferocactus viridescens* (Torr. & A. Gray) Britton & Rose | San Diego barrel cactus, coast barrel cactus* | CSS | N |
| *Mammillaria dioica* K. Brandegee | fish-hook cactus | CSS | N |
| *Opuntia littoralis* (Engelm.) Cockerell. | coast prickly-pear, shore cactus | DCSS, CSS | N |
| **CHENOPODIACEAE** | **GOOSEFOOT FAMILY** | | |
| *Atriplex semibaccata* R. Br. | Australian saltbush | URB | I |

| Attachment 1<br>Plant Species Observed in the Survey Area | | | |
|---|---|---|---|
| Scientific Name | Common Name | Habitat | Origin |
| *Chenopodium album* | lamb's quarters | EUC | N |
| *Salsola tragus* L. | Russian thistle, tumbleweed | URB, DCSS | I |
| **CRASSULACEAE** | **STONECROP FAMILY** | | |
| *Dudleya edulis* (Nutt.) Moran | lady fingers | CSS | N |
| *Dudleya pulverulenta* (Nutt.) Britton & Rose | chalk lettuce, chalk dudleya | DCSS | N |
| **EUPHORBIACEAE** | **SPURGE FAMILY** | | |
| *Euphorbia* [=*Chamaesyce*] *albomarginata* Torr. & A. Gray | rattlesnake sandmat | URB | N |
| **FABACEAE (LEGUMINOSAE)** | **LEGUME FAMILY** | | |
| *Acacia* sp. | acacia | CSS | I |
| *Acmispon glaber* (Vogel) Brouillet [=*Lotus scoparius*] | deerweed, California broom | CSS | N |
| **GERANIACEAE** | **GERANIUM FAMILY** | | |
| *Erodium cicutarium* (L.) L'Hér. ex Aiton | redstem filaree | URB | I |
| **MORACEAE** | **MULBERRY FAMILY** | | |
| *Ficus* sp. | fig | URB | I |
| **MYRTACEAE** | **MYRTLE FAMILY** | | |
| *Eucalyptus* sp. | gum tree | EUC | I |
| **MYRSINACEAE** | **MYRSINE FAMILY** | | |
| *Anagallis arvensis* L. | scarlet pimpernel, poor-man's weatherglass | URB | I |
| **NYCTAGINACEAE** | **FOUR O'CLOCK FAMILY** | | |
| *Mirabilis laevis* [=*Mirabilis californica*] (Benth.) Curran var. *crassifolia* (Choisy) Spellenb. | wishbone bush | CSS | N |
| **OXALIDACEAE** | **OXALIS FAMILY** | | |
| *Oxalis* sp. | oxalis | CSS | N/I |
| **PLANTAGINACEAE** | **PLANTAIN FAMILY** | | |
| *Antirrhinum kelloggii* Greene | climbing snapdragon | CSS | N |
| **POLYGONACEAE** | **BUCKWHEAT FAMILY** | | |
| *Eriogonum fasciculatum* Benth. var. *fasciculatum* | coast California buckwheat | DCSS, CSS | N |
| **PORTULACACEAE** | **PURSLANE FAMILY** | | |
| *Portulacaria afra* | elephant's food | URB | I |
| **ROSACEAE** | **ROSE FAMILY** | | |
| *Rhaphiolepis indica* (L.) Lindl. ex Ker Gawl. | Indian hawthorn | URB | I |

| Attachment 1<br>Plant Species Observed in the Survey Area | | | |
|---|---|---|---|
| Scientific Name | Common Name | Habitat | Origin |
| **SAPINDACEAE** | **SOAPBERRY FAMILY** | | |
| *Dodonaea* sp. | Hopseed bush | URB | I |
| **SOLANACEAE** | **NIGHTSHADE FAMILY** | | |
| *Lycium californicum* Nutt. | California box-thorn, California lycium | CSS | N |
| *Solanum nigrum* L. | black nightshade | CSS | I |

*Notes*: Scientific and common names were primarily derived from the Jepson Online Interchange (University of California 2013). In instances where common names were not provided in this resource, common names were obtained from Rebman and Simpson (2006). Additional common names were obtained from the USDA maintained database (USDA 2013) or the Sunset Western Garden Book (Brenzel 2001) for ornamental/horticultural plants. Common names denoted with * are from County of San Diego 2010.

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**ORIGIN**
N = Native to locality
I = Introduced species from outside locality

**HABITATS**
CSS = Diegan coastal sage scrub
DCSS = Disturbed Diegan coastal sage scrub
EUC = Eucalyptus woodland
URB = Urban/Developed

# ATTACHMENT 2

## Wildlife Species Observed/Detected in the Survey Area

| Attachment 2<br>Wildlife Species Observed/Detected in the Survey Area | | | | |
|---|---|---|---|---|
| Scientific Name | Common Name | Occupied Habitat | On-site Abundance/ Seasonality (Birds Only) | Evidence of Occurrence |
| **INVERTEBRATES** (Nomenclature from Eriksen and Belk 1999; Milne and Milne 1980; Mattoni 1990; and Opler and Wright 1999) | | | | |
| ***APIDAE*** | ***HONEY BEES*** | | | |
| Apis sp. | honey bee | DCSS | | V |
| **BIRDS** (Nomenclature from American Ornithologists' Union 2013 and Unitt 2004) | | | | |
| ***COLUMBIDAE*** | ***PIGEONS & DOVES*** | | | |
| *Zenaida macroura marginella* | mourning dove | URB | C / Y | O, V |
| ***TROCHILIDAE*** | ***HUMMINGBIRDS*** | | | |
| *Calypte anna* | Anna's hummingbird | DCSS | C / Y | O, V |
| ***CORVIDAE*** | ***CROWS, JAYS, & MAGPIES*** | | | |
| *Corvus brachyrhynchos hesperis* | American crow | FO | C / Y | V |
| ***TROGLODYTIDAE*** | ***WRENS*** | | | |
| *Thryomanes bewickii* | Bewick's wren | DCSS | C / Y | O |
| ***SYLVIIDAE*** | ***GNATCATCHERS*** | | | |
| *Polioptila californica californica* | coastal California gnatcatcher | DCSS | C / Y | O, V |
| ***EMBERIZIDAE*** | ***EMBERIZIDS*** | | | |
| *Melospiza melodia* | song sparrow | DCSS | C / Y | O, V |
| *Melozone* [=*Pipilo*] *crissalis* | California towhee | DCSS, URB | C / Y | O, V |
| ***FRINGILLIDAE*** | ***FINCHES*** | | | |
| *Haemorhous* [=*Carpodacus*] *mexicanus frontalis* | house finch | DCSS | C / Y | O, V |
| **MAMMALS** (Nomenclature from Baker et al. 2003) | | | | |
| ***LEPORIDAE*** | ***RABBITS & HARES*** | | | |
| *Sylvilagus audubonii* | desert cottontail | DCSS | | S |

See notes on next page.

## Attachment 2
## Wildlife Species Observed/Detected in the Survey Area

**HABITATS**
DCSS = Diegan coastal sage scrub
FO = Fly over
URB = Urban/Developed

**ABUNDANCE** (based on Garrett and Dunn 1981)
C = Common to abundant; almost always encountered in proper habitat, usually in moderate to large numbers
F = Fairly common; usually encountered in proper habitat, generally not in large numbers
U = Uncommon; occurs in small numbers or only locally

**EVIDENCE OF OCCURRENCE**
O = Observed
S = Scat
V = Vocalization

**SEASONALITY** (birds only)
A = Accidental; species not known to occur under normal conditions; may be an off-course migrant
M = Migrant; uses site for brief periods of time, primarily during spring and fall months
S = Spring/summer resident; probable breeder on-site or in vicinity
T = Transient; uses site regularly but unlikely to breed on-site
V = Rare vagrant
W = Winter visitor; does not breed locally
Y = Year-round resident; probable breeder on-site or in vicinity

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# ATTACHMENT 3

## Sensitive Plant Species Observed or with the Potential for Occurrence in the Survey Area

| Attachment 3<br>Sensitive Plant Species Observed (†)<br>or with the Potential for Occurrence in the Survey Area | | | | | |
|---|---|---|---|---|---|
| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
| **ANGIOSPERMS: DICOTS** | | | | | |
| **CHENOPODIACEAE GOOSEFOOT FAMILY** | | | | | |
| *Aphanisma blitoides*<br>aphanisma | –/– | 1B.2 | NE, MSCP | Annual herb; coastal bluff scrub, coastal sage scrub; sandy soils; blooms March–June; elevation less than 1,000 feet. | This species has low potential for occurrence on-site due to lack of coastal bluff scrub, habitat. Although coastal sage scrub is present on-site, the general survey was conducted within the blooming period of this species and would be expected to be detected if present. |
| *Suaeda esteroa*<br>estuary seablite | –/– | 1B.2 | – | Perennial herb; coastal salt marshes and swamps; blooms May–October; elevation less than 20 feet. | This species was not observed and not expected to occur within the survey area due to the lack of coastal salt marsh and swamp habitats. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |
| **APIACEAE CARROT FAMILY** | | | | | |
| *Eryngium aristulatum* var. *parishii*<br>San Diego button-celery | CE/FE | 1B.1 | NE, MSCP | Biennial/perennial herb; vernal pools, mesic areas of coastal sage scrub and grasslands, blooms April–June; elevation less than 2,000 feet. Known from San Diego and Riverside counties. Additional populations occur in Baja California, Mexico. | This species was not observed and not expected to occur within the survey area due to the lack of vernal pools and mesic habitats. |

| Attachment 3<br>Sensitive Plant Species Observed (†)<br>or with the Potential for Occurrence in the Survey Area | | | | | |
|---|---|---|---|---|---|
| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
| **ASTERACEAE** **SUNFLOWER FAMILY** | | | | | |
| *Ambrosia pumila*<br>San Diego ambrosia | –/FE | 1B.1 | NE, MSCP | Perennial herb (rhizomatous); chaparral, coastal sage scrub, valley and foothill grasslands, creek beds, vernal pools, often in disturbed areas; blooms May–September; elevation less than 1,400 feet. Many occurrences extirpated in San Diego County. | This perennial species was not observed and would have been apparent at the time of the survey if present. Therefore, it is not expected to occur within the project area. |
| *Baccharis vanessae*<br>Encinitas baccharis [=Encinitas coyote brush] | CE/FT | 1B.1 | NE, MSCP | Perennial deciduous shrub; chaparral; maritime; sandstone; blooms August–November; elevation less than 2,500 feet. San Diego County endemic. Known from fewer than 20 occurrences. Extirpated from Encinitas area. | This species is not expected to occur, as the project area occurs out of its known range. |
| *Bahiopsis* [=*Viguiera*] *laciniata*<br>San Diego viguiera [=San Diego County viguiera] † | –/– | 4.2 | – | Perennial shrub; chaparral, coastal sage scrub; blooms February–June; elevation less than 2,500 feet. | This species was **observed** within the Diegan coastal sage scrub and the disturbed coastal sage scrub**.** |
| *Deinandra* [=*Hemizonia*] *conjugens*<br>Otay tarplant | CE/FT | 1B.1 | NE, MSCP | Annual; blooms May–June, elevation less than 1,000 feet. | This species is not expected to occur, as the project area occurs out of its known range. |
| *Isocoma menziesii* var. *decumbens*<br>decumbent goldenbush | –/– | 1B.2 | – | Perennial shrub; chaparral, coastal sage scrub; sandy soils, often in disturbed areas; blooms April–November; elevation less than 500 feet. | This perennial species was not observed and would have been apparent at the time of the survey if present. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |

**Attachment 3**
**Sensitive Plant Species Observed (†)**
**or with the Potential for Occurrence in the Survey Area**

| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
|---|---|---|---|---|---|
| *Stylocline citroleum*<br>oil nest-straw | –/– | 1B.1 | – | Annual herb; chenopod scrub; potentially coastal sage scrub, valley and foothill grasslands; clay soils; blooms March–April; elevation less than 1,300 feet. California endemic. Known from San Diego (presumed extirpated) and Kern counties. | This species is not expected to occur due to the absence of clay soils on-site. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |
| **BORAGINACEAE** | **BORAGE FAMILY** | | | | |
| *Harpagonella palmeri*<br>Palmer's grapplinghook | –/– | 4.2 | – | Annual herb; chaparral, coastal sage scrub, valley and foothill grasslands; clay soils; blooms March–May; elevation less than 3,200 feet. Inconspicuous and easily overlooked. | This species is not expected to occur due to the absence of clay soils on-site. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015d). |
| **CACTACEAE** | **CACTUS FAMILY** | | | | |
| *Cylindropuntia californica* var. *californica* [=*Opuntia parryi* var. *serpentina*]<br>snake cholla | –/– | 1B.1 | NE, MSCP | Perennial stem succulent; chaparral, coastal sage scrub; blooms April–May; elevation 100–500 feet. | This species is not expected to occur, as the project area occurs out of its known range. |
| *Ferocactus viridescens*<br>San Diego barrel cactus † | –/– | 2B.1 | MSCP | Perennial stem succulent; chaparral, coastal sage scrub, valley and foothill grasslands, vernal pools; blooms May–June; elevation less than 1,500 feet. | This species was **observed** within the Diegan coastal sage scrub and the disturbed coastal sage scrub. This species has also been known to occur within a one-mile buffer of the project area (State of California 2015d). |

| Attachment 3<br>Sensitive Plant Species Observed (†)<br>or with the Potential for Occurrence in the Survey Area | | | | | |
|---|---|---|---|---|---|
| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
| **CRASSULACEAE** **STONECROP FAMILY** | | | | | |
| *Dudleya brevifolia* [=*D. blochmaniae* ssp. *brevifolia*]<br>short-leaved dudleya [short-leaved live-forever] | CE/– | 1B.1 | NE, MSCP | Perennial herb; southern maritime chaparral, coastal sage scrub on Torrey sandstone; blooms in April; elevation less than 1,000 feet. San Diego County endemic. Known from fewer than five occurrences in the Del Mar and La Jolla areas. | This species is not expected to occur due to the absence of Torrey sandstone on-site. |
| *Dudleya variegata*<br>variegated dudleya | –/– | 1B.2 | NE, MSCP | Perennial herb; clay soil, openings in chaparral, coastal sage scrub, grasslands, vernal pools; blooms May–June; elevation less than 1,900 feet. | Although coastal sage scrub is present on-site, this species has low potential for occurrence on-site due to lack of clay soils. |
| **FABACEAE** **LEGUME FAMILY** | | | | | |
| *Astragalus tener* var. *titi*<br>coastal dunes milkvetch | CE/FE | 1B.1 | NE, MSCP | Annual herb; coastal bluff scrub, coastal dunes, sandy soils, mesic coastal prairie; blooms March–May; elevation less than 200 feet. California endemic. Known from fewer than 10 occurrences in San Diego (presumed extirpated), Los Angeles (presumed extirpated), and Monterey counties. | This species was not observed and not expected to occur within the survey area due to the lack of suitable habitats. |
| **FAGACEAE** **OAK FAMILY** | | | | | |
| *Quercus dumosa*<br>Nuttall's scrub oak | –/– | 1B.1 | – | Perennial evergreen shrub; closed-cone coniferous forest, coastal chaparral, coastal sage scrub; sandy and clay loam soils; blooms February–March; elevation less than 1,300 feet. | This perennial species was not observed and would have been apparent at the time of the survey if present. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |

| Attachment 3<br>Sensitive Plant Species Observed (†)<br>or with the Potential for Occurrence in the Survey Area | | | | | |
|---|---|---|---|---|---|
| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
| **LAMIACEAE MINT FAMILY** | | | | | |
| *Acanthomintha ilicifolia*<br>San Diego thornmint | CE/FT | 1B.1 | NE, MSCP | Annual herb; chaparral, coastal sage scrub, and grasslands; friable or broken clay soils; blooms April–June; elevation less than 3,200 feet. | This species is not expected to occur due to the absence of suitable habitats with friable, clay soils on-site. |
| *Pogogyne abramsii*<br>San Diego mesa mint | CE/FE | 1B.1 | NE, MSCP | Annual herb; vernal pools; blooms April–July; elevation 300–700 feet. San Diego County endemic. | This species is not expected to occur due to the absence of vernal pools on-site. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |
| *Pogogyne nudiuscula*<br>Otay mesa mint | CE/FE | 1B.1 | NE, MSCP | Annual herb; vernal pools; blooms May–July; elevation 300–820 feet. In California, known from approximately 10 occurrences in Otay Mesa in San Diego County. Additional populations occur in Baja California, Mexico. | This species is not expected to occur due to the absence of vernal pools on-site. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |
| **PLANTAGINACEAE PLANTAIN FAMILY** | | | | | |
| *Stemodia durantifolia*<br>purple stemodia | –/– | 2B.1 | – | Perennial herb; Sonoran desert scrub, mesic; sandy soils; blooms January–December; elevation 600–1,000 feet. | This species was not observed and not expected to occur within the survey area due to the lack of suitable habitats. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |

| Attachment 3<br>Sensitive Plant Species Observed (†)<br>or with the Potential for Occurrence in the Survey Area | | | | | |
|---|---|---|---|---|---|
| Species | State/Federal Status | CNPS List | City of San Diego | Habitat/Blooming Period | Comments |
| **POLEMONIACEAE PHLOX FAMILY** | | | | | |
| *Navarretia fossalis*<br>spreading navarretia<br>[=prostrate navarretia] | –/FT | 1B.1 | NE, MSCP | Annual herb; vernal pools, marshes and swamps, chenopod scrub; blooms April–June; elevation 100–4,300 feet. | This species is not expected to occur due to the absence of vernal pools on-site. |
| **ANGIOSPERMS: MONOCOTS** | | | | | |
| **AGAVACEAE AGAVE FAMILY** | | | | | |
| *Agave shawii* var. *shawii*<br>Shaw's agave | –/– | 2B.1 | NE, MSCP | Perennial leaf succulent; coastal bluff scrub, coastal sage scrub, maritime succulent scrub; blooms September–May; elevation less than 400 feet. | This species is not expected to occur, as the project area occurs out of its known range. |
| **POACEAE GRASS FAMILY** | | | | | |
| *Orcuttia californica*<br>California Orcutt grass | CE/FE | 1B.1 | NE, MSCP | Annual herb; vernal pools; blooms April–August; elevation 50–2,200 feet. | This species is not expected to occur due to the absence of vernal pools on-site. |
| **THEMIDACEAE BRODIAEA FAMILY** | | | | | |
| *Bloomeria* [=*Muilla*] *clevelandii*<br>San Diego goldenstar | –/– | 1B.1 | MSCP | Perennial herb (bulbiferous); chaparral, coastal sage scrub, valley and foothill grassland, vernal pools; clay soils; blooms May; elevation 170–1,500 feet. | This species was not observed and not expected to occur within the survey area due to the lack of clay soils. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |
| *Brodiaea orcuttii*<br>Orcutt's brodiaea | –/– | 1B.1 | MSCP | Perennial herb (bulbiferous); closed cone coniferous forest, chaparral, meadows and seeps, valley and foothill grassland, vernal pools; mesic, clay soil; blooms May–July; elevation less than 5,600 feet. | This species was not observed and is not expected to occur within the survey area due to the lack of suitable habitats and clay soils. This species has been known to occur within a one-mile buffer of the project area (State of California 2015d). |

## Attachment 3
## Sensitive Plant Species Observed (†) or with the Potential for Occurrence in the Survey Area

**FEDERAL CANDIDATES AND LISTED PLANTS**

FE = Federally listed endangered
FT = Federally listed threatened

**STATE LISTED PLANTS**

CE = State listed endangered
CT = State listed threatened

**CALIFORNIA NATIVE PLANT SOCIETY RARE PLANT RANKING**

1A = Species presumed extinct.
1B = Species rare, threatened, or endangered in California and elsewhere. These species are eligible for state listing.
2B = Species rare, threatened, or endangered in California but more common elsewhere. These species are eligible for state listing.
4 = A watch list of species of limited distribution. These species need to be monitored for changes in the status of their populations.
.1 = Species seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat).
.2 = Species fairly threatened in California (20-80% occurrences threatened; moderate degree and immediacy of threat).

**CITY OF SAN DIEGO**

NE = Narrow endemic
MSCP = Multiple Species Conservation Program covered species

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# ATTACHMENT 4

## Sensitive Wildlife Species Occurring or with the Potential to Occur in the Survey Area

| Attachment 4<br>Sensitive Wildlife Species Occurring or with the Potential to Occur in the Survey Area | | | |
|---|---|---|---|
| Species | Status | Habitat | Occurrence/Comments |
| **INVERTEBRATES** (Nomenclature from Eriksen and Belk 1999) | | | |
| **ANOSTRACA FAIRY SHRIMP** | | | |
| San Diego fairy shrimp<br>*Branchinecta sandiegonensis* | FE, MSCP, * | Vernal pools. | This species is not expected to occur within the survey area due to the lack of vernal pool habitat. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015b). |
| **TEIIDAE WHIPTAIL LIZARDS** | | | |
| Belding's orange-throated whiptail<br>*Aspidoscelis hyperythra beldingi* | CSC, MSCP | Chaparral, coastal sage scrub with coarse sandy soils and scattered brush. | This species was not observed within the survey area, but has a moderate potential to occur due to the presence of coastal sage scrub. |
| **BIRDS** (Nomenclature from American Ornithologists' Union 2013 and Unitt 2004) | | | |
| **ACCIPITRIDAE HAWKS, KITES, & EAGLES** | | | |
| Cooper's hawk (nesting)<br>*Accipiter cooperii* | WL, MSCP | Mature forest, open woodlands, wood edges, river groves. Parks and residential areas. Migrant and winter visitor. | This species was not observed within the survey area, but has a moderate potential to nest on-site due to the presence of eucalyptus woodland. |
| **VIREONIDAE VIREOS** | | | |
| Least Bell's vireo (nesting)<br>*Vireo bellii pusillus* | FE, SE, MSCP | Willow riparian woodlands. Summer resident. | This species is not expected to occur within the survey area due to the lack of riparian habitats. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015b). |

| Attachment 4<br>Sensitive Wildlife Species Occurring or with the Potential to Occur in the Survey Area | | | |
|---|---|---|---|
| Species | Status | Habitat | Occurrence/Comments |
| **SYLVIIDAE** **GNATCATCHERS** | | | |
| Coastal California gnatcatcher<br>*Polioptila californica californica* | FT, CSC, MSCP | Coastal sage scrub, maritime succulent scrub. Resident. | This species was **observed** within the coastal sage scrub inside and immediately outside of the survey area. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015b). |
| **EMBERIZIDAE** **EMBERIZIDS** | | | |
| Southern California rufous-crowned sparrow<br>*Aimophila ruficeps canescens* | WL, MSCP | Coastal sage scrub, chaparral, grassland. Resident. | This species was not observed within the survey area, but has a moderate potential to occur due to the presence of rocky slopes within coastal sage scrub. |
| **MAMMALS** (Nomenclature from Baker et. al. 2003) | | | |
| **PHYLLOSTOMIDAE NEW WORLD LEAF-NOSED BATS** | | | |
| Mexican long-tongued bat<br>*Choeronycteris mexicana* | CSC | Sightings in San Diego County very rare. Migratory. | This species was not observed and has a low potential to occur due to the absence of riparian habitat and streams. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015a). |
| **MOLOSSIDAE** **FREE-TAILED BATS** | | | |
| Pocketed free-tailed bat<br>*Nyctinomops femorosaccus* | CSC | Normally roost in crevice in rocks, slopes, cliffs. Lower elevations in San Diego and Imperial Counties. Colonial. Leave roosts well after dark. | This species was not observed and has a low potential to occur due to the absence of suitable rock structures. This species has been known to occur within a one-mile buffer of the survey area (State of California 2015a). |

## Attachment 4
## Sensitive Wildlife Species Occurring or with the Potential to Occur in the Survey Area

**STATUS CODES**

Listed/Proposed

FE = Listed as endangered by the federal government
FT = Listed as threatened by the federal government
SE = Listed as endangered by the state of California

Other

CSC = California Department of Fish and Game species of special concern
MSCP = Multiple Species Conservation Program covered species
* = Taxa listed with an asterisk fall into one or more of the following categories:

- Taxa considered endangered or rare under Section 15380(b) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range but which are threatened with extirpation within California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

WL = California Department of Fish and Game watch list species

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# Waste Management Plan for the Friars Road Mixed-Use Project, San Diego, California

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RECON Number 7916
December 14, 2016

Kevin Israel, Environmental Analyst

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# Acronyms

| | |
|---|---|
| AB | Assembly Bill |
| APN | Assessor's Parcel Number |
| C&D | Construction and Demolition |
| CEQA | California Environmental Quality Act |
| City | City of San Diego |
| ESD | Environmental Services Department |
| MMRP | Mitigation Monitoring and Reporting Program |
| SWMC | Solid Waste Management Coordinator |
| U.S. EPA | U.S. Environmental Protection Agency |
| WMP | Waste Management Plan |

# 1.0 Introduction

This Waste Management Plan (WMP) is a requirement for the Friars Road Mixed-Use Project (proposed project). The purpose of the WMP is to identify solid waste impacts that would be generated by demolition, grading, construction, and operation of the proposed project and measures to reduce those impacts to ensure compliance with state and local regulations.

Without implementation of the reduction and diversion measures herein, the estimated solid waste to be generated by the proposed project would exceed the City's Significance Determination Thresholds for the California Environmental Quality Act (CEQA; City of San Diego 2011). The direct impact threshold of significance for projects in the City of San Diego (City) is 1,500 tons of waste per year and projects that generate more than 60 tons of waste per year would have a significant cumulative impact on solid waste services. The proposed project would generate approximately 130,412 tons of waste (total) during construction, grading, and demolition and 297 tons per year during occupancy. Therefore, preparation of a WMP is required to demonstrate how the proposed project would reduce solid waste impacts to below a level of significance.

The WMP consists of four sections corresponding to the progress of site improvements. These are the Demolition Phase, Grading Phase, Construction Phase, and Occupancy (post-construction) Phase. Each phase addresses the amount of waste that would be generated by project activities, waste reduction goals, and the recommended techniques to achieve the waste reduction goals. More specifically, the WMP includes the following:

- Tons of waste anticipated to be generated.
- Material/type and amount of waste anticipated to be diverted.
- Project features that would reduce the amount of waste generated.
- Project features that would divert or limit the generation of waste.
- Source separation techniques for waste generated.
- How materials would be reused on-site.
- Name and location of recycling, reuse, or landfill facilities where waste would be taken.

# 2.0 Background

The California State legislature has enacted several bills intended to promote waste diversion. In 1986, Assembly Bill (AB) 2020, the California Beverage Container Recycling and Litter Reduction Act, established California Redemption Value, a refundable deposit on certain types of beverage containers (State of California 1986). In 1989, the legislature passed AB 939, the Integrated Waste Management Act, which—as modified in 2010 by Senate Bill 1016—mandated that all local governments reduce waste disposed of in landfills from generators within their borders by 50 percent by the year 2000 (State of California 1989 and 2010). AB 341, approved October 2011, sets a policy goal of 75 percent waste diversion by the year 2020 (State of California 2011).

In compliance with the state policies, the City of San Diego Environmental Services Department (ESD) developed the Source Reduction and Recycling Element, which describes local waste management policies and programs. The City's Recycling Ordinance, adopted November 2007, requires on-site recyclables collection for all residential and commercial uses (City of San Diego 2007a). The ordinance requires recycling of plastic and glass bottles and jars, paper, newspaper, metal containers, and cardboard. The focus of the ordinance is on education, with responsibility shared between the ESD, haulers, and building owners and managers. On-site technical assistance, educational materials, templates, and service provider lists are to be provided by the ESD. Property owners and managers are to provide on-site recycling services and educational materials annually and to new tenants. Strategies for compliance are discussed in Section 6.2, Waste Reduction Measures.

The City's Refuse and Recyclable Materials Storage Regulations, adopted December 2007, indicate the minimum exterior refuse and recyclable material storage areas required at residential and commercial properties (City of San Diego 2007b). These are intended to provide permanent, adequate, and convenient space for the storage and collection of refuse and recyclable materials; encourage recycling of solid waste to reduce the amount of waste material entering landfills; and meet the recycling goals established by the City Council and mandated by the State of California. These regulations are discussed further in Section 6.3, Exterior Storage.

In July 2008, the Construction and Demolition (C&D) Debris Deposit Ordinance was adopted by the City (City of San Diego 2008a). The ordinance requires that the majority of construction, demolition, and remodeling projects requiring building, combination, or demolition permits pay a refundable C&D Debris Recycling Deposit and divert at least 50 percent of their waste by recycling, reusing, or donating reusable materials. The required diversion rate will increase to 75 percent under certain circumstances. The ordinance is designed to keep C&D materials out of local landfills and ensure they get diverted from disposal. Requirements are discussed further in Section 5.4.4, Contractor Education and Responsibilities.

AB 1826, approved September 2014 and partially effective January 2016, will require a business in California that generates greater than two cubic yards of organic waste per week to arrange for recycling services for that organic waste in a specified manner (State of California 2014). Although organic waste generally includes landscaping and food waste, the law does not apply to food waste generated by multi-family dwellings. Other forms of organic waste are not anticipated to be generated by the project at a rate for which AB 1826 would apply.

# 3.0 Existing Conditions

The proposed project is located on a total of 5.43 acres at 6950, 7020, and 7050 Friars Road, within the Linda Vista Community Plan of the City of San Diego (Assessor's Parcel Numbers [APNs] 437-250-00, 23, and 24). The site is bounded to the south by Friars Road and the intersection of Friars Road and Via de la Moda, to the north and northeast by an undeveloped slope, to the west by a multi-family residential development, and to the east by existing commercial development. The site consists of three office buildings, associated parking, landscaping, and naturally vegetated slopes. Figure 1 shows the regional location of the proposed project and Figure 2 shows the project location with existing conditions on an aerial photograph.

# 4.0 Proposed Conditions

The proposed project includes demolition of the three existing commercial/office buildings and construction of one multi-family residential buildings and one mixed-use building with subterranean parking (Figure 3). Common recreational facilities, as well as private usable open space amenities, will be incorporated into the overall design. Access would be at the intersection of Friars Road and Via de la Moda with a signalized intersection and enhanced pedestrian crosswalks.

Demolition would include two three-story buildings and one two-story building, totaling approximately 48,180 square feet, and paved parking areas, driveways, and walkways totaling 486,680 square feet. Construction would include 243 apartments, 6 shopkeeper units, and 70 condominiums for a total of 319 residential dwelling units. The apartments and shopkeeper units would total 204,242 square feet of habitable space in a seven-story structure over two levels of subterranean parking. The condominium units would total 110,883 square feet of habitable space in a nine-story structure over two levels of subterranean parking. Common areas and open space construction, including decks and balconies, would total 85,634 square feet. Subterranean parking would total 177,745 square feet.


Project Location

# FIGURE 1
Regional Location

RECON

M:\JOBS4\7916\common_gis\fig1.mxd 6/29/2015 fmm

Image Source: USDA FSA NAIP (flown May 2014)


# FIGURE 2

Project Location on Aerial Photograph

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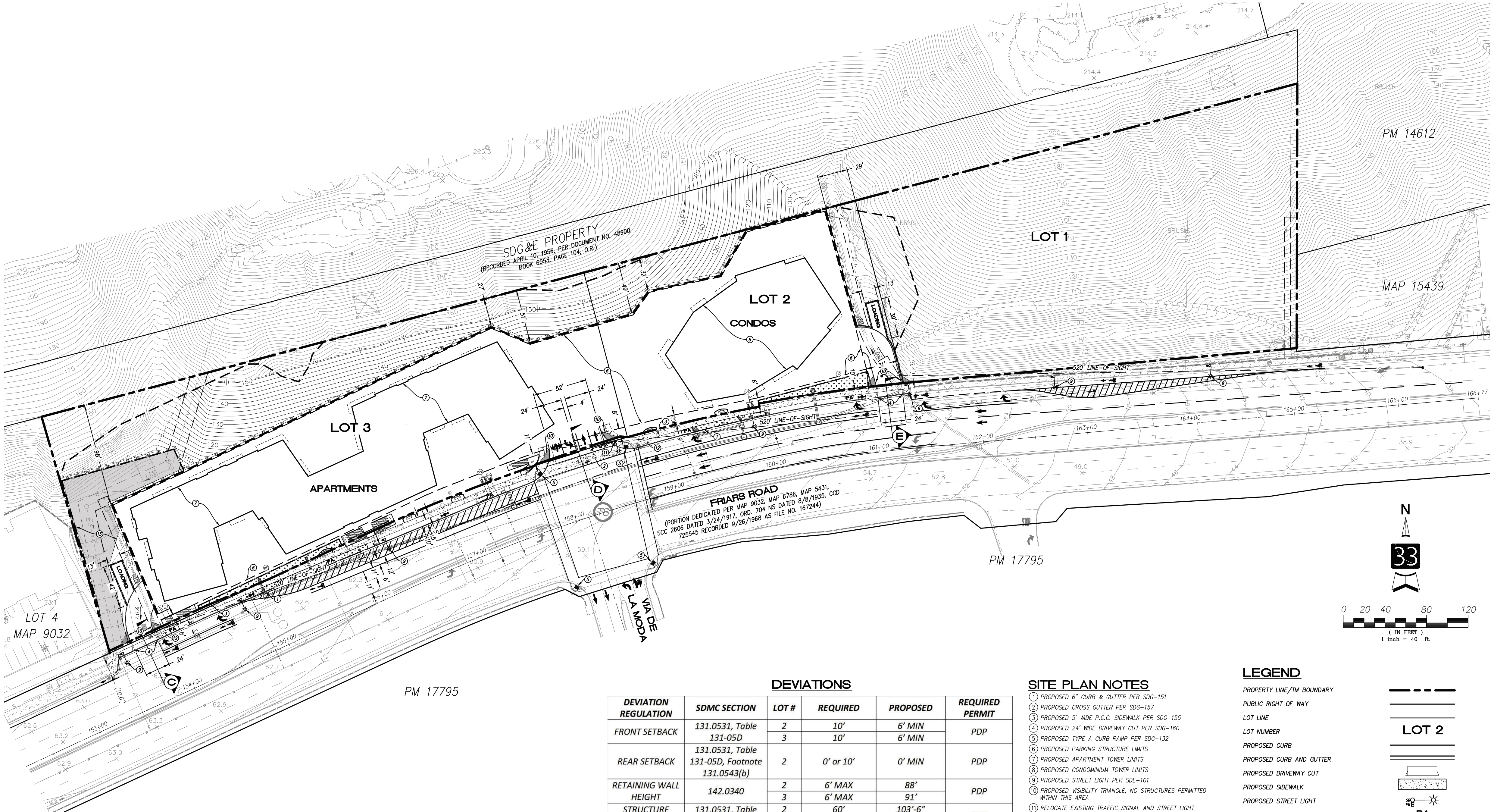
Map Source: Latitude 33




## DEVIATIONS

| DEVIATION REGULATION | SDMC SECTION | LOT # | REQUIRED | PROPOSED | REQUIRED PERMIT |
|---|---|---|---|---|---|
| FRONT SETBACK | 131.0531, Table 131-05D | 2 | 10' | 6' MIN | PDP |
| | | 3 | 10' | 6' MIN | |
| REAR SETBACK | 131.0531, Table 131-05D, Footnote 131.0543(b) | 2 | 0' or 10' | 0' MIN | PDP |
| RETAINING WALL HEIGHT | 142.0340 | 2 | 6' MAX | 88' | PDP |
| | | 3 | 6' MAX | 91' | |
| STRUCTURE HEIGHT | 131.0531, Table 131-05D | 2 | 60' | 103'-6" | PDP |
| | | 3 | 60' | 124'-2" | |
| FLOOR AREA RATIO | 131.0531, Table 131-05D | 1-3 | 1.50 | 1.58 | PDP |
| GROUND FLOOR RESIDENTIAL | 131.0540(c)(1) | 2-3 | 50% | <50% | PDP |

## SITE PLAN NOTES

1. PROPOSED 6" CURB & GUTTER PER SDG-151
2. PROPOSED CROSS GUTTER PER SDG-157
3. PROPOSED 5' WIDE P.C.C. SIDEWALK PER SDG-155
4. PROPOSED 24' WIDE DRIVEWAY CUT PER SDG-160
5. PROPOSED TYPE A CURB RAMP PER SDG-132
6. PROPOSED PARKING STRUCTURE LIMITS
7. PROPOSED APARTMENT TOWER LIMITS
8. PROPOSED CONDOMINIUM TOWER LIMITS
9. PROPOSED STREET LIGHT PER SDE-101
10. PROPOSED VISIBILITY TRIANGLE, NO STRUCTURES PERMITTED WITHIN THIS AREA
11. RELOCATE EXISTING TRAFFIC SIGNAL AND STREET LIGHT
12. NO SHRUBS GREATER THAN 3' IN HEIGHT ALLOWED WITHIN LINE-OF-SIGHT AREAS
13. PROPOSED COLORED CONCRETE SEWER ACCESS ROAD

## LEGEND

- PROPERTY LINE/TM BOUNDARY
- PUBLIC RIGHT OF WAY
- LOT LINE
- LOT NUMBER — LOT 2
- PROPOSED CURB
- PROPOSED CURB AND GUTTER
- PROPOSED DRIVEWAY CUT
- PROPOSED SIDEWALK
- PROPOSED STREET LIGHT — SB PB
- PROPOSED PLANTER AREA — PA
- EXISTING GRADE/ELEV — (123.95 TC) (123.45 FS)
- PROPOSED GRADE/ELEV — 123.95 TC 123.45 FS
- PROPOSED SEWER ACCESS PATH

## NOTE

NO OBSTRUCTION INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT.

## INTERSECTION SIGHT DISTANCE

EAST & WEST DRIVEWAYS & SIGNALIZED INTERSECTION:

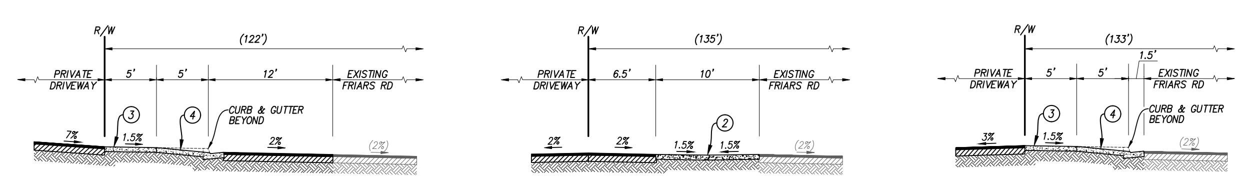
PER 201.1 OF THE HIGHWAY DESIGN MANUAL: "STOPPING SIGHT DISTANCE IS IS TO BE PROVIDED FOR ALL USERS , INCLUDING MOTORISTS AND BICYCLISTS, AT ALL ELEMENTS OF INTERCHANGES AND INTERSECTIONS AT GRADE. (SEE TOPIC 504, INDEX 405.1, & FIGURE 405.7)."

FRIARS ROAD 85% DESIGN SPEED (PER CITY'S SPEED SURVEY) = 47mph

FROM TABLE 405.1A OF THE HIGHWAY DESIGN MANUAL

CORNER SIGHT DISTANCE = **520.00'**

## DRIVEWAY SECTIONS




WEST DRIVEWAY WIDTH = 24'

**SECTION 'C'**
NOT TO SCALE

MAIN DRIVEWAY WIDTH = 52'

**SECTION 'D'**
NOT TO SCALE

EAST DRIVEWAY WIDTH = 24'

**SECTION 'E'**
NOT TO SCALE

RECON

FIGURE 3
Site Plan

# 5.0 Demolition, Grading, and Construction

According to the Waste Composition Study prepared by the ESD, C&D waste constituted the largest single component of disposed waste in San Diego in 2000 (City of San Diego 2000). Of the almost 590,000 tons of waste disposed that year, C&D waste composed 34 percent.

## 5.1 Demolition

Demolition activities would include two existing three-story office buildings and one two-story office building, totaling approximately 48,180 square feet, and approximately 48,680 square feet of paved areas (see Figure 2). According to a 2009 study by the U.S. Environmental Protection Agency (U.S. EPA), a sample of non-residential demolition projects generated an average of 158 pounds of waste per square foot (U.S. EPA 2009). Based on this generation rate, it is estimated that 4,482 tons of waste would be generated during demolition.

Estimates of material type and amounts are included in Table 1 and discussed below. Anticipated portions of demolition debris to be diverted for recycling are 95 percent from the buildings and 100 percent from the parking lots, totaling a diversion rate of 96 percent. This rate of diversion would exceed the 2020 goal of 75 percent.

Estimates of building material type and amounts are based on similar wood frame developments. Estimates have a degree of uncertainty and would be revised as the proposed project progresses and demolition debris is more specifically identified. Material weights are based on the ESD C&D Debris Conversion Rate Table (Attachment 1, City of San Diego 2008b). As outlined in Table 1, building materials are classified as:

- Building materials (doors, windows, cabinets, etc.)
- Carpet
- Ceiling tiles (loose)
- Concrete (broken)
- Drywall (used)
- Roofing materials and joists
- Scrap metal

Paved areas to be demolished, including parking lots, driveways, and walkways, total approximately 48,680 square feet. Approximately 10 percent is concrete driveway, curbs and walkways, and approximately 90 percent is asphalt. Asphalt and concrete paving depth varies by project and soil type, but is typically six inches for surface parking lots. Based on the same conversion rate table, estimated asphalt and concrete to be removed totals 3,448 tons. These materials would be entirely diverted for reuse at the appropriate facility recommended in Table 1. Removed landscaping and native vegetation would have a negligible weight relative to waste from other sources and would be recycled as green waste at the Miramar Greenery facility, achieving a 100 percent diversion rate.

| Table 1<br>Materials Generated by Demolition Activities and the Percent Diverted | | | | | | | |
|---|---|---|---|---|---|---|---|
| Material[1] | Cubic Yards Generated | Tons per Cubic Yard[1] | Tons Generated[2] | Percent Diverted[3] | Nearest Handling Facility[3] | Tons Diverted | Tons Disposed |
| **Existing Buildings** | | | | | | | |
| Building Materials (doors, windows, cabinets, etc.) | 533 | 0.15 | 81 | 100 | Habitat for Humanity ReStore | 81 | 0 |
| Carpet | 133 | 0.3 | 40 | 100 | DFS Flooring | 40 | 0 |
| Ceiling Tiles (loose) | 1,300 | 0.09 | 117 | 100 | AMS, San Diego | 117 | 0 |
| Concrete (broken) | 1,579 | 1.2 | 1,895 | 100 | Vulcan Carol Canyon Landfill & Recycling Site | 1,895 | 0 |
| Drywall (used) | 4,284 | 0.25 | 1,071 | 100 | EDCO Recovery & Transfer, San Diego | 1,071 | 0 |
| Roofing Materials and Joists | 333 | 1.5 | 500 | 65 | EDCO Recovery & Transfer, San Diego | 325 | 175 |
| Scrap Metal | 200 | 0.51 | 102 | 100 | Allan Company, Consolidated Way | 102 | 0 |
| **Subtotal** | **8,362** | | **3,806** | **95** | | **3,631** | **175** |
| **Parking Lots** | | | | | | | |
| Asphalt | 811 | 0.70 | 568 | 100 | Vulcan Carol Canyon Landfill & Recycling Site | 568 | 0 |
| Concrete | 90 | 1.2 | 108 | 100 | Vulcan Carol Canyon Landfill & Recycling Site | 108 | 0 |
| **Parking Lots Total** | **901** | | **676** | **100** | | **676** | **0** |
| **Grand Total** | | | **4,482** | **96** | | **4,307** | **175** |

NOTE: Totals may vary due to independent rounding.
[1]City of San Diego Environmental Services Department (ESD) Construction and Demolition (C&D) Debris Conversion Rate Table (Attachment 1).
[2]Portions of material types based on demolition estimates of similar office buildings.
[3]City of San Diego ESD 2015 Certified C&D Recycling Facility Directory (Attachment 2).

The diversion methods outlined in Section 5.4, Waste Diversion, would be implemented during demolition, and materials would be source separated to the greatest extent possible. The nearest acceptable recycling facilities and materials are shown in Table 1 and location details and alternative facilities are listed on the ESD 2015 Certified C&D Recycling Facility Directory (Attachment 2; City of San Diego 2015a).

# 5.2 Grading

As discussed in Section 1.0, Introduction, the majority of the site has been developed (see Figure 2). Following cleanup and demolition activities, implementation of the proposed project would require approximately 106,000 cubic yards of soil cut to match the grade of Friars Road, exporting 96,000 cubic yards of material. Based on the ESD Construction and Demolition Debris Conversion Rate Table, grading soil weighs approximately 1.3 tons per cubic yard (Attachment 1). Therefore, project grading would result in a net export of 124,800 tons, as shown in Table 2. All exported soil would be recycled using the City of San Diego Clean Fill Dirt Program or an approved clean fill dirt handler listed in Attachment 1 (City of San Diego 2015b).

**Table 2**
**Grading Waste Generation, Diversion, and Disposal**

| Net Export (cubic yards) | Generation Rate[1] (tons per cubic yard) | Tons Exported | Percent Diverted | Tons Diverted | Tons Disposed |
|---|---|---|---|---|---|
| 96,000 | 1.3 | 124,800 | 100% | 124,800 | 0 |

[1]SOURCE: City of San Diego C&D Debris Conversion Rate Table (Attachment 1).

Any vegetation removed would be taken to the Miramar Greenery facility for 100 percent reuse. Diversion goals will be communicated to contractors through contract documents, the CEQA document and corresponding MMRP, and the SWMC for the project.

# 5.3 Construction

According to a 2009 study by the U.S. EPA, a sample of multi-family residential construction projects generated an average of 4.0 pounds of construction waste per square foot and non-residential construction projects generated an average of 4.3 pounds of construction waste per square foot (U.S. EPA 2009). Based on these generation rates, the proposed square footage of multi-family residential and shopkeeper units, common/open space area, and proposed parking garage area (non-residential construction) is estimated to generate 1,130 tons of waste during construction (see Table 3a).

| Table 3a<br>Construction Phase Waste Generation | | | | |
|---|---|---|---|---|
| Structure | Land Use | Area (sf) | Generation Rate (pounds per sf)[1] | Tons Generated |
| 249 Apartments/ Shopkeeper Units[2] | Multi-Family Residential | 204,242 | 4.0 | 408 |
| 70 Condominium Units | Multi-Family Residential | 110,883 | 4.0 | 222 |
| Common/Open Spaces | Multi-Family Residential | 59,046 | 4.0 | 118 |
| Building Subtotal | Multi-Family Residential | – | – | 748 |
| Subterranean Parking | Parking (non-residential) | 177,745 | 4.3 | 382 |
| **Total** | **–** | **551,916** | **–** | **1,130** |

NOTE: Totals may vary due to independent rounding.
[1]U.S. Environmental Protection Agency 2009.
[2] Apartments and shopkeeper units are combined because construction materials and thus, waste generation, would be similar and both uses would include a residential component.
sf = square feet

Estimates of material types and portions are based on similar multi-family residential developments and parking structures. As outlined in Table 3b below, the types of construction waste anticipated to be generated include the following:

- Asphalt and concrete
- Brick/masonry/tile
- Carpet, padding/foam
- Clean wood/wood pallets
- Corrugated cardboard
- Drywall
- Metals
- Trash/garbage

With implementation of the diversion procedures described in Section 5.4, Waste Diversion, and outlined in Table 3b, it is estimated that 81 percent of the waste generated during the construction phase of the proposed project would be diverted to appropriate facilities for reuse. Only 215 tons of trash/garbage would be disposed in the landfill.

| Table 3b<br>Construction Waste Diversion and Disposal by Material Type | | | | | |
|---|---|---|---|---|---|
| Material Type | Estimated Waste (tons) [1] | Percent Diverted[2] | Nearest Handling Facility[1] | Estimated Diversion (tons) | Estimated Disposal (tons) |
| Asphalt and Concrete | 146 | 100 | Vulcan Carol Canyon Landfill & Recycle Site | 146 | 0 |
| Brick/Masonry/Tile | 99 | 100 | Vulcan Carol Canyon Landfill & Recycle Site | 99 | 0 |
| Carpet, Padding/Foam | 53 | 100 | DFS Flooring | 53 | 0 |
| Clean Wood/Wood Pallets | 202 | 100 | Miramar Greenery | 202 | 0 |
| Corrugated Cardboard | 85 | 100 | Allan Company Miramar Recycling | 85 | 0 |
| Drywall | 166 | 100 | EDCO Recovery & Transfer | 166 | 0 |
| Metals | 164 | 100 | Allan Company Miramar Recycling | 164 | 0 |
| Trash/Garbage | 215 | 0 | Miramar Landfill | 0 | 215 |
| **Total** | **1,130** | – | – | **915 (81%)** | **215 (19%)** |

NOTE: Totals may vary due to independent rounding.
[1]Portions of material types based on demolition estimates of similar residential developments and parking structures.
[2]City of San Diego ESD 2015 Certified C&D Recycling Facility Directory (Attachment 2).

# 5.4 Waste Diversion

Methods of waste diversion would include mixed debris and source separation. With mixed debris diversion (Section 5.4.1), all material waste is disposed of in a single container for transport to a mixed C&D transfer station or facility. With source separated diversion (Section 5.4.2), materials are separated on-site before transport to appropriate facilities that accept specific material types.

As described below, the source separation strategy would be the primary method implemented during demolition and construction of the proposed project, and materials listed above would be separated and taken to source-separation facilities that achieve an almost 100 percent diversion rate. However, the City recognizes that some types of C&D waste are difficult to source separate. Therefore, ESD staff would be invited by the applicant (or applicant's successor in interest) to attend any Development Services Department-required preconstruction meetings. During the preconstruction meetings, strategies for waste diversion would be discussed, and source separation would be utilized to the greatest extent feasible. In order to provide a conservative estimate of the amount of construction waste to be diverted versus disposed, both types are discussed and the mixed debris method would be the "worst case" for several types of material generated during the demolition phase (see Table 1). Detailed requirements for implementation of the following diversion methods are discussed in Section 5.4.4, Contractor Education and Responsibilities.

### 5.4.1 Mixed Debris

Mixed debris recycling, where all material waste is disposed of in a single container at a mixed C&D transfer station or facility, would be implemented for disposal of items that are difficult to separate (e.g., some types of roofing materials; trash/garbage). As detailed in Section 5.4.4, containers would be placed throughout the project site and materials for recycling would be redirected to appropriate recipients selected from ESD's directory of facilities that recycle construction and demolition waste (Tables 1 and 3b; Attachment 2).

As shown in Attachment 2, most of the mixed debris facilities achieve less than a 68 percent diversion rate, meaning that co-mingled materials sent to a mixed debris facility would not meet the 75 percent diversion goal established by AB 341. To ensure that the overall diversion goal is attained, materials must be source separated and trucked to facilities with higher diversion rates when possible.

### 5.4.2 Source Separation

The types of construction and demolition waste discussed above would be separated on-site into material-specific containers to facilitate reuse and recycling. This source separation achieves a nearly 100 percent diversion rate and is essential to (1) ensure the appropriate waste diversion rate, (2) minimize costs associated with transportation and disposal, and (3) facilitate compliance with the C&D ordinance.

As detailed in Section 5.4.4, recycling, salvage, reuse, and disposal options would be determined before the job begins. Recyclable waste materials, outlined in Sections 5.1 and 5.3, would be diverted to an approved recycler selected from ESD's directory of facilities that recycle specific waste materials from construction and demolition (see Tables 1 and 3b; Attachment 2). These facilities achieve a 100 percent diversion rate, higher than for mixed C&D materials.

### 5.4.3 Total Diversion

Table 4 summarizes the amount of waste estimated to be generated and diverted by each phase of the proposed project. Including demolition, grading, and construction, 130,412 tons of waste would be generated, 130,022 tons of which would be diverted, primarily through source separation. This would result in 99.7 percent of waste material diverted from the landfill for reuse. As discussed in Section 5.4.4, a SWMC would be designated and contractor education would occur to ensure that diversion methods are carried out adequately.

| Table 4<br>Total Waste Generated, Diverted, and Disposed<br>by Phase | | | |
|---|---|---|---|
| Phase | Tons Generated | Tons Diverted | Tons Disposed |
| Demolition | 4,482 | 4,307 (96%) | 175 (4%) |
| Grading | 124,800 | 124,800 (100%) | 0 (0%) |
| Construction | 1,130 | 915 (81%) | 215 (19%) |
| **Total** | **130,412** | **130,022 (99.7%)** | **390 (0.3%)** |
| NOTE: Totals may vary due to independent rounding. | | | |

### 5.4.4 Contractor Education and Responsibilities

A SWMC for the proposed project would be designated to ensure that all contractors and subcontractors are educated and that procedures for waste reduction and recycling efforts are implemented. Specific responsibilities of the SWMC would include the following:

- Review of the WMP at the preconstruction meeting, including the SWMC responsibilities.
- Distribute the WMP to all contractors when they first begin work on-site and when training workers, subcontractors, and suppliers on proper waste management procedures applicable to the project.
- Work with the contractors to estimate the quantities of each type of material that would be salvaged, recycled, or disposed of as waste, then assist in documentation.
- Use detailed material estimates to reduce risk of unplanned and potentially wasteful material cuts.
- Review and enforce procedures for source separated and mixed debris receptacles. Containers of various sizes shall:
    - Be placed in readily accessible areas that will minimize misuse or contamination.
    - Be clearly labeled with a list of acceptable and unacceptable materials, the same as the materials recycled at the receiving material recovery facility or recycling processor.
    - Contain no more than 5 percent non-recyclable materials, by volume.
    - Be inspected daily to remove contaminants and evaluate discarded material for reuse onsite.
- Review and enforce procedures for transportation of materials to appropriate recipients selected from ESD's directory of facilities that recycle demolition and construction materials (see Tables 1 and 3b; Attachment 2).
- Ensure removal of demolition and construction waste materials from the project site at least once every week to ensure no over-topping of containers. The accumulation and burning of on-site construction, demolition, and land-clearing waste materials will be prohibited.

- Require export soils to be taken to one of the City's certified soil recyclers.
- Facilitate the return or reuse of excess materials and packaging.
- Coordinate implementation of a "buy recycled" program for green construction products where possible, including incorporating mulch and compost into the landscaping.
- Coordinate implementation of solid waste mitigation with other requirements such as storm water requirements, which may include specifications such as the placement of bins to minimize the possibility of runoff contamination.

The SWMC would ensure the proposed project meets the following state law and City Municipal Code requirements. Adjustments would be made as needed to maintain conformance:

- The City's C&D Debris Diversion Deposit Program, which requires a refundable deposit based on the tonnage of the expected recyclable waste materials as part of the building permit requirements (City of San Diego 2008a).
- The City's Recycling Ordinance, which requires that collection of recyclable materials be provided (City of San Diego 2007a).
- The City's Storage Ordinance, which requires that areas for recyclable material collection must be provided (City of San Diego 2007b).
- The name and contact information of the waste contractor will be provided to ESD at least 10 days prior to the start of any work and updated within 5 days of any changes.

# 6.0 Occupancy Waste

Unlike demolition, grading, and construction, occupancy is an ongoing process. Therefore, it requires an ongoing plan to manage and reduce waste in order to meet the waste reduction goals established by local and state policy.

## 6.1 Waste Generation

The estimated annual waste to be generated during occupancy of the proposed project is based on an average of findings from estimates of multi-family developments reported by the California Department of Resources Recycling and Recovery (State of California 2013). The six shopkeeper units are included within the multi-family residential units at the same annual waste generation rate of 0.93 since shopkeeper units would include a residential component. Using a separate waste generation rate for the portion of the unit used as office space would overstate or double count waste generation due to the shared kitchen and bathroom facilities between the uses. Further, a Washington State Waste Characterization Study prepared by the Washington State Department of Ecology (State of California 2013) found waste generation per employee for office space would equate to approximately

0.23 tons per employee per year, which is well below the estimate per unit of 0.93 tons per unit. The shopkeeper units would likely be used by one employee (the resident of the unit) based on the design of the units (one-bedroom). Table 5 summarizes the estimated occupancy phase waste generation which amounts to approximately 297 tons of waste per year. As discussed in Section 6.2, Waste Reduction Measures, an ongoing plan to manage waste disposal in order to meet state and City waste reduction goals would be implemented by the applicant (or applicant's successor in interest).

**Table 5**
**Occupancy Phase Annual Waste Generation**

| Land Use | Housing Units | Annual Generation Rate[1] (tons per unit) | Waste Generated (tons) |
|---|---|---|---|
| Multi-family Residential | 319[2] | 0.93 | 297 |
| **Total** | – | – | **297** |

[1] State of California 2013.
[2] The six shopkeeper units are included within this total.

## 6.2 Waste Reduction Measures

Compliance with existing ordinances has been shown to achieve a 40 percent diversion rate. Therefore, waste anticipated to be diverted during the occupancy phase would be approximately 119 tons per year. The remaining 178 tons per year would still exceed the 60 ton-per-year the threshold of significance for having a cumulative impact on solid waste services in the City (City of San Diego 2011).

The applicant (or applicant's successor in interest) shall be responsible for implementing a long-term solid waste management plan to ensure that the development meets or exceeds the requirement of 50 percent diversion set forth in AB 939 and future AB 341 requirements of 75 percent diversion, and is in compliance with City Ordinances. Specific program measures provided by the applicant (or applicant's successor in interest) would include:

- Dedicated recycling signage, collection, both interior and exterior storage areas, and a means of handling landscaping and green waste materials as required by and in accordance with applicable City Ordinances.

- Providing recycling receptacles in recreational areas and walkways where trash receptacles are provided.

- Educating all tenants annually and new tenants upon occupancy about recycling services including the types of recyclable materials accepted, the location of recycling containers, and the tenants' responsibility to recycle. All tenants shall be given information and instructions upon any change in recycling service to the facility.

## 6.3 Exterior Storage

This WMP follows the guidelines set by the City of San Diego's Municipal Code designating on-site refuse and recyclable material storage space requirements (City of San Diego 2007b). Table 6 shows exterior storage area requirements for residential developments pursuant to the City's guidelines.

Because the proposed project would include a total of 319 residential units, a minimum of 624 square feet of refuse storage area and a minimum of 624 square feet of recyclable material storage area would be required. The total exterior refuse/recyclable material storage requirement for the proposed project would be 1,248 square feet. The project would comply with this requirement by providing a minimum of 1,248 square feet of refuse/recyclable material storage space within common areas.

**Table 6**
**Minimum Exterior Refuse and Recyclable Material Storage Areas for Residential Developments**

| Number of Dwelling Units Per Development | Minimum Refuse Storage Area Per Development (sf) | Minimum Recyclable Material Storage Area per Development (sf) | Total Minimum Storage Area per Development (sf) |
|---|---|---|---|
| 2-6 | 12 | 12 | 24 |
| 7-15 | 24 | 24 | 48 |
| 16-25 | 48 | 48 | 96 |
| 26-50 | 96 | 96 | 192 |
| 51-75 | 144 | 144 | 288 |
| 76-100 | 192 | 192 | 384 |
| 101-125 | 240 | 240 | 480 |
| 126-150 | 288 | 288 | 576 |
| 151-175 | 336 | 336 | 672 |
| 176-200 | 384 | 384 | 768 |
| 201+ | 384 plus 48 square feet for every 25 dwelling units above 201 | 384 plus 48 square feet for every 25 dwelling units above 201 | 768 plus 96 square feet for every 25 dwelling units above 201 |
| **Project Total** | **624** | **624** | **1,248** |

SOURCE: City of San Diego Municipal Code, Article 2, Division 8: Refuse and Recyclable Material Storage Regulations, Section142.0830, Table 142-08C; effective, January 2000.

## 6.4 Landscaping and Green Waste Recycling

The proposed project would require some landscaping and landscape maintenance. Drought-tolerant plants would be used to reduce the amount of green waste produced. Collection of green waste and its disposal at recycling centers that accept green waste (e.g., the Miramar Greenery facility) would help further reduce the waste generated by the proposed project during occupancy. As discussed in Section 6.2, Waste Reduction Measures, the ongoing waste management plan would include a means for handling landscaping and green waste materials.

# 7.0 Conclusion

## 7.1 Demolition, Grading, and Construction

A total of approximately 130,412 tons of waste would be generated in the demolition, grading, and construction phases of the proposed project (see Table 4). Most would be recycled at source separated facilities that achieve a 100 percent diversion. When necessary, mixed debris would be recycled at a lower diversion rate, leaving 390 tons to be disposed. This amounts to a 99.7 percent reduction in solid waste, which would be diverted from the landfill.

## 7.2 Occupancy

The proposed project would include 319 residential units and would generate approximately 297 tons of waste per year and be required to provide a minimum of 624 square feet of exterior refuse and recyclable material storage area each (total of 1,248 square feet; see Table 6). The applicant (or applicant's successor in interest) would implement an ongoing waste management plan with measures to ensure that the waste is minimized and the operations phase of the project complies with the City ordinances. Compliance with existing ordinances has been shown to achieve a 40 percent diversion rate. Therefore, approximately 178 tons of waste per year would be generated from the proposed project, exceeding the 60 ton-per-year threshold of significance for having a cumulative impact on solid waste services by 118 tons per year. Thus, a near 100 percent diversion rate during the other phases would be required to offset the impact of the occupancy phase.

## 7.3 Overall Compliance

With implementation of this WMP, the proposed project would comply with all applicable City ordinances regarding collection, diversion, and disposal of waste generated from C&D, grading, and occupancy. During occupancy, an ongoing waste management plan would include provision of sufficient interior and exterior storage space for refuse and recyclable materials, and a means of handling and recycling landscaping and green waste materials.

This WMP outlines strategies to achieve 99.7 percent of waste being diverted from disposal during the C&D and grading phases of the proposed project. This would reduce the anticipated impact of waste disposal to below the threshold of direct significance as well as greatly exceed the state requirement of 50 percent and goal of 75 percent. Although the occupancy phase is anticipated to involve a recurring shortcoming of only 40 percent diversion with implementation of an ongoing waste management plan, this would be compensated for by the near 100 percent diversion rate during the other phases.

# 8.0 References Cited

California, State of

1986 Assembly Bill 2020. California Beverage Container Recycling and Litter Reduction Act.

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2013 Waste Characterization, Residential Developments: Estimated Solid Waste Generation Rates. California Department of Resources Recycling and Recovery. http://www.calrecycle.ca.gov/wastechar/WasteGenRates/Residential.htm. Updated January 16. Accessed online October 15, 2015.

2014 Assembly Bill 1826. Solid Waste: Organic Waste.

San Diego, City of

2000 Waste Composition Study 1999-2000. Final Report. San Diego Environmental Services Department. November 2000.

2007a Recycling Ordinance. San Diego Municipal Code Chapter 6, Article 6, Division 7. November 20, 2007.

2007b Refuse and Recyclable Materials Storage Regulations. Municipal Code Chapter 14, Article 2, Division 8. December 9, 2007.

2008a Construction and Demolition Debris Diversion Deposit Program. San Diego Municipal Code Chapter 6, Article 6, Division 6.

2008b Construction and Demolition Debris Conversion Rate Table. San Diego Environmental Services Department. May 2008.

2011 Significance Determination Thresholds. California Environmental Quality Act. January.

2015a 2015 Certified Construction and Demolition Recycling Facility Directory, San Diego Environmental Services Department.

2015b Clean Fill Dirt Program. San Diego Environmental Services Department. http://www.sandiego.gov/environmental-services/miramar/cfdp.shtml. Accessed online May 20, 2015.

U.S. Environmental Protection Agency (U.S. EPA)

2009 Estimating 2003 Building-Related Construction and Demolition Materials Amounts. March.

# ATTACHMENTS

# ATTACHMENT 1

# ESD C&D Debris Conversion Rate Table

# CITY OF SAN DIEGO
# CONSTRUCTION & DEMOLITION (C&D) DEBRIS CONVERSION RATE TABLE

This worksheet lists materials typically generated from a construction or demolition project and provides formulas for converting common units (i.e., cubic yards, square feet, and board feet) to tons. It should be used for preparing your Waste Management Form, which requires that quantities be provided in tons.

**Step 1**
Enter the estimated quantity for each applicable material in Column I, based on units of cubic yards (cy), square feet (sq ft), or board feet (bd ft).

**Step 2**
Multiply by Tons/Unit figure listed in Column II. Enter the result for each material in Column III. If using Excel version, column III will automatically calculate tons

**Step 3**
Enter quantities for each separated material from Column III on this worksheet into the corresponding section of your Waste Management Form.

For your final calculations, use the actual quantities, based on weight tags, gate receipts, or other documents.

| | | Column I | | | Column II | | Column III |
|---|---|---|---|---|---|---|---|
| **Category** | **Material** | **Volume** | **Unit** | | **Tons/Unit** | | **Tons** |
| Asphalt/Concrete | Asphalt (broken) | | cy | x | 0.70 | = | |
| | Concrete (broken) | | cy | x | 1.20 | = | |
| | Concrete (solid slab) | | cy | x | 1.30 | = | |
| Brick/Masonry/Tile | Brick (broken) | | cy | x | 0.70 | = | |
| | Brick (whole, palletized) | | cy | x | 1.51 | = | |
| | Masonry Brick (broken) | | cy | x | 0.60 | = | |
| | Tile | | sq ft | x | 0.00175 | = | |
| Building Materials (doors, windows, cabinets, etc.) | | | cy | x | 0.15 | = | |
| Cardboard (flat) | | | cy | x | 0.05 | = | |
| Carpet | By square foot | | sq ft | x | 0.0005 | = | |
| | By cubic yard | | cy | x | 0.30 | = | |
| Carpet Padding/Foam | | | sq ft | x | 0.000125 | = | |
| Ceiling Tiles | Whole (palletized) | | sq ft | x | 0.0003 | = | |
| | Loose | | cy | x | 0.09 | = | |
| Drywall (new or used) | 1/2" (by square foot) | | sq ft | x | 0.0008 | = | |
| | 5/8" (by square foot) | | sq ft | x | 0.00105 | = | |
| | Demo/used (by cubic yd) | | cy | x | 0.25 | = | |
| Earth | Loose/Dry | | cy | x | 1.20 | = | |
| | Excavated/Wet | | cy | x | 1.30 | = | |
| | Sand (loose) | | cy | x | 1.20 | = | |
| Landscape Debris (brush, trees, etc) | | | cy | x | 0.15 | = | |
| Mixed Debris | Construction | | cy | x | 0.18 | = | |
| | Demolition | | cy | x | 1.19 | = | |
| Scrap metal | | | cy | x | 0.51 | = | |
| Shingles, asphalt | | | cy | x | 0.22 | = | |
| Stone (crushed) | | | cy | x | 2.35 | = | |
| Unpainted Wood & Pallets | By board foot | | bd ft | x | 0.001375 | = | |
| | By cubic yard | | cy | x | 0.15 | = | |
| Garbage/Trash | | | cy | x | 0.18 | = | |
| Other (estimated weight) | | | cy | x | estimate | = | |
| | | | cy | x | estimate | = | |
| | | | cy | x | estimate | = | |
| | | | cy | x | estimate | = | |

**Total All** ______

# ATTACHMENT 2

## 2015 Certified Construction & Demolition Recycling Facility Directory

THE CITY OF SAN DIEGO

ENVIRONMENTAL SERVICES DEPARTMENT

# 2015 Certified Construction & Demolition Recycling Facility Directory

These facilities are certified by the City of San Diego to accept materials listed in each category. Hazardous materials are not accepted. The diversion rate for these materials shall be considered 100%, except mixed C&D debris which updates quarterly. The City is not responsible for changes in facility information. Please call ahead to confirm details such as accepted materials, days and hours of operation, limitations on vehicle types, and cost. For more information visit: [www.recyclingworks.com](www.recyclingworks.com).

| ***Please note: In order to receive recycling credit, Mixed C&D Facility and transfer station receipts must:***<br>*-be coded as construction & demolition (C&D) debris*<br>*-have project address or permit number on receipt*<br>**Make sure to notify weighmaster that your load is subject to the City of San Diego C&D Ordinance.*<br>***Note about landfills: Miramar Landfill and other landfills do not recycle mixed C&D debris.*** | **Mixed C&D Debris** | **Asphalt /Concrete** | **Brick/Block/Rock** | **Building Materials for Reuse** | **Cardboard** | **Carpet** | **Carpet Padding** | **Ceiling Tile** | **Ceramic Tile / Porcelain** | **Clean Fill Dirt** | **Clean Wood / Green Waste** | **Drywall** | **Industrial Plastics** | **Lamps / Light Fixtures** | **Metal** | **Mixed Inerts** | **Styrofoam Blocks** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EDCO Recovery & Transfer**<br>3660 Dalbergia St, San Diego, CA 92113<br>619-234-7774 \| www.edcodisposal.com/public-disposal | 65% | | | | | | | | | | | ● | | | | | |
| **EDCO Station Transfer Station & Buy Back Center**<br>8184 Commercial St, La Mesa, CA 91942<br>619-466-3355 \| www.edcodisposal.com/public-disposal | 65% | | | | ● | | | | | | | ● | | | ● | | |
| **EDCO CDI Recycling & Buy Back Center**<br>224 S. Las Posas Rd, San Marcos, CA 92078<br>760-744-2700 \| www.edcodisposal.com/public-disposal | 89% | | | | ● | | | | | | | | | | ● | | |
| **Escondido Resource Recovery**<br>1044 W. Washington Ave, Escondido<br>760-745-3203 \| www.edcodisposal.com/public-disposal | 65% | | | | | | | | | | | | | | | | |
| **Fallbrook Transfer Station & Buy Back Center**<br>550 W. Aviation Rd, Fallbrook, CA 92028<br>760-728-6114 \| www.edcodisposal.com/public-disposal | 65% | | | | ● | | | | | | | | | | ● | | |
| **Otay C&D/Inert Debris Processing Facility**<br>1700 Maxwell Rd, Chula Vista, CA 91913<br>619-421-3773 \| www.sd.disposal.com | 66% | | | | | | | | | | | | | | | | |
| **Ramona Transfer Station & Buy Back Center**<br>324 Maple St, Ramona, CA 92065<br>760-789-0516 \| www.edcodisposal.com/public-disposal | 65% | | | | ● | | | | | | | | | | ● | | |
| **SANCO Resource Recovery & Buy Back Center**<br>6750 Federal Blvd, Lemon Grove, CA 91945<br>619-287-5696 \| www.edcodisposal.com/public-disposal | 65% | | | | ● | | | | | | | | | | ● | | |
| **All American Recycling**<br>10805 Kenney St, Santee, CA 92071<br>619-508-1155 (Must call for appointment) | | | | | | ● | | | | | | | | | | | |
| **Allan Company**<br>6733 Consolidated Wy, San Diego, CA 92121<br>858-578-9300 \| www.allancompany.com/facilities.htm | | | | | ● | | | | | | | | | | ● | | |
| **Allan Company Miramar Recycling**<br>5165 Convoy St, San Diego, CA 92111<br>858-268-8971 \| www.allancompany.com/facilities.htm | | | | | ● | | | | | | | | | | ● | | |
| **Allan Company**<br>8514 Mast Blvd, Santee, CA 92701<br>619-448-4295 \| www.allancompany.com/facilities.htm | | | | | ● | | | | | | | | | | ● | | |
| **AMS**<br>4674 Cardin St, San Diego, CA 92111<br>858-541-1977 \| www.a-m-s.com | | | | | | | | ● | | | | | | | | | |
| **AMS**<br>1120 West Mission Ave, Escondido, CA 92025<br>858-541-1977 \| www.a-m-s.com | | | | | | | | ● | | | | | | | | | |
| **Armstrong World Industries, Inc.**<br>300 S. Myrida St, Pensacola, FL 32505<br>877-276-7876 (Press 1, Then 8)<br>www.armstrong.com/commceilingsna | | | | | | | | ● | | | | | | | | | |
| **Cactus Recycling**<br>8710 Avenida De La Fuente, San Diego, CA 92154<br>619-661-1283 \| www.cactusrecycling.com | | | | | ● | | | | | | | | ● | | ● | | ● |

| | Mixed C&D Debris | Asphalt /Concrete | Brick/Block/Rock | Building Materials for Reuse | Cardboard | Carpet | Carpet Padding | Ceiling Tile | Ceramic Tile / Porcelain | Clean Fill Dirt | Clean Wood / Green Waste | Drywall | Industrial Plastics | Lamps / Light Fixtures | Metal | Mixed Inerts | Styrofoam Blocks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DFS Flooring**<br>10178 Willow Creek Road, San Diego, CA 92131<br>858-630-5200 \| www.dfsflooring.com | | | | | | ● | ● | | | | | | | | | | |
| **Enniss Incorporated**<br>12421 Vigilante Rd, Lakeside, CA 92040<br>619-443-9024 \| www.enniss.net | | ● | ● | | | | | | ● | ● | | | | | | | |
| **Escondido Sand and Gravel**<br>500 N. Tulip St, Escondido, CA 92025<br>760-432-4690 \| www.weirasphalt.com/esg | | ● | | | | | | | | | | | | | | | |
| **Habitat for Humanity ReStore**<br>10222 San Diego Mission Rd, San Diego, CA 92108<br>619-516-5267 \| www.sdhfh.org/restore.php | | | | ● | | | | | | | | | | | | | |
| **Hanson Aggregates West – Lakeside Plant**<br>12560 Highway 67, Lakeside, CA 92040<br>858-547-2141 | | ● | | | | | | | | | | | | | | | |
| **Hanson Aggregates West – Miramar**<br>9229 Harris Plant Rd, San Diego, CA 92126<br>858-974-3849 | | ● | | | | | | | | ● | | | | | | | |
| **Hidden Valley Steel & Scrap, Inc.**<br>1342 Simpson Wy, Escondido, CA 92029<br>760-747-6330 | | | | | | | | | | | | | | | ● | | |
| **HVAC Exchange**<br>2675 Faivre St, Chula Vista, CA 91911<br>619-423-1855 \| www.thehvacexchange.com | | | | | | | | | | | | | | | ● | | |
| **IMS Recycling Services**<br>2740 Boston Ave, San Diego, CA 92113<br>619-231-2521 \| www.imsrecyclingservices.com | | | | | ● | | | | | | | | ● | | | | |
| **IMS Recycling Services**<br>2697 Main St, San Diego, CA 92113<br>619-231-2521 \| www.imsrecyclingservices.com | | | | | | | | | | | | | ● | | ● | | |
| **Inland Pacific Resource Recovery**<br>12650 Slaughterhouse Canyon Rd, Lakeside, CA 92040<br>619-390-1418 | | | | | | | | | | | ● | | | | | | |
| **Lakeside Land Co., Inc.**<br>10101 Riverford Rd, Lakeside, CA 92040<br>619-449-9083 \| www.lakesideland.com | | ● | | | | | | | | | | | | | | ● | |
| **Lamp Disposal Solutions**<br>8248 Ronson Ct, San Diego, CA 92111<br>858-569-1807 \| www.lampdisposalsolutions.com | | | | | | | | | | | | | | ● | | | |
| **Lights Out Disposal**<br>1097 Palm Ave, Ste 100, El Cajon, CA 92020<br>619-438-1093 \| www.lightsoutdisposal.com | | | | | | | | | | | | | | ● | | | |
| **Los Angeles Fiber Company**<br>4920 S. Boyle Ave, Vernon, CA 90058<br>323-589-5637 \| www.lafiber.com | | | | | | ● | ● | | | | | | | | | | |
| **Miramar Greenery, City of San Diego**<br>5180 Convoy St, San Diego, CA 92111<br>858-694-7000 \| www.sandiego.gov/environmental-services/miramar/greenery.shtml | | | | | | | | | | | ● | | | | | | |
| **Moody's**<br>3210 Oceanside Blvd., Oceanside, CA 92056<br>760-433-3316 | | ● | | | | | | | | ● | | | | | | ● | |
| **Otay Valley Rock, LLC**<br>2041 Heritage Rd, Chula Vista, CA 91913<br>619-591-4717 \| www.otayrock.com | | ● | | | | | | | | | | | | | | | |
| **Pacific Steel, Inc.**<br>1700 Cleveland Ave, National City, CA 91950<br>619-474-7081 | | | | | | | | | | | | | | | ● | | |
| **Reclaimed Aggregates Chula Vista**<br>855 Energy Wy, Chula Vista, CA 91913<br>619-656-1836 | | ● | | | | | | | | | | | | | | ● | |

| | Mixed C&D Debris | Asphalt /Concrete | Brick/Block/Rock | Building Materials for Reuse | Cardboard | Carpet | Carpet Padding | Ceiling Tile | Ceramic Tile / Porcelain | Clean Fill Dirt | Clean Wood / Green Waste | Drywall | Industrial Plastics | Lamps / Light Fixtures | Metal | Mixed Inerts | Styrofoam Blocks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reconstruction Warehouse**<br>3341 Hancock St., San Diego, CA 92110<br>619-795-7326 \| www.recowarehouse.com | | | | ● | | | | | | | | | | | | | |
| **Robertson's Ready Mix**<br>2094 Willow Glen Dr, El Cajon, CA 92019<br>619-593-1856 | | ● | | | | | | | | ● | | | | | | ● | |
| **Romero General Construction Corp.**<br>8354 Nelson Wy, Escondido, CA 92026<br>760-749-9312 \|<br>www.romerogc.com/crushing/nelsonway.htm | | ● | | | | | | | | | | | | | | | |
| **SA Recycling**<br>3055 Commercial St., San Diego, CA 92113<br>619-238-6740 \| www.sarecycling.com | | | | | | | | | | | | | | | ● | | |
| **SA Recycling**<br>1211 S. 32nd St., San Diego, CA 92113<br>619-234-6691 \| www.sarecycling.com | | | | | | | | | | | | | | | ● | | |
| **Vulcan Carol Canyon Landfill and Recycle Site**<br>10051 Black Mountain Rd, San Diego, CA 92126<br>858-530-9465 \| www.vulcanmaterials.com/carrollcanyon | | ● | ● | | | | | | | ● | | | | | | ● | |

TRANSPORTATION IMPACT ANALYSIS

# FRIARS ROAD RESIDENTIAL

San Diego, California
October 25, 2016

LLG Ref. 3-15-2525


*Prepared by:*

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&
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# EXECUTIVE SUMMARY

Linscott, Law & Greenspan, Engineers (LLG) has been retained to prepare the following Transportation Impact Analysis associated with the Friars Road Residential project (Project). The Project is located at 6950 / 7020 / 7050 Friars Road, directly across from Fashion Valley Mall, in the City of San Diego within the Linda Vista Community Planning area.

The Project proposes to remove the three existing office buildings currently on the site, totaling 28,548 SF, and replace them with 249 apartments and 70 condominiums, for a total of 319 units of multi-family residential. Six of the units are proposed to be designated “shopkeeper” units. Per the City’s Land Development Code (LDC), a shopkeeper unit is a residential dwelling unit with both living quarters and commercial space which is operated by the resident of the dwelling unit.

Access to the Project site is proposed via three (3) driveways: the two existing driveways east and west of Via De La Moda, and a new driveway which will serve as the primary access to the site, forming the north leg of the signalized Friars Road / Via De La Moda intersection. Access to the site will be gate controlled. Construction is expected to begin in January 2017 and will take approximately 20 months to complete. Opening Day of the Project is anticipated at the end of 2018.

The Project will require a Planned Development Permit, a Site Development Permit and a Vesting Tentative Map.

Using the City of San Diego trip generation rates from the *Trip Generation Manual*, May 2003, the Project is calculated to generate a net total of 878 ADT with -61 inbound and 91 outbound trips during the AM peak hour and 80 inbound and -42 outbound trips during the PM peak hour. The Project is calculated with negative AM inbound and PM outbound peak hour volumes because ***the reduction in traffic from the removal of the existing uses is greater than the new traffic added due to new multi-family residential use.*** Furthermore, the change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes.

With experience working on other projects in the area, eight (8) Near-Term (Opening Day 2018) cumulative projects were identified.

A study area encompassing areas of anticipated impact related to the Project, including seven (7) intersections and six (6) street segments, were studied under the following six (6) scenarios:

- Existing
- Existing + Project
- Near-Term (Opening Day 2018)
- Near-Term (Opening Day 2018) + Project
- Year 2035 (Horizon Year)
- Year 2035 (Horizon Year) + Project

Based on the City of San Diego significance criteria, the Project is ***not*** calculated to generate significant direct or cumulative impacts, and therefore mitigation measures are not required. However, as a condition of approval, and to provide access to the Project and be consistent with the Community Plan, the Project will construct the following improvements along the Project frontage. These improvements are assumed in the "with project" analyses.

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage:*** Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-lane Major Road classification.

Based on coordination with City staff and information provided in the *Mission Valley Public Facilities Financing Plan* (PFFP), the Near-Term (Opening Day 2018) scenario assumes Phase I of the SR 163 / Friars Road Interchange project, and the Year 2035 (Horizon Year) scenario assumes the proposed extension of Hazard Center Drive and the proposed extension of Camino de La Reina from Fashion Valley Road to Via Las Cumbres and the extension of Via Las Cumbres between Friars Road and Hotel Circle N. as proposed in the Levi-Cushman Specific Plan.

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# FRIARS ROAD RESIDENTIAL

San Diego, California
October 25, 2016

## 1.0 INTRODUCTION

Linscott, Law & Greenspan, Engineers (LLG) has been retained to prepare the following Transportation Impact Analysis associated with the Friars Road Residential project (Project). The Project is located at 6950 / 7020 / 7050 Friars Road, directly across from the Fashion Valley Mall, in the City of San Diego within the Linda Vista Community Planning area.

The Project proposes to remove the three existing office buildings currently on the site, totaling 28,548 SF, and replace them with 249 apartments and 70 condominiums, for a total of 319 units of multi-family residential. Six of the units are proposed to be designated “shopkeeper” units.

The Project will require a Planned Development Permit, a Site Development Permit and a Vesting Tentative Map.

The site is located north of Interstate 8 (I-8) and west of State Route 163 (SR-163), just north of the Friars Road / Via De La Moda intersection. ***Figure 1–1*** shows the Project vicinity map and ***Figure 1–2*** shows the Project area map.

The traffic analysis presented in this report encompasses the following key areas:

- Project Description
- Study Area
- Existing Conditions
- Cumulative Projects
- Existing Analysis
- Project Trip Generation/ Distribution/ Assignment
- Existing + Project Analysis
- Near-Term (Opening Day 2018) Analysis
- Year 2035 (Horizon Year) Analysis
- Site Access and On-Site Circulation
- Parking
- Alternative Transportation Assessment
- Transportation Demand Management
- Construction Traffic Assessment
- Conclusions

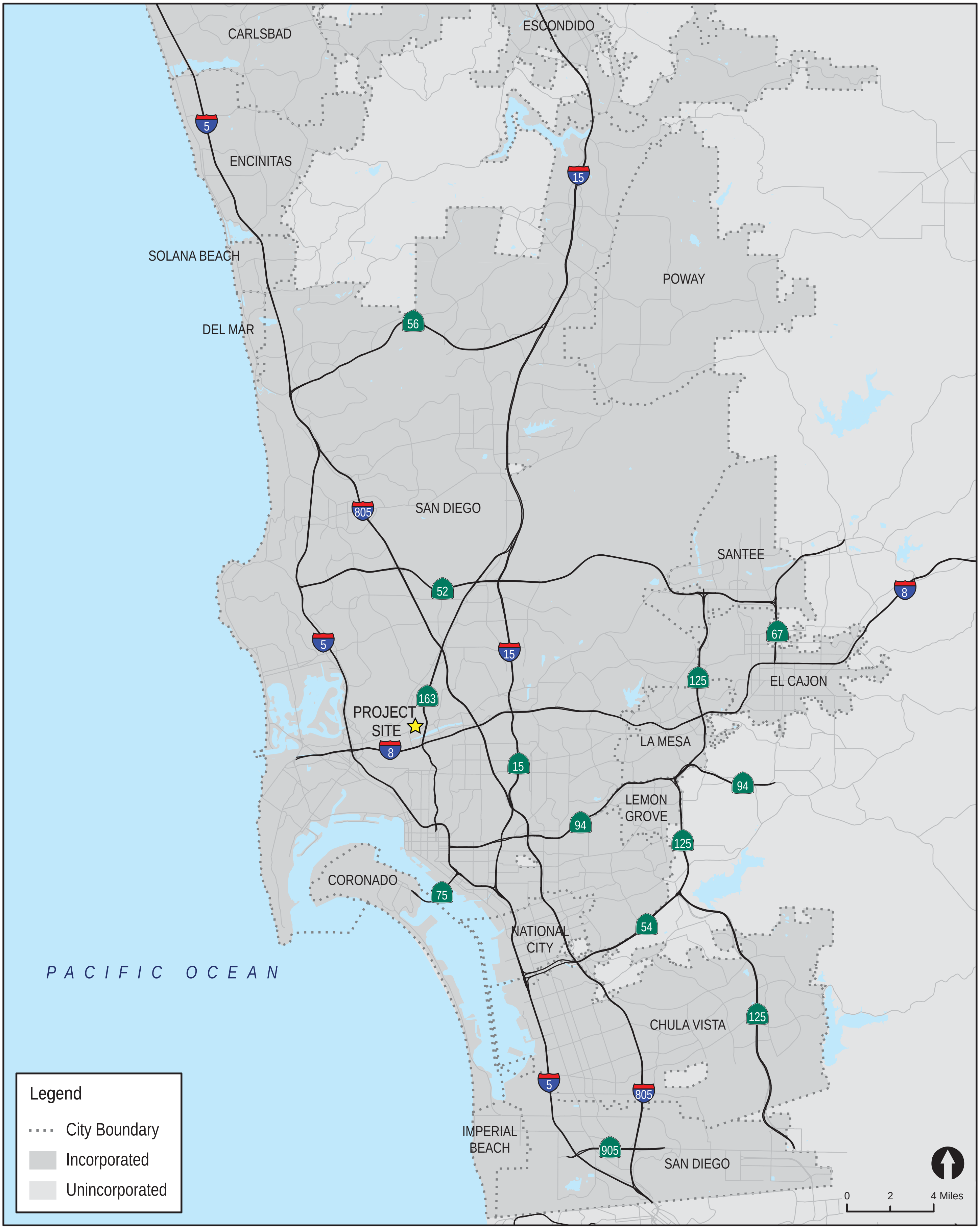


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**Figure 1-1**

## Vicinity Map

FRIARS ROAD RESIDENTIAL

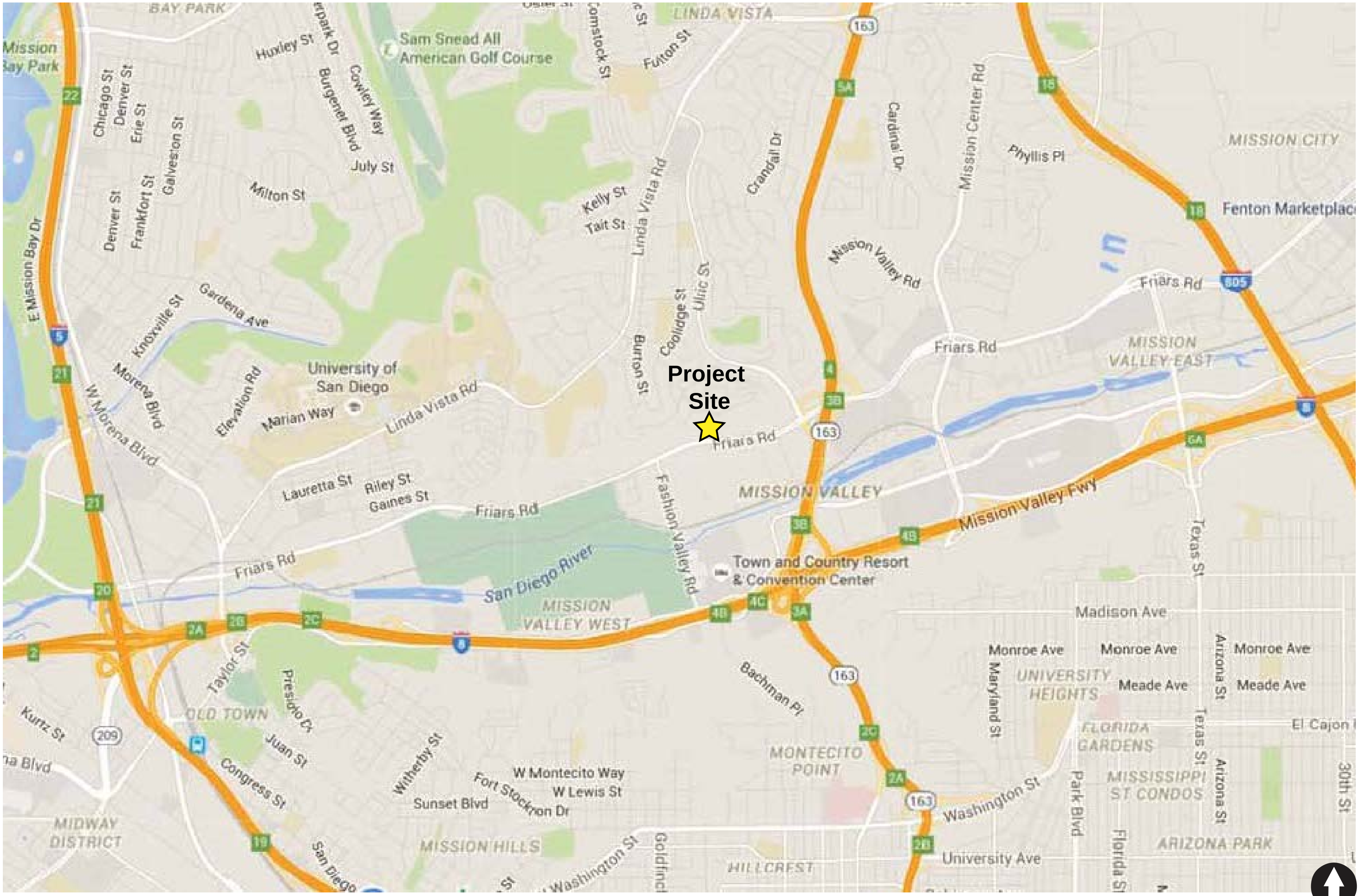


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**Figure 1-2**

## Project Area Map

FRIARS ROAD RESIDENTIAL

# 2.0 PROJECT DESCRIPTION

## 2.1 Project Location

The Project site is located at 6950 / 7020 / 7050 Friars Road, directly across from Fashion Valley Mall, in the City of San Diego within the Linda Vista Community Planning area. The site is located north of Interstate 8 (I-8) and west of State Route 163 (SR-163), just north of the Friars Road / Via De La Moda intersection.

## 2.2 Project Description

The Project proposes to remove the three existing office buildings currently on the site, totaling 28,548 SF, and replace them with 249 apartments and 70 condominiums, for a total of 319 units of multi-family residential. Six of the units are proposed to be designated “shopkeeper” units with a total of 1,542 square feet of commercial space. Per the City’s Land Development Code (LDC), a shopkeeper unit is a residential dwelling unit with both living quarters and commercial space which is operated by the resident of the dwelling unit.

Access to the Project site is proposed via three (3) driveways: the two existing right-in / right-out driveways east and west of Via De La Moda, and a new driveway which will serve as the primary access to the site, forming the north leg of the Frias Road / Via De La Moda intersection. Access to the site will be gate controlled. Construction is expected to begin in early 2017 with Opening Day of the Project anticipated at the end of 2018.

The Project will require a Planned Development Permit, a Site Development Permit and a Vesting Tentative Map.

The following improvements will be constructed by the Project along the Project frontage:

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage***: Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-Lane Major Road classification.

***Figures 2–1a*** and 2-***1b*** depict the Project Site Plan.

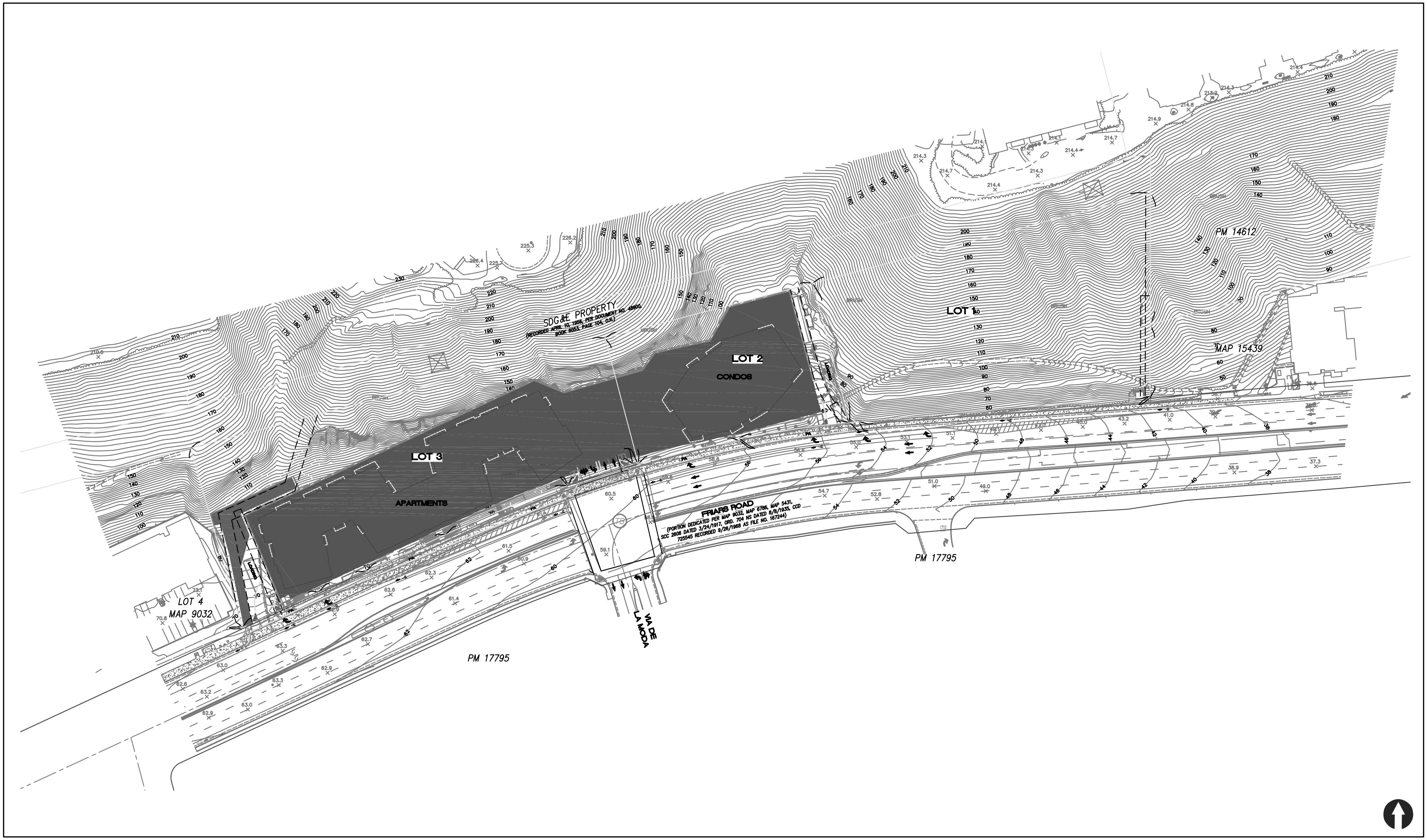


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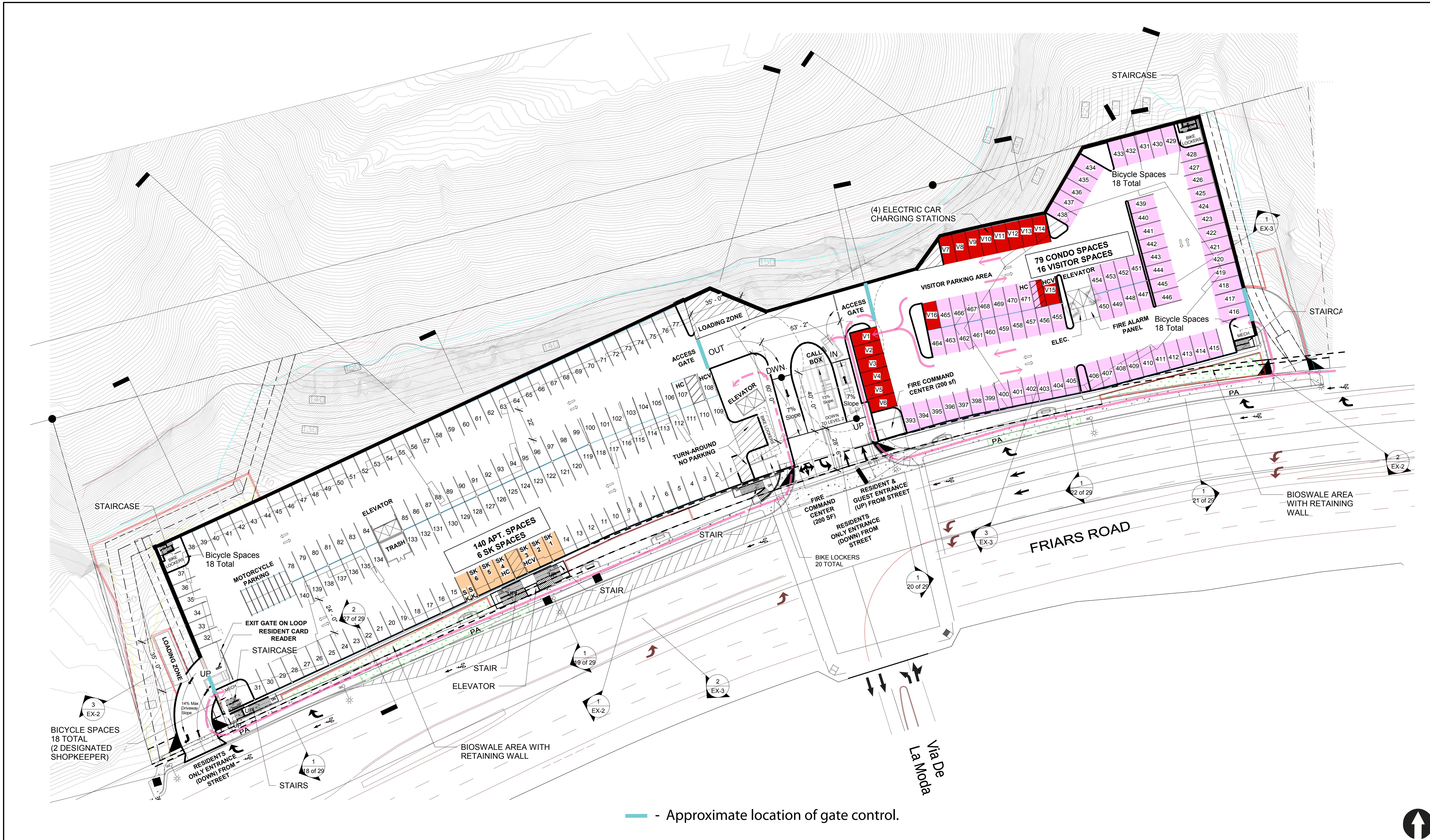
Figure 2-1a

**Site Plan**

Friars Road Multi-Family




- Approximate location of gate control.

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**Figure 2-1b**

## Site Plan

FRIARS ROAD MULTI-FAMILY

# 3.0 EXISTING CONDITIONS

Evaluation of the traffic impacts associated with the proposed Project requires an understanding of the existing transportation system within the study area. ***Figure 3–1*** shows an existing conditions diagram.

## 3.1 Project Study Area

The study area for this project encompasses areas of anticipated impact related to the project. The scope of the study area was developed with the City of San Diego staff per the *City of San Diego Traffic Impact Study Manual* guidelines and the *SANTEC/ITE Regional Guidelines for Traffic Impact Studies* for intersections and segments using a SANDAG Series 12 (2035) traffic model project distribution and the "50 directional peak-hour trips" per the City's guidelines. Based on the Project's trip generation and the City's "50 peak-hour trips in either direction" for freeway mainlines and "20 peak-hour trips in either direction for metered freeway ramps" guidelines, analysis of the study area freeway mainlines is not required, and there are no freeway ramp meters within the study area. The development of the study area also took into account a review of approved traffic studies in the project area, and a working knowledge of the local transportation system.

Based on the above guidelines, this study analyzes seven (7) intersections and six (6) street segments.

*Intersections:*

- Friars Road / Fashion Valley Road
- Friars Road / Via De La Moda
- Friars Road / Avenida De Las Tiendas (Private Driveway)
- Friars Road / SR-163 Southbound Ramps
- Ulric Street / SR-163 Southbound On-Ramp
- Friars Road / SR-163 Northbound Ramps
- Riverwalk Drive / Fashion Valley Road

*Street Segments:*

- Friars Road: West of Fashion Valley Road
- Friars Road: Fashion Valley Road to Via De La Moda
- Friars Road: Via De La Moda to Avenida De Las Tiendas (Private Driveway)
- Friars Road: Avenida De Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway)
- Friars Road: Avenida Del Rio (Private Driveway) to Ulric Street
- Fashion Valley Road: Friars Road to Riverwalk Drive

## 3.2 Existing Street Network

The following is a description of the existing street network in the study area.

**Friars Road** forms the boundary between the Mission Valley and Linda Vista Communities, and is a classified roadway on both the Mission Valley Community Plan and the Linda Vista Community Plan. Friars Road is classified as a Four-Lane Major Arterial between east of Napa Street and Colusa Street, a Six-Lane Major Arterial between Colusa Street and the SR-163 Interchange, an Eight-Lane Primary Arterial between the SR-163 Interchange and Mission Center Road, and a Six-Lane Expressway between Mission Center Road and the I-15 Interchange in the *Mission Valley Community Plan*.

Within the Project study area Friars Road is currently constructed as a four-lane undivided roadway with a two-way-left-turn lane west of Fashion Valley Road, as a five-lane divided roadway between Fashion Valley Road and Avenida De Las Tiendas, and as a six-lane divided roadway east of Avenida De Las Tiendas. The posted speed limit within the study area is 45 mph. Curbside parking is permitted intermittently in the westbound direction. Bike lanes are provided in both directions throughout the corridor. Bus stops are provided near the SR-163 interchange.

**Fashion Valley Road** is classified as a four-lane Major Arterial in the *Mission Valley Community Plan*. Currently, Fashion Valley Road is constructed as a four-lane undivided roadway (Collector) between Friars Road and Hotel Circle N. While this roadway lacks any center left-turn lane or median, left-turn pockets are provided at intersections and one mid-block location (transit center driveway), providing additional capacity. Traffic is controlled by signals at the intersections of Friars Road, Riverwalk Drive and Hotel Circle North. Traffic is controlled by stop signs at parking lot driveways to commercial / retail uses. The posted speed limit is 35 mph. Curbside parking is not permitted. No bike lanes are provided, but three bus stops are provided between Friars Road and Hotel Circle N.

**Riverwalk Drive** is classified as a four-lane Collector in the *Mission Valley Community Plan*. Currently, Riverwalk Drive is constructed as a two-lane undivided roadway (Collector) that terminates into the Fashion Valley Mall (east of Avenida Del Rio). A planned extension of Hazard Center Drive that includes 2 lanes under SR-163 is under design as a requirement of the Hazard Center Redevelopment project. Riverwalk Drive provides access to the Fashion Valley mall and Fashion Valley Transit Center. Curbside parking is not permitted.

**Ulric Street** is classified as a four-lane Major in the *Linda Vista Community Plan*. Within the study area, Ulric Street is currently constructed as a three-lane undivided roadway. The posted speed limit is 40 mph. Curbside parking is not permitted. Bike lanes and bus stops are provided.

## 3.3 Existing Traffic Volumes

***Peak Hour Volumes–*** Existing weekday AM and PM peak hour (7:00-9:00 AM and 4:00-6:00 PM) traffic volumes were commissioned at all the study area intersections. The AM and PM peak hour manual turning movement counts were commissioned on Tuesday October 6, and Wednesday October 7, 2015, while schools in the area were in session.

***Daily Volumes–*** Existing street segment Average Daily Traffic (ADT) volumes were commissioned on Tuesday October 6, 2015 while schools in the area were in session. ***Table 3–1*** is a summary of the existing street segment average daily traffic volumes within the Project study area.

***Figure 3–2*** shows the Existing AM and PM peak hour turning movement volumes and daily traffic volumes. ***Appendix A*** contains copies of the intersection and segment counts sheets and the signal timing plans.

TABLE 3–1
EXISTING TRAFFIC VOLUMES

| Street Segment | ADT[a] | Date[b] | Source |
|---|---|---|---|
| **Friars Road** | | | |
| West of Fashion Valley Road | 25,337 | October 2015 | LLG |
| Fashion Valley Road to Via De La Moda | 25,980 | October 2015 | LLG |
| Via De La Moda to Avenida De Las Tiendas (Private Driveway) | 31,416 | October 2015 | LLG |
| Avenida De Las Tiendas (Private Driveway) to Ulric Street[b] | 42,743 | October 2015 | LLG |
| **Fashion Valley Road** | | | |
| Friars Road to Riverwalk Drive | 10,268 | October 2015 | LLG |

***Footnotes:***

a. Average Daily Traffic Volumes.
b. Count conducted east of Avenida del Rio, and includes outbound traffic from the Avenida del Rio driveway.

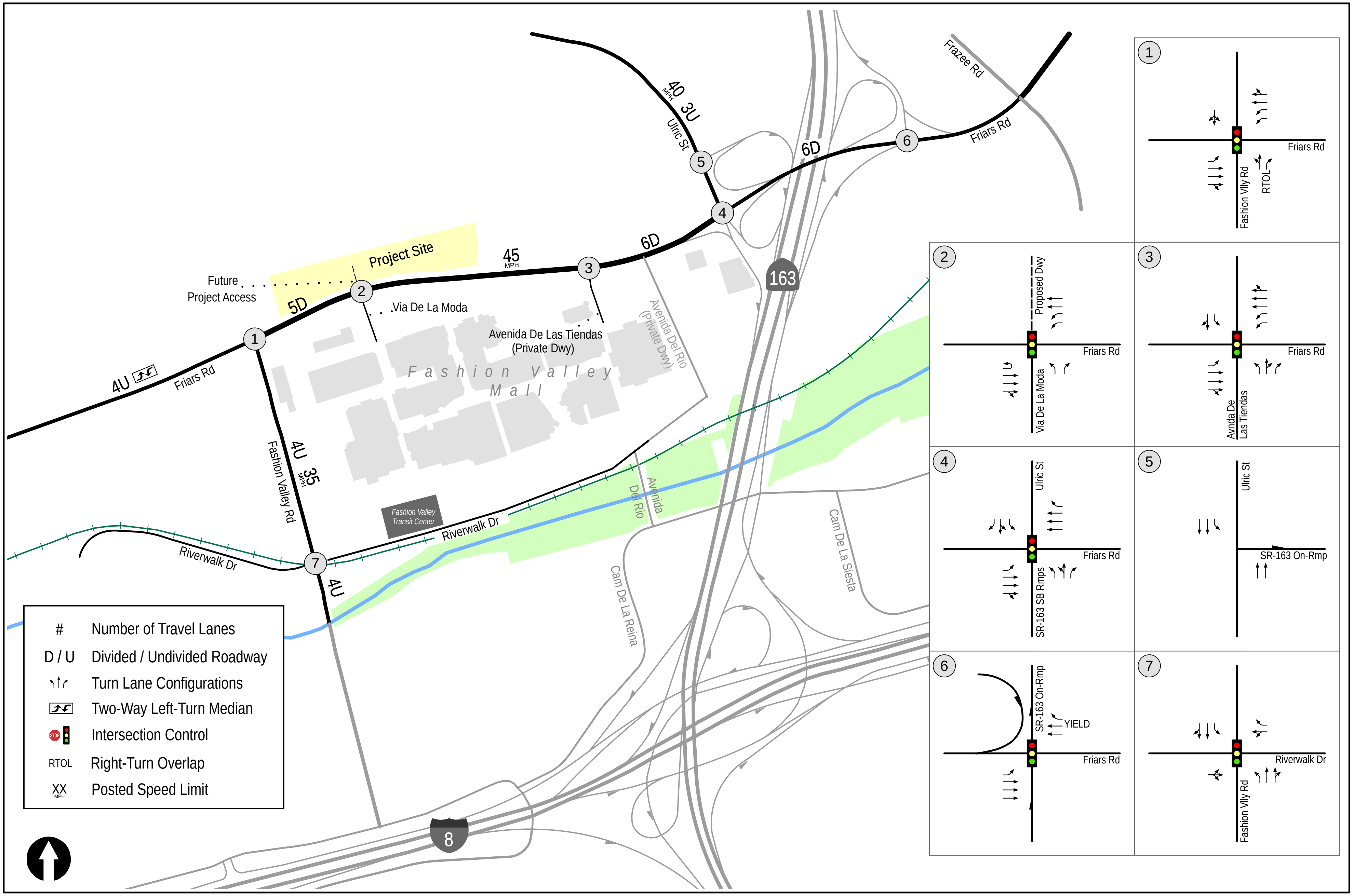


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**Figure 3-1**

# Existing Conditions Diagram

FRIARS ROAD RESIDENTIAL

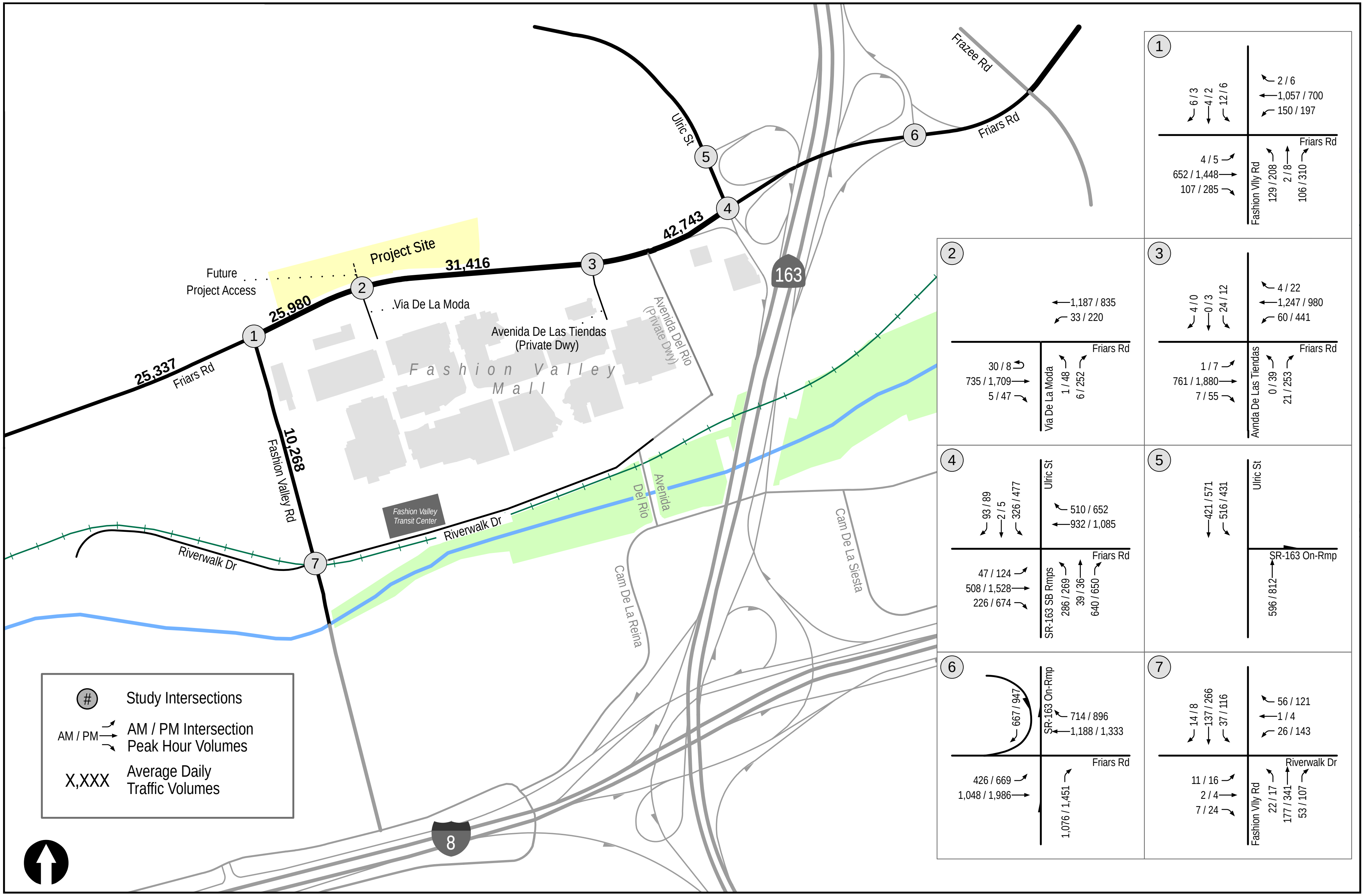


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**Figure 3-2**

# Existing Traffic Volumes

FRIARS ROAD RESIDENTIAL

## 4.0 SIGNIFICANCE CRITERIA

According to the City of San Diego's *Significance Determination Thresholds* dated January 2011, a project is considered to have a significant impact if project traffic would decrease the operations of surrounding roadways by a defined threshold. For projects deemed complete on or after January 1, 2007, the City defined thresholds are shown in ***Table 4–1***.

The impact is designated either a "direct" or "cumulative" impact. According to the City's *Significance Determination Thresholds*,

> "*Direct* traffic impacts are those projected to occur at the time a proposed development becomes operational, including other developments not presently operational but which are anticipated to be operational at that time (opening day)."
>
> "*Cumulative* traffic impacts are those projected to occur at some point after a proposed development becomes operational, such as during subsequent phases of a project and when additional proposed developments in the area become operational (short-term cumulative) or when affected community plan area reaches full planned buildout (long-term cumulative)."
>
> It is possible that a project's opening day (direct) impacts may be reduced in the long term, as future projects develop and provide additional roadway improvements (for instance, through implementation of traffic phasing plans). In such a case, the project may have direct impacts but not contribute considerably to a cumulative impact."
>
> For intersections and roadway segments affected by a project, level of service (LOS) D or better is considered acceptable under both direct and cumulative conditions."

If the project exceeds the thresholds in *Table 4–1*, then the project is considered to have a significant "direct" or "cumulative" project impact. A significant impact can also occur if a project causes the Level of Service to degrade from D to E, even if the allowable increases in *Table 4–1* are not exceeded. A feasible mitigation measure will need to be identified to return the impact within the City thresholds, or the impact will be considered significant and unmitigated.

## TABLE 4–1
## CITY OF SAN DIEGO
## TRAFFIC IMPACT SIGNIFICANT THRESHOLDS

| Level of Service with Project[b] | Allowable Increase Due to Project Impacts[a] | | | | | |
|---|---|---|---|---|---|---|
| | Freeways | | Roadway Segments | | Intersections | Ramp Metering[c] |
| | V/C | Speed (mph) | V/C | Speed (mph) | Delay (sec.) | Delay (min.) |
| E | 0.010 | 1.0 | 0.02 | 1.0 | 2.0 | 2.0 |
| F | 0.005 | 0.5 | 0.01 | 0.5 | 1.0 | 1.0 |

***Footnotes:***

a. If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are determined to be significant. The project applicant shall then identify feasible improvements (within the Traffic Impact Study) that will restore/and maintain the traffic facility at an acceptable LOS.

b. All LOS measurements are based upon Highway Capacity Manual procedures for peak-hour conditions. However, V/C ratios for roadway segments are estimated on an ADT/24-hour traffic volume basis (using Table 2 of the City's Traffic Impact Study Manual). The acceptable LOS for freeways, roadways, and intersections is generally "D" ("C" for undeveloped locations). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive.

c. The allowable increase in delay at a ramp meter with more than 15 minutes delay and freeway LOS E is 2 minutes. The allowable increase in delay at a ramp meter with more than 15 minutes delay and freeway LOS F is 1 minute.

***General Notes:***

1. Delay = Average control delay per vehicle measured in seconds for intersections or minutes for ramp meters
2. LOS = Level of Service
3. V/C = Volume to Capacity ratio
4. Speed = Arterial speed measured in miles per hour

## 5.0 TRAFFIC ANALYSIS METHODOLOGY

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of service designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

### 5.1 Intersections

***Signalized intersections*** were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Volume 3: Interrupted Flow, Chapter 18 of the *2010 Highway Capacity Manual (HCM)*, with the assistance of the *Synchro* version 9 computer software. The delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS). A more detailed explanation of the methodology is attached in ***Appendix B***.

***Unsignalized intersections*** were analyzed under AM and PM peak hour conditions. Average vehicle delay and Levels of Service (LOS) was determined based upon the procedures found in Volume 3: Interrupted Flow, Chapter 19 for two-way stop-controlled intersections and Chapter 20 for all-way stop-controlled intersections of the *2010 Highway Capacity Manual (HCM)*, with the assistance of the *Synchro* version 9 computer software. A more detailed explanation of the methodology is attached in *Appendix B.*

### 5.2 Street Segments

Street segment analysis is based upon the comparison of average daily traffic volumes (ADTs) to the City of San Diego's *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics. The Mission Valley and Linda Vista Circulation Elements and the City of San Diego's *Roadway Classification, Level of Service, and ADT Table* is attached in ***Appendix C***.

# 6.0 ANALYSIS OF EXISTING CONDITIONS

The analysis of existing conditions includes the assessment of the study area intersections and street segments using the methodologies described in *Section 4.0* of this study.

## 6.1 Existing Intersection Operations

Intersection capacity analyses were conducted for the study intersections under Existing conditions. ***Table 6–1*** reports the intersection operations during the peak hour conditions. The study area intersections are calculated to currently operate at LOS D or better.

***Appendix D*** contains the intersection analysis worksheets for the Existing scenario.

## 6.2 Existing Street Segment Operations

Existing street segment analyses were conducted for roadways in the study area. ***Table 6–2*** reports Existing daily street segment operations. The study area street segments are calculated to currently operate at LOS C or better with the exception of Friars Road west of Fashion Valley Road which is calculated to operate at LOS E.

## TABLE 6–1
## EXISTING INTERSECTION OPERATIONS

| Intersection | Control Type | Peak Hour | Existing | |
|---|---|---|---|---|
| | | | Delay[a] | LOS[b] |
| 1. Friars Road / Fashion Valley Road | Signal | AM<br>PM | 12.0<br>23.5 | B<br>C |
| 2. Friars Road / Via De La Moda | Signal | AM<br>PM | 4.7<br>13.9 | A<br>B |
| 3. Friars Road / Avenida De Las Tiendas (Private Driveway) | Signal | AM<br>PM | 5.2<br>19.1 | A<br>B |
| 4. Friars Road / SR 163 SB Ramps | Signal | AM<br>PM | 30.2<br>44.3 | C<br>D |
| 5. Ulric Street / SR 163 SB On Ramp | Unsignalized | AM<br>PM | 16.2<br>19.7 | C<br>C |
| 6. Friars Road / SR 163 NB Ramps | Signal | AM<br>PM | 17.9<br>19.6 | B<br>B |
| 7. Riverwalk Drive / Fashion Valley Road | Signal | AM<br>PM | 12.3<br>18.7 | B<br>B |

***Footnotes:***

a. Average delay expressed in seconds per vehicle.
b. Level of Service.

| SIGNALIZED | | UNSIGNALIZED | |
|---|---|---|---|
| DELAY/LOS THRESHOLDS | | DELAY/LOS THRESHOLDS | |
| Delay | LOS | Delay | LOS |
| 0.0 ≤ 10.0 | A | 0.0 ≤ 10.0 | A |
| 10.1 to 20.0 | B | 10.1 to 15.0 | B |
| 20.1 to 35.0 | C | 15.1 to 25.0 | C |
| 35.1 to 55.0 | D | 25.1 to 35.0 | D |
| 55.1 to 80.0 | E | 35.1 to 50.0 | E |
| ≥ 80.1 | F | ≥ 50.1 | F |

## TABLE 6–2
## EXISTING STREET SEGMENT OPERATIONS

| Street Segment | Functional Classification | Capacity (LOS E) [a] | ADT [b] | LOS [c] | V/C [d] |
|---|---|---|---|---|---|
| **Friars Road** | | | | | |
| West of Fashion Valley Road | 4-Lane Collector w/ TWLTL[f] | 30,000 | 25,337 | E | 0.845 |
| Fashion Valley Road to Via De La Moda | 5-Lane Major Arterial | 45,000 | 25,980 | C | 0.577 |
| Via De La Moda to Avenida De Las Tiendas (Private Driveway) | 5-Lane Major Arterial | 45,000 | 31,416 | C | 0.698 |
| Avenida De Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway) | 6-Lane Major / Prime Arterial[h] | 55,000 | 42,743[g] | C | 0.777 |
| Avenida Del Rio (Private Driveway) to Ulric Street | 6-Lane Major / Prime Arterial[h] | 55,000 | 42,743 | C | 0.777 |
| **Fashion Valley Road** | | | | | |
| Friars Road to Riverwalk Drive | 4-Lane Collector[e] | 22,500 | 10,268 | B | 0.456 |

***Footnotes:***

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. A Collector capacity averaged between 30,000 and 15,000 ADT (i.e. 22,500 ADT) was selected to account for mid-block left-turn pocket and reduced friction from driveways restricted to right-turns only.
f. TWLTL – Two-way left-turn lane.
g. ADT count from adjacent segment of Friars Road between Avenida Del Rio and Ulric Street, which includes outbound traffic from Avenida Del Rio, conservatively used to analyze this segment.
h. Modified Major / Prime capacity of 55,000 ADT assumed. Westbound lanes operate as a Prime (no parking or driveways) and eastbound lanes operate as a Major due to Avenida Del Rio Driveway.

# 7.0 TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

## 7.1 Trip Generation

The Project proposes to remove the three existing office buildings currently on the site, totaling 28,548 SF, and replace them with 249 apartments and 70 condominiums, for a total of 319 units of multi-family residential. Six of the units are proposed to be designated "shopkeeper" units with a total of 1,542 square feet of commercial space per the site plan. Per the City's Land Development Code (LDC), a shopkeeper unit is a residential dwelling unit with both living quarters and commercial space which is operated by the resident of the dwelling unit.

Trip generation calculations were conducted using trip rates provided in the City of San Diego's *Trip Generation Manual,* May 2003. Since the Project site is located within 1,500 feet from the Fashion Valley Transit Station, applicable transit credits were applied to both the existing office and the proposed residential land uses when calculating trip generation, per the City of San Diego's *Traffic Impact Study Manual*, July 1998. Similarly, since the Project site is located across the street from a regional mall (Fashion Valley Mall), applicable mixed-use credits were also applied. It should be noted that transit and mixed-use credits were not applied when calculating the trip generation for the shopkeeper unit's commercial space, but a credit of two trips per shopkeeper unit (one outbound and one inbound) was applied to account for work trips not taken by working residents.

The existing office buildings currently on the Project site, which are proposed to be replaced with the Project, are calculated to generate 799 ADT with 87 inbound and 12 outbound trips during the AM peak hour and 24 inbound and 87 outbound trips during the PM peak hour.

Before applying the existing land use trip generation credit, the Project is calculated to generate a gross total of 1,677 ADT with 26 inbound and 103 outbound trips during the AM peak hour and 104 inbound and 45 outbound trips during the PM peak hour.

With the existing land use trip generation credit, the Project is calculated to generate a net total of 878 ADT with -61 inbound and 91 outbound trips during the AM peak hour and 80 inbound and -42 outbound trips during the PM peak hour. The Project is calculated with negative AM inbound and PM outbound peak hour volumes because ***the reduction in traffic from the removal of the existing uses is greater than the new traffic added due to new multi-family residential use.*** Furthermore, the change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes.

***Table 7–1*** summarizes the Project's trip generation calculations.

### TABLE 7–1
### PROJECT TRIP GENERATION

| Description and Size | Trip Rate & Credits | ADT[a] | AM Peak Hour | | | | | PM Peak Hour | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % of ADT | In: Out Split | Volume | | | % of ADT | In: Out Split | Volume | | |
| | | | | | In | Out | Total | | | In | Out | Total |
| ***Proposed*** | | | | | | | | | | | | |
| ***Apartments*** | Trip Rate (6 / DU)[b] | 1,494 | 8% | 20 : 80 | 24 | 96 | 120 | 9% | 70 : 30 | 94 | 40 | 134 |
| 249 Dwelling Units | *Transit Credit (5%)[c]* | *-75* | | | *-2* | *-9* | *-11* | | | *-6* | *-2* | *-8* |
| (Over 20 DU/ac) | *Mixed-use Credit (10%)[d]* | *-149* | | | *-2* | *-8* | *-10* | | | *-9* | *-4* | *-13* |
| | Cumulative (100%) | 1,270 | | | 20 | 79 | 99 | | | 79 | 34 | 113 |
| | Pass-By (0%)[e] | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 1,270 | | | 20 | 79 | 99 | | | 79 | 34 | 113 |
| ***Condominiums*** | Trip Rate (6 / DU)[b] | 420 | 8% | 20 : 80 | 7 | 27 | 34 | 9% | 70 : 30 | 27 | 11 | 38 |
| 70 Dwelling Units | *Transit Credit (5%)[c]* | *-21* | | | *-1* | *-2* | *-3* | | | *-1* | *-1* | *-2* |
| (Over 20 DU/ac) | *Mixed-use Credit (10%)[d]* | *-42* | | | *-1* | *-2* | *-3* | | | *-3* | *-1* | *-4* |
| | Cumulative (100%) | 357 | | | 5 | 23 | 28 | | | 23 | 9 | 32 |
| | Pass-By (0%) | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 357 | | | 5 | 23 | 28 | | | 23 | 9 | 32 |
| ***Shopkeeper Units (Commercial Space)*** | Trip Rate (40 / KSF)[i] | 50 | 3% | 60 : 40 | 1 | 1 | 2 | 9% | 50 : 50 | 2 | 2 | 4 |
| 6 Shopkeeper Units | *Transit Credit (0%)[j]* | *0* | | | *0* | *0* | *0* | | | *0* | *0* | *0* |
| 1,542 SF Total Shop / Work Space | *Mixed-use Credit (0%)[k]* | *0* | | | *0* | *0* | *0* | | | *0* | *0* | *0* |
| | Cumulative (100%) | 50 | | | 1 | 1 | 2 | | | 2 | 2 | 4 |
| | Pass-By (0%) | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 50 | | | 1 | 1 | 2 | | | 2 | 2 | 4 |
| | *Cumulative* | *1,677* | | | *26* | *103* | *129* | | | *104* | *45* | *149* |
| *Proposed Subtotal* | *Pass-By* | *0* | | | *0* | *0* | *0* | | | *0* | *0* | *0* |
| | *Driveway* | *1,677* | | | *26* | *103* | *129* | | | *104* | *45* | *149* |
| ***Existing*** | | | | | | | | | | | | |
| **Commercial Office** | Trip Rate (ln formula)[f] | 361 | 13% | 90 : 10 | 42 | 5 | 47 | 14% | 20 : 80 | 10 | 41 | 51 |
| 13,000 SF | *Transit Credit (3%)[g]* | *-11* | | | *-3* | *0* | *-3* | | | *0* | *-1* | *-1* |
| | *Mixed-use Credit (3%)[h]* | *-11* | | | *-2* | *0* | *-2* | | | *0* | *-2* | *-2* |
| | Cumulative (100%) | 339 | | | 37 | 5 | 42 | | | 10 | 38 | 48 |
| | Pass-By (0%) | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 339 | | | 37 | 5 | 42 | | | 10 | 38 | 48 |
| **Commercial Office** | Trip Rate (ln formula)[f] | 208 | 13% | 90 : 10 | 24 | 3 | 27 | 14% | 20 : 80 | 6 | 23 | 29 |
| *6,280 SF* | *Transit Credit (3%)[g]* | -6 | | | *-1* | *0* | *-1* | | | *0* | *-1* | *-1* |
| | *Mixed-use Credit (3%)[h]* | -6 | | | *-1* | *0* | *-1* | | | *0* | *-1* | *-1* |
| | Cumulative (100%) | 196 | | | 22 | 3 | 25 | | | 6 | 21 | 27 |
| | Pass-By (0%) | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 196 | | | 22 | 3 | 25 | | | 6 | 21 | 27 |
| **Commercial Office** | Trip Rate (ln formula)[f] | 280 | 13% | 90 : 10 | 32 | 4 | 36 | 14% | 20 : 80 | 8 | 31 | 39 |
| *9,268 SF* | *Transit Credit (3%)[g]* | *-8* | | | *-2* | *0* | *-2* | | | *0* | *-1* | *-1* |
| | *Mixed-use Credit (3%)[h]* | *-8* | | | *-2* | *0* | *-2* | | | *0* | *-2* | *-2* |
| | Cumulative (100%) | 264 | | | 28 | 4 | 32 | | | 8 | 28 | 36 |
| | Pass-By (0%) | 0 | | | 0 | 0 | 0 | | | 0 | 0 | 0 |
| | Driveway | 264 | | | 28 | 4 | 32 | | | 8 | 28 | 36 |
| | *Cumulative* | *799* | | | *87* | *12* | *99* | | | *24* | *87* | *111* |
| *Existing Subtotal* | *Pass-By* | *0* | | | *0* | *0* | *0* | | | *0* | *0* | *0* |
| | *Driveway* | *799* | | | *87* | *12* | *99* | | | *24* | *87* | *111* |
| ***Trip Generation Summary*** | | | | | | | | | | | | |
| | *Cumulative* | *878* | | | *-61* | *91* | *30* | | | *80* | *-42* | *38* |
| *Net Project Total (Proposed – Existing)* | *Pass-By* | *0* | | | *0* | *0* | *0* | | | *0* | *0* | *0* |
| | *Driveway* | *878* | | | *-61* | *91* | *30* | | | *80* | *-42* | *38* |

***Footnotes:***

a. Traffic volumes expressed in vehicles per day.

b. Trip rate for multi-family units over 20 DU/acre used with AM splits as 8 % ADT with 20:80 (In:Out). PM splits are 9% ADT with 70:30 (In:Out).

c. Transit credits for residential land uses are 5% ADT, 9% AM and 6% PM peak hours.

d. Community Mixed-use credits for residential land uses are 10% ADT, 8% AM and 10% PM peak hours.

e. Pass-by represents difference between Driveway and Cumulative trips, per the City Trip Generation Manual. Based on the Trip Generation Manual, no pass-by allowed for commercial office and multi-family residential land uses.

f. Trip Generation formula for Commercial office is Ln(T) = 0.756 * ln(X) + 3.95. AM splits are 13 % ADT with 90:10 (In:Out). PM splits are 14 % ADT with 20:80 (In:Out).

g. Transit credits for commercial office land uses are 3% ADT, 5.5% AM and 2% PM peak hours.

h. Community Mixed-use credits for commercial office land uses are 3% ADT, 5% AM and 4% PM peak hours.

i. Specialty Retail / Strip Commercial rate. Two trips per shopkeeper unit (one outbound and one inbound) subtracted from calculated ADT to account for work trips not taken by working residents.

***General Notes:***

1. All trip rates and percentages are based on the City of San Diego Trip Generation Manual, May 2003.
2. Driveway Trips—vehicles entering and exiting project driveways (Driveway = Cumulative + Pass-By).
3. Cumulative Trips—net new vehicles added to the network.
4. Pass-By Trips—vehicles already on the street network diverting to the project site.

## 7.2 Project Traffic Distribution

A Series 12 Year 2035 Select Zone Assignment plot was obtained from SANDAG to assist in determining the regional distribution of Project traffic (SZA for TAZ 3075) is included in ***Appendix E***). The Project's distribution was also informed by the proximity of the Project to potential employment and retail opportunities, existing traffic patterns and freeway access.

***Figure 7-1*** presents the Project traffic distribution under Existing conditions.

***Figure 7-2*** presents the Project traffic distribution under Near-Term (Opening Day 2018) conditions. While the traffic distribution is essentially the same as the Existing conditions distribution (shown in *Figure 7-1*) the distribution shown in *Figure 7-2* accounts for Phase I of the SR-163 /Friars Road Interchange Project, which proposes changes to the configuration of the Southbound and Northbound Ramps at Friars Road, as discussed further in *Section 10.1* of this study.

***Figure 7-3*** presents the Project traffic distribution under Year 2035 (Horizon Year) conditions, and accounts for the minimal network improvements assumed for the Levi-Cushman Specific Plan, as discussed further in *Section 11.1* of this study.

## 7.3 Project Traffic Assignment

The Project site's existing land uses are currently provided access to the street system via two right-in, right-out driveways along Friars Road, with U-turns required at the intersections of Fashion Valley Road or Via De La Moda in some cases. The Project, once constructed, will provide a total of three access points via Friars Road, including the two existing driveways. However, primary access will be provided via a new driveway at the signalized Friars Road / Via De La Moda intersection. In order to provide a conservative analysis, 100% of the Project traffic was assigned to the Via De La Moda driveway. Since the existing and proposed land uses were not assumed to access the site via the same driveways, the existing and proposed trips were assigned to the roadway network separately, based on the applicable trip distribution shown in *Figures 7-1* through *Figure 7-3*, and used to determine the total net Project Trips assignment.

***Figure 7-4*** depicts the existing office trips under Existing conditions, ***Figure 7-5*** depicts the gross total Project trips under Existing conditions and ***Figure 7-6*** depicts the net total Project trips under Existing conditions (*Figure 7-4* volumes subtracted from *Figure 7-5* volumes).

***Figure 7-7*** depicts the existing office trips under Near-Term (Opening Day) conditions. It should be noted that existing office trips shown in *Figure 7-7* were only modified as compared to the volumes shown in *Figure 7-4* (Existing Land Use Trips under Existing conditions) to account for the reconfiguration of the Friars Road / SR-163 Northbound Ramp intersection as part of Phase I of the SR-163 / Friars Road Interchange Project, as discussed further in *Section 10.1* of this study. ***Figure 7-8*** depicts the gross total Project trips under Near-Term (Opening Day 2018) conditions, and ***Figure 7-9*** depicts the net total Project trips under Near-Term (Opening Day 2018) conditions (*Figure 7-7* volumes subtracted from *Figure 7-8* volumes).

*Figure 7-7* also depicts the existing office trips under Year 2035 (Horizon Year) conditions. ***Figure 7-10*** depicts the gross total Project trips under Year 2035 (Horizon Year) conditions, and ***Figure 7-11*** depicts the net total Project trips under Year 2035 (Horizon Year) conditions (*Figure 7-7* volumes subtracted from *Figure 7-10* volumes).

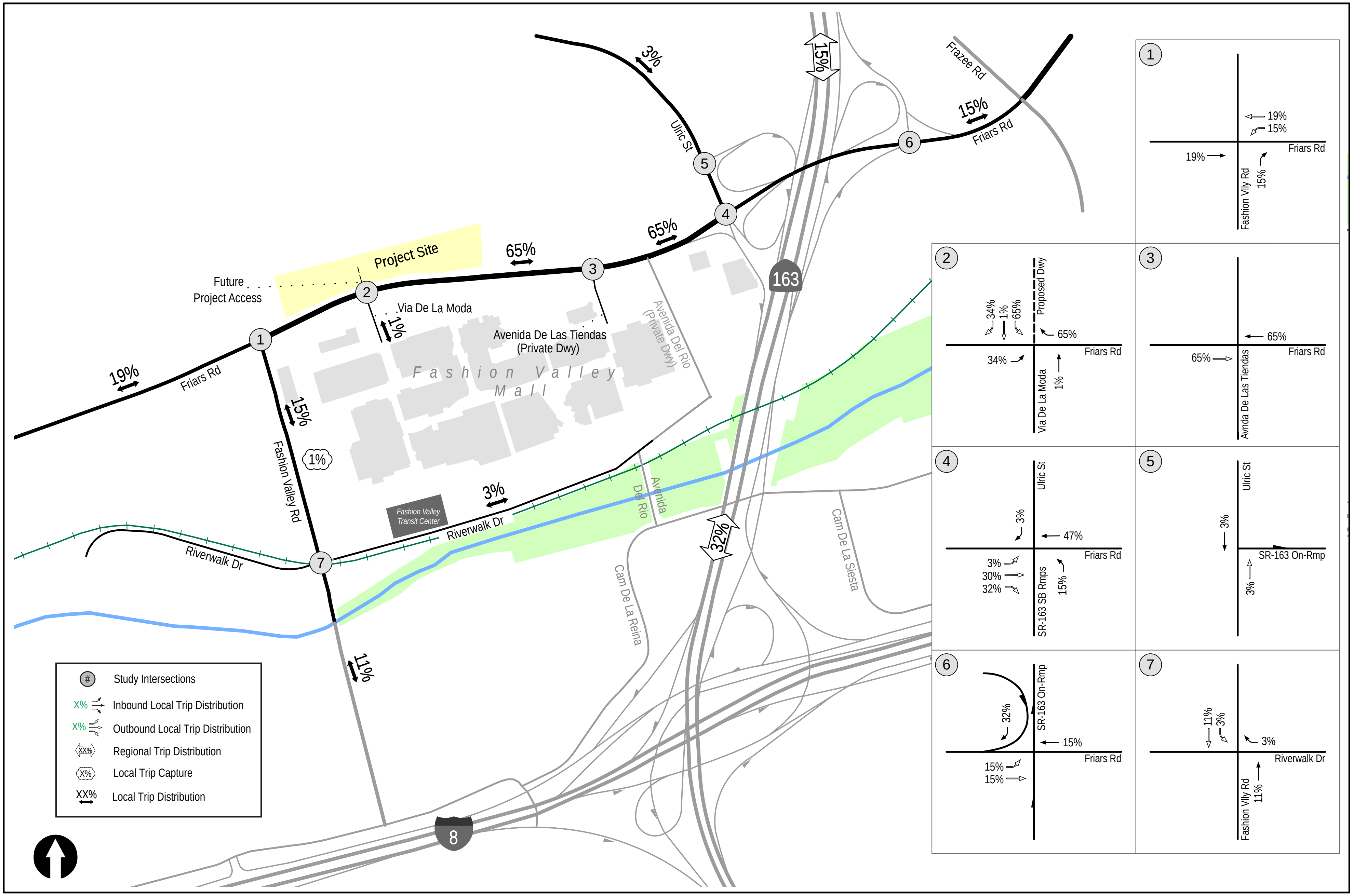


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**Figure 7-1**

# Project Traffic Distribution

## Existing Conditions

FRIARS ROAD RESIDENTIAL

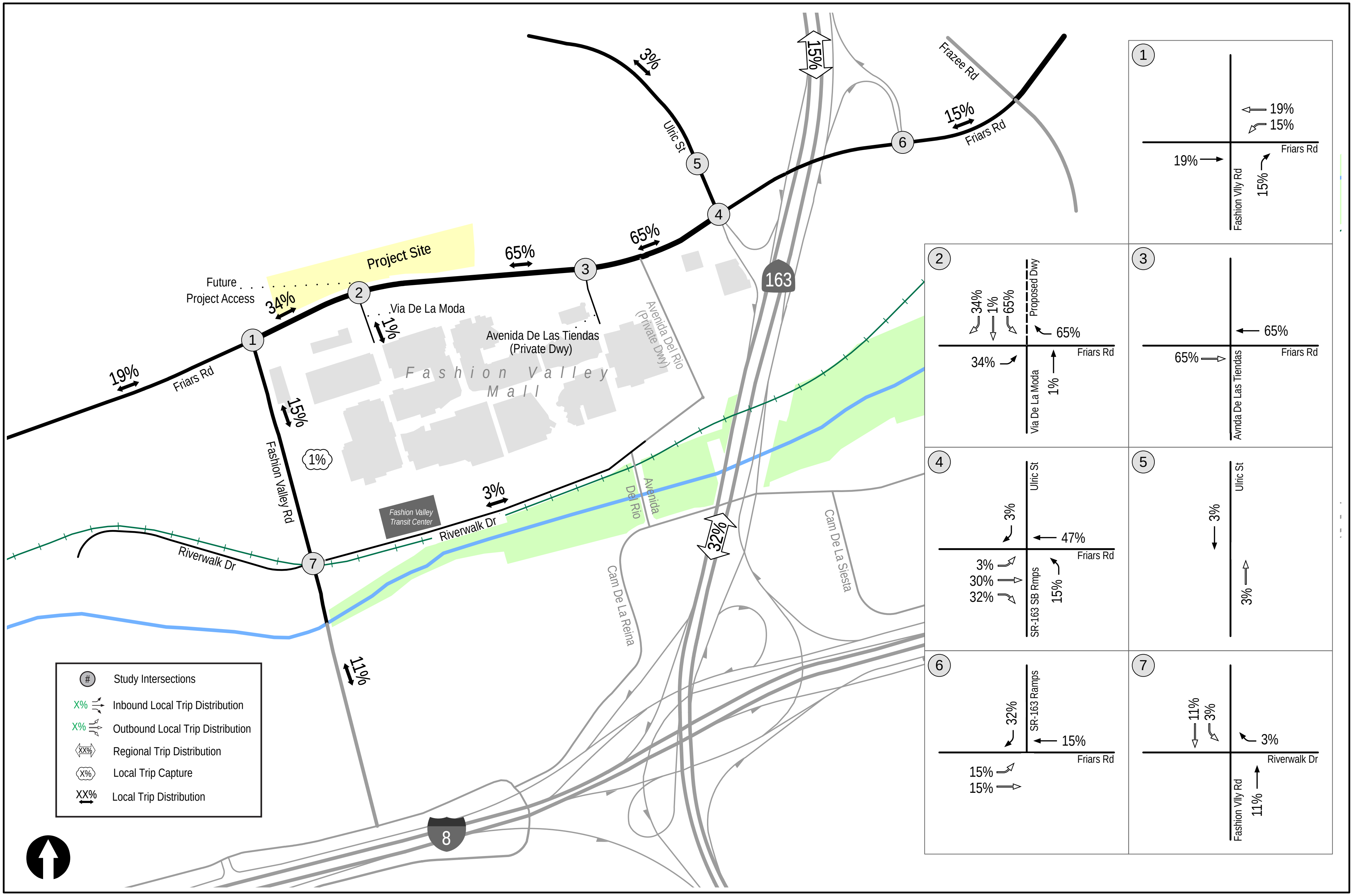


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Figure 7-2

# Near-Term Project Distribution

## Near-Term (Opening Year 2018)

FRIARS ROAD APARTMENTS

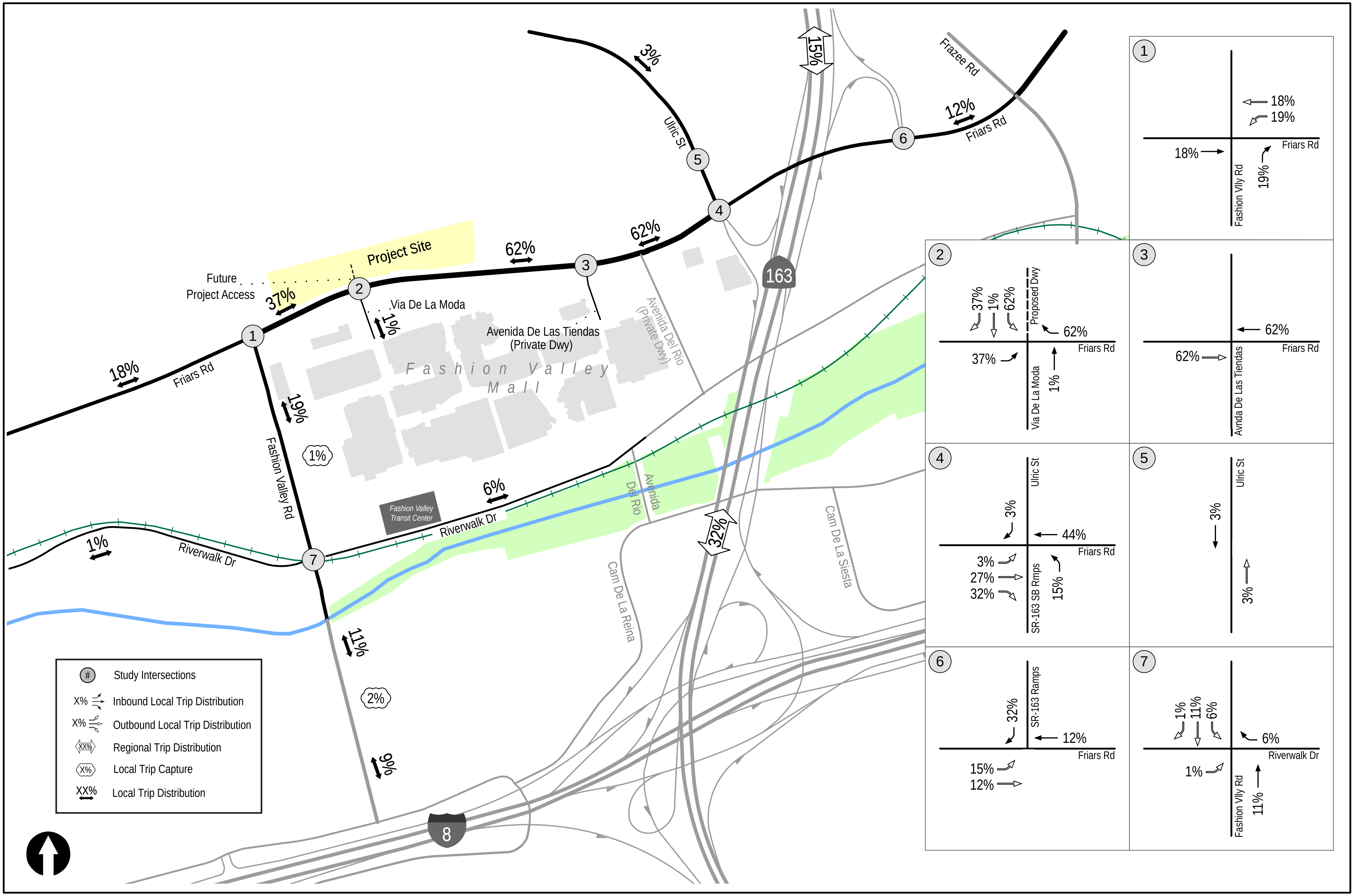


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**Figure 7-3**

# Project Traffic Distribution

**Horizon Year**

FRIARS ROAD RESIDENTIAL

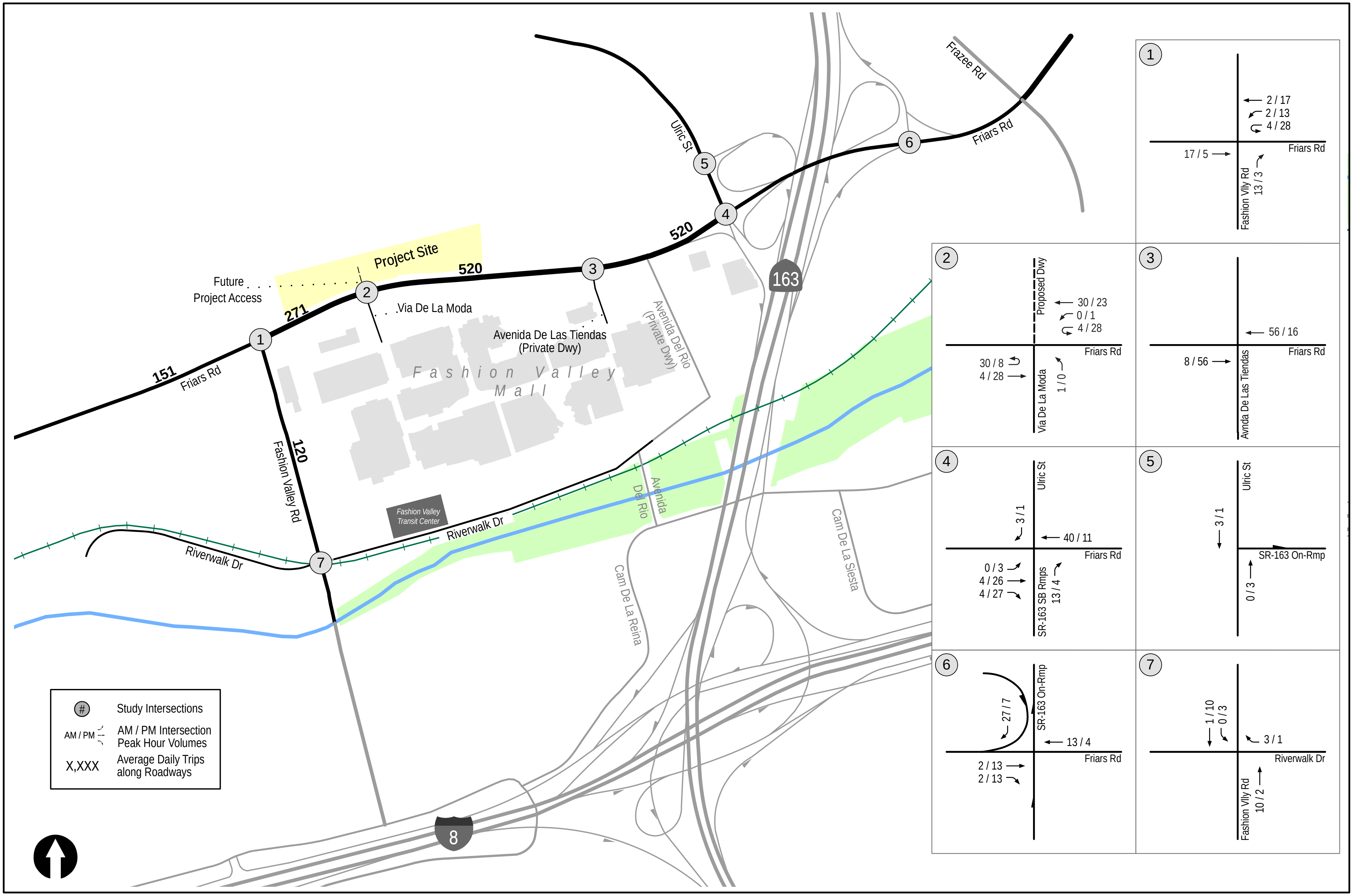


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**Figure 7-4**

# Office Traffic Volumes

**Existing Conditions**

FRIARS ROAD RESIDENTIAL

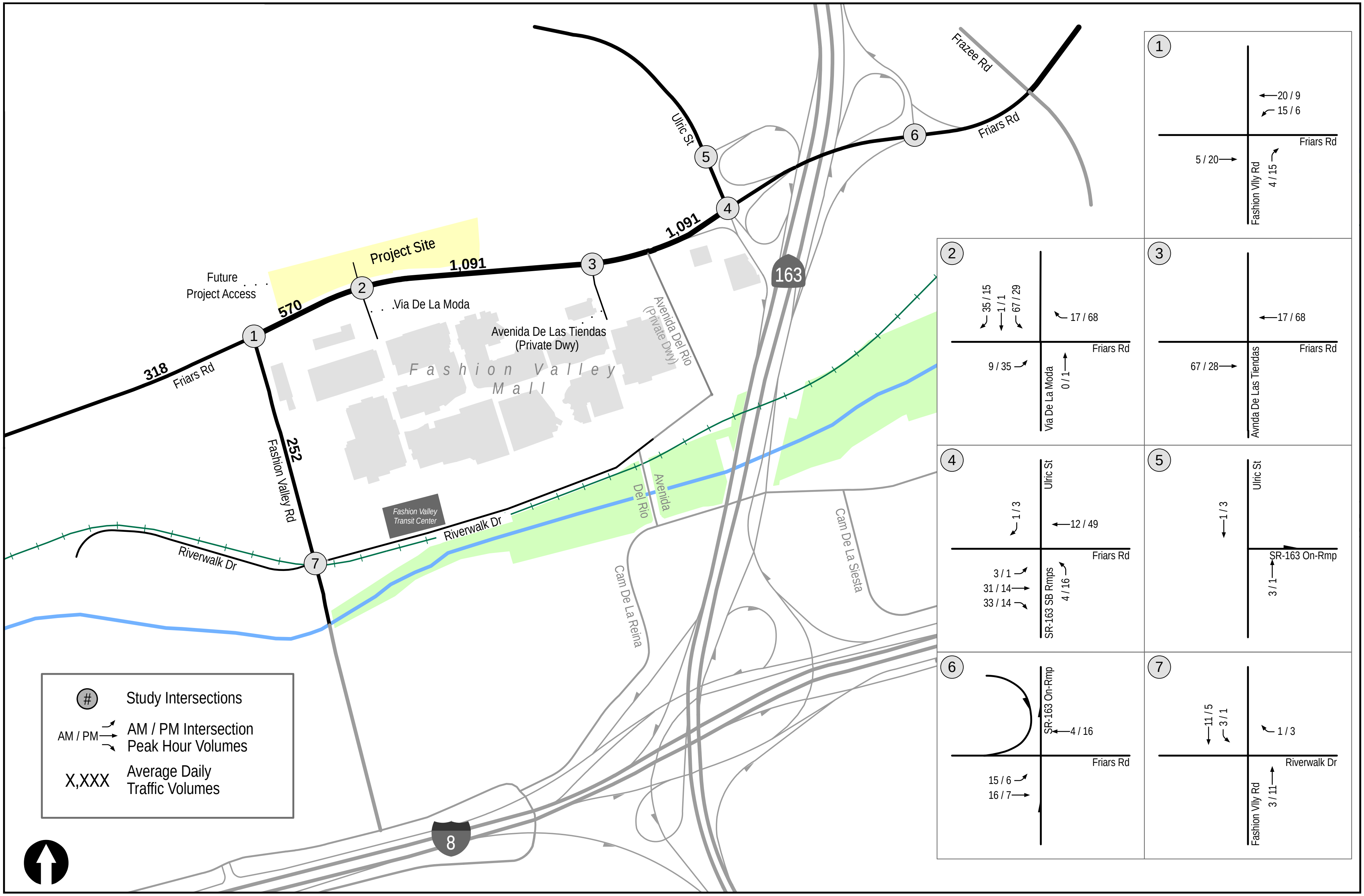


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**Figure 7-5**

# Gross Project Traffic Volumes

**Existing Conditions**

FRIARS ROAD RESIDENTIAL

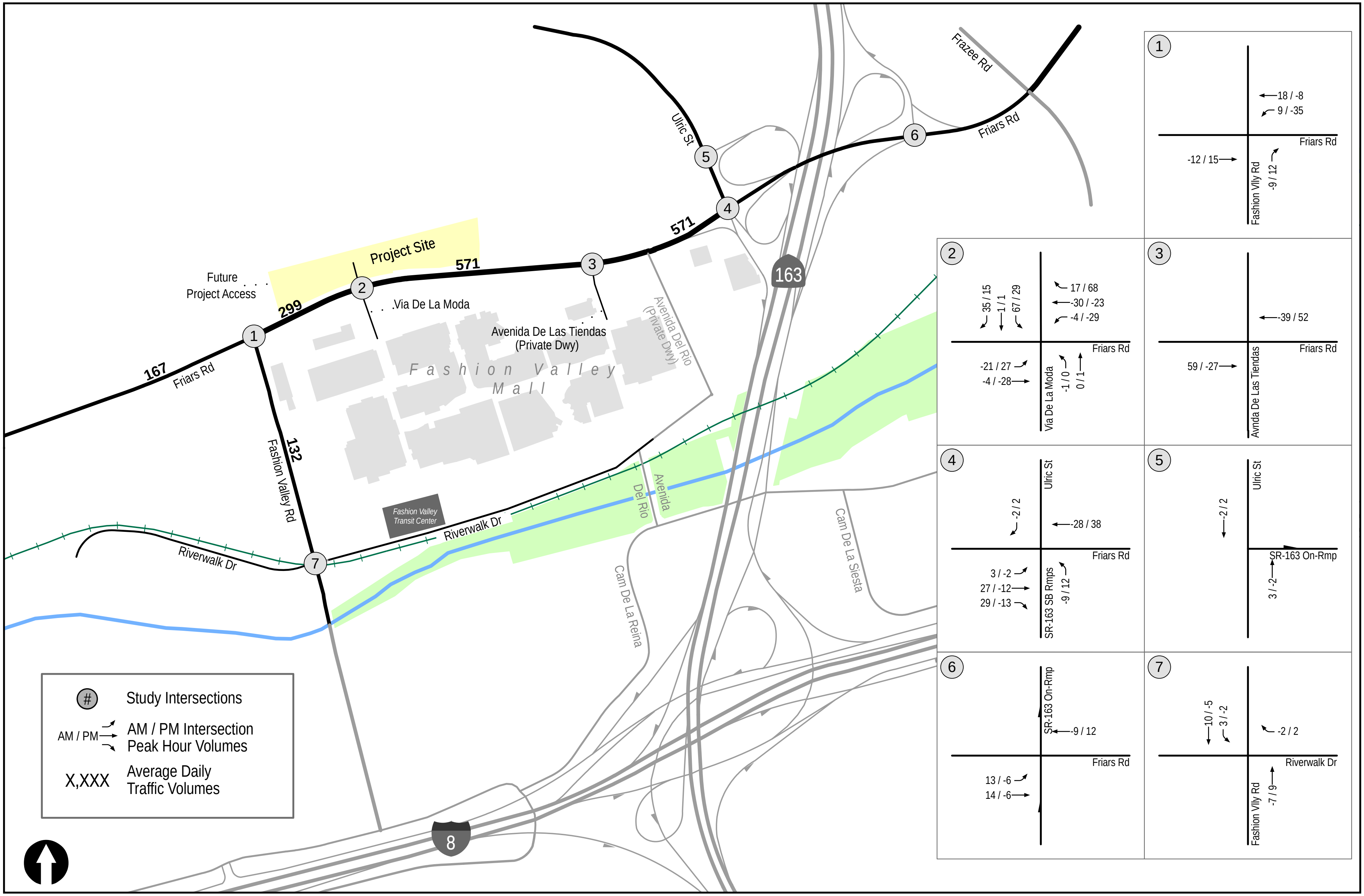


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**Figure 7-6**

# Net Total Project Traffic Volumes

**Existing Conditions**

Friars Road Residential

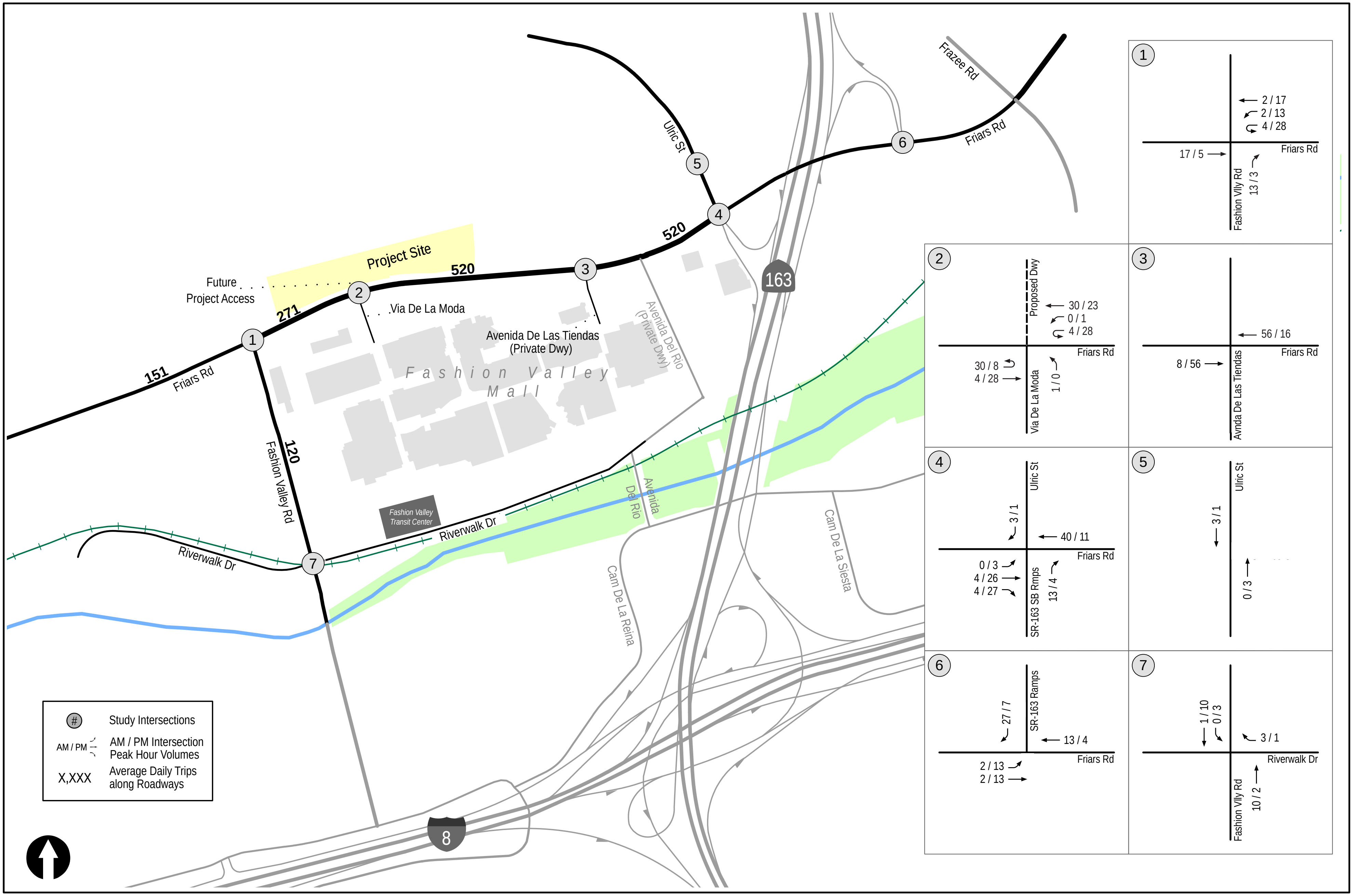


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**Figure 7-7**

# Office Traffic Volumes

## Near-Term (Opening Year 2018) and Year 2035 (Horizon Year) Conditions

FRIARS ROAD RESIDENTIAL

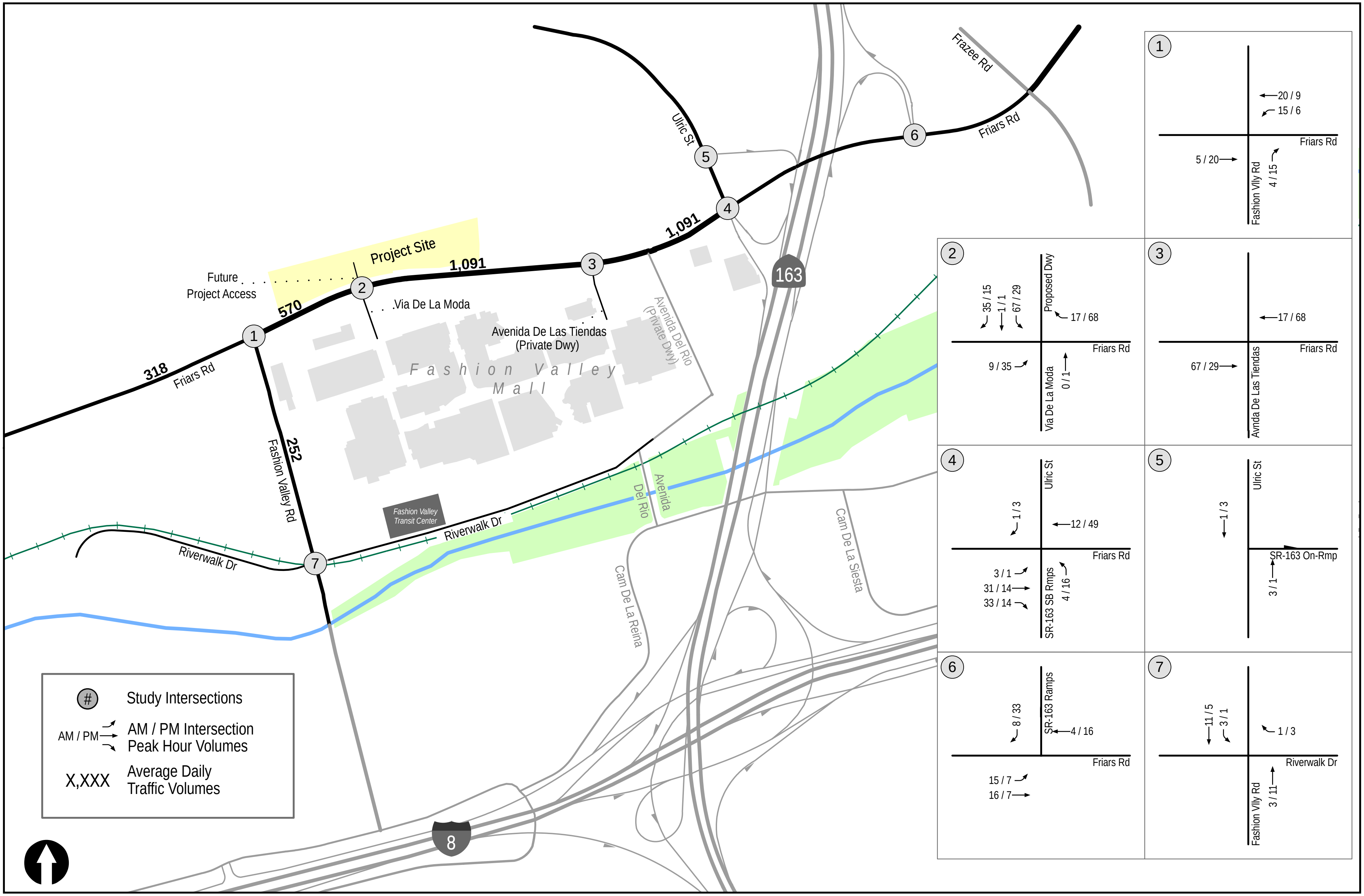


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**Figure 7-8**

# Gross Total Project Traffic Volumes

## Near-Term (Opening Year 2018) Conditions

FRIARS ROAD RESIDENTIAL

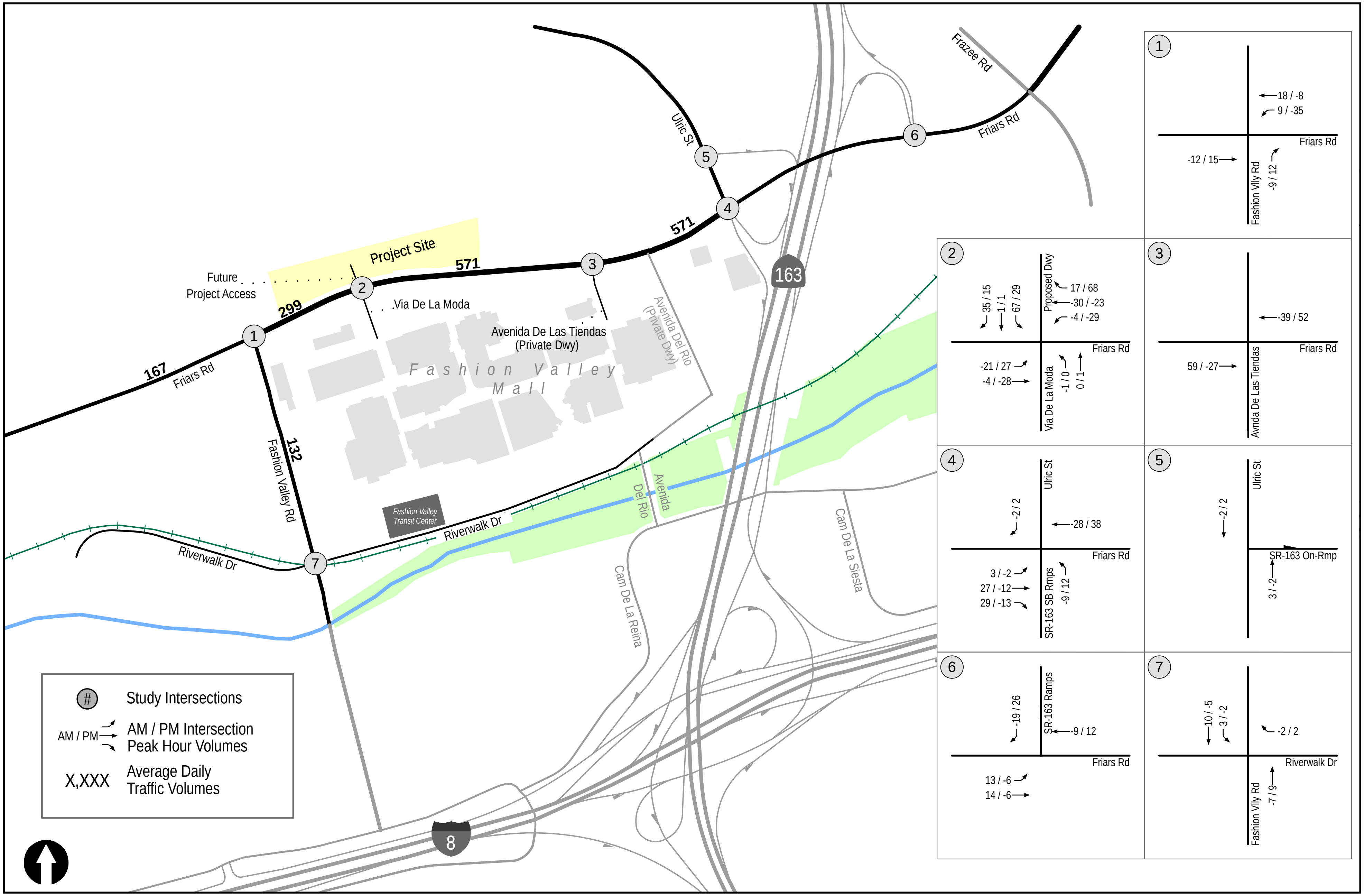


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**Figure 7-9**

## Net Total Project Traffic Volumes

**Near-Term (Opening Year 2018)**

FRIARS ROAD RESIDENTIAL

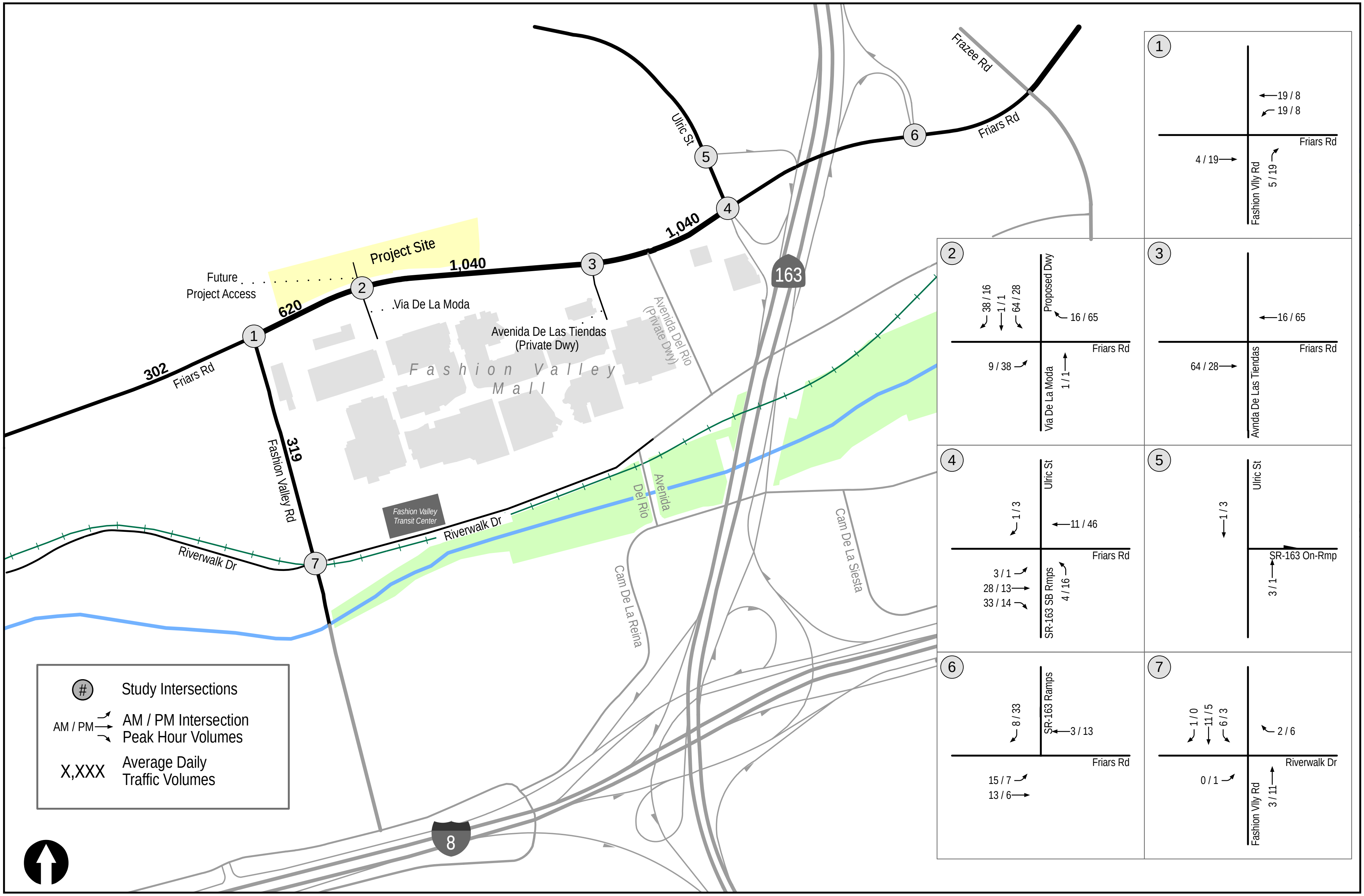


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**Figure 7-10**

# Gross Total Project Traffic Volumes

**Year 2035 (Horizon Year 2035)**

FRIARS ROAD RESIDENTIAL

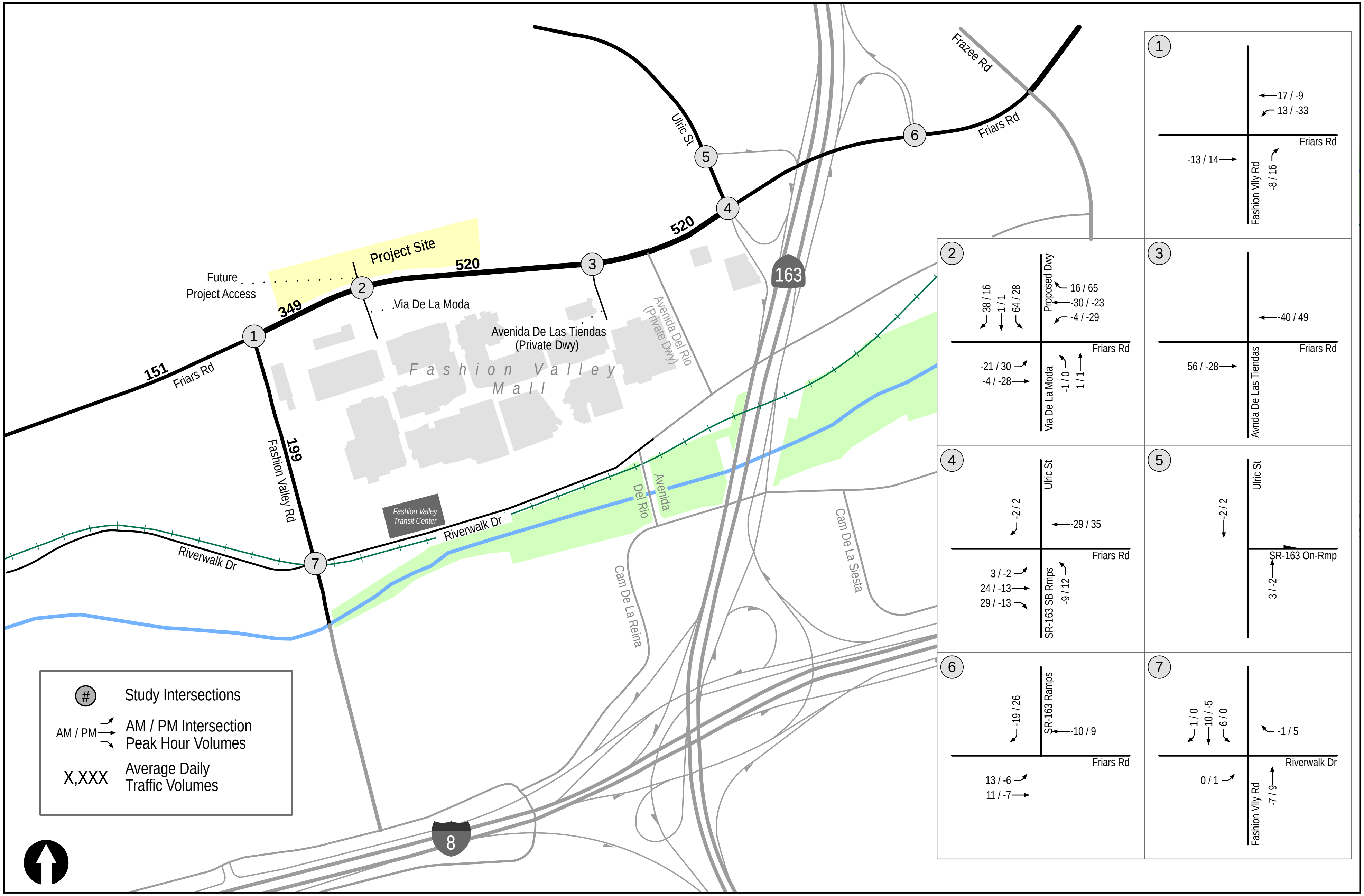


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**Figure 7-11**

# Net Total Project Traffic Volumes

**Year 2035 (Horizon Year)**

FRIARS ROAD RESIDENTIAL

# 8.0 EXISTING + PROJECT ANALYSIS

The California Environmental Quality Act (CEQA) Guidelines and recent court cases suggest the assessment of existing (ground) conditions with project build-out conditions. Thus, the Existing + Project analysis presumes the full build out of the project under the existing environmental conditions (existing traffic volumes, existing roadway infrastructure, and existing surrounding land uses).

***Figure 8–1*** shows the Existing + Project AM and PM peak hour turning movement volumes and daily traffic volumes.

## 8.1 Project Improvements

The following improvements will be constructed by the Project along the Project frontage:

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage***: Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-lane Major Road classification.

These improvements are assumed in the "with project" analyses. No other improvements, whether project or community based, were assumed.

## 8.2 Existing + Project Intersection Operations

Intersection capacity analyses were conducted for the study intersections under Existing + Project conditions. ***Table 8–1*** reports the intersection operations during the peak hour conditions. The study area intersections are calculated to continue to operate at LOS D or better under Existing + Project conditions.

It should be noted that reduced peak hour delays are calculated at some of the study intersections under "with Project" conditions since ***the reduction in traffic from the removal of the existing uses is greater than the new multi-family residential Project traffic at some turning movements.*** The change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes.

***Appendix F*** contains the intersection analysis worksheets for the Existing + Project scenario.

## 8.3 Existing + Project Street Segment Operations

Existing + Project street segment analyses were conducted for roadways in the study area. ***Table 8–2*** reports Existing + Project daily street segment operations. With the addition of the Project traffic, the study area street segments are calculated to continue to operate at LOS C or better with the exception of Friars Road west of Fashion Valley Road which is calculated to continue to operate at LOS E.

## TABLE 8–1
## EXISTING + PROJECT INTERSECTION OPERATIONS

| Intersection | Control Type | Peak Hour | Existing | | Existing + Project | | Δ[c] | Significant Impact? |
|---|---|---|---|---|---|---|---|---|
| | | | Delay[a] | LOS[b] | Delay | LOS | | |
| 1. Friars Road / Fashion Valley Road | Signal | AM | 12.0 | B | 16.1 | B | 4.1 | No |
| | | PM | 23.5 | C | 23.0 | C | (0.5) | No |
| 2. Friars Road / Via De La Moda | Signal | AM | 4.7 | A | 8.0 | A | 3.3 | No |
| | | PM | 13.9 | B | 17.6 | B | 3.7 | No |
| 3. Friars Road / Avenida De Las Tiendas (Private Driveway) | Signal | AM | 5.2 | A | 5.2 | A | 0.0 | No |
| | | PM | 19.1 | B | 18.8 | B | (0.3) | No |
| 4. Friars Road / SR 163 SB Ramps | Signal | AM | 30.2 | C | 29.8 | C | (0.4) | No |
| | | PM | 44.3 | D | 44.4 | D | 0.1 | No |
| 5. Ulric Street / SR 163 SB On Ramp | Unsignalized | AM | 16.2 | C | 16.3 | C | 0.1 | No |
| | | PM | 19.7 | C | 19.6 | C | (0.1) | No |
| 6. Friars Road / SR 163 NB Ramps | Signal | AM | 17.9 | B | 18.3 | B | 0.4 | No |
| | | PM | 19.6 | B | 19.3 | B | (0.3) | No |
| 7. Riverwalk Drive / Fashion Valley Road | Signal | AM | 12.3 | B | 12.5 | B | 0.2 | No |
| | | PM | 18.7 | B | 19.0 | B | 0.3 | No |

***Footnotes:***
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. "Δ" denotes the project-induced increase, or (decrease) in delay.

***General Notes:***
1. Negative Δ calculated at some intersections due to the net reduction in traffic (for some turning movements) due to the Project.

| SIGNALIZED | | UNSIGNALIZED | |
|---|---|---|---|
| DELAY/LOS THRESHOLDS | | DELAY/LOS THRESHOLDS | |
| Delay | LOS | Delay | LOS |
| 0.0 ≤ 10.0 | A | 0.0 ≤ 10.0 | A |
| 10.1 to 20.0 | B | 10.1 to 15.0 | B |
| 20.1 to 35.0 | C | 15.1 to 25.0 | C |
| 35.1 to 55.0 | D | 25.1 to 35.0 | D |
| 55.1 to 80.0 | E | 35.1 to 50.0 | E |
| ≥ 80.1 | F | ≥ 50.1 | F |

## TABLE 8–2
## EXISTING + PROJECT STREET SEGMENT OPERATIONS

| Street Segment | Functional Classification | Capacity (LOS E) [a] | Existing | | | Existing + Project | | | V/C Increase | Sig |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ADT[b] | LOS[c] | V/C[d] | ADT[b] | LOS[c] | V/C[d] | | |
| **Friars Road** | | | | | | | | | | |
| West of Fashion Valley Road | 4-Lane Collector w/ TWLTL[f] | 30,000 | 25,337 | E | 0.845 | 25,504 | E | 0.850 | 0.005 | None |
| Fashion Valley Road to Via De La Moda | 5-Lane Major Arterial | 45,000 | 25,980 | C | 0.577 | 26,279 | C | 0.584 | 0.007 | None |
| Via De La Moda to Avenida De Las Tiendas (Private Driveway) | 5-Lane Major Arterial | 45,000 | 31,416 | C | 0.698 | 31,987 | C | 0.711 | 0.013 | None |
| Avenida De Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway) | 6-Lane Major / Prime Arterial[g] | 55,000 | 42,743 | C | 0.777 | 43,314 | C | 0.788 | 0.011 | None |
| Avenida Del Rio (Private Driveway) to Ulric Street | 6-Lane Major / Prime Arterial[g] | 55,000 | 42,743 | C | 0.777 | 43,314 | C | 0.788 | 0.011 | None |
| **Fashion Valley Road** | | | | | | | | | | |
| Friars Road to Riverwalk Drive | 4-Lane Collector[e] | 22,500 | 10,268 | B | 0.456 | 10,400 | B | 0.462 | 0.006 | None |

***Footnotes:***

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. A Collector capacity averaged between 30,000 and 15,000 ADT (i.e. 22,500 ADT) was selected to account for mid-block left-turn pocket and reduced friction from driveways restricted to right-turns only.
f. TWLTL – Two-way left-turn lane.
g. Modified Major / Prime capacity of 55,000 ADT assumed. Westbound lanes operate as a Prime (no parking or driveways) and eastbound lanes operate as a Major due to Avenida Del Rio Driveway.

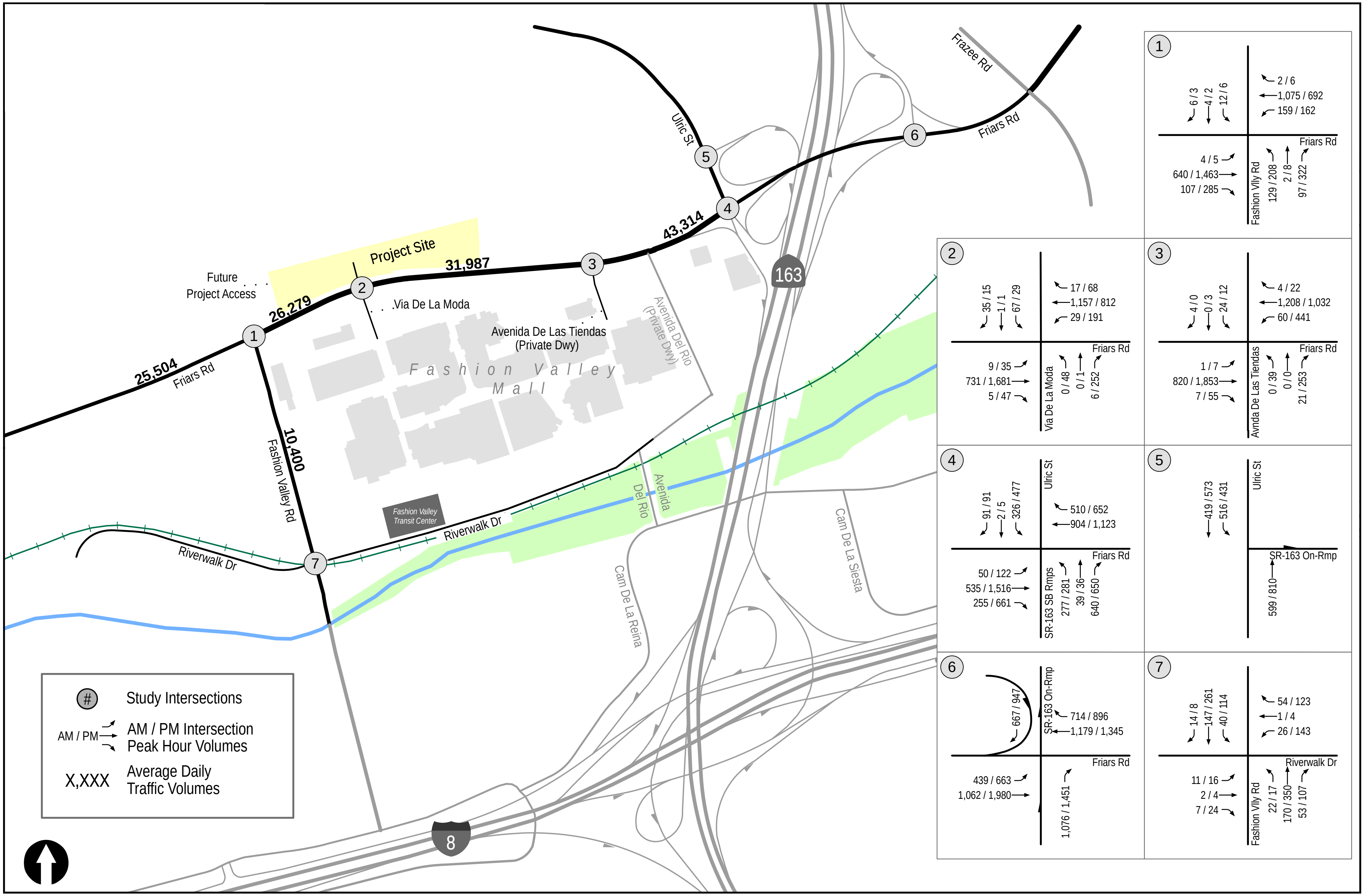


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**Figure 8-1**

# Existing + Project Traffic Volumes

Friars Road Residential

# 9.0 Cumulative Projects

Cumulative projects represent reasonably foreseeable planned development that contributes to background traffic conditions for all future scenarios.

## 9.1 Cumulative Project Research

With assistance from the City and our experience working on other projects in the area, LLG identified eight (8) cumulative projects in the near-term scenarios, and seven (7) in the long-term. Each project was reviewed to determine its occupancy/ construction status and timing of construction. ***Table 9–1*** and ***Table 9–2*** summarize the cumulative projects included in the analysis. ***Figure 9–1*** shows the location of each cumulative project.

## 9.2 Cumulative Project Forecast

LLG coordinated with City Staff regarding near-term cumulative project traffic. The near-term cumulative traffic was obtained and manually assigned for each project. ***Figure 9–2*** shows the near-term cumulative project traffic assignment. The traffic assignment for each individual cumulative project is included in ***Appendix L***.

Long-Term cumulative traffic conditions were evaluated using the *SANDAG Series 12 Model* for the Year 2035 (Horizon Year) scenario. Seven (7) cumulative projects were considered and verified in the forecast model or included manually.

## TABLE 9–1
## CUMULATIVE PROJECTS – NEAR-TERM

| Project Name | Type of Development | Project Size | ADT | Status | Notes |
|---|---|---|---|---|---|
| N-1. Quarry Falls (Civita)- Phase I | Residential<br>Community Commercial<br>Neighborhood Commercial | 2,477 dwelling units<br>50,000 SF<br>50,000 SF | 17,450 | Approved. Approximately 1,512 DU built as of January 2016 | Buildout of Phase I is expected to be constructed and occupied under Near-Term (2018) conditions. |
| N-2. Mission Valley Fire Station | Fire Station | 16,000 SF | 50 | Constructed and occupied[b] | Trip Generation based on 17 personnel (Mission Valley PFFP) and 5.5 calls per day (received from Fire Department) |
| N-3. USD Master Plan, *Near-Term* | University | 750 FTE[c] | 2,550 | In Review | – |
| N-4. Union Tribune Master Plan | Multi-Family Residential<br>Specialty Retail | 200 Units<br>3,000 SF | 1,128 | Approved | Approved by Planning Commission on 6/18/2015. |
| N-5. Legacy International Center | Timeshare<br>Religious Facility | 127 rooms<br>196,165 SF | 1,805 | In Review | – |
| N-6. Camino Del Rio Mixed Use | Multi-Family Residential<br>Multi-Tenant Office<br>Retail | 305 dwelling units<br>5,000 SF<br>4,000 SF | 1,432 | Under Construction | Approved by Planning Commission on 10/30/2014. |
| N-7. Town & Country Resort – *Phase I*[a] | Multi-Family Residential | 435 dwelling units | (2,089) | In Review | – |
| N-8. Francis Parker Upper School | Middle / High School | 140 Students | 476 | In Review | – |

***Footnotes:***

a. Phase I of the Town & Country Project proposes the development of 435 du and the removal of 254 hotel rooms, 36,625 SF of convention center, 14,298 SF of spa, and 25,652 SF of food and beverage building space, for a net total reduction in ADT of 2,089. For the purposes of this study, and to provide a conservative analysis, the reduction in ADT associated with the first phase of the project was not assumed.

b. The Mission Valley Fire Station is currently constructed and occupied. However it was unoccupied (and therefore not generating traffic) when the existing traffic counts were conducted, and was therefore included as a cumulative project.

c. FTE – Full Time Equivalent Students

TABLE 9–2
CUMULATIVE PROJECTS – YEAR 2035 (HORIZON YEAR)

| Project Name | Type of Development | Project Size | ADT | Status | Notes |
|---|---|---|---|---|---|
| L-1. Levi-Cushman Specific Plan[a] – *Project Buildout* | Residential<br>Hotel<br>Office<br>Retail | 1,329 dwelling units<br>1,000 Hotel rooms<br>200,000 SF<br>2,582,000 SF | 67,000 | In Process | Approved. Not yet constructed. |
| L-2. Town & Country Resort[b] – *Project Buildout* | Multi-Family Residential | 840 dwelling units | 0 | In Review | – |
| L-3. Union Tribune Master Plan | Multi-Family Residential<br>Specialty Retail | 200 Units<br>3,000 SF | 1,128 | Approved | Approved by Planning Commission on 6/18/2015. |
| L-4. Camino Del Rio Mixed Use | Multi-Family Residential<br>Multi-Tenant Office<br>Retail | 305 dwelling units<br>5,000 SF<br>4,000 SF | 1,432 | Under Construction | Approved by Planning Commission on 10/30/2014. |
| L-5. Legacy International Center | Timeshare<br>Religious Facility | 127 rooms<br>196,165 SF | 1,805 | In Review | – |
| L-6. USD Master Plan, *Project Buildout* | University | 3,000 FTE[c] | 9,300 | In Review | – |
| L-7. Hazard Center Redevelopment | Residential<br>Commercial / Retail | 473 multi-dwelling units<br>4,205 SF Commercial<br>(includes demolition of 1,540 seat theater) | 950 | Approved | Not yet constructed |

***Footnotes:***

a. As of February 2015, the Riverwalk Master Plan (formerly Levi-Cushman Specific Plan) proposes to develop 4,000 dwelling units, 150,000 SF of commercial retail and office and 950,000 SF of office, 900 room hotel and 40-acre park, generating 51,980 ADT. This is lower than original Specific Plan trip generation of 67,000 ADT. However, the horizon year traffic analysis assumes 67,000 ADT to be conservative.

b. Project Buildout of the Town & Country Project proposes the development of 840 total du and the removal of 254 hotel rooms, 36,625 SF of convention center, 14,298 SF of spa, and 25,652 SF of food and beverage building space, for a net total of 0 ADT.

c. FTE – Full Time Equivalent Students.

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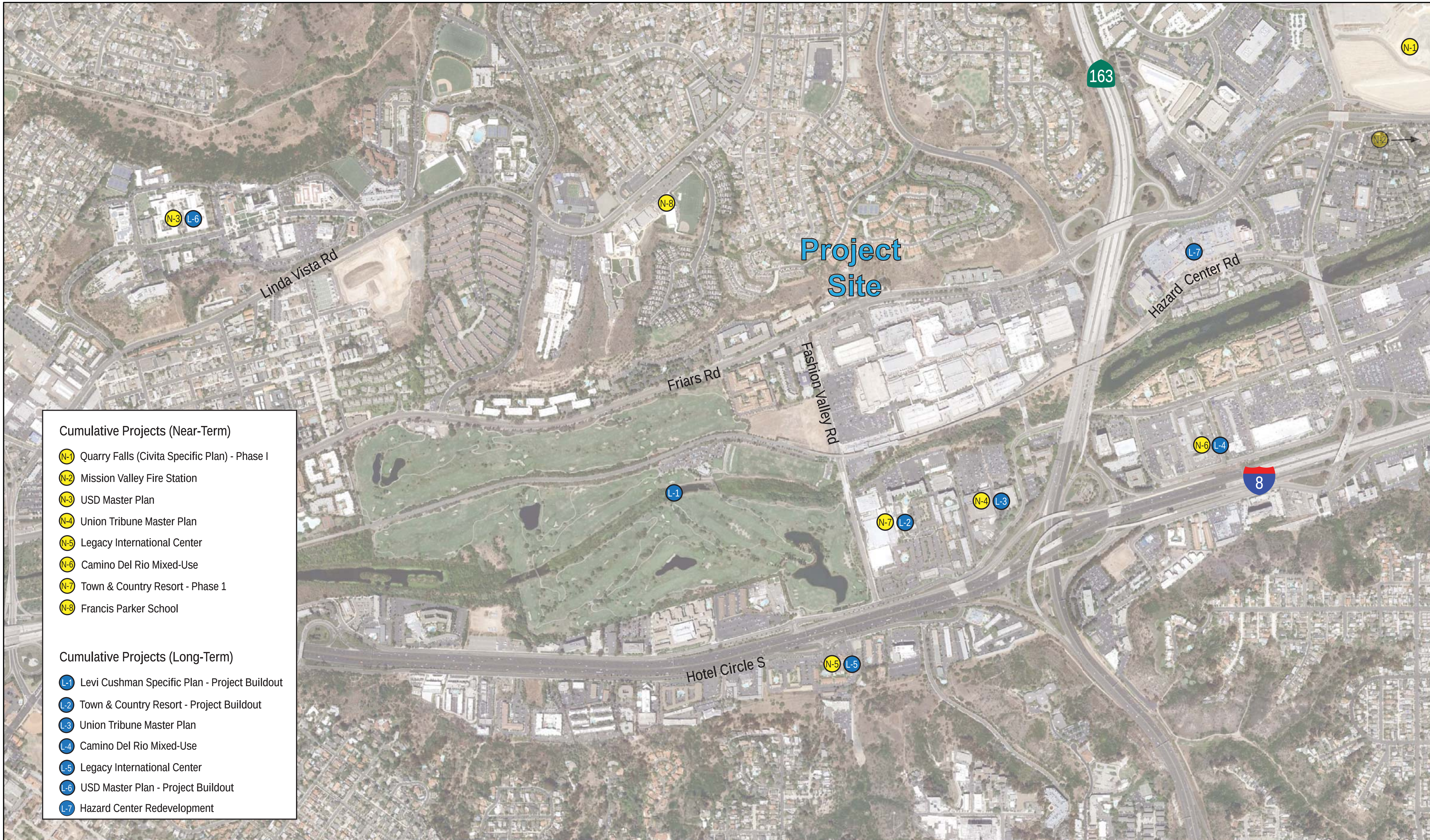


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Figure 9-1

**Cumulative Projects Location Map**

FRIARS ROAD RESIDENTIAL

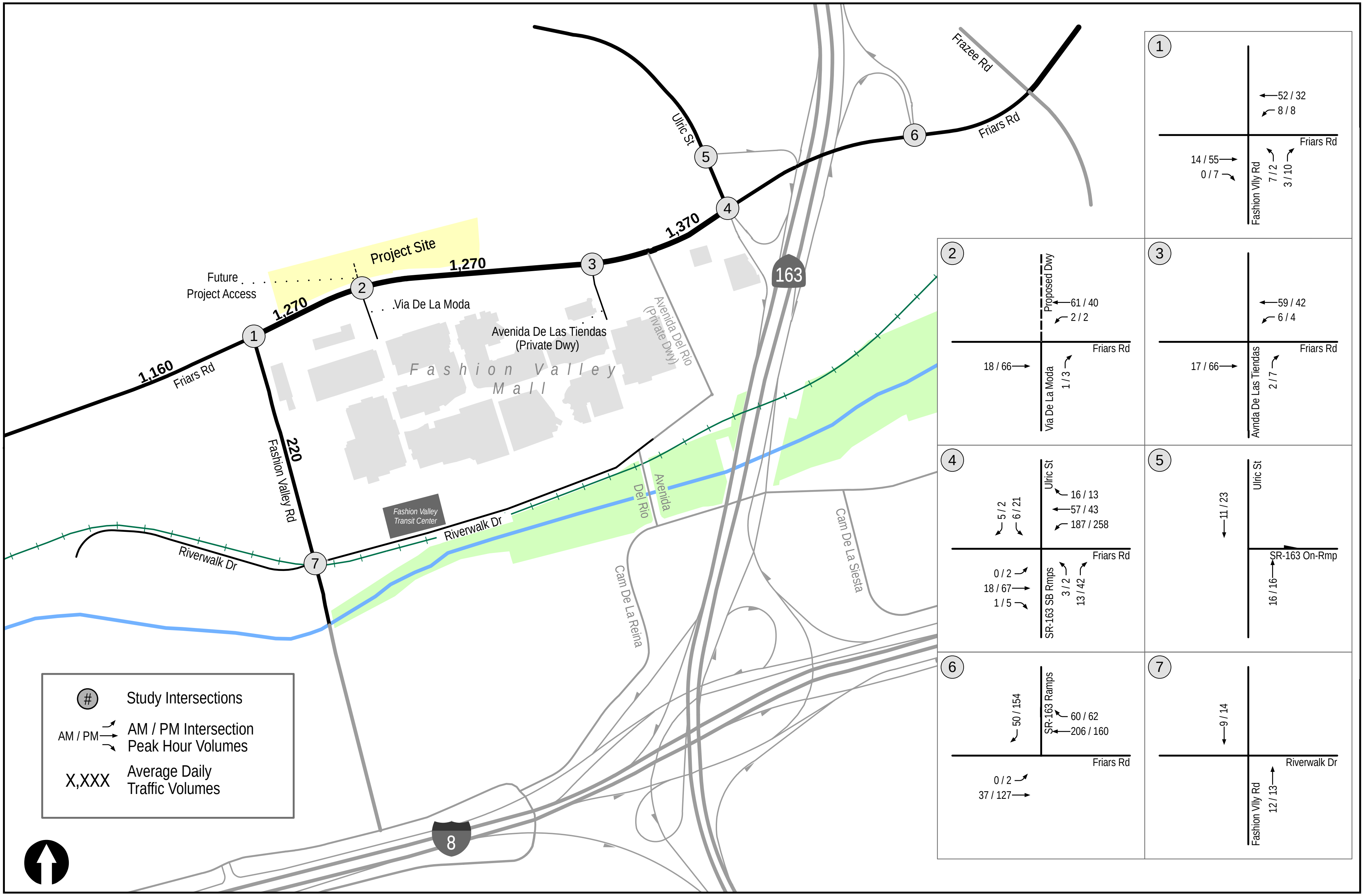


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**Figure 9-2**

# Cumulative Project Assignment
**(Near-Term)**

FRIARS ROAD RESIDENTIAL

# 10.0 NEAR-TERM (OPENING DAY 2018) ANALYSIS

The following section presents the analysis of study area intersections and street segments under Near-Term (Opening Day 2018) conditions without and with the Project.

## 10.1 Near-Term (Opening Day 2018) Conditions

### *Planned Local and Regional Improvements*

In assessing the impacts of the proposed development, it was necessary to review planned, on-going, and future roadway improvements in the study area.

For the purposes of this traffic study, the implementation of a number of local and regional roadway improvements were considered based on coordination with City staff and information provided in the *Mission Valley Public Facilities Financing Plan* and the *Linda Vista Public Facilities Financing Plan*. Based on the funding status, feasibility, and the likelihood of improvements being constructed by Opening Day 2018, the only improvement assumed was Phase I of the SR-163 / Friars Road Interchange Project, as summarized in ***Table 10-1***.

The Phase I of the SR-163/ Friars Road Interchange Project proposes to relieve regional and local traffic congestion with the construction of several improvements including the following:

- Construction of an extended southbound State Route 163 (SR-163) to westbound Friars Road off-ramp, widening of the Friars Road overcrossing structure to eight lanes extending to Frazee Road, and construction of a flyover structure to eliminate conflict between traffic entering southbound SR-163 and exiting SR-163 to I-8 west.
- Construction of an auxiliary lane on southbound SR-163 from Genesee Avenue to the Friars Road/SR-163 Interchange. Elimination of the weave between southbound SR-163 and exiting I-8 west traffic requires widening of the bridge over the San Diego River.
- Construction of Class II bike lanes and sidewalks on both sides of Friars Road. The on and off ramps will be realigned to eliminate "free right" movements and improve safety for bicyclists and pedestrians.
- Additional improvements include traffic signal modifications at the on and off ramp intersections, Frazee/Friars Road intersection and Avenida de las Tiendas/Friars Road intersection. Frazee Road near the Friars Road intersection will be reconfigured to increase the number of thru and turning lanes.

The Friars Road widening and ramp improvements at Friars Road will be constructed as a part of Phase I, which are programmed to begin construction in Fall 2016. The bridge widening and flyover structure will be constructed in Phase II and the southbound SR-163 auxiliary lane and northbound on-ramp with auxiliary lane will be built in Phase III. The timing for Phases II and III are yet to be determined and are contingent on funding. ***Appendix G*** shows a detailed Phasing Exhibit of the SR-163 / Friars Road Interchange Project.

***Figure 10–1*** depicts the Near-Term improvements for the study area street segments and intersections.

TABLE 10–1
NEAR-TERM (OPENING YEAR 2018) PLANNED IMPROVEMENTS

| Project Name (Community/Project No.) | Improvements | Schedule/ Funding |
|---|---|---|
| **SR 163 / Friars Road Interchange – Phase I** (Mission Valley / MV-14, 17, & 18) and SANDAG RTP 2050 | Phase I of the project includes widening of Friars Road from Avenida de las Tiendas to Mission Center Road, including the Friars Road overcrossing and reconstructing the interchange improvements to ramp intersections.<br>• Widening Friars Road overcrossing<br>• Improving Frazee Road, Avenida de las Tiendas and Ulric Street intersections along Friars Road<br>• Constructing a designated bike lane and improving pedestrian facilities. | Phase I is expected to open to traffic in 2018.<br>Phase I funding is 100% secure. The project has also been included in the 2050 RTP under the Revenue Constrained scenario. |

### *Project Driveway Improvements*

The following improvements will be constructed by the Project along the Project frontage:

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage***: Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-lane Major Road classification.

These improvements are assumed in the "with project" analyses.

## 10.2 Near-Term (Opening Day 2018) Traffic Volumes

Near-Term (Opening Day 2018) traffic volumes were calculated for the study area by manually adding the Near-Term cumulative project volumes onto the existing volumes. The traffic volumes represent LLG's best efforts, based on standard practice, of forecasting Near-Term (Opening Day 2018) conditions with the most recent information available at the time this report was prepared.

The volumes were also checked for consistency between intersections, where no driveways or roadways exist between intersections.

***Figure 10–2*** shows the Near-Term AM and PM peak hour turning movement volumes and daily traffic volumes. ***Figure 10–3*** shows the Near-Term + Project AM and PM peak hour turning movement volumes and daily traffic volumes

## 10.3 Near-Term (Opening Day 2018) Intersection Operations

Intersection capacity analyses were conducted for the study intersections under Near-Term (Opening Day 2018) without and with Project conditions. ***Table 10–2*** reports the intersection operations during the peak hour conditions. The majority of the study area intersections are calculated to operate at LOS D or better under Near-Term without and with Project conditions with the exception of the following:

- Friars Road / SR 163 Northbound Ramps: LOS E both without and with Project traffic during the PM peak hour.

Based on City of San Diego significance criteria, significant direct impacts are <u>not</u> calculated at these locations since the significance thresholds are not exceeded.

It should be noted that reduced peak hour delays are calculated at some of the study intersections under "with Project" conditions since ***the reduction in traffic from the removal of the existing uses is greater than the new multi-family residential Project traffic at some turning movements.*** The change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes.

***Appendix H*** contains the intersection analysis worksheets for the Near-Term (Opening Day 2018) scenario. ***Appendix I*** contains the intersection analysis worksheets for the Near-Term (Opening Day 2018) + Project scenario.

## 10.4 Near-Term (Opening Day 2018) Street Segment Operations

Street segment analyses were conducted for roadways in the study area under Near-Term (Opening Day 2018) without and with Project conditions. ***Table 10–3*** reports the daily street segment operations. As shown in *Table 10–3*, the study area street segments are calculated to operate at LOS C or better under without and with Project conditions with the exception of Friars Road west of Fashion Valley Road which is calculated to operate at LOS E under without and with Project conditions. Based on City of San Diego significance criteria, a significant direct impact is <u>not</u> calculated at this location since the significance threshold is not exceeded.

## TABLE 10–2
## NEAR-TERM (OPENING DAY 2018) AND NEAR-TERM + PROJECT INTERSECTION OPERATIONS

| Intersection | Control Type | Peak Hour | Near-Term (Opening Day 2018) | | Near-Term (Opening Day 2018) + Project | | Δ[c] | Significant Impact? |
|---|---|---|---|---|---|---|---|---|
| | | | Delay[a] | LOS[b] | Delay | LOS | | |
| 1. Friars Road / Fashion Valley Road | Signal | AM<br>PM | 12.2<br>23.9 | B<br>C | 18.0<br>23.5 | B<br>C | 5.8<br>(0.4) | No<br>No |
| 2. Friars Road / Via De La Moda | Signal | AM<br>PM | 4.7<br>15.9 | A<br>B | 9.3<br>25.4 | A<br>C | 4.6<br>9.5 | No<br>No |
| 3. Friars Road / Avenida De Las Tiendas (Private Driveway) | Signal | AM<br>PM | 5.4<br>22.1 | A<br>C | 5.4<br>21.8 | A<br>C | 0.0<br>(0.3) | No<br>No |
| 4. Friars Road / SR 163 SB Ramps | Signal | AM<br>PM | 52.1<br>42.2 | D<br>D | 51.2<br>42.2 | D<br>D | (0.9)<br>0.0 | No<br>No |
| 5. Ulric Street / SR 163 SB On Ramp | Unsignalized | AM<br>PM | 16.6<br>20.5 | C<br>C | 16.8<br>20.4 | C<br>C | 0.2<br>(0.1) | No<br>No |
| 6. Friars Road / SR 163 NB Ramps | Signal | AM<br>PM | 40.9<br>56.2 | D<br>E | 41.1<br>57.5 | D<br>E | 0.2<br>1.3 | No<br>No |
| 7. Riverwalk Drive / Fashion Valley Road | Signal | AM<br>PM | 14.2<br>18.9 | B<br>B | 14.3<br>19.3 | B<br>B | 0.1<br>0.4 | No<br>No |

***Footnotes:***
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. "Δ" denotes the project-induced increase, or (decrease) in delay.

***General Notes:***
1. Negative Δ calculated at some intersections due to the net reduction in traffic (for some turning movements) due to the Project.

| SIGNALIZED | | UNSIGNALIZED | |
|---|---|---|---|
| DELAY/LOS THRESHOLDS | | DELAY/LOS THRESHOLDS | |
| Delay | LOS | Delay | LOS |
| 0.0 ≤ 10.0 | A | 0.0 ≤ 10.0 | A |
| 10.1 to 20.0 | B | 10.1 to 15.0 | B |
| 20.1 to 35.0 | C | 15.1 to 25.0 | C |
| 35.1 to 55.0 | D | 25.1 to 35.0 | D |
| 55.1 to 80.0 | E | 35.1 to 50.0 | E |
| ≥ 80.1 | F | ≥ 50.1 | F |

## TABLE 10–3
## NEAR-TERM (OPENING DAY 2018) AND NEAR-TERM + PROJECT STREET SEGMENT OPERATIONS

| Street Segment | Functional Classification | Capacity (LOS E) [a] | Near-Term (Opening Day 2018) | | | Near-Term (Opening Day 2018) + Project | | | V/C Increase | Sig |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ADT[b] | LOS[c] | V/C[d] | ADT[b] | LOS[c] | V/C[d] | | |
| **Friars Road** | | | | | | | | | | |
| West of Fashion Valley Road | 4-Lane Major Collector w/ TWLTL[f] | 30,000 | 26,497 | E | 0.883 | 26,664 | E | 0.889 | 0.006 | None |
| Fashion Valley Road to Via De La Moda | 5-Lane Major Arterial | 45,000 | 27,250 | C | 0.606 | 27,549 | C | 0.612 | 0.006 | None |
| Via De La Moda to Avenida De Las Tiendas (Private Driveway) | 5-Lane Major Arterial | 45,000 | 32,686 | C | 0.726 | 33,257 | C | 0.739 | 0.013 | None |
| Avenida De Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway) | 6-Lane Major / Prime Arterial[g] | 55,000 | 44,113 | C | 0.802 | 44,684 | C | 0.812 | 0.010 | None |
| Avenida Del Rio (Private Driveway) to Ulric Street | 7-Lane Major / Prime Arterial[g] | 60,000 | 44,113 | C | 0.735 | 44,684 | C | 0.745 | 0.010 | None |
| **Fashion Valley Road** | | | | | | | | | | |
| Friars Road to Riverwalk Drive | 4-Lane Collector [e] | 22,500 | 10,488 | B | 0.466 | 10,620 | B | 0.472 | 0.006 | None |

***Footnotes:***

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. A Collector capacity averaged between 30,000 and 15,000 ADT (i.e. 22,500 ADT) was selected to account for mid-block left-turn pocket and reduced friction from driveways restricted to right-turns only.
f. TWLTL – Two-way left-turn lane.
g. Modified Major / Prime capacity assumed. Westbound lanes operate as a Prime (no parking or driveways) and eastbound lanes operate as a Major due to Avenida Del Rio Driveway.

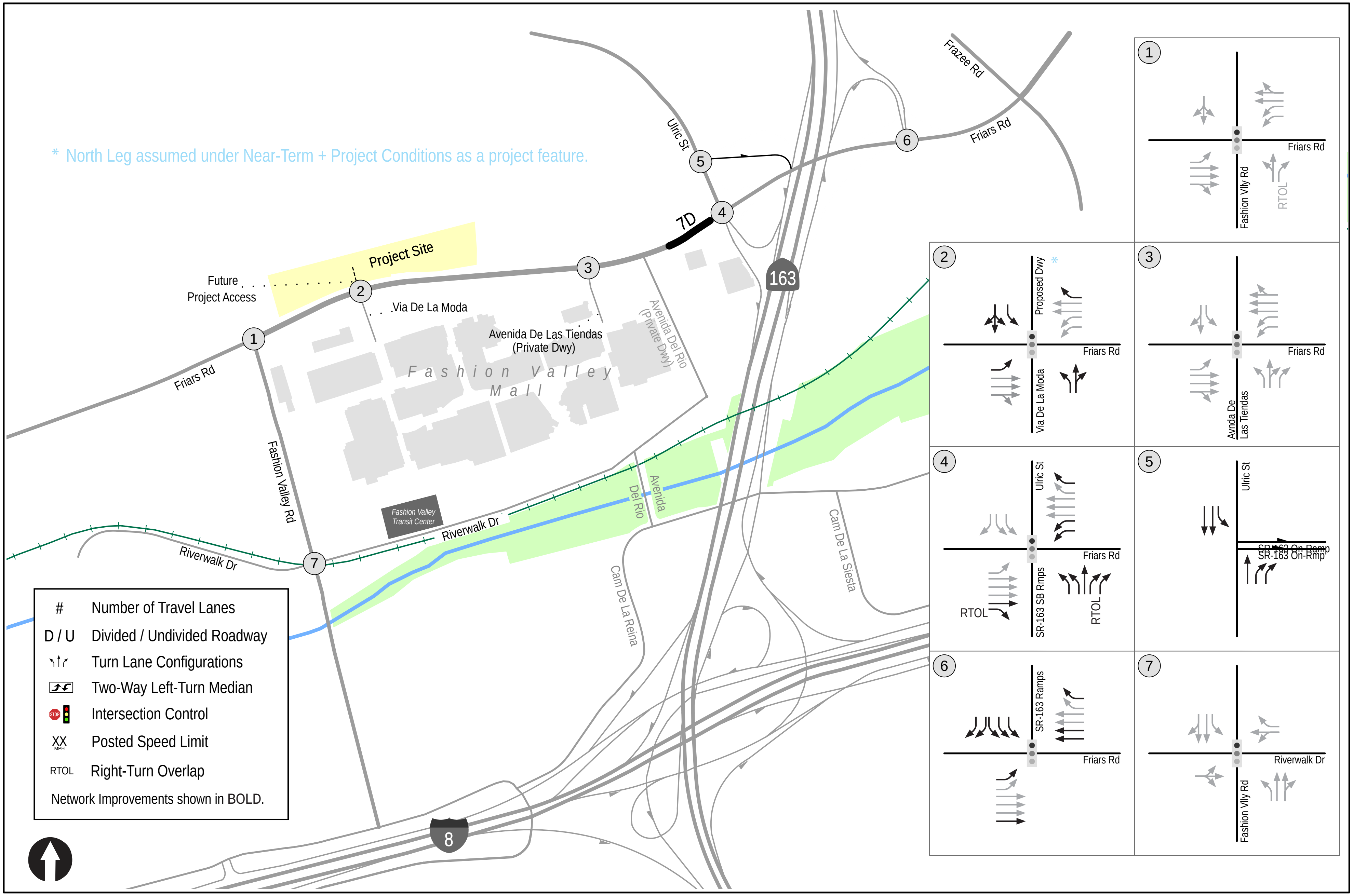


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**Figure 10-1**

# Near-Term (Opening Day 2018) Planned Improvements

Friars Road Residential

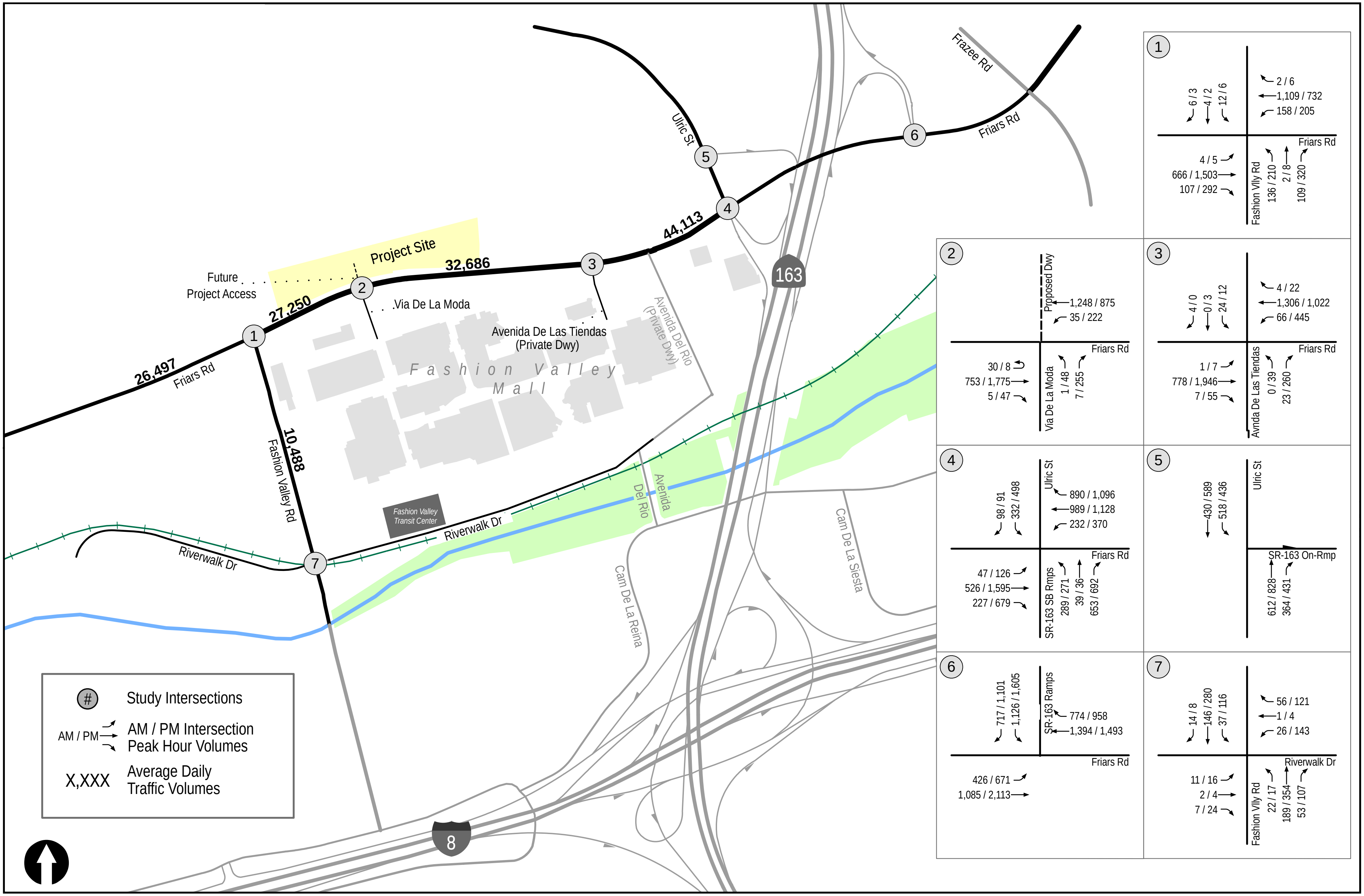


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**Figure 10-2**

# Near-Term Without Project Traffic Volumes
## (Opening Day 2018)

FRIARS ROAD RESIDENTIAL

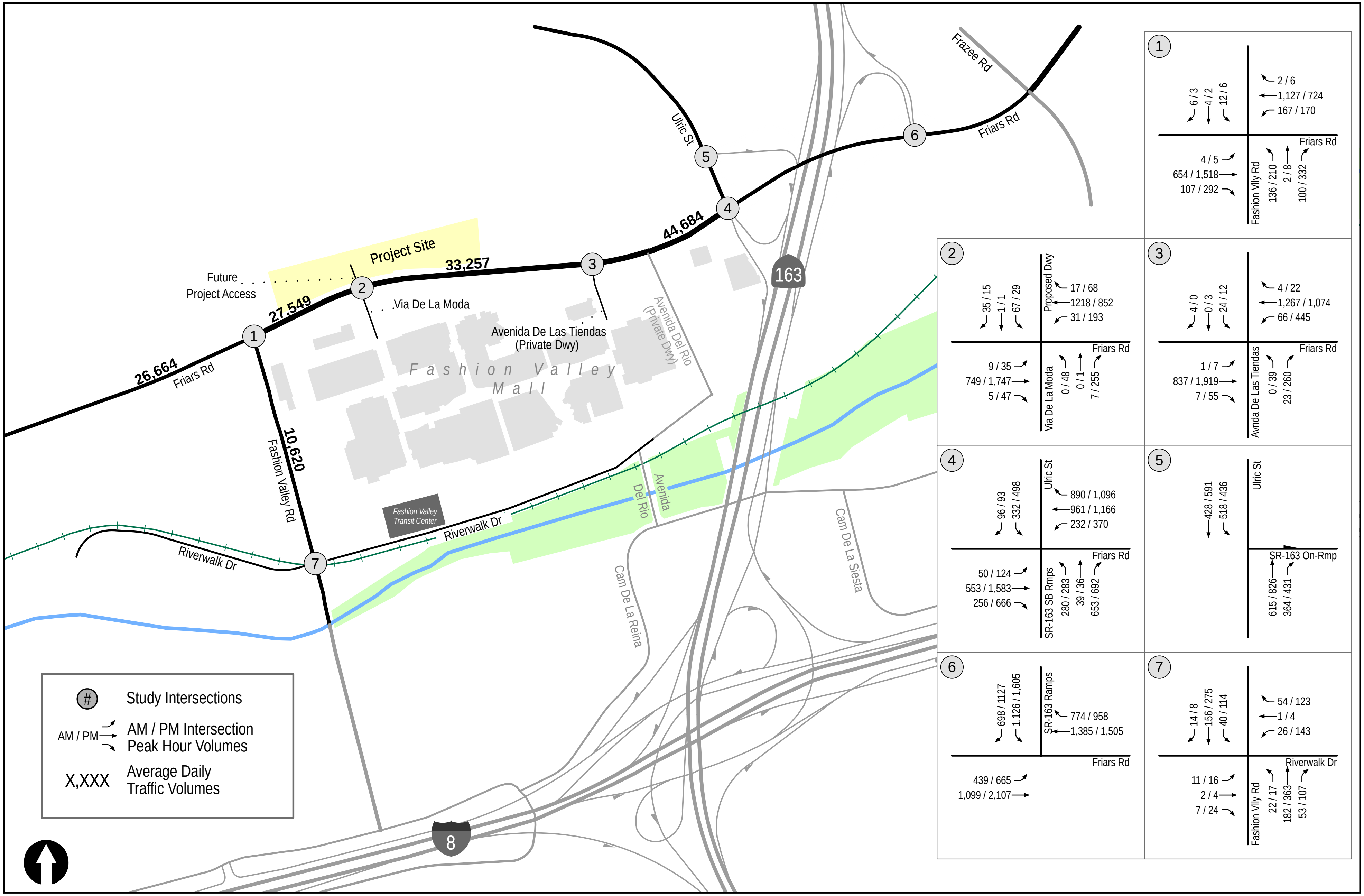


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**Figure 10-3**

# Near-Term + Project Traffic Volumes
**(Opening Day 2018)**

FRIARS ROAD RESIDENTIAL

# 11.0 YEAR 2035 (HORIZON YEAR) ANALYSIS

The following section presents the analysis of study area intersections and street segments under Year 2035 (Horizon Year) conditions without and with the Project.

## 11.1 Year 2035 (Horizon Year) Conditions

### *Planned Local and Regional Improvements*

In assessing the impacts of the proposed development, it was necessary to review planned, on-going, and future roadway improvements in the study area.

For the purposes of this traffic study, the implementation of local and regional roadway improvements were assumed in place based on coordination with City staff and information provided in the *Mission Valley Public Facilities Financing Plan* and the *Linda Vista Public Facilities Financing Plan.*

In addition to Phase I of the SR-163 / Friars Road Interchange Project, assumed under Near-Term (Opening Year 2018) conditions and discussed further in *Section 10.1* of this study, the Year 2035 (Horizon Year) scenario assumes the proposed extension of Hazard Center Drive and the proposed extension of Camino de La Reina from Fashion Valley Road to Via Las Cumbres and the extension of Via Las Cumbres between Friars Road and Hotel Circle N. as proposed in the Levi-Cushman / Atlas Master Plans as shown in ***Table 11–1***. This is considered reasonable as well as conservative as the analysis for the Town & Country Master Plan in the Year 2035 (Horizon Year) assumes approximately 67,000 ADT from the Levi-Cushman / Atlas Specific Plan, yet assumes only two of many improvements (on the basis of providing access and basic circulation) required by this Specific Plan.

***Figure 11–1*** depicts the Year 2035 (Horizon Year) improvements for the study area street segments and intersections.

TABLE 11–1
YEAR 2035 (HORIZON YEAR) PLANNED IMPROVEMENTS

| Project Name (Community/Project No.) | Improvements | Schedule/ Funding |
|---|---|---|
| **Camino De La Reina Extension – Fashion Valley Road to Via las Cumbres** (Mission Valley / MV-7) | The Riverwalk Master Plan will provide for the construction of Camino De La Reina as a four lane major Street between Fashion Valley Road and Via las Cumbres. In association with this project, the intersection of Avenida Del Rio and Fashion Valley Road was assumed to be widened in the eastbound direction to include one dedicated left-turn lane, one thru lane and one dedicated right-turn lane with right-turn overlap phasing and restriped in the westbound direction to include one dedicated left-turn lane and one shared thru / right-turn lane.<br><br>Development agreements have expired but included as a reasonably planned improvement to access the Levi Cushman site. | Project expected to be completed by 2035.<br>*100% subdivider funding (Riverwalk Master Plan)* |
| **Via Las Cumbres Extension** (Mission Valley / MV-13) | The Riverwalk Master Plan will construct Via Las Cumbres between Friars Road and Hotel Circle N. | Project expected to be completed by 2035.<br>*100% subdivider funding (Riverwalk Master Plan)* |
| **Hazard Center Drive Extension** (Mission Valley / MV-15) | The Hazard Center Redevelopment project will extend Hazard Center Drive under SR 163. Based on coordination with City, only a 2-lane facility is proposed. | Project expected to be completed by 2035.<br>*100% subdivider funding improvement required for Hazard Center Redevelopment project to proceed.* |

### *Project Driveway Improvements*

The following improvements will be constructed by the Project along the Project frontage:

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage***: Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-lane Major Road classification.

These improvements are assumed in the "with project" analyses.

## 11.2 Year 2035 (Horizon Year) Traffic Volumes

Year 2035 (Horizon Year) traffic volumes were forecasted for the study area using the SANDAG Series 12 Regional Traffic Model conducted for the Friars Road Residential Project. Extensive efforts between LLG and SANDAG were made to include detailed land use/roadway network information. The traffic volumes represent LLG's best efforts of forecasting Year 2035 (Horizon Year) conditions with the most recent modeling information available at the time this report was prepared.

Based on the projected forecast ADT volumes, the Year 2035 (Horizon Year) peak hour volumes were calculated based on the existing relationship between ADT and peak hour volumes. The forecast volumes were also checked for consistency between intersections, where no driveways or roadways exist between intersections, and were compared to existing volumes for accuracy.

***Figure 11–2*** shows the forecasted Year 2035 (Horizon Year) AM and PM peak hour turning movement volumes and daily traffic volumes. ***Figure 11–3*** shows the forecasted Year 2035 (Horizon Year) + Project AM and PM peak hour turning movement volumes and daily traffic volumes

## 11.3 Year 2035 (Horizon Year) Intersection Operations

Intersection capacity analyses were conducted for the study intersections under Year 2035 (Horizon Year) without and with Project conditions. ***Table 11–2*** reports the intersection operations during the peak hour conditions. As shown in *Table 11–2*, the following intersections are calculated to operate at LOS E or F:

- Friars Road / Fashion Valley Road: LOS E both without and with Project traffic during the PM peak hour.
- Friars Road / SR 163 Southbound Ramps: LOS F both without and with Project traffic during the AM and PM peak hours.
- Friars Road / SR 163 Northbound Ramps: LOS F both without and with Project traffic during the PM peak hour.
- Ulric Street / SR 163 Southbound On-Ramp: LOS F both without and with Project traffic during the AM and PM peak hours.
- Riverwalk Drive / Fashion Valley Road: LOS F both without and with Project traffic during the AM and PM peak hours.

Based on City of San Diego significance criteria, significant cumulative impacts are not calculated at these locations since the significance thresholds are not exceeded.

It should be noted that reduced peak hour delays are calculated at some of the study intersections under "with Project" conditions since ***the reduction in traffic from the removal of the existing uses is greater than the new multi-family residential Project traffic at some turning movements.*** The change of use from office to residential changes peak hour traffic patterns. For example, residential uses typically generate heavy AM outbound volumes while office uses typically generate heavy AM inbound volumes.

***Appendix J*** contains the intersection analysis worksheets for the Year 2035 (Horizon Year) scenario. ***Appendix K*** contains the intersection analysis worksheets for the Year 2035 (Horizon Year) + Project scenario.

## 11.4 Year 2035 (Horizon Year) Street Segment Operations

Street segment analyses were conducted for roadways in the study area under Year 2035 (Horizon Year) without and with Project conditions. ***Table 11–3*** reports the daily street segment operations. As shown in *Table 11–3*, the following study area street segments are calculated to operate at LOS E or F:

- Friars Road – West of Fashion Valley Road: LOS F both without and with Project traffic.
- Friars Road – Via De La Moda to Avenida De Las Tiendas (Private Driveway): LOS E both without and with Project traffic.
- Friars Road – Avenida Le Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway): LOS F both without and with Project traffic.
- Friars Road – Avenida Del Rio (Private Driveway) to Ulric Street: LOS F both without and with Project traffic.

Based on City of San Diego significance criteria, significant cumulative impacts are not calculated at these locations since the significance thresholds are not exceeded.

## TABLE 11–2
## YEAR 2035 (HORIZON YEAR) AND YEAR 2035 + PROJECT INTERSECTION OPERATIONS

| Intersection | Control Type | Peak Hour | Year 2035 (Horizon Year) | | Year 2035 (Horizon Year) + Project | | Δ[c] | Significant Impact? |
|---|---|---|---|---|---|---|---|---|
| | | | Delay[a] | LOS[b] | Delay | LOS | | |
| 1. Friars Road / Fashion Valley Road | Signal | AM<br>PM | 19.7<br>56.9 | B<br>E | 30.1<br>58.3 | C<br>E | 10.4<br>1.4 | No<br>No |
| 2. Friars Road / Via De La Moda | Signal | AM<br>PM | 5.6<br>18.3 | A<br>B | 10.6<br>30.4 | B<br>C | 5.0<br>12.1 | No<br>No |
| 3. Friars Road / Avenida De Las Tiendas (Private Driveway) | Signal | AM<br>PM | 7.9<br>38.4 | A<br>D | 7.9<br>37.0 | A<br>D | 0.0<br>(1.4) | No<br>No |
| 4. Friars Road / SR 163 SB Ramps | Signal | AM<br>PM | 106.3<br>102.2 | F<br>F | 106.8<br>102.2 | F<br>F | 0.5<br>0.0 | No<br>No |
| 5. Ulric Street / SR 163 SB On Ramp | Unsignalized | AM<br>PM | 56.2<br>123.6 | F<br>F | 57.0<br>122.7 | F<br>F | 0.8<br>(0.9) | No<br>No |
| 6. Friars Road / SR 163 NB Ramps | Signal | AM<br>PM | 51.3<br>86.7 | D<br>F | 50.1<br>87.4 | D<br>F | (1.2)<br>0.7 | No<br>No |
| 7. Riverwalk Drive / Fashion Valley Road | Signal | AM<br>PM | 119.2<br>130.5 | F<br>F | 120.0<br>131.3 | F<br>F | 0.8<br>0.8 | No<br>No |

***Footnotes:***
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. "Δ" denotes the project-induced increase, or (decrease) in delay.

***General Notes:***
1. Negative Δ calculated at some intersections due to the net reduction in traffic (for some turning movements) due to the Project.

| SIGNALIZED<br>DELAY/LOS THRESHOLDS<br>Delay | <br><br>LOS | UNSIGNALIZED<br>DELAY/LOS THRESHOLDS<br>Delay | <br><br>LOS |
|---|---|---|---|
| 0.0 ≤ 10.0 | A | 0.0 ≤ 10.0 | A |
| 10.1 to 20.0 | B | 10.1 to 15.0 | B |
| 20.1 to 35.0 | C | 15.1 to 25.0 | C |
| 35.1 to 55.0 | D | 25.1 to 35.0 | D |
| 55.1 to 80.0 | E | 35.1 to 50.0 | E |
| ≥ 80.1 | F | ≥ 50.1 | F |

## TABLE 11–3
## YEAR 2035 (HORIZON YEAR) AND YEAR 2035 + PROJECT STREET SEGMENT OPERATIONS

| Street Segment | Functional Classification | Capacity (LOS E) [a] | Year 2035 (Horizon Year) | | | Year 2035 ( Horizon Year) + Project | | | V/C Increase | Sig |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ADT[b] | LOS[c] | V/C[d] | ADT[b] | LOS[c] | V/C[d] | | |
| **Friars Road** | | | | | | | | | | |
| West of Fashion Valley Road | 4-Lane Collector w/ TWLTL[f] | 30,000 | 34,476 | F | 1.149 | 34,627 | F | 1.154 | 0.005 | None |
| Fashion Valley Road to Via De La Moda | 5-Lane Major Arterial | 45,000 | 29,669 | C | 0.659 | 30,018 | C | 0.667 | 0.008 | None |
| Via De La Moda to Avenida De Las Tiendas (Private Driveway) | 5-Lane Major Arterial | 45,000 | 44,450 | E | 0.988 | 44,970 | E | 0.999 | 0.011 | None |
| Avenida De Las Tiendas (Private Driveway) to Avenida Del Rio (Private Driveway) | 6-Lane Major / Prime Arterial[g] | 55,000 | 58,400 | F | 1.062 | 58,920 | F | 1.071 | 0.009 | None |
| Avenida Del Rio (Private Driveway) to Ulric Street | 7-Lane Major / Prime Arterial[g] | 60,000 | 64,370 | F | 1.073 | 64,890 | F | 1.082 | 0.009 | None |
| **Fashion Valley Road** | | | | | | | | | | |
| Friars Road to Riverwalk Drive | 4-Lane Collector [e] | 22,500 | 16,985 | C | 0.755 | 17,184 | C | 0.764 | 0.009 | None |

***Footnotes:***

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. A Collector capacity averaged between 30,000 and 15,000 ADT (i.e. 22,500 ADT) was selected to account for mid-block left-turn pocket and reduced friction from driveways restricted to right-turns only.
f. TWLTL – Two-way left-turn lane.
g. Modified Major / Prime capacity assumed. Westbound lanes operate as a Prime (no parking or driveways) and eastbound lanes operate as a Major due to Avenida Del Rio Driveway.

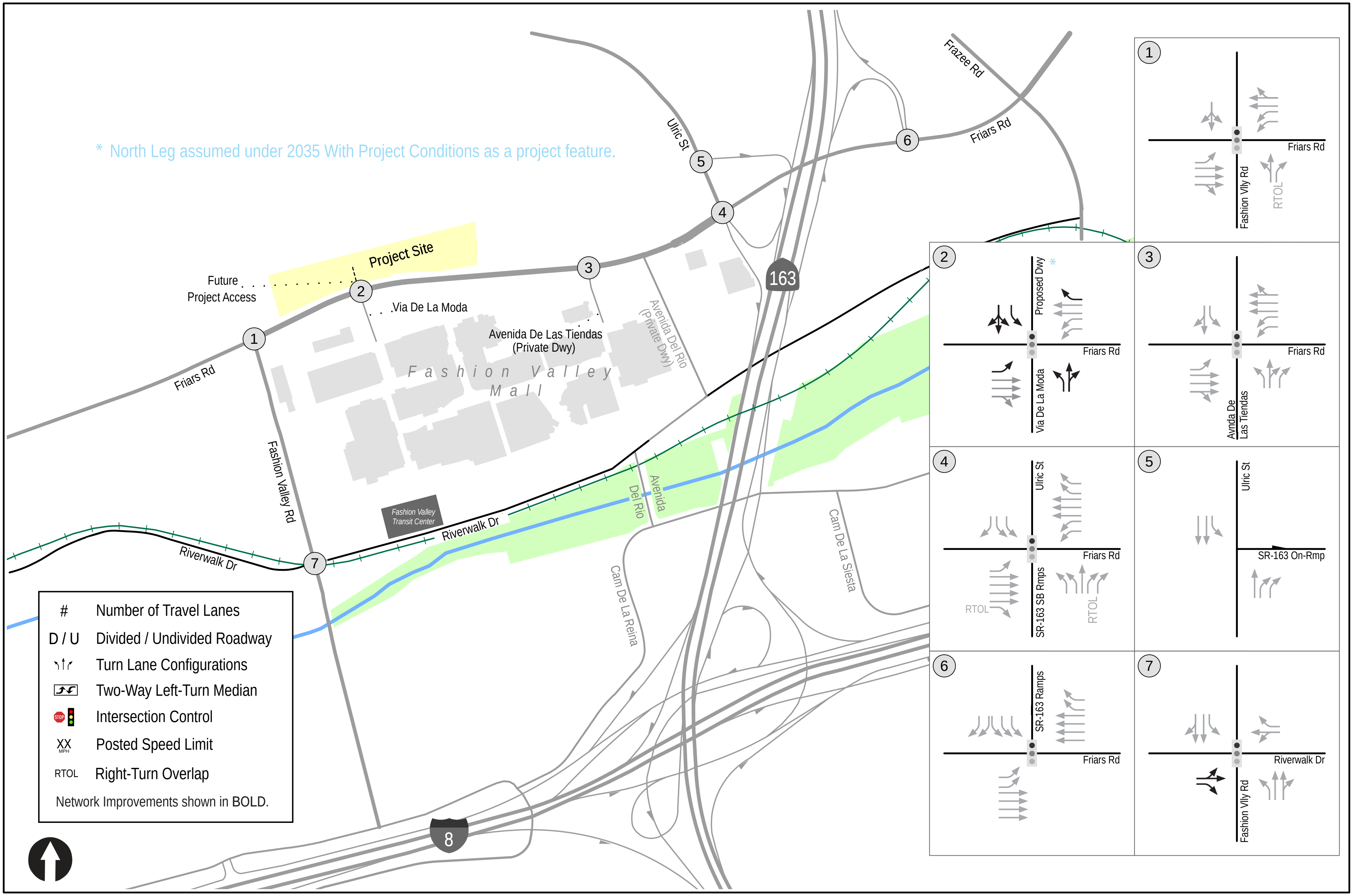


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**Figure 11-1**

# Year 2035 (Horizon Year) Planned Improvements

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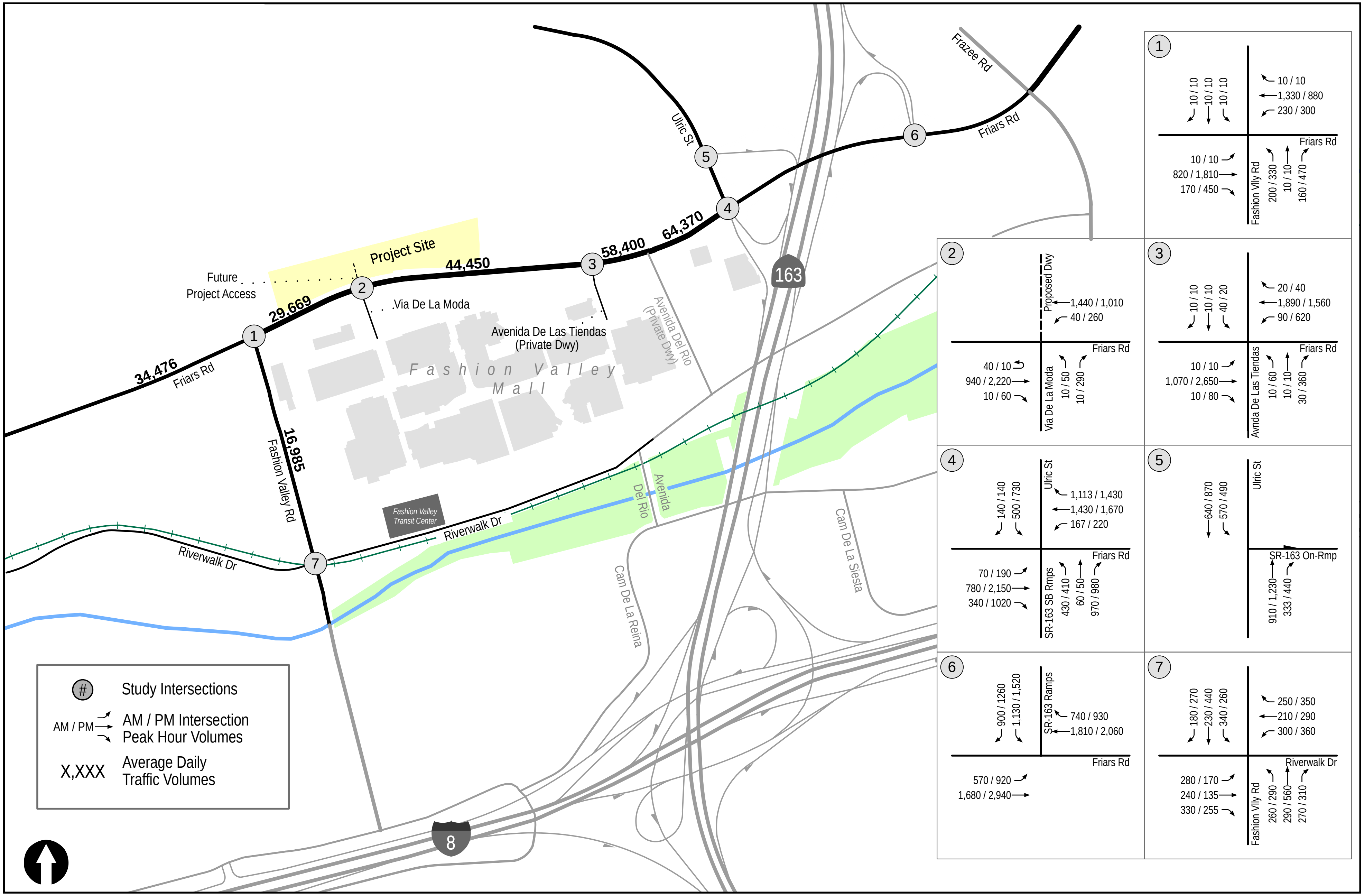


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**Figure 11-2**

# Year 2035 Without Project Traffic Volumes

**(Horizon Year)**

FRIARS ROAD RESIDENTIAL

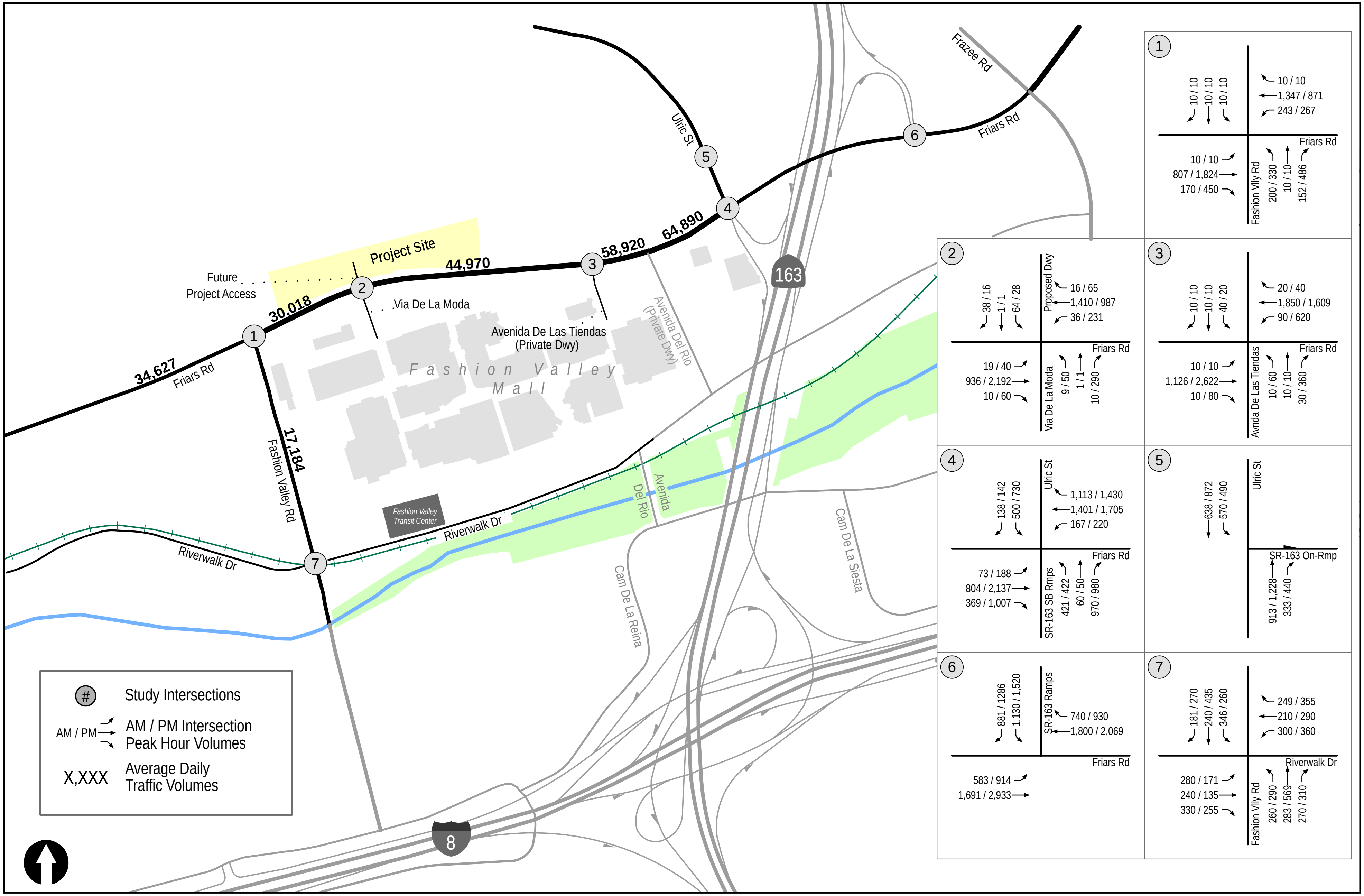


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**Figure 11-3**

## Year 2035 With Project Traffic Volumes

**Year 2035 (Horizon Year)**

FRIARS ROAD RESIDENTIAL

# 12.0 SITE ACCESS AND ON-SITE CIRCULATION

Access to the Project site is proposed via three (3) driveways off of Friars Road: the existing right-in / right-out driveways east and west of Via De La Moda, and a new driveway which will serve as the primary access to the site. The primary access driveway will form the north leg of the signalized Friars Road / Via De La Moda intersection. As shown in *Figure 2-1b*, entry gates to the parking garage will be set back at an appropriate distance to ensure acceptable operations.

Guest parking and shopkeeper unit parking will be provided from the Via De La Moda driveway and will be located after the gate control, accessible by a communication pedestal.

A queue assessment was conducted for the main project driveway at Via De La Moda (included in ***Appendix N***), where it was determined that the $95^{th}$ percentile queue is expected to be no longer than one car, or 25 feet. The Project will provide adequate storage (approximately 90', or 3-4 vehicles) for incoming vehicles entering the parking garages, and therefore, no queue spillback onto Friars Road is anticipated.

# 13.0 PARKING

Parking for the Project shall comply with the Land Development Code (LDC) based on the zoning and land uses (Currently LDC Section 142.0500) at the time building permits are applied for. Parking and loading areas shall meet the requirements of the City's Land Development Code for off-street parking. Overall, sufficient project parking is proposed to avoid parking congestion.

Parking for the apartments will be "unbundled", meaning that the cost of parking will be separate from the cost of the rent of the apartment. This is sometimes referred to as "price parking". This approach requires residents to pay for parking spaces, as opposed to being automatically assigned spaces. Residents may also choose not to rent a parking space if they do not have a car. This approach tends to reduce the average number of cars owned per dwelling unit.

A total of 12 parking spaces will be provided for the six shopkeeper units: six parking spaces for the residents of the units, and six parking spaces for visitors of the shopkeeper units.

As previously discussed, guest parking and shopkeeper unit parking will be provided from the Via de la Moda driveway and will be located after the gate control, accessible by a communication pedestal.

Based on the City's parking requirements and the proposed land use, the Project should provide a minimum of 477 parking spaces, 34 motorcycle parking spaces, and 142 bicycle parking spaces as shown in ***Table 13-1***. The Project will provide 493 total parking spaces, and will therefore exceed the City's minimum parking requirement. The Project will provide 34 motorcycle parking spaces and will meet the City's minimum motorcycle parking requirement. The Project will provide 170 bicycle parking spaces and will therefore exceed the City's minimum bicycle parking requirement.

## 13.1 Parking Program

Access to parking for the Project will be accessible via the main entrance at Via de la Moda to residents of the condos, apartments, and shopkeeper units, as well as to visitors. Parking Level 1 will be the upper level of parking and will be accessible by traveling up the entrance ramp. A resident card reader and guest call box will be located in the center island, and will provide access to Parking Area 1 (to the left, under the apartment building) and to Parking Area 2 (to the right, under the condo building). Parking Area 1 on the upper level will provide 140 apartment spaces and 6 visitor parking spaces dedicated to the shopkeeper units. Residents of the apartments and all visitors of the shopkeeper units will travel up the entrance ramp, stop at the call box to gain entry, turn left and travel through the access gate to park. Parking Area 2 on the upper level will provide 79 condo spaces and 16 visitor spaces. Residents of the condos and all other visitors will travel up the entrance ramp, stop at the call box to gain entry, turn right and travel through the access gate to park.

Parking Level 2 will be the lower level of parking and will be accessible by traveling down the entrance ramp. Parking Level 2 will only provide resident parking. A resident card reader and access gate will be located in the center island at the bottom of the ramp and will provide access to Parking Area 1 (to the left, under the apartment building) and to Parking Area 2 (to the right, under the condo building). Parking Area 1 on the lower level will provide 155 apartment spaces. Parking Area 2 on the lower level will provide 27 condo spaces and 70 apartment spaces. Residents will travel down the entrance ramp, stop at the card reader to gain entry, travel through the access gate and turn either left for apartment parking or right for apartment and condo parking.

Residents will also be able to access parking via the Project's other two driveways located on either side of the main access, which will both be gate controlled and accessible by card readers. The westerly driveway will provide access to the Parking Area 2 on the upper and lower levels. The easterly driveway will provide access to the Parking Area 1 on the upper and lower levels.

## TABLE 13-1
## PARKING CALCULATIONS

| Multiple Dwelling Unit Type | Total No. of Units (Apts.) | Total No. of Units (Condos) | Total No. of Units (Shopkeeper) | Transit Area Min. Parking Required (Apts.) | Transit Area Min. Parking Required (Condos) | Total Parking Provided | Total Motorcycle Parking Min. Required / Provided | Total Bike Spaces Min. Required / Provided | Total Accessible Parking (Min. Required / Provided) |
|---|---|---|---|---|---|---|---|---|---|
| 1 Bedroom | 133 | 34 | - | @1.25/du **166.25 Spaces** | @1.25/du **42.5 Spaces** | **209 Spaces** (208.75 Required) | @0.1/du **17 Spaces** | @0.4/du **67 Spaces** | 9 Accessible Spaces Required (including 2 van spaces) |
| 2 Bedroom | 110 | 36 | - | @1.75/du **192.5 Spaces** | @1.75/du **63 Spaces** | **256 Spaces** (255.5 Required) | @0.1/du **15 Spaces** | @0.5/du **73 Spaces** | |
| Shopkeeper (1 Bedroom) | - | - | 6 | @2.0/du per City Requirement **12 Spaces** (1 visitor, 1 resident / unit) | - | **6 Spaces** Visitor **6 Spaces** Resident Parking within Garage | **2 Spaces** Per City Requirement | **2 Spaces** Per City Requirement | |
| Subtotal | 243 | 70 | 6 | **370.75 (371) Spaces Required** | **105.5 (106) Spaces** | **477 Spaces** (including 10 accessible spaces) | 34 Spaces Required | 142 Spaces Required (140 spaces provided, 30 lockers provided) | |
| Visitor / Guest Parking | | | | | | **16**(including 4 electric car charging stations)) | | | |
| Total Development | **319 Dwelling Units** | | | **477 Total Spaces Required** | | **493 Total Spaces Provided** (including 10 accessible spaces) | **34 Spaces Provided** | **170 Spaces Provided** (140 spaces provided, 30 lockers provided) | **10 Spaces Provided** (including 5 van spaces) |

***Source:*** Tucker Sadler Architects

## 14.0 ALTERNATIVE TRANSPORTATION ASSESSMENT

The following section discusses the multi-modal access to the project site – pedestrian, bicycle and transit.

### 14.1 Pedestrian

Pedestrian access will be provided via sidewalks leading up to the site along Friars Road and five sets of access stairs up the slope to the site. Fashion Valley Mall and the Fashion Valley Transit Center is located within an approximately five minute (≈1,430 feet) walk from the Project site. ADA complaint access will be provided by elevator between the site and nearby bus stops.

The Project's pedestrian circulation plan is shown in ***Figure 14-1***.

### 14.2 Bicycle

Class II bike lanes are currently provided along Friars Road in both directions throughout the corridor. The bike lanes will be retained along the project frontage along with the proposed project frontage improvements.

### 14.3 Transit

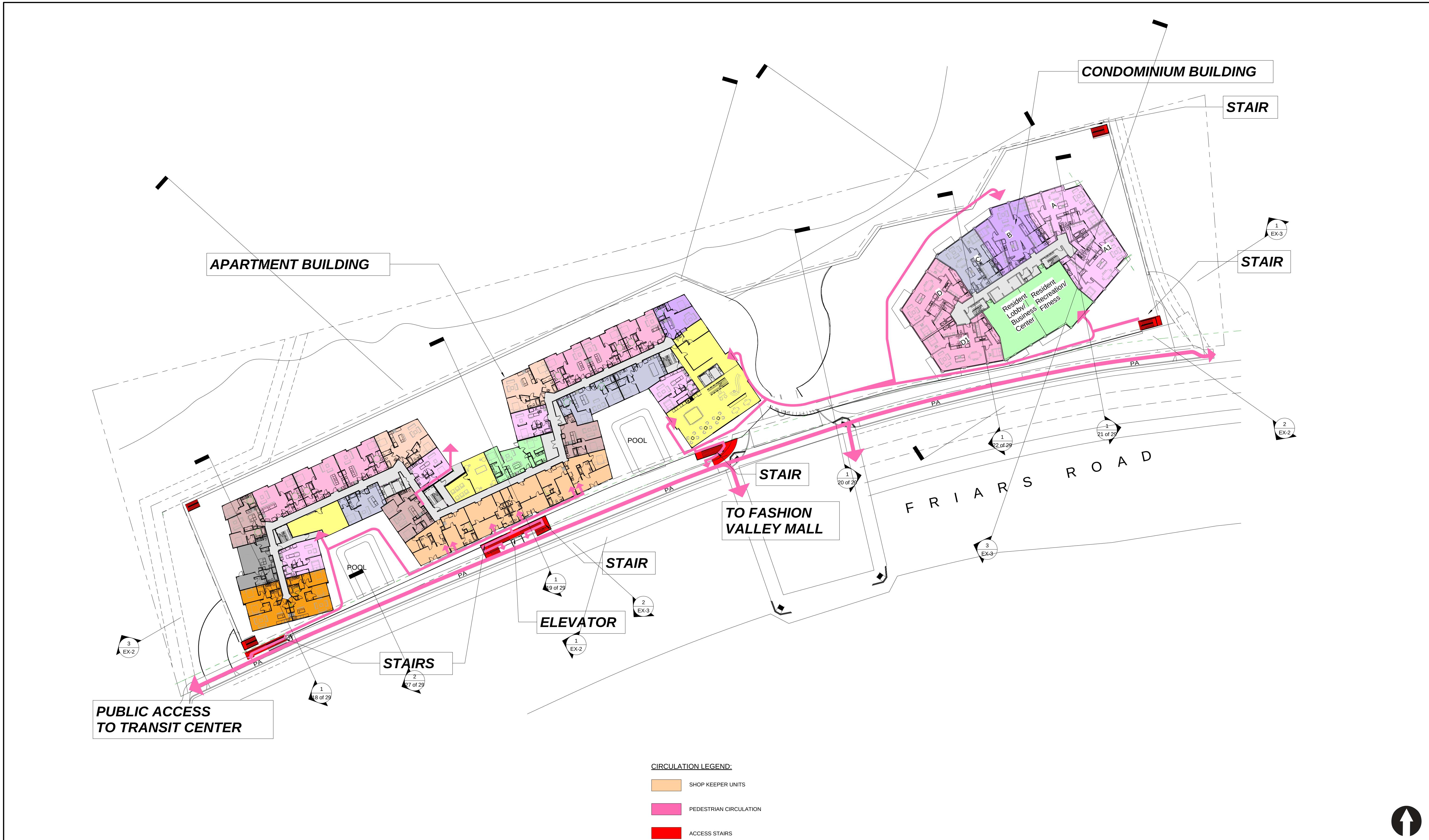
*Light Rail*

The Fashion Valley Transit Center is located within an approximately five minute (≈1,430 feet) walk from the Project site from which regional light rail transit service is provided by the Trolley Green Line, which runs between Santee and Downtown San Diego. The intermediate stops include Alvarado Medical Center, San Diego State University (SDSU), Qualcomm Stadium, Mission Valley Center, Linda Vista, Old Town and the Convention Center. Within the Mission Valley community, the light rail tracks run parallel to Friars Road and the San Diego River, passing through the Fashion Valley Mall. The trolley service headways are approximately every 15 minutes and operate between approximately 5 AM and 1 AM.

*Bus Service*

Bus service is provided by the Metropolitan Transit System (MTS). The routes serving the Fashion Valley Transit Center include 6, 20, 25, 41, 88, 120 and 928. These bus routes connect the Fashion Valley Mall to Kearny Mesa, UCSD, Old Town, Downtown, Del Lago and North Park.

In addition to the Transit Center, there are MTS bus stops located along Friars Road and Fashion Valley Road, within a five minute walk (≈1,430 feet maximum). The bus stops on Friars Road are serviced by MTS Route 41, which connects Fashion Valley Transit Center to the UCSD campus, MTS Route 25 and MTS Route 928, which both connect the Fashion Valley Transit Center to Kearny Mesa. The bus stop on Fashion Valley Road is serviced by MTS Route 88 and MTS Route 120, which connects Fashion Valley Transit Center to Kearny Mesa. Generally, the bus routes within the project vicinity operate with a headway of approximately 10-15 minutes and operate on both weekdays and weekends.




Linscott Law & Greenspan engineers

N:\2525\Figures
Date: 08/15/16

Figure 14-1

**Pedestrian Circulation Plan**

Friars Road Multi-Family

## 15.0 TRANSPORTATION DEMAND MANAGEMENT

The owner / permittee will implement the following Transportation Demand Management (TDM) strategies to aid in the reduction of vehicular trips for the Project:

- Bicycle racks provided for resident and / or shopkeeper customer use.
- The provision of a charging station(s) for electric vehicles.
- Transportation information displayed in common areas to include materials such as:
    - Ridesharing promotional materials, including the iCommute program.
    - Promotional materials for "Guaranteed Ride Home" programs like those provided by iCommute to ensure that residents that carpool, vanpool, take transit, walk, or bike to work are provided with a ride to their home or location near their residence in the event that an emergency occurs during their work day.
    - Bicycle route and parking including maps and bicycle safety information.
    - Promotional materials provided by MTS and other publically supported transportation organizations
    - A listing of facilities for carpoolers / vanpoolers, transit riders, bicyclists, and pedestrians, including information on the availability of preferential carpool / vanpool parking spaces and the methods for obtaining these spaces
- Annual events held to promote the use of alternative transportation.
- Unbundling of parking for the apartments such that the cost of parking will be separate from the cost of the rent of the apartment. This approach requires residents to pay for parking spaces, as opposed to being automatically assigned spaces, and tends to reduce the average number of cars owned per dwelling unit and therefore tends to reduce driving.

## 16.0 CONSTRUCTION TRAFFIC ASSESSMENT

In addition to the Project generated traffic analysis conducted for the Friars Road Residential project, presented in previous chapters of this study, a supplemental construction traffic assessment was conducted to review any traffic implications due to construction traffic associated with the Project.

### 16.1 Construction Activity

There are several different types of construction activities, including demolition, excavation, grading, concrete pours, and building structures that are planned to be implemented. For the Friars Road Residential project, the excavation phase, in which approximately 117,000 cubic yards of export will be removed from the project site, is expected to be the most intensive in terms of traffic generation. Hauling will average 150 truckloads per day, with approximately 20 truckloads per hour expected. The excavation material is currently planned to be taken to a dumpsite in Lakeside.

### 16.2 Construction Trip Generation

Construction traffic relates to the traffic generated from construction vehicles. Construction vehicles consist primarily of heavy trucks and on-site employee vehicles. The Project's construction trip generation was calculated based on the following information:

***Trucks***

During the excavation phase, construction traffic will primarily consist of heavy vehicles (trucks). As noted above, hauling will average 150 truckloads per day. Given that heavy vehicle traffic is expected to occur throughout an eight-hour workday, 20 trucks were assumed to access the site during both the AM and PM peak hours.

Based on the Highway Capacity Manual's *Exhibit 11-10*, a Passenger Car Equivalent (PCE) factor of 1.5 for level terrain (see ***Appendix M***) was applied to account for the effects of heavy vehicles in the traffic flow. "Passenger Car Equivalence" is defined as the number of passenger cars that are displaced by a single heavy vehicle of a particular type under the prevailing traffic conditions. Heavy vehicles have a greater traffic impact than passenger cars since they are larger than passenger cars, and therefore occupy more roadway space, and their performance characteristics are generally inferior to passenger cars, leading to the formation of downstream gaps in the traffic stream (especially on upgrades), which cannot always be effectively filled by normal passing maneuvers.

***On-Site Employees***

A typical day during the excavation phase of construction will include approximately ten on-site employees. It was conservatively assumed that all employees would drive their own vehicles to the site in the morning during the AM peak hour and leave the site in the evening during the PM peak hour. No carpooling or transit use was assumed in the trip generation calculations.

***Existing Land Uses***

There are currently three existing office buildings on the Project site which are calculated to generate 799 ADT with 87 inbound and 12 outbound trips during the AM peak hour and 24 inbound and 87 outbound trips during the PM peak hour. The existing land uses will be replaced by the Project, and therefore the Project's construction trip generation was calculated accounting for the existing land use trip generation credit. Further information on the existing land use trip generation is provided in Section 7 of this study.

With the existing land use trip generation credit, the Project's excavation phase of construction is calculated to generate a net total of (329) ADT with (47) inbound and 18 outbound trips during the AM peak hour and 6 inbound and (47) outbound trips during the PM peak hour, as summarized in ***Table 16-1***. The Project's excavation phase of construction is calculated with a negative ADT, AM inbound and PM outbound peak hour volumes because the reduction in traffic from the removal of the existing uses is greater than the new traffic added due to the excavation phase of construction.

TABLE 16-1
CONSTRUCTION TRIP GENERATION

| Land Use | Construction Vehicles | Daily Trip Rate | PCE [a] | ADT [b] | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|---|---|---|
| | | | | | In | Out | In | Out |
| **Construction Trips** | | | | | | | | |
| Heavy Trucks [c] | 150 | 2 | 1.5 | 450 | 30 | 30 | 30 | 30 |
| On-Site Employees[d] | 10 | 2 | - | 20 | 10 | 0 | 0 | 10 |
| **Existing Trips** | | | | | | | | |
| Commercial Office[e] | - | - | - | 799 | 87 | 12 | 24 | 87 |
| **Net Total** | **-** | **-** | **-** | **(329)** | **(47)** | **18** | **6** | **(47)** |

***Footnotes:***

a. Passenger Car Equivalents. Based on the Highway Capacity Manual's Exhibit 11-10, a Passenger Car Equivalent (PCE) factor of 1.5 for level terrain was applied.

b. Average Daily Trips.

c. Given that heavy vehicle traffic will occur throughout an eight-hour workday, 20 trucks were conservatively assumed to access the site during both the AM and PM peak hours.

d. 100% of the on-site employees conservatively assumed to drive their own vehicles to the site and to arrive during the AM peak hour and depart during the PM peak hour.

e. Detailed information on the existing land use trip generation is provided in *Table 7-1*.

## 16.3 Construction Traffic Assessment

As shown in *Table 16-1*, the net traffic generated by the excavation phase of construction is calculated to either be less than existing conditions or less than the Project's net trip generation (summarized in *Table 7-1). Tables 8-1* and *8-2* show that the Project is not calculated to contribute to significant impacts at any of the study intersections or street segments under Existing + Project conditions. Therefore it can be concluded that the Project's construction traffic will similarly not contribute to significant impacts.

Primary access to the Project site is proposed via a new driveway, forming the north leg of the signalized Friars Road / Via De La Moda intersection. It is recommended that the proposed new driveway and associated signal modification be in place for the excavation phase of construction so that the heavy vehicles departing the site will not be required to make a U-turn at the adjacent intersection of Friars Road / Fashion Valley Road to access SR-163.

## 17.0 CONCLUSIONS

Per the City's significance thresholds and the analysis methodology presented in this report, Project related traffic is **not** calculated to contribute to significant direct or cumulative impacts within the study area. Therefore, no mitigation measures are required. However, as a condition of approval, to provide access to the Project, and to be consistent with the Community Plan, the Project will construct the following improvements along the Project frontage:

- ***Friars Road / Via De La Moda***: In order to provide primary access to the Project site, the Project will construct the north leg of the Friars Road / Via De La Moda intersection, and reconfigure the intersection to accommodate the proposed north leg. A dedicated westbound right-turn lane will be provided, the northbound movement will provide a dedicated left-turn lane and a shared right-turn / thru lane, and the southbound movement will provide a dedicated left-turn lane and a shared left-turn / thru / right-turn lane. The existing signal at the intersection will be modified, including split phasing, as part of the improvement project.
- ***Friars Road - Project Frontage:*** Widen Friars Road along the Project frontage to accommodate an additional (third) westbound lane, providing the ultimate Linda Vista and Mission Valley Community Plan 6-lane Major Road classification.

SOUTHERN CALIFORNIA SOIL & TESTING, INC.
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# GEOTECHNICAL INVESTIGATION
# FRIARS ROAD APARTMENT DEVELOPMENT
# SAN DIEGO, CALIFORNIA

**PREPARED FOR:**

**MR. DOYLE BARKER**
**MANAGING DIRECTOR**
**LANDCAP FRIARS ROAD, LLC**
**27132 B PASEO ESPADA, SUITE 1206**
**SAN JUAN CAPISTRANO, CALIFORNIA 92675**

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*Providing Professional Engineering Services Since 1959*

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October 15, 2014

**SCS&T No. 140338N**
**Report No. 1**

**Mr. Doyle Barker**
**Managing Director**
**LandCap Friars Road, LLC**
**27132 B Paseo Espada, Suite 1206**
**San Juan Capistrano, California 92675**

Subject: GEOTECHNICAL INVESTIGATION
FRIARS ROAD APARTMENT DEVELOPMENT
SAN DIEGO, CALIFORNIA

Dear Mr. Barker:

Southern California Soil & Testing Inc. (SCS&T) is pleased to present our report describing the geotechnical investigation performed for the subject project. SCS&T conducted the geotechnical investigation in general conformance with the scope of work presented in our proposal dated August 22, 2014. If you have any questions, please call us at (619) 280-4321.

Respectfully Submitted,
**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

REGISTERED PROFESSIONAL ENGINEER THOMAS B. CANADY No. 50057 Exp. 6/30/15 CIVIL STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST W. LEE VANDERHURST No. 1125 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Thomas B. Canady, PE 50057
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Senior Engineering Geologist

TBC:WLV:ma:aw

(1) Addressee via e-mail at dbarker@landcapip.com

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## EXECUTIVE SUMMARY

This report presents the results of the geotechnical investigation Southern California Soil & Testing, Inc. (SCS&T) performed for the subject project. We understand that the project will consist of the design and construction of three residential buildings, a leasing/recreation building, pavements and a pool. The residential buildings will be five stories over three levels of subterranean parking. The leasing building will have two stories and no basement. Details on the planned construction were not available at the time of this report. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project.

SCS&T explored the subsurface conditions by drilling six borings to depths between about 28 feet and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. An SCS&T geologist logged the borings and collected samples of the materials encountered for laboratory testing. SCS&T tested selected samples from the borings to evaluate pertinent soil classification and engineering properties to assist in developing geotechnical conclusions and recommendations. A refraction microtremor (ReMi) survey was performed at the eastern portion of the site. The survey was performed to develop a shear wave profile and characterize the strength of the subsurface materials.

The materials encountered in the borings consist of fill, alluvium and Stadium Conglomerate. The fill consists of dense silty to clayey gravel with varying amounts of cobbles. The alluvial deposits consist of dense silty gravel with varying amounts of cobbles. The Stadium Conglomerate sediments consist of very dense, weakly to strongly cemented conglomerate and silty to clayey sandstone. Groundwater was encountered in borings B-3 and B-4 at a depth of about 31 feet below the existing ground surface.

The main geotechnical considerations affecting the project are the presence of potentially compressible fill and alluvium, difficult excavations in rocky materials, and excavations extending below groundwater. To reduce the potential for settlement, the existing fill and alluvium should be excavated in their entirety beneath structures and improvements. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. These structures can be supported on shallow spread footings with bottom levels entirely on competent Stadium Conglomerate. The leasing/recreation building can be supported on shallow spread footings with bottom levels entirely on compacted fill. Gravel and cobbles should be anticipated in the fill, alluvium and Stadium Conglomerate. Strongly cemented zones should be anticipated within the Stadium Conglomerate. Groundwater should also be anticipated. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting materials with concretions, gravel and cobbles. We expect that temporary dewatering may be necessary during construction. The grading and foundation recommendations presented herein may need to be updated once final plans are developed. Global slope stability will need to be evaluated once project plans are developed.

## 1 INTRODUCTION

This report presents the results of the geotechnical investigation Southern California Soil & Testing, Inc. (SCS&T) performed for the subject project. We understand that the project will consist of the design and construction of three residential buildings, a leasing/recreation building, pavements and a pool. The residential buildings will be five stories over three levels of subterranean parking. The leasing/recreation building will have two stories and no basement. The planned building locations, basement elevations and site grading were not available at the time of this report. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project. Figure 1 presents a site vicinity map.

## 2 SCOPE OF WORK

### 2.1 FIELD INVESTIGATION

We explored the subsurface conditions by drilling six borings to depths between about 28 feet and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. Figure 2 shows the approximate locations of the borings. An SCS&T geologist logged the borings and collected samples of the materials encountered for laboratory testing. The logs of the borings are presented in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1. A refraction microtremor (ReMi) survey was performed at the eastern portion of the site. The survey was performed to develop a shear wave profile and characterize the strength of the subsurface materials. The results of this geophysical evaluation are presented in Appendix III.

### 2.2 LABORATORY TESTING

Selected samples obtained from the borings were tested to evaluate pertinent soil classification and engineering properties and enable development of geotechnical conclusions and recommendations. The laboratory tests consisted of:

- R-Value
- Expansion Index
- Corrosivity
- Direct Shear

The results of the laboratory tests, and brief explanations of test procedures, are presented in Appendix II.

### 2.3 ANALYSIS AND REPORT

The results of the field and laboratory tests were evaluated to develop conclusions and recommendations regarding:

- Subsurface conditions beneath the site
- Potential geologic hazards
- Criteria for seismic design in accordance with the 2013 California Building Code (CBC)
- Site preparation and grading

- Excavation characteristics
- Appropriate alternatives for foundation support along with geotechnical engineering criteria for design of the foundations
- Estimated foundation settlements
- Support for concrete slabs-on-grade
- Lateral pressures for the design of retaining walls
- Pavement sections
- Corrosion potential

# 3 SITE AND SUBSURFACE CONDITIONS

## 3.1 SITE DESCRIPTION

The site is located north of Friars Road and east of Fashion Valley Road in the Linda Vista community of the City of San Diego, California. The site is bordered by a San Diego Gas & Electric (SDG&E) transmission line on the north, a commercial development on the west, Friars Road on the south, and undeveloped land on the east. The site is located on the northern flank of Mission Valley. The northern portion of the site consists of a natural slope that ascends about 140 feet to the north at inclinations between about 1:1 (horizontal:vertical) and 1.6:1 (horizontal:vertical). The southern portion of the site consists of a fill slope that descends about 25 feet to the south at an inclination of about 1.5:1 (horizontal:vertical). Existing site improvements consist of three commercial buildings and associated pavement and landscape areas. Site elevations range from about 160 feet on the north to about 60 feet on the south.

## 3.2 SUBSURFACE CONDITIONS

The materials encountered in the borings consist of fill, alluvium and Stadium Conglomerate. Descriptions of the materials are presented below. Figure 2 presents the site-specific geology. Figures 3A through 3C present geologic cross sections. The cross sections can be updated to show the planned building locations once project plans are developed. Figure 4 presents the regional geology in the vicinity of the site.

**Fill** - The fill consists of dense silty to clayey gravel with varying amounts of cobbles. The fill extends to depths up to about 10 feet below the existing ground surface.

**Alluvium** - Alluvial deposits were encountered in borings B-6. The alluvium consists of dense silty gravel with varying amounts of cobbles.

**Stadium Conglomerate** - Eocene age Stadium Conglomerate sediments were encountered in each of our borings. The Stadium Conglomerate consists of very dense, weakly to strongly cemented conglomerate and silty to clayey sandstone. Difficult drilling conditions were encountered in the Stadium Conglomerate. Air rotary percussion methods were used to advance borings B-5 and B-6.

**Groundwater** - Groundwater was encountered in borings B-3 and B-4 at a depth of about 31 feet below the existing ground surface. The groundwater is believed to be a localized perched condition and not a regional groundwater table. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

# 4 GEOLOGIC HAZARDS

## 4.1 CITY OF SAN DIEGO SEISMIC SAFETY STUDY

The site is generally located in Geologic Hazard Category 52 on the City of San Diego Seismic Safety Study map. This category is defined as other level areas, gently sloping to steep terrain, with favorable geologic structure and low risk. The southeastern corner of the site is located in Geologic Hazard Category 32. This category is defined as minor drainages with fluctuating groundwater and low liquefaction potential. We anticipate that the planned subterranean parking will extend through potentially liquefiable deposits. In our opinion, the geologic risk is low.

## 4.2 CBC SEISMIC DESIGN PARAMETERS

A geologic hazard likely to affect the project is groundshaking as a result of movement along an active fault zone in the vicinity of the subject site. The site coefficients and adjusted maximum considered earthquake spectral response accelerations in accordance with the 2013 CBC are presented below:

Site Coordinates: Latitude 32.76970°
Longitude -117.17003°
Site Class: C
Site Coefficients, $F_a$ = 1.000
$F_v$ = 1.341
Mapped Spectral Response Acceleration at Short Periods, $S_s$ = 1.190g
Mapped Spectral Response Acceleration at 1-Second Period, $S_1$ = 0.459g
$S_{MS}=F_aS_s$ = 1.190g
$S_{M1}=F_vS_1$ = 0.615g
$S_{DS}=⅔ S_{MS}$ = 0.793g
$S_{D1}=⅔ S_{M1}$ = 0.410g
$PGA_M$ = 0.527g

## 4.3 FAULTING AND SURFACE RUPTURE

The closest known active fault is the Rose Canyon fault zone (San Diego section) located about 1.7 miles (2.8 kilometers) west-southwest of the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults are known to underlie or project toward the site. Therefore, the probability of fault rupture is negligible.

### 4.4 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction occurs when loose, saturated, generally fine sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid; resulting in large total and differential ground surface settlements as well as possible lateral spreading during an earthquake. Given the relatively dense nature of the materials beneath the site, the potential for liquefaction and dynamic settlement to occur is negligible.

### 4.5 LANDSLIDES AND SLOPE STABILITY

Evidence of deep-seated landslides or slope instabilities was not observed. Global stability of the existing natural slope will need to be evaluated once project plans are developed.

### 4.6 FLOODING, TSUNAMIS AND SEICHES

The site is not located within a flood zone or dam inundation area. The site is not located within a mapped area on the State of California Tsunami Inundation Maps (Cal EMA, 2009); therefore, damage due to flooding or tsunamis is considered negligible. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is negligible.

### 4.7 SUBSIDENCE

The site is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum); therefore, the potential for subsidence due to the extraction of fluids is negligible.

### 4.8 HYDRO-CONSOLIDATION

Hydro-consolidation can occur in recently deposited (less than 10,000 years old) sediments that were deposited in a semi-arid environment. Examples of such sediments are aolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore space between particle grains can re-adjust when inundated by groundwater causing the material to consolidate. The relatively dense materials underlying the site are not susceptible to hydro-consolidation.

## 5 CONCLUSIONS

The main geotechnical considerations affecting the project are the presence of potentially compressible fill and alluvium, difficult excavations in rocky materials, and excavations extending below groundwater. Site preparation will need to be performed in areas to receive at-grade structures, improvements or new fill to reduce the potential for distress. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. These structures can be supported on shallow spread footings with bottom levels entirely on competent Stadium Conglomerate. The leasing building can be supported on shallow spread footings with bottom levels entirely on compacted fill. Gravel and cobbles should be anticipated in the fill, alluvium and Stadium Conglomerate. Strongly cemented zones should be expected within the Stadium Conglomerate. Groundwater should also be anticipated. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting materials with concretions, gravel and cobbles. We expect that temporary dewatering may be necessary during construction.

# 6 RECOMMENDATIONS

## 6.1 SITE PREPARATION AND GRADING

### 6.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation and debris. The existing fill and alluvium should be excavated in its entirety beneath settlement sensitive structures and improvements. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. For at-grade structures and improvements, the excavation should extend horizontally at least 5 feet outside the planned perimeter foundations, at least 2 feet outside the perimeter of planned hardscape and pavements, or up to existing improvements, whichever is less. Hardscape should be underlain by at least 12 inches of material with an expansion index of 20 or less determined in accordance with ASTM D4829. An SCS&T representative should observe conditions exposed in the bottom of the excavation to determine if additional excavation is required.

### 6.1.2 Earthwork

Excavated material, except for roots, debris and rocks greater than 6 inches, can be used as compacted fill. Fill should be moisture conditioned to near optimum moisture content and compacted to at least 90% relative compaction. Fill should be placed in horizontal lifts at a thickness appropriate for the equipment spreading, mixing, and compacting the material, but generally should not exceed 8 inches in loose thickness. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D 1557. Utility trench backfill beneath structures, pavements and hardscape should be compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavements should be compacted to at least 95% relative compaction.

### 6.1.3 Expansive Material

The onsite materials tested have a very low to low expansion potential. The foundation recommendations presented in this report reflect a low expansion potential.

### 6.1.4 Imported Soil

Imported soil should consist of predominately granular soil free of organic matter and rocks greater than 6 inches. Imported soil should have an expansion index of 20 or less and should be inspected and, if appropriate, tested by SCS&T prior to transport to the site.

### 6.1.5 Site Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order. Difficult excavation should be anticipated in cemented zones within the Stadium Conglomerate. Gravel and cobbles should also be anticipated within the fill, alluvium and Stadium Conglomerate. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting strongly cemented materials with gravel and cobbles.

### 6.1.6 Temporary Excavations

Temporary excavations 3 feet deep or less can be made vertically. Deeper temporary excavations in fill or alluvium should be laid back no steeper than 1:1 (horizontal:vertical). Deeper temporary excavations in Stadium Conglomerate should be laid back no steeper than ¾:1 (horizontal:vertical). The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation. SCS&T should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces. Slopes steeper than those described above will require shoring. A shoring system consisting of soldier piles and lagging can be used.

### 6.1.7 Temporary Shoring

For design of cantilevered shoring with level backfill, an active earth pressure equal to a fluid weighing 35 pounds per cubic foot (pcf) can be used. The surcharge loads on shoring from traffic and construction equipment working adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring. For design of soldier piles embedded in Stadium Conglomerate, an allowable passive pressure of 350 pounds per square foot (psf) per foot of embedment (over twice the pile width) up to a maximum of 7,500 psf can be used. Soldier piles should be spaced at least three pile diameters, center to center.

#### 6.1.8 Dewatering

Groundwater seepage may occur locally due to local irrigation or following heavy rain. Groundwater should be anticipated in the planned basement excavations. Dewatering can be accomplished by sloping the excavation bottom to a sump and pumping from the sump. A layer of gravel about 6 inches thick placed in the bottom of the excavation will facilitate groundwater flow and can be used as a working platform.

#### 6.1.9 Slopes

Permanent cut or fill slopes constructed no steeper than 2:1 (horizontal:vertical) should generally have an adequate factor of safety. Fill slopes steeper than 2:1 will need to be reinforced with geotextile to have an adequate factor of safety. Compaction of fill slopes should be performed by back-rolling with a sheepsfoot compactor or other suitable equipment, or by overfilling and cutting back to expose dense material at design grade. Cut slopes constructed 1½:1 (horizontal:vertical) in competent Stadium Conglomerate should generally have an adequate factor of safety. The engineering geologist should observe all cut slopes during grading to ascertain that no unforeseen adverse conditions requiring revised recommendations are encountered. All slopes are susceptible to surficial slope failure and erosion. Water should not be allowed to flow over the top of slopes. Additionally, slopes should be planted with vegetation that will reduce the potential for erosion.

#### 6.1.10 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

#### 6.1.11 Grading Plan Review

SCS&T should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

### 6.2 FOUNDATIONS

#### 6.2.1 Shallow Spread Footings

The proposed buildings can be supported on shallow spread footings with bottom levels either entirely on compacted fill or entirely on competent Stadium Conglomerate. Footings should extend at least 24 inches below lowest adjacent finished grade. A minimum width of 12 inches is recommended for continuous footings and 24 inches for isolated or retaining wall footings. An allowable bearing capacity of 2,500 psf can be used for footings on compacted fill. An allowable bearing capacity of 5,000 psf can be used for footings on Stadium Conglomerate. The bearing capacity values can be increased by 500 psf for each foot of depth below the minimum and 250 psf for each foot of width beyond the minimum up to a maximum of 5,000 psf on compacted fill and 7,500 psf on Stadium Conglomerate. The bearing value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. Footings located adjacent to or within slopes should be extended to a depth such that a minimum horizontal distance of 7 feet exists between the lower outside footing edge and the face of the slope.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using an allowable lateral pressure of 350 psf per foot of depth below the ground surface. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

#### 6.2.2 Settlement Characteristics

Total foundation settlements are estimated to be less than 1 inch. Differential settlements between adjacent columns, and between the middle and ends of continuous footings, are estimated to be less than ½ inch. Settlements should be completed shortly after structural loads are applied.

#### 6.2.3 Foundation Plan Review

SCS&T should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

### 6.2.4 Foundation Excavation Observations

A representative from SCS&T should observe the foundation excavations prior to forming or placing reinforcing steel.

## 6.3 SLABS-ON-GRADE

### 6.3.1 Parking Structure Slabs-on-Grade

Portland cement concrete pavement for the lower parking level should have a minimum thickness of 6 inches and be underlain by at least 6 inches of aggregate base. The pavements should be reinforced with at least No. 4 reinforcing bars placed at 18 inches on center each way. Reinforcement should be placed approximately at mid-height of the pavement. Concrete should have a minimum compressive strength of 3,250 pounds per square inch (psi) for the rigid pavements.

### 6.3.2 Building Slabs-on-Grade

The project structural engineer should design the interior concrete slabs-on-grade floor. A moisture vapor retarder/barrier should be placed beneath slabs where moisture sensitive floor coverings will be installed. Typically, plastic is used as a vapor retardant. If plastic is used, a minimum 10-mil is recommended. The plastic should comply with ASTM E1745. Plastic installation should comply with ASTM E1643. Current construction practice typically includes placement of a 2-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture vapor to the underside of the slab that can increase the time required to reduce moisture vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The slab can be placed directly on the vapor retarder/barrier. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed.

### 6.3.3 Exterior Slabs-on-Grade

The upper 1 foot of soil below exterior concrete slabs-on-grade should have an expansion index of 20 or less. Exterior slabs should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns.

A 1-inch maximum size aggregate mix is recommended for concrete for exterior slabs. The corrosion potential of on-site soils with respect to reinforced concrete will need to be taken into account in concrete mix design. Coarse and fine aggregate in concrete should conform to the “Greenbook” Standard Specifications for Public Works Construction.

## 6.4 CONVENTIONAL RETAINING WALLS

### 6.4.1 Foundations

The recommendations provided in the foundation section of this report are also applicable to conventional retaining walls.

### 6.4.2 Lateral Earth Pressures

The active earth pressure for the design of unrestrained earth retaining structures with level backfills can be taken as equivalent to the pressure of a fluid weighing 40 pcf. The at-rest earth pressure for the design of restrained earth retaining structures with level backfills can be taken as equivalent to the pressure of a fluid weighing 60 pcf. The above values assume a granular and drained backfill condition. An additional 20 pcf should be added to these values for walls with a 2:1 (horizontal: vertical) sloping backfill. An increase in earth pressure equivalent to an additional 2 feet of retained soil can be used to account for surcharge loads from light traffic. The above values do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. If any other surcharge loads are anticipated, SCS&T should be contacted for the necessary increase in soil pressure.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a backdrain to reduce the accumulation of hydrostatic pressures. Backdrains may consist of a 2-foot wide zone of ¾-inch crushed rock. The backdrain should be separated from the adjacent soils using a non-woven filter fabric, such as Mirafi 140N or equivalent. Weep holes should be provided or a perforated pipe (Schedule 40 PVC) should be installed at the base of the backdrain and sloped to discharge to a suitable storm drain facility. As an alternative, a geocomposite drainage system such as Miradrain 6000 or equivalent placed behind the wall and connected to a suitable storm drain facility can be used. The project architect should provide waterproofing specifications and details. Figure 5 shows typical conventional retaining wall backdrain details.

### 6.4.3 Seismic Earth Pressure

If required, the seismic earth pressures can be taken as equivalent to the pressure of a fluid weighing 20 pcf for flexible walls and 40 pcf for stiff walls. These values are for level backfill conditions and do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. This pressure is in addition to the un-factored static active pressures. The allowable passive pressure and bearing capacity can be increased by ⅓ in determining the stability of the wall.

#### 6.4.4 Backfill

All backfill soils should be compacted to at least 90% relative compaction. Expansive or clayey soil should not be used for backfill material. Additionally, fill within 3 feet from the back of the wall should not contain rocks greater than 3 inches in any dimension. The wall should not be backfilled until the grout has reached an adequate strength.

### 6.5 SOIL NAIL WALLS

It is anticipated that the soil nails will encounter Stadium Conglomerate. The following soil parameters can be used for the design of the soil nails.

- **Soil Unit Weight:** 125 pcf
- **Internal Friction Angle:** 35°
- **Cohesion:** 100 psf
- **Ultimate Bond Stress:** 2,000 psf

Bond stress capacity is influenced by soil conditions, method of construction and grouting techniques. The contractor should verify the bond stress capacity in the field prior to production nail installation.

### 6.6 MECHANICALLY STABILIZED EARTH RETAINING WALLS

The following soil parameters can be used for design of mechanically stabilized earth (MSE) retaining walls.

**MSE Wall Design Parameters**

| Soil Parameter | Reinforced Soil | Retained Soil | Foundation Soil |
|---|---|---|---|
| **Internal Friction Angle** | 32° | 32° | 32° |
| **Cohesion** | 0 | 0 | 0 |
| **Moist Unit Weight** | 125 pcf | 130 pcf | 130 pcf |

The bottom of MSE walls should extend to such a depth that a total of 5 feet exists between the bottom of the wall and the face of the slope. Figure 6 presents a typical MSE retaining wall backdrain detail.

### 6.7 PAVEMENT SECTION RECOMMENDATIONS

The pavement support characteristics of the soils encountered during our investigation are considered poor. An R-value of 10 was assumed for design of preliminary pavement sections. The actual R-value of the subgrade soils should be determined after grading and final pavement sections be provided. Based on an R-value of 10, the following pavement structural sections are recommended for the assumed Traffic Indices.

**Flexible Pavement Sections**

| Traffic Type | Traffic Index | Asphalt Concrete (inches) | Aggregate Base* (inches) |
|---|---|---|---|
| Parking Stalls | 4.5 | 3 | 8 |
| Drive Lanes | 6.0 | 4 | 11 |
| Heavy Traffic Areas | 7.0 | 5 | 13 |

***Aggregate Base should conform to Class 2 Aggregate Base in accordance with the Caltrans Standard Specifications or Crushed Miscellaneous Base in accordance with the Standard Specifications for Public Works Construction.**

**Portland Cement Concrete Pavement Sections**

| Traffic Type | Traffic Index | JPCP* (inches) | Aggregate Base* (inches) |
|---|---|---|---|
| Parking Stalls | 4.5 | 6 | 6 |
| Drive Lanes | 6.0 | 7 | 6 |
| Heavy Traffic Areas | 7.0 | 7 | 6 |

***Jointed Plain Concrete Pavement**

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be removed and replaced with compacted fill. If the subgrade consists of competent Stadium Conglomerate, scarification and recompaction need not be performed. The aggregate base material should be compacted to at least 95% relative compaction. All materials and methods of construction should conform to good engineering practices and the minimum standards of the City of San Diego.

### 6.8 SOIL CORROSIVITY

Representative samples of the onsite soils were tested to evaluate corrosion potential. The test results are presented in Appendix II. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

## 7 GEOTECHNICAL ENGINEERING DURING CONSTRUCTION

The geotechnical engineer should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

## 8 CLOSURE

SCS&T should be advised of any changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can, however, occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations, and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

## 9 REFERENCES

American Concrete Institute (ACI) (2012), Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary, August.

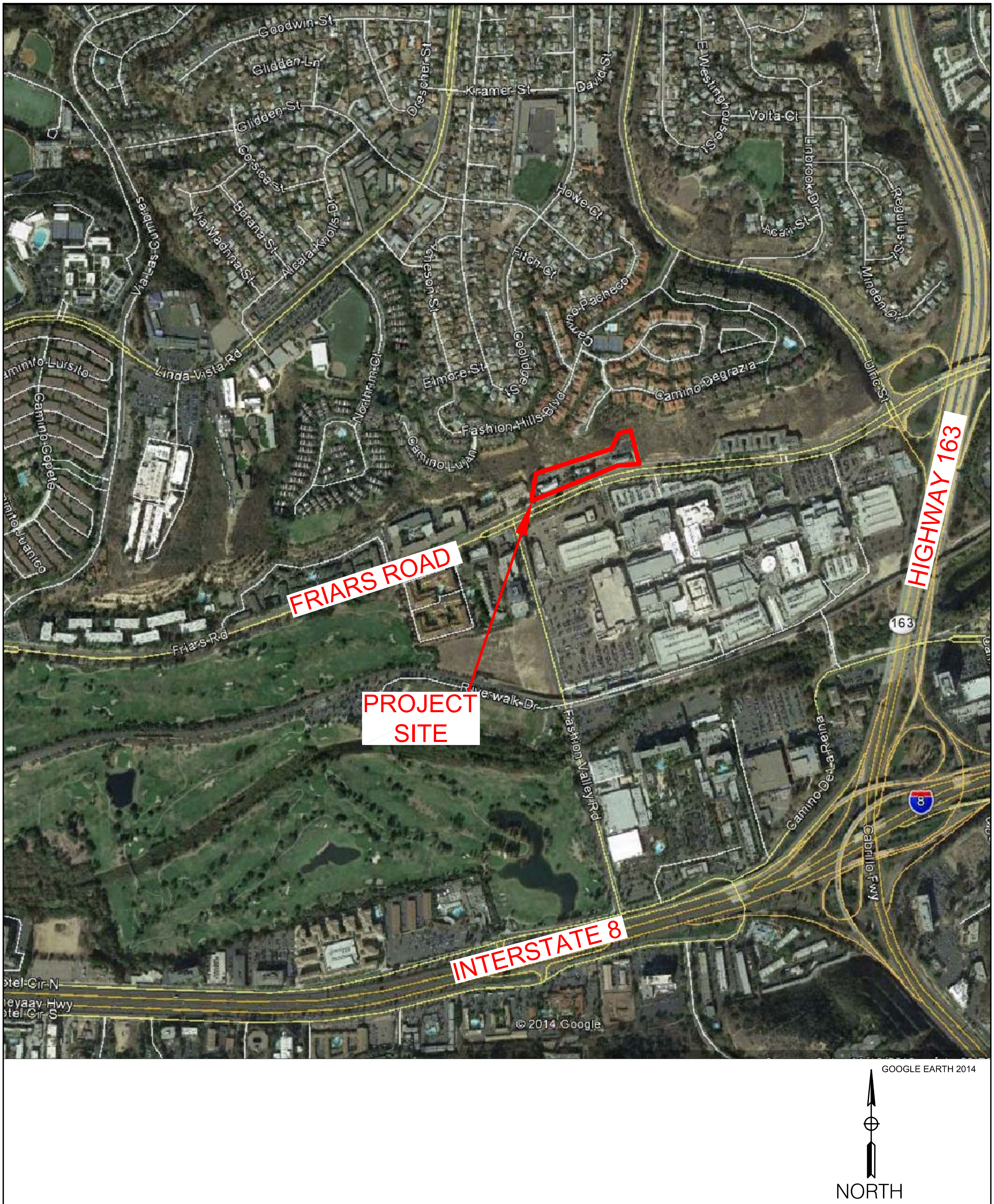
California Emergency Management Agency, California Geological Survey, University of Southern California (Cal EMA) (2009), Tsunami Inundation Map for Emergency Planning, Del Mar Quadrangle, June 1.

Caltrans (2010), Standard Specifications.

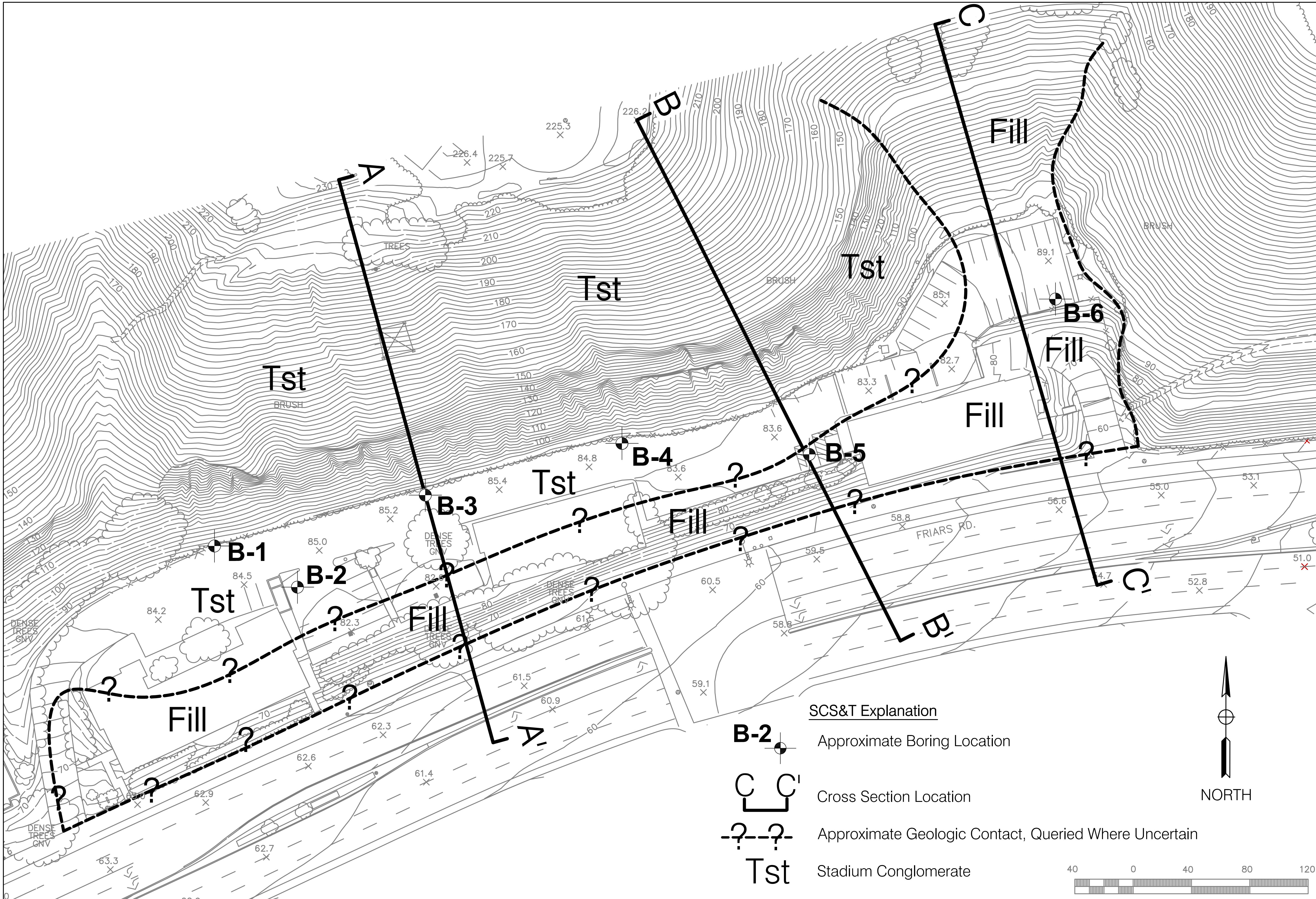
City of San Diego (2008), Seismic Safety Study, Geologic Hazards and Faults, Grid Tile: 21, Development Services Department, April 3.

International Code Council (2012), 2013 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Based on the 2012 International Existing Building Code, Effective Date: January 1, 2014.

Public Works Standards, Inc. (2011), "Greenbook," Standard Specifications for Public Works Construction, 2012 Edition.




| | | | |
|---|---|---|---|
| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | SITE LOCATION MAP<br>FRIARS ROAD<br>APARTMENT DEVELOPMENT<br><br>San Diego, California | Date: OCTOBER 2014<br>By: CTL<br>Job No.: 14-0338N-1<br>Scale: NOT TO SCALE | Figure:<br>1 |

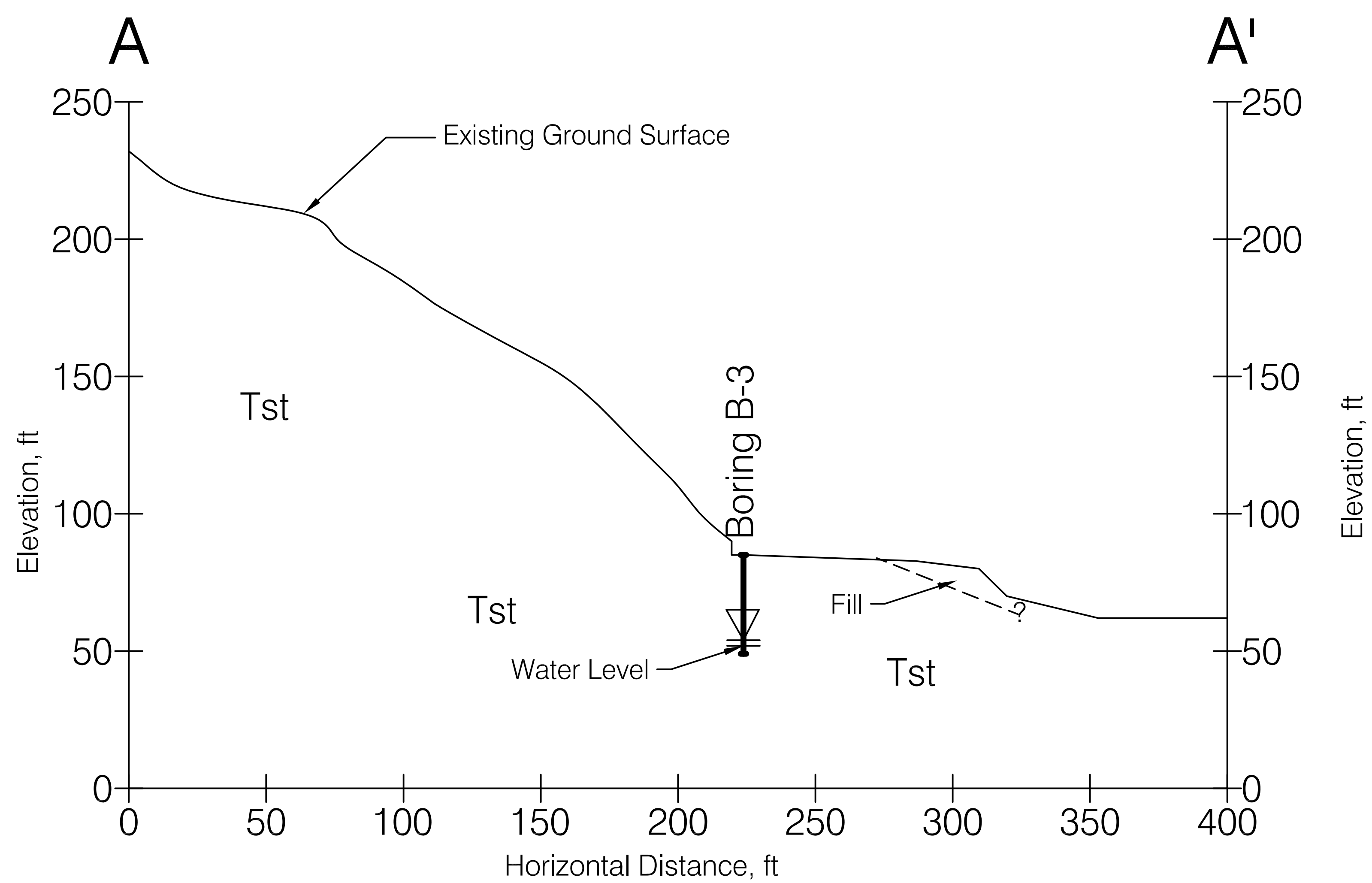



Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: SEE DRAWING

SUBSURFACE EXPLORATION AND GEOLOGY MAP
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 2




SCS&T Explanation

- ?- - ?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

Tst Stadium Conglomerate

Date: OCTOBER 2014
By: CTL
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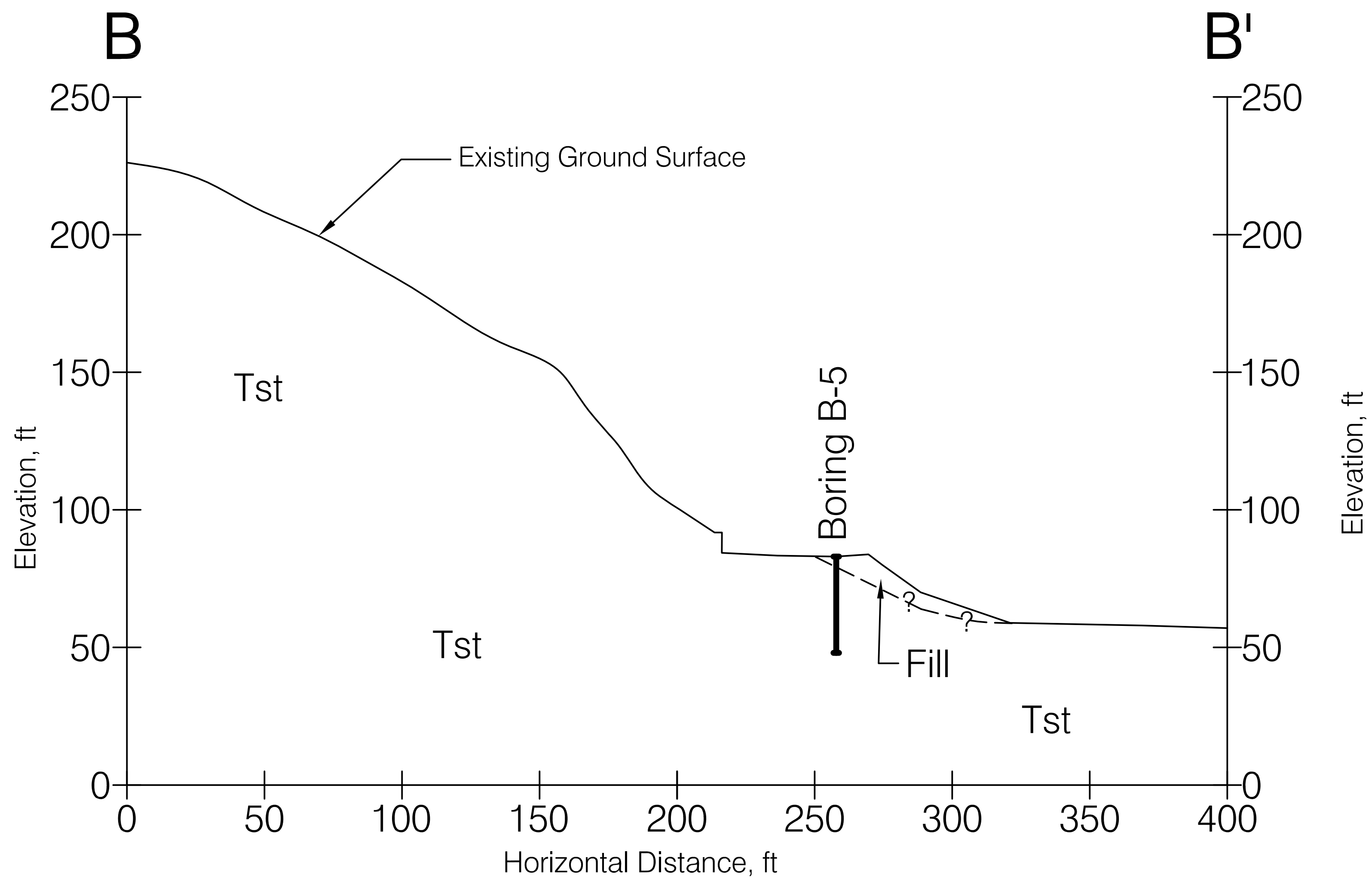
Scale: SEE DRAWING

GEOLOGIC CROSS SECTION A-A'
FRIARS ROAD APARTMENT
DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA
SOIL & TESTING, INC.

Figure:
3A




SCS&T Explanation

-?--?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

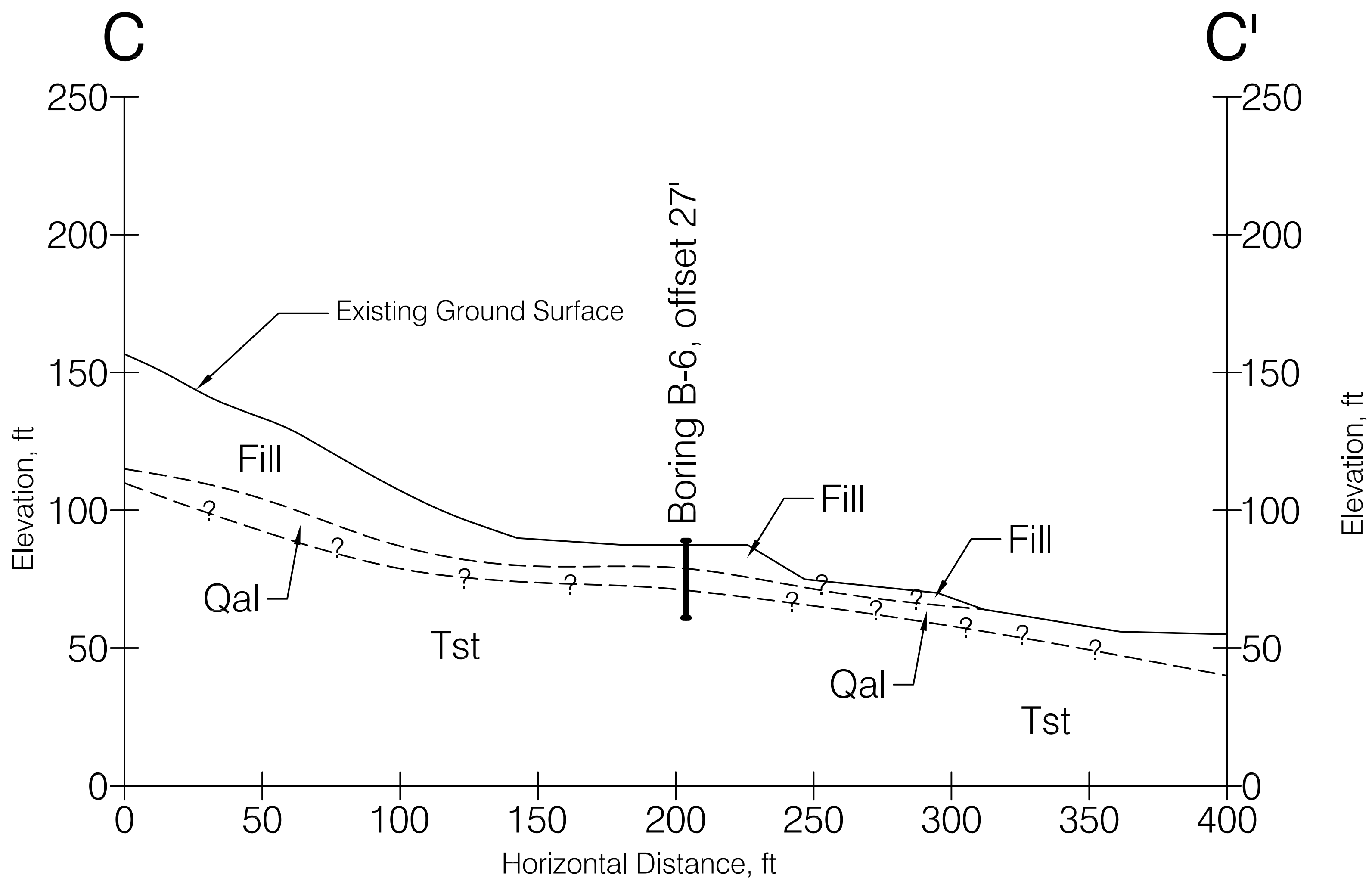
Tst Stadium Conglomerate

Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: SEE DRAWING

GEOLOGIC CROSS SECTION B-B'
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure:
3B




**SCS&T Explanation**

-?--?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

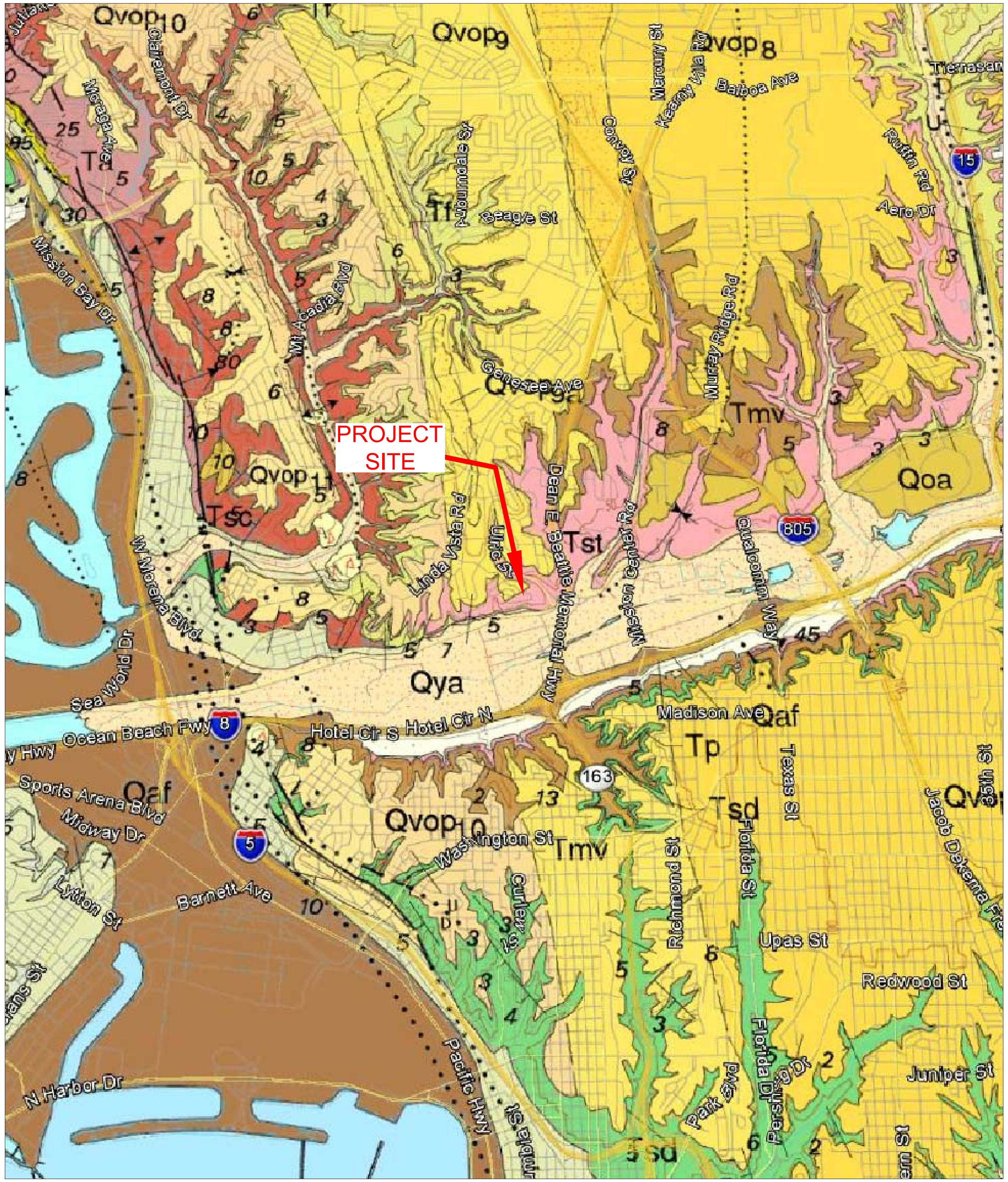
Tst Stadium Conglomerate

Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: SEE DRAWING

GEOLOGIC CROSS SECTION C-C'
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 3C




## MODERN SURFICIAL DEPOSITS

- af — Artificial fill (late Holocene)
- Qw — Wash deposits (late Holocene)
- Qls — Landslide deposits, undivided (Holocene and Pleistocene)
- Qmb — Marine beach deposits (late Holocene)
- Qpe — Paralic estuarine deposits (late Holocene)
- Qmo — Undivided marine deposits in offshore region (late Holocene)
- Qcf — Canyon fill deposits in offshore region (late Holocene)

## YOUNG SURFICIAL DEPOSITS

- Qya — Young alluvial flood-plain deposits (Holocene and late Pleistocene)
- Qyc — Young colluvial deposits (Holocene and late Pleistocene)
- Qct — Undivided canyon terrace deposits in offshore region (Holocene and Pleistocene)

## OLD SURFICIAL DEPOSITS

- Qoa — Old alluvial flood-plain deposits, undivided (late to middle Pleistocene)
- Qop — Old paralic deposits, undivided (late to middle Pleistocene)
  - $Qop_7$ — Unit 7
  - $Qop_6$ — Unit 6
  - $Qop_{2-4}$ — Units 2-4, undivided

## VERY OLD SURFICIAL UNITS

- Qvoa — Very old alluvial flood-plain deposits, undivided (middle to early Pleistocene)
- Qvop — Very old paralic deposits, undivided (middle to early Pleistocene)

| | | | | | |
|---|---|---|---|---|---|
| $Qvop_7$ | Unit 7 | | | | |
| $Qvop_6$ | Unit 6 | $Qvop_{13}$ | Unit 13 | | |
| $Qvop_5$ | Unit 5 | $Qvop_{12}$ | Unit 12 | | |
| $Qvop_4$ | Unit 4 | $Qvop_{11}$ | Unit 11 | $Qvop_{11a}$ | Unit 11a |
| $Qvop_3$ | Unit 3 | $Qvop_{10}$ | Unit 10 | $Qvop_{10a}$ | Unit 10a |
| $Qvop_2$ | Unit 2 | $Qvop_9$ | Unit 9 | $Qvop_{9a}$ | Unit 9a |
| $Qvop_1$ | Unit 1 | $Qvop_8$ | Unit 8 | $Qvop_{8a}$ | Unit 8a |

## SEDIMENTARY AND VOLCANIC BEDROCK UNITS

- QTso — Undivided sediments and sedimentary rocks in offshore region (Holocene, Pleistocene, Pliocene and Miocene)
- Tsdcg / Tsdss / Tsd — San Diego Formation (early Pleistocene and late Pliocene)
  - Tsd - undivided
  - Tsdcg - transitional marine and nonmarine pebble and cobble conglomerate
  - Tsdss - marine sandstone
- Tba — Basaltic-andesite dike (Miocene)
- Tmo — Undivided sedimentary rocks in offshore region (Miocene)
- Tmvo — Undivided volcanic rocks in offshore region (Miocene)
- Tmuo — Undivided volcanic and sedimentary rocks in offshore region (Miocene)
- To — Otay Formation (late Oligocene)
- Tp / Tpm — Pomerado Conglomerate (middle Eocene)
  - Tpm - Miramar Sandstone Member
- Tmv — Mission Valley Formation (middle Eocene)
- Tst — Stadium Conglomerate (middle Eocene)
- Tf — Friars Formation (middle Eocene)
- Tsc / Tscu — Scripps Formation (middle Eocene)
  - Tscu - upper unit
- Ta — Ardath Shale (middle Eocene)
- Tt — Torrey Sandstone (middle Eocene)
- Td — Delmar Formation (middle Eocene)
- Td+Tf — Delmar Formation and Friars Formation, undivided (middle Eocene)
- Tmss / Tmsc — Mount Soledad Formation (middle Eocene)
  - Tmss - sandstone
  - Tmsc - cobble conglomerate
- Teo — Undivided Eocene rocks in offshore region (Eocene)
- Kcs / Kccg — Cabrillo Formation (Upper Cretaceous)
  - Kcs - sandstone
  - Kccg - cobble conglomerate
- Kp — Point Loma Formation (Upper Cretaceous)
- Kl — Lusardi Formation (Upper Cretaceous)
- Kuo — Undivided rocks of the Rosario Group in the offshore area (Upper Cretaceous)

## UNNAMED CRETACEOUS ROCKS OF THE PENINSULAR RANGES BATHOLITH

- Kgu — Granodiorite and tonalite, undivided (mid-Cretaceous)
- Kgd — Granodiorite, undivided (mid-Cretaceous)
- Kt — Tonalite, undivided (mid-Cretaceous)
- Kd — Diorite, undivided (mid-Cretaceous)
- Kgh — Hypabyssal rocks, undivided (mid-Cretaceous)

## JURASSIC AND CRETACEOUS METAMORPHOSED AND UNMETAMORPHOSED VOLCANIC AND SEDIMENTARY ROCKS

- Mzu — Metamorphosed and unmetamorphosed volcanic and sedimentary rocks, undivided (Mesozoic)
- Mzo — Undivided metamorphic rocks in offshore region (Mesozoic)

Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: NOT TO SCALE

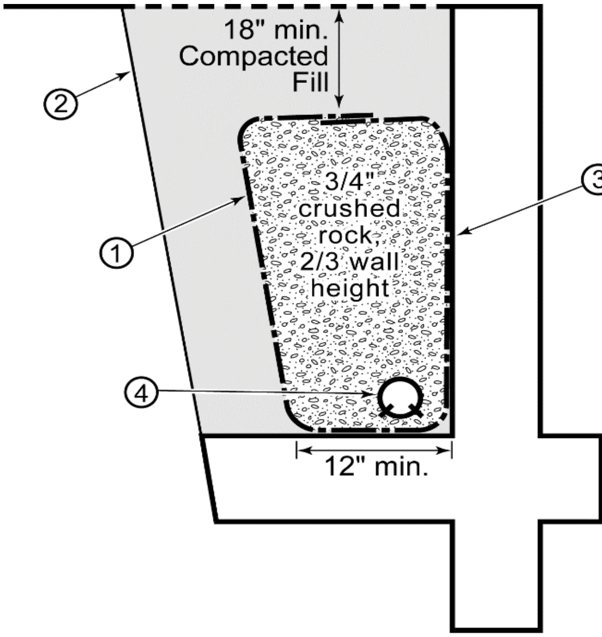
REGIONAL GEOLOGY MAP
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

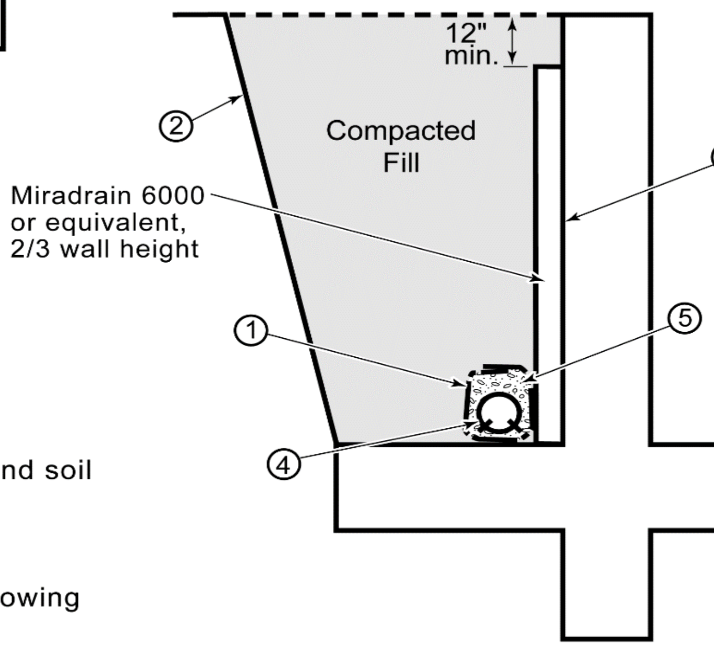
SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 4

## Typical Retaining Wall Backdrain Detail

Not to Scale




① Filter fabric between rock and soil

② Backcut

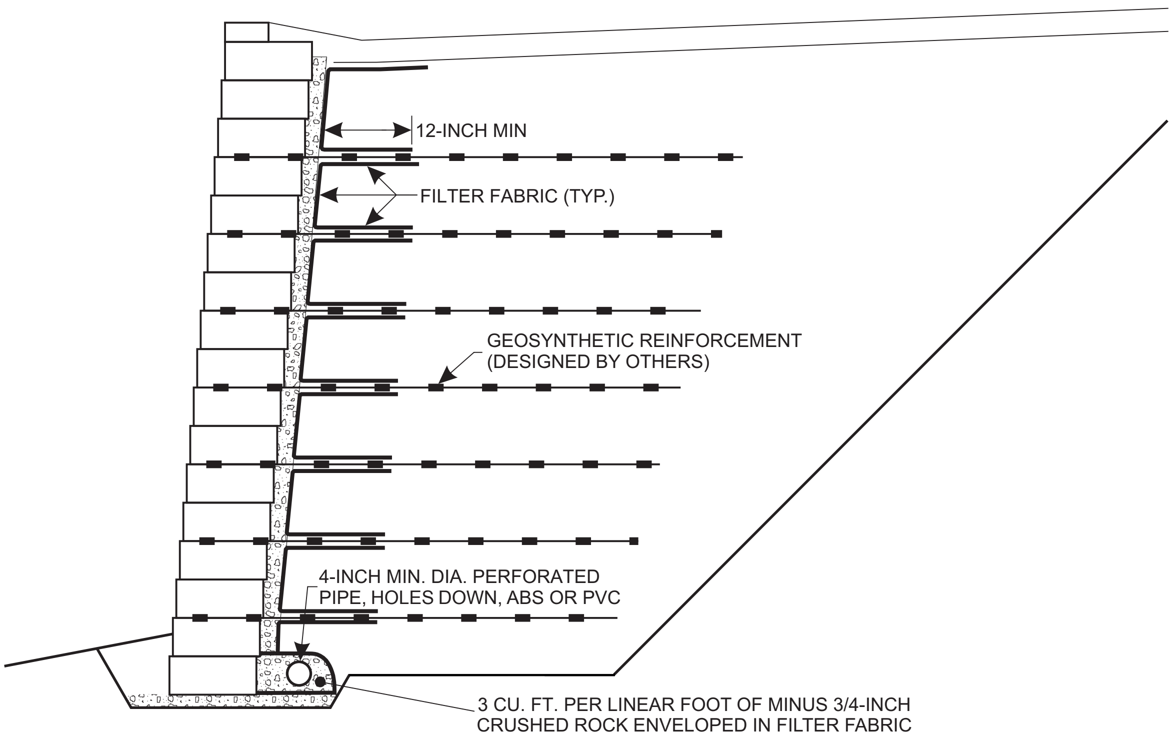
③ Waterproof back of wall following architect's specifications

④ 4" minimum perforated pipe, SDR35 or equivalent, holes down, 1% fall to outlet, encased in 3/4" crushed rock. Provide 3 cubic feet per linear foot crushed rock minimum. Crushed rock to be surrounded by filter fabric (Mirafi 140N or equivalent), with 6" minimum overlap. Provide solid outlet pipe at suitable location.

⑤ 3/4" crushed rock

| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | |
|---|---|---|---|
| By: | CTL | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure: | 5 |

# Typical MSE Retaining Wall
## Backdrain Detail
**Not to Scale**




**NOTES**

1) Backcut as recommended by the geotechnical consultant.

2) Interceptor drain at excavation backcut may be recommended based on conditions observed during construction.

3) Filter fabric should be installed between crushed rock and soil. Filter fabric should consist of Mirafi 140N or equivalent. Filter fabric should be overlapped at least 6 inches.

4) Perforated pipe should outlet through a solid pipe to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.

5) Drain installation should be observed by the geotechnical consultant.

| | | | |
|---|---|---|---|
| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | |
| | By: TBC | Date: 10/15/2014 | |
| | Job Number: 140338N-1 | Figure: 6 | |

## APPENDIX I
## FIELD INVESTIGATION

Our field investigation consisted of drilling six borings on September 10 through 12, 2014 using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. Figure 3 shows the approximate locations of the borings. The field investigation was performed under the observation of an SCS&T geologist who also logged the borings and test hole and obtained samples of the materials encountered. Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. The CAL sampler was driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the sampler the final 12 inches of an 18-inch drive is noted on the borings logs as “Driving Resistance (blows/ft. of drive).” CAL sampler refusal was encountered when 50 blows were applied during any one of the three 6-inch intervals, a total of 100 blows was applied, or there was no discernible sampler advancement during the application of 10 successive blows. Disturbed bulk samples were obtained from the drill cuttings.

The soils are classified in accordance with the Unified Soil Classification System as illustrated on Figure I-1. Logs of the borings are presented on Figures I-2 through I-13.

# SUBSURFACE EXPLORATION LEGEND

## UNIFIED SOIL CLASSIFICATION CHART

| SOIL DESCRIPTION | | GROUP SYMBOL | TYPICAL NAMES |
|---|---|---|---|
| I. COARSE GRAINED, more than 50% of material is larger than No. 200 sieve size. | | | |
| GRAVELS<br>More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3". | CLEAN GRAVELS | GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| | | GP | Poorly graded gravels, gravel sand mixtures, little or no fines. |
| | GRAVELS WITH FINES (Appreciable amount of fines) | GM | Silty gravels, poorly graded gravel-sand-silt mixtures. |
| | | GC | Clayey gravels, poorly graded gravel-sand, clay mixtures. |
| SANDS<br>More than half of coarse fraction is smaller than No. 4 sieve size. | CLEAN SANDS | SW | Well graded sand, gravelly sands, little or no fines. |
| | | SP | Poorly graded sands, gravelly sands, little or no fines. |
| | | SM | Silty sands, poorly graded sand and silty mixtures. |
| | | SC | Clayey sands, poorly graded sand and clay mixtures. |
| II. FINE GRAINED, more than 50% of material is smaller than No. 200 sieve size. | | | |
| | SILTS AND CLAYS (Liquid Limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | OL | Organic silts and organic silty clays or low plasticity. |
| | SILTS AND CLAYS (Liquid Limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity. |
| III. HIGHLY ORGANIC SOILS | | PT | Peat and other highly organic soils. |

### FIELD SAMPLE SYMBOLS

| | |
|---|---|
| ☒ | - Bulk Sample |
| CAL | - Modified California penetration test sampler |
| CK | - Undisturbed chunk sample |
| MS | - Maximum Size of Particle |
| | - Water seepage at time of excavation or as indicated |
| SPT | - Standard penetration test sampler |
| ST | - Shelby Tube |
| ▽ | - Water level at time of excavation or as indicated |

### LABORATORY TEST SYMBOLS

| | |
|---|---|
| AL | - Atterberg Limits |
| CON | - Consolidation |
| COR | - Corrosivity Test<br>- Sulfate<br>- Chloride<br>- pH and Resistivity |
| DS | - Direct Shear |
| EI | - Expansion Index |
| MAX | - Maximum Density |
| RV | - R Value |
| SA | - Sieve Analysis |
| UC | - Unconfined Compression |

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

| FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|
| By: | WLV | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure: | I-1 |

# LOG OF BORING B-1

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 4 | | | | | | | | |
| 6 | | Cobbles to 10 inches in size. | | X | | | | COR |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | Gravel to 3 inches in size. | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-3.**

# LOG OF BORING B-1 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 2 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | CLAYEY SANDSTONE, moist, very dense, fine grained moderately cemented. | CAL | | 57 | | | |
| 36 | | **BORING TERMINATED AT 36 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | |
|---|---|---|---|
| **SOUTHERN CALIFORNIA SOIL & TESTING, INC.** | FRIARS ROAD APARTMENT DEVELOPMENT | | |
| By: WLV | | Date: 10/15/2014 | |
| Job Number: 140338N-1 | | Figure I-3 | |

# LOG OF BORING B-2

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 84 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 1 inch asphalt concrete over 1 inch aggregate base | | X | | | | |
| 2 | GC | **FILL (af)** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | X | | | | EI |
| 4 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | No sample recovery. | CAL | | 69 | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-5.**

# LOG OF BORING B-2 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | Strongly cemented, very difficult drilling | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| | | **BORING TERMINATED AT 35 FEET** | | | | | | |
| 36 | | | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | |
|---|---|---|---|
| **SOUTHERN CALIFORNIA SOIL & TESTING, INC.** | FRIARS ROAD APARTMENT DEVELOPMENT | | |
| | By: WLV | Date: 10/15/2014 | |
| | Job Number: 140338N-1 | Figure I-5 | |

# LOG OF BORING B-3

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 7 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, light brown, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | X | | | | | RV |
| 4 | | | | | | | | |
| 6 | | Orangish yellow, cobbles up to 12 inches in size. | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | Dark orangish brown. | X | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-7.**

# LOG OF BORING B-3 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | 31 Feet |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 24 | | | | | | | | |
| 26 | | SILTY SANDSTONE, brown, fine grained, some gravel, wet, very dense, moderately cemented. | | | | | | |
| 28 | | No sample recovery, rock in shoe. | CAL | | 50/1" | | | |
| 30 | | Groundwater at 31 feet upon completion of drilling. | CAL | | 63 | | | DS |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | | CAL | | 69/11" | | | |
| | | **BORING TERMINATED AT 36 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | | |
| | By: | WLV | Date: | 10/15/2014 |
| | Job Number: | 140338N-1 | Figure | I-7 |

# LOG OF BORING B-4

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 4 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | X | | | | | EI |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-9.**

# LOG OF BORING B-4 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | 31 Feet |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | Groundwater at 31 feet upon completion of drilling. | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | **BORING TERMINATED AT 35 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | |
|---|---|---|---|
| **SOUTHERN CALIFORNIA SOIL & TESTING, INC.** | FRIARS ROAD APARTMENT DEVELOPMENT | | |
| By: | WLV | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure | I-9 |

# LOG OF BORING B-5

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Hollow Stem Auger/Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | X | | | | |
| 2 | GC | **<u>FILL (af)</u>** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | X | | | | EI |
| 4 | | **<u>STADIUM CONGLOMERATE (Tst</u>**) - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 6 | | | | X | | | | |
| 8 | | | | X | | | | |
| 10 | | Very difficult drilling, changed to air percussion. | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-11.**

# LOG OF BORING B-5 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | **BORING TERMINATED AT 35 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

| FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|
| By: | WLV | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure | I-11 |

# LOG OF BORING B-6

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 89 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 3 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | GM | **FILL (af)** - SILTY GRAVEL, light brown, rounded gravel and cobbles to 6 inches in size, moist, dense. | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | GM | **ALLUVIUM (Qal)** - SILTY GRAVEL, pale brown, rounded gravel and cobbles to 6 inches in size, moist, dense. | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented. | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-13.**

# LOG OF BORING B-6 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 89 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented. | | | | | | |
| 24 | | Caving. | | | | | | |
| 26 | | | | | | | | |
| 28 | | **BORING REFUSAL AT 28 FEET DUE TO CAVING** | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

## APPENDIX II
## LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were performed:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil
- **R-VALUE:** An R-value test was performed on one sample in accordance with California Test Method 301. Figure II-1 presents the test result.
- **EXPANSION INDEX:** The expansion index was determined on three samples in accordance with ASTM D4829. Figure II-1 presents the test results.
- **CORROSIVITY**: Corrosivity tests were performed on one sample. The pH and minimum resistivity were determined in general accordance with California Test 643. The soluble sulfate content was determined in accordance with California Test 417. The total chloride ion content was determined in accordance with California Test 422. Figure II-1 presents the test results.
- **DIRECT SHEAR:** A direct shear test was performed on one sample in accordance with ASTM D3080. The shear stress was applied at a constant rate of strain of 0.003 inch per minute. Figure II-2 presents the test results.

Soil samples not tested are now stored in our laboratory for future reference and analysis, if needed. Unless notified to the contrary, all samples will be disposed of 30 days from the date of this report.

## R-VALUE

CALIFORNIA TEST 301

| SAMPLE | DESCRIPTION | R- VALUE |
|---|---|---|
| B-3 at 1 Foot to 5 Feet | CONGLOMERATE, light brown | 10 |

## EXPANSION INDEX

ASTM D2489

| SAMPLE | DESCRIPTION | EXPANSION INDEX |
|---|---|---|
| B-2 at 0 Feet to 3 Feet | CLAYEY GRAVEL, moderate brown | 39 |
| B-4 at 0 Feet to 5 Feet | CONGLOMERATE, dark yellowish-orange | 1 |
| B-5 at 0 Feet to 3 Feet | CLAYEY GRAVEL, moderate brown | 39 |

***CLASSIFICATION OF EXPANSIVE SOIL*** [1]

| EXPANSION INDEX | POTENTIAL EXPANSION |
|---|---|
| 1 - 20 | Very Low |
| 21 - 50 | Low |
| 51 - 90 | Medium |
| 91 - 130 | High |
| Above 130 | Very High |

1. ASTM - D4829

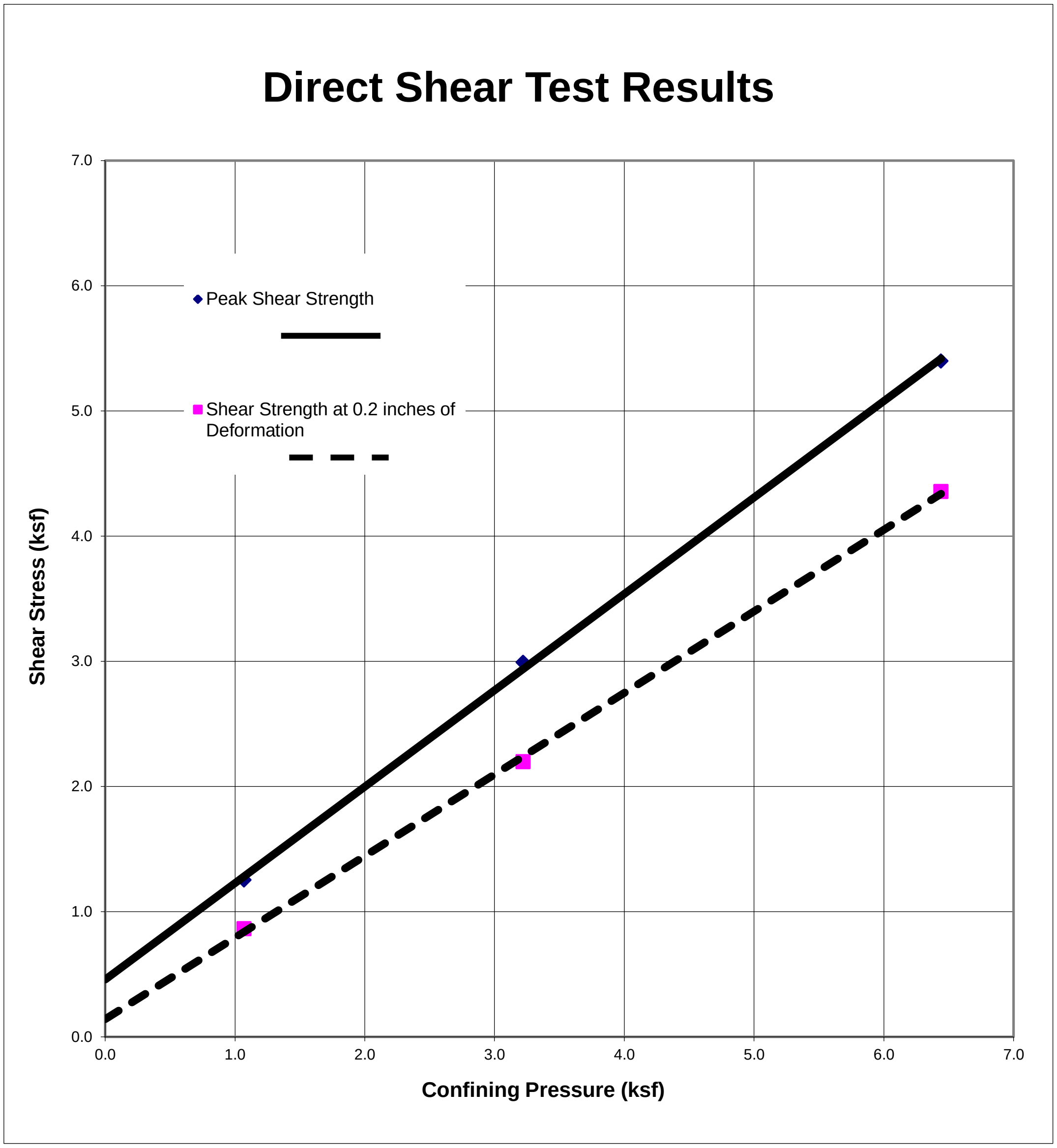
## RESISTIVITY, pH, SOLUBLE CHLORIDE and SOLUBLE SULFATE

| SAMPLE | RESISTIVITY (Ω-cm) | pH | CHLORIDE (%) | SULFATE (%) |
|---|---|---|---|---|
| B-1 at 5 Feet to 10 Feet | 436 | 7.72 | 0.061 | 0.042 |

***SULFATE EXPOSURE CLASSES*** [2]

| Class | Severity | Water-Soluble Sulfate ($SO_4$) in Soil, Percent by Mass |
|---|---|---|
| S0 | Not applicable | $SO_4 < 0.10$ |
| S1 | Moderate | $0.10 \le SO_4 < 0.20$ |
| S2 | Severe | $0.20 \le SO_4 \le 2.00$ |
| S3 | Very Severe | $SO_4 > 2.00$ |

2. ACI 318, Table 4.2.1




| SAMPLE | DESCRIPTION | INTERNAL FRICTION ANGLE(DEG.) | COHESION INTERCEPT (PSF) |
|---|---|---|---|
| B-3 at 30 Feet | SILTY SANDSTONE, brown | | |
| | ***Peak Shear Strength:*** | 38 | 459 |
| | ***Shear Strength at 0.2 inch Horizontal Displacement:*** | 33 | 140 |

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

| FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|
| By: | TBC | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure: | II-2 |

# APPENDIX III
# GEOPHYSICAL EVALUATION

SOUTHWEST GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

October 1, 2014
Project No. 114395

Mr. Tom Canady
Southern California Soil & Testing
6280 Riverdale Street
San Diego, CA 92704

Subject: Geophysical Evaluation
7050 Friars Road
San Diego, California

Dear Mr. Canady:

In accordance with your authorization, we have performed geophysical survey services pertaining to the property located at 7050 Friars Road in San Diego, California (Figure 1). The purpose of our survey was to characterize the subsurface Shear-wave velocity conditions in the rear paved parking lot through the collection of surface wave data (Figure 2). This report presents the survey methodology, equipment used, analysis, and findings.

Our scope of services included the performance of a refraction microtremor (ReMi) survey. The ReMi technique uses recorded surface waves (specifically Rayleigh waves) that are contained in background noise to develop a Shear-wave velocity profile of the study area down to a depth, in this case, of approximately 70 feet. The ReMi survey included the use of a 24-channel Geometrics Geode seismograph and 24 14-Hz vertical component geophones. The geophones were spaced 5 feet apart, for a total line length of 115 feet. Fifteen records, each 32 seconds long, were recorded and then downloaded to a computer. The data were later processed using SeisOpt® ReMi™ software. Figures 2 and 3 depict the general site conditions at the project site. Figure 4 and Table 1 present the results from our survey.

**TABLE 1**
**ReMi Results**

| Line No. | Depth (feet) | Shear Wave Velocity (feet/second) |
|---|---|---|
| RL-1 | 0 – 18 | 1,127 |
| | 18 – 61 | 1,991 |
| | 61 – 70 | 3,283 |

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, Inc. should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

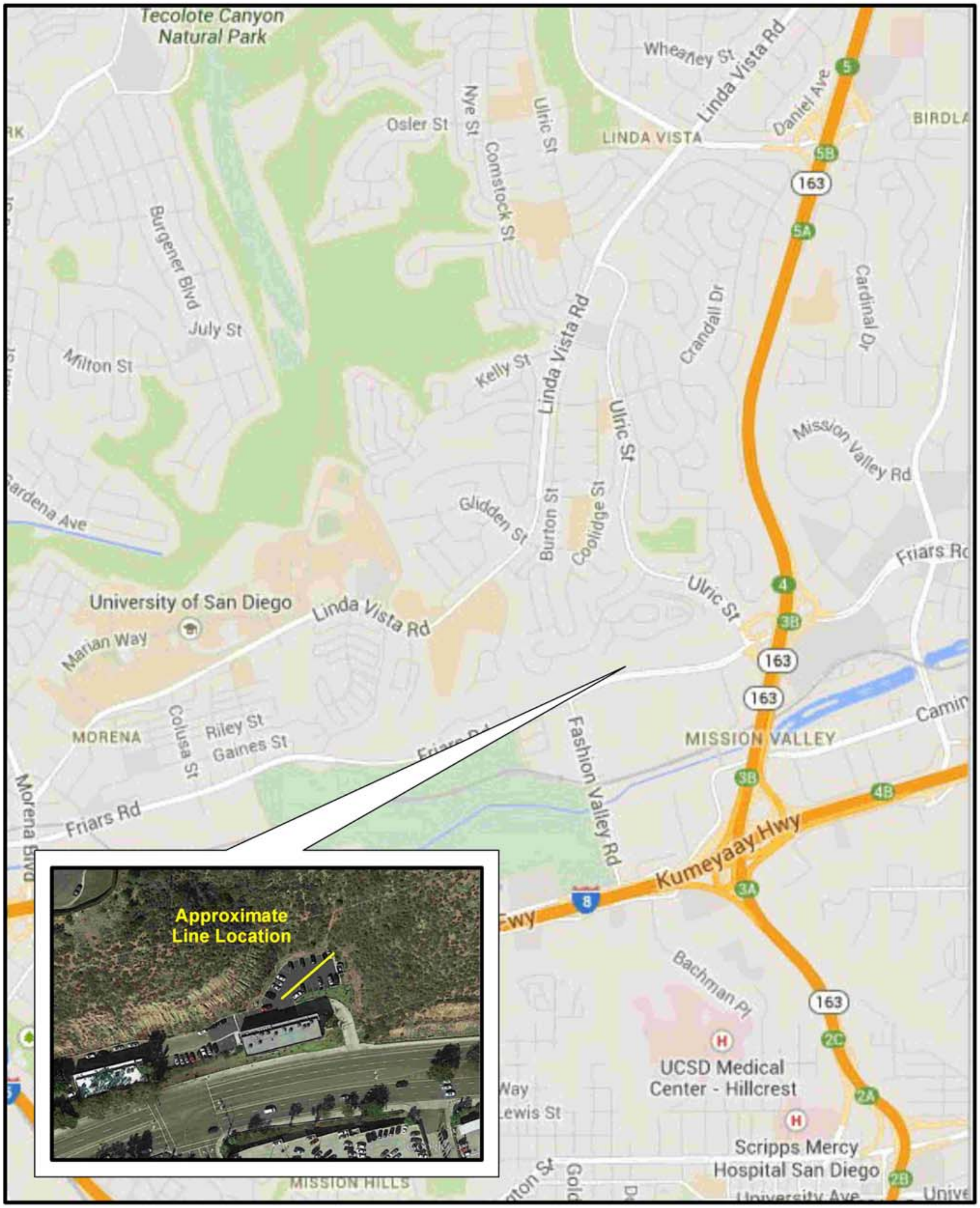
Sincerely,
**SOUTHWEST GEOPHYSICS, INC.**

Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist


HV/hv

| | | |
|---|---|---|
| Attachments: | Figure 1 | – Site Location Map |
| | Figure 2 | – Line Location Map |
| | Figure 3 | – Site Photographs |
| | Figure 4 | – ReMi Results |

Distribution: Addressee (electronic)




**SITE LOCATION MAP**

N

7050 Friars Road
San Diego, California

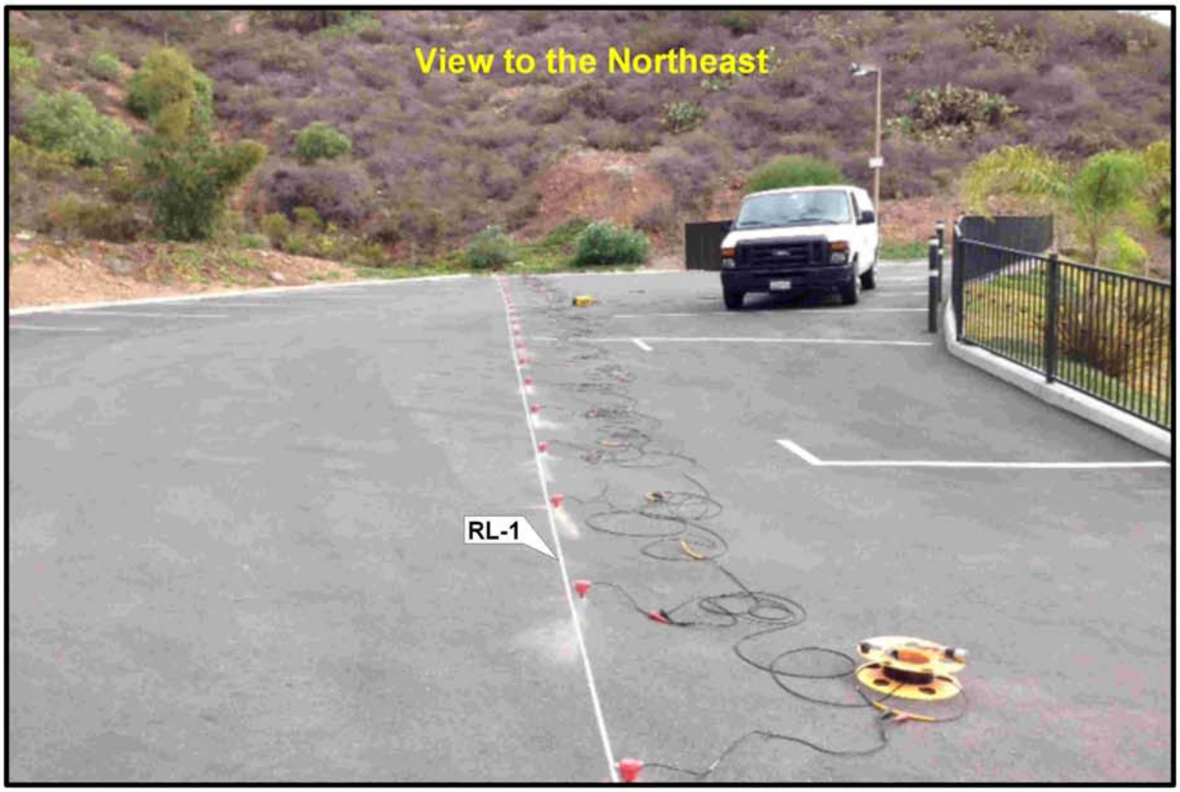
Project No.: 114395

Date: 10/14

SOUTHWEST GEOPHYSICS INC.

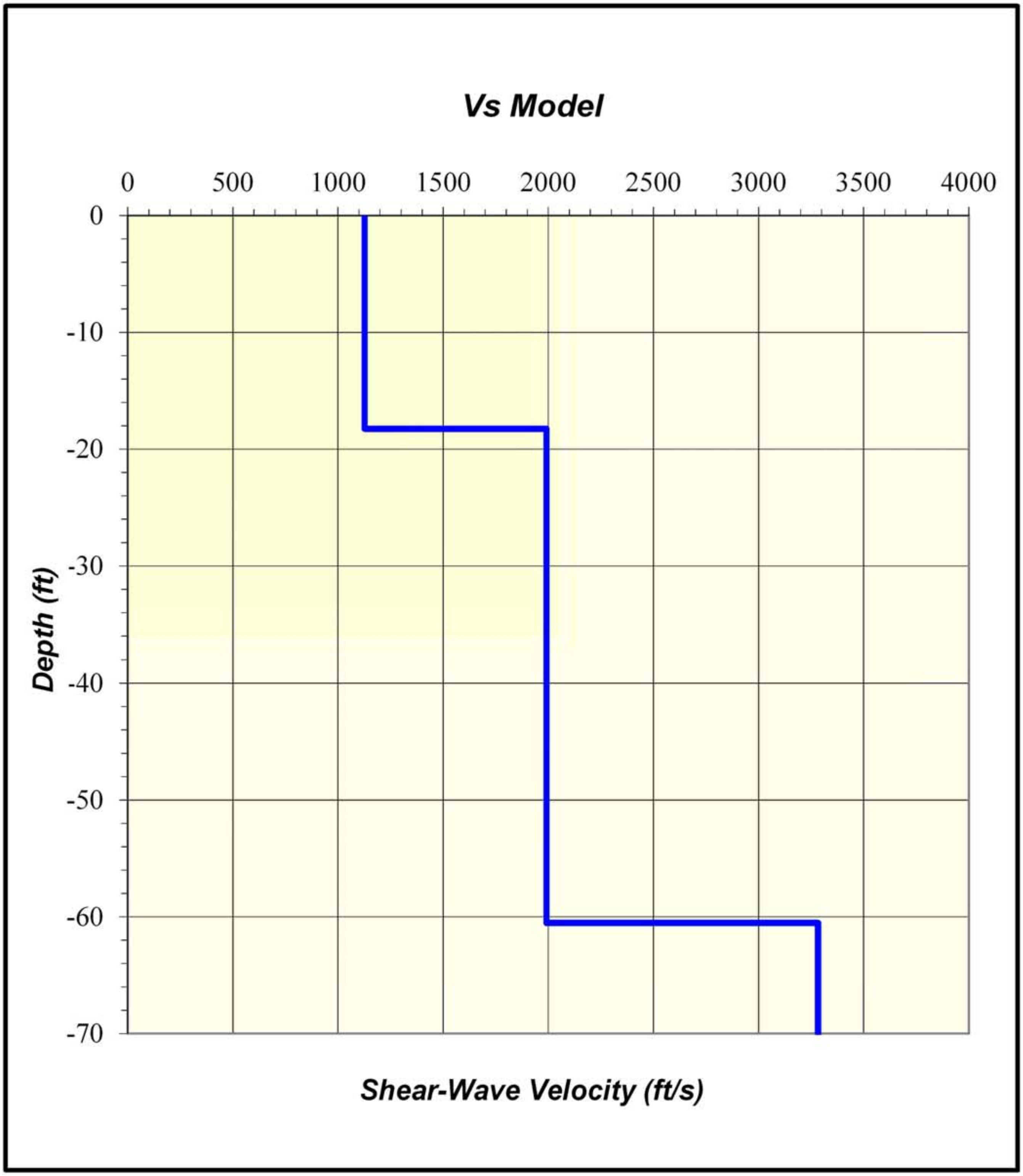
Figure 1


| | | | | |
|---|---|---|---|---|
| **LINE LOCATION MAP** | N | 7050 Friars Road<br>San Diego, California<br>Project No.: 114395 Date: 10/14 | SOUTHWEST GEOPHYSICS INC.<br>Figure 2 | 0 50 100<br>approximate scale in feet |





| | | |
|---|---|---|
| **SITE PHOTOGRAPHS** | 7050 Friars Road<br>San Diego, California | SOUTHWEST GEOPHYSICS INC. |
| | Project No.: 114395 — Date: 10/14 | Figure 3 |




**ReMi RESULTS**

7050 Friars Road
San Diego, California

Project No.: 114395

Date: 10/14

SOUTHWEST GEOPHYSICS INC.

Figure 4

SCST, Inc.
Corporate Headquarters
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SDVOSB . DVBE

September 9, 2016

**SCST No. 140338N.2**
**Report No. 1**

**Mr. Jeffrey Holbrook**
**Manager**
**LCG Friars, LLC**
**27132 B Paseo Espada, Suite 1206**
**San Juan Capistrano, California 92675**

Subject: ADDENDUM GEOTECHNICAL REPORT
INFILTRATION TEST RESULTS AND RESPONSES TO REVIEW COMMENTS
FRIARS ROAD MIXED USE DEVELOPMENT
SAN DIEGO, CALIFORNIA

References: Latitude 33 Planning and Engineering (2016), Grading & Utility Plan, Friars Road Mixed Use, San Diego, CA 92108, February 11.

Southern California Soil & Testing, Inc. (SCS&T) (2014), Geotechnical Investigation, Friars Road Apartment Development, San Diego, CA, SCS&T No. 140338N-1, October 15.

Dear Mr. Holbrook:

SCST, Inc. prepared this addendum geotechnical report to provide in situ infiltration test results and respond to review comments from Patrick Thomas of The City of San Diego for the subject project. We understand that the currently proposed project will consist of the design and construction of an apartment building and a condominium building over a two-level, partial subterranean parking structure (podium) with a parking level 2 finished floor elevation of 55.0 feet. Our scope of work included performing three borehole percolation tests at the site.

**SITE DESCRIPTION**

The site is located north of Friars Road and east of Fashion Valley Road in the Linda Vista community of the City of San Diego, California. Figure 1 presents a site location map. The site is bordered by an SDG&E transmission line on the north, a commercial development on the west, Friars Road and Fashion Valley mall on the south, and undeveloped land on the east. The site is located on the northern flank of Mission Valley. The northern portion of the site consists of a natural slope that ascends about 140 feet to the north at inclinations between about 1:1 (horizontal:vertical) and 1.6:1 (horizontal:vertical). The southern portion of the site consists of a fill slope that descends about 25 feet to the south towards Friars Road at an inclination of about 1.5:1 (horizontal:vertical). The toe of the fill slope is at the edge of the public right-of-way. Existing site improvements consist of three commercial buildings and associated pavement and landscape areas. Site elevations range from about 160 feet on the north to about 60 feet on the south.

## FIELD EXPLORATION

We explored the subsurface conditions by drilling three percolation test holes to depths between about 7 and 10 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger. We previously drilled six borings to depths between about 28 and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion (SCS&T, 2014). Figure 2 presents the approximate locations of the current percolation test holes and previous borings. An SCST engineer logged the test holes and collected samples for laboratory testing. The logs of the test holes are presented in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1.

## SUBSURFACE CONDITIONS

The materials encountered in the percolation test holes consist of fill and Stadium Conglomerate. Descriptions of the materials are presented below.

**Fill (af):** Fill was encountered in percolation test hole P-3. The fill encountered in the test hole extends to a depth of about 5 feet below the existing ground surface and consists of dense clayey gravel.

**Stadium Conglomerate (Tst):** Eocene Stadium Conglomerate was encountered in each of the percolation test holes. The Stadium Conglomerate encountered in the test holes consists of very dense conglomerate in a weakly cemented silty to clayey sandstone matrix with varying amounts of gravel and cobbles. Difficult drilling was encountered in the conglomerate.

**Groundwater**: Groundwater was not encountered in the percolation test holes. However, it was encountered in borings B-3 and B-4, drilled in the north-middle portion of the site during our referenced geotechnical investigation (SCS&T, 2014), at a depth of about 31 feet below the existing ground surface, corresponding to an elevation of about 54 feet. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

## LABORATORY TESTING

Selected samples obtained from the percolation test holes were tested to determine soil classification and enable the development of geotechnical conclusions. The laboratory testing consisted of grain size distribution and Atterberg limits. The results of the laboratory testing and brief explanations of the test procedures are presented in Appendix II.

## PERCOLATION TESTING

Borehole percolation testing was performed at three locations at depths of about 7 and 10 feet below the existing ground surface. The testing was performed by an SCST engineer in general accordance with the BMP Design Manual percolation test procedure. The material encountered at the bottom of the percolation test holes consists of Stadium Conglomerate. Table 1 presents the tested infiltration rates. The results of the percolation testing are presented in Appendix III.

**Table 1: Infiltration Rate Test Results**

| Test Location | Test Depth (feet) | Material Type at Test Depth | Infiltration Rate (inches/hour) |
|---|---|---|---|
| P-1 | 7 | STADIUM CONGLOMERATE, clayey sanstone matrix, very dense, weakly cemented | < 0.1 |
| P-2 | 7 | STADIUM CONGLOMERATE, clayey sanstone matrix, very dense, weakly cemented | 0.0 |
| P-3 | 10 | STADIUM CONGLOMERATE, silty to clayey sanstone matrix, very dense, weakly cemented | 0.1 |

## CONCLUSIONS AND RECOMMENDATIONS

Evaluation of storm water infiltration feasibility was performed in general accordance with the City of San Diego BMP Design Manual, Appendix C. Worksheet C.4-1 is provided in Appendix IV. Please note that infiltration testing was not conducted at a minimum of two locations within 50 feet of each proposed BMP in accordance with Section D.4.5 of Appendix D, as we were unable to access the proposed BMP locations due to current site constraints (existing buildings and slope). Additional infiltration testing may need to be performed after the existing buildings have been demolished and the site cut to planned finish grade. In our opinion, the Stadium Conglomerate tested during this evaluation is generally representative of the Stadium Conglomerate that will be encountered below the proposed BMP locations.

The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates do not support full infiltration; however, they do barely support allowing partial infiltration based on the City of San Diego's definition of "any appreciable quantity" of greater than 0.01 inch per hour. To mitigate the increased risk associated with allowing storm water infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain consisting of 6-inch diameter perforated PVC pipe surrounded by drain rock wrapped in filter fabric should be placed at the bottom of the basins and connected to a suitable storm drain facility.

As previously mentioned, groundwater was encountered in the north-middle portion of the site during our referenced geotechnical investigation at an elevation of about 54 feet. However, the proposed storm water BMP basins have been strategically located in areas where groundwater was not encountered. Therefore, it is our opinion that the depth to groundwater requirement of more than 10 feet below the bottom of the BMP should be satisfied.

**RESPONSES TO CITY REVIEW COMMENTS**

The remainder of this report presents our responses to review comments from Patrick Thomas of The City of San Diego related to the grading plan submittal. We responded to the geotechnical issues.

Issue No. 11: *The project's geotechnical consultant must submit an addendum geotechnical report or update letter that specifically addresses the following:*

Response: We prepared this addendum geotechnical report to address the issues.

Issue No. 12: *Provide completed Worksheet C.4-1.*

Response: Worksheet C.4-1 is provided in Appendix IV. In accordance with Section C.4.4 of Appendix C, the project design engineer is responsible for completing criteria 4 and 8.

Issue No. 13: *The geotechnical consultant indicates BMP facilities that involve infiltration are not feasible due to the proximity of groundwater to the proposed finish floor of the proposed development. A geotechnical condition created by the proposed development may not be considered a valid geotechnical hazard or constraint as the constraint is proposed by the project.*

Response: Groundwater was encountered in the north-middle portion of the site during our referenced geotechnical investigation at an elevation of about 54 feet. However, the proposed storm water BMP basins have been strategically located in areas where groundwater was not encountered. Therefore, it is our opinion that this issue has been resolved.

Issue No. 14: *The project's geotechnical consultant must address the specific geologic or geotechnical hazard associated with any amount of storm water infiltration that cannot be mitigated to an acceptable level for proposed storm water BMP's. The analyses and supporting documentation must be submitted for review.*

Response: To mitigate the increased risk associated with allowing any amount of storm water infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain consisting of 6-inch diameter perforated PVC pipe surrounded by drain rock wrapped in filter fabric should be placed at the bottom of the basins and connected to a suitable storm drain facility.

If you have questions, please call us at (619) 280-4321.

Respectfully submitted,
**SCST, INC.**

Thomas B. Canady, PE 50057
Principal Engineer

W. Lee Vanderhurst, CEG 1125
Principal Geologist

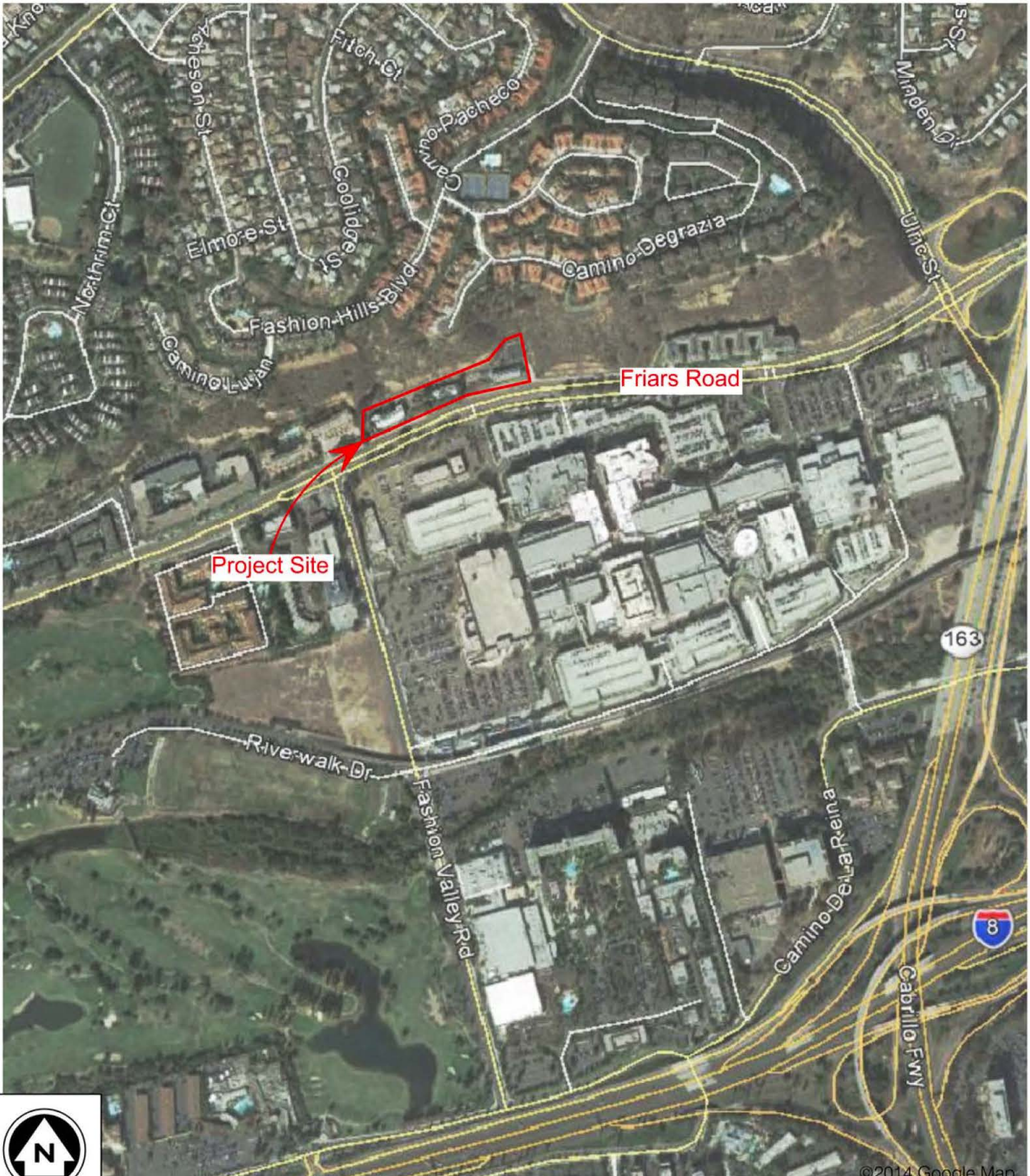
TBC:WLV

Attachments:

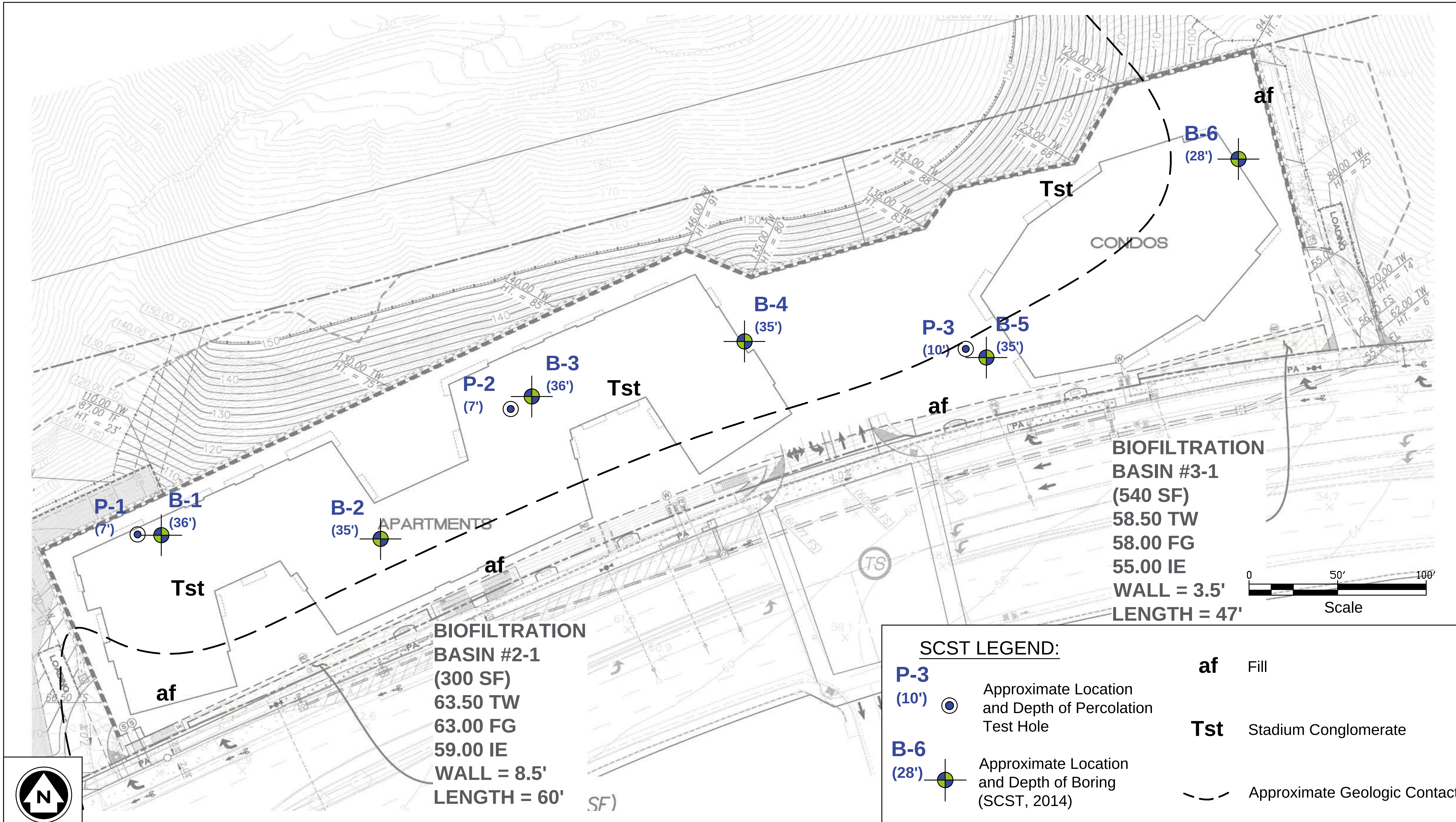
<u>Figures</u>
Figure 1 - Site Location Map
Figure 2 - Geotechnical Map

<u>Appendices</u>
Appendix I - Subsurface Exploration
Appendix II - Laboratory Testing
Appendix III - Infiltration Rate Test Results
Appendix IV - Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

(1) Addressee via e-mail at jholbrook@landcapip.com
(1) Justin Barrett via e-mail at justin.barrett@latitude33.com




| | | | |
|---|---|---|---|
| SCST ENGINEERING SCST, Inc. | SITE LOCATION MAP<br>Friars Road Mixed<br>Use Development<br>San Diego, California | Date: September, 2016<br>By: JCU<br>Job No.: 140338N.2-1 | Figure:<br>1 |




SCST, Inc.

GEOTECHNICAL MAP

Friars Road Mixed Use Development
San Diego, California

Date: September, 2016
By: JCU
Job No.: 140338N.2-1

Figure: 2

## APPENDIX I
## SUBSURFACE EXPLORATION

The subsurface conditions were explored by drilling 3 percolation test holes on August 26, 2016 to depths between about 7 and 10 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger. Figure 2 presents the approximate locations of the percolation test holes. The field investigation was performed by an SCST engineer who also logged the percolation test holes and obtained samples of the materials encountered.

The soils are classified in accordance with the Unified Soil Classification System as illustrated on Figure I-1. Logs of the percolation test holes are presented on Figures I-2 through I-4.

# SUBSURFACE EXPLORATION LEGEND

## UNIFIED SOIL CLASSIFICATION CHART

| SOIL DESCRIPTION | | GROUP SYMBOL | TYPICAL NAMES |
|---|---|---|---|
| I. COARSE GRAINED, more than 50% of material is larger than No. 200 sieve size. | | | |
| GRAVELS<br>More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3". | CLEAN GRAVELS | GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| | | GP | Poorly graded gravels, gravel sand mixtures, little or no fines. |
| | GRAVELS WITH FINES (Appreciable amount of fines) | GM | Silty gravels, poorly graded gravel-sand-silt mixtures. |
| | | GC | Clayey gravels, poorly graded gravel-sand, clay mixtures. |
| SANDS<br>More than half of coarse fraction is smaller than No. 4 sieve size. | CLEAN SANDS | SW | Well graded sand, gravelly sands, little or no fines. |
| | | SP | Poorly graded sands, gravelly sands, little or no fines. |
| | | SM | Silty sands, poorly graded sand and silty mixtures. |
| | | SC | Clayey sands, poorly graded sand and clay mixtures. |
| II. FINE GRAINED, more than 50% of material is smaller than No. 200 sieve size. | | | |
| | SILTS AND CLAYS (Liquid Limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | OL | Organic silts and organic silty clays or low plasticity. |
| | SILTS AND CLAYS (Liquid Limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity. |
| III. HIGHLY ORGANIC SOILS | | PT | Peat and other highly organic soils. |

### SAMPLE SYMBOLS

| | |
|---|---|
| ⊠ | - Bulk Sample |
| CAL | - Modified California sampler |
| CK | - Undisturbed Chunk sample |
| MS | - Maximum Size of Particle |
| ST | - Shelby Tube |
| SPT | - Standard Penetration Test sampler |

### GROUNDWATER SYMBOLS

- ▽ - Water level at time of excavation or as indicated
- - Water seepage at time of excavation or as indicated

### LABORATORY TEST SYMBOLS

| | |
|---|---|
| AL | - Atterberg Limits |
| CON | - Consolidation |
| COR | - Corrosivity Tests (Resistivity, pH, Chloride, Sulfate) |
| DS | - Direct Shear |
| EI | - Expansion Index |
| MAX | - Maximum Density |
| RV | - R-Value |
| SA | - Sieve Analysis |
| UC | - Unconfined Compression |
| RW | - Response to Wetting |

| SCST, Inc. | Friars Road Mix Use Development<br>San Diego, California | | | |
|---|---|---|---|---|
| | By: | RS | Date: | September, 2016 |
| | Job Number: | 140338N.2-1 | Figure: | I-1 |

# LOG OF PERCOLATON TEST HOLE P-1

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, clayey sandstone matrix, dry, very dense, weakly cemented, difficult drilling. | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | **TEST HOLE TERMINATED AT 7 FEET** | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

SCST, Inc.

Friars Road Mix Use Development
San Diego, California

| | | | |
|---|---|---|---|
| By: | RS | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure: | I-2 |

# LOG OF PERCOLATON TEST HOLE P-2

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, light brown, rounded gravel and cobbles to 3 inches in size, clayey sandstone matrix, dry, very dense, weakly cemented, very difficult drilling. | | X | | | | |
| 4 | | | | X | | | | SA AL |
| 6 | | | | X | | | | |
| 8 | | **TEST HOLE TERMINATED AT 7 FEET** | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

# LOG OF PERCOLATON TEST HOLE P-3

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2, 4 | GC | **FILL (af)** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | | | | | |
| 6, 8 | | **STADIUM CONGLOMERATE (Tst**) - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty to clayey sandstone matrix, dry, very dense, weakly cemented, difficult drilling. | | | | | | |
| 10, 12, 14, 16, 18, 20 | | **TEST HOLE TERMINATED AT 10 FEET** | | | | | | |

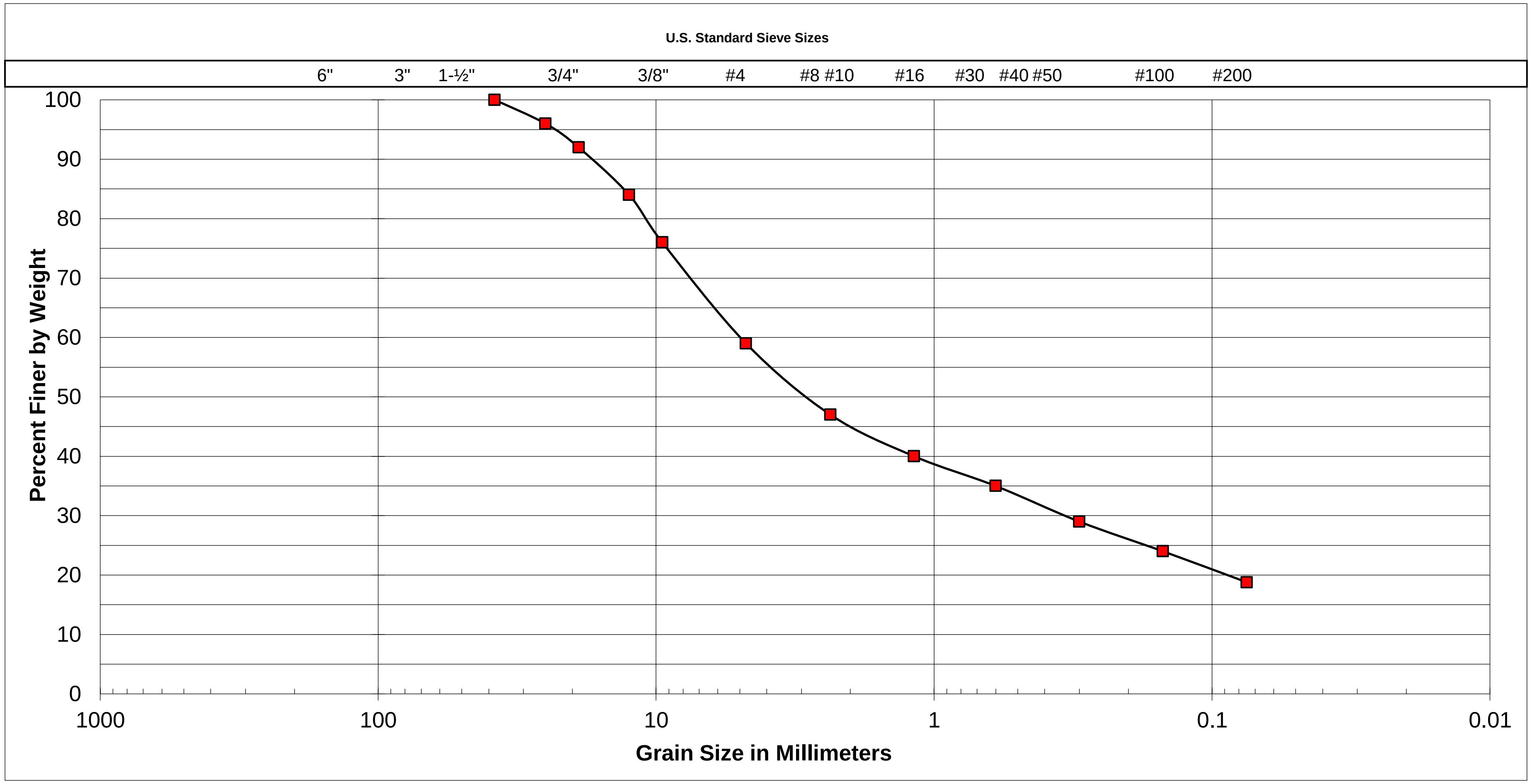
**SCST, Inc**

| | | | |
|---|---|---|---|
| Friars Road Mix Use Development<br>San Diego, California | | | |
| By: | RS | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure | I-4 |

## APPENDIX II
## LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were performed:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **GRAIN SIZE DISTRIBUTION:** The grain size distribution was determined on one sample in accordance with ASTM D422. Figure II-1 presents the test results.
- **ATTERBERG LIMITS:** The Atterberg limits were determined on one sample in accordance with ASTM D4318. Figure II-1 presents the test results.




| Cobbles | Gravel | | Sand | | | Silt or Clay |
|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | |

| SAMPLE LOCATION |
|---|
| P-2 at 1 to 7 feet |

| UNIFIED SOIL CLASSIFICATION: | CLAYEY SAND |
|---|---|
| DESCRIPTION | SC |

| ATTERBERG LIMITS | |
|---|---|
| LIQUID LIMIT | 34 |
| PLASTIC LIMIT | 16 |
| PLASTICITY INDEX | 18 |

SCST, Inc.

| Friars Road Mixed Use Development<br>San Diego, California | | | |
|---|---|---|---|
| By: | DRB | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure: | II-1 |

## APPENDIX III
## INFILTRATION RATE TEST RESULTS

We performed falling head borehole percolation testing at three locations (P-1 through P-3) in general conformance with Appendix C of the BMP Design Manual. The percolation test holes were prepared for testing by placing about 4 to 6 inches of gravel in the bottom of the test hole and then installing a 2-inch diameter solid PVC pipe from the top of the pea gravel to the ground surface or higher. Pea gravel was placed in the annular space between the PVC pipe and the borehole sidewall between the depths of about 1½ feet and 1 foot below the existing ground surface, then hydrated bentonite chips were placed between the depths of about 1 and 6 inches below the existing ground surface. Prior to starting the percolation testing, the test holes were presoaked overnight (approximately 24 hours) by filling the holes with water. The percolation testing was performed immediately after presoaking by filling the test holes with clean potable water to about 3 to 8 feet above the bottom of the PVC pipe and measuring the drop in the water level every 30 minutes, until a constant rate was established. Figures III-1 through III-3 present the results of the borehole percolation testing.

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

| | | | |
|---|---|---|---|
| Project Name: | Friars Road Mixed Use Development | Test Number: | **P-1** |
| Job Number: | 140388N.2-1 | Tested By: | VAU |
| Date Drilled: | 8/26/2016 | Date Tested: | 8/27/2016 |
| Drilling Method: | 6-inch diameter hollow stem auger | Presoak Time: | 24 hours |
| Drilled Depth: | 7 feet | | |
| Pipe Interval: | 0-6½ feet | | |
| Pipe Diameter: | 2 inches | | |
| Test Hole Diameter: | 6 inches | | |

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:24<br>8:54 | 0:30 | 3.8 | 3.7 | 1.2 | 25 |
| 2 | 8:54<br>9:24 | 0:30 | 3.7 | 3.5 | 2.4 | 13 |
| 3 | 9:24<br>9:54 | 0:30 | 3.5 | 3.4 | 1.2 | 25 |
| 4 | 9:54<br>10:24 | 0:30 | 3.4 | 3.3 | 1.2 | 25 |
| 5 | 10:24<br>10:54 | 0:30 | 3.3 | 3.2 | 1.2 | 25 |
| 6 | 10:54<br>11:24 | 0:30 | 3.2 | 3.1 | 1.2 | 25 |
| 7 | | | | | | |
| 8 | | | | | | |
| Observed Rates: | | | | | | 25 min/in<br>2.4 in/hr |
| Gravel Correction Factor: | | | | | | 2.37 |
| Corrected Rates: | | | | | | 59 min/in<br>1.0 in/hr |
| ***Tested Infiltation Rate, $I_t$:** | | | | | | **< 0.1 in/hr** |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{1.2(60)(3)}{30((3 + 2(37.8))}$$

$$I_t = < 0.1 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

| | | | |
|---|---|---|---|
| Project Name: | Friars Road Mixed Use Development | Test Number: | **P-2** |
| Job Number: | 140388N.2-1 | Tested By: | VAU |
| Date Drilled: | 8/26/2016 | Date Tested: | 8/27/2016 |
| Drilling Method: | 6-inch diameter hollow stem auger | Presoak Time: | 24 hours |
| Drilled Depth: | 7 feet | | |
| Pipe Interval: | 0-6½ feet | | |
| Pipe Diameter: | 2 inches | | |
| Test Hole Diameter: | 6 inches | | |

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:17<br>8:47 | 0:30 | 4.3 | 3.5 | 9.6 | 3 |
| 2 | 8:47<br>9:17 | 0:30 | 3.5 | 3.0 | 6.0 | 5 |
| 3 | 9:17<br>9:47 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 4 | 9:47<br>10:17 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 5 | 10:17<br>10:47 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 6 | 10:47<br>11:17 | 0:30 | 4.1 | 4.0 | 1.2 | 25 |
| 7 | 11:17<br>11:47 | 0:30 | 4.0 | 4.0 | 0.0 | 0 |
| 8 | | | | | | |
| Observed Rates: | | | | | | 0 min/in<br>0.0 in/hr |
| Gravel Correction Factor: | | | | | | 2.37 |
| Corrected Rates: | | | | | | 0 min/in<br>0.0 in/hr |
| ***Tested Infiltation Rate, $I_t$:** | | | | | | **0.0 in/hr** |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{0.0(60)(3)}{30((3 + 2(48.0))}$$

$$I_t = 0.0 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

| SCST, Inc. | Friars Road Mixed Use Development<br>San Diego, California | | | |
|---|---|---|---|---|
| | By: | VAU | Date: | September, 2016 |
| | Job No: | 140388N.2-1 | Figure: | III-2 |

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

| | | | |
|---|---|---|---|
| Project Name: | Friars Road Mixed Use Development | Test Number: | **P-3** |
| Job Number: | 140388N.2-1 | Tested By: | VAU |
| Date Drilled: | 8/26/2016 | Date Tested: | 8/27/2016 |
| Drilling Method: | 6-inch diameter hollow stem auger | Presoak Time: | 24 hours |
| Drilled Depth: | 10 feet | | |
| Pipe Interval: | 0-9½ feet | | |
| Pipe Diameter: | 2 inches | | |
| Test Hole Diameter: | 6 inches | | |

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:08 – 8:38 | 0:30 | 8.4 | 6.4 | 24.0 | 1 |
| 2 | 8:38 – 9:08 | 0:30 | 8.1 | 6.9 | 14.4 | 2 |
| 3 | 9:08 – 9:38 | 0:30 | 8.3 | 7.1 | 14.4 | 2 |
| 4 | 9:38 – 10:08 | 0:30 | 7.1 | 5.8 | 15.6 | 2 |
| 5 | 10:08 – 10:38 | 0:30 | 7.4 | 7.1 | 3.6 | 8 |
| 6 | 10:38 – 11:08 | 0:30 | 6.7 | 6.4 | 3.6 | 8 |
| 7 | 11:08 – 11:38 | 0:30 | 6.4 | 6.1 | 3.6 | 8 |
| 8 | 11:38 – 12:08 | 0:30 | 7.5 | 7.2 | 3.6 | 8 |
| Observed Rates: | | | | | 8 min/in<br>7.2 in/hr | |
| Gravel Correction Factor: | | | | | 2.37 | |
| Corrected Rates: | | | | | 20 min/in<br>3.0 in/hr | |
| ***Tested Infiltation Rate, $I_t$:** | | | | | **0.1 in/hr** | |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{3.6(60)(3)}{30((3 + 2(88.2))}$$

$$I_t = 0.1 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

# APPENDIX IV
## WORKSHEET C.4-1: CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION

SCST ENGINEERING

**Worksheet C.4-1: Categorization of Infiltration Feasibility Condition**

| Categorization of Infiltration Feasibility Condition | | Worksheet C.4-1 | |
|---|---|---|---|
| **Part 1 - Full Infiltration Feasibility Screening Criteria**<br>**Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?** | | | |
| Criteria | Screening Question | **Yes** | **No** |
| 1 | **Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates do not support allowing infiltration greater than 0.5 inch per hour.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 2 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour. Allowing infiltration greater than 0.5 inch per hour will increase the risk of geotechnical hazards. Given the relatively impermeable nature of the Stadium Conglomerate beneath the site, allowing infiltration greater than 0.5 inch/hour will result in uncontrolled lateral migration of groundwater through permeable bedding material of utilities within the public right-of-way (Friars Road) and potentially negative impacts on the existing retaining wall that borders Fashion Valley mall that cannot be mitigated to an acceptable level. SCST does not recommend allowing infiltration greater than 0.5 inch/hour at the site.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |

| Worksheet C.4-1 Page 2 of 4 | | | |
|---|---|---|---|
| Criteria | Screening Question | Yes | No |
| 3 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 4 | **Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>Latitude 33 response: The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| **Part 1 Result*** | If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration**<br><br>If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2 | | |

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by [City Engineer] to substantiate findings.

**Worksheet C.4-1 Page 3 of 4**

**Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria**

**Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?**

| Criteria | Screening Question | Yes | No |
|---|---|---|---|
| 5 | **Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☑ | ☐ |

Provide basis:

The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates barely support allowing partial infiltration based on the City of San Diego's definition of any appreciable quantity (greater than 0.01 inch per hour).

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

| Criteria | Screening Question | Yes | No |
|---|---|---|---|
| 6 | **Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☑ | ☐ |

Provide basis:

To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain. Groundwater was encountered in the north-middle portion of the site during our geotechnical investigation at an elevation of about 54 feet. However, the proposed BMPs are located in areas where groundwater was not encountered. Therefore, it is our opinion that the depth to groundwater requirement of more than 10 feet below the bottom of BMP should be satisfied.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Without pre-treatment, infiltration of stormwater pollutants could migrate laterally and adversely affect down-gradient sites. SCST would recommend pre-treatment of stormwater runoff. In SCST's opinion, allowing infiltration of pre-treated stormwater runoff in any appreciable quantity does not pose a significant risk to the regional groundwater table.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Latitude 33 response: Ground water discharges directly to the San Diego River and there are no downstream water rights that exist within this area.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.<br><br>If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

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SDVOSB . DVBE

February 17, 2016

**SCST No. 140338N**
**Report No. 3**

**Mr. Doyle Barker**
**Managing Director**
**LandCap Friars Road, LLC**
**27132 B Paseo Espada, Suite 1206**
**San Juan Capistrano, California 92675**

Subject: RESPONSE TO CITY REVIEW COMMENT
FRIARS ROAD MIXED USE DEVELOPMENT
SAN DIEGO, CALIFORNIA

References: Latitude 33 Planning and Engineering (2016), Grading & Utility Plan, Friars Road Mixed Use, San Diego, CA 92108, February 11.

Southern California Soil & Testing, Inc. (2015), Geotechnical Investigation, Friars Road Apartment Development, San Diego, CA, SCS&T No. 140338N-1, October 15.

Dear Mr. Barker:

SCST, Inc. prepared this letter to respond to a review comment from Patrick Thomas of The City of San Diego for the subject project. The review comment and our response are provided below.

Issue No. 4: *The geotechnical consultant recommends that the global stability of the existing natural slope be evaluated. Submit the geotechnical consultant's global stability evaluation including static, pseudo static and surficial slope stability analysis.*

Response: We performed the slope stability analysis using Slide version 6.038 software. Figures 1 through 3 present the results. The estimated shear strengths of the materials are shown in the figures. The analysis was performed using GLE/Morgenstern-Price method, which satisfies both force and moment equilibrium. Our analysis indicates adequate safety factors with respect to static, pseudo static and surficial slope stability. The wall designer should evaluate internal wall stability.

If you have questions, please call us at (619) 280-4321.

Respectfully submitted,
**SCST, INC.**

REGISTERED PROFESSIONAL ENGINEER
THOMAS B. CANADY
No. 50057
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
W. LEE VANDERHURST
No. 1125
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Thomas B. Canady, PE 50057
Principal Engineer

W. Lee Vanderhurst, CEG 1125
Principal Geologist

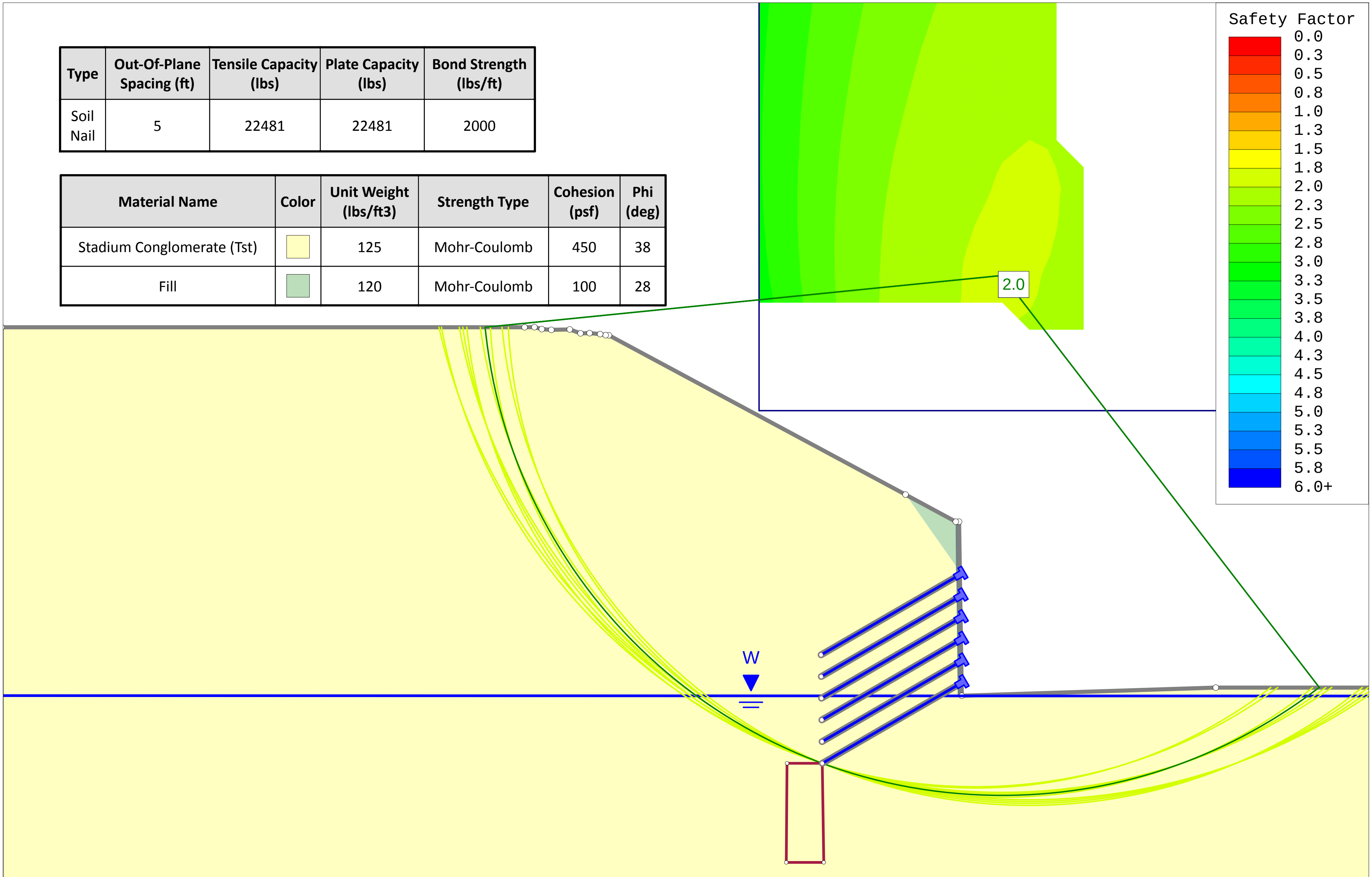
TBC:WLV:aw

Attachments: Figures 1 through 3 - Slope Stability Analysis

(1) Addressee via e-mail at dbarker@landcapip.com
(1) Justin Giles via e-mail at justin.giles@latitude33.com

| Type | Out-Of-Plane Spacing (ft) | Tensile Capacity (lbs) | Plate Capacity (lbs) | Bond Strength (lbs/ft) |
|---|---|---|---|---|
| Soil Nail | 5 | 22481 | 22481 | 2000 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) |
|---|---|---|---|---|---|
| Stadium Conglomerate (Tst) | | 125 | Mohr-Coulomb | 450 | 38 |
| Fill | | 120 | Mohr-Coulomb | 100 | 28 |



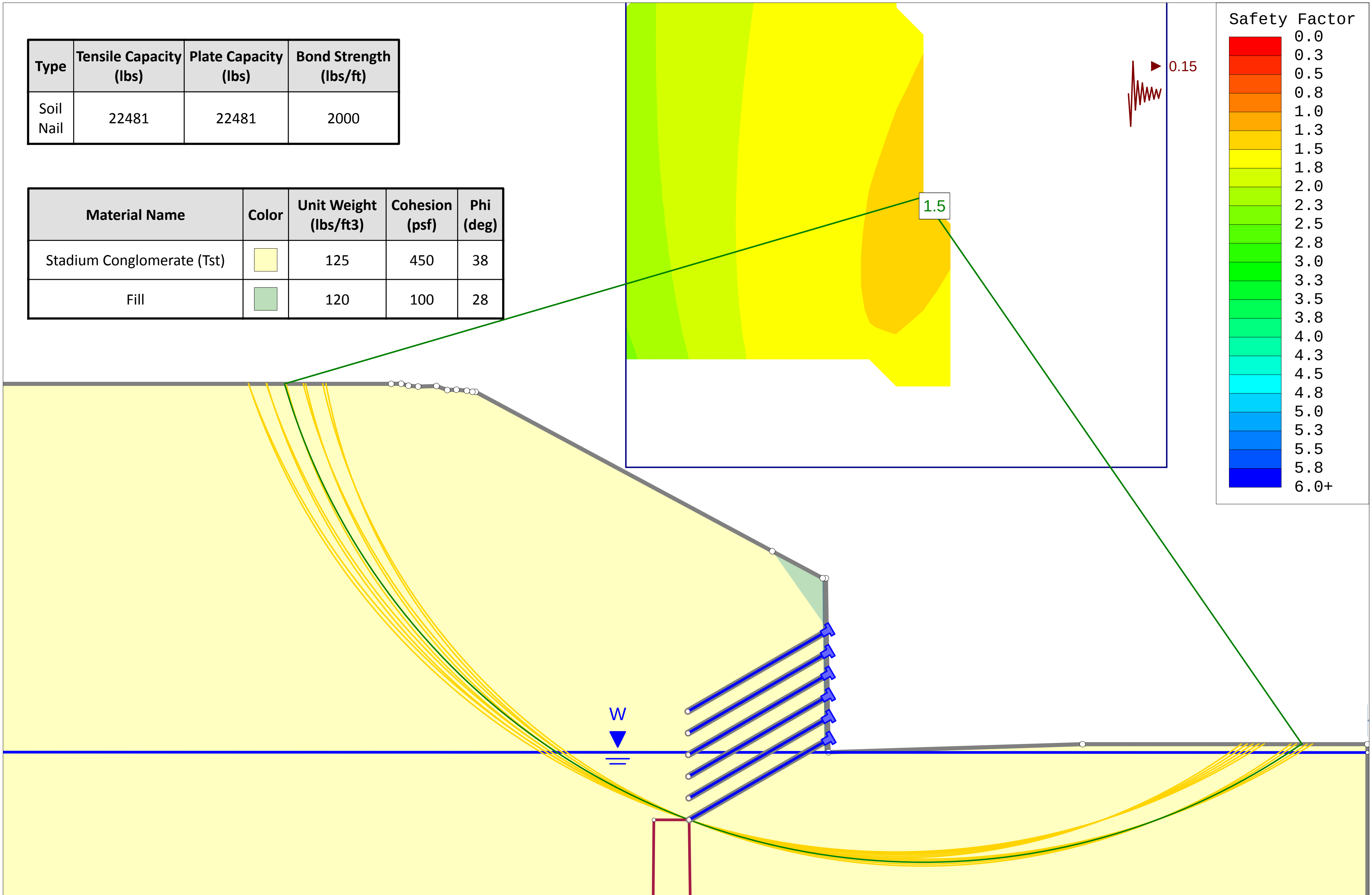

| | | | |
|---|---|---|---|
| *Project* | Friars Road Mixed Use | | |
| *Analysis Description* | Global Slope Stability - Static | | |
| *Drawn By* EM/CTL | *Scale* 1"=60' | *Company* SCST, Inc. | |
| *Date* February, 2016 | | *Figure* 1 | |

SCST ENGINEERING

SLIDEINTERPRET 6.038

| Type | Tensile Capacity (lbs) | Plate Capacity (lbs) | Bond Strength (lbs/ft) |
|---|---|---|---|
| Soil Nail | 22481 | 22481 | 2000 |

| Material Name | Color | Unit Weight (lbs/ft3) | Cohesion (psf) | Phi (deg) |
|---|---|---|---|---|
| Stadium Conglomerate (Tst) | | 125 | 450 | 38 |
| Fill | | 120 | 100 | 28 |




SLIDEINTERPRET 6.038

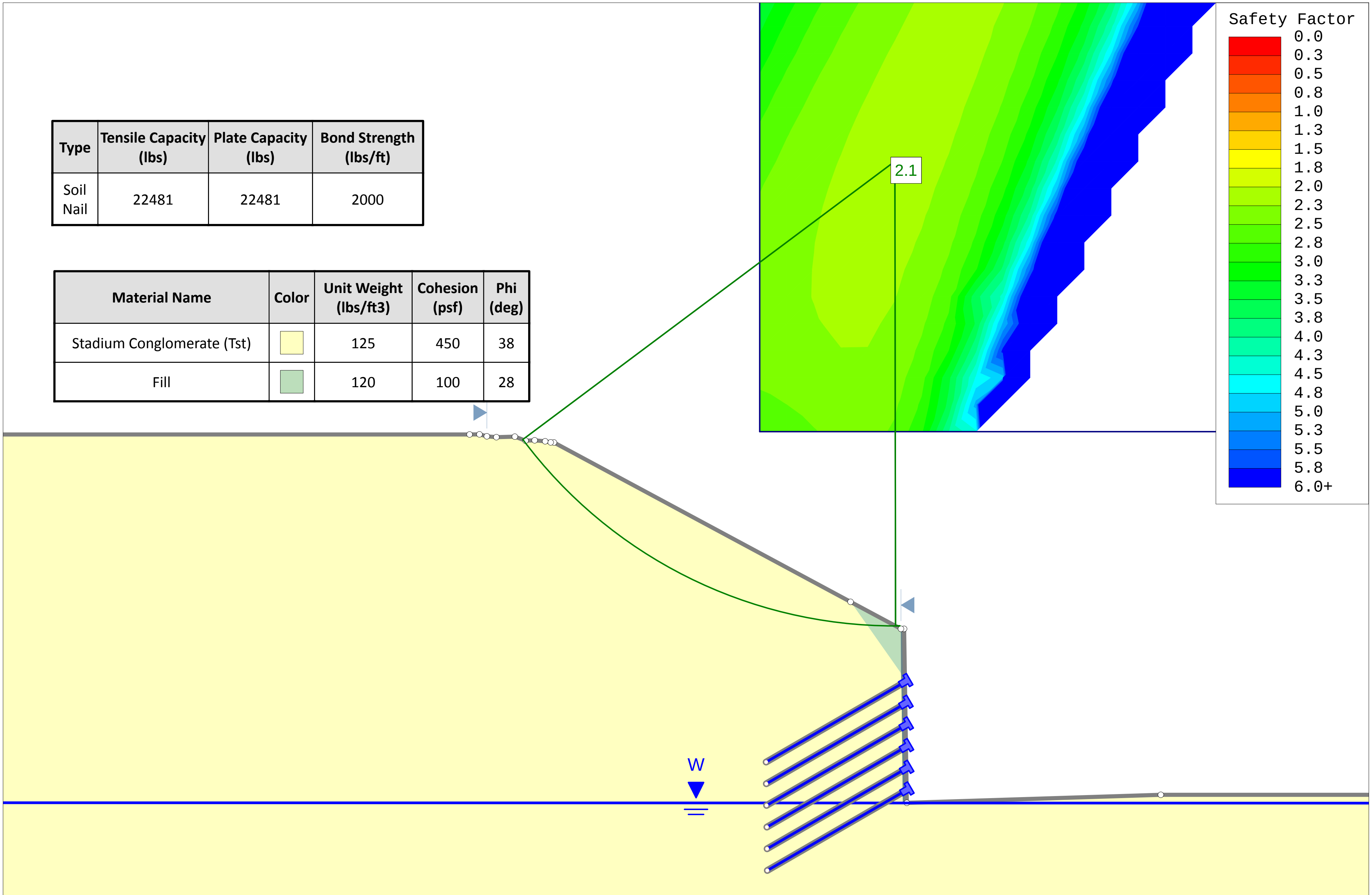
| | |
|---|---|
| *Project* | Friars Road Mixed Use |
| *Analysis Description* | Global Slope Stability - Pseudo Static |

| *Drawn By* | *Scale* | *Company* |
|---|---|---|
| CTL | 1"=60' | SCST, Inc. |

| *Date* | *Figure* |
|---|---|
| February, 2016 | 2 |

| Type | Tensile Capacity (lbs) | Plate Capacity (lbs) | Bond Strength (lbs/ft) |
|---|---|---|---|
| Soil Nail | 22481 | 22481 | 2000 |

| Material Name | Color | Unit Weight (lbs/ft3) | Cohesion (psf) | Phi (deg) |
|---|---|---|---|---|
| Stadium Conglomerate (Tst) | | 125 | 450 | 38 |
| Fill | | 120 | 100 | 28 |




SCST ENGINEERING

SLIDEINTERPRET 6.038

| | | | |
|---|---|---|---|
| *Project* | Friars Road Mixed Use | | |
| *Analysis Description* | Surficial Slope Stability | | |
| *Drawn By* CTL | *Scale* 1"=60' | *Company* | SCST, Inc. |
| *Date* | February, 2016 | *Figure* | 3 |

# PRELIMINARY SEWER STUDY

## FRIARS ROAD RESIDENTIAL

October 28, 2015



PREPARED BY: LATITUDE 33 PLANNING & ENGINEERING
PREPARED FOR: LANDCAP FRIARS ROAD, LLC
JOB NUMBER: 1351.00

# PRELIMINARY SEWER STUDY

**For**

Friars Road Residential
City of San Diego

**Prepared for:** LandCap Friars Road, LLC
27132 B Paseo Espada, Suite 1206
San Juan Capistrano, CA 92675

**Project Address:**
6950, 7020, and 7050 Friars Road
San Diego, CA 92108


**Prepared by:** Latitude 33 Planning and Engineering
9968 Hibert Street 2$^{nd}$ Floor
San Diego, CA 92131


**Preparation Date**
October 28, 2015

---

Matthew J. Semic R.C.E. 71075

Prepared By: JMB
Reviewed By: MJS

# TABLE OF CONTENTS



# LIST OF TABLES

## A. INTRODUCTION

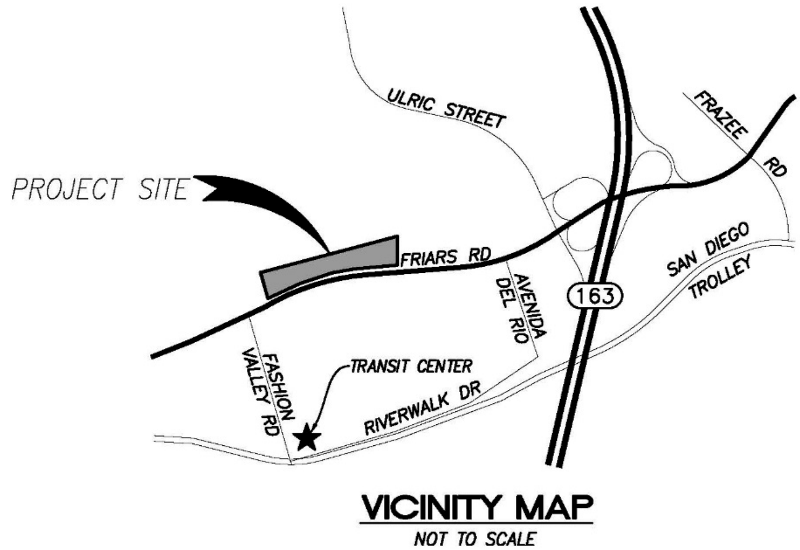
The purpose of this Preliminary Sewer Capacity Study is to evaluate the impacts of the proposed development of the Friars Road Residential Building project. The intent is to preliminarily assess the impacts the proposed expansion has on the project specific existing 8-inch polyvinyl chloride pipe that runs into the 18-inch vitrified clay pipe downstream in Friars Road. This study will also assess each project sewer line's size, slope, and velocity, as well as determine the total effluent for this proposed development.

The project site is within the City of San Diego, and public facilities shall be designed per the *City of San Diego Sewer Design Guide Revised Edition (2015)*. Private facilities shall be designed to meet the most current version of the California Plumbing Code. The proposed sewer connections will serve residential uses.

## B. PROJECT DESCRIPTION

The proposed project is located in Mission Valley, north of Interstate 8 and the San Diego River, west of State Route 163, south of Linda Vista Road, and east of the Riverwalk Golf Course. More specifically the land is described as Lots 1, 2 and 3 of Fashion Valley North, in the city of San Diego, State of California, according to Map thereof No. 9032, filed in the office of the County Recorder of San Diego County, November 17, 1978. APN: 437-250-22, 23 & 24.

**Figure 1: Vicinity Map**




The developer seeks to:

- Demolish the existing 3 office buildings on site.
- Construct a new 8-story apartment building with 249 units over a 2 level parking garage.
- Construct a new 9-story condo building with 70 units over a 2 level parking garage.

This project does not require a Community Plan Amendment or rezone and will be consistent with the Mission Valley Community Plan. Refer to Figure 1 in Appendix A.

## C. EXISTING CONDITIONS

There is one main segment along Friars Road serving the existing three office buildings. This 8-inch PVC segment flows westward on Friars Road and connects into an existing 18-inch vitrified clay pipe and flows westward toward a manhole north of Fashion Valley Road, then flows south along Fashion Valley Road toward the South Mission Valley Trunk Sewer.

An existing sewer easement runs through the west portion of the site on the west side of lot 3 for an existing 18-inch vitrified clay pipe that carries flow from the residential units to the north of the site in the community of Fashion Hills. This segment picks up the effluent from Fashion Hills, runs southward toward Friars Road, and then connects in Friars Road to the manhole where the existing 8-inch segment merges with the existing 18-inch segment.

A third existing 8-inch vitrified clay sewer carries effluent from a residential community to the north. This segment flows southward to the west of Fashion Valley Road. The sewer main connects to the manhole at the intersection of Friars Road and Fashion Valley Road that also picks up effluent from the Fashion Hills community and the three existing office buildings. The effluent then flows south along Fashion Valley Road through an existing 18-inch vitrified clay pipe. Refer to as-builts provided in Appendix C.

The project is located within the South Mission Valley Trunk Sewer basin. The sewer flows in the westerly direction, south of the San Diego River to the North Metro Interceptor Sewer which carries sewage to the Point Loma Wastewater Treatment Plant.

After evaluating as-builts and land use information, it has been calculated that the existing 18-inch vitrified clay pipe (that carries effluent both from the Fashion Hills residential community to the north and existing office buildings on site) carries about **271,000 gallons per day (gpd)**.

## D. PROPOSED CONDITIONS

The first proposed 6-inch private lateral carrying effluent from the proposed condominium tower will connect to the 8-inch PVC main in Friars Road. This sewer lateral will exit the southwest side of the building.

The second proposed 6-inch private lateral carrying effluent from the proposed apartment building will connect to the 8-inch PVC main in Friars Road. This sewer lateral will exist the south side of the building.

The existing sewer system serving the residential communities to the north will remain. This existing gravity system will confluence with the gravity line to the east, serving the residential towers. Refer to the Sewer Map in Appendix B.

A new 4-inch private line will be installed at the basement floor of the parking structure for both the apartment and condominium buildings. This will be for any wastewater or runoff collected from vehicles parking in the structure. A small flow-activated pump will be installed outside the structure to pump up to the 8-inch PVC main in Friars Road. Because the flow is minimal for this line and can be scheduled to operate in off-peak times. This segment will not be included in this analysis.

## E. ANALYSIS CRITERIA

**Gravity Sewer**

The *City of San Diego's Sewer Design Guide* was used in the calculation of the Peak Design Flow and Velocity for each section of the public sewer.

- The ratio of depth of flow to pipe diameter ($d_n$/D) shall not exceed 0.5 (section 1.3.3.3)
- The minimum velocity shall be 2.0 feet per second (section 1.3.3.1).
- The maximum allowable velocity shall be 10 fps (section 1.3.3.1).
- Manning's "n" factor of 0.013 was used for all gravity sewer mains.

*Equivalent Population* were calculated from zoning information provided in Table 1-1 of the *City of San Diego Sewer Design Guide*. See **Appendix C**. Flow rates were be checked based on the most current, adopted edition of the Uniform Plumbing code. Net acreage was calculated according to the definition provided in the *San Diego Sewer Design Guide* page 1-18.

Below are tables showing the existing *equivalent population* and the proposed *equivalent population* based on existing and proposed land usage, respectively.

**Table 1: Existing Equivalent Populations Based on Land Use (per City of San Diego Sewer Design Guide).**

| LAND USE | NO. OF DWELLING UNITS | FLOORS | Net Acre | Net Acre | Dwelling unit Density | UNIT DENSITY | Equivalent Population | Population |
|---|---|---|---|---|---|---|---|---|
| | DU | | sf | ac | DU/ac | pers/DU | pers/net ac | persons |
| EXISTING OFFICE BUILDINGS (3) | - | 3 | 235,224 | 5.4 | - | - | 38.2 | 630 |
| RESIDENTIAL (RM-3-7) | 226 | - | - | - | - | 2.6 | - | 590 |
| RESIDENTIAL (RM-1-1) | 66 | - | - | - | - | 3.1 | - | 205 |
| | | | | | | | TOTALS | 1,425 |

**Table 2: Proposed Equivalent Populations Based on Land Use (per City of San Diego Sewer Design Guide).**

| LAND USE | NO. OF DWELLING UNITS | FLOORS | Net Acre | Net Acre | Dwelling unit Density | UNIT DENSITY | Equivalent Population | Population |
|---|---|---|---|---|---|---|---|---|
| | DU | | sf | ac | DU/ac | pers/DU | pers/net ac | persons |
| RESIDENTIAL (APARTMENT) | 249 | 8 | 104,544 | 2.4 | 103.75 | 3.5 | 364.6 | 875 |
| RESIDENTIAL (CONDOMINIUM) | 70 | 9 | 130,680 | 3.0 | 23.33 | 3.5 | 85.0 | 255 |
| EXIST. RESIDENTIAL (RM-3-7) | 226 | - | - | - | - | 2.6 | - | 590 |
| EXIST. RESIDENTIAL (RM-1-1) | 66 | - | - | - | - | 3.1 | - | 205 |
| | | | | | | | TOTALS | 1,925 |

In summary the existing equivalent population is 1,425 persons and the proposed is 1,925 persons.

*Daily Per Capita Sewer Flow* sewer flow for the equivalent population shall be per capita **80 gallons per day** (gpd).

*Average Dry Weather Flow (ADWF)* for each sewer main reach shall be determined by multiplying the total accumulated equivalent population contributing to that reach by 80 gpd.

ADWF = 80 gpd x Equivalent Pop

*Peaking Factor for Dry Weather (PFDW)* is the ratio of peak dry weather flow to average dry weather flow. It is dependent on the equivalent population within a tributary area. The Peaking Factor for Dry Weather can be found using Figure 1-1 in the *City of San Diego Sewer Design Guide*. See **Appendix C**.

*Peak Dry Weather Flow (PDWF)* shall be determined by multiplying the average dry weather flow by the appropriate peaking factor.

PDWF = ADWF x PFDW

## F. SEWER ANALYSIS

This sewer capacity analysis is based on the design requirements provided by City of San Diego. The sewer tables in **Appendix B** are used to determine the ultimate developed condition of the effluent generation, with consideration of the peaking factors based on the population count within the Friars Road Residential Project project.

Based on proposed conditions, for the proposed land use, the peak dry weather flow (PDWF) is approximately **351,327 gpd (0.544 cfs)** which is approximately 23% more than the existing usage of **270,784 gpd (0.419 cfs)** on average.

**Table 3: Existing Average Flows and Proposed PDWF.**

| | | |
|---|---|---|
| Existing [1] | 270,784 gpd | 0.419 cfs |
| Proposed [2] | 351,327 gpd | 0.544 cfs |

1. Average flow per email in Appendix C
2. Peak dry weather flow

## G. CONCLUSION

This project will generate effluent flows from 5.4 acres of residential area, including 319 dwelling units. The total effluent flow, under peak conditions, has been calculated as **0.351 MGD (351,327 gpd)**. Gravity sewer lines have been designed to achieve a minimum slope of 1.0%, with velocities not exceeding 10fps, and capacity not exceeding 50%.

This sewer capacity analysis has analyzed both the existing and proposed effluent generation based on existing and proposed flows based on land use, and as-built plans. Calculations are provided in **Appendix B** to show, in the proposed condition, adequate design slope, velocity, and pipe capacity. An exhibit showing the existing and proposed pipe layout can be found in **Appendix B**.

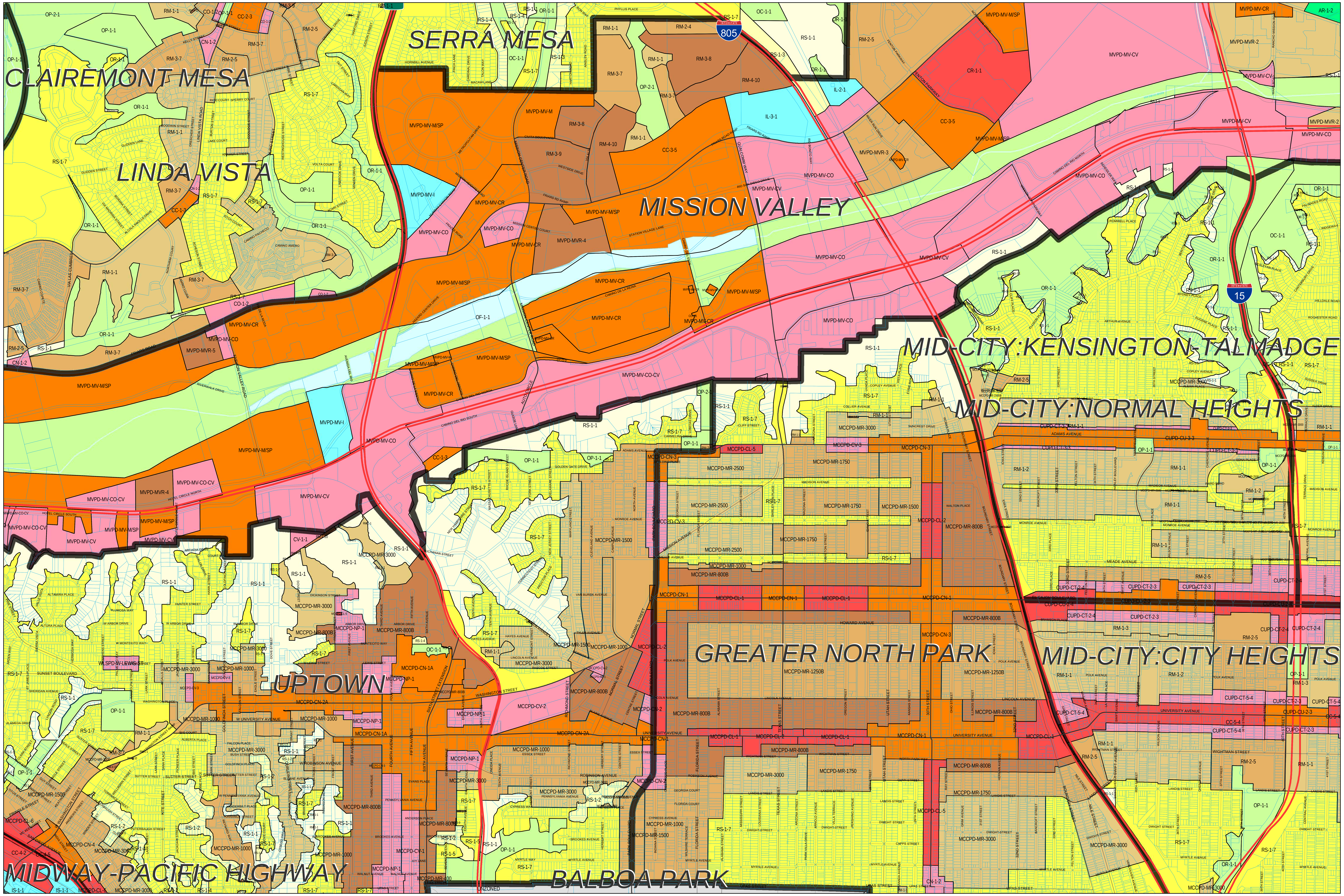
A minimum 4-inch diameter line shall be used for all proposed private lines on the property and with cleanouts spaced at a maximum of 100 feet. Where minimum velocities are not achieved during peak flows, a minimum slope of 1.0% is implemented.

Given the calculations for the existing and proposed conditions, the existing 8-inch PVC sewer and existing 18-inch VC sewer are both sufficient to carry the proposed flow due to the construction of the proposed apartment and condominium buildings. With the exception of the construction of two 6-inch laterals, no additional improvements need to be made to the existing mains in Friars Road or downstream in Fashion Valley Road.

# APPENDIX A

- Zoning Map

# Official Zoning Map




**Legend**

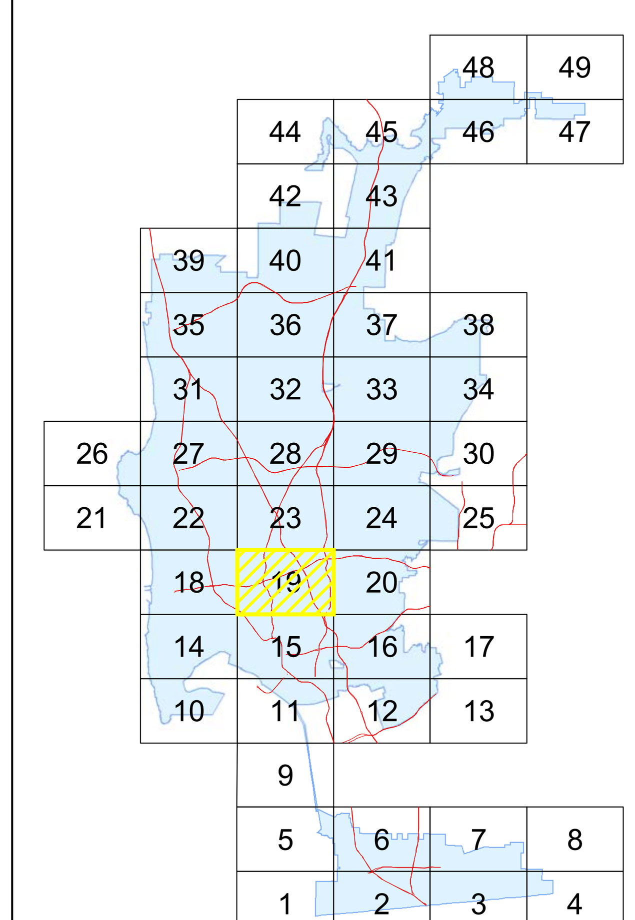
- City of San Diego Boundary
- Community Plan Areas
- Parcels

Zoning

ZONE_NAME

- AR-1-2
- CC-1-3
- CC-2-3
- CC-3-5
- CC-4-2
- CC-4-5
- CC-5-4
- CN-1-2
- CO-1-2
- CR-1-1
- CUPD-CT-2-3
- CUPD-CT-2-4
- CUPD-CT-3-3
- CUPD-CT-5-4
- CUPD-CU-2-3
- CUPD-CU-2-4
- CUPD-CU-3-3
- CV-1-1
- IL-2-1
- IL-3-1
- IS-1-1
- MCCPD-CL-1
- MCCPD-CL-2
- MCCPD-CL-5
- MCCPD-CL-6
- MCCPD-CN-1
- MCCPD-CN-1A
- MCCPD-CN-2
- MCCPD-CN-2A
- MCCPD-CN-3
- MCCPD-CN-4
- MCCPD-CV-1
- MCCPD-CV-2
- MCCPD-CV-3
- MCCPD-MR-1000
- MCCPD-MR-1250B
- MCCPD-MR-1500
- MCCPD-MR-1500B
- MCCPD-MR-1750
- MCCPD-MR-2500
- MCCPD-MR-3000
- MCCPD-MR-400
- MCCPD-MR-800B
- MCCPD-NP-1
- MCCPD-NP-2
- MVPD-MV-CO
- MVPD-MV-CO-CV
- MVPD-MV-CR
- MVPD-MV-CV
- MVPD-MV-I
- MVPD-MV-M
- MVPD-MV-M/SP
- MVPD-MVR-2
- MVPD-MVR-3
- MVPD-MVR-4
- MVPD-MVR-5
- OC-1-1
- OF-1-1
- OP-1-1
- OP-2-1
- OR-1-1
- RM-1-1
- RM-1-2
- RM-1-3
- RM-2-4
- RM-2-5
- RM-3-7
- RM-3-8
- RM-3-9
- RM-4-10
- RS-1-1
- RS-1-2
- RS-1-3
- RS-1-4
- RS-1-5
- RS-1-7
- UNZONED
- WLSPD-W-LEWIS-ST

**Index Map**




SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.



# City of San Diego

## Development Services Department

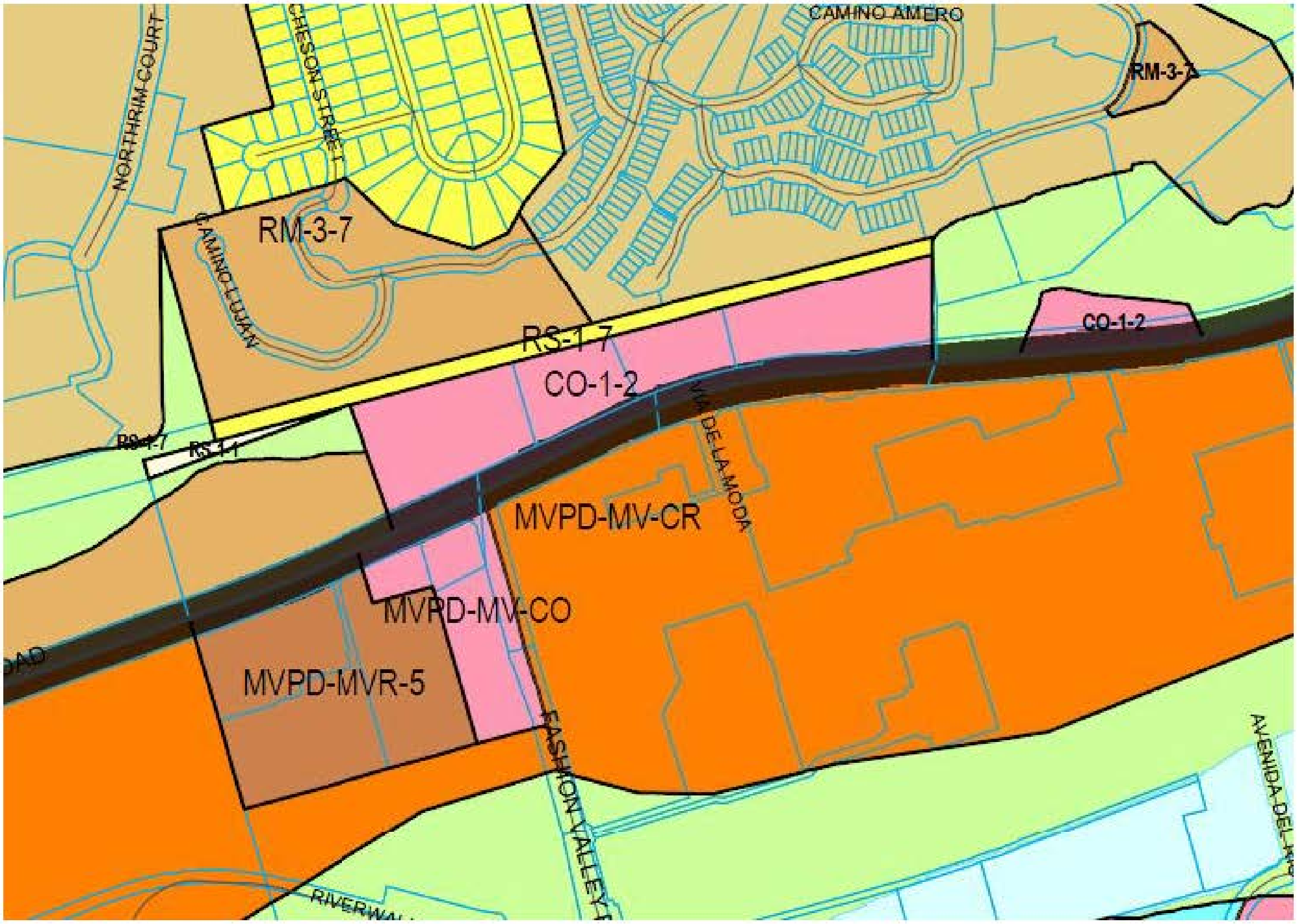
0 800 1,600 2,400

Feet

GRID TILE: 19

GRID SCALE: 800

DATE: 6/4/2012 6:57:52 PM


CAMINO AMERO
RM-3-7
NORTHRIM COURT
RM-3-7
CAMINO LUJAN
RS-1-7
CO-1-2
CO-1-2
RS-1-7
RS-1-1
VIA DE LA MODA
MVPD-MV-CR
MVPD-MV-CO
MVPD-MVR-5
FASHION VALLEY

# APPENDIX B

- Sewer Map
- Sewer Study Summary
- Odor Control Product Cut-Sheet

# Sewer Study Summary (Existing)

**By : Latitude 33 Planning and Engineering** **For: Friars Road Residential**

Date: 10/28/2015

Prepared by : JMB

Checked by : MJS

| | | | Population Served | | | | | | | Peak Wet Weather Flow (Design Flow) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Line** | **From** | **To** | **In-Line** | **Cumulative Total** | **Sewage Per Capita Per Day** | **Average Dry Weather Flow (gpd)** | **Dry Weather Peaking Factor** | **Dry Weather Flow (gpd)** | **Wet Weather Peaking Factor** | **gpd** | **mgd** | **cfs** | **Line Diameter (D) (in)** | **Design Slope (%)** | **dn (in)** | **dn/D** | **Velocity (ft/s)** |
| **Segment 1** | | | | | | | | | | | | | | | | | |
| 1 | ETH | CO#3 | 590 | 590 | 80 | 47,200 | 2.67 | 126,199 | 1.00 | 126,199 | 0.126 | 0.195 | 18 | 2.0 | 1.44 | 0.08 | 2.95 |
| 2 | CO#3 | CO#4 | 1220 | 1220 | 80 | 97,600 | 2.43 | 236,713 | 1.00 | 236,713 | 0.237 | 0.366 | 18 | 0.4 | 2.7 | 0.15 | 2.20 |
| 3 | CO#4 | Out | 1425 | 1425 | 80 | 114,000 | 2.38 | 270,785 | 1.00 | 270,785 | 0.271 | 0.419 | 18 | 2.0 | 1.98 | 0.11 | 3.96 |
| **Segment 2** | | | | | | | | | | | | | | | | | |
| 4 | EOF#3 | CO#1 | 210 | 210 | 80 | 16,800 | 3.07 | 51,598 | 1.00 | 51,598 | 0.052 | 0.080 | 6 | 2.0 | 1.26 | 0.21 | 2.66 |
| **Segment 3** | | | | | | | | | | | | | | | | | |
| 5 | EOF#2 | CO#2 | 210 | 210 | 80 | 16,800 | 3.07 | 51,598 | 1.00 | 51,598 | 0.052 | 0.080 | 6 | 2.0 | 1.26 | 0.21 | 2.66 |
| **Segment 4** | | | | | | | | | | | | | | | | | |
| 6 | EOF#1 | CO#2 | 210 | 210 | 80 | 16,800 | 3.07 | 51,598 | 1.00 | 51,598 | 0.052 | 0.080 | 6 | 2.0 | 1.26 | 0.21 | 2.66 |
| **Segment 5** | | | | | | | | | | | | | | | | | |
| 7 | CO#1 | CO#2 | 210 | 210 | 80 | 16,800 | 3.07 | 51,598 | 1.00 | 51,598 | 0.052 | 0.080 | 8 | 0.4 | 1.68 | 0.21 | 1.50 |
| 8 | CO#2 | CO#3 | 630 | 630 | 80 | 50,400 | 2.65 | 133,573 | 1.00 | 133,573 | 0.134 | 0.207 | 8 | 0.4 | 2.8 | 0.35 | 1.90 |
| **Segment 6** | | | | | | | | | | | | | | | | | |
| 9 | CO#5 | CO#4 | 205 | 205 | 80 | 16,400 | 3.08 | 50,532 | 1.00 | 50,532 | 0.051 | 0.078 | 8 | 2.0 | 1.12 | 0.14 | 2.63 |
| | | | | | | | | | **Total GPD** | **270,785** | **0.271** | **0.419** | | | | | |

| Legend: |
|---|
| ETH = Existing Townhomes |
| EOF = Existing Office |
| CO = Cleanout |

# Sewer Study Summary (Proposed)

**By : Latitude 33 Planning and Engineering      For: Friars Road Residential**

Date: 10/28/2015

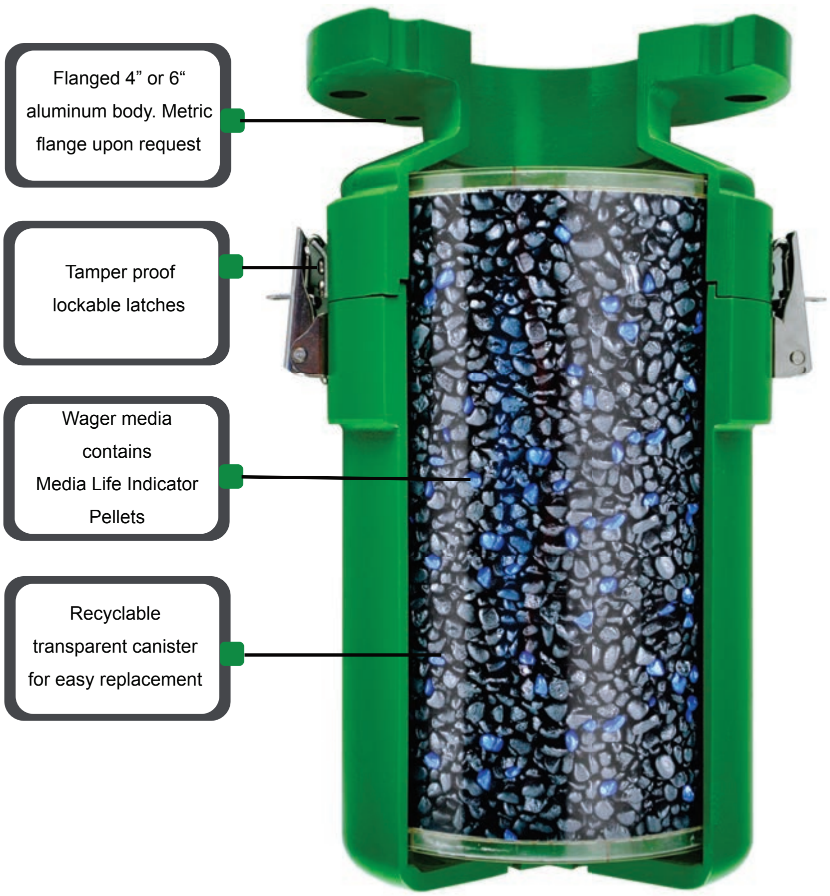
Prepared by : JMB
Checked by : MJS

| | | | **Population Served** | | | | | | | **Peak Wet Weather Flow (Design Flow)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Line** | **From** | **To** | **In-Line** | **Cumulative Total** | **Sewage Per Capita Per Day** | **Average Dry Weather Flow (gpd)** | **Dry Weather Peaking Factor** | **Dry Weather Flow (gpd)** | **Wet Weather Peaking Factor** | **gpd** | **mgd** | **cfs** | **Line Diameter (D) (in)** | **Design Slope (%)** | **dn (in)** | **dn/D** | **Velocity (ft/s)** |
| **Segment 1** | | | | | | | | | | | | | | | | | |
| 1 | ETH | CO#3 | 590 | 590 | 80 | 47,200 | 2.67 | 126,199 | 1.00 | 126,199 | 0.126 | 0.195 | 18 | 46.0 | 0.54 | 0.03 | 12.64 |
| 2 | CO#3 | CO#4 | 1720 | 1720 | 80 | 137,600 | 2.32 | 318,692 | 1.00 | 318,692 | 0.319 | 0.493 | 18 | 0.4 | 3.24 | 0.18 | 2.28 |
| 3 | CO#4 | Out | 1925 | 1925 | 80 | 154,000 | 2.28 | 351,327 | 1.00 | 351,327 | 0.351 | 0.544 | 18 | 0.4 | 3.42 | 0.19 | 2.33 |
| **Segment 2** | | | | | | | | | | | | | | | | | |
| | PCT | CO#1 | 255 | 255 | 80 | 20,400 | 2.99 | 61,043 | 1.00 | 61,043 | 0.061 | 0.094 | 6 | 2.0 | 1.38 | 0.23 | 2.77 |
| **Segment 3** | | | | | | | | | | | | | | | | | |
| | PAT | CO#2 | 875 | 875 | 80 | 70,000 | 2.54 | 177,518 | 1.00 | 177,518 | 0.178 | 0.275 | 6 | 2.0 | 2.4 | 0.40 | 3.74 |
| **Segment 4** | | | | | | | | | | | | | | | | | |
| 7 | CO#1 | CO#2 | 255 | 255 | 80 | 20,400 | 2.99 | 61,043 | 1.00 | 61,043 | 0.061 | 0.094 | 8 | 0.4 | 1.84 | 0.23 | 1.56 |
| 8 | CO#2 | CO#3 | 1130 | 1130 | 80 | 90,400 | 2.45 | 221,517 | 1.00 | 221,517 | 0.222 | 0.343 | 8 | 0.4 | 3.68 | 0.46 | 2.19 |
| **Segment 5** | | | | | | | | | | | | | | | | | |
| 9 | CO#5 | CO#4 | 205 | 205 | 80 | 16,400 | 3.08 | 50,532 | 1.00 | 50,532 | 0.051 | 0.078 | 8 | 2.0 | 1.12 | 0.14 | 2.63 |
| | | | | | | | | | **Total Flow** | **351,327** | **0.351** | **0.544** | | | | | |

| Legend: |
|---|
| ETH = Existing Townhomes |
| PAT = Proposed Apartment Tower |
| PCT = Proposed Condominium Tower |
| CO = Clean Out |

# 1800

## Sewer Odor Control Vent Check Valve




The 1800 Odor Control Vent Valve connects to a candy cane style pipe, and is designed to allow for ventilation in the open position. The valve body may be easily disassembled with two quick release lockable metal latches. The interior of the body contains a canister filled with odor media. This media is in pellet form allowing for better airflow thru the media bed, and is highly effective in removing hydrogen sulfide gas ($H_2S$) found in wastewater treatment applications. Pellets are non-toxic and landfill disposable. The media contains blue indicator pellets that turn white when the media is spent. A complementary lab analysis is also offered to determine the remaining life of the media. This is especially helpful in creating an effective preventative maintenance program for odor control.

The 1800 is cast in 356-T6 aluminum with an epoxy powder coated finish. It is available in both standard 4” or 6” with a option of a metric flanged end connection.

A vertically mounted 1800, with rainshield is also available to protect the media from water damage in any rain event.

WAGER
COMPANY


Robert H. Wager Company, Inc. 570 Montroyal Rd.  Rural Hall, NC  27045
1-800-562-7024      (336) 969-6909    www.wagerusa.com

# APPENDIX C

- Reference from King's Handbook of Hydraulics
- As-built Plans Used for Reference

*for the Solution of*
*Hydraulic Engineering Problems*
*Sixth Edition*

**Table 7-4.** For Determining the Area $a$ of the Cross Section of a Circular Conduit Flowing Part Full

Let $\frac{\text{depth of water}}{\text{diameter of channel}} = \frac{D}{d}$ and $C_a$ = the tabulated value. Then $a = C_a d^2$.

| $\frac{D}{d}$ | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|---|---|---|---|---|---|---|---|---|---|---|
| .0 | .0000 | .0013 | .0037 | .0069 | .0105 | .0147 | .0192 | .0242 | .0294 | .0350 |
| .1 | .0409 | .0470 | .0534 | .0600 | .0668 | .0739 | .0811 | .0885 | .0961 | .1039 |
| .2 | .1118 | .1199 | .1281 | .1365 | .1449 | .1535 | .1623 | .1711 | .1800 | .1890 |
| .3 | .1982 | .2074 | .2167 | .2260 | .2355 | .2450 | .2546 | .2642 | .2739 | .2836 |
| .4 | .2934 | .3032 | .3130 | .3229 | .3328 | .3428 | .3527 | .3627 | .3727 | .3827 |
| .5 | .393 | .403 | .413 | .423 | .433 | .443 | .453 | .462 | .472 | .482 |
| .6 | .492 | .502 | .512 | .521 | .531 | .540 | .550 | .559 | .569 | .578 |
| .7 | .587 | .596 | .605 | .614 | .623 | .632 | .640 | .649 | .667 | .666 |
| .8 | .674 | .681 | .689 | .697 | .704 | .712 | .719 | .725 | .732 | .738 |
| .9 | .745 | .750 | .756 | .761 | .766 | .771 | .775 | .779 | .782 | .784 |

**Table 7-14.** Values of $K'$ for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{8/3} s^{1/2}$$

$D$ = depth of water $d$ = diameter of channel

| $\frac{D}{d}$ | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|---|---|---|---|---|---|---|---|---|---|---|
| .0 | | .00007 | .00031 | .00074 | .00138 | .00222 | .00328 | .00455 | .00604 | .00775 |
| .1 | .00967 | .0118 | .0142 | .0167 | .0195 | .0225 | .0257 | .0291 | .0327 | .0360 |
| .2 | .0406 | .0448 | .0492 | .0537 | .0585 | .0634 | .0686 | .0738 | .0793 | .0849 |
| .3 | .0907 | .0966 | .1027 | .1089 | .1153 | .1218 | .1284 | .1352 | .1420 | .1490 |
| .4 | .1561 | .1633 | .1705 | .1779 | .1854 | .1929 | .2005 | .2082 | .2100 | .2238 |
| .5 | .232 | .239 | .247 | .255 | .263 | .271 | .279 | .287 | .295 | .303 |
| .6 | .311 | .319 | .327 | .335 | .343 | .350 | .358 | .366 | .373 | .380 |
| .7 | .388 | .395 | .402 | .409 | .416 | .422 | .429 | .435 | .441 | .447 |
| .8 | .453 | .458 | .463 | .468 | .473 | .477 | .481 | .485 | .488 | .491 |
| .9 | .494 | .496 | .497 | .498 | .498 | .498 | .496 | .494 | .489 | .483 |
| 1.0 | .463 | | | | | | | | | |

**TABLE 1-1**

**CITY OF SAN DIEGO**
**DENSITY CONVERSIONS**

| Zone | Maximum Density (DU/Net Ac) | Population/(DU) | Equivalent Population (Pop/Net Ac) |
|---|---|---|---|
| AR-1-1, RE-1-1 | 0.1 | 3.5 | 0.4 |
| RE-1-2 | 0.2 | 3.5 | 0.7 |
| AR-1-2, RE-1-3 | 1 | 3.5 | 3.5 |
| RS-1-1, RS-1-8 | 1 | 3.5 | 3.5 |
| RS-1-2, RS-1-9 | 2 | 3.5 | 7.0 |
| RS-1-3, RS-1-10 | 3 | 3.5 | 10.5 |
| RS-1-4, RS-1-11 | 4 | 3.5 | 14.0 |
| RS-1-5, RS-1-12 | 5 | 3.5 | 17.5 |
| RS-1-6, RS-1-13 | 7 | 3.5 | 24.5 |
| RS-1-7, RS-1-14 | 9 | 3.5 | 31.5 |
| RX-1-1 | 11 | 3.4 | 37.4 |
| RT-1-1 | 12 | 3.3 | 39.6 |
| RX-1-2, RT-1-2, RU-1-1 | 14 | 3.2 | 44.8 |
| RT-1-3, RM-1-2 | 17 | 3.1 | 52.7 |
| RT-1-4 | 20 | 3.0 | 60.0 |
| RM-1-3 | 22 | 3.0 | 66.0 |
| RM-2-4 | 25 | 3.0 | 75.0 |
| RM-2-5 | 29 | 3.0 | 87.0 |
| RM-2-6 | 35 | 2.8 | 98.0 |
| RM-3-7, RM-5-12 | 43 | 2.6 | 111.8 |
| RM-3-8 | 54 | 2.4 | 129.6 |

**TABLE 1-1**

**CITY OF SAN DIEGO**
**DENSITY CONVERSIONS**
**(Continued)**

| Zone | Maximum Density (DU/Net Ac) | Population/(DU) | Equivalent Population (Pop/Net Ac) |
|---|---|---|---|
| RM-3-9 | 73 | 2.2 | 160.6 |
| RM-4-10 | 109 | 1.8 | 196.2 |
| RM-4-11 | 218 | 1.5 | 327.0 |
| Schools/Public | 8.9 | 3.5 | 31.2 |
| Offices | 10.9 | 3.5 | 38.2* |
| Commercial/Hotels | 12.5 | 3.5 | 43.7* |
| Industrial | 17.9 | 3.5 | 62.5* |
| Hospital | 42.9 | 3.5 | 150.0* |

**Definitions:**

DU = Dwelling Units
Ac = Acreage
Pop = Population

Net Acreage is the developable lot areas excluding areas that are dedicated as public streets in acres. Gross Area is the entire area in acres of the drainage basin, including lots, streets, etc.

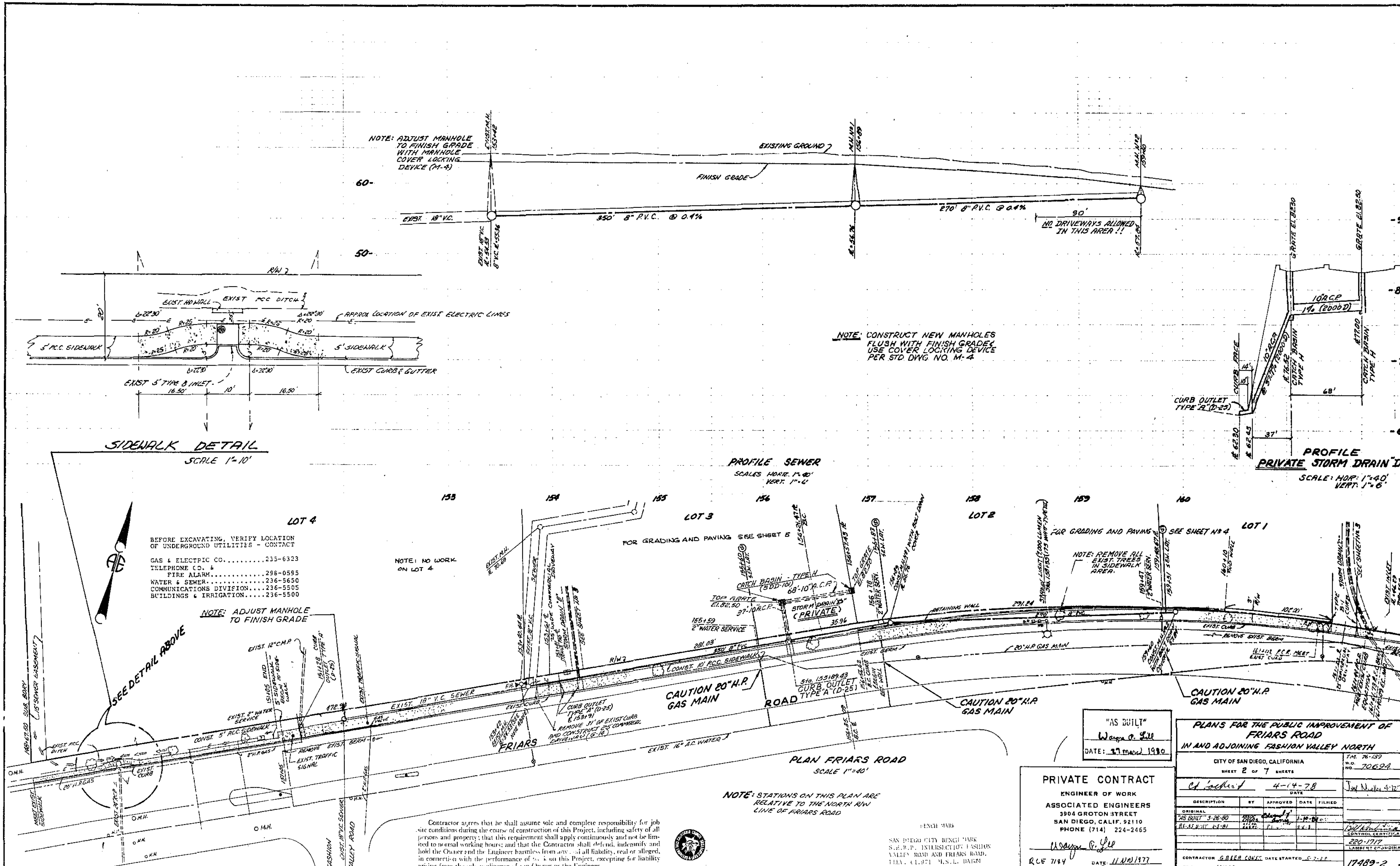
For undeveloped areas, assume Net Acreage = 0.8 x Gross Area in Acres

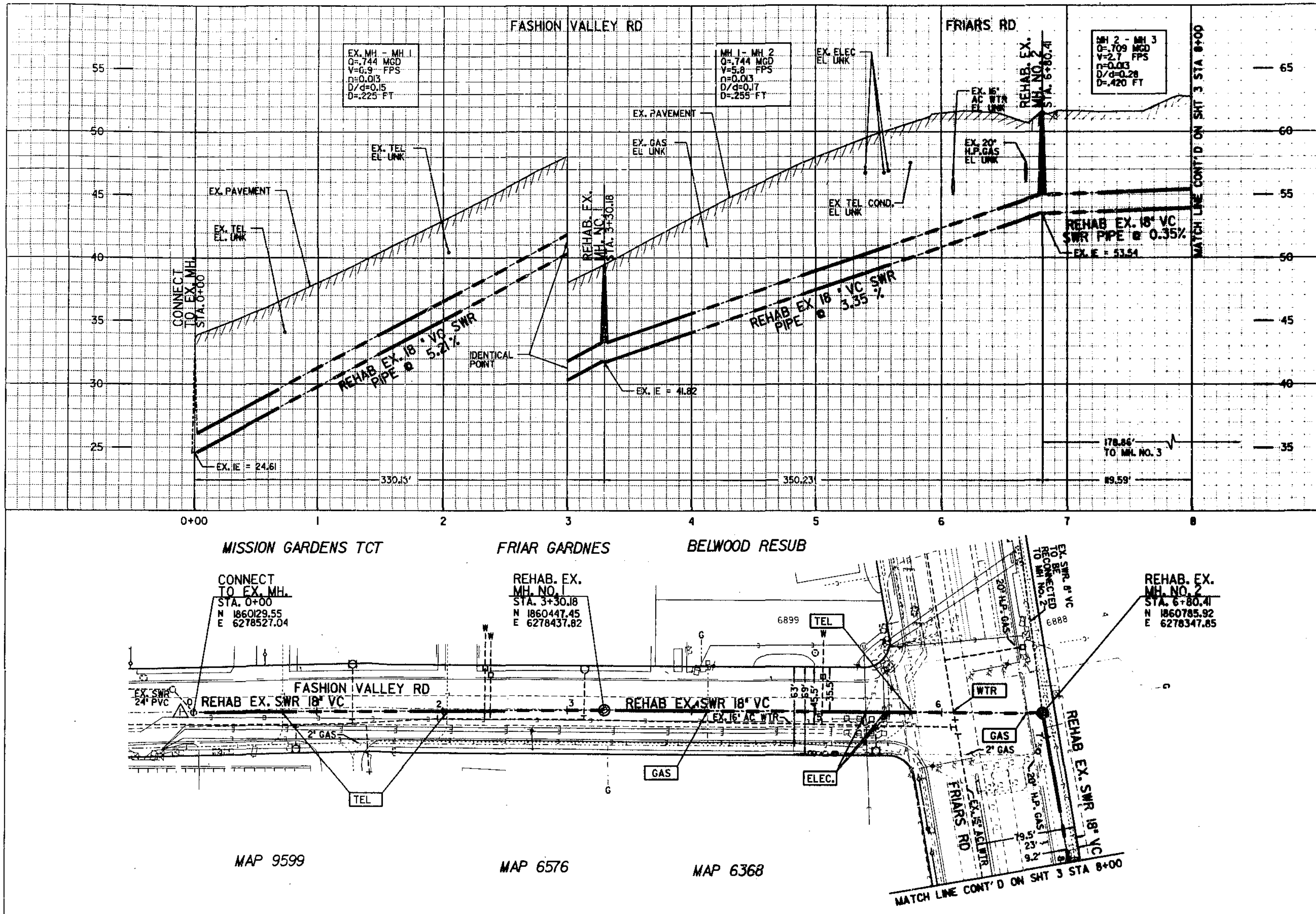
For developed areas, calculate actual net acreage.

Tabulated figures are for general case. The tabulated figures shall not be used if more accurate figures are available.

Population is based on actual equivalent dwelling units (EDU) or the maximum estimate obtained from zoning.

Figures with asterisk (*) represent equivalent population per floor of the building.


NOTE: ADJUST MANHOLE TO FINISH GRADE WITH MANHOLE COVER LOCKING DEVICE (M-4)
EXISTING GROUND
FINISH GRADE
EXIST. 18" V.C.
350' 8" P.V.C. @ 0.4%
270' 8" P.V.C. @ 0.4%
90'
NO DRIVEWAYS ALLOWED IN THIS AREA !!
60-
50-
NOTE: CONSTRUCT NEW MANHOLES FLUSH WITH FINISH GRADES. USE COVER LOCKING DEVICE PER STD DWG NO. M-4
EXIST. HDWALL
EXIST PCC DITCH
APPROX LOCATION OF EXIST ELECTRIC LINES
5' P.C.C. SIDEWALK
5' SIDEWALK
EXIST CURB & GUTTER
EXIST 5' TYPE B INLET
16.50'
10'
16.50'
SIDEWALK DETAIL
SCALE 1"=10'
PROFILE SEWER
SCALES HORZ. 1"=40' VERT. 1"=4'
10"RCP
1% (2000 D)
CURB FACE
CURB OUTLET TYPE "A" (D-25)
CATCH BASIN TYPE H
68'
37'
PROFILE
PRIVATE STORM DRAIN "D"
SCALE: HOR: 1"=40' VERT: 1"=6'
-90
-80
-70
-60
153
154
155
156
157
158
159
160
LOT 4
LOT 3
LOT 2
LOT 1
BEFORE EXCAVATING, VERIFY LOCATION OF UNDERGROUND UTILITIES - CONTACT
GAS & ELECTRIC CO..........235-6323
TELEPHONE CO. & FIRE ALARM............296-0595
WATER & SEWER..............236-5650
COMMUNICATIONS DIVISION....236-5505
BUILDINGS & IRRIGATION.....236-5500
NOTE: NO WORK ON LOT 4
FOR GRADING AND PAVING SEE SHEET 5
FOR GRADING AND PAVING SEE SHEET No 4
NOTE: REMOVE ALL EXIST. TREES IN SIDEWALK AREA.
CATCH BASIN - TYPE H (SDD-101)
68'-10" R.C.P.
TOP GRATE El. 82.50
37'-10" R.C.P.
STORM DRAIN "D" (PRIVATE)
155+59 2" WATER SERVICE
281.03'
350' 8" PVC
271.24
RETAINING WALL
CONST. 10' P.C.C. SIDEWALK
Sta. 155+89.43 CURB OUTLET TYPE "A" (D-25)
20" H.P. GAS MAIN
NOTE: ADJUST MANHOLE TO FINISH GRADE
SEE DETAIL ABOVE
EXIST. 12" C.M.P.
EXIST. 8" WATER SERVICE
CONST. 5' P.C.C. SIDEWALK
REMOVE EXIST. BERM
EXIST. TRAFFIC SIGNAL
EXIST. 18" V.C. SEWER
CURB OUTLET TYPE "A" (D-25)
REMOVE 31' OF EXIST CURB AND CONSTRUCT 25' COMMERCIAL DRIVEWAY (G-14)
CAUTION 20" H.P. GAS MAIN
ROAD
FRIARS
EXIST. 16" A.C. WATER
CAUTION 20" H.P. GAS MAIN
CAUTION 20" H.P. GAS MAIN
EXIST. CURB
REMOVE EXIST. BERM
PLAN FRIARS ROAD
SCALE 1"=40'
NOTE: STATIONS ON THIS PLAN ARE RELATIVE TO THE NORTH R/W LINE OF FRIARS ROAD
FASHION VALLEY ROAD
Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, excepting for liability arising from the sole negligence of the Owner or the Engineer.
"AS BUILT"
Wayne P. Lill
DATE: 27 March 1980
PRIVATE CONTRACT
ENGINEER OF WORK
ASSOCIATED ENGINEERS
3904 GROTON STREET
SAN DIEGO, CALIF. 92110
PHONE (714) 224-2465
Wayne P. Lill
RCE 7184
DATE: 11 NOV 1977
PLANS FOR THE PUBLIC IMPROVEMENT OF
FRIARS ROAD
IN AND ADJOINING FASHION VALLEY NORTH
CITY OF SAN DIEGO, CALIFORNIA
SHEET 2 OF 7 SHEETS
T.M. 76-139
W.O. NO. 70694
4-14-78
DATE
DESCRIPTION
BY
APPROVED
DATE
FILMED
ORIGINAL
"AS BUILT" 3-26-80
CONTROL CERTIFICATION
220-1717
LAMBERT COORDINATES
CONTRACTOR GREER CONST.
DATE STARTED
INSPECTOR JONES
DATE COMPLETED
17489-2 -D
REV. 14 JAN 91




CONTRACTOR NOTES:

1. CONTRACTOR TO CLEAN AND TELEVISE EXISTING SEWER MAIN PRIOR TO ANY REHABILITATION WORK TO VERIFY THE NEED FOR POINT REPAIR.
2. CONTRACTOR TO PERFORM POINT REPAIRS INTERNALLY IF POINT REPAIR BY EXCAVATION IS NOT FESIBLE.
3. EXISTING UTILITY CROSSINGS ARE NOT REPRESENTATIVE OF ACTUAL LENGTH OF CONFLICT AREA (SEE PLAN VIEW).

FASHION VALLEY RD. & FRAIRS RD.

REFERENCE:

BENCH MARK: SWBP , URLIC STREET & DAVID STREET ELEV. = 314.751 MSL NGVD29 FEET.

FIELD NOTES : HACKNEY 01/03/00, 218-1716 WO#174191

WATER: 13171-18-D , 23944-2-D
SEWER: 15026-21-D
STORM DRAIN: 220-1716
GAS: 22-507 , S/99-1
ELECTRIC: 218-1716 , 220-1716
CABLE TV: 218-1716
TELEPHONE: 1058 , 1060 , 1062
IMPROVEMENTS:
WATER FIELD BOOK: F16S, F17S, G16S, G17S
SEWER FIELD BOOK: F16S , F17S , G16S , G17S
100 FT SCALE : 220-1716
THOMAS BROS.: 1268-J3

EAST LINDA VISTA TRUNK SEWER PHASE II

FASHION VALLEY RD

STA 0+00 TO STA 8+00

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 2 OF 23 SHEETS

WATER W.O. 186731
SEWER W.O. 174191

FOR CITY ENGINEER — DATE 10-31-01

ASSOCIATE ENGINEER
PROJECT ENG.

| DESCRIPTION | BY | APPROVED | DATE | FILMED |
|---|---|---|---|---|
| ORIGINAL | SS/SC | | | SEP 9 '02 |
| AS-BUILT PER CITY INSPECTOR | UCH/JW/RD | | 1/10/05 | |

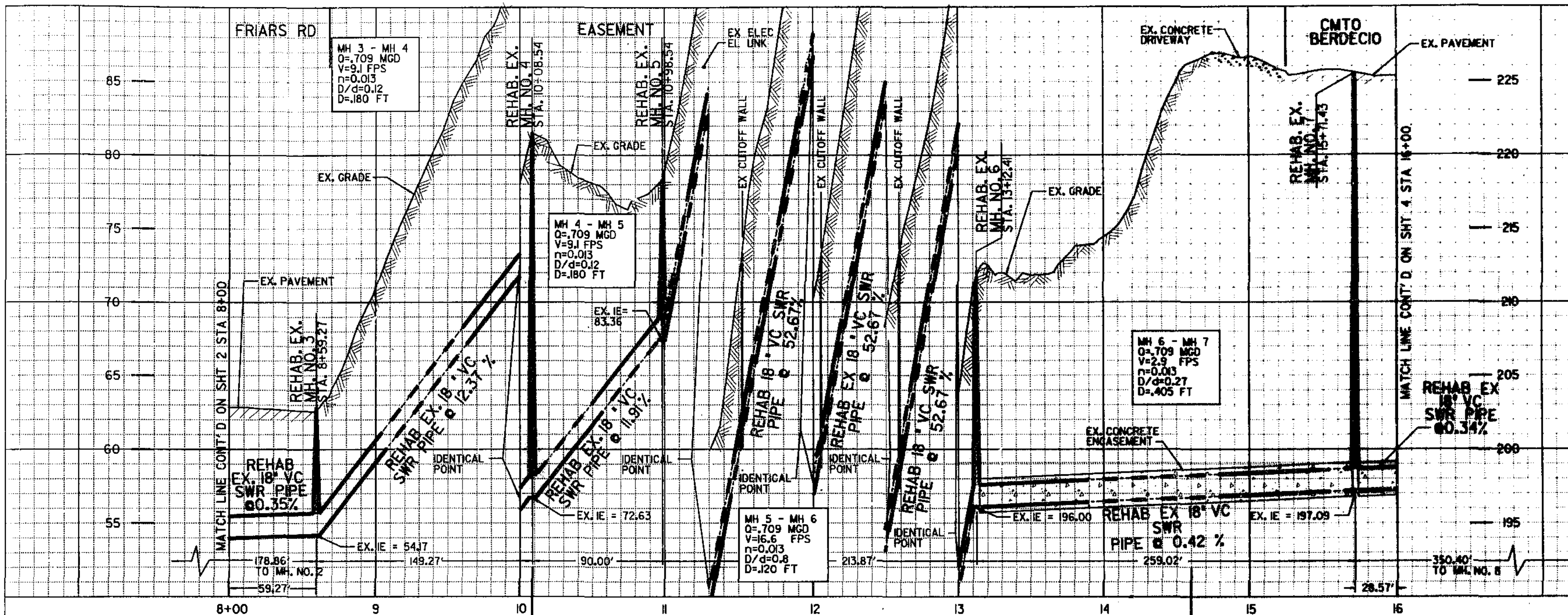
CONTROL CERTIFICATION
220-1716
LAMBERT COORDINATES

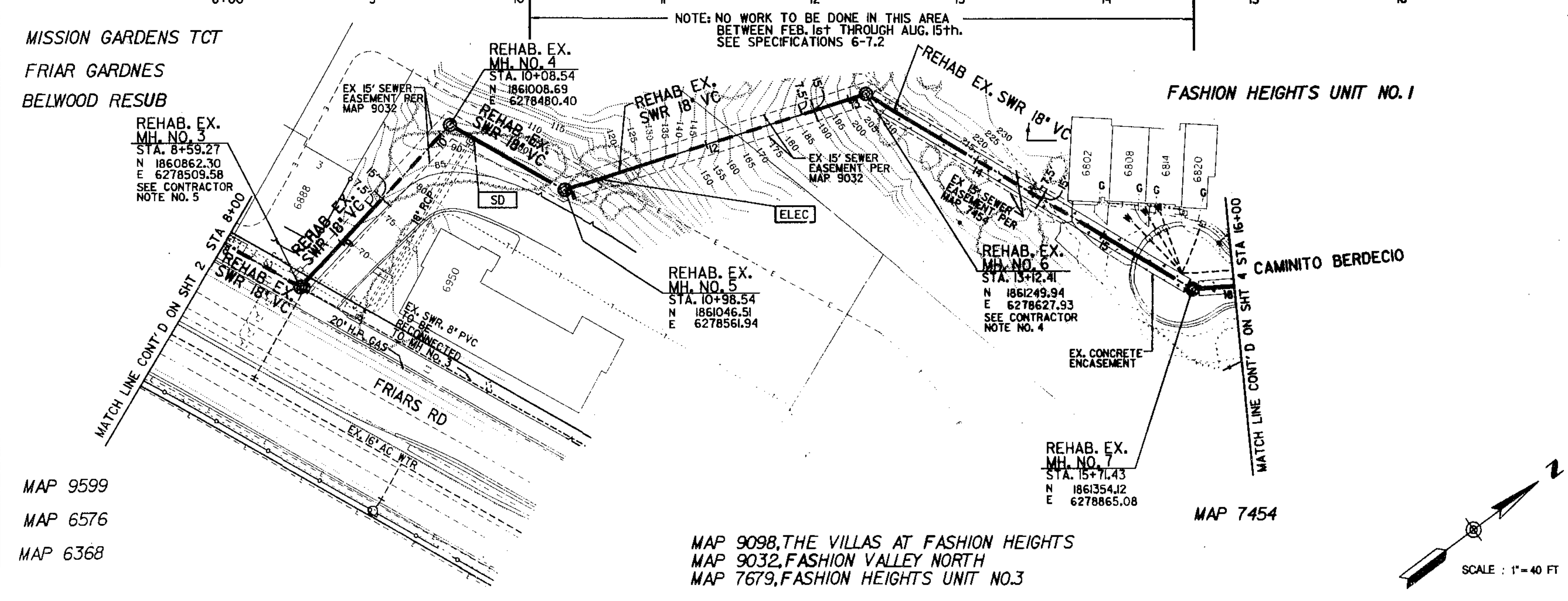
CONTRACTOR — DATE STARTED
INSPECTOR DANIEL L. TITTLE DATE COMPLETED

29160-02-D

AS-BUILT

FILMED FROM THE ORIGINAL. BEST QUALITY OBTAINABLE




CONTRACTOR NOTES:

1. CONTRACTOR TO CLEAN AND TELEVISE EXISTING SEWER MAIN PRIOR TO ANY REHABILITATION WORK TO VERIFY THE NEED FOR POINT REPAIR.

2. IN UNDEVELOPED AREAS, CONTRACTOR TO HAND CARRY ALL EQUIPMENT. ACCESS TO CONSTRUCTION AREAS SHALL BE VIA THREE FOOT WIDE FOOTPATH FROM THE NEAREST DEVELOPED AREA. VEGETATION THAT OCCURS IN THE THREE FOOT WIDE FOOTPATH SHALL BE CLEARED BY CONTRACTOR, LEAVING PLANT ROOT BALLS INTACT. SEE REVEGETATION PLAN, SHEETS 20 THRU 23.

3. CONTRACTOR TO REMOVE AND REPLACE IN KIND ANY EXISTING FENCE AS NECESSARY TO INSTALL PROPOSED SEWER AT NO COST TO THE CITY. CONTRACTOR TO COORDINATE WITH ANY PROPERTY OWNERS AFFECTED.

4. CONTRACTOR TO LOCATE AND UNCOVER MANHOLE NO. 6 PRIOR TO THE START OF CONSTRUCTION.

5. CONTRACTOR TO PERFORM POINT REPAIRS INTERNALLY IF POINT REPAIR BY EXCAVATION IS NOT FESIBLE.

6. CONTRACTOR TO NOTIFY FASHION HILLS OWNERS ASSOCIATION PRIOR TO THE START OF CONSTRUCTION ON CAMINITO BERDECIO.

7. EXISTING UTILITY CROSSINGS ARE NOT REPRESENTATIVE OF ACTUAL LENGTH OF CONFLICT AREA (SEE PLAN VIEW).

FRIARS RD. & SEWER EASMENT

REFERENCE:

BENCH MARK: SWBP , URLIC STREET & DAVID STREET
ELEV. = 314.751 (MSL NVGD 29 FT)

FIELD NOTES : HACKNEY 01/03/00, 218-1716 WO#174191

WATER:
SEWER: 15026-21-D , 15026-22-D
STORM DRAIN: 220-1716
GAS: 31-200 , 31-201
ELECTRIC: 220-1716
CABLE TV: 218-1716
TELEPHONE: 1058 , 1078 , 1062
IMPROVEMENTS:
SEWER & WATER FIELD BOOK : F16S, F17S, G16S, G17S
100 FT SCALE : 220-1716
THOMAS BROS.: 1268-J3

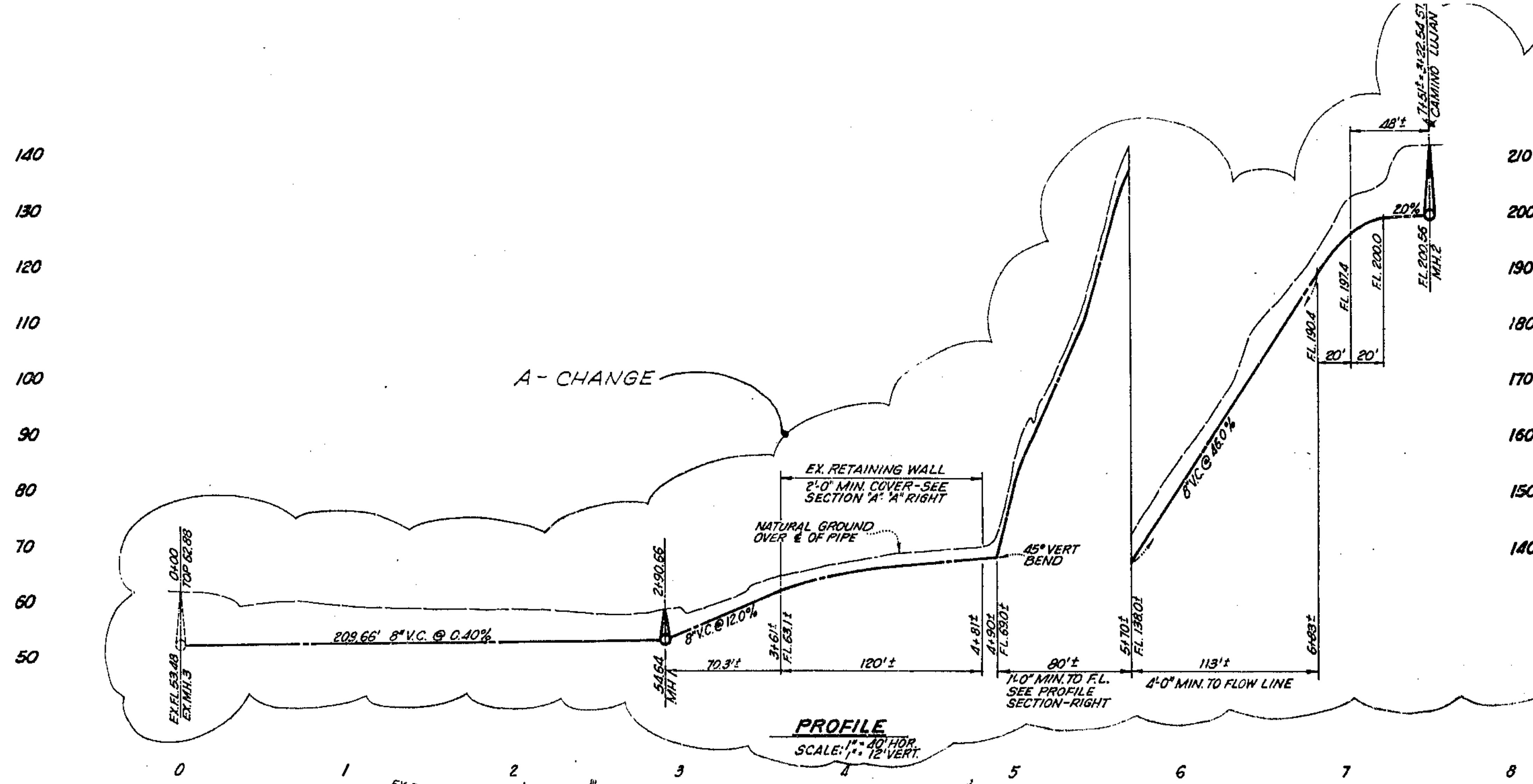
EAST LINDA VISTA TRUNK SEWER PHASE II

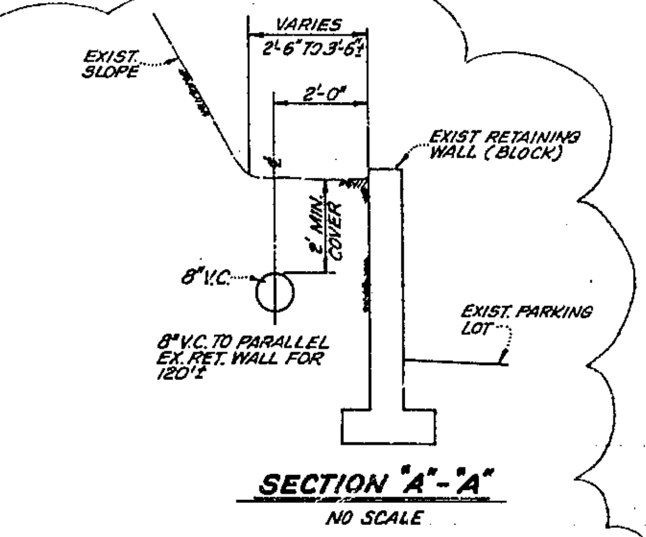
FRIARS RD. & SEWER EASEMENT

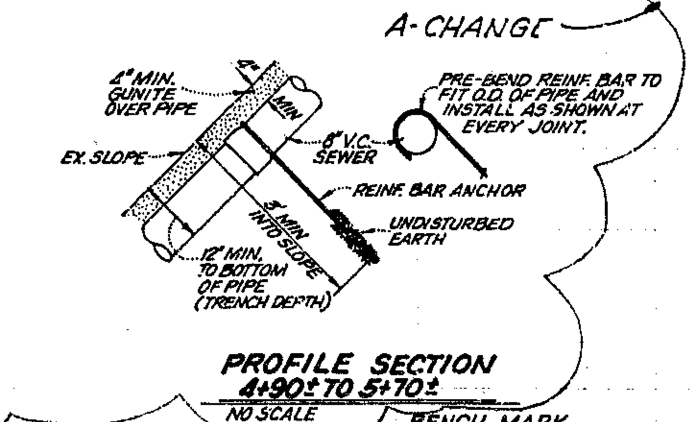
STA 8+00 TO STA 16+00

| | | | | | |
|---|---|---|---|---|---|
| CITY OF SAN DIEGO, CALIFORNIA<br>ENGINEERING AND CAPITAL PROJECTS DEPARTMENT<br>SHEET 3 OF 23 SHEETS | | | | | WATER W.O. 186731<br>SEWER W.O. 174191 |
| APPROVED FOR CITY ENGINEER | | 10-31-01 DATE | | | SUBMITTED BY ASSOCIATE ENGINEER |
| DESCRIPTION | BY | APPROVED | DATE | FILMED | CHECKED BY PROJECT ENGINEER |
| ORIGINAL | SS/SC | | | SEP 9 '02 | |
| AS-BUILT PER CITY INSPECTOR | LCH/JW/RO | | 170CT05 | | CONTROL CERTIFICATION 220-1716 LAMBERT COORDINATES |
| CONTRACTOR | DATE STARTED 12-19-02 | | | | 29160-03-D |
| INSPECTOR DANIEL L. TITTLE | DATE COMPLETED 05-25-04 | | | | |

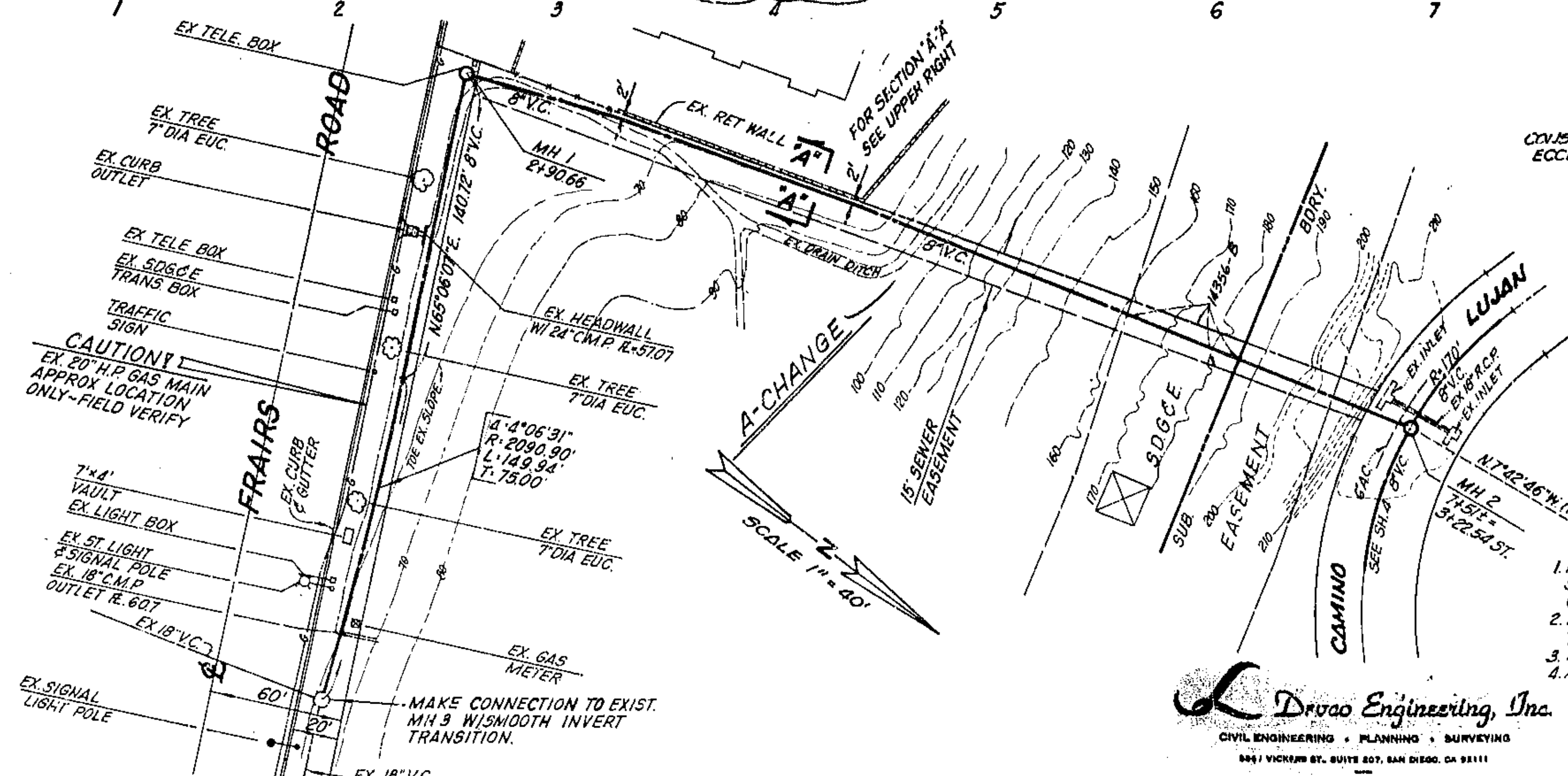
AS-BUILT

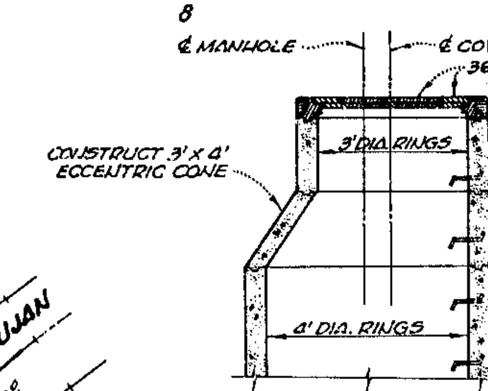



**BENCH MARK**
CITY OF SAN DIEGO BENCH MARK N.E. CORNER ULRIC ST. AND LINBROOK DR. BRASS PLUG
ELEV.: 159.047 DATUM: M.S.L.




NOTE:
CONSTRUCT ALL 4' DIAMETER MANHOLES ON THIS PROJECT AS PER STANDARD DRAWING S-1, EXCEPT MODIFY UPPER PORTION AS SHOWN.

**MODIFIED CONCRETE MANHOLE**
NO SCALE.

**A-CHANGE NOTE**
1. REVISE HORIZ. ALIGNMENT OF 8" V.C. SEWER & REVISE PROFILE TO CONFORM
2. PROFILE SCALE FROM 1" = 6' VERT. TO 1" = 12' VERT.
3. ADD SECTION "A"-"A" AT RET. WALL
4. ADD PROFILE SECTION 4+90± - 5+70±

Dryco Engineering, Inc.
CIVIL ENGINEERING • PLANNING • SURVEYING

ENGINEER OF WORK
6/21/78
LEROY C. BODAS R.C.E. 22312

PRIVATE CONTRACT

PLANS FOR THE IMPROVEMENT OF
OFFSITE SEWER

CITY OF SAN DIEGO, CALIFORNIA
SHEET 14 OF 16 SHEETS

T.M. 70-168-3
W.O. NO. 70307

DATE 8-25-78

| DESCRIPTION | BY | APPROVED | DATE | FILMED |
|---|---|---|---|---|
| ORIGINAL | | | | |
| "A" CHANGE- SEE NOTE | DEVCO | | | |
| AS BUILT | DEVCO | SMITH | 8-15-85 | |

CONTROL CERTIFICATION
220-1717
LAMBERT COORDINATES

CONTRACTOR ROYAL DATE STARTED 7-14-78
INSPECTOR SMITH DATE COMPLETED 8-28-85

15418-14-D

NEW SHEET AS BUILT

# PRELIMINARY WATER STUDY

## FRIARS ROAD RESIDENTIAL

October 28, 2015


PREPARED BY: LATITUDE 33 PLANNING & ENGINEERING
PREPARED FOR: LANDCAP FRIARS ROAD, LLC
JOB NUMBER: 1351.00

# PRELIMINARY WATER STUDY

**For**

Friars Road Residential
City of San Diego

**Prepared for:** LandCap Friars Road, LLC
27132 B Paseo Espada, Suite 1206
San Juan Capistrano, CA 92675

**Project Address:**
6950, 7020, and 7050 Friars Road
San Diego, CA 92108

**Prepared by:** Latitude 33 Planning and Engineering
9968 Hibert Street 2nd Floor
San Diego, CA 92131

**Preparation Date**
October 28, 2015

Matthew J. Semic R.C.E. 71075

Prepared By: JMB
Reviewed By: MJS

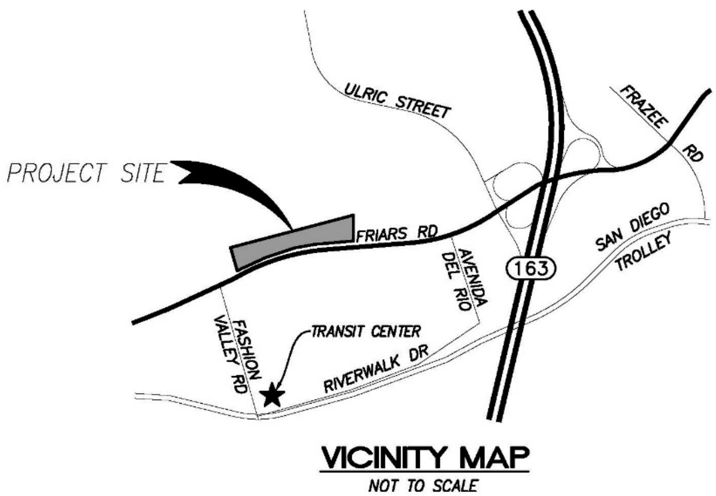
# TABLE OF CONTENTS

## A. INTRODUCTION

The purpose of this report is to evaluate the hydraulics (i.e. flows and pressures) of the proposed Friars Road Residential project, including the proposed apartment and condominium buildings. The intent is to provide a level of detail needed to preliminarily assess demands and overall function of the proposed system. This information can then be incorporated into the City of San Diego's Master Plan to determine adequacy of surrounding infrastructure.

The proposed project is located in Mission Valley, north of Interstate 8 and the San Diego River, west of State Route 163, south of Linda Vista Road, and east of the Riverwalk Golf Course. More specifically the land is described as Lots 1, 2 and 3 of Fashion Valley North, in the city of San Diego, State of California, according to Map thereof No. 9032, filed in the office of the County Recorder of San Diego County, November 17, 1978. APN: 437-250-22, 23 & 24.

**Figure 1: Vicinity Map**




The developer seeks to:

- Demolish the existing 3 office buildings on site.
- Construct a new 8-story apartment building with 249 units over a 2 level parking garage.
- Construct a new 9-story condo building with 70 units over a 2 level parking garage.

This project does not require a Community Plan Amendment or rezone and will be consistent with the Mission Valley Community Plan. Refer to Figure 1 in Appendix A.

## B. EXISTING CONDITIONS

Mission Valley is served by the Alvarado Filtration Plant. There is an existing 16-inch asbestos cement public main within Friars Road. The main serves a variety of commercial and residential buildings along Friars Road, including the three office buildings on this site via three 2-inch laterals. Refer to the Exhibit 2 in Appendix A for the Friars Road Residential Splash Map provided by the City of San Diego. With assistance from staff at the City of San Diego it was determined that the existing 16-inch water line has a hydraulic grade line of 372 feet, and a static pressure of 136 psi. Refer to Figure 2 in Appendix A for the Water Main Average Pressure provided by the City of San Diego.

## C. PROPOSED CONDITIONS

The City of San Diego's Water and Sewer Design Guide was used for system layout and performance standards. Per the guide, every water main must be capable of supplying a minimum static pressure of at least 65 pounds-per-square inch (psi). Operating pressures under the peak hour demand and the maximum day peak hour demand plus fire flow shall not fall more than 25 psi below the respective static pressure, and residual water main pressure must not fall below 40 psi. During fire conditions, an operating pressure of at least 20 psi must be maintained in the main nearest the fire, while a drop in pressure of no more than 25 psi below static is desirable in the remainder of the water system.

There are two proposed water services connected to the existing City of San Diego 10-inch public water main in Friars Road. Refer to Exhibit 1 in Appendix A. This study assumes that the apartment and condominium buildings will be equipped with a fire sprinkler system and will utilize construction materials/techniques that would require a maximum fire flow of 3,000 gallons per minute (gpm) for the each proposed building. Water demands were calculated using the allowable land use (Table 2-2) and the Peaking Factor Zone map (Figure 2-3). Refer to Appendix C Chapter 2 Water Demands and Service Criteria, as well as Appendix B for demand calculations.

Onsite water services used in this study will be polyvinyl choloride (PVC) and vary from 2-inches to 4-inches in diameter. Services are sized based on minimum pressure and flow requirements during the peak hour demand plus the fire flow demand (note these service sizes are subject to change upon further plumbing design during the Building Permit process).

## D. CALCULATIONS

To establish the amount of domestic water required for the build-out of the project, it is necessary to analyze the water system demand based upon the proposed land use. The project land use, residential and commercial, is translated into an Average Annual Water Demand. Average annual water demands are determined based on the unit water demand criteria found in Table 2-2 of *City of San Diego Water Department, Capital Improvement Program Guidelines* *and Standards, November 2002.* Refer to Appendix C Chapter 2 Water Demands and Service Criteria.

**Table 1: Friars Road Residential Existing Land Use**

| LAND USE | ZONE | EQUIVALENT POPULATION | NET AREA[1,2] | NO. OF FLOORS | POPULATION |
|---|---|---|---|---|---|
| | | pop/acre | ac | | persons |
| OFFICE TOWERS (3) | CO-1-2 | 38.2 | 5.4 | 3 | 630 |

**Table 2: Friars Road Residential Proposed Water System Demand**

| LAND USE | Unit Water Demand (OFFICE) | AVERAGE ANNUAL WATER DEMAND | AVERAGE ANNUAL WATER DEMAND |
|---|---|---|---|
| | gal/net ac-day | gal/day | mgal/day |
| OFFICE TOWERS (3) | 5,730 | 30,942 | 0.031 |

| | | |
|---|---|---|
| **TOTALS** | **30,942** | **0.031** |

**Table 3: Friars Road Residential Proposed Land Use**

| LAND USE | ZONE | NO. OF DWELLING UNITS | NET AREA[1,2] | DWELLING UNIT DENSITY | UNIT DENSITY | POPULATION DENSITY | POPULATION |
|---|---|---|---|---|---|---|---|
| | | DU | ac | DU/ac | pers/DU | pers/net ac | persons |
| RESIDENTIAL (APARTMENT) | CO-1-2 | 249 | 2.4 | 103.75 | 3.5 | 364.6 | 875 |
| RESIDENTIAL (CONDO) | CO-1-2 | 70 | 3.0 | 23.33 | 3.5 | 85.0 | 255 |
| | | | | | | **TOTALS** | **1,130** |

**Table 4: Friars Road Residential Proposed Water System Demand**

| LAND USE | Unit Water Demand (RESIDENTIAL) | Unit Water Demand (OTHER) | AVERAGE ANNUAL WATER DEMAND | AVERAGE ANNUAL WATER DEMAND |
|---|---|---|---|---|
| | gal/pers-day | gal/net ac-day | gal/day | mgal/day |
| Residential (Apartment) | 150 | - | 131,250 | 0.131 |
| Residential (Condominium) | 150 | - | 38,250 | 0.038 |
| | | **TOTALS** | **169,500** | **0.169** |

Based on calculations, the average annual water demand for the project proposes a demand for **169,500 gallons per day** (gpd). The average annual water demands are used to determine the peak hour and maximum day water demands. The peaking factors correspond to the zones identified in Figure 2-3 of *City of San Diego Water Department, Capital Improvement Program Guidelines and Standards, November 2002.* The project lies within the costal/downtown peaking factor zone.

**Table 5: Demand Ratios per *City of San Diego***

| | |
|---|---|
| **PEAK HOUR DEMAND RATIO** | 5.6 |
| **MAX. DAY DEMAND RATIO** | 2.3 |

**Table 6: Friars Road Residential Existing Peak and Maximum Day Water Demands**

| **LAND USE** | **PEAK HOUR DEMAND RATIO** | **PEAK HOUR DEMAND** | **PEAK HOUR DEMAND** | **MAX. DAY DEMAND RATIO** | **MAX. DAY DEMAND** | **MAX. DAY DEMAND** |
|---|---|---|---|---|---|---|
| | | gal/day | gal/min | | gal/day | gal/min |
| OFFICE TOWERS (3) | 5.6 | 173,275 | 120.33 | 2.3 | 71,167 | 49.42 |
| | **TOTALS** | **173,275** | **120.33** | **TOTALS** | **71,167** | **49.42** |

**Table 7: Friars Road Residential Proposed Peak and Maximum Day Water Demands**

| LAND USE | PEAK HOUR DEMAND RATIO | PEAK HOUR DEMAND | PEAK HOUR DEMAND | MAX. DAY DEMAND RATIO | MAX. DAY DEMAND | MAX. DAY DEMAND |
|---|---|---|---|---|---|---|
| | | gal/day | gal/min | | gal/day | gal/min |
| RESIDENTIAL (APARTMENT) | 5.6 | 735,00 | 510.42 | 2.3 | 301,875 | 209.64 |
| RESIDENTIAL (CONDO) | | 214,200 | 148.75 | | 87,975 | 61.09 |
| | **TOTALS** | **949,200** | **659.17** | **TOTALS** | **389,850** | **270.73** |

The peak hour demand and maximum day demand for the project are **660 gallons per minute (gpm)** and **271 gpm**, respectively.

For design purposes, fire demand estimates provided by *City of San Diego Water Department, Capital Improvement Program Guidelines and Standards, November 2002* were used and are as follows:

**Table 8: Fire Demands**

| | |
|---|---|
| **Condominiums and Apartments** | 3,000 gpm |

Refer to Appendix B for estimated Water and Fire Demand calculations.

## E. ANALYSIS

Water systems must be designed to provide the minimum residual pressures given:

- Maximum day demands plus fire demand conditions, **or**
- Peak hour demand conditions

In analyzing the supply, the minimum hydraulic grade line elevation available from the water source is used, in this case 372 feet. Every water main must be capable of supplying a minimum static pressure of at least 65 pounds-per-square inch (psi) (with no demand on the system).

Operating pressures under the maximum day demand condition or under the peak hour demand condition must fall no more than 25 psi below the respective static pressure (with no demand on the system)., and residual water main pressure must be at least 40 psi. During fire conditions, an operating pressure of at least 20 psi must be maintained in the main nearest the fire, while a drop in pressure of no more than 25 psi below static is desirable in the remainder of the water system.

Design pressure requirements for the entire system must be capable of supporting the fire flows **plus** the maximum day demand.

**Table 9: Existing demand for Friars Road Residential**

| LAND USE | FIRE DEMAND | MAX. DAY DEMAND | MIN. REQUIRED DESIGN |
|---|---|---|---|
| | gal/min | gal/min | gal/min |
| OFFICE TOWERS (3) | 3,000 | 49.42 | 3,049 |
| | | **TOTALS** | **3,049** |

**Table 10: Minimum required design demand for Friars Road Residential**

| LAND USE | FIRE DEMAND | MAX. DAY DEMAND | MIN. REQUIRED DESIGN |
|---|---|---|---|
| | gal/min | gal/min | gal/min |
| RESIDENTIAL (APARTMENT) | 3,000 | 209.64 | 3,210 |
| RESIDENTIAL (CONDO) | 3,000 | 61.09 | 3,061 |
| | | **TOTALS** | **6,271** |

The minimum required design demand is **6,271 gallons per minute (gpm).**

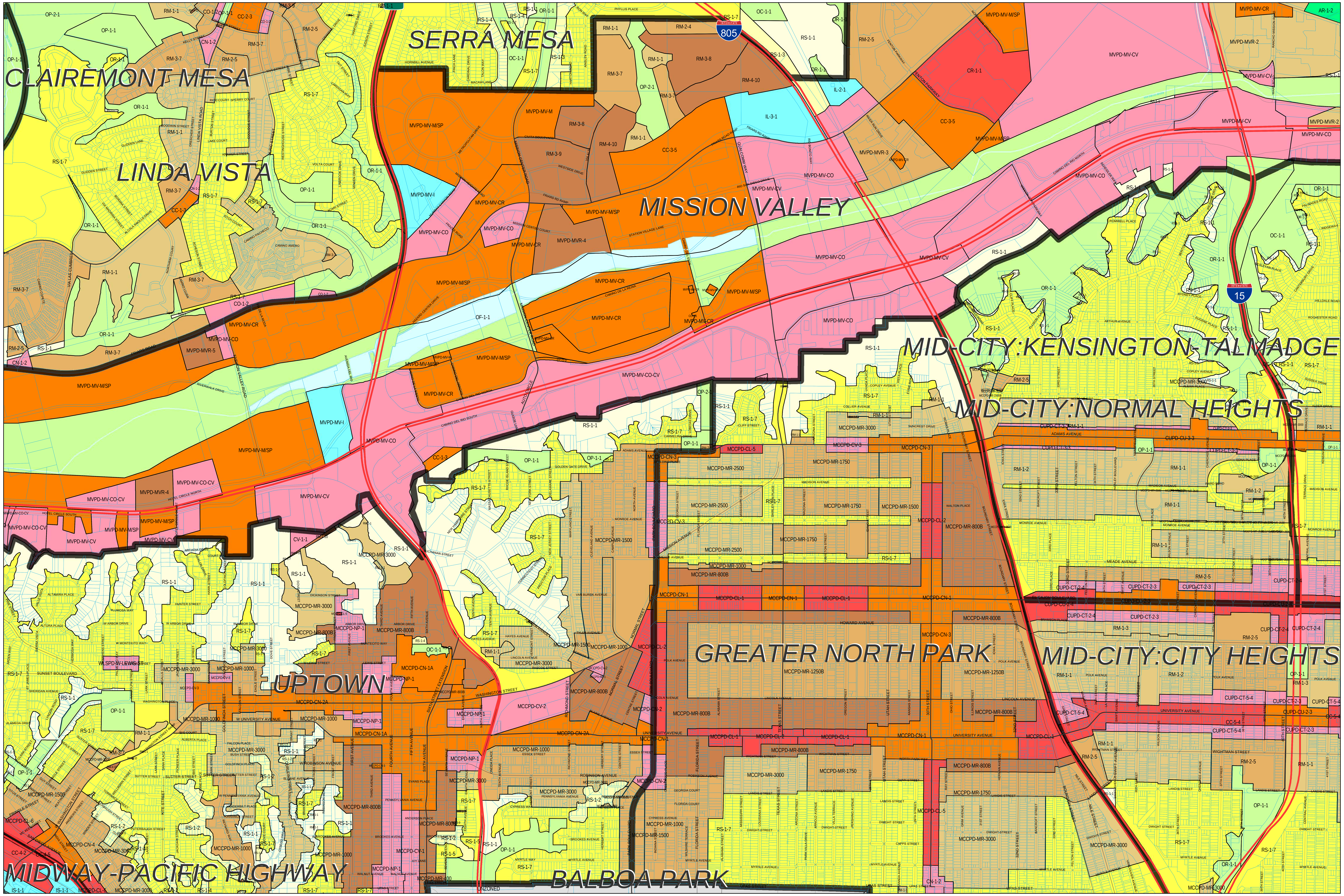
## F. SUMMARY

This report has been prepared to quantify the water and fire demand associated with the Friars Road Residential Project. Based upon the calculations supplied within, City of San Diego staff will determine whether the surrounding infrastructure will be adequate to handle the demands due to this residential site.

# APPENDIX A

- Figure 1: Zoning Map
- Figure 2: Water Main Average Pressure from City of San Diego
- Exhibit 1: Friars Road Residential Water Plan
- Exhibit 2: Friars Road Residential Splash Map

# Official Zoning Map




### Legend

City of San Diego Boundary
Community Plan Areas
Parcels

Zoning

ZONE_NAME

AR-1-2
CC-1-3
CC-2-3
CC-3-5
CC-4-2
CC-4-5
CC-5-4
CN-1-2
CO-1-2
CR-1-1
CUPD-CT-2-3
CUPD-CT-2-4
CUPD-CT-3-3
CUPD-CT-5-4
CUPD-CU-2-3
CUPD-CU-2-4
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CV-1-1
IL-2-1
IL-3-1
IS-1-1
MCCPD-CL-1
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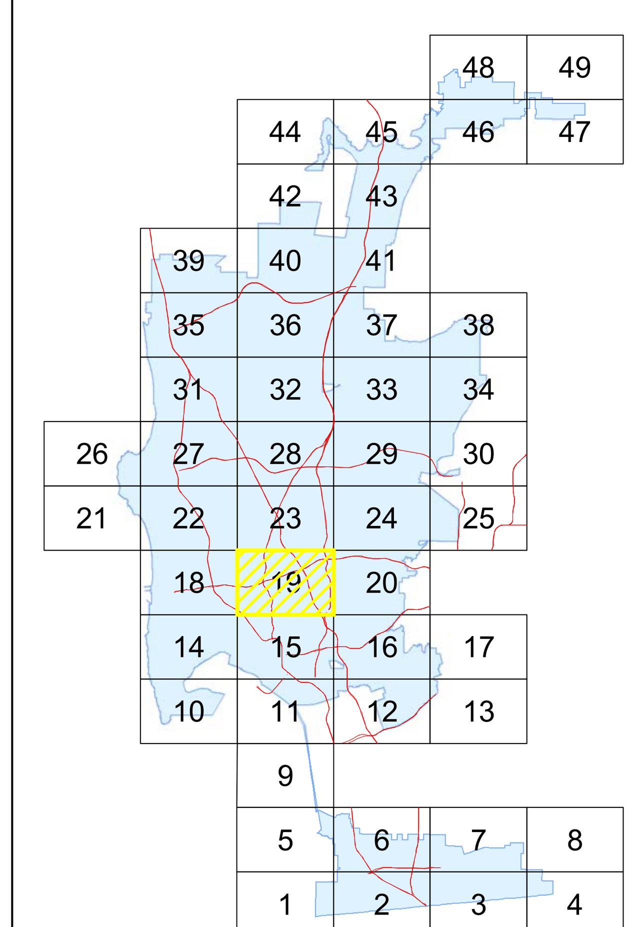
MCCPD-MR-400
MCCPD-MR-800B
MCCPD-NP-1
MCCPD-NP-2
MVPD-MV-CO
MVPD-MV-CO-CV
MVPD-MV-CR
MVPD-MV-CV
MVPD-MV-I
MVPD-MV-M
MVPD-MV-M/SP
MVPD-MVR-2
MVPD-MVR-3
MVPD-MVR-4
MVPD-MVR-5
OC-1-1
OF-1-1
OP-1-1
OP-2-1
OR-1-1
RM-1-1
RM-1-2
RM-1-3
RM-2-4
RM-2-5
RM-3-7
RM-3-8
RM-3-9
RM-4-10
RS-1-1
RS-1-2
RS-1-3
RS-1-4
RS-1-5
RS-1-7
UNZONED
WLSPD-W-LEWIS-ST

### Index Map




SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.



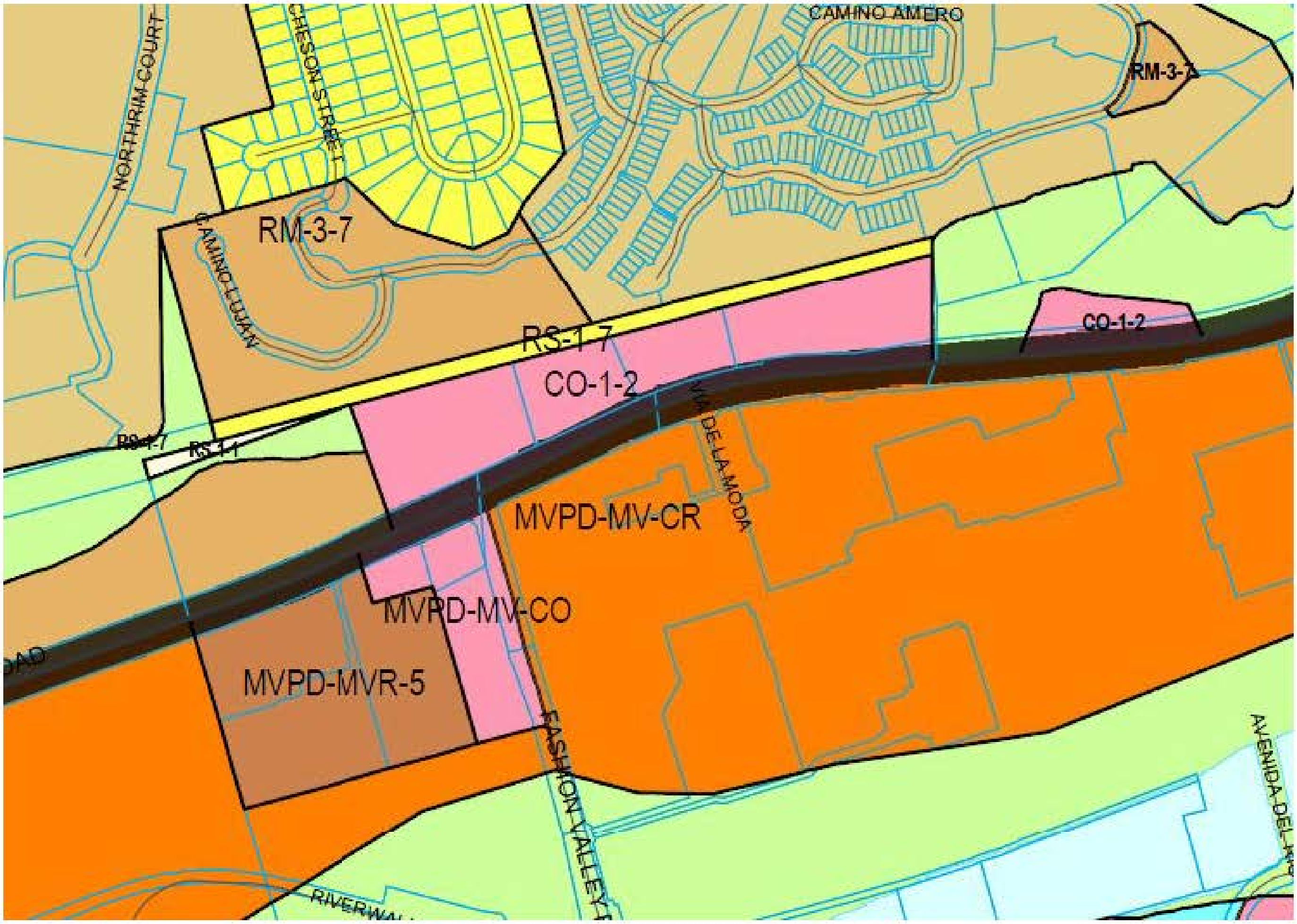
# City of San Diego
## Development Services Department

0 800 1,600 2,400
Feet

GRID TILE: 19

GRID SCALE: 800

DATE: 6/4/2012 6:57:52 PM


CAMINO AMERO
RM-3-7
NORTHRIM COURT
RM-3-7
CAMINO LUJAN
RS-1-7
CO-1-2
CO-1-2
RS-1-7
RS-1-1
VIA DE LA MODA
MVPD-MV-CR
MVPD-MV-CO
MVPD-MVR-5
FASHION VALLEY
AVENIDA DEL RIO

| Attribute | Value |
|---|---|
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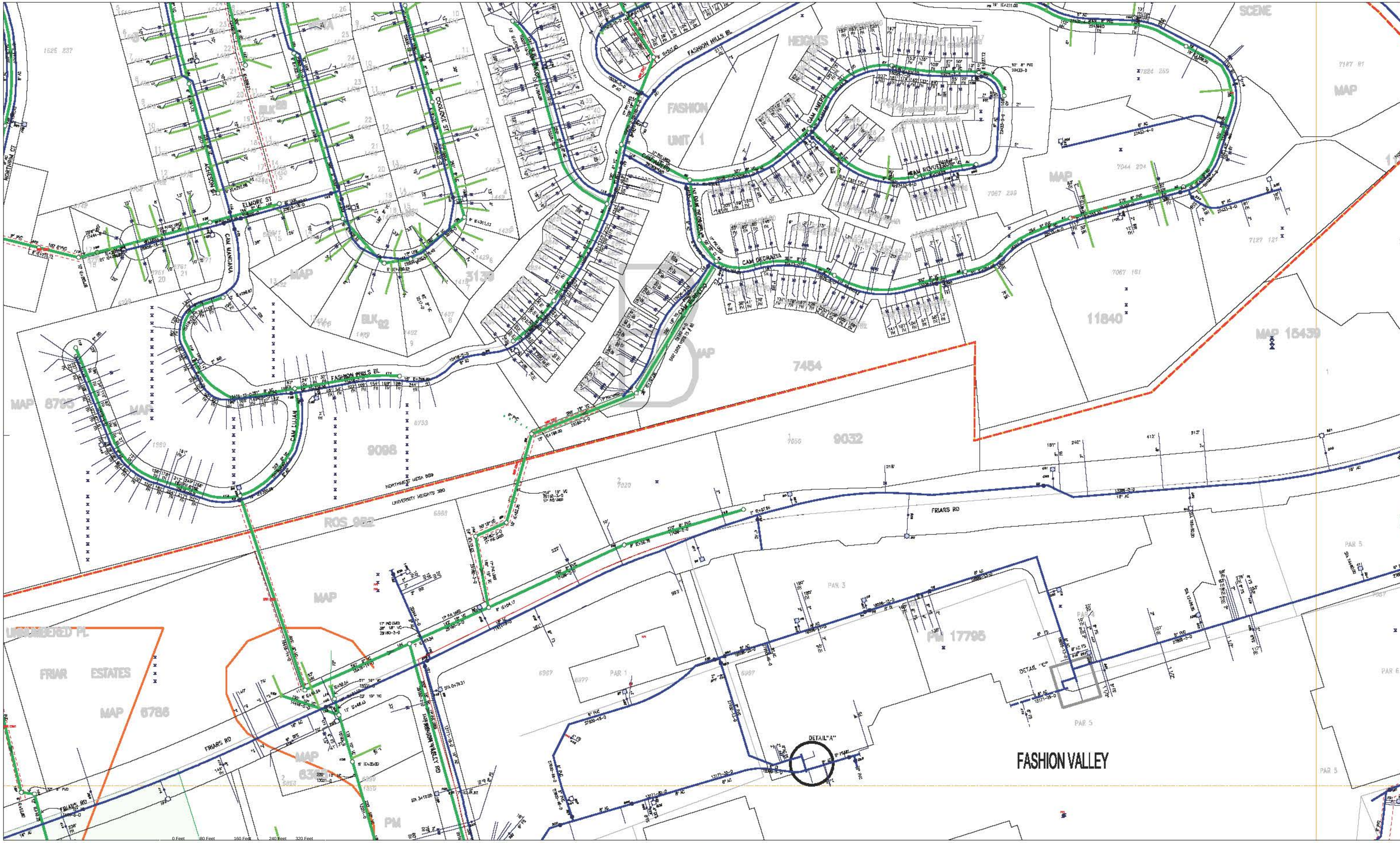
| X | 6279012 |
| Y | 1860958.5 |
| HYDFSN | 524559 |
| HYDSIZE | 6 |
| HYDINST | NULL |
| HYDMAKE | RICH |
| HYDSTYLE | 7 |
| HYDLOC | 700E FASH VLY RD S |
| HYDADDRESS | 7011 FRIARS RD |
| ELEVATION | 58 |
| AVG_PRESSURE | 136.04 |
| AVG_HGL | 371.91 |
| AVG_AVAI_FIREFLOW | 6852.072 |
| AVG_RESI_PRESSURE | 121.3007 |
| AVG_PRED_FIREFLOW | 1691.2247 |
| PEAK_PRESSURE | 135.22 |






City of San Diego Public Utilities Water & Wastewater

PUBLIC UTILITIES

# APPENDIX B

- Peak Demand Test Results
- Fire Flow Results
- Peak Demand Plus Fire Flow Results

FRIARS ROAD RESIDENTIAL

Water Demand Input Values (Residential)

| LAND USE | ZONE | NO. OF DWELLING UNITS | NET AREA[1,2] | Dwelling unit Density | UNIT DENSITY | Population Density | Population | Unit Water Demand (RESIDENTIAL) | Unit Water Demand (OTHER) | AVERAGE ANNUAL WATER DEMAND | AVERAGE ANNUAL WATER DEMAND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DU | ac | DU/ac | pers/DU | pers/net ac | persons | gal/pers-day | gal/net ac-day | gal/day | mgal/day |
| RESIDENTIAL (APARTMENT) | CO-1-2 | 249 | 2.4 | 103.75 | 3.5 | 364.6 | 875 | 150 | - | 131,250 | 0.131 |
| RESIDENTIAL (CONDO) | CO-1-2 | 70 | 3.0 | 23.33 | 3.5 | 85.0 | 255 | 150 | - | 38,250 | 0.038 |

| | | |
|---|---|---|
| **TOTALS** | **169,500** | **0.170** |

PEAKING FACTOR ZONE 16 COASTAL/DOWNTOWN

| LAND USE | ZONE | AVERAGE ANNUAL WATER DEMAND | AVERAGE ANNUAL WATER DEMAND | PEAK HOUR DEMAND RATIO | PEAK HOUR DEMAND | PEAK HOUR DEMAND | MAX. DAY DEMAND RATIO | MAX. DAY DEMAND | MAX. DAY DEMAND |
|---|---|---|---|---|---|---|---|---|---|
| | | gal/day | mgal/day | | gal/day | gal/min | | gal/day | gal/min |
| RESIDENTIAL (APARTMENT) | CO-1-2 | 131,250 | 0.131 | 5.6 | 735,000 | 510.42 | 2.3 | 301,875 | 209.64 |
| RESIDENTIAL (CONDOMINIUM) | CO-1-2 | 38,250 | 0.038 | | 214,200 | 148.75 | | 87,975 | 61.09 |

| | | | | | |
|---|---|---|---|---|---|
| **TOTALS** | **949,200** | **659.17** | **TOTALS** | **389,850** | **270.73** |

Fire Demand Input Values

| LAND USE | FIRE DEMAND | MAX. DAY DEMAND | MIN. REQUIRED DESIGN |
|---|---|---|---|
| | gal/min | gal/min | gal/min |
| RESIDENTIAL (APARTMENT) | 3,000 | 209.64 | 3,210 |
| RESIDENTIAL (CONDO) | 3,000 | 61.09 | 3,061 |

| | |
|---|---|
| **TOTALS** | **6,271** |

# APPENDIX C

- City of San Diego Water Department, Capital Improvement Program Guidelines and Standards
- Fire Code Appendix B

Book

2

Facility Design Guidelines

# Chapter 2

# Water Demands and Service Criteria

City of San Diego Water Department
Capital Improvements Program

# Chapter 2

# WATER DEMANDS AND SERVICE CRITERIA

## 2.1 General

This chapter outlines planning procedures to estimate water demands and fire flows. Water system service requirements are also defined in terms of water pressure and reservoir storage.

## 2.2 Service Area

The DESIGN CONSULTANT defines the project's service area and identifies the pressure zones in which it is located. The Senior Civil Engineer in charge of either Water Planning and Project Development, or Planning and Development Review Water Review Section, approves the service area boundaries.

## 2.3 Land Use and Residential Population

The DESIGN CONSULTANT develops present and future land use maps for the service area to define the following land use categories: residential (by zone in accordance with Table 2-1), central business district, commercial and institutional, parks, hospitals, hotels, industrial, office, and schools.

The DESIGN CONSULTANT estimates the residential population in the service area based on present and future allowable land use. Unless more accurate population density estimates are available, the residential population in the service area is estimated based on the figures presented in Table 2-1.

**Table 2-1**
**Residential Population Density**

| Zone | Dwelling Unit Density (dwelling unit/net acre) | Unit Density (persons/dwelling unit) | Population Density (persons/net acre) |
|---|---|---|---|
| A-1-10 | 0.1 | 3.5 | 0.4 |
| A-1-5 | 0.2 | 3.5 | 0.7 |
| A-1-1 | 1 | 3.5 | 3.5 |
| R-1-40 | 1 | 3.5 | 3.5 |
| R-1-20 | 2 | 3.5 | 7.0 |
| R-1-10 | 4 | 3.5 | 14 |
| R-1-5 | 9 | 3.5 | 32 |
| R-2 | 14 | 3.2 | 45 |
| R-2A | 29 | 3.0 | 87 |
| R-3 | 43 | 2.6 | 112 |
| R-3A | 73 | 2.2 | 161 |
| R-4 | 109 | 1.8 | 196 |
| R-4C | 218 | 1.5 | 327 |

Dwelling unit density in Table 2-1 is based on net area. The net area is measured in acres, and is 80% of the gross area for each residential zone.

## 2.4 Average Annual Water Demands

For most projects, average annual water demands are determined based on the unit water demand criteria presented in Table 2-2.

**Table 2-2**
**Unit Water Demands**

| Land Use Category | Unit Water Demand |
|---|---|
| Residential | 150 gallons/person-day |
| Central Business District | 6000 gallons/net acre-day |
| Commercial and Institutional | 5000 gallons/net acre-day |
| Fully Landscaped Park | 4000 gallons/net acre-day |
| Hospitals | 22500 gallons/net acre-day |
| Hotels | 6555 gallons/net acre-day |
| Industrial | 6250 gallons/net acre-day |
| Office | 5730 gallons/net acre-day |
| Schools | 4680 gallons/net acre-day |

Average annual water demands are calculated as the sum of: (1) the residential water demand, and (2) other water demands for each land use category as follows:

Residential Water Demand (gallons/day) = Residential Population x 150 gallons/person-day

Other Water Demand (gallons/day) = Land Use Area by Category (net acres) x Unit Water Demand for Each Land Use Category (gallons/net acre-day)

Average Annual Water Demand (gallons/day) = Residential Water Demand + Other Water Demands

On some projects, particularly large residential developments, using the unit water demands in Table 2-2 may generate unrealistically high estimates of water requirements. For these large projects, the DESIGN CONSULTANT or developer may request that the CIP Project Manager consider an alternative approach, making use of the City's water demand distribution data developed for macroscale planning purposes. Similarly, the CIP Project Manager may also consider alternative unit water demand estimates for specific land use types where such estimates are based on detailed demand evaluations.

## 2.5 Peak Water Demands

Unless the project involves a large development that calls for an alternative approach, peak hour and maximum day water demands are estimated using the peaking factors presented in Figures 2-1 and 2-2. These peaking factors correspond to the zones identified in Figure 2-3.

# FIGURE 2-1
## PEAK HOUR DEMAND FACTOR

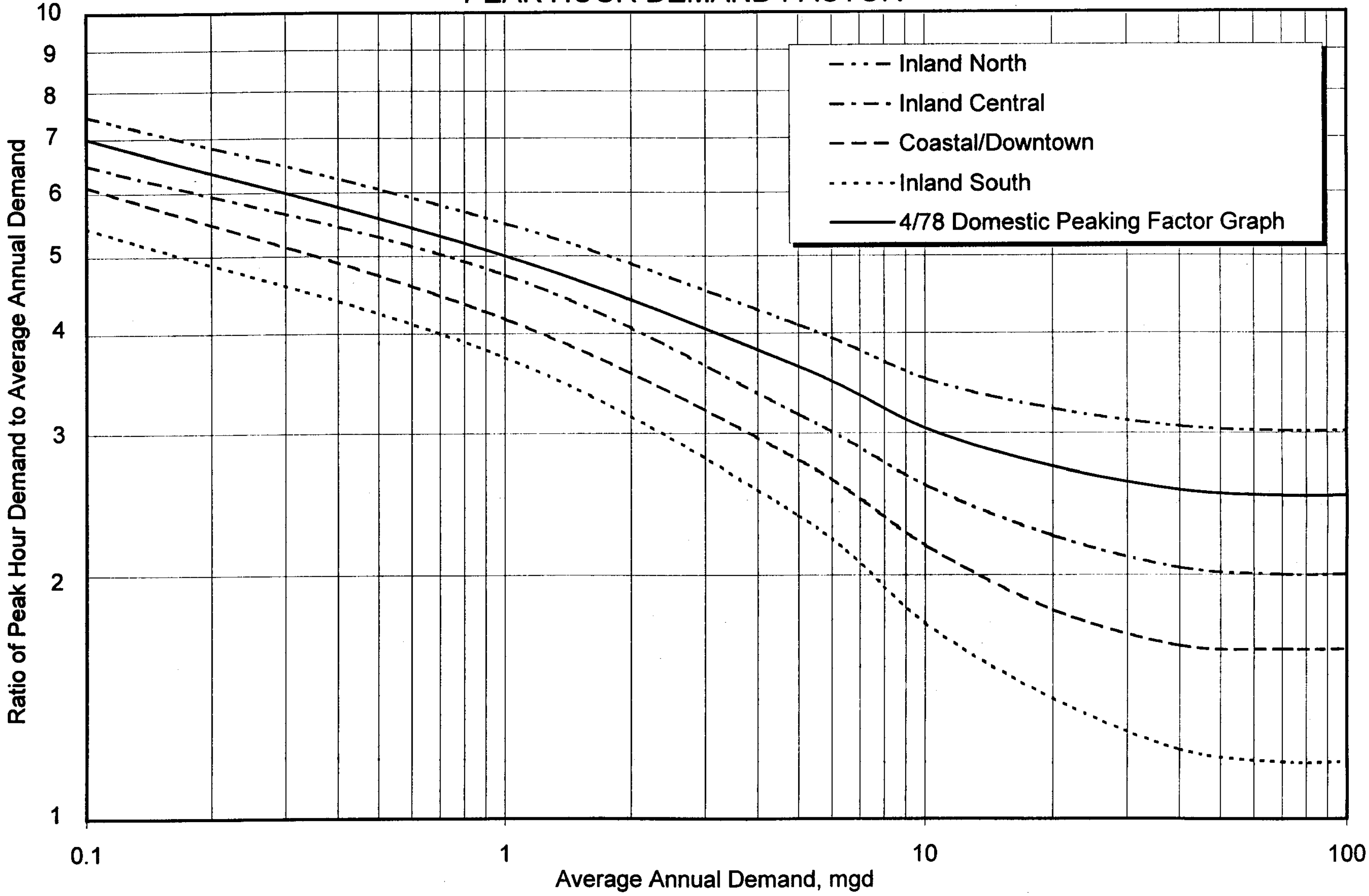
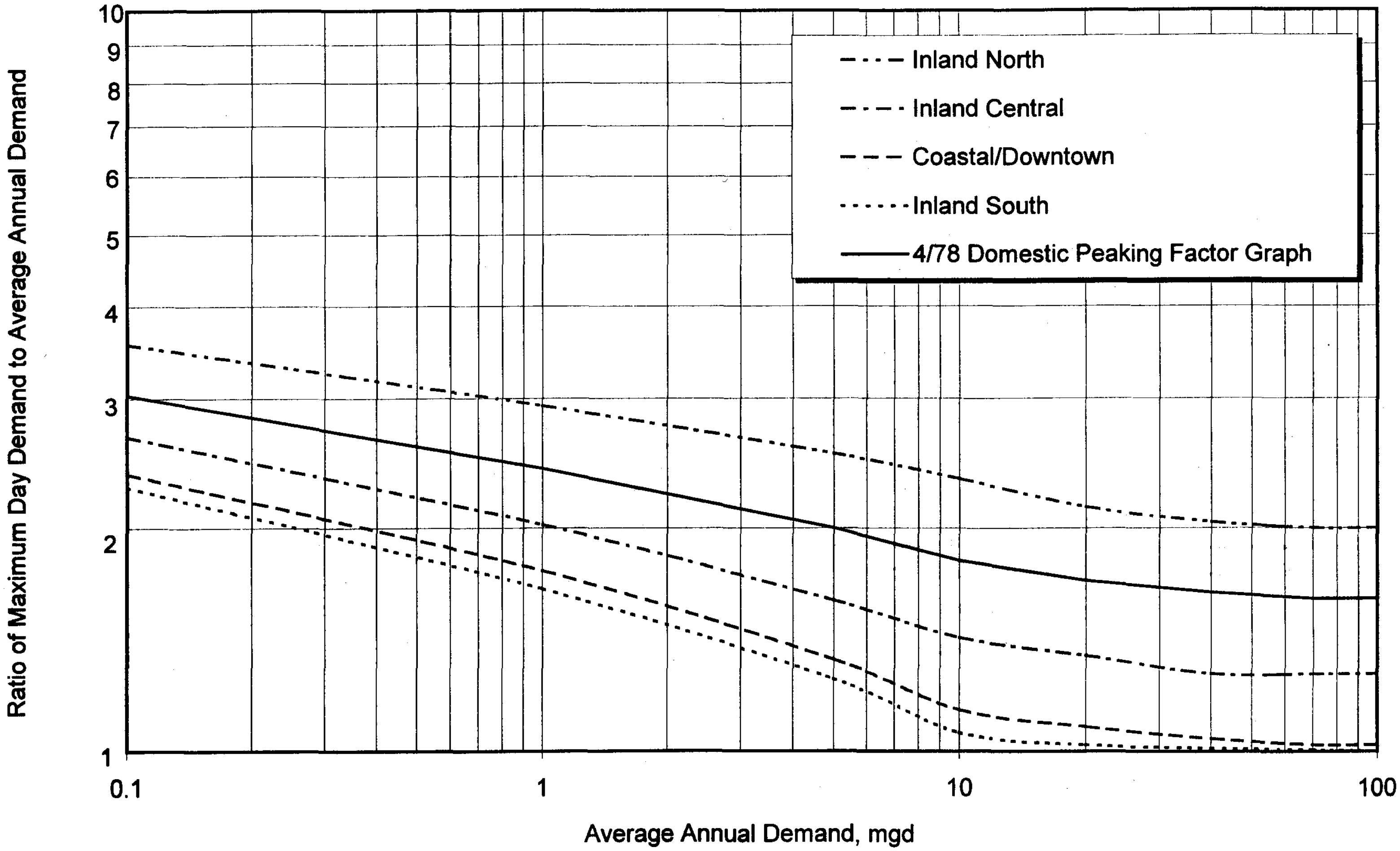
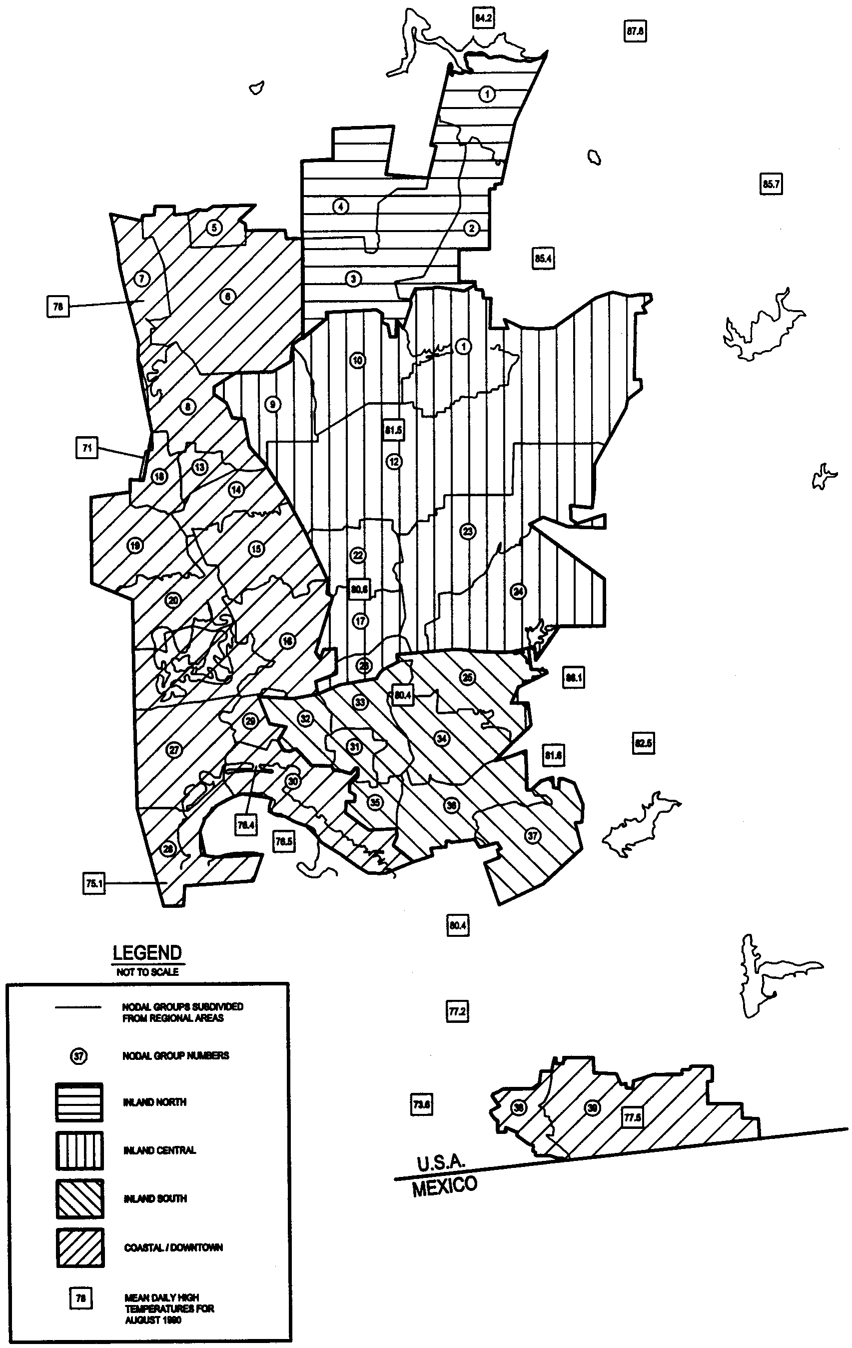


FIGURE 2-2
MAXIMUM DAY DEMAND FACTOR



**PEAKING FACTOR ZONES**
(BOUNDARIES BASED ON LAND USE GROUPINGS)

FIGURE 2-3




July 1999

Peak water demands are estimated as follows:

Peak Hour Demand = Average Annual Water Demand * Peak Hour Demand Ratio

Maximum Day Demand = Average Annual Water Demand * Maximum Day Demand Ratio

## 2.6 Fire Demands

The DESIGN CONSULTANT estimates fire demands flows by using the *Fire Suppression Rating Schedule*, Edition 6-80, Section 1 (Public Fire Suppression), published by the Insurance Services Office.

The fire flow duration for planning purposes is at least five hours. In general, minimum required fire demands for design are shown in Table 2-3.

**Table 2-3**
**Fire Demands for Design Purposes**

| **Development Type** | **Fire Demand** (gpm) |
|---|---|
| Single family residential | 2,000 |
| Duplexes | 2,500 |
| Condominiums and apartments | 3,000 |
| Commercial | 4,000 |
| Industrial | 6,000 |

Should application of the ISO methodology result in figures lower than those shown in Table 2-3, the CIP Project Manager may approve the ISO figures on a case-by-case basis following submittal of supporting calculations.

The required fire demand must be supplied from at least two fire hydrants within a maximum radius of 750 feet from the fire.

## 2.7 Pressure Criteria

### 2.7.1 Design Pressures

Water systems must be designed to provide the minimum residual pressures given:

(1) maximum day demands plus fire demand conditions, or
(2) peak hour demand conditions.

In analyzing the supply to a pressure zone, the minimum hydraulic grade line elevation available from the water source is used, a level that typically occurs during dry weather conditions. The maximum static pressure in gravity systems is determined from reservoir overflow elevations and/or the discharge control setting on pressure reducing valves, whichever is greater. The maximum static pressure in pumped systems is determined from reservoir overflow elevations or pump shutoff levels, whichever is greater.

### 2.7.2 Operating Pressures

The basic pressure criteria for water system design are shown in Figure 2-4. Every water main in each pressure zone must be capable of supplying a minimum static pressure of 65 psi with no demand on the system. Operating pressures under the maximum day demand condition in the system (remote from a fire) or under peak hour demand conditions must fall no more than 25 psi below the static pressure with no demand on the system, and residual water main pressure must be at least 40 psi. Operating pressures are determined in the distribution system pipelines, excluding losses through service connections and building plumbing, and are measured relative to adjacent building pad elevations.

When analyzing a system with one source of supply (either a reservoir or a pipeline) out of service, pressures may fall more than 25 psi below static pressure with no demand on the system, but in no event may the pressure fall more than 40 psi.

### 2.7.3 Pressure Requirements During Fires

For the simulation of fire conditions, a minimum operating pressure of 20 psi is required in the mains (measured relative to the building pad elevation) in the vicinity of the fire, and a drop in pressure of no more than 25 psi below static is desirable for the remainder of the system. The residual pressure is determined given the fire demand concentrated at a hydrant within a radius of 750 feet of the fire, and with simultaneous water consumption occurring at the maximum day rate.

For water systems with available storage, the residual pressures in the distribution system during a fire are maintained given the following conditions:

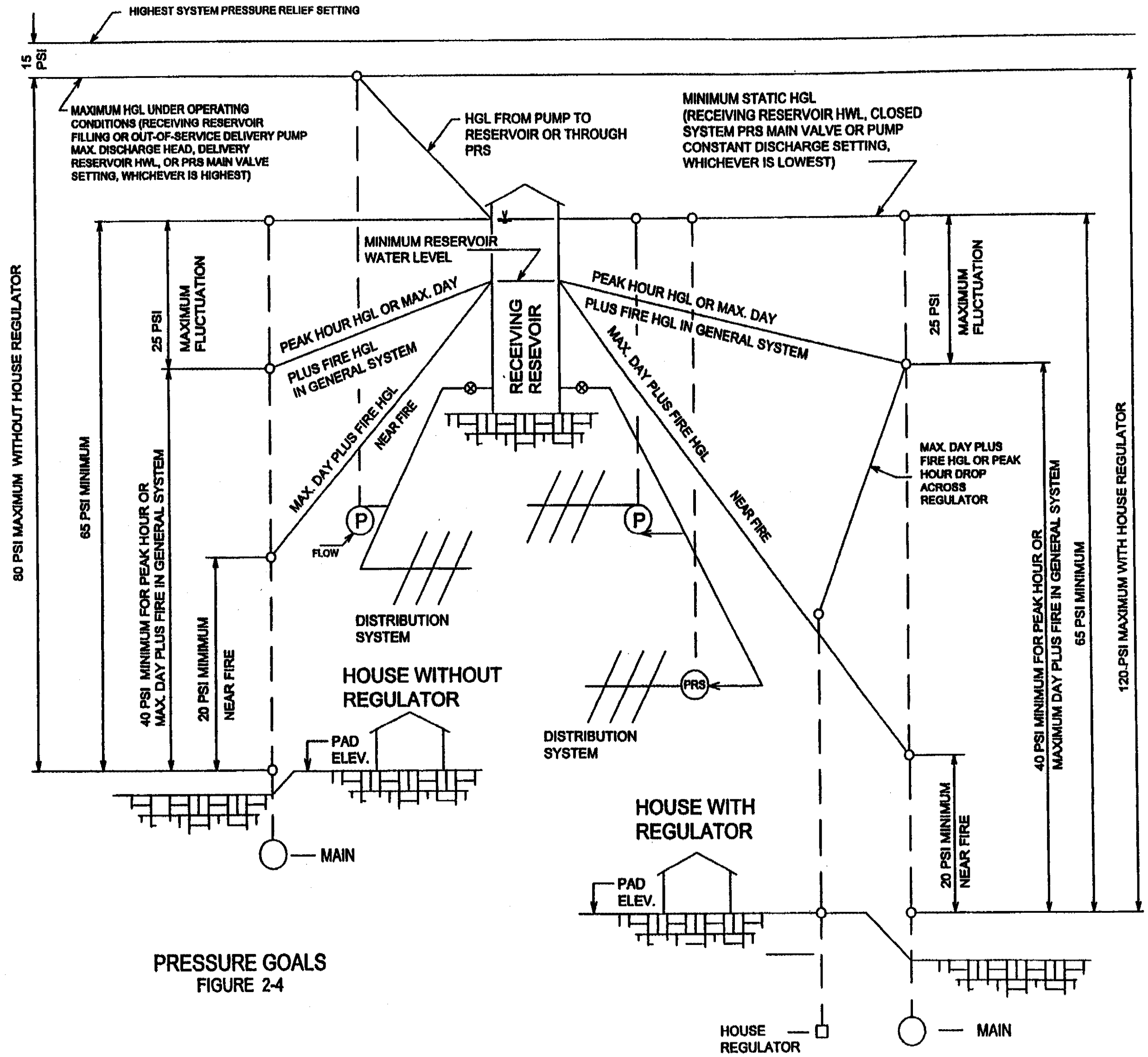
- The water level in the storage facility at the time of the fire is at or near the minimum level that typically occurs with normal diurnal demands, and

- The prescribed 5-hour fire duration is coincident with the 5-hour period of highest water demands.

## 2.8 System Reliability

Water systems must be designed to meet the pressure criteria with one critical source out of service. Water mains must be designed so that no more than one, average-sized city block (approximately 30 homes) is out of service at any time, and no more than two fire hydrants (excluding fire services) are on a dead end or are out of service at any time. These provisions do not apply under earthquake conditions.

Water mains serving more than two hydrants or more than 30 homes must be looped, fed from two sources, or provided with a reservoir of sufficient capacity to supply the emergency needs (contingency and fire storage) as described below in subsection 2.9.




PRESSURE GOALS
FIGURE 2-4

## 2.9 Storage Criteria for Water Systems

There are three basic types of water storage in the City's system: regulating reservoirs, forebays and clearwells. Regulating reservoirs balance supply and demand for a pressure zone and/or service area. Pressure zones are normally designated by the overflow elevation of the regulating reservoirs. Forebays are used to balance supply and pumping demand to provide a stable suction head for a booster pump station. Typically, a clearwell is a regulating reservoir to store filtered water in a water treatment plant. The shape and material of the storage vessel (elevated tank, standpipe, circular, rectangular or trapezoidal ground level steel, prestressed or reinforced concrete reservoirs) is generally determined by the amount of water storage required, topography of the available site and the economy of construction.

**Definitions**

- Ultimate Maximum Day Demand or Maximum Day Demand (UMDD): It is the forecasted maximum day demand (ultimate average day demand multiplied by a peaking factor) for a projected future planning date. This date is selected during the planning phase of the project. The Maximum Day Demand Flow Rate is the uniform flow rate delivering water in a 24-hour period to meet Maximum Day Demand.

- Peak Hour Demand is the forecasted UMDD multiplied by a peaking factor for determining the projected highest hourly consumption during one year.

- Service area includes all pressure zones supplied by a water facility including:

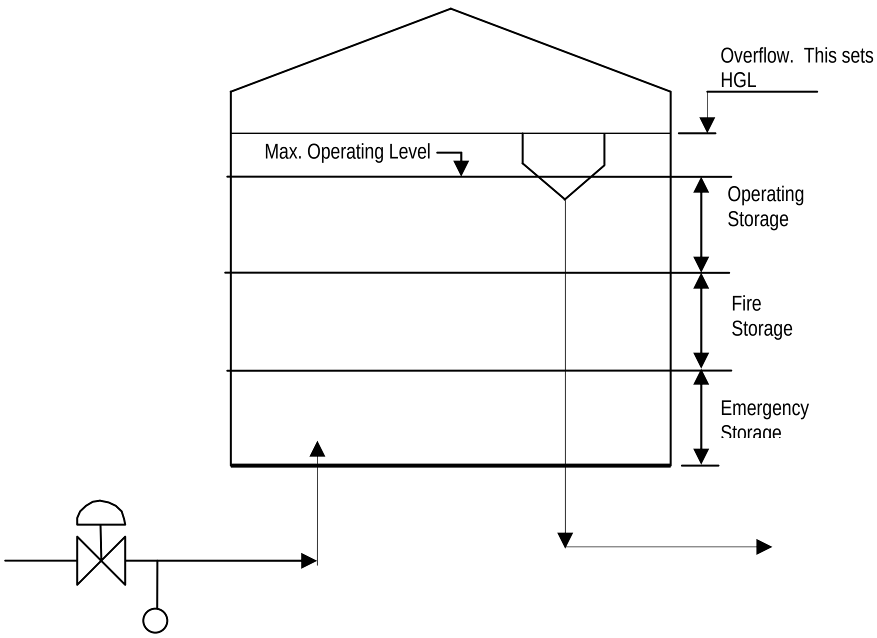
  a) Zone(s) served directly without the need for pumping or pressure reduction,
  b) Pumped zone(s) supplied through pumping station(s), and
  c) Pressure reduced zone(s) downstream of a pressure reducing station(s).

- WTP – Water Treatment Plant

### 2.9.1 Regulating Reservoirs

The required storage volume within a pressure zone or service area is the sum of three elements: operating storage, fire storage and emergency storage, as indicated in the sketch below.

### A. Operating Storage




**1) Definition.** Operating storage is defined as the volume of storage necessary to allow a reservoir's sources of supply to operate at a uniform rate throughout the day while meeting variable water demand. In some cases, operating storage is used to permit reducing or stopping of supply during peak hour water demand conditions or stopping of pumping operations during hours of peak energy demand. Operating storage may also be defined as the amount of storage necessary to supply Peak Hour Demand with a water supply having a uniform Maximum Day Demand Flow Rate. Operating storage must fluctuate daily in all water storage facilities, like standpipes and elevated tanks supplied by pumps and in ground level reservoirs supplied by gravity pipelines.

In order to optimize the use of transmission facilities and to improve water pressure during peak water demand conditions, pump or gravity inflow must be controlled to achieve top operating levels at 5:00 AM each morning.

**2) Calculation Procedure.** Operating storage is calculated as 30 % of the ultimate maximum day demand in the service area (one or more pressure zones). The source(s) of supply must provide for maximum day demand.

To allow the reduction or stopping of supply during peak hour water demand conditions or stopping of pumping operations during hours of peak power demand, requires additional operating storage volume. Assuming that the amount of operating storage was already determined to balance a uniform daily supply with continuously variable demand, the additional operating storage for reducing or stopping of supply due to peak hour water demand or peak power demand management equals the rate of supply reduction times the duration of supply reduction.

If more than one reservoir is planned for the service area, operational storage can be divided between reservoirs, but only when water system modeling shows that minimum pressure requirements are met during peak hour demand.

For existing and substantially developed service areas, the amount of operational storage may be determined by flow measurement. This flow measurement, based on supply and demand curves, must be adjusted for future growth and reasonably anticipated climatic extremes.

The amount of operating storage may be reduced by water supply capacity available in excess of maximum day demand flow rate.

**3) Example.** Assume the expected ultimate maximum day demand in a pressure zone is 6,000 gal/min, then the required operating storage is:

Operating storage = ((6,000 gal/min x 1440)/1,000,000) x 0.3 = 2.6 mg

Continuing with the example above, let us assume now that the pumps are shut off for two hours for peak power demand management, the supply is thus reduced by 6,000 gal/min for 2 hours. The additional operating storage required is then:

Power management storage = ((6,000 gal/min x 60) x 2)/1,000,000 = .72 mg
Use 0.8 mg for power management storage.

Total operating storage: 2.6 mg + 0.8 mg = 3.4 mg

**B. Fire Storage**

**1) Definition.** Fire storage is the minimum amount of water required to be stored for firefighting purposes. Minimum fire flow flows and their duration are established by the City Fire Marshall based on Insurance Services Offices (ISO) guidelines.

**2) Calculation Procedure.** Fire storage is calculated by multiplying the maximum fire demand expected in the service area by its duration, as stated in Section 2.6. If more than one tank is planned for a service area, fire storage can be divided between tanks, but only when water system modeling shows that minimum fire flow and pressure requirements are met.

The amount of fire storage may be reduced by water supply capacity available in excess of maximum day demand flow rate with operating storage, or in excess of peak demand flow rate without operating storage.

**3) Example.** Continuing with the example above, let us assume now that the pressure zone is classified as commercial with minimum fire flow of 4,000 gal/min for 5 hours. (For service areas with UMDD of 100 MGD and more, consider that 2 fires are burning concurrently.) The minimum fire storage is:

Fire storage = ((4,000 gal/min x 60) x 5)/1,000,000 = 1.20 mg

**C. Emergency Storage**

**1) Definition.** Emergency storage is the amount of water that needs to be stored to satisfy demand when any single component of the system (power, pump, supply pipe, etc.) is out of service.

**2) Calculation Procedure.** Maximum emergency storage is calculated as 12 hours times the ultimate maximum day demand, in gallons per minute. If anticipated total service outage exceeds 12 hours, then a cost/benefit analysis is required to determine the most cost effective solution to meet reliability and water quality objectives.

The amount of emergency storage may be reduced by water supply capacity available after a single system component is out of service, or by the reduced time it takes to return to full service based on reasonable estimate of time for restoration of system capacity, as determined by Water Operations Division.

If more than one reservoir is planned, emergency storage can be divided between the reservoirs, but only when water system modeling shows that minimum flow and pressure requirements are met during peak hour and fire demand conditions.

**3) Example.** The minimum amount of emergency storage based on the examples above is:

Emergency storage = ((6,000 gal/min x 60) x 12)/1,000,000 = 4.4 mg

If, for instance, there are two pump stations with a 3,000 gal/min capacity each supplying the same pressure zone and one pump station is out of service, the emergency storage is reduced to:

((3,000 x60) x 12)/1,000,000 = 2.2 mg

**D. Total Storage.** For the examples listed above, the total storage would be the sum of operating, fire and emergency storages, or 3.4+1.20+4.4 = **9.0 million gallons**.

> **Note:** Water storage volume located in pumped zones of a service area may not be used to reduce the calculated "Total Storage" for the gravity fed portions of a service area.

## 2.9.2Forebays

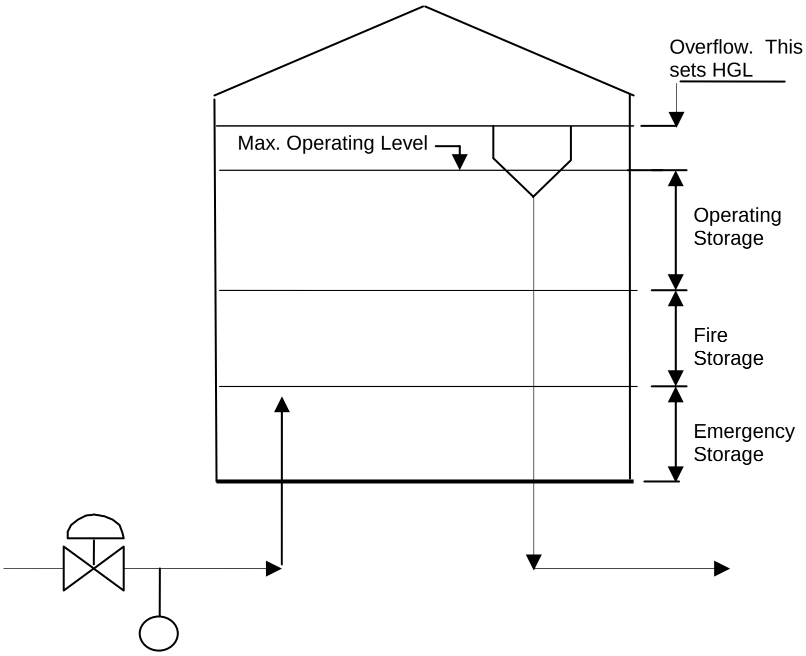
Forebays are usually small tanks located on the suction side of a booster pump station. They balance available supply with pumping demand and provide a stable suction head to the pump station. If a pump station is adjacent to a regulating reservoir; the reservoir acts as a forebay also. Due to the nature of its function, forebays have only one element – operating storage.

The required volume can be calculated as shown in section 2.9.1A.2 above.

## 2.9.3Clearwells

A clearwell is a regulating reservoir to store filtered water near a water treatment plant.

### A. Operating Storage




**1) Definition.** Operating storage is defined as the volume of storage necessary to allow a WTP to operate at a uniform rate throughout the day while meeting variable water demand. Operating storage must fluctuate daily in all water storage facilities. In general, the operating storage volume is divided between the potable water reservoirs within the treatment plant service area. The clearwell's share of the operating storage (30% UMDD) will depend on the location and capacity of the other reservoirs within the WTP service area.

**2) Calculation Procedure.** The required volume can be calculated as shown in section 2.9.1.A.2 above.

### B. Fire Storage

**1) Definition.** Fire storage is the minimum amount of water required to be stored for firefighting purposes. Minimum fire flow flows and their duration are established by the City Fire Marshall based on Insurance Services Office (ISO) guidelines. Fire storage requirements for clearwells are the same as for any reservoir within the distribution system.

**2) Calculation Procedure.** The required volume can be calculated as shown in section 2.9.1.A.2 above.

### C. Emergency Storage/Shutdown Storage

**1) Definition.** Emergency storage is the amount of water that needs to be stored to satisfy demand when any single component of the WTP (sedimentation basin, power, pump, supply pipe, etc.) is out of service.

It is generally advisable that the raw water supply and treatment facilities are designed with the same reliability and redundancy as the water distribution system for delivery of uninterrupted water supply. That is, with any single component out of service, one at a time. This will allow routine facility maintenance to proceed anytime or at the minimum during the winter months without impacting the capacity of the system to meet treated water demand.

Shutdowns are not unique to water treatment plants, they are just more routine and have more significant impact due to the complexity and size of facilities. Shutdowns and emergencies have similar impacts with the difference that shutdowns are prescheduled and can be anticipated. Therefore, a thorough analysis of the raw water supply and treatment facilities is required to determine the critical facility components resulting in the longest or most significant reduction of treatment capacity when they are out of service, due to either routine maintenance or emergency failure.

**2) Calculation Procedure**. After determination of the critical maintenance shutdown and emergency repair vulnerability of the water treatment plant, the required volume can be calculated as shown in Section 2.9.1.C.2. above.

It is to be noted that operating and emergency storage can be used during WTP shutdowns. As such, additional shutdown storage capacity is only required if shutdown demand is greater than the sum of operating and emergency storage.

**D. Total Storage.** For examples listed in section 2.9.1 above, the total clearwell storage would be the sum of operating, fire and emergency storages, or 2.6+1.20+4.4 = **8.2 million gallons** for a WTP with 8.7 MGD capacity and without any service area distribution system storage. (Assumption WTP capacity = UMDD).

> **Note:** Water storage volume located in pumped zones of a service area may not be used to reduce the calculated "Total Storage" for the gravity fed portions of a service area.

**E. Minimum and Maximum Storage**

As a minimum, the clearwell storage should not be less than 25% of the WTP capacity, and not more than the UMDD of its service area for plants 10 MGD and larger.

It is generally more economical to build a reliable WTP to meet UMDD than to provide additional water storage for emergencies and to meet UMDD. Therefore, vulnerability risk analysis and cost/benefit analysis are recommended before deviating from the guidelines outlined above.

# APPENDIX B

# FIRE-FLOW REQUIREMENTS FOR BUILDINGS

## SECTION B101 GENERAL

**B101.1 Scope.** The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

## SECTION B102 DEFINITIONS

**B102.1 Definitions.** For the purpose of this appendix, certain terms are defined as follows:

**FIRE-FLOW.** The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

**FIRE-FLOW CALCULATION AREA.** The floor area, in square feet ($m^2$), used to determine the required fire flow.

## SECTION B103 MODIFICATIONS

**B103.1 Decreases.** The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

**B103.2 Increases.** The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

**B103.3 Areas without water supply systems.** For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code.*

## SECTION B104 FIRE-FLOW CALCULATION AREA

**B104.1 General.** The fire-flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

**B104.2 Area separation.** Portions of buildings which are separated by fire walls without openings, constructed in accordance with the *California Building Code,* are allowed to be considered as separate fire-flow calculation areas.

**B104.3 Type IA and Type IB construction.** The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

> **Exception:** Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

## SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

**B105.1 One- and two-family dwellings.** The minimum fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet (344.5 $m^2$) shall be 1,000 gallons per minute (3785.4 L/min). Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 $m^2$) shall not be less than that specified in Table B105.1.

> **Exception:** A reduction in required fire flow of 50 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system.

**B105.2 Buildings other than one- and two-family dwellings.** The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1.

> **Exception:** A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

## SECTION B106 REFERENCED STANDARDS

| | | | |
|---|---|---|---|
| | CBC-07 | California Building Code | B104.2, Table B105.1 |
| ICC | IWUIC-06 | International Wildland-Urban Interface Code | B103.3 |
| NFPA | 1142-01 | Standard on Water Supplies for Suburban and Rural Fire Fighting | B103.3 |

**TABLE B105.1**
**MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS**

| FIRE-FLOW CALCULATION AREA (square feet) | | | | | FIRE-FLOW (gallons per minute)[c] | FLOW DURATION (hours) |
|---|---|---|---|---|---|---|
| Type IA and IB[b] | Type IIA and IIIA[b] | Type IV and V-A[b] | Type IIB and IIIB[b] | Type V-B[b] | | |
| 0-22,700 | 0-12,700 | 0-8,200 | 0-5,900 | 0-3,600 | 1,500 | 2 |
| 22,701-30,200 | 12,701-17,000 | 8,201-10,900 | 5,901-7,900 | 3,601-4,800 | 1,750 | |
| 30,201-38,700 | 17,001-21,800 | 10,901-12,900 | 7,901-9,800 | 4,801-6,200 | 2,000 | |
| 38,701-48,300 | 21,801-24,200 | 12,901-17,400 | 9,801-12,600 | 6,201-7,700 | 2,250 | |
| 48,301-59,000 | 24,201-33,200 | 17,401-21,300 | 12,601-15,400 | 7,701-9,400 | 2,500 | |
| 59,001-70,900 | 33,201-39,700 | 21,301-25,500 | 15,401-18,400 | 9,401-11,300 | 2,750 | |
| 70,901-83,700 | 39,701-47,100 | 25,501-30,100 | 18,401-21,800 | 11,301-13,400 | 3,000 | 3 |
| 83,701-97,700 | 47,101-54,900 | 30,101-35,200 | 21,801-25,900 | 13,401-15,600 | 3,250 | |
| 97,701-112,700 | 54,901-63,400 | 35,201-40,600 | 25,901-29,300 | 15,601-18,000 | 3,500 | |
| 112,701-128,700 | 63,401-72,400 | 40,601-46,400 | 29,301-33,500 | 18,001-20,600 | 3,750 | |
| 128,701-145,900 | 72,401-82,100 | 46,401-52,500 | 33,501-37,900 | 20,601-23,300 | 4,000 | 4 |
| 145,901-164,200 | 82,101-92,400 | 52,501-59,100 | 37,901-42,700 | 23,301-26,300 | 4,250 | |
| 164,201-183,400 | 92,401-103,100 | 59,101-66,000 | 42,701-47,700 | 26,301-29,300 | 4,500 | |
| 183,401-203,700 | 103,101-114,600 | 66,001-73,300 | 47,701-53,000 | 29,301-32,600 | 4,750 | |
| 203,701-225,200 | 114,601-126,700 | 73,301-81,100 | 53,001-58,600 | 32,601-36,000 | 5,000 | |
| 225,201-247,700 | 126,701-139,400 | 81,101-89,200 | 58,601-65,400 | 36,001-39,600 | 5,250 | |
| 247,701-271,200 | 139,401-152,600 | 89,201-97,700 | 65,401-70,600 | 39,601-43,400 | 5,500 | |
| 271,201-295,900 | 152,601-166,500 | 97,701-106,500 | 70,601-77,000 | 43,401-47,400 | 5,750 | |
| 295,901-Greater | 166,501-Greater | 106,501-115,800 | 77,001-83,700 | 47,401-51,500 | 6,000 | |
| — | — | 115,801-125,500 | 83,701-90,600 | 51,501-55,700 | 6,250 | |
| — | — | 125,501-135,500 | 90,601-97,900 | 55,701-60,200 | 6,500 | |
| — | — | 135,501-145,800 | 97,901-106,800 | 60,201-64,800 | 6,750 | |
| — | — | 145,801-156,700 | 106,801-113,200 | 64,801-69,600 | 7,000 | |
| — | — | 156,701-167,900 | 113,201-121,300 | 69,601-74,600 | 7,250 | |
| — | — | 167,901-179,400 | 121,301-129,600 | 74,601-79,800 | 7,500 | |
| — | — | 179,401-191,400 | 129,601-138,300 | 79,801-85,100 | 7,750 | |
| — | — | 191,401-Greater | 138,301-Greater | 85,101-Greater | 8,000 | |

For SI: 1 square foot = 0.0929 $m^2$, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. The minimum required fire flow shall be allowed to be reduced by 25 percent for Group R.

b. Types of construction are based on the *California Building Code*.

c. Measured at 20 psi.

The City of San Diego

# PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

Friars Road Mixed Use
Planned Development Permit No. 1586192, Site Development Permit No. 1586193
Vesting Tentative Map No. 1586194

**ENGINEER OF WORK:**

Matthew J. Semic, PE C71075

Insert Civil Engineer's Name and PE Number Here

**PREPARED FOR:**

Landcap Friars Road, LLC 27132
B Paseo Espada, Suite 1206
San Juan Capistrano, CA 92675

**PREPARED BY:**

latitude 33 PLANNING & ENGINEERING

Latitude 33 Planning & Engineering
9968 Hibert Street Second Floor
San Diego, CA 92131
(858) 751-0633

**DATE:**
**September 13, 2016**

Approved by: City of San Diego Date

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**TABLE OF CONTENTS**

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## ACRONYMS

| | |
|---|---|
| APN | Assessor's Parcel Number |
| ASBS | Area of Special Biological Significance |
| BMP | Best Management Practice |
| CEQA | California Environmental Quality Act |
| CGP | Construction General Permit |
| DCV | Design Capture Volume |
| DMA | Drainage Management Areas |
| ESA | Environmentally Sensitive Area |
| GLU | Geomorphic Landscape Unit |
| GW | Ground Water |
| HMP | Hydromodification Management Plan |
| HSG | Hydrologic Soil Group |
| HU | Harvest and Use |
| INF | Infiltration |
| LID | Low Impact Development |
| LUP | Linear Underground/Overhead Projects |
| MS4 | Municipal Separate Storm Sewer System |
| N/A | Not Applicable |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| PDP | Priority Development Project |
| PE | Professional Engineer |
| POC | Pollutant of Concern |
| SC | Source Control |
| SD | Site Design |
| SDRWQCB | San Diego Regional Water Quality Control Board |
| SIC | Standard Industrial Classification |
| SWPPP | Stormwater Pollutant Protection Plan |
| SWQMP | Storm Water Quality Management Plan |
| TMDL | Total Maximum Daily Load |
| WMAA | Watershed Management Area Analysis |
| WPCP | Water Pollution Control Program |
| WQIP | Water Quality Improvement Plan |

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**CERTIFICATION PAGE**

**Project Name: Friars Road Mixed Use**
**Permit Application Number: PDP 156192, SDP 1586193, VTM 1586194**

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

RCE 71075 EXP. 6-30-17

Engineer of Work's Signature, PE Number & Expiration Date

Matthew J. Semic

Print Name

Latitude 33 Planning & Engineering

Company

September 13, 2016

Date

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. SEMIC
No. 71075
Exp. 06-30-17
CIVIL
STATE OF CALIFORNIA

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**SUBMITTAL RECORD**

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plan check comments is included. When applicable, insert response to plan check comments.

| Submittal Number | Date | Project Status | Changes |
|---|---|---|---|
| 1 | 04/12/2016 | ☒ Preliminary Design/Planning/CEQA<br>☐ Final Design | Initial Submittal |
| 2 | 06/30/2016 | ☒ Preliminary Design/Planning/CEQA<br>☐ Final Design | Second Submittal |
| 3 | 09/13/2016 | ☒ Preliminary Design/Planning/CEQA<br>☐ Final Design | Third Submittal |
| 4 | | ☐ Preliminary Design/Planning/CEQA<br>☐ Final Design | |

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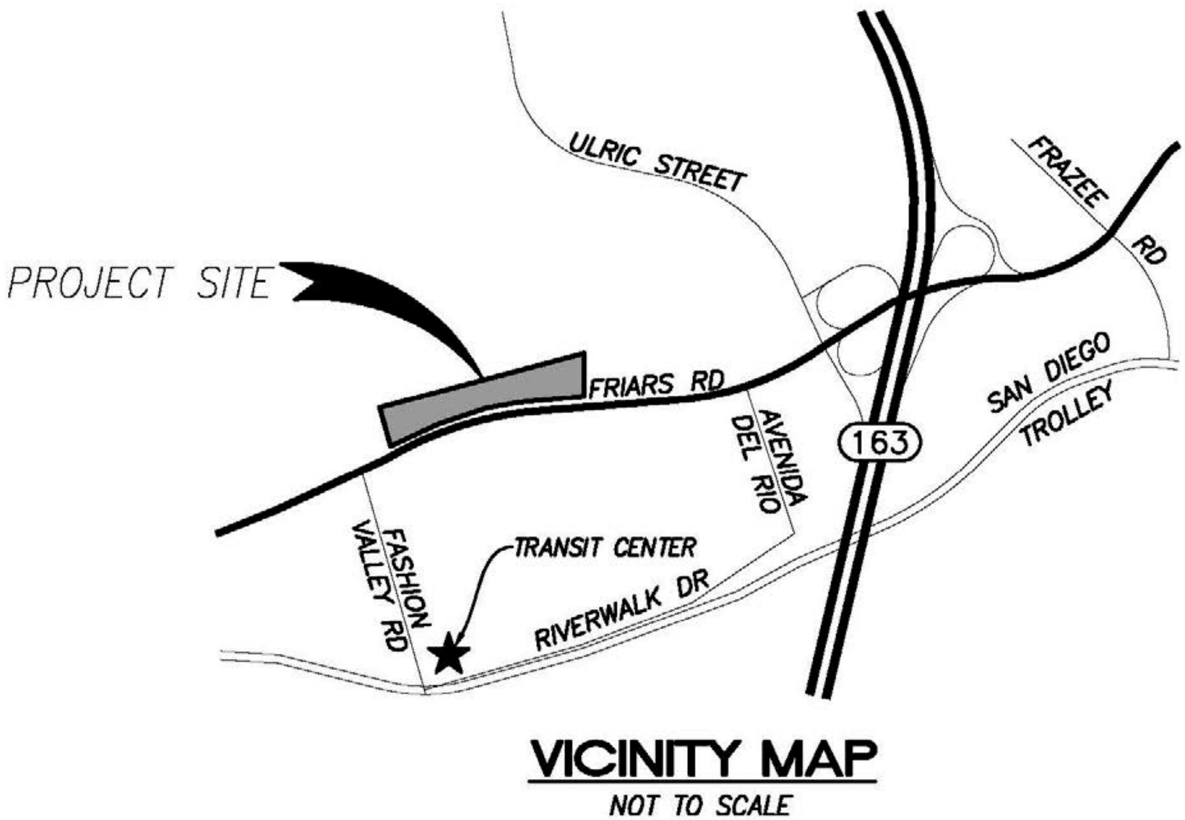
**PROJECT VICINITY MAP**

**Project Name: Friars Road Mixed Use**
**Permit Application Number: PDP 156192, SDP 1586193, VTM 1586194**



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**STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST**

Complete and attach DS-560 Form included in Appendix A.1

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| Applicability of Permanent, Post-Construction Storm Water BMP Requirements | | | Form I-1 |
|---|---|---|---|
| **Project Identification** | | | |
| Project Name: Friars Road Mixed Use | | | |
| Permit Application Number: PDP 156192, SDP 1586193, VTM 1586194 | | | Date: 09/13/2016 |
| **Determination of Requirements** | | | |
| The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.<br><br>Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop".<br>Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below. | | | |
| **Step** | **Answer** | **Progression** | |
| Step 1: Is the project a "development project"?<br>See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☒ Yes | Go to Step 2. | |
| | ☐ No | Stop.<br>Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below. | |
| Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):<br>Not Applicable | | | |
| Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions?<br>To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist. | ☐ Standard Project | Stop.<br>Standard Project requirements apply. | |
| | ☒ PDP | PDP requirements apply, including PDP SWQMP.<br>Go to Step 3. | |
| | ☐ PDP Exempt | Stop.<br>Standard Project requirements apply. Provide discussion and list any additional requirements below. | |
| Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:<br>Not Applicable | | | |

## Form I-1 Page 2

| Step | Answer | Progression |
|---|---|---|
| Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval?<br>See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☐ Yes | Consult the City Engineer to determine requirements.<br>Provide discussion and identify requirements below.<br>Go to Step 4. |
| | ☒ No | BMP Design Manual PDP requirements apply.<br>Go to Step 4. |
| Discussion / justification of prior lawful approval, and identify requirements (<u>not required if prior lawful approval does not apply</u>): | | |
| Step 4. Do hydromodification control requirements apply?<br>See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☐ Yes | PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6).<br>Go to Step 5. |
| | ☒ No | Stop.<br>PDP structural BMPs required for pollutant control (Chapter 5) only.<br>Provide brief discussion of exemption to hydromodification control below. |
| Discussion / justification if hydromodification control requirements do <u>not</u> apply:<br>Project runoff is conveyed via reinforced concrete pipe storm drain directly to The San Diego River, an exempt watershed. | | |
| Step 5. Does protection of critical coarse sediment yield areas apply?<br>See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☐ Yes | Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2).<br>Stop. |
| | ☒ No | Management measures not required for protection of critical coarse sediment yield areas.<br>Provide brief discussion below.<br>Stop. |
| Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply:<br>Project runoff is conveyed via reinforced concrete pipe storm drain directly to The San Diego River, an exempt watershed. | | |

| Site Information Checklist For PDPs | Form I-3B |
|---|---|
| Project Summary Information | |
| Project Name | Friars Road Mixed Use |
| Project Address | 6950, 7020, 7050 Friars Road San Diego, CA 92108 |
| Assessor's Parcel Number(s) (APN(s)) | 437-250-22, -23, -24 |
| Permit Application Number | PDP 156192, SDP 1586193, VTM 1586194 |
| Project Watershed | Select One:<br>☐ San Dieguito River<br>☐ Penasquitos<br>☐ Mission Bay<br>☒ San Diego River<br>☐ San Diego Bay<br>☐ Tijuana River |
| Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX) | Mission San Diego - 907.11 |
| Project Area<br>(total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way) | 5.43 Acres ( 236,520 Square Feet) |
| Area to be disturbed by the project<br>(Project Footprint) | 3.71 Acres (161,502 Square Feet) |
| Project Proposed Impervious Area<br>(subset of Project Footprint) | 2.47 Acres (107,537 Square Feet) |
| Project Proposed Pervious Area<br>(subset of Project Footprint) | 1.24 Acres (53,996 Square Feet) |
| Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area. | |
| The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition. | 18.3% (0.68 AC increase in impervious area/3.71 AC) |

| Form I-3B Page 2 of 11 |
|---|
| Description of Existing Site Condition and Drainage Patterns |
| Current Status of the Site (select all that apply):<br>☒ Existing development<br>☐ Previously graded but not built out<br>☐ Agricultural or other non-impervious use<br>☐ Vacant, undeveloped/natural<br>Description / Additional Information:<br>3 multi-story commercial buildings and a large asphalt concrete parking lot are currently present on site. |
| Existing Land Cover Includes (select all that apply):<br>☒ Vegetative Cover<br>☒ Non-Vegetated Pervious Areas<br>☒ Impervious Areas<br>Description / Additional Information:<br>The project site consists of vegetated and non-vegetated slopes and landscape/planter areas in addition to the buildings and hardscape mentioned above. |
| Underlying Soil belongs to Hydrologic Soil Group (select all that apply):<br>☒ NRCS Type A<br>☐ NRCS Type B<br>☐ NRCS Type C<br>☒ NRCS Type D |
| Approximate Depth to Groundwater (GW):<br>☐ GW Depth < 5 feet<br>☐ 5 feet < GW Depth < 10 feet<br>☐ 10 feet < GW Depth < 20 feet<br>☒ GW Depth > 20 feet (Encountered at ~ 54' MSL. Boring ground surface = 85' MSL) |
| Existing Natural Hydrologic Features (select all that apply):<br>☐ Watercourses<br>☐ Seeps<br>☐ Springs<br>☐ Wetlands<br>☒ None<br>Description / Additional Information:<br>Not Applicable |

| Form I-3B Page 3 of 11 |
| --- |
| Description of Existing Site Topography and Drainage: |
| How is storm water runoff conveyed from the site? At a minimum, this description should answer:<br>1. Whether existing drainage conveyance is natural or urban;<br>2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;<br>3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;<br>4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations. |
| Description / Additional Information: |
| The storm water runoff is classified as urban runoff as the majority of the site has already been developed. The hillside to the north has been previously disturbed and will be re-vegetated as part of the project's scope. In the existing condition, runoff comes off the hillside into existing Type F catch basins through an existing graded channel on the east and west portions of the site. Runoff then flows south through 18" and 30" private ACP storm drains into the public 30" RCP storm drain in Friars Road, and conveyed off site. Onsite runoff is collected in the parking lot through existing Type H catch basins and into the public storm drain in Friars Road through 10" private ACP storm drain. |

| Form I-3B Page 4 of 11 |
|---|
| Description of Proposed Site Development and Drainage Patterns |
| Project Description / Proposed Land Use and/or Activities:<br><br>The proposed project seeks to demolish the existing 3 office buildings on site and construct a new 8-story apartment building and 9-story condo building over a 2 level parking garage. The proposed condition utilizes the existing public storm drain on the east and west sides of the project and proposes two new type 'F' catch basins to capture the reduced hillside runoff from the existing condition. The hillside runoff has been reduced due to proposed re-stabilizing and re-vegetation of the eroded hillside areas. With the proposed design consisting of an apartment building, condo building, and podium parking garage, the rest of the site will utilize roof drains to bring runoff through storm drains within the garage footprint and outlet into one of a pair of private partial infiltration bio-filtration basin. We are proposing two partial infiltration bio-filtration basins, one for each of our on-site DMAs. Each will outlet via overflow catch basin to a private RCP storm drain which will outlet to the proposed RCP public storm drain in Friars Road. We are also proposing two public partial infiltration bio-filtration basins to collect runoff from the public-right-of-way. These BMPs will each be installed with multiple overflow catch basins which will connect to the 30" RCP public storm drain in Friars Road. |
| List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):<br><br>An apartment building and condo building will be built on top of a two story parking structure. Friars Road will be widened along the project frontage including a 5' sidewalk which will connect to stairwells leading to the parking structure/podium deck. A driveway will link vehicles from Friars Road to the parking structure on the East and West sides of the project. |
| List/describe proposed pervious features of the project (e.g., landscape areas):<br><br>The streetscape between the sidewalk and street will be improved with landscaping and street trees following the green streets design guidelines. The hillside disturbance will also be re-vegetated. Additionally, various types of planters and potted trees will be installed atop the podium parking structure. |
| Does the project include grading and changes to site topography?<br>☒ Yes<br>☐ No<br>Description / Additional Information:<br><br>Grading will occur into the hillside and will result in approximately 96,000 CY of export. |

## Form I-3B Page 5 of 11

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

The proposed condition will capture the hillside runoff via a concrete brow ditch which will be installed along the top of the wall. This runoff will connect to a proposed Type 'F' catch basin on the east side of the project which will be installed within the existing public storm drain which then connects directly to the storm drain system in Friars Road. On the west side of the project, another proposed Type 'F' catch basin will be installed within the existing public storm drain. It will then be piped via said public storm drain toward Friars Road and outlet through a proposed Type 'A' curb outlet before ultimately entering the storm drain system via curb inlet in Friars Road.

Runoff from the proposed apartment building, condo building, and parking garage will utilize roof drains to bring runoff through private storm drains within the garage footprint and into a pair of partial infiltration bio-filtration basins. Each partial infiltration bio-filtration basin will be equipped with overflow catch basins which will outlet via private RCP storm drain into the proposed public RCP storm drain in Friars Road.

Runoff from the public right-of-way will sheet flow to the curb & gutter along the project frontage and enter one of two public partial infiltration bio-filtration basin BMPs via curb-cuts. These basins will each be contain multiple overflow catch basins which will connect to the proposed public RCP storm drain in Friars Road.

All runoff from the project site will ultimately enter the existing Type 'B' inlet at the east side of Lot 2. This inlet connects to the public storm drain system within Friars Road which is piped east in Friars Road, then turns south through the Fashion Valley Mall site before discharging directly to the San Diego River.

Appendix B of the attached Preliminary Drainage Report (Attachment 5), contains Hydrologic Calculations including the 100 year pre- and post-project flows as follows:

Pre-project 100 year flow rate = 16.64 cfs. Post-project 100 year flow rate = 16.19 cfs. This decrease in runoff from the project site can be associated to change in land use (and associated runoff factors) from entirely commercial use to primarily residential use in conjunction with the re-vegetation and re-stabilization of the previously disturbed steep hillsides.

| Form I-3B Page 6 of 11 |
| --- |
| Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):<br>☒ On-site storm drain inlets<br>☒ Interior floor drains and elevator shaft sump pumps<br>☒ Interior parking garages<br>☒ Need for future indoor & structural pest control<br>☒ Landscape/Outdoor Pesticide Use<br>☒ Pools, spas, ponds, decorative fountains, and other water features<br>☐ Food service<br>☒ Refuse areas<br>☐ Industrial processes<br>☐ Outdoor storage of equipment or materials<br>☐ Vehicle and Equipment Cleaning<br>☐ Vehicle/Equipment Repair and Maintenance<br>☐ Fuel Dispensing Areas<br>☐ Loading Docks<br>☒ Fire Sprinkler Test Water<br>☐ Miscellaneous Drain or Wash Water<br>☒ Plazas, sidewalks, and parking lots<br>☐ Large Trash Generating Facilities<br>☐ Animal Facilities<br>☐ Plant Nurseries and Garden Centers<br>☐ Automotive-related Uses<br><br>Description / Additional Information: |

| Form I-3B Page 7 of 11 |
| --- |
| Identification and Narrative of Receiving Water |
| Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)<br><br>All runoff will ultimately enter the existing Type 'B' inlet at the east side of Lot 2. This inlet connects to the public storm drain system within Friars Road which is piped east in Friars Road, then turns south through the Fashion Valley Mall site before discharging directly to the San Diego River. Once runoff enters the San Diego River, it travels west within the River for approximately 5 miles before its ultimate convergence with The Pacific Ocean. |
| Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.<br><br>The 2010 California 303(d) List of Water Quality Limited Segments does not list any beneficial uses for the San Diego River. |
| Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations.<br><br>No ASBS are present in the receiving water downstream from our project site. |
| Provide distance from project outfall location to impaired or sensitive receiving waters.<br><br>Runoff travels approximately one half mile in the public storm drain system prior to discharging to the San Diego River |
| Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands.<br><br>The project site does not lie within the MHPA boundary or Environmentally Sensitive Lands, therefore, the permanent BMPs proposed for the project are not adjacent to the MHPA or any Environmentally Sensitive Lands. |

| Form I-3B Page 8 of 11 | | |
|---|---|---|
| Identification of Receiving Water Pollutants of Concern | | |
| List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies: | | |
| 303(d) Impaired Water Body | Pollutant(s)/Stressor(s) | TMDLs/ WQIP Highest Priority Pollutant |
| San Diego River (Lower) | Enterococcus, Fecal Coliform, Low Dissolved Oxygen, Manganese, Nitrogen, Phosphorous, Total Dissolved Solids, Toxicity | The San Diego River (Lower) Highest Priority Pollutant for both wet and dry weather is Bacteria as listed in the approved WQIP. |
| | | |
| | | |
| | | |
| | | |
| | | |

| Identification of Project Site Pollutants* | | | |
|---|---|---|---|
| *Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)<br>Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6): | | | |
| Pollutant | Not Applicable to the Project Site | Anticipated from the Project Site | Also a Receiving Water Pollutant of Concern |
| Sediment | NOT APPLICABLE<br>NO FLOW-THRU BMPs ARE PROPOSED | | |
| Nutrients | | | |
| Heavy Metals | | | |
| Organic Compounds | | | |
| Trash & Debris | | | |
| Oxygen Demanding Substances | | | |
| Oil & Grease | | | |
| Bacteria & Viruses | | | |
| Pesticides | | | |

## Form I-3B Page 9 of 11

### Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- ☐ Yes, hydromodification management flow control structural BMPs required.
- ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☒ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

The project will discharge runoff directly to The San Diego River which has been identified as appropriate for an exemption by the WMAA.

### Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

- ☐ Yes
- ☐ No

Discussion / Additional Information:

Not Applicable as hydromodification management requirements do not apply to the project.

| Form I-3B Page 10 of 11 |
| --- |
| Flow Control for Post-Project Runoff*<br>*This Section only required if hydromodification management requirements apply |
| List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.<br><br>Not Applicable as hydromodification management requirements do not apply to the project |
| Has a geomorphic assessment been performed for the receiving channel(s)?<br>☐ No, the low flow threshold is 0.1Q2 (default low flow threshold)<br>☐ Yes, the result is the low flow threshold is 0.1Q2<br>☐ Yes, the result is the low flow threshold is 0.3Q2<br>☐ Yes, the result is the low flow threshold is 0.5Q2<br><br>If a geomorphic assessment has been performed, provide title, date, and preparer:<br><br>Not Applicable as hydromodification management requirements do not apply to the project |
| Discussion / Additional Information: (optional)<br><br>Not Applicable as hydromodification management requirements do not apply to the project |

| Form I-3B Page 11 of 11 |
|---|
| Other Site Requirements and Constraints |
| When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.<br><br>Not Applicable as hydromodification management requirements do not apply to the project |
| Optional Additional Information or Continuation of Previous Sections As Needed |
| This space provided for additional information or continuation of information from previous sections as needed.<br><br>Not Applicable as hydromodification management requirements do not apply to the project |

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| Source Control BMP Checklist for All Development Projects | | | Form I-4 |
|---|---|---|---|
| **Source Control BMPs** | | | |
| All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.<br><br>Answer each category below pursuant to the following.<br>• "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.<br>• "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.<br>• "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided. | | | |
| **Source Control Requirement** | **Applied?** | | |
| SC-1 Prevention of Illicit Discharges into the MS4 | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-1 not implemented: | | | |
| SC-2 Storm Drain Stenciling or Signage | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-2 not implemented: | | | |
| SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-3 not implemented: | | | |
| SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SC-4 not implemented:<br><br>No outdoor work areas are proposed by the project. | | | |
| SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-5 not implemented: | | | |

| Form I-4 Page 2 of 2 | | | |
|---|---|---|---|
| Source Control Requirement | Applied? | | |
| SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below) | | | |
| On-site storm drain inlets | ☒ Yes | ☐ No | ☐ N/A |
| Interior floor drains and elevator shaft sump pumps | ☒ Yes | ☐ No | ☐ N/A |
| Interior parking garages | ☒ Yes | ☐ No | ☐ N/A |
| Need for future indoor & structural pest control | ☒ Yes | ☐ No | ☐ N/A |
| Landscape/Outdoor Pesticide Use | ☒ Yes | ☐ No | ☐ N/A |
| Pools, spas, ponds, decorative fountains, and other water features | ☒ Yes | ☐ No | ☐ N/A |
| Food service | ☐ Yes | ☐ No | ☒ N/A |
| Refuse areas | ☒ Yes | ☐ No | ☐ N/A |
| Industrial processes | ☐ Yes | ☐ No | ☒ N/A |
| Outdoor storage of equipment or materials | ☐ Yes | ☐ No | ☒ N/A |
| Vehicle/Equipment Repair and Maintenance | ☐ Yes | ☐ No | ☒ N/A |
| Fuel Dispensing Areas | ☐ Yes | ☐ No | ☒ N/A |
| Loading Docks | ☐ Yes | ☐ No | ☒ N/A |
| Fire Sprinkler Test Water | ☒ Yes | ☐ No | ☐ N/A |
| Miscellaneous Drain or Wash Water | ☒ Yes | ☐ No | ☐ N/A |
| Plazas, sidewalks, and parking lots | ☒ Yes | ☐ No | ☐ N/A |
| SC-6A: Large Trash Generating Facilities | ☐ Yes | ☐ No | ☒ N/A |
| SC-6B: Animal Facilities | ☐ Yes | ☐ No | ☒ N/A |
| SC-6C: Plant Nurseries and Garden Centers | ☐ Yes | ☐ No | ☒ N/A |
| SC-6D: Automotive-related Uses | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.<br><br>All potential sources of runoff pollutants will be identified on the Final Engineering reports and plans. | | | |

| Source Control BMP Checklist for All Development Projects | Form I-4 |
|---|---|

**Site Design BMPs**

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

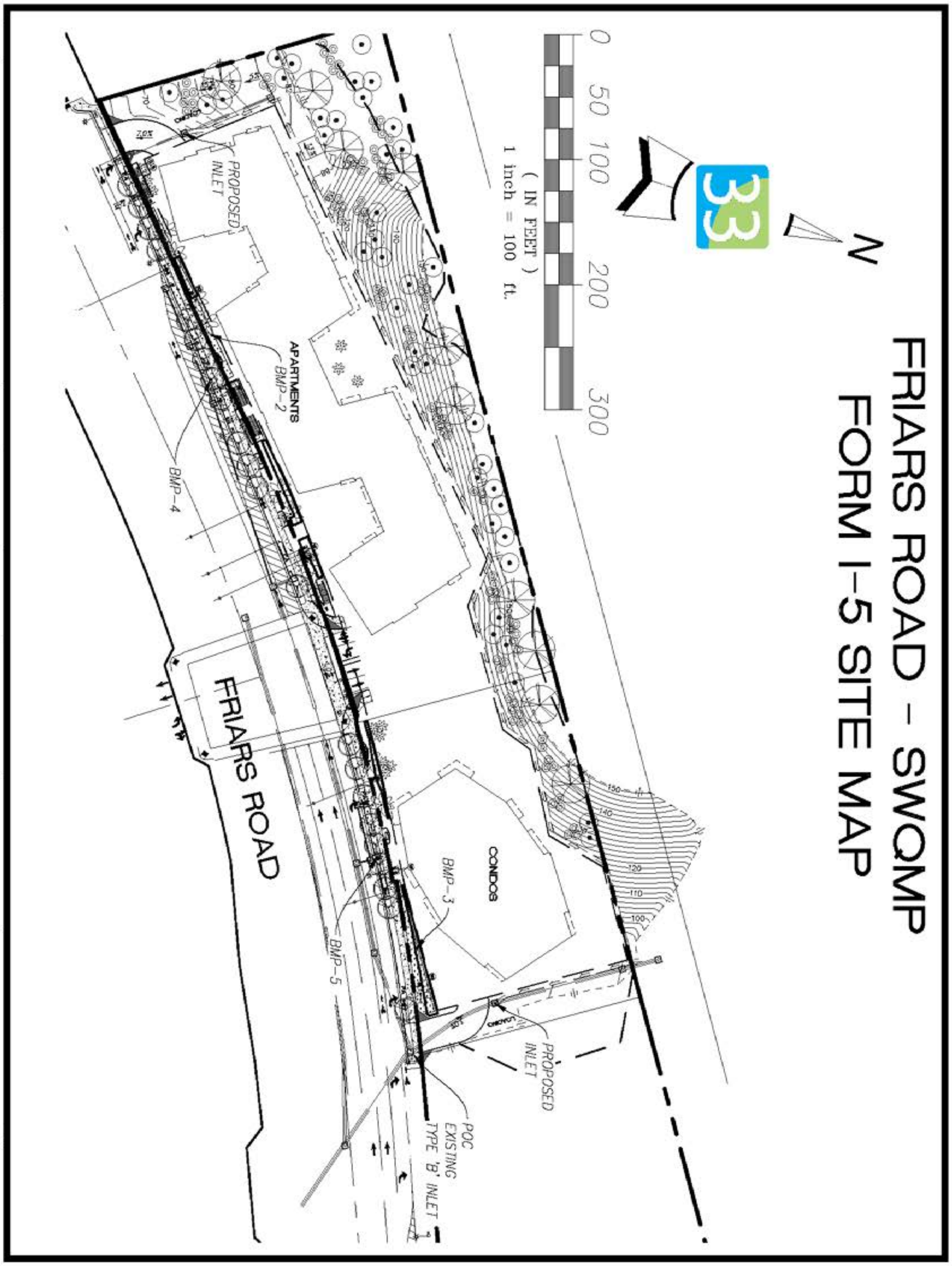
| Site Design Requirement | Applied? | | |
|---|---|---|---|
| SD-1 Maintain Natural Drainage Pathways and Hydrologic Features | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SD-1 not implemented:<br><br>The project site's previous development altered the Natural Drainage Pathways, therefore, they cannot be maintained. Additionally, no Hydrologic Features are presently found on the project site. | | | |
| 1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map? | ☐ Yes | ☒ No | |
| 1-2 Are trees implemented? If yes, are they shown on the site map? | ☒ Yes | ☐ No | |
| 1-3 Implemented trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)? | ☒ Yes | ☐ No | |
| 1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E? | ☒ Yes | ☐ No | |
| SD-2 Have natural areas, soils and vegetation been conserved? | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-2 not implemented: | | | |

Form I-5 Page 2 of 4

| Site Design Requirement | Applied? | | |
|---|---|---|---|
| SD-3 Minimize Impervious Area | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-3 not implemented: | | | |
| SD-4 Minimize Soil Compaction | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-4 not implemented: | | | |
| SD-5 Impervious Area Dispersion | ☐ Yes | ☒ No | ☐ N/A |
| Discussion / justification if SD-5 not implemented:<br><br>Project proposes two large towers atop a podium parking structure. The pervious areas adjacent to the parking structure are either part of the public-right-of-way or part of a steep hillside. In each case, it is either not practical or not legal to discharge runoff onto these areas. | | | |
| 5-1 Is the pervious area receiving runon from impervious area identified on the site map? | ☐ Yes | ☐ No | ☒ N/A |
| 5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.) | ☐ Yes | ☐ No | ☒ N/A |
| 5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E? | ☐ Yes | ☐ No | ☒ N/A |

| Form I-5 Page 3 of 4 | | | |
|---|---|---|---|
| Site Design Requirement | Applied? | | |
| SD-6 Runoff Collection | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-6 not implemented: | | | |
| 6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map? | ☐ Yes | ☒ No | |
| 6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E? | ☐ Yes | ☐ No | ☒ N/A |
| 6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site | ☐ Yes | ☒ No | |
| 6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E? | ☐ Yes | ☒ No | |
| SD-7 Landscaping with Native or Drought Tolerant Species | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-7 not implemented: | | | |
| SD-8 Harvesting and Using Precipitation | ☐ Yes | ☒ No | ☐ N/A |
| Discussion / justification if SD-8 not implemented:<br><br>Per the results of Form I-7 (Attachment 1c), Harvest and Re-use is determined to be **infeasible** for the project site. | | | |
| 8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map? | ☐ Yes | ☒ No | |
| 8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E? | ☐ Yes | ☒ No | |

Insert Site Map with all site design BMPs identified:



| Summary of PDP Structural BMPs | Form I-6 |
|---|---|
| PDP Structural BMPs | |

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

**Step 1:** Calculate Design Capture Volume

After the site has been delineated into Drainage Management Areas (DMAs), area takeoffs were performed to determine the type of groundcover of each DMA. This is taken to account in Worksheet B.2-1. A design capture volume was generated for each DMA.

**Step 2:** Is Harvest and Re-use Feasible

Per the attached Form I-7, harvest and re-use was determined to be infeasible for the project site.

**Step 3:** Is infiltration feasible

**3a & 3b:** Per field tests and geotechnical explorations, an infiltration rate on site was determined to be approximately 0.1 in/hr. A rate of this scale is enough to place the project into a **Partial Infiltration Condition**

**3c:** Compute sizing requirements

Determine required minimum Bio-filtration BMP footprint and determine if feasible:

Utilizing worksheet B.5-1, a minimum Bio-filtration BMP footprint was determined for each basin. Due to the project site's steep hillsides and large podium parking structure design, the minimum required footprint was determined to be too large and therefore infeasible for DMA 2 & DMA 3.

Therefore, utilizing worksheet B.5-2, an alternate sizing factor was generated for DMA 2 & DMA 3 based on land-use and run-off coefficient. This newly acquired sizing factor value was then entered into worksheet B.5-1 to determine if the minimum footprint would reduce enough such that Bio-filtration BMPs could be implemented on site. The reduced minimum BMP footprint size was attainable on site in the strip of landscaping between the public right-of-way and the face of the proposed parking structure.

DMA 4 & DMA 5 minimum footprint sizes within Friars Road were determined to be feasible. The project proposes to implement "green streets" by installing a partial infiltration bio-filtration basin in DMA 4 & DMA 5 within the Friars Road parkway. A partial infiltration bio-filtration basin footprint greater than the minimum required per worksheet B.5-1 has been proposed for each of these two DMAs.

## Form I-6 Page 2 of 10

(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

**Step 4:** Can BMP be designed for remaining DCV

It was determined that the bio-filtration BMPs could be designed for the remaining DCV.

**4a:** For the partial infiltration BMPs, we were able to provide the minimum reduction in DCV as a portion of the DCV retained within the BMP. Utilizing the Volume retention performance standards, we were able to compare our infiltration rate to the % Average Annual Retention and determined the required fraction of DCV for retention. It was determined in each case that we were able to provide the minimum required fraction of DCV retained for partial infiltration condition. (Please reference the calculations in Worksheet B.5-1 for each DMA within Attachment 1e).

**Step 5: Not applicable as flow-thru treatment is not proposed.**

**Step 6 & 7:** Prepare O&M requirements

Maintenance requirements can be found within Attachment 3 of this SWQMP report. Additionally, for maintenance of private BMPs, a Storm Water Management Discharge Control Maintenance Agreement will be prepared and issued during the Final Engineering documents.

**Step 7:** Prepare Storm Water Quality Management Plan

This report serves as the Storm Water Quality Management Plan.

| Form I-6 Page 3 of 10 (Copy as many as needed) | |
|---|---|
| Structural BMP Summary Information | |
| Structural BMP ID No. "BMP-2" | |
| Construction Plan Sheet No. "TBD" | |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (Provide BMP type / Description in discussion section below<br>☐ Flow-thru treatment control included as pre-treatment / forebay for an onsite retention or biofiltration BMP (provide BMP type / description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type / description in discussion section below<br>☐ Detention pond of vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment / forebay for another structural BMP<br>☐ Other (describe in discussion section below | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Matthew J. Semic<br>Latitude 33 Planning & Engineering<br>9968 Hibert Street 2nd Floor, San Diego, CA 92131<br>Matt.semic@latitude33.com |
| Who will be the final owner of this BMP? | Project Owner aka<br>LCG Friars, LLC |
| Who will maintain this BMP into perpetuity? | Property Owner<br>Currently LCG Friars, LLC |
| What is the funding mechanism for maintenance? | Paid for by LCG Friars, LLC |

| Form I-6 Page 4 of 10 (Copy as many as needed) |
| --- |
| Structural BMP ID No. "BMP-2" |
| Construction Plan Sheet No. "TBD" |

Discussion (as needed):

BMP-2 was sized utilizing worksheet B.5-1 with alternative sizing factor calculated by worksheet B.5-2 (see calculation worksheets in Attachment 1e).

The required minimum BMP footprint for DMA 2 from worksheet B.5-1 is **685.7 sq-ft**.

The proposed BMP-2 has a footprint of **775 sq-ft** > **685.7 sq-ft** OK

Volume Reduction:

Utilizing worksheet D.5-1 Factor of Safety and Design Infiltration Rate Worksheet, our design infiltration rate was determined to be 0.044in/hr.

With the minimum area of 685.7 sq-ft a 2" depth of runoff that can be infiltrated, 193.4 cubic-feet is infiltrated, equal to a 10.9% reduction in our DCV which is greater than the required 10%.

| Form I-6 Page 5 of 10 (Copy as many as needed) | |
|---|---|
| Structural BMP Summary Information | |
| Structural BMP ID No. "BMP-3" | |
| Construction Plan Sheet No. "TBD" | |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (Provide BMP type / Description in discussion section below<br>☐ Flow-thru treatment control included as pre-treatment / forebay for an onsite retention or biofiltration BMP (provide BMP type / description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type / description in discussion section below<br>☐ Detention pond of vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment / forebay for another structural BMP<br>☐ Other (describe in discussion section below | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Matthew J. Semic<br>Latitude 33 Planning & Engineering<br>9968 Hibert Street 2nd Floor, San Diego, CA 92131<br>Matt.semic@latitude33.com |
| Who will be the final owner of this BMP? | Project Owner aka<br>LCG Friars, LLC |
| Who will maintain this BMP into perpetuity? | Property Owner<br>Currently LCG Friars, LLC |
| What is the funding mechanism for maintenance? | Paid for by LCG Friars, LLC |

| Form I-6 Page 6 of 10 (Copy as many as needed) |
|---|
| Structural BMP ID No. "BMP-3" |
| Construction Plan Sheet No. "TBD" |

Discussion (as needed):

BMP-3 was sized utilizing worksheet B.5-1 with alternative sizing factor calculated by worksheet B.5-2 (see calculation worksheets in Attachment 1e).

The required minimum BMP footprint for DMA 2 from worksheet B.5-1 is **726.5 sq-ft**.

The proposed BMP-2 has a footprint of **800 sq-ft** > **726.5 sq-ft** OK

Volume Reduction:

Utilizing worksheet D.5-1 Factor of Safety and Design Infiltration Rate Worksheet, our design infiltration rate was determined to be 0.044in/hr.

With the minimum area of 726.5 sq-ft a 2" depth of runoff that can be infiltrated, 204.9 cubic-feet is infiltrated, equal to a 10.9% reduction in our DCV which is greater than the required 10%.

| Form I-6 Page 7 of 10 (Copy as many as needed) | |
|---|---|
| Structural BMP Summary Information | |
| Structural BMP ID No. "BMP-4" | |
| Construction Plan Sheet No. "TBD" | |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (Provide BMP type / Description in discussion section below<br>☐ Flow-thru treatment control included as pre-treatment / forebay for an onsite retention or biofiltration BMP (provide BMP type / description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type / description in discussion section below<br>☐ Detention pond of vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment / forebay for another structural BMP<br>☐ Other (describe in discussion section below | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Matthew J. Semic<br>Latitude 33 Planning & Engineering<br>9968 Hibert Street 2nd Floor, San Diego, CA 92131<br>Matt.semic@latitude33.com |
| Who will be the final owner of this BMP? | The City of San Diego |
| Who will maintain this BMP into perpetuity? | The City of San Diego operations and Maintenance at the discretion of the City Engineer |
| What is the funding mechanism for maintenance? | Paid for by LCG Friars, LLC |

| Form I-6 Page 8 of 10 (Copy as many as needed) |
|---|
| Structural BMP ID No. "BMP-4" |
| Construction Plan Sheet No. "TBD" |

Discussion (as needed):

The "Green Street" section of the project is incorporating a biofiltration basin, sized sufficiently for pollution control using Table B5-1 (see below). In order to provide treatment, curb cuts along Friars Road will be necessary throughout the biofiltration area to collect runoff from the widened street. Rocks within the basins will be required to prevent erosion as well as multiple overflow inlets. Please reference sheet 3 of the Tentative Map for a typical cross section of the biofiltration basins and the basin locations in plan view.

BMP-4 was sized utilizing worksheet B.5-1(see calculation worksheets in Attachment 1e).

The required minimum BMP footprint for DMA 4 from worksheet B.5-1 is **413.8 sq-ft**.

The proposed BMP-4 has a footprint of **536 sq-ft** > **413.8 sq-ft** OK

Volume Reduction:

Utilizing worksheet D.5-1 Factor of Safety and Design Infiltration Rate Worksheet, our design infiltration rate was determined to be 0.044in/hr.

With the minimum area of 229.4 sq-ft (from line 23 of worksheet B.5-1) a 2" depth of runoff that can be infiltrated, 64.7 cubic-feet is infiltrated, equal to a 10.9% reduction in our DCV which is greater than the required 10%. With our proposed footprint of 536 sq-ft, 151.2 cubic-feet is infiltrated, equal to a 25.4% reduction in our DCV.

| Form I-6 Page 9 of 10 (Copy as many as needed) | |
|---|---|
| Structural BMP Summary Information | |
| Structural BMP ID No. "BMP-5" | |
| Construction Plan Sheet No. "TBD" | |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (Provide BMP type / Description in discussion section below<br>☐ Flow-thru treatment control included as pre-treatment / forebay for an onsite retention or biofiltration BMP (provide BMP type / description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type / description in discussion section below<br>☐ Detention pond of vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment / forebay for another structural BMP<br>☐ Other (describe in discussion section below | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Matthew J. Semic<br>Latitude 33 Planning & Engineering<br>9968 Hibert Street 2nd Floor, San Diego, CA 92131<br>Matt.semic@latitude33.com |
| Who will be the final owner of this BMP? | The City of San Diego |
| Who will maintain this BMP into perpetuity? | The City of San Diego operations and Maintenance at the discretion of the City Engineer |
| What is the funding mechanism for maintenance? | Paid for by LCG Friars, LLC |

## Form I-6 Page 10 of 10 (Copy as many as needed)

Structural BMP ID No. "BMP-5"

Construction Plan Sheet No. "TBD"

Discussion (as needed):

The "Green Street" section of the project is incorporating a biofiltration basin, sized sufficiently for pollution control using Table B5-1 (see below). In order to provide treatment, curb cuts along Friars Road will be necessary throughout the biofiltration area to collect runoff from the widened street. Rocks within the basins will be required to prevent erosion as well as multiple overflow inlets. Please reference sheet 3 of the Tentative Map for a typical cross section of the biofiltration basins and the basin locations in plan view.

BMP-5 was sized utilizing worksheet B.5-1(see calculation worksheets in Attachment 1e).

The required minimum BMP footprint for DMA 5 from worksheet B.5-1 is **276.7 sq-ft**.

The proposed BMP-5 has a footprint of **281 sq-ft** > **276.7 sq-ft** OK

Volume Reduction:

Utilizing worksheet D.5-1 Factor of Safety and Design Infiltration Rate Worksheet, our design infiltration rate was determined to be 0.044in/hr.

With the minimum area of 157 sq-ft (from line 23 of worksheet B.5-1) a 2" depth of runoff that can be infiltrated, 44.3 cubic-feet is infiltrated, equal to a 10.9% reduction in our DCV which is greater than the required 10%. With our proposed footprint of 281 sq-ft, 79.2 cubic-feet is infiltrated, equal to a 19.5% reduction in our DCV.

City of San Diego
**Development Services**
1222 First Ave., MD-302
San Diego, CA 92101
(619) 446-5000

# Permanent BMP Construction

**Self Certification Form**

FORM
DS-563
January 2016

| | |
|---|---|
| Date Prepared: | Project No.: |
| Project Applicant: | Phone: |
| Project Address: | |
| Project Engineer: | Phone: |

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

**CERTIFICATION:**
As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No.______________________; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

**Signature:** ______________________________

**Date of Signature:** ______________________________

**Printed Name:** ______________________________

**Title:** ______________________________

**Phone No.** ______________________________

Engineer's Stamp

DS-563 (01-16)

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# ATTACHMENT 1
# BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 1a** | DMA Exhibit (Required)<br><br>See DMA Exhibit Checklist. | ☒ Included |
| **Attachment 1b** | Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)*<br><br>*Provide table in this Attachment OR on DMA Exhibit in Attachment 1a | ☒ Included on DMA Exhibit in Attachment 1a<br><br>☐ Included as Attachment 1b, separate from DMA Exhibit |
| **Attachment 1c** | Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs)<br><br>Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7. | ☒ Included<br><br>☐ Not included because the entire project will use infiltration BMPs |
| **Attachment 1d** | Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs)<br><br>Refer to Appendices C and D of the BMP Design Manual to complete Form I-8. | ☒ Included<br><br>☐ Not included because the entire project will use harvest and use BMPs |
| **Attachment 1e** | Pollutant Control BMP Design Worksheets / Calculations (Required)<br><br>Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations | ☒ Included |

**Use this checklist to ensure the required information has been included on the DMA Exhibit:**

The DMA Exhibit must identify:

- ☒ Underlying hydrologic soil group
- ☒ Approximate depth to groundwater
- ☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☒ Critical coarse sediment yield areas to be protected (Not Applicable to this project)
- ☒ Existing topography and impervious areas
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☒ Structural BMPs (identify location, type of BMP, and size/detail)

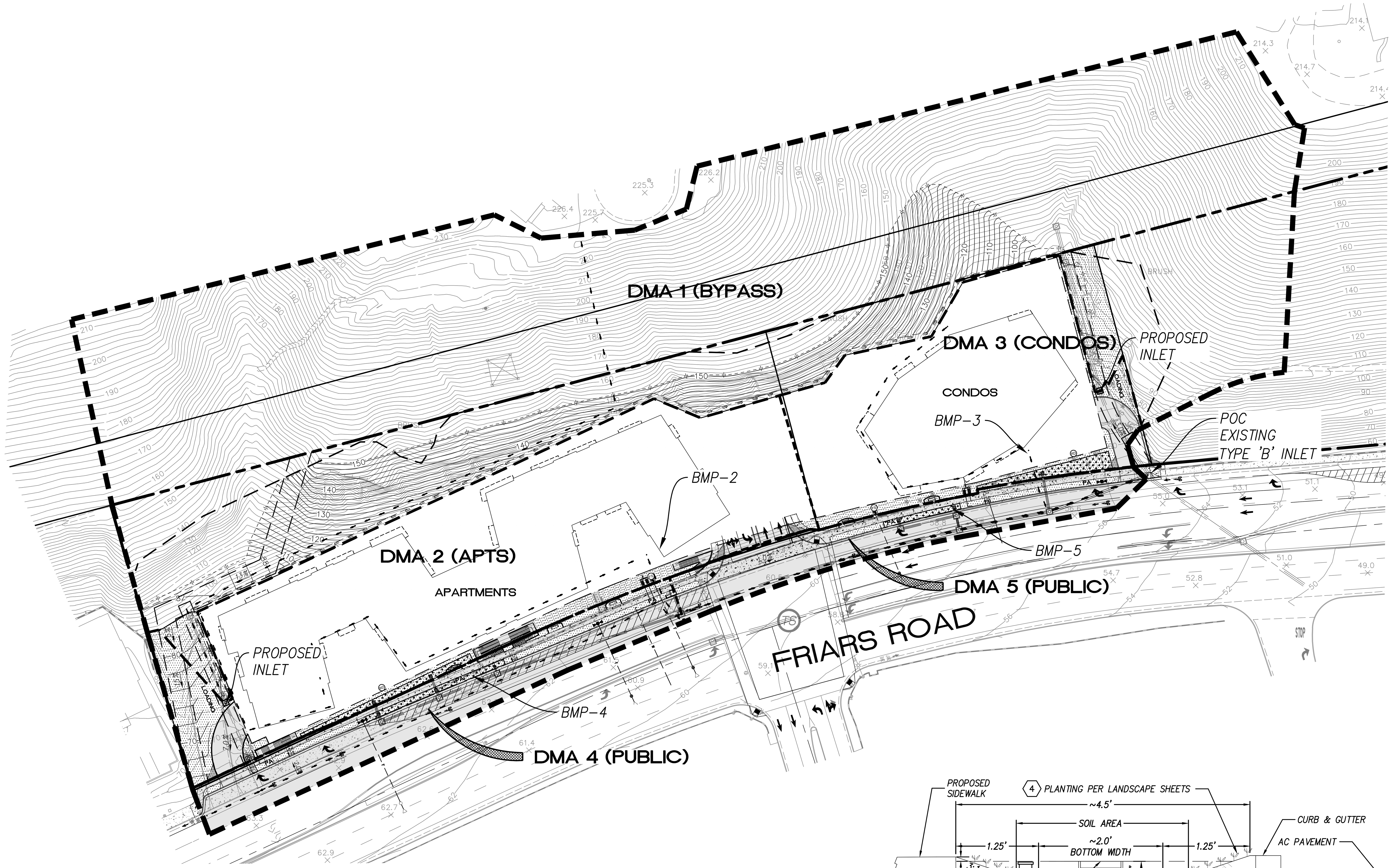
# DMA SUMMARY TABLE

| DMA 2 - APARTMENTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME | AREA (SF) | POST PROJECT SURFACE | DMA RUNOFF FACTOR | DMA AREA X RUNOFF | WEIGHTED RUNOFF FACTOR | REQ'D TREATMENT FLOW-RATE (CFS) | BMP FLOW-RATE CAPACITY (CFS) |
| DMA 2-1 | 57,312 | IMPERVIOUS BUILDING | 0.9 | 51,581 | – | – | BMP-2 |
| DMA 2-2 | 2,844 | IMPERVIOUS HARDSCAPE | 0.9 | 2,560 | – | – | – |
| DMA 2-3 | 6,643 | PERVIOUS LANDSCAPE | 0.1 | 664 | – | – | – |
| TOTAL AREA | 66,799 | | | 54,805 | .82 | 0.376 | 0.462 |

| DMA 3 - CONDOS | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME | AREA (SF) | POST PROJECT SURFACE | DMA RUNOFF FACTOR | DMA AREA X RUNOFF | WEIGHTED RUNOFF FACTOR | REQ'D TREATMENT FLOW-RATE (CFS) | BMP FLOW-RATE CAPACITY (CFS) |
| DMA 2-1 | 31,523 | IMPERVIOUS BUILDING | 0.9 | 28,371 | – | – | BMP-3 |
| DMA 2-2 | 1,119 | IMPERVIOUS HARDSCAPE | 0.9 | 1,007 | – | – | – |
| DMA 2-3 | 3,611 | PERVIOUS LANDSCAPE | 0.1 | 361 | – | – | – |
| TOTAL AREA | 36,253 | | | 29,739 | .82 | 0.204 | 0.237 |

| DMA 4 - PUBLIC | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME | AREA (SF) | POST PROJECT SURFACE | DMA RUNOFF FACTOR | DMA AREA X RUNOFF | WEIGHTED RUNOFF FACTOR | REQ'D FOOTPRINT OF BMP (SF) | BMP FOOTPRINT PROVIDED (SF) |
| DMA 4-1 | 14,979 | IMPERVIOUS HARDSCAPE | 0.9 | 13,481 | – | – | – |
| DMA 4-2 | 2,483 | PERVIOUS LANDSCAPE | 0.1 | 248 | – | – | – |
| TOTAL AREA | 17,462 | | | 13,729 | .79 | 414 | 536 |

| DMA 5 - PUBLIC | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME | AREA (SF) | POST PROJECT SURFACE | DMA RUNOFF FACTOR | DMA AREA X RUNOFF | WEIGHTED RUNOFF FACTOR | REQ'D FOOTPRINT OF BMP (SF) | BMP FOOTPRINT PROVIDED (SF) |
| DMA 5-1 | 10,325 | IMPERVIOUS HARDSCAPE | 0.9 | 9,293 | – | – | – |
| DMA 5-2 | 921 | PERVIOUS LANDSCAPE | 0.1 | 92 | – | – | – |
| TOTAL AREA | 11,246 | | | 9,385 | .83 | 277 | 281 |




## EXISTING SITE INFORMATION

HYDROLOGIC SOIL GROUP: "A" AS LOAMY SANDS AND "D" AS STADIUM CONGLOMERATE.

GROUNDWATER: GROUNDWATER NOT ENCOUNTERED WITHIN ~ 31 FEET IN BORINGS PER REPORT BY SP CALSOPILS & TESTING ENTITLED "GEOTECHNICAL INVESTIGATION FRIARS ROAD APARTMENT DEVELOPMENT SAN DIEGO, CALIFORNIA" DATED OCTOBER 15, 2014. GROUNDWATER DEPTH IS MEASURED AT APPROXIMATE ELEVATION OF 54' MSL.

EXISTING NATURAL HYDROLOGIC FEATURES: NO NATURAL HYDROLOGIC FEATURES EXIST ONSITE.

EXISTING TOPOGRAPHY AND IMPERVIOUS AREA: EXISTING TOPOGRAPHY SHOWN HEREON. SEE AREA SUMMARY TABLE FOR EXISTING IMPERVIOUS AREA.

EXISTING DRAINAGE: DRAINAGE FROM THE SLOPE ABOVE TEH SITE IS COLLECTED IN A BROW DITCH AND CONVEYED TO CATCH BASINS ON THE EAST AND WEST SIDS OF THE PROJECT AS SHOWN HEREON. THESE DISCHARGE ONTO FRIARS ROAD AND RUNOFF IS COLLECTED BY A TYPE 'B' CURB INLET ON THE EAST FRONTAGE OF THE PROJECT. OTHER ON-SITE DRAINAGE IS CAPTURED IN CATCH BASINS AND PIPED TO FRIARS ROAD OR SHEET FLOWS TO THE SAME TYPE 'B' INLET. ALL RUNOFF FROM THE PROJECT ENTERS THE PUBLIC STORM DRAIN SYSTEM AND IS CONVEYED DIRECTLY TO THE SAN DIEGO RIVER WATERSHED.

## PROPOSED SITE INFORMATION

PROPOSED DRAINAGE: RUNOFF FROM THE SLOPE BEHIND THE PROJECT (DMA 1 - BYPASS) WILL ENTER A PROPOSED CONCRETE BROW DITCH WHICH WILL CONVEY RUNOFF TO THE EXISTIN CATCH BASINS IN THE HILLSIDE AND OUTLET TO FRIARS ROAD. RUNOFF CAPTURED ON-SITE (DMA 2 -APARTMENTS AND DMA 3 CONDOS) WILL BE COLLECTED VIA PRIVATE STORM DRAIN SYSTEM INSTALLED ON THE PODIUM DECK OF THE PARKING GARAGE AND BUILDING ROOFS AND WILL BE PIPED DIRECTLY TO BIOFILTRATION BASINS LOCATED BETWEEN THE PROPOSED BUILDINGS AND FRIARS RIGHT-OF-WAY BEFORE BEING PIPED INTO THE PROPOSED STORM DRAIN SYSTEM WITHIN FRIARS ROAD. RUNOFF CAPTURED WITHIN FRIARS ROAD (DMA 4 & 5 - PUBLIC) WILL BE COLLECTED VIA CURB CUTS INTO TWO BIOFILTRATION BASINS BEFORE CONNECTING TO THE TYPE' 'B' INLET ON THE EAST FRONTAGE OF THE PROJECT.

PROPOSED GRADING: SHOWN HEREON.

PROPOSED IMPERVIOUS FEATURES: SHOWN HEREON.

PROPOSED DRAINAGE: SHOWN HEREON.

PROPOSED DESIGN FEATURES: SITE DESIGN REQUIREMENTS SHOWN HEREON. SEE FORM I-4 FOR EXPLANATION.

DRAINAGE MANAGEMENT AREAS: SHOWN HEREON. SEE DMA SUMMARY TABLE.

POTENTIAL POLLUTANT SOURCE AREAS AND SOURCE CONTROL: SHOWN HEREON. SEE FORMS 1-3B AND 1-4 FOR EXPLANATION.

STRUCTURAL BMPS: BF-1 BIOFILTRATION SHOWN HEREON. SEE SHEET 2 FOR DETAILS.

## LEGEND

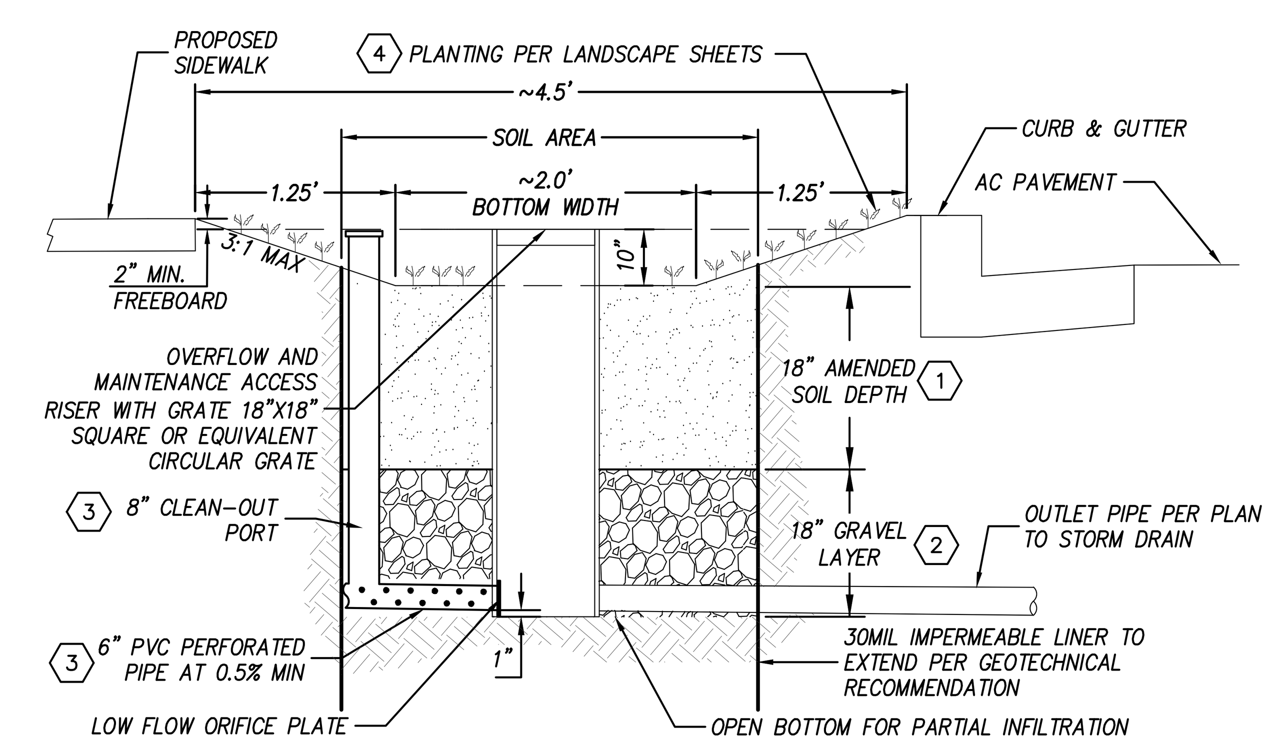
- SHEET FLOW PATH
- CONCENTRATED FLOW PATH
- WATERSHED BOUNDARY
- IMPERVIOUS HARDSCAPE
- BIOFILTRATION BASIN (BMP-X)
- PERVIOUS LANDSCAPE
- IMPERVIOUS BUILDING
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN

## SITE MAP NOTES

- NO MATERIALS TO BE EXPOSED TO STORMWATER RUNOFF
- NO BUILDING OR POLLUTANT GENERATING ACTIVITY AREAS ARE PROPOSED (FUELING, GARAGES, WASTE CONTAINERS, WASH RACKS, HAZARDOUS MATERIALS)
- NO ONSITE AREAS OF POTENTIAL EROSION
- NO EXISTING DRINKING WATER WELLS

## BIOFILTRATION BASIN NOTES

1. AMENDED SOIL SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.4 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL MAINTAIN A MINIMUM INFILTRATION RATE OF 5 IN/HR OVER THE LIFETIME OF THE FACILITY.
2. GRAVEL STORAGE LAYER SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.5 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL CONSIST OF 6" FILTER COURSE OVER 12" OF CLEAN WASHED ASTM #57 OPEN GRADED STONE. FILTER COURSE SHALL CONSIST OF 3" LAYER OF CLEAN WASHED ASTM 33 FINE AGGREGATE SAND OVERLYING A 3" LAYER OF ASTM NO 8 STONE.
3. UNDERDRAINS SHALL BE MINIMUM 6" SLOTTED PVC PIPE CONFORMING TO ASTM D3034 OR CORRUGATED HDP CONFORMING TO AASHTO 252M. CLEANOUT PORTS SHALL BE A MINIMUM 8" DIAMETER WITH LOCKABLE CAP AND PLACED EVERY 50' OF UNDERDRAIN LENGTH.
4. BIOFILTRATION BASINS SHALL BE PLANTED WITH ADEQUATE GROUNDCOVER AS OUTLINED IN APPENDIX E OF THE SAN DIEGO LOW IMPACT DEVELOPMENT DESIGN MANUAL. SEE LANDSCAPE PLANS SHEETS 31, 33, 34, 36 AND 38 FOR PLANTING PLAN. 'DEER GRASS' AND 'YARROW' PROPOSED.




## BIOFILTRATION BASIN DETAIL

NOT TO SCALE

| AREA SUMMARY TABLE<br>SEE FORM I3-B OF SWQMP REPORT (SITE INFORMATION CHECKLIST) | | | |
|---|---|---|---|
| | EXISTING CONDITION | PROPOSED CONDITION | DIFFERENCE |
| IMPERVIOUS AREA | 77,995 SF (1.79 AC) – 48% | 107,537 SF (2.47 AC) – 67% | +29,542 SF (0.68 AC) |
| PERVIOUS AREA | 83,508 (1.92 AC) – 52% | 53,996 SF (1.24 AC) –33% | –29,542 SF (0.68 AC) |
| **TOTAL AREA** | **161,503 SF (3.71 AC)** | **161,503 SF (3.71 AC)** | --- |

* NOTE: DMA/BASIN CONFIGURATION TAKES INTO ACCOUNT OFFSITE AREAS WHICH DRAIN ONTO THE PROJECT SITE. THE AREAS IN THIS TABLE ARE IN CONFORMANCE WITH FORM I3-B OF THE SWQMP AND ONLY ACCOUNT FOR THE "PROJECT FOOTPRINT".

N

0 20 40 80
( IN FEET )
1 inch = 40 ft.

SHEET 1 OF 1

FRIARS ROAD MIXED USE
**DMA EXHIBIT**

SCALE: 1" = 40'
DATE: 09/09/2016 | DRAWN BY: JRG
JOB NO.: 1352.00 | CHECKED BY: JB

latitude 33
PLANNING & ENGINEERING
9968 Hibert Street 2nd Floor, San Diego, CA 92131
Tel 858.751.0633

H:\1300\1351.00 - FRIARS ROAD (PLANNING)\ENGINEERING\REPORTS\WATER QUALITY_ARCHIVE\2016-06-30 3RD SUBMITTAL\ATTACHMENTS\ATTACHMENT 1A-1B (DMA EXHIBIT AND TABLE)\1351.00 DMA EXHIBIT.DWG

<table>
<tr><th colspan="2">Harvest and Use Feasibility Screening</th><th>Form I-7</th></tr>
<tr><td colspan="3">1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?<br>☒ Toilet and urinal flushing<br>☐ Landscape Irrigation<br>☐ Other: ______________</td></tr>
<tr><td colspan="3">2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.<br>Per Table B.3-1, Residential flushes per day amounts to 18.5/3.45 = 5.36 flushes/day. This is a new development which will employ the use of low-flow toilets. So, (5.36 flushes/day )x(1.6 gallons/flush)x(0.5 WEF) = (4.3 gallons/resident-day)*(319 residents) = (1371.7 gallons/day)<br>(1371.7 gallons/day)*1.5 = 2,058 gallon 36 hour demand<br><br>(2,058 gallons) * (1 cubic foot/7.48 gallons) => 36 Hour Demand = 275 Cubic Feet</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.<br>DCV = 3681 cubic feet > 275 Cubic Feet<br>0.25 DCV = 920 cubic feet > 275 Cubic Feet</td></tr>
<tr><td>3a. Is the 36-hour demand greater than or equal to the DCV?<br>Yes / No</td><td>3b. Is the 36-hour demand greater than 0.25 DCV but less than the full DCV?<br>Yes / No</td><td>3c. Is the 36-hour demand less than 0.25DCV?<br>Yes</td></tr>
<tr><td>Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.</td><td>Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.</td><td>Harvest and use is considered to be infeasible.</td></tr>
<tr><td colspan="3">Is harvest and use feasible based on further evaluation?<br>☐ Yes, refer to appendix E to select and size harvest and use BMPs<br>☒ No, select alternate BMPs</td></tr>
</table>

**Worksheet C.4-1: Categorization of Infiltration Feasibility Condition**

| Categorization of Infiltration Feasibility Condition | | | Worksheet C.4-1 |
|---|---|---|---|
| **Part 1 - Full Infiltration Feasibility Screening Criteria**<br>**Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?** | | | |
| Criteria | Screening Question | **Yes** | **No** |
| 1 | **Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates do not support allowing infiltration greater than 0.5 inch per hour.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 2 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour. Allowing infiltration greater than 0.5 inch per hour will increase the risk of geotechnical hazards. Given the relatively impermeable nature of the Stadium Conglomerate beneath the site, allowing infiltration greater than 0.5 inch/hour will result in uncontrolled lateral migration of groundwater through permeable bedding material of utilities within the public right-of-way (Friars Road) and potentially negative impacts on the existing retaining wall that borders Fashion Valley mall that cannot be mitigated to an acceptable level. SCST does not recommend allowing infiltration greater than 0.5 inch/hour at the site.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |

| Worksheet C.4-1 Page 2 of 4 | | | |
|---|---|---|---|
| Criteria | Screening Question | Yes | No |
| 3 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 4 | **Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>Latitude 33 response: The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| **Part 1 Result*** | If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration**<br><br>If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2 | | |

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by [City Engineer] to substantiate findings.

| Worksheet C.4-1 Page 3 of 4 | | | |
|---|---|---|---|
| **Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria**<br><br>**Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?** | | | |
| Criteria | Screening Question | **Yes** | **No** |
| 5 | **Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☑ | ☐ |
| Provide basis:<br><br>The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates barely support allowing partial infiltration based on the City of San Diego's definition of any appreciable quantity (greater than 0.01 inch per hour).<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates. | | | |
| 6 | **Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☑ | ☐ |
| Provide basis:<br><br>To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain. Groundwater was encountered in the north-middle portion of the site during our geotechnical investigation at an elevation of about 54 feet. However, the proposed BMPs are located in areas where groundwater was not encountered. Therefore, it is our opinion that the depth to groundwater requirement of more than 10 feet below the bottom of BMP should be satisfied.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates. | | | |

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Without pre-treatment, infiltration of stormwater pollutants could migrate laterally and adversely affect down-gradient sites. SCST would recommend pre-treatment of stormwater runoff. In SCST's opinion, allowing infiltration of pre-treated stormwater runoff in any appreciable quantity does not pose a significant risk to the regional groundwater table.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Latitude 33 response: Ground water discharges directly to the San Diego River and there are no downstream water rights that exist within this area.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.<br><br>If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

| Area Weighted Runoff Factor | | | |
|---|---|---|---|
| **Surface** | **Runoff Factor** | **Area (sq. ft)** | **Weighted Area** |
| Roof | 0.9 | 43,029 | 38,726 |
| Concrete of Asphalt | 0.9 | 1,852 | 1,667 |
| Unit Pavers (Grouted) | 0.9 | - | - |
| Decomposed Granite | 0.3 | - | - |
| Cobbles or Crushed Aggregate | 0.3 | - | - |
| Ammended, Mulched soils or Landscape | 0.1 | 6,444 | 644 |
| CompactedSoils (Unpaved Parking | 0.3 | - | - |
| Natural (A Soil) | 0.1 | - | - |
| Natural (B Soil) | 0.14 | - | - |
| Natural (C Soil) | 0.23 | - | - |
| Natural (D Soil) | 0.3 | - | - |
| Total | | 51,325 | 41,037 |
| **Composite C** | **0.80** | | |

| Worksheet B.2-1 DCV (DMA 2 - Apartments) | | | | |
|---|---|---|---|---|
| **Design Capture Volume** | | **Worksheet B.2-1** | | |
| 1 | 85th percentile 24-hr storm depth from Figure B.1-1 | d= | 0.52 | inches |
| 2 | Area tributary to BMP (s) | A= | 1.18 | acres |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | C= | 0.80 | unitless |
| 4 | Trees Credit Volume | TCV= | | cubic-feet |
| 5 | Rain barrels Credit Volume | RCV= | | cubic-feet |
| 6 | Calculate DCV = (3630 x C x d x A) – TCV - RCV | DCV= | 1778 | cubic-feet |

**Worksheet D.5.1: Factor of Safety and Design Infiltration Rate Worksheet (DMA 2)**

| Factor of Safety and Design Infiltration Rate Worksheet | | | | Worksheet D.5-1 | |
|---|---|---|---|---|---|
| **Factor Category** | | **Factor Description** | **Assigned Weight (w)** | **Factor Value (v)** | **Product (p) p = w x v** |
| A | Suitability Assessment | Soil assessment methods | 0.25 | 2 | 0.5 |
| | | Predominant soil texture | 0.25 | 1 | 0.25 |
| | | Site soil variability | 0.25 | 1 | 0.25 |
| | | Depth to groundwater / impervious layer | 0.25 | 2 | 0.5 |
| | | **Suitability Assessment Safety Factor, $S_A = \Sigma p$** | | | **1.5** |
| B | Design | Level of pretreatment / expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy / resiliency | 0.25 | 2 | 0.5 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | **Design Safety Factor, $S_B = \Sigma p$** | | | **1.5** |
| Combined Safety Factor, $S_{total}=S_A \times S_B$ | | | | 2.25 | |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias) | | | | 0.1 | |
| **Design Infiltration Rate, in/hr, $K_{design}=K_{observed} / S_{total}$** | | | | **0.044** | |
| Supporting Data | | | | | |

Briefly describe infiltration test and provide reference to test forms:
Tests performed at depths of approximately 3 feet to 4.5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations shown on Figure 2 of the Geotech Report. See Table A-3 of the Geotech Report for infiltration test results.

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 2)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 1778 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 685.7 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 193.4 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 1584.6 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 2) (continued)**

| Simple Sizing Method for Biofiltration BMPs | | | Worksheet B.5-1 (Page 2 of 2) |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 2376.9 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 561.5 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 1188.5 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 685.7 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 51325 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.8 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.03 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 1231.8 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 1231.8 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.

3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

| Worksheet B.5-2: Calculation of Alternative Minimum Footprint Sizing Factor (DMA 2) | | | | |
|---|---|---|---|---|
| Alternative Minimum Footprint Sizing Factor | | | Worksheet B.5-2 (Page 1 of 2) | |
| 1 | Area draining to the BMP | | 1.18 | acre |
| 2 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | | 0.8 | |
| 3 | Load to Clog (See Table B.5-3 for guidance; $L_c$) | | 2.0 | lb/sq-ft |
| 4 | Allowable Period to Accumulate Clogging Load ($T_L$) | | 10 | years |
| **Volume Weighted EMC Calculation** | | | | |
| **Land Use** | **Fraction of Total DCV** | **TSS EMC (mg/L)** | **Product** | |
| Single Family Residential | 0.0% | 123 | 0 | |
| Commercial | 0.0% | 128 | 0 | |
| Industrial | 0.0% | 125 | 0 | |
| Education (Municipal) | 0.0% | 132 | 0 | |
| Transportation | 0.0% | 78 | 0 | |
| Multi-family Residential | 100.0% | 40 | 40 | |
| Roof Runoff | 0.0% | 14 | 0 | |
| Low Traffic Areas | 0.0% | 50 | 0 | |
| Open Space | 0.0% | 216 | 0 | |
| Other, specify: | 0.0% | | 0 | |
| Other, specify: | 0.0% | | 0 | |
| Other, specify: | 0.0% | | 0 | |
| 5 | Volume Weighted EMC (sum of all products) | | 40 | mg/L |
| **BMP Parameters** | | | | |
| 6 | If pretreatment measures are included in the design, apply an adjustment of 25%1 [Line 5 x (1-0.25)] | | 30.0 | mg/L |
| 7 | Average Annual Precipitation | | 10.34 | inches |
| 8 | Calculate the Average Annual Runoff (Line 7 x 43,560/12) x Line2 | | 30027.36 | cu-ft/yr |
| 9 | Calculate the Average Annual TSS Load (Line 8 x 62.4 x Line 6)/$10^6$ | | 56.21 | lb/yr |
| 10 | Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3 | | 281.06 | sq-ft |
| 11 | Calculate the Alternative Minimum Footprint Sizing Factor [ Line 10/ (Line 1 x Line 2)] | | 0.0068 | |

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 2-ASF)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 1778 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 685.7 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 193.4 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 1584.6 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 2-ASF) (cont'd)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 2 of 2) | |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 2376.9 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 561.5 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 1188.5 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 685.7 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 51325 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.8 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.0068 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 279.2 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 685.7 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

| Area Weighted Runoff Factor (DMA 3) | | | |
|---|---|---|---|
| Surface | Runoff Factor | Area (sq. ft) | Weighted Area |
| Roof | 0.9 | 45,820 | 41,238 |
| Concrete of Asphalt | 0.9 | 2,111 | 1,900 |
| Unit Pavers (Grouted) | 0.9 | - | - |
| Decomposed Granite | 0.3 | - | - |
| Cobbles or Crushed Aggregate | 0.3 | - | - |
| Ammended, Mulched soils or Landscape | 0.1 | 3,300 | 330 |
| CompactedSoils (Unpaved Parking | 0.3 | - | - |
| Natural (A Soil) | 0.1 | - | - |
| Natural (B Soil) | 0.14 | - | - |
| Natural (C Soil) | 0.23 | - | - |
| Natural (D Soil) | 0.3 | - | - |
| Total | | 51,231 | 43,468 |
| **Composite C** | **0.85** | | |

| Worksheet B.2-1 DCV (DMA 3) | | | | |
|---|---|---|---|---|
| **Design Capture Volume** | | **Worksheet B.2-1** | | |
| 1 | 85th percentile 24-hr storm depth from Figure B.1-1 | d= | 0.52 | inches |
| 2 | Area tributary to BMP (s) | A= | 1.18 | acres |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | C= | 0.85 | unitless |
| 4 | Trees Credit Volume | TCV= | | cubic-feet |
| 5 | Rain barrels Credit Volume | RCV= | | cubic-feet |
| 6 | Calculate DCV = (3630 x C x d x A) – TCV - RCV | DCV= | 1884 | cubic-feet |

**Worksheet D.5.1: Factor of Safety and Design Infiltration Rate Worksheet (DMA 3)**

| Factor of Safety and Design Infiltration Rate Worksheet | | | | Worksheet D.5-1 | |
|---|---|---|---|---|---|
| **Factor Category** | | **Factor Description** | **Assigned Weight (w)** | **Factor Value (v)** | **Product (p) p = w x v** |
| A | Suitability Assessment | Soil assessment methods | 0.25 | 2 | 0.5 |
| | | Predominant soil texture | 0.25 | 1 | 0.25 |
| | | Site soil variability | 0.25 | 1 | 0.25 |
| | | Depth to groundwater / impervious layer | 0.25 | 2 | 0.5 |
| | | **Suitability Assessment Safety Factor, $S_A = \Sigma p$** | | | **1.5** |
| B | Design | Level of pretreatment / expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy / resiliency | 0.25 | 2 | 0.5 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | **Design Safety Factor, $S_B = \Sigma p$** | | | **1.5** |
| Combined Safety Factor, $S_{total}=S_A \times S_B$ | | | | 2.25 | |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias) | | | | 0.1 | |
| **Design Infiltration Rate, in/hr, $K_{design}=K_{observed} / S_{total}$** | | | | **0.044** | |
| Supporting Data | | | | | |

Briefly describe infiltration test and provide reference to test forms:
Tests performed at depths of approximately 3 feet to 4.5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations shown on Figure 2 of the Geotech Report. See Table A-3 of the Geotech Report for infiltration test results.

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 3)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 1884 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 726.5 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 204.9 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 1679.1 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 3) (continued)**

| Simple Sizing Method for Biofiltration BMPs | | | Worksheet B.5-1 (Page 2 of 2) |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 2518.7 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 595.0 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 1259.3 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 726.5 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 51231 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.85 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.03 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 1306.4 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 1306.4 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

| Worksheet B.5-2: Calculation of Alternative Minimum Footprint Sizing Factor (DMA 3) | | | | |
|---|---|---|---|---|
| Alternative Minimum Footprint Sizing Factor | | | Worksheet B.5-2 (Page 1 of 2) | |
| 1 | Area draining to the BMP | | 1.18 | acre |
| 2 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | | 0.85 | |
| 3 | Load to Clog (See Table B.5-3 for guidance; $L_c$) | | 2.0 | lb/sq-ft |
| 4 | Allowable Period to Accumulate Clogging Load ($T_L$) | | 10 | years |

| Volume Weighted EMC Calculation | | | |
|---|---|---|---|
| **Land Use** | **Fraction of Total DCV** | **TSS EMC (mg/L)** | **Product** |
| Single Family Residential | 0.0% | 123 | 0 |
| Commercial | 0.0% | 128 | 0 |
| Industrial | 0.0% | 125 | 0 |
| Education (Municipal) | 0.0% | 132 | 0 |
| Transportation | 0.0% | 78 | 0 |
| Multi-family Residential | 100.0% | 40 | 40 |
| Roof Runoff | 0.0% | 14 | 0 |
| Low Traffic Areas | 0.0% | 50 | 0 |
| Open Space | 0.0% | 216 | 0 |
| Other, specify: | 0.0% | | 0 |
| Other, specify: | 0.0% | | 0 |
| Other, specify: | 0.0% | | 0 |

| | | | |
|---|---|---|---|
| 5 | Volume Weighted EMC (sum of all products) | 40 | mg/L |
| **BMP Parameters** | | | |
| 6 | If pretreatment measures are included in the design, apply an adjustment of 25%1 [Line 5 x (1-0.25)] | 30.0 | mg/L |
| 7 | Average Annual Precipitation | 10.34 | inches |
| 8 | Calculate the Average Annual Runoff (Line 7 x 43,560/12) x Line2 | 31904.07 | cu-ft/yr |
| 9 | Calculate the Average Annual TSS Load (Line 8 x 62.4 x Line 6)/$10^6$ | 59.72 | lb/yr |
| 10 | Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3 | 298.62 | sq-ft |
| 11 | Calculate the Alternative Minimum Footprint Sizing Factor [ Line 10/ (Line 1 x Line 2)] | 0.0068 | |

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 3-ASF)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 1884 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 726.5 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 204.9 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 1679.1 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 3-ASF) (cont'd)**

| Simple Sizing Method for Biofiltration BMPs | | | Worksheet B.5-1 (Page 2 of 2) |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 2518.7 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 595.0 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 1259.3 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 726.5 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 51231 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.85 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.0068 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 296.1 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 726.5 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

| Area Weighted Runoff Factor (DMA 4) | | | |
|---|---|---|---|
| Surface | Runoff Factor | Area (sq. ft) | Weighted Area |
| Roof | 0.9 | | - |
| Concrete of Asphalt | 0.9 | 14,979 | 13,481 |
| Unit Pavers (Grouted) | 0.9 | - | - |
| Decomposed Granite | 0.3 | - | - |
| Cobbles or Crushed Aggregate | 0.3 | - | - |
| Ammended, Mulched soils or Landscape | 0.1 | 2,483 | 248 |
| CompactedSoils (Unpaved Parking | 0.3 | - | - |
| Natural (A Soil) | 0.1 | - | - |
| Natural (B Soil) | 0.14 | - | - |
| Natural (C Soil) | 0.23 | - | - |
| Natural (D Soil) | 0.3 | - | - |
| Total | | 17,462 | 13,729 |
| **Composite C** | **0.79** | | |

| Worksheet B.2-1 DCV (DMA 4) | | | | | |
|---|---|---|---|---|---|
| **Design Capture Volume** | | **Worksheet B.2-1** | | | |
| 1 | 85th percentile 24-hr storm depth from Figure B.1-1 | d= | 0.52 | inches |
| 2 | Area tributary to BMP (s) | A= | 0.40 | acres |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | C= | 0.79 | unitless |
| 4 | Trees Credit Volume | TCV= | | cubic-feet |
| 5 | Rain barrels Credit Volume | RCV= | | cubic-feet |
| 6 | Calculate DCV = (3630 x C x d x A) – TCV - RCV | DCV= | 595 | cubic-feet |

**Worksheet D.5.1: Factor of Safety and Design Infiltration Rate Worksheet (DMA 4)**

| Factor of Safety and Design Infiltration Rate Worksheet | | | | Worksheet D.5-1 | |
|---|---|---|---|---|---|
| **Factor Category** | | **Factor Description** | **Assigned Weight (w)** | **Factor Value (v)** | **Product (p) p = w x v** |
| A | Suitability Assessment | Soil assessment methods | 0.25 | 2 | 0.5 |
| | | Predominant soil texture | 0.25 | 1 | 0.25 |
| | | Site soil variability | 0.25 | 1 | 0.25 |
| | | Depth to groundwater / impervious layer | 0.25 | 2 | 0.5 |
| | | **Suitability Assessment Safety Factor, $S_A = \Sigma p$** | | | **1.5** |
| B | Design | Level of pretreatment / expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy / resiliency | 0.25 | 2 | 0.5 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | **Design Safety Factor, $S_B = \Sigma p$** | | | **1.5** |
| Combined Safety Factor, $S_{total}=S_A \times S_B$ | | | | 2.25 | |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias) | | | | 0.1 | |
| **Design Infiltration Rate, in/hr, $K_{design}=K_{observed} / S_{total}$** | | | | **0.044** | |
| Supporting Data | | | | | |

Briefly describe infiltration test and provide reference to test forms:
Tests performed at depths of approximately 3 feet to 4.5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations shown on Figure 2 of the Geotech Report. See Table A-3 of the Geotech Report for infiltration test results.

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 4)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 595 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 229.5 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 64.7 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 530.3 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 4)(continued)**

| Simple Sizing Method for Biofiltration BMPs | | | Worksheet B.5-1 (Page 2 of 2) |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 795.4 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 187.9 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 397.7 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 229.4 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 17462 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.79 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.03 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 413.8 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 413.8 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

| Area Weighted Runoff Factor (DMA 5) | | | |
|---|---|---|---|
| **Surface** | **Runoff Factor** | **Area (sq. ft)** | **Weighted Area** |
| Roof | 0.9 | | - |
| Concrete of Asphalt | 0.9 | 10,325 | 9,293 |
| Unit Pavers (Grouted) | 0.9 | - | - |
| Decomposed Granite | 0.3 | - | - |
| Cobbles or Crushed Aggregate | 0.3 | - | - |
| Ammended, Mulched soils or Landscape | 0.1 | 921 | 92 |
| CompactedSoils (Unpaved Parking | 0.3 | - | - |
| Natural (A Soil) | 0.1 | - | - |
| Natural (B Soil) | 0.14 | - | - |
| Natural (C Soil) | 0.23 | - | - |
| Natural (D Soil) | 0.3 | - | - |
| Total | | 11,246 | 9,385 |
| **Composite C** | **0.83** | | |

| Worksheet B.2-1 DCV (DMA 5) | | | | |
|---|---|---|---|---|
| **Design Capture Volume** | | **Worksheet B.2-1** | | |
| 1 | 85th percentile 24-hr storm depth from Figure B.1-1 | d= | 0.52 | inches |
| 2 | Area tributary to BMP (s) | A= | 0.26 | acres |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | C= | 0.83 | unitless |
| 4 | Trees Credit Volume | TCV= | | cubic-feet |
| 5 | Rain barrels Credit Volume | RCV= | | cubic-feet |
| 6 | Calculate DCV = (3630 x C x d x A) – TCV - RCV | DCV= | 407 | cubic-feet |

**Worksheet D.5.1: Factor of Safety and Design Infiltration Rate Worksheet (DMA 4)**

| Factor of Safety and Design Infiltration Rate Worksheet | | | | Worksheet D.5-1 | |
|---|---|---|---|---|---|
| **Factor Category** | | **Factor Description** | **Assigned Weight (w)** | **Factor Value (v)** | **Product (p) p = w x v** |
| A | Suitability Assessment | Soil assessment methods | 0.25 | 2 | 0.5 |
| | | Predominant soil texture | 0.25 | 1 | 0.25 |
| | | Site soil variability | 0.25 | 1 | 0.25 |
| | | Depth to groundwater / impervious layer | 0.25 | 2 | 0.5 |
| | | **Suitability Assessment Safety Factor, $S_A = \Sigma p$** | | | **1.5** |
| B | Design | Level of pretreatment / expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy / resiliency | 0.25 | 2 | 0.5 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | **Design Safety Factor, $S_B = \Sigma p$** | | | **1.5** |
| Combined Safety Factor, $S_{total}=S_A \times S_B$ | | | | 2.25 | |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias) | | | | 0.1 | |
| **Design Infiltration Rate, in/hr, $K_{design}=K_{observed} / S_{total}$** | | | | **0.044** | |
| Supporting Data | | | | | |
| Briefly describe infiltration test and provide reference to test forms: Tests performed at depths of approximately 3 feet to 4.5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations shown on Figure 2 of the Geotech Report. See Table A-3 of the Geotech Report for infiltration test results. | | | | | |

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 5)**

| Simple Sizing Method for Biofiltration BMPs | | Worksheet B.5-1 (Page 1 of 2) | |
|---|---|---|---|
| 1 | Remaining DCV after implementing retention BMPs | 407 | cubic- feet |
| **Partial Retention** | | | |
| 2 | Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible | 0.044 | in/hr. |
| 3 | Allowable drawdown time for aggregate storage below the underdrain | 36 | hours |
| 4 | Depth of runoff that can be infiltrated [Line 2 x Line 3] | 2 | inches |
| 5 | Aggregate pore space | 0.40 | in/in |
| 6 | Required depth of gravel below the underdrain [Line 4/ Line 5] | 3.96 | inches |
| 7 | Assumed surface area of the biofiltration BMP | 157 | sq-ft |
| 8 | Media retained pore storage | 0.1 | in/in |
| 9 | Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7 | 44.3 | cubic- feet |
| 10 | DCV that requires biofiltration [Line 1 – Line 9] | 362.7 | cubic- feet |
| **BMP Parameters** | | | |
| 11 | Surface Ponding [6 inch minimum, 12 inch maximum] | 10 | inches |
| 12 | Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations | 18 | inches |
| 13 | Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area | 18 | inches |
| 14 | Freely drained pore storage | 0.2 | in/in |
| 15 | Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.) | 5.0 | in/hr. |
| **Baseline Calculations** | | | |
| 16 | Allowable Routing Time for sizing | 6 | hours |
| 17 | Depth filtered during storm [ Line 15 x Line 16] | 30 | inches |
| 18 | Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)] | 21 | inches |
| 19 | Total Depth Treated [Line 17 + Line 18] | 51 | inches |

**Note**: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

**Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (DMA 5)(continued)**

| Simple Sizing Method for Biofiltration BMPs | | | Worksheet B.5-1 (Page 2 of 2) |
|---|---|---|---|
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 20 | Required biofiltered volume [1.5 x Line 10] | 544.1 | cubic-feet |
| 21 | Required Footprint [Line 20/ Line 19] x 12 | 128.5 | sq-ft |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 22 | Required Storage (surface + pores) Volume [0.75 x Line 10] | 272.0 | cubic-feet |
| 23 | Required Footprint [Line 22/ Line 18] x 12 | 156.9 | sq-ft |
| **Footprint of the BMP** | | | |
| 24 | Area draining to the BMP | 11246 | sq-ft |
| 25 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.82 | |
| 26 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11) | 0.03 | |
| 27 | Minimum BMP Footprint [Line 24 x Line 25 x Line 26] | 276.7 | sq-ft |
| 28 | Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27) | 276.7 | sq-ft |
| **Check for Volume Reduction [Not applicable for No Infiltration Condition]** | | | |
| 29 | Calculate the fraction of DCV retained in the BMP [Line 9/Line 1] | 0.109 | unitless |
| 30 | Minimum required fraction of DCV retained for partial infiltration condition | 0.100 | unitless |
| 31 | Is the retained DCV ≥ 0.10? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion. | Yes | No |

**Note**:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.

4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

# ATTACHMENT 2
# BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☒ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

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**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 2a** | Hydromodification Management Exhibit (Required) | ☐ Included<br>See Hydromodification Management Exhibit Checklist |
| **Attachment 2b** | Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional)<br><br>See Section 6.2 of the BMP Design Manual. | ☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required)<br><br>Optional analyses for Critical Coarse Sediment Yield Area Determination<br>☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite<br><br>☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment<br><br>☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite |
| **Attachment 2c** | Geomorphic Assessment of Receiving Channels (Optional)<br><br>See Section 6.3.4 of the BMP Design Manual. | ☐ Not Performed<br><br>☐ Included<br><br>☐ Submitted as separate stand-alone document |
| **Attachment 2d** | Flow Control Facility Design and Structural BMP Drawdown Calculations (Required)<br><br>Overflow Design Summary for each structural BMP<br><br>See Chapter 6 and Appendix G of the BMP Design Manual | ☐ Included<br><br>☐ Submitted as separate stand-alone document |
| **Attachment 2e** | Vector Control Plan (Required when structural BMPs will not drain in 96 hours) | ☐ Included<br><br>☐ Not required because BMPs will drain in less than 96 hours |

**Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:**

The Hydromodification Management Exhibit must identify:

- ☐ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☐ Existing topography
- ☐ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed grading
- ☐ Proposed impervious features
- ☐ Proposed design features and surface treatments used to minimize imperviousness
- ☐ Point(s) of Compliance (POC) for Hydromodification Management
- ☐ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☐ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

# ATTACHMENT 3
# STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 3a** | Structural BMP Maintenance Thresholds and Actions (Required) | ☒ Included<br><br>See Structural BMP Maintenance Information Checklist. |
| **Attachment 3b** | Maintenance Agreement (Form DS-3247) (when applicable) | ☐ Included<br><br>☒ Not Applicable (will complete during Ministerial review) |

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**Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:**

**Preliminary Design / Planning / CEQA level submittal:**

- Attachment 3a must identify:
  - ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

**<u>Final Design level submittal:</u>**

**Attachment 3a** must identify:

- ☒ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☒ How to access the structural BMP(s) to inspect and perform maintenance
- ☒ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☒ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☒ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☒ When applicable, frequency of bioretention soil media replacement.
- ☒ Recommended equipment to perform maintenance
- ☒ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

**Attachment 3b**: For private entity operation and maintenance, Attachment 3b must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

# Structural BMP Maintenance Information

## BF-1 | Biofiltration

| Typical Maintenance Indicator(s) for Proprietary Biofiltration Units | Maintenance Actions |
|---|---|
| Accumulation of sediment, litter, or debris | Remove and properly dispose of accumulated materials, without damage to the vegetation. |
| Poor vegetation establishment | Re-seed, re-plant, or re-establish vegetation per original plans. |
| Overgrown vegetation | Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height). |
| Erosion due to concentrated irrigation flow | Repair/re-seed/re-plant eroded areas and adjust the irrigation system. |
| Erosion due to concentrated storm water runoff flow | Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction. |
| Standing water in vegetated swales | Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction. |
| Standing water in bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event* | Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils. |
| Obstructed inlet or outlet structure | Clear obstructions. |
| Damage to structural components such as weirs, inlet or outlet structures | Repair or replace as applicable. |
| Clogged Biofiltration Media Mix | Remove and properly dispose media and replace with fresh media. |
| *These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event. | |

# E.13. BF-1 Biofiltration

Location: 43rd Street and Logan Avenue, San Diego, California

| MS4 Permit Category |
| --- |
| Biofiltration |
| **Manual Category** |
| Biofiltration |
| **Applicable Performance Standard** |
| Pollutant Control<br>Flow Control |
| **Primary Benefits** |

Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation (Optional)

## Description

Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer (aka choking layer) consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

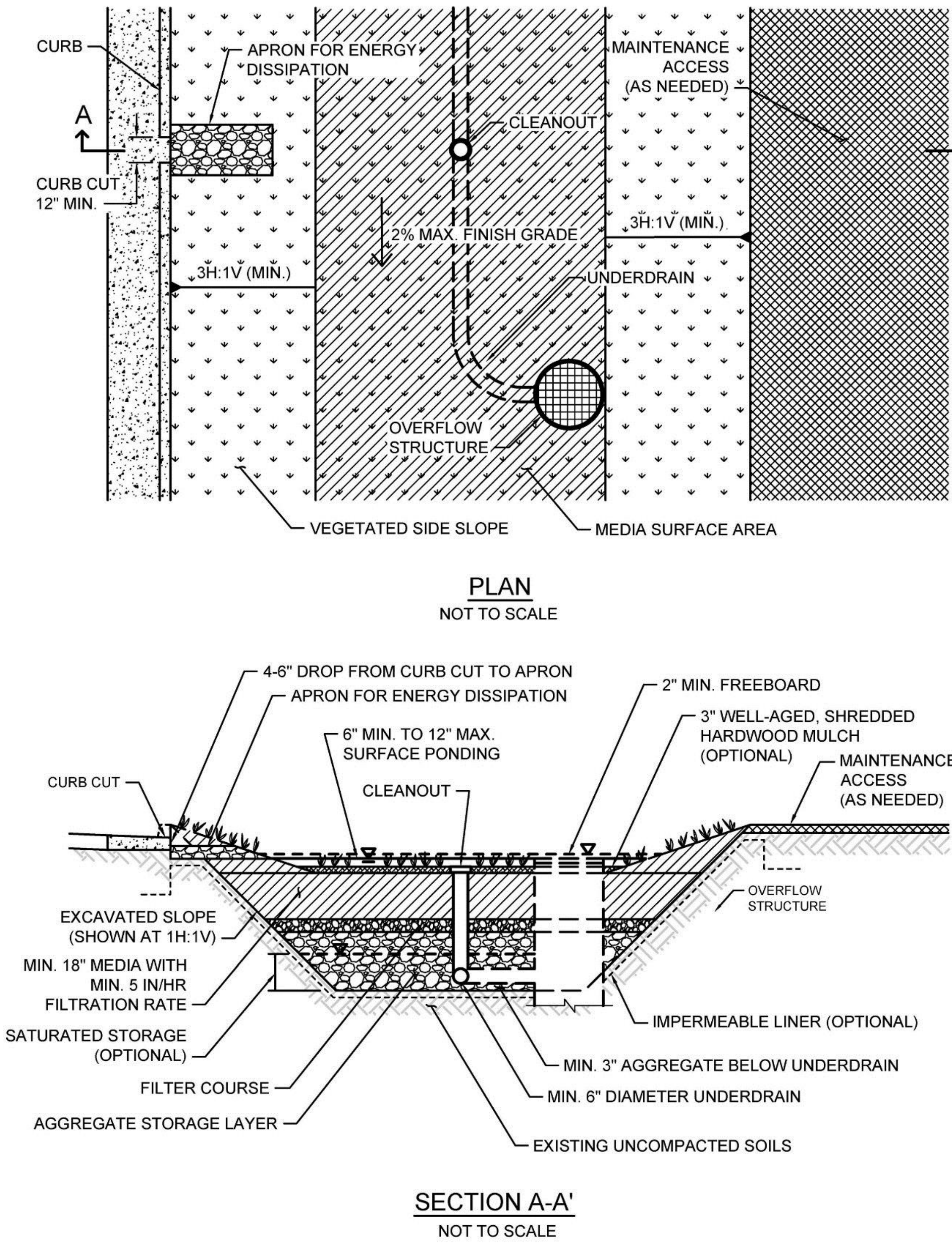


**Figure E.13-E.13-1: Typical plan and Section view of a Biofiltration BMP**

### Design Adaptations for Project Goals

**Biofiltration Treatment BMP for storm water pollutant control.** The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

**Integrated storm water flow control and pollutant control configuration.** The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

### Design Criteria and Considerations

Bioretention with underdrain must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

| | Siting and Design | Intent/Rationale |
|---|---|---|
| □ | Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities). | Must not negatively impact existing site geotechnical concerns. |
| □ | An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed. | Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge. |
| □ | Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred). | Bigger BMPs require additional design features for proper performance.<br>Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP. |
| □ | Finish grade of the facility is ≤ 2%. | Flatter surfaces reduce erosion and channelization within the facility. |
| Surface Ponding | | |

| | Siting and Design | Intent/Rationale |
|---|---|---|
| ☐ | Surface ponding is limited to a 24-hour drawdown time. | Surface ponding limited to 24 hour for plant health.<br>Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist. |
| ☐ | Surface ponding depth is ≥ 6 and ≤ 12 inches. | Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns.<br>Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered. |
| ☐ | A minimum of 2 inches of freeboard is provided. | Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge. |
| ☐ | Side slopes are stabilized with vegetation and are = 3H:1V or shallower. | Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain. |
| Vegetation | | |
| ☐ | Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.20. | Plants suited to the climate and ponding depth are more likely to survive. |
| ☐ | An irrigation system with a connection to water supply should be provided as needed. | Seasonal irrigation might be needed to keep plants healthy. |
| Mulch (Mandatory) | | |
| ☐ | A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided. | Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply. |
| Media Layer | | |

| | Siting and Design | Intent/Rationale |
|---|---|---|
| ☐ | Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. Additional Criteria for media hydraulic conductivity described in the bioretention soil media model specification (Appendix F.4) | A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed. |
| ☐ | Media is a minimum 18 inches deep, meeting the following media specifications:<br>Model biorention soil media specification provided in Appendix F.4 <u>or</u><br>County of San Diego Low Impact Development Handbook: Appendix G - Bioretention Soil Specification (June 2014, unless superseded by more recent edition).<br><br>Alternatively, for proprietary designs and custom media mixes not meeting the media specifications, the media meets the pollutant treatment performance criteria in Section F.1. | A deep media layer provides additional filtration and supports plants with deeper roots.<br><br>Standard specifications shall be followed.<br><br>For non-standard or proprietary designs, compliance with Appendix F.1 ensures that adequate treatment performance will be provided. |
| ☐ | Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%. | Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity.<br>Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance.<br>Use Worksheet B.5-1 Line 26 to estimate the minimum surface area required per this criteria. |
| ☐ | Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2). | Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients. |
| Filter Course Layer | | |
| ☐ | A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used. | Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade and can result in poor water quality performance for turbidity and suspended solids. Filter fabric is more likely to clog. |

| | Siting and Design | Intent/Rationale |
|---|---|---|
| ☐ | Filter course is washed and free of fines. | Washing aggregate will help eliminate fines that could clog the facility and impede infiltration. |
| ☐ | To reduce clogging potential, a two-layer filter course (aka choking stone system) is used consisting of one 3" layer of clean and washed ASTM 33 Fine Aggregate Sand overlying a 3" layer of ASTM No 8 Stone (Appendix F.5). | This specification has been developed to maintain permeability while limiting the migration of media material into the stone reservoir and underdrain system. |
| Aggregate Storage Layer | | |
| ☐ | ASTM #57 open graded stone is used for the storage layer and a two layer filter course (detailed above) is used above this layer | This layer provides additional storage capacity. ASTM #8 stone provides an acceptable choking/bridging interface with the particles in ASTM #57 stone. |
| ☐ | The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure. | Proper storage layer configuration and underdrain placement will minimize facility drawdown time. |
| Inflow, Underdrain, and Outflow Structures | | |
| ☐ | Inflow, underdrains and outflow structures are accessible for inspection and maintenance. | Maintenance will prevent clogging and ensure proper operation of the flow control structures. |
| ☐ | Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows. | High inflow velocities can cause erosion, scour and/or channeling. |
| ☐ | Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed. | Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion. |
| ☐ | Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer. | A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked. |
| ☐ | Minimum underdrain diameter is 8 inches. | Smaller diameter underdrains are prone to clogging. |
| ☐ | Underdrains should be affixed with an upturned elbow to an elevation at least 9 to 12 inches above the invert of the underdrain. | An upturned elbow reduces velocity in the underdrain pipe and can help reduce mobilization of sediments from the underdrain and media bed. |

| | Siting and Design | Intent/Rationale |
|---|---|---|
| ☐ | Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent. | Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration. |
| ☐ | An underdrain cleanout with a minimum 8-inch diameter and lockable cap is placed every 50 feet as required based on underdrain length. | Properly spaced cleanouts will facilitate underdrain maintenance. |
| ☐ | Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow for on-line infiltration basins and water quality peak flow for off-line basins. | Planning for overflow lessens the risk of property damage due to flooding. |

### *Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only*

To design bioretention with underdrain for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in Appendix B.5 to size biofiltration BMPs.

### *Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable*

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If bioretention with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After bioretention with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

# ATTACHMENT 4
# COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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**Use this checklist to ensure the required information has been included on the plans:**

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s) *(Will provide during final design)*
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Boucher photocopies are not allowed.

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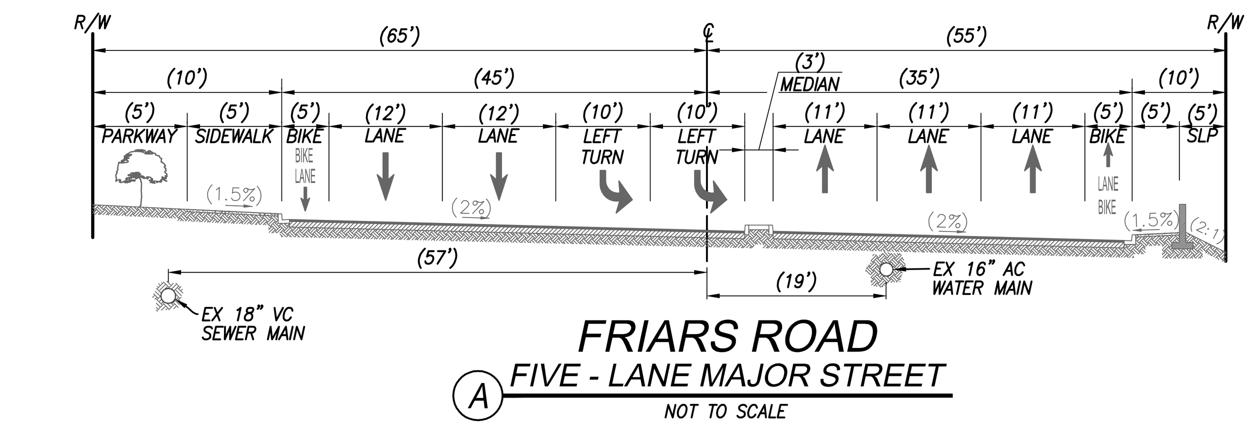
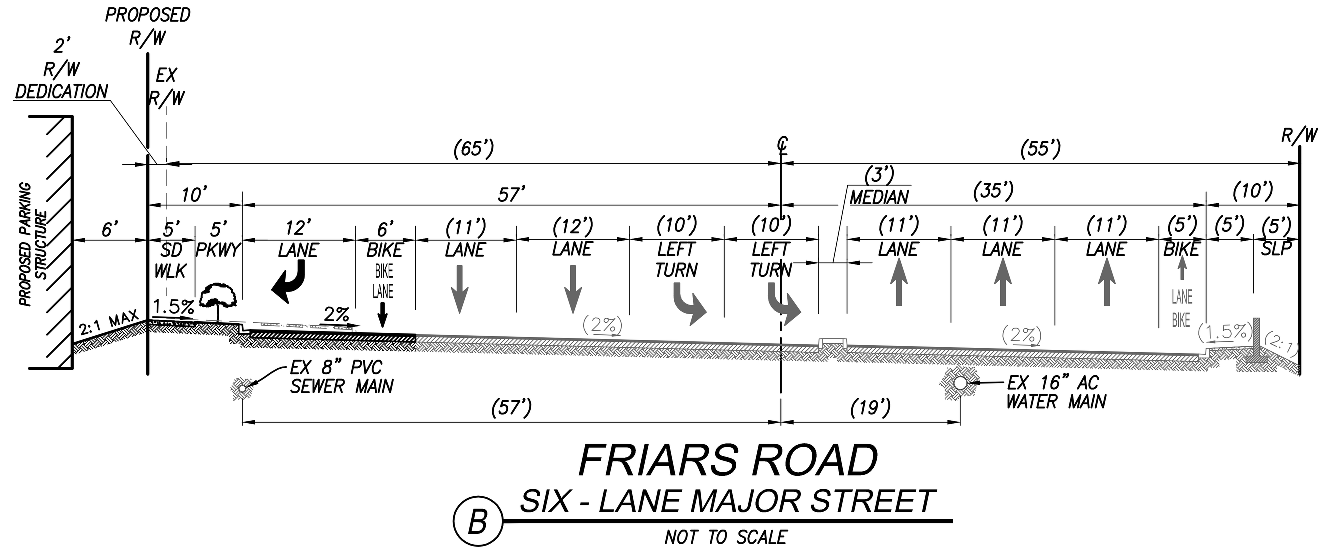
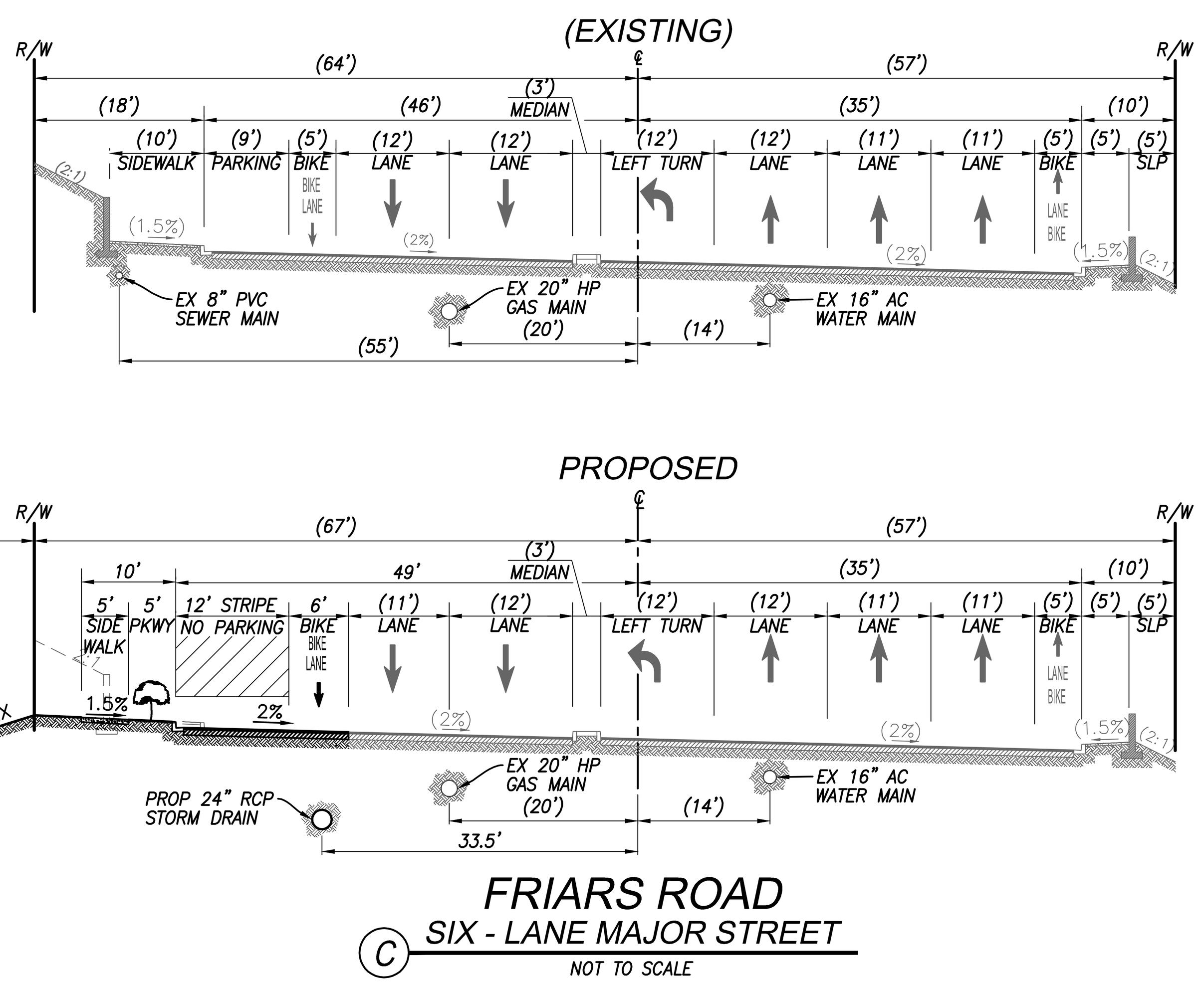
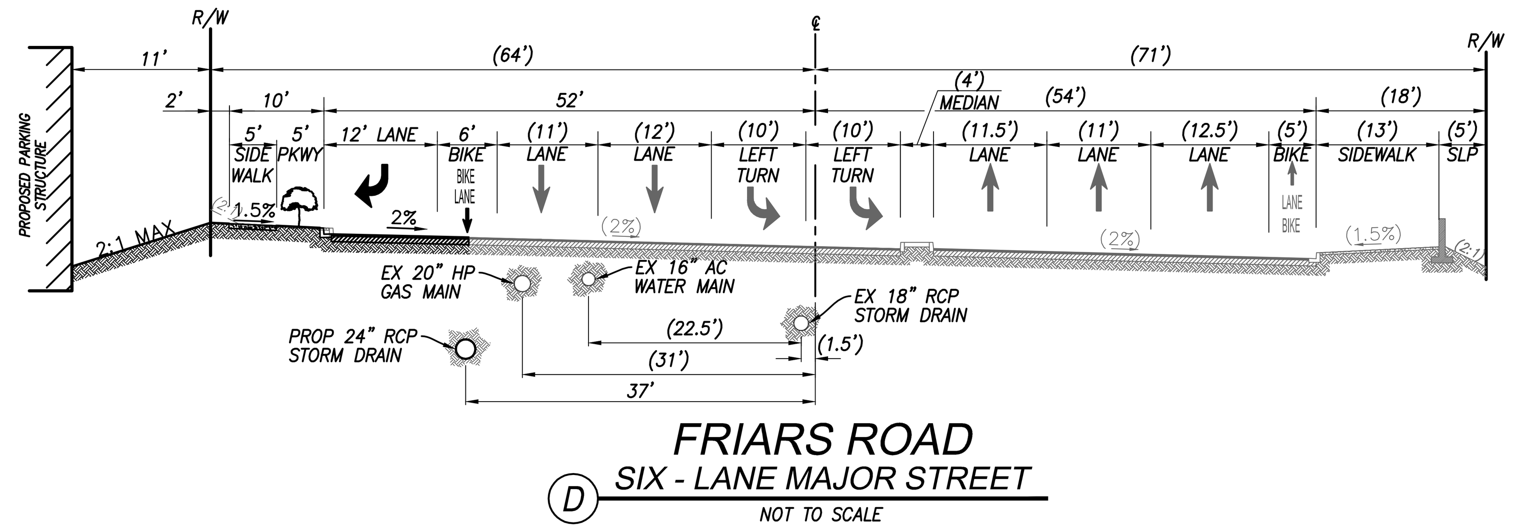
# FRIARS ROAD MIXED USE

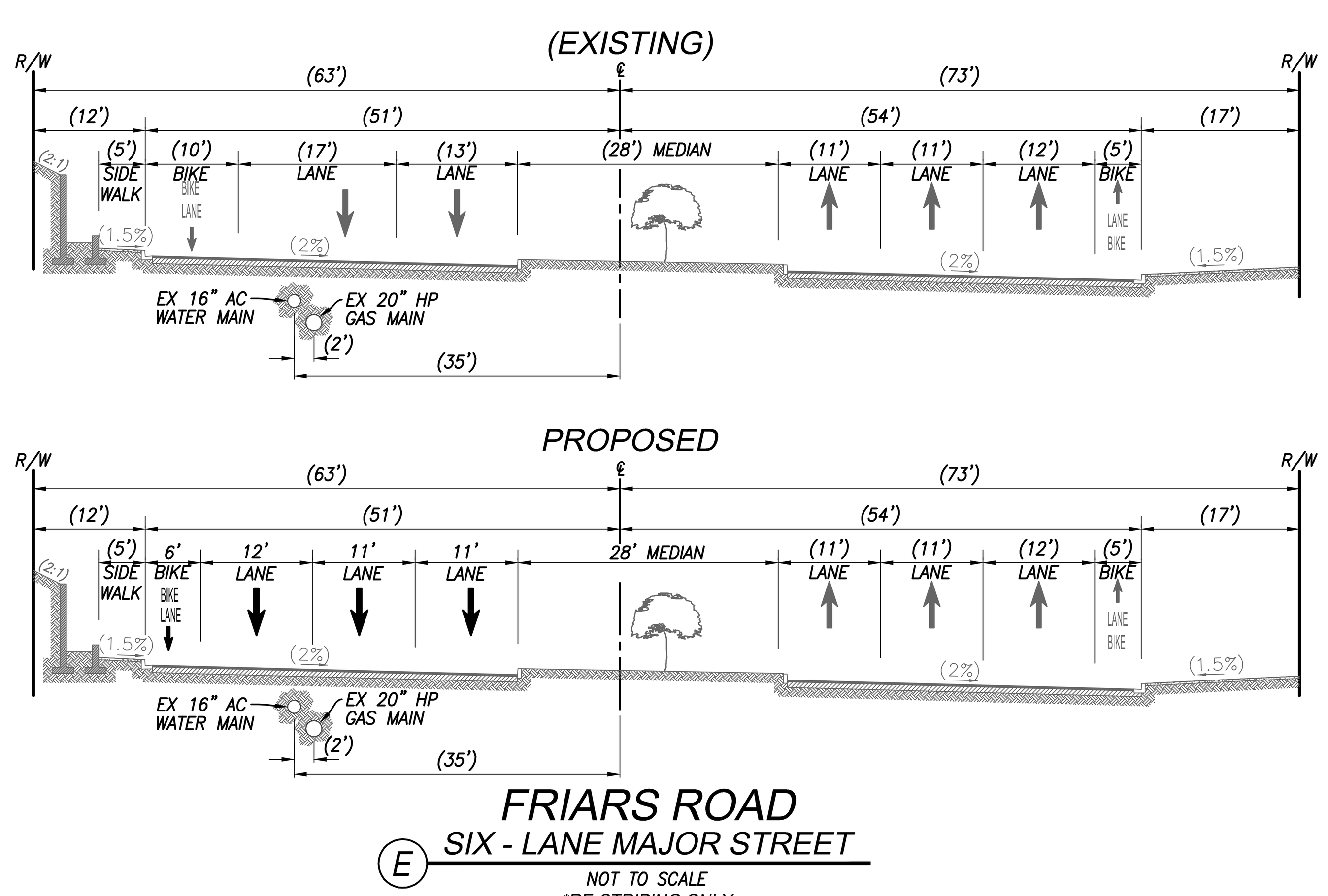
## PLANNED DEVELOPMENT PERMIT NO. 1586192
## SITE DEVELOPMENT PERMIT NO. 1586193
## VESTING TENTATIVE MAP NO. 1586194
## CITY OF SAN DIEGO - PTS NO. 453373





## SHEET INDEX



## ASSESSOR'S PARCEL NO.

437–250–22, –23, –24

## COORDINATE INDEX

1860–6277 NAD 83
220–1717 L.C.

## BENCH MARK

THE BENCHMARK FOR THIS PROJECT IS THE BRASS PLUG ON TOP OF CONCRETE CURB LOCATED AT THE SOUTHEAST CORNER OF FRIARS ROAD & FASHION VALLEY ROAD, PER CITY OF SAN DIEGO VERTICAL CONTROL BOOK DATED OCTOBER 4TH, 2011.

ELEVATION: 61.802, MSL, PER U.S.G.S. ADJUSTMENT OF 1970

## BASIS OF BEARINGS

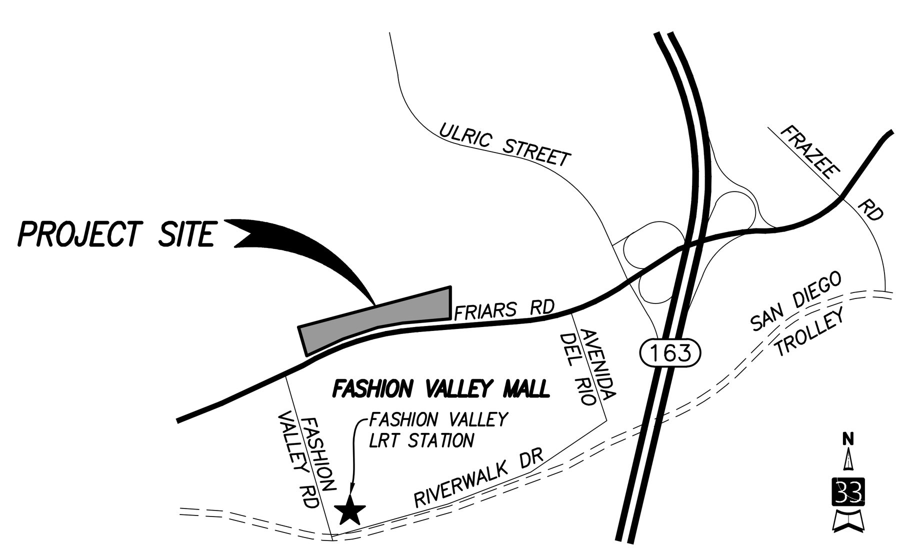
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM OF 1983 (CCS83) ZONE 6, NAD83 (EPOCH 1991.35) BASED UPON THE BEARING BETWEEN STATION 55 AND STATION 158, BOTH STATIONS HAVING A COORDINATE VALUE OF FIRST ORDER ACCURACY OR BETTER PER RECORD OF SURVEY 14492.

## LOT ACREAGE SUMMARY

| LOT # | EXISTING LOT SIZE (ACRES) | PROPOSED LOT SIZE (ACRES) | LOT DESCRIPTION |
|---|---|---|---|
| 1 | 2.82 | 2.01 | UNDEVELOPED (STEEP SLOPES) |
| 2 | 1.17 | 1.05 | RESIDENTIAL (CONDOS) |
| 3 | 1.44 | 2.36 | RESIDENTIAL (APARTMENTS) |
| -- | -- | 0.01 | DEDICATED RIGHT-OF-WAY |
| TOTAL | 5.43 | 5.43 | TOTAL GROSS ACREAGE |

## UNIT MIX SUMMARY

| LOT # | UNIT TYPE | 1-BEDROOM | 2-BEDROOM | TOTAL |
|---|---|---|---|---|
| 2 | CONDO | 34 | 36 | 70 |
| 3 | APARTMENT | 133 | 110 | 243 |
| 3 | SHOPKEEPER | 6 | 0 | 6 |
| TOTAL | | 173 | 146 | 319 |




VICINITY MAP
NOT TO SCALE

## DEVELOPMENT SUMMARY

1. SUMMARY OF REQUEST:
A VESTING TENTATIVE MAP, SITE DEVELOPMENT PERMIT, AND A PLANNED DEVELOPMENT PERMIT FOR 70 MARKET RATE CONDOMINIUM RESIDENTIAL UNITS AND 243 APARTMENT RESIDENTIAL UNITS, AND 6 SHOPKEEPER UNITS FOR A TOTAL OF 319 UNITS.

2. STREET ADDRESS: 6950, 7020, AND 7050 FRIARS ROAD SAN DIEGO, CA 92108

3. SITE AREA:
TOTAL SITE AREA (GROSS): 5.43 ACRES, 236,519 S.F.
TOTAL SITE AREA (NET): 3.41 ACRES, 148,333 S.F.
(NET SITE AREA EXCLUDES REQUIRED PUBLIC STREET DEDICATIONS AND STEEP HILLSIDES[LOT 1])

4. ZONING: CO–1–2 AND MISSION VALLEY DEVELOPMENT INTENSITY DISTRICT OVERLAY ZONE.

5. COVERAGE DATA:
REQUIRED F.A.R. = 1.50
TOTAL GROSS FLOOR AREA: 397,144 S.F.
PROPOSED F.A.R. = 1.68

6. DENSITY:
NUMBER OF EXISTING DWELLING UNITS TO REMAIN ON SITE: NONE
NUMBER OF PROPOSED DWELLING UNITS ON SITE: 313
NUMBER OF PROPOSED SHOPKEEPER UNITS ON SITE: 6

7: YARD/SETBACK:

| | | |
|---|---|---|
| FRONT YARD: | REQUIRED: 10' | PROPOSED: 6' (MINIMUM) * |
| SIDE YARD: | REQUIRED: 0'/10' | PROPOSED: 10' (MINIMUM) |
| REAR YARD: | REQUIRED: 0'/10' | PROPOSED: 0' (MINIMUM) * |

*(SEE DEVIATION TABLES, SHEET 4)

8. PARKING (RESIDENTIAL):

| | |
|---|---|
| TOTAL TRANSIT AREA PARKING SPACES REQUIRED BY ZONE: | 477 SPACES |
| TOTAL TRANSIT AREA PARKING SPACES PROVIDED ON SITE: | 496 SPACES |
| TOTAL ACCESSIBLE PARKING SPACES REQUIRED BY ZONE: | 9 SPACES (MIN. 2 VAN) |
| TOTAL ACCESSIBLE PARKING SPACES PROVIDED ON SITE: | 10 SPACES (5 VAN) |
| TOTAL NUMBER OF MOTORCYCLE SPACES REQUIRED BY ZONE: | 32 SPACES |
| TOTAL NUMBER OF MOTORCYCLE SPACES PROVIDED ON SITE: | 34 SPACES |
| TOTAL NUMBER OF BICYCLE SPACES REQUIRED BY ZONE: | 141.8 SPACES |
| TOTAL NUMBER OF BICYCLE SPACES PROVIDED ON SITE: | 170 SPACES (30 LOCKERS) |

(SEE SHEET 11 FOR DETAILED PARKING CALCULATIONS.)

9. BRUSH MANAGEMENT ZONE IS APPLICABLE TO THIS PROJECT.
(SEE SHEET 8 FOR BRUSH MANAGEMENT PLAN.)

10. DEVIATIONS: STRUCTURE HEIGHT, FLOOR AREA RATIO, FRONT SETBACK, REAR SETBACK, AND RETAINING WALL HEIGHT, AND GROUND FLOOR RESIDENTIAL.
(SEE DEVIATION TABLES, SHEET 4)

11. THE PROPOSED PROJECT COMPLIES WITH THE MISSION VALLEY DEVELOPMENT INTENSITY DISTRICT OVERLAY ZONE AND IS WITHIN 1,500 FEET OF FASHION VALLEY LRT STATION, SECTION 1514.0301(d)(2).

12. TYPE OF CONSTRUCTION: MODIFIED 1B

13. OCCUPANCY CLASSIFICATION: R–2

14. YEAR CONSTRUCTED FOR ALL BUILDINGS ON SITE: 1981.

15. GEOLOGIC HAZARD CATEGORY: 23, 32, AND 52

16. LANDSCAPE AREA SQUARE FOOTAGE: 6,810 SQUARE FEET.

## MAPPING NOTE

A FINAL MAP SHALL BE FILED AT THE COUNTY RECORDER'S OFFICE PRIOR TO THE EXPIRATION OF THE TENTATIVE MAP, IF APPROVED. A DETAILED PROCEDURE OF SURVEY SHALL BE SHOWN ON THE MAP AND ALL PROPERTY CORNERS SHALL BE MARKED WITH DURABLE SURVEY MONUMENTS.

## CERTIFICATION STATEMENT

I HEREBY ACKNOWLEDGE AND CERTIFY THAT:
1. I AM ACCOUNTABLE FOR KNOWING AND COMPLYING WITH THE GOVERNING POLICIES, REGULATIONS AND SUBMITTAL REQUIREMENTS APPLICABLE TO THIS PROPOSED DEVELOPMENT;
2. I HAVE PERFORMED REASONABLE RESEARCH TO DETERMINE THE REQUIRED APPROVALS AND DECISION PROCESS FOR THE PROPOSED PROJECT, AND THAT FAILURE TO ACCURATELY IDENTIFY AN APPROVAL OR DECISION PROCESS COULD SIGNIFICANTLY DELAY THE PERMITTING PROCESS;
3. I HAVE TAKEN THE PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW TRAINING AND AM ON THE APPROVED LIST FOR PROFESSIONAL CERTIFICATION;
4. MAINTAINING MY PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW PRIVILEGE REQUIRES ACCURATE SUBMITTALS ON A CONSISTENT BASIS;
5. SUBMITTING INCOMPLETE DOCUMENTS AND PLANS ON A CONSISTENT BASIS MAY RESULT IN THE REVOCATION OF MY PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW;
6. IF REQUIRED DOCUMENTS OR PLAN CONTENT IS MISSING, PROJECT REVIEW WILL BE DELAYED; AND
7. THIS SUBMITTAL PACKAGE MEETS ALL OF THE MINIMUM SUBMITTAL REQUIREMENTS CONTAINED IN LAND DEVELOPMENT MANUAL, VOLUME 1, CHAPTER 1, SECTION 4.

BRADLEY SONNENBURG

SIGNATURE:____________________ DATE:__________

## GENERAL NOTES

1. LOT SUMMARY

| LAND USE | LOT NO. |
|---|---|
| UNDEVELOPED | 1 |
| RESIDENTIAL (CONDOS) | 2 |
| MIXED–USE (APARTMENTS/SHOPKEEPER UNITS) | 3 |

2. TOTAL AREA WITHIN PROJECT BOUNDARY IS 5.43 ACRES (GROSS).

3. EXISTING ZONING IS CO–1–2 AND MISSION VALLEY DEVELOPMENT INTENSITY DISTRICT OVERLAY ZONE.

4. GAS AND ELECTRIC: SAN DIEGO GAS & ELECTRIC

5. TELEPHONE: PACIFIC TELEPHONE COMPANY

6. CABLE TELEVISION: TIME WARNER CABLE, COX COMMUNICATIONS

7. SEWER AND WATER: CITY OF SAN DIEGO

8. DRAINAGE SYSTEM: CITY OF SAN DIEGO

9. FIRE: CITY OF SAN DIEGO

10. SCHOOL DISTRICT: SAN DIEGO UNIFIED SCHOOL DISTRICT

11. ALL NEW UTILITIES WILL BE LOCATED UNDERGROUND.

12. CONTOUR INTERVAL: 2 FEET
DATUM: BRASS PLUG ON TOP OF CONCRETE CURB LOCATED AT THE SOUTHEAST CORNER OF FRIARS ROAD & FASHION VALLEY ROAD, PER CITY OF SAN DIEGO VERTICAL CONTROL BOOK DATED AUGUST 1989

ELEVATION: 61.802, MSL, PER U.S.G.S. ADJUSTMENT OF 1970 (NAD 83)

SOURCE: PHOTOGRAMMETRIC AERIAL SURVEY DATED 04/16/2014 AND A FIELD SURVEY BY RICK ENGINEERING COMPANY ON 03/04/2015.

13. ALL PROPOSED SLOPES ARE 2:1 UNLESS NOTED OTHERWISE.

14. GRADING SHOWN HEREIN IS PRELIMINARY AND IS SUBJECT TO MODIFICATION IN FINAL DESIGN.

15. LOT DIMENSIONS AND SETBACK DIMENSIONS SHOWN HEREON ARE PRELIMINARY AND ARE SUBJECT TO MODIFICATION IN FINAL DESIGN.

16. ALL EXISTING BUILDINGS AND STRUCTURES SHALL BE REMOVED.

17. AFFORDABLE HOUSING IN–LIEU FEES WILL BE PAID CONSISTENT WITH AGREEMENT BETWEEN THE CITY OF SAN DIEGO AND LCG FRIARS, LCC

18. LOT 2 OF THE PROPOSED MAP IS A CONDOMINIUM PROJECT AS DEFINED IN SECTION 4125 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT. TOTAL NUMBER OF CONDOMINIUM UNITS IS 70.

19. AT NO TIME WILL THE DEVELOPER REQUEST, NOR THE CITY PERMIT, WATER METERS AND SERVICES WITHIN ANY VEHICULAR USE AREA TO SERVE THIS DEVELOPMENT.

20. ALL PUBLIC WATER & SEWER FACILITIES AND ASSOCIATED EASEMENTS WILL BE GRANTED, DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CITY OF SAN DIEGO WATER & SEWER FACILITY DESIGN GUIDELINES AND CITY REGULATIONS, STANDARDS AND PRACTICES.

21. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE SUBDIVIDER SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE.

22. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, DATED MAY 30, 2003 INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.

23. THE SUBDIVIDER SHALL PROCESS ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENTS, FOR ALL ACCEPTABLE ENCROACHMENTS INTO THE WATER AND SEWER EASEMENT, INCLUDING BUT NOT LIMITED TO STRUCTURES, ENHANCED PAVING, OR LANDSCAPING: NO STRUCTURES OR LANDSCAPING OF ANY KIND SHALL BE INSTALLED IN OR OVER ANY VEHICULAR ACCESS ROADWAY.

24. THE SUBDIVIDER SHALL RECORD A DECLARATION OF COVENANTS AND RESERVATION OF EASEMENTS FOR THE MUTUAL ACCESS EASEMENT OF BOTH SITES. THE CONDOMINIUM SITE (LOT 2) WILL EMPLOY THE USE OF ACCESS GATES AND CONTROLLED PARKING.

25. THE SUBDIVIDER SHALL INSTALL CURRENT CITY STANDARD STREET LIGHTS IN COMPLIANCE WITH CURRENT STREET LIGHT STANDARDS ACCORDING TO THE CITY OF SAN DIEGO STREET DESIGN MANUAL AND COUNCIL POLICY 200–18.

26. NO TREES OR SHRUBS EXCEEDING THREE FEET IN HEIGHT AT MATURITY SHALL BE INSTALLED WITHIN TEN FEET OF ANY WATER AND SEWER FACILITIES.

## GRADING DATA

1. TOTAL AMOUNT OF SITE TO BE GRADED: 2.96 AC.
2. PERCENT OF TOTAL SITE GRADED: 54.5%
3. AMOUNT OF SITE WITH 25 PERCENT SLOPES OR GREATER: 3.90 AC.
4. PERCENT OF THE EXIST. SLOPES STEEPER THAN 25% PROPOSED TO BE GRADED: 27.1%
5. PERCENT OF TOTAL SITE WITH 25 PERCENT SLOPES OR GREATER: 71.8%
6. AMOUNT OF CUT: 106,000 CUBIC YARDS
7. AMOUNT OF FILL: 10,000 CUBIC YARDS
8. MAXIMUM HEIGHT OF FILL SLOPE(S): 56' FEET 2:1 SLOPE RATIO.
9. MAXIMUM HEIGHT OF CUT SLOPE(S): 0' FEET 2:1 SLOPE RATIO.
10. AMOUNT OF EXPORT: 96,000 CUBIC YARDS

## SOLAR ACCESS NOTE

THIS IS TO AFFIRM THAT THE DESIGN OF THIS PROVIDES, TO THE EXTENT FEASIBLE, FOR FUTURE PASSIVE OR NATURAL HEATING AND COOLING OPPORTUNITIES IN ACCORDANCE WITH THE PROVISION OF SECTION 66473.1 OF THE STATE SUBDIVISION MAP ACT.

## LEGAL DESCRIPTION

PARCEL 1:
LOTS 1, 2, AND 3 OF FASHION VALLEY NORTH, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 9032, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 17, 1978.


**OWNER/APPLICANT: LCG FRIARS, LLC**
27132 B PASEO ESPADA, STE. 1206
SAN JUAN CAPOSTRANO, CA 92675
(P) 949.348.1104 (F) 949.481.6403

**ARCHITECT: TUCKER SADLER**
1620 5TH STREET, SUITE 200
SAN DIEGO, CA 92101
(P) 619.236.1662

**LANDSCAPE ARCHITECT: TUCKER SADLER**
1620 5TH STREET, SUITE 200
SAN DIEGO, CA 92101
(P) 619.236.1662

**CIVIL ENGINEER: LATITUDE 33 PLANNING & ENGINEERING**
9968 HIBERT STREET, 2ND FLOOR
SAN DIEGO, CA 92131
(P) 858.751.0633
(F) 858.751.0634

**PLANNING: LATITUDE 33 PLANNING & ENGINEERING**
9968 HIBERT STREET, 2ND FLOOR
SAN DIEGO, CA 92131
(P) 858.751.0633
(F) 858.751.0634


OWNER/APPLICANT:

SIGNATURE:____________________ DATE:__________
LCG FRIARS ROAD, LLC

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. SEMIC
Exp. 06–30–17
CIVIL
STATE OF CALIFORNIA

MATTHEW J. SEMIC
R.C.E 71075

DATE REGISTRATION EXPIRES: 06/30/17


latitude 33
PLANNING & ENGINEERING
9968 Hibert Street 2nd Floor, San Diego, CA 92131
Tel 858.751.0633

LandCap Friars Road, LLC
27132 B Paseo Espada Suite 1206
San Juan Capistrano, Ca 92675
(P) 949.348.1104 (F) 949.481.6403


FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

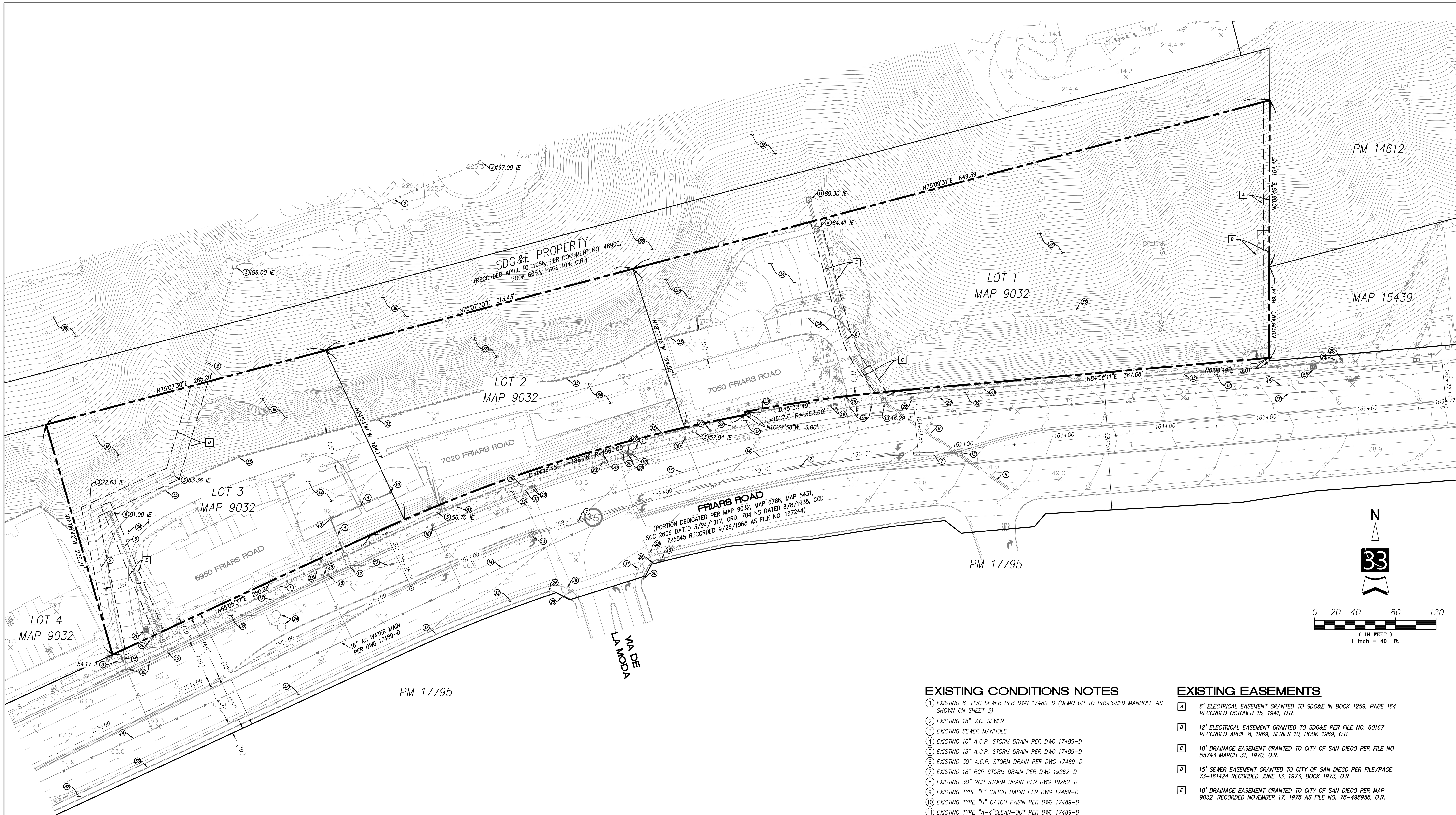
SHEET TITLE:
COVER SHEET

PROJECT NUMBER: 1351.00

DATE: 09/13/2016

SCALE: AS INDICATED

DRAWING NUMBER: 1 OF 29




## EXISTING CONDITIONS NOTES

1. EXISTING 8" PVC SEWER PER DWG 17489–D (DEMO UP TO PROPOSED MANHOLE AS SHOWN ON SHEET 3)
2. EXISTING 18" V.C. SEWER
3. EXISTING SEWER MANHOLE
4. EXISTING 10" A.C.P. STORM DRAIN PER DWG 17489–D
5. EXISTING 18" A.C.P. STORM DRAIN PER DWG 17489–D
6. EXISTING 30" A.C.P. STORM DRAIN PER DWG 17489–D
7. EXISTING 18" RCP STORM DRAIN PER DWG 19262–D
8. EXISTING 30" RCP STORM DRAIN PER DWG 19262–D
9. EXISTING TYPE "F" CATCH BASIN PER DWG 17489–D
10. EXISTING TYPE "H" CATCH PASIN PER DWG 17489–D
11. EXISTING TYPE "A–4"CLEAN–OUT PER DWG 17489–D
12. EXISTING CURB OUTLET PER DWG 17489–D
13. EXISTING CURB INLET PER DWG 19262–D
14. EXISTING 16" A.C. WATER MAIN
15. EXISTING 6" FIRE HYDRANT ASSEMBLY
16. EXISTING WATER METER/SERVICE TO BE KILLED
17. EXISTING 20" HP GAS MAIN
18. EXISTING GAS HAND–HOLE
19. EXISTING SDG&E PULLBOX
20. EXISTING ELECTRICAL TRANSFORMER
21. EXISTING ELECTRICAL VAULT
22. EXISTING TELECOM VAULT
23. EXISTING TRAFFIC SIGNAL PULLBOX
24. EXISTING TRAFFIC SIGNAL DETECTOR LOOPS
25. EXISTING TRAFFIC SIGNAL PEDESTAL
26. EXISTING TRAFFIC SIGNAL
27. EXISTING STREET LIGHT PULLBOX
28. EXISTING STREET LIGHT
29. EXISTING CURB & GUTTER
30. EXISTING DRIVEWAY CUT
31. EXISTING PEDESTRIAN RAMP
32. EXISTING P.C.C. SIDEWALK
33. EXISTING CMU RETAINING WALL
34. EXISTING ASPHALT CONCRETE
35. EXISTING CONCRETE DRAINAGE CHANNEL
36. EXISTING STEEP SLOPE

## EXISTING EASEMENTS

A — 6' ELECTRICAL EASEMENT GRANTED TO SDG&E IN BOOK 1259, PAGE 164 RECORDED OCTOBER 15, 1941, O.R.

B — 12' ELECTRICAL EASEMENT GRANTED TO SDG&E PER FILE NO. 60167 RECORDED APRIL 8, 1969, SERIES 10, BOOK 1969, O.R.

C — 10' DRAINAGE EASEMENT GRANTED TO CITY OF SAN DIEGO PER FILE NO. 55743 MARCH 31, 1970, O.R.

D — 15' SEWER EASEMENT GRANTED TO CITY OF SAN DIEGO PER FILE/PAGE 73–161424 RECORDED JUNE 13, 1973, BOOK 1973, O.R.

E — 10' DRAINAGE EASEMENT GRANTED TO CITY OF SAN DIEGO PER MAP 9032, RECORDED NOVEMBER 17, 1978 AS FILE NO. 78–498958, O.R.

## NON-PLOTTABLE EASEMENTS

AN EASEMENT FOR EITHER OR BOTH POLE LINES, UNDERGROUND CONDUITS TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS AND INCIDENTAL PURPOSES, IN FAVOR OF SAN DIEGO GAS AND ELECTRIC COMPANY, RECORDED JUNE 7, 1979 AS INSTRUMENT NO. 79–235015, O.R.

AN EASEMENT FOR EITHER OR BOTH POLE LINES, UNDERGROUND CONDUITS TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS AND INCIDENTAL PURPOSES, IN FAVOR OF PACIFIC TELEPHONE AND TELEGRPH COMPANY, RECORDED AUGUST 9, 1979 AS INSTRUMENT NO. 79–333697, O.R.

A NONEXCLUSIVE EASEMENT OF USE AND ENJOYMENT IN, TO AND THROUGHOUT THE PARKING AREA WITHIN THE OTHER LOTS FOR PARKING, INGRESS, EGRESS AND SUPPORT, AS MORE FULLY DEFINED AND SET FORTH IN THAT CERTAIN DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED DECEMBER 30, 1986 AS FILE NO. 86–616262, O.R.

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9968 Hibert Street 2nd Floor, San Diego, CA 92131
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# FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

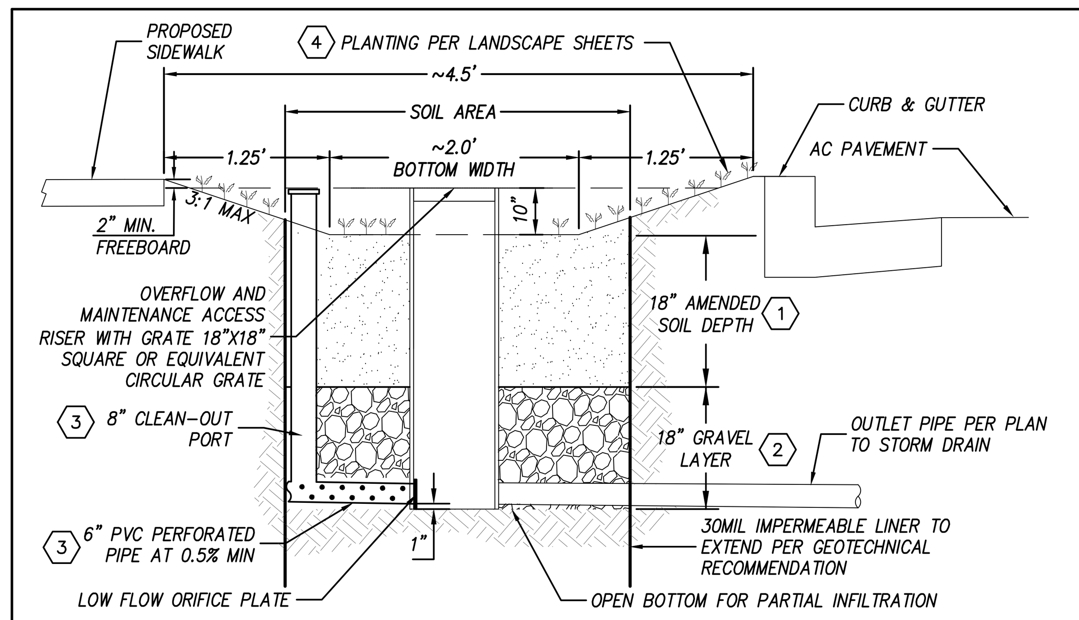
SHEET TITLE:
EXISTING CONIDTIONS

PROJECT NUMBER: 1351.00

DATE: 09/13/2016

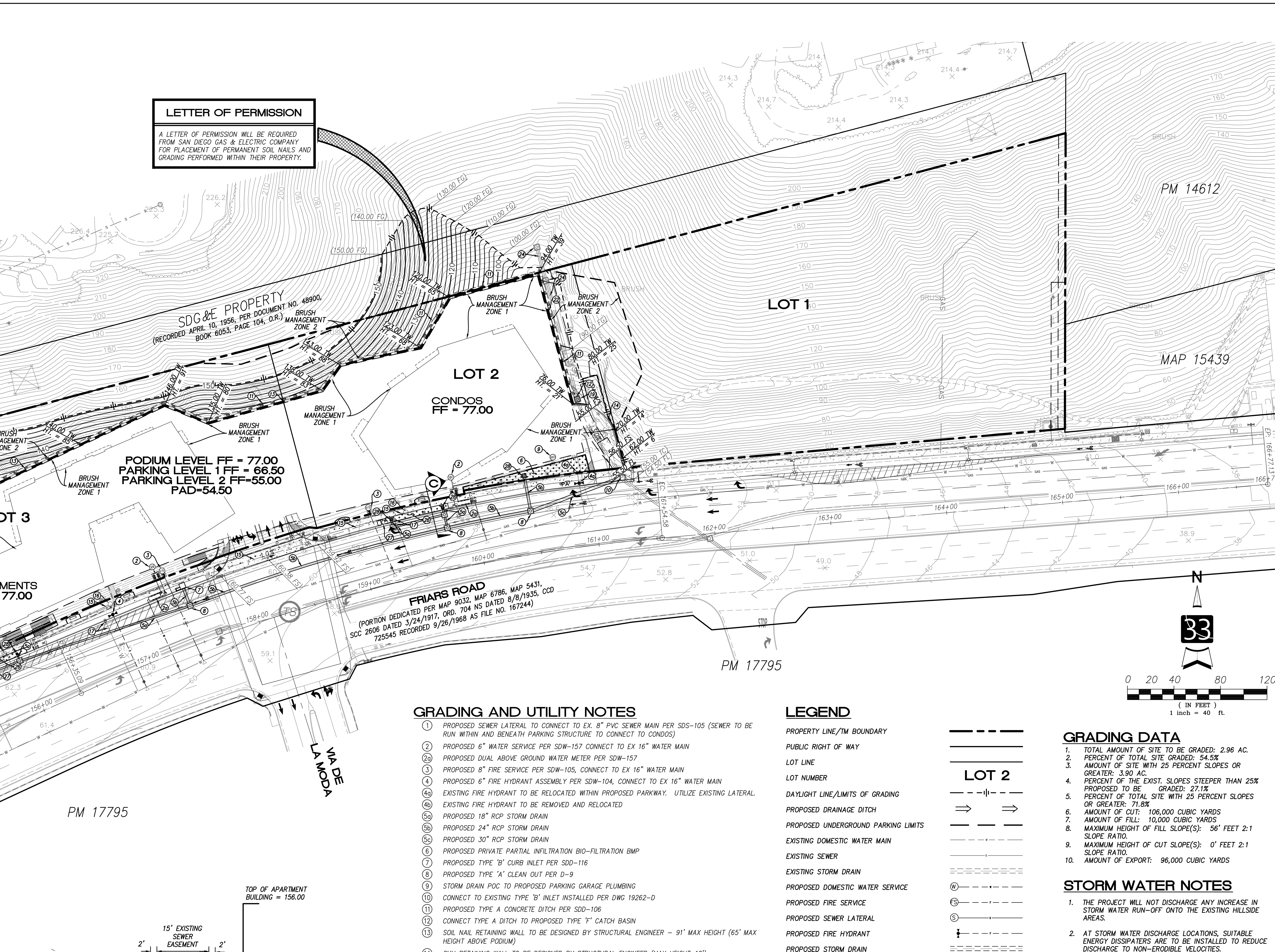
SCALE: AS INDICATED

DRAWING NUMBER: 2 OF 29




**SECTION 'C' - BIOFILTRATION BASIN DETAIL**

NOT TO SCALE

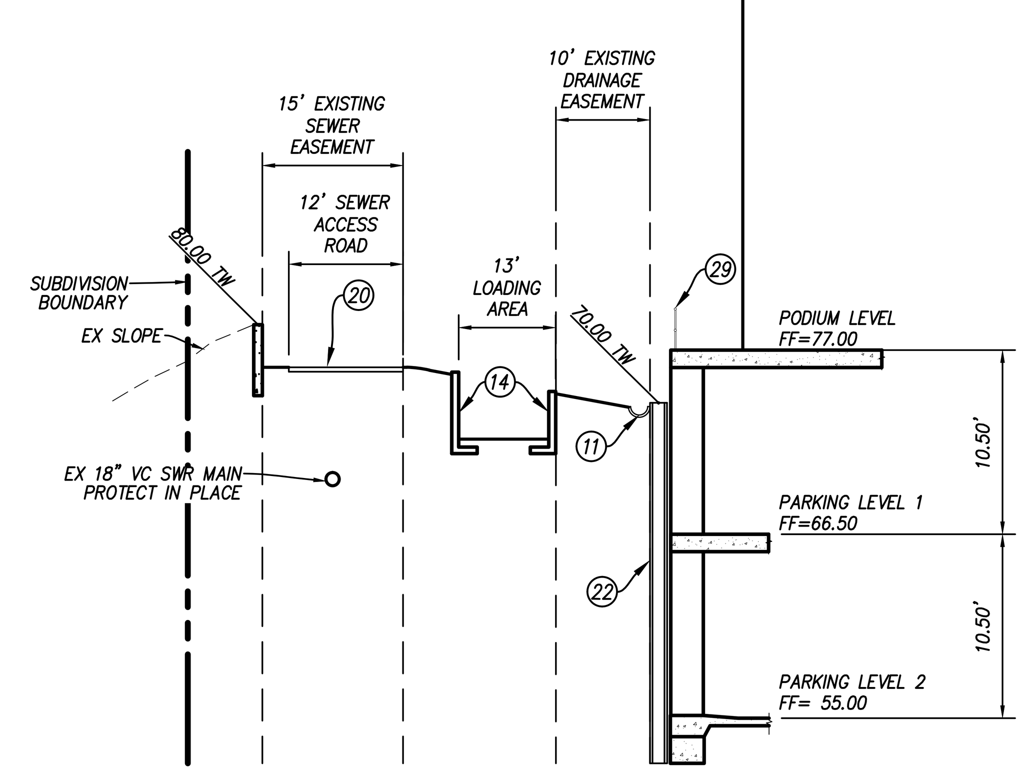



## GRADING AND UTILITY NOTES

1. PROPOSED SEWER LATERAL TO CONNECT TO EX. 8" PVC SEWER MAIN PER SDS-105 (SEWER TO BE RUN WITHIN AND BENEATH PARKING STRUCTURE TO CONNECT TO CONDOS)
2. PROPOSED 6" WATER SERVICE PER SDW-157 CONNECT TO EX 16" WATER MAIN
2a. PROPOSED DUAL ABOVE GROUND WATER METER PER SDW-157
3. PROPOSED 8" FIRE SERVICE PER SDW-105, CONNECT TO EX 16" WATER MAIN
4. PROPOSED 6" FIRE HYDRANT ASSEMBLY PER SDW-104, CONNECT TO EX 16" WATER MAIN
4a. EXISTING FIRE HYDRANT TO BE RELOCATED WITHIN PROPOSED PARKWAY. UTILIZE EXISTING LATERAL.
4b. EXISTING FIRE HYDRANT TO BE REMOVED AND RELOCATED
5a. PROPOSED 18" RCP STORM DRAIN
5b. PROPOSED 24" RCP STORM DRAIN
5c. PROPOSED 30" RCP STORM DRAIN
6. PROPOSED PRIVATE PARTIAL INFILTRATION BIO-FILTRATION BMP
7. PROPOSED TYPE 'B' CURB INLET PER SDD-116
8. PROPOSED TYPE 'A' CLEAN OUT PER D-9
9. STORM DRAIN POC TO PROPOSED PARKING GARAGE PLUMBING
10. CONNECT TO EXISTING TYPE 'B' INLET INSTALLED PER DWG 19262-D
11. PROPOSED TYPE A CONCRETE DITCH PER SDD-106
12. CONNECT TYPE A DITCH TO PROPOSED TYPE 'F' CATCH BASIN
13. SOIL NAIL RETAINING WALL TO BE DESIGNED BY STRUCTURAL ENGINEER – 91' MAX HEIGHT (65' MAX HEIGHT ABOVE PODIUM)
14. CMU RETAINING WALL TO BE DESIGNED BY STRUCTURAL ENGINEER (MAX HEIGHT=10')
15. EXISTING PUBLIC 8" PVC SEWER MAIN PER DWG 17489-D TO BE REMOVED UP TO PROPOSED MH LOCATION. MH TOP BE TURNED TO AVOID CURB.
16. EXISTING SEWER MANHOLE PER DWG 17489-D TO BE REMOVED
17. EXISTING WATER SERVICE TO BE KILLED
18. PROPOSED MANHOLE PER SDS-106
19. PROPOSED TYPE 'F' CATCH BASIN
20. PROPOSED 12' WIDE (MIN.) SEWER ACCESS PATH. COLORED CONCRETE TO BLEND INTO HILLSIDE. 15% MAX RUNNING SLOPE.
21. PROPOSED CURB OUTLET TYPE 'A' PER SDRSD D-25 (CONNECT TO EXISTING STORM DRAIN)
22. PERMANENT SOLDIER BEAM WALL TO BE DESIGNED BY STRUCTURAL ENGINEER (39' MAX HEIGHT)
23. PROPOSED GRADING PER SO CAL SOILS & TESTING RECOMMENDATION TO REPAIR SLOPE. FILL SLOPES SHALL BE GRADED AT 2:1 MAX.
24. REMOVE EXISTING STORM DRAIN AND TYPE 'F' CATCH BASINS
25. PROPOSED 20' RADIUS TURN-AROUND FOR SEWER ACCESS
26. PROPOSED BIO-FILTRATION/GREEN STREETS RETENTION AREA
27. PROPOSED CURB CUT
28. PROPOSED OVERFLOW CATCH BASIN
29. PROVIDE PROTECTIVE PEDESTRIAN RAILING PER SDM-115 WHEREVER THE GRADE DIFFERENTIAL FROM EDGE OF PODIUM DECK TO FINISHED GRADE IS GREATER THAN OR EQUAL TO -2.5 FEET.
30. PROVIDE ROCKFALL PROTECTION FENCE IN CONFORMANCE WITH FHA ROCK SLOPE DESIGN SOLUTIONS CHAPTER 6 ALONG FULL LENGTH OF RETAINING WALL
31. PROVIDE METAL BEAM GUARD RAILING PER CALTRANS STANDARD PLAN RSP A77A1 & A77A2 WHERE SEWER ACCESS ROAD IS ABOVE PODIUM DECK

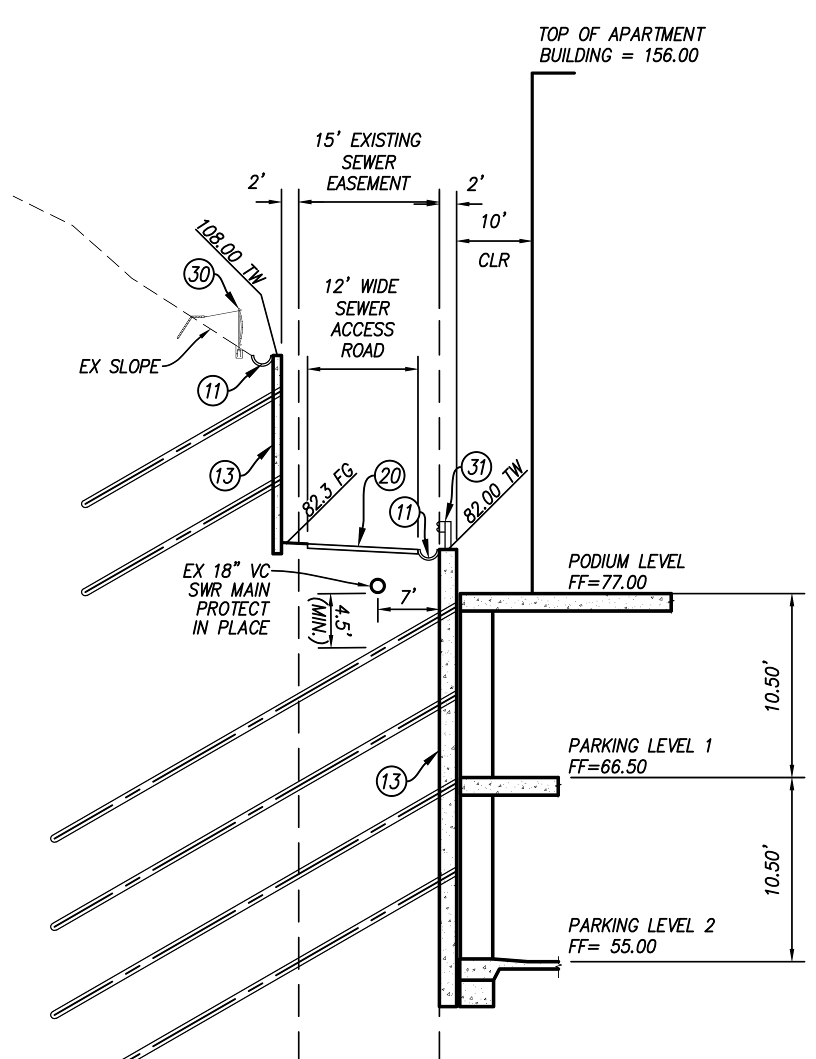
## SEWER ACCESS NOTE

GIVEN THAT THE PERFORMANCE CALCULATIONS FOR THE PROPOSED SEWER ACCESS ROAD TURNAROUND ARE CRITICAL TO THE CITY'S ABILITY TO SERVICE AND REPAIR THE EXISTING 18" TRUNK SEWER CROSSING LOT #3: PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, WRITTEN CONFIRMATION FROM THE VACTOR TRUCK MANUFACTURER (CONTACT INFORMATION PREVIOUSLY FORWARDED TO THE DESIGNER AND AVAILABLE UPON REQUEST) AS TO THE ADEQUACY OF THE PROPOSED ACCESS ROAD'S DESIGN WITH RESPECT TO THE TURNAROUND CAPABILITIES OF THE DESIGN VEHICLE (VACTOR TRUCK MODEL #114SD W/ CUSTOMER INSTALLED SPECIAL BUMPER) MUST BE SUBMITTED TO AND APPROVED BY THE PUBLIC WATER AND SEWER DEVELOPMENT REVIEW SECTION.




**SECTION 'B'**

NOT TO SCALE




**SECTION 'A'**

NOT TO SCALE

## LEGEND

| | |
|---|---|
| PROPERTY LINE/TM BOUNDARY | |
| PUBLIC RIGHT OF WAY | |
| LOT LINE | |
| LOT NUMBER | LOT 2 |
| DAYLIGHT LINE/LIMITS OF GRADING | |
| PROPOSED DRAINAGE DITCH | |
| PROPOSED UNDERGROUND PARKING LIMITS | |
| EXISTING DOMESTIC WATER MAIN | |
| EXISTING SEWER | |
| EXISTING STORM DRAIN | |
| PROPOSED DOMESTIC WATER SERVICE | |
| PROPOSED FIRE SERVICE | |
| PROPOSED SEWER LATERAL | |
| PROPOSED FIRE HYDRANT | |
| PROPOSED STORM DRAIN | |
| PROPOSED MODULAR WETLANDS | |
| PROPOSED PUBLIC STORM DRAIN INLET | |
| PROPOSED RETAINING WALL | |
| PROPOSED BIOFILTRATION BASIN | |

## EMRA NOTES

THE FOLLOWING PROPOSED UTILITIES AND IMPROVEMENTS WILL REQUIRE THE OWNER TO ENTER INTO AN ENCROACHMENT REMOVAL AND MAINTENANCE AGREEMENT WITH THE CITY OF SAN DIEGO:

1. PROPOSED PRIVATE STORM DRAIN PIPES TO CONNECT TO PUBLIC INLETS AND CATCH BASINS

2. PROPOSED CMU RETAINING WALLS CROSSING OVER EXISTING DRAINAGE EASEMENTS

3. PROPOSED SOIL NAILS WITHIN SEWER EASEMENT

## BIOFILTRATION BASIN NOTES

1. AMENDED SOIL SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.4 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL MAINTAIN A MINIMUM INFILTRATION RATE OF 5 IN/HR OVER THE LIFETIME OF THE FACILITY.
2. GRAVEL STORAGE LAYER SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.5 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL CONSIST OF 6" FILTER COURSE OVER 12" OF CLEAN WASHED ASTM #57 OPEN GRADED STONE. FILTER COURSE SHALL CONSIST OF 3" LAYER OF CLEAN WASHED ASTM 33 FINE AGGREGATE SAND OVERLYING A 3" LAYER OF ASTM NO 8 STONE.
3. UNDERDRAINS SHALL BE MINIMUM 6" SLOTTED PVC PIPE CONFORMING TO ASTM D3034 OR CORRUGATED HDP CONFORMING TO AASHTO 252M. CLEANOUT PORTS SHALL BE A MINIMUM 8" DIAMETER WITH LOCKABLE CAP AND PLACED EVERY 50' OF UNDERDRAIN LENGTH.
4. BIOFILTRATION BASINS SHALL BE PLANTED WITH ADEQUATE GROUNDCOVER AS OUTLINED IN APPENDIX E OF THE SAN DIEGO LOW IMPACT DEVELOPMENT DESIGN MANUAL. SEE LANDSCAPE PLANS SHEETS 31, 33, 34, 36 AND 38 FOR PLANTING PLAN. 'DEER GRASS' AND 'YARROW' PROPOSED.

## GRADING DATA

1. TOTAL AMOUNT OF SITE TO BE GRADED: 2.96 AC.
2. PERCENT OF TOTAL SITE GRADED: 54.5%
3. AMOUNT OF SITE WITH 25 PERCENT SLOPES OR GREATER: 3.90 AC.
4. PERCENT OF THE EXIST. SLOPES STEEPER THAN 25% PROPOSED TO BE GRADED: 27.1%
5. PERCENT OF TOTAL SITE WITH 25 PERCENT SLOPES OR GREATER: 71.8%
6. AMOUNT OF CUT: 106,000 CUBIC YARDS
7. AMOUNT OF FILL: 10,000 CUBIC YARDS
8. MAXIMUM HEIGHT OF FILL SLOPE(S): 56' FEET 2:1 SLOPE RATIO.
9. MAXIMUM HEIGHT OF CUT SLOPE(S): 0' FEET 2:1 SLOPE RATIO.
10. AMOUNT OF EXPORT: 96,000 CUBIC YARDS

## STORM WATER NOTES

1. THE PROJECT WILL NOT DISCHARGE ANY INCREASE IN STORM WATER RUN-OFF ONTO THE EXISTING HILLSIDE AREAS.
2. AT STORM WATER DISCHARGE LOCATIONS, SUITABLE ENERGY DISSIPATERS ARE TO BE INSTALLED TO REDUCE DISCHARGE TO NON-ERODIBLE VELOCITIES.
3. MULTIPLE STORM WATER DISCHARGE LOCATIONS WILL BE USED TO MIMIC THE EXISTING DRAINAGE PATTERN.
4. NO ADDITIONAL RUN-OFF IS PROPOSED FOR THE DISCHARGE LOCATIONS.
5. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PREMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.
6. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTIONS BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
7. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE STORM WATER QUALITY MANAGEMENT PLAN WILL BE SUBJECT TO FINAL REVIEW AND APPROVAL BY THE CITY ENGINEER.
8. DEVELOPMENT OF THIS PROJECT SHALL COMPLY WITH ALL STORM WATER CONSTRUCTION REQUIREMENTS OF THE STATE CONSTRUCTION GENERAL PERMIT, ORDER NO. 2009-0009DWQ, OR SUBSEQUENT ORDER, AND THE MUNICIPAL STORM WATER PERMIT, SDRWQCB ORDER NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 (MS4 PERMIT). IN ACCORDANCE WITH ORDER NO. 2009-0009DWQ, OR SUBSEQUENT ORDER, A RISK LEVEL DETERMINATION SHALL BE CALCULATED FOR THE SITE AND A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE IMPLEMENTED CONCURRENTLY WITH THE COMMENCEMENT OF GRADING ACTIVITIES.
9. PRIOR THE ISSUANCE OF A GRADING OR A CONSTRUCTION PERMIT, A COPY OF THE NOTICE OF INTENT (NOI) WITH A VALID WASTE DISCHARGE ID NUMBER (WDID#) SHALL BE SUBMITTED TO THE CITY OF SAN DIEGO AS A PROOF OF ENROLLMENT UNDER THE CONSTRUCTION GENERAL PERMIT.

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FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

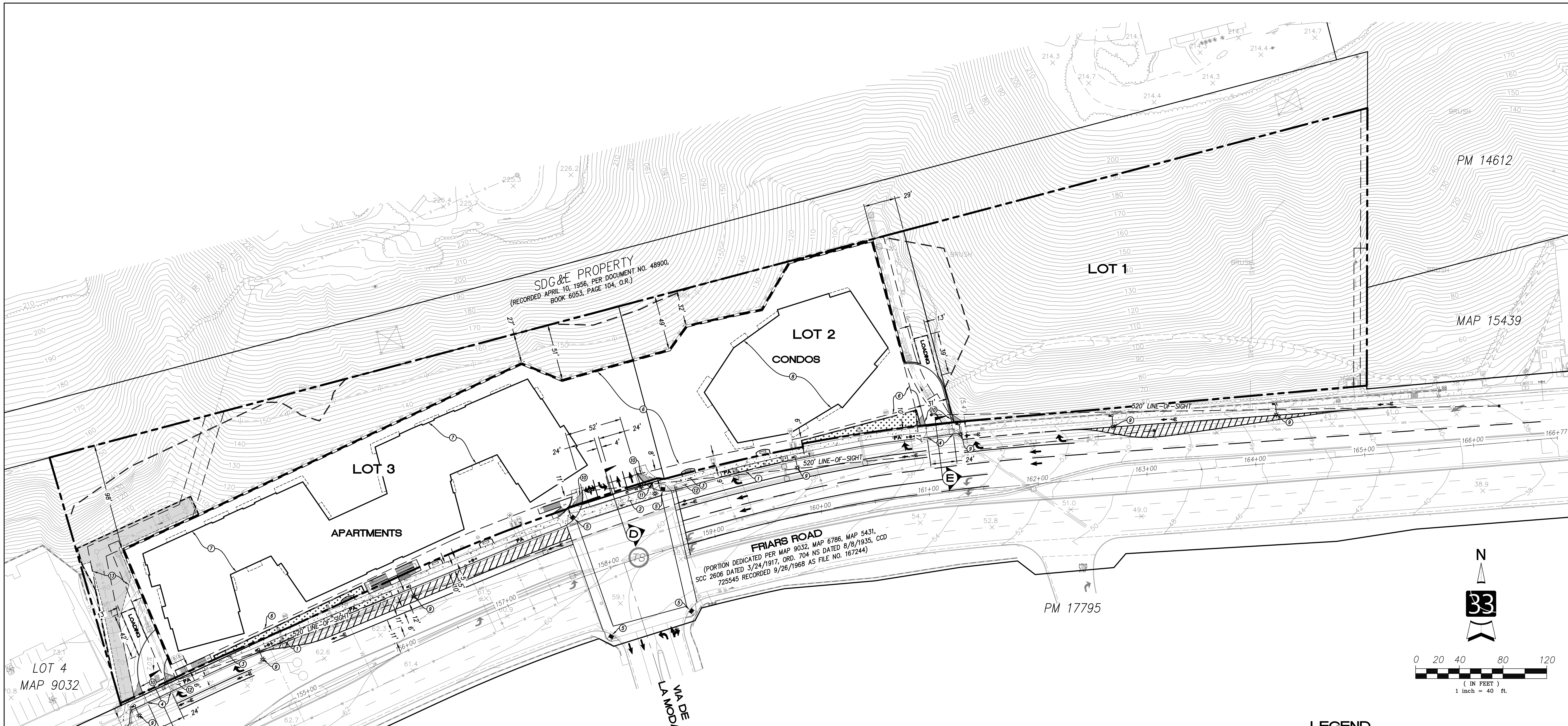
SHEET TITLE:
GRADING & UITLITY PLAN

PROJECT NUMBER: 1351.00

DATE: 09/13/2016

SCALE: AS INDICATED

DRAWING NUMBER: 3 OF 29




## DEVIATIONS

| DEVIATION REGULATION | SDMC SECTION | LOT # | REQUIRED | PROPOSED | REQUIRED PERMIT |
|---|---|---|---|---|---|
| FRONT SETBACK | 131.0531, Table 131-05D | 2 | 10’ | 6’ MIN | PDP |
| | | 3 | 10’ | 6’ MIN | |
| REAR SETBACK | 131.0531, Table 131-05D, Footnote 131.0543(b) | 2 | 0’ or 10’ | 0’ MIN | PDP |
| RETAINING WALL HEIGHT | 142.0340 | 2 | 6’ MAX | 75’ | PDP |
| | | 3 | 6’ MAX | 85’ | |
| STRUCTURE HEIGHT | 131.0531, Table 131-05D | 2 | 60’ | 130.5’ | PDP |
| | | 3 | 60’ | 101’ | |
| FLOOR AREA RATIO | 131.0531, Table 131-05D | 1-3 | 1.50 | 1.68 | PDP |
| GROUND FLOOR RESIDENTIAL | 131.0540(c)(1) | 2-3 | 50% | <50% | PDP |

## SITE PLAN NOTES

1. PROPOSED 6" CURB & GUTTER PER SDG-151
2. PROPOSED CROSS GUTTER PER SDG-157
3. PROPOSED 5' WIDE P.C.C. SIDEWALK PER SDG-155
4. PROPOSED 24' WIDE DRIVEWAY CUT PER SDG-160
5. PROPOSED TYPE A CURB RAMP PER SDG-132
6. PROPOSED PARKING STRUCTURE LIMITS
7. PROPOSED APARTMENT TOWER LIMITS
8. PROPOSED CONDOMINIUM TOWER LIMITS
9. PROPOSED STREET LIGHT PER SDE-101
10. PROPOSED VISIBILITY TRIANGLE, NO STRUCTURES PERMITTED WITHIN THIS AREA
11. RELOCATE EXISTING TRAFFIC SIGNAL AND STREET LIGHT
12. NO SHRUBS GREATER THAN 3' IN HEIGHT ALLOWED WITHIN LINE-OF-SIGHT AREAS
13. PROPOSED COLORED CONCRETE SEWER ACCESS PATH

## LEGEND

PROPERTY LINE/TM BOUNDARY
PUBLIC RIGHT OF WAY
LOT LINE
LOT NUMBER — LOT 2
PROPOSED CURB
PROPOSED CURB AND GUTTER
PROPOSED DRIVEWAY CUT
PROPOSED SIDEWALK
PROPOSED STREET LIGHT — SB PB
PROPOSED PLANTER AREA — PA
EXISTING GRADE/ELEV — (123.95 TC) (123.45 FS)
PROPOSED GRADE/ELEV — 123.95 TC 123.45 FS
PROPOSED SEWER ACCESS PATH

## NOTE

NO OBSTRUCTION INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT.

## INTERSECTION SIGHT DISTANCE

EAST & WEST DRIVEWAYS & SIGNALIZED INTERSECTION:

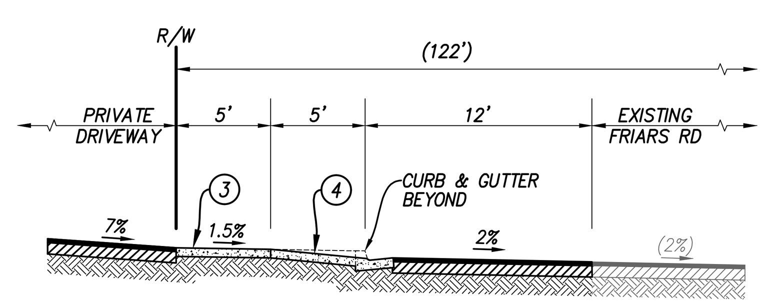
PER 201.1 OF THE HIGHWAY DESIGN MANUAL: "STOPPING SIGHT DISTANCE IS IS TO BE PROVIDED FOR ALL USERS , INCLUDING MOTORISTS AND BICYCLISTS, AT ALL ELEMENTS OF INTERCHANGES AND INTERSECTIONS AT GRADE. (SEE TOPIC 504, INDEX 405.1, & FIGURE 405.7)."

FRIARS ROAD 85% DESIGN SPEED (PER CITY'S SPEED SURVEY) = 47mph

FROM TABLE 405.1A OF THE HIGHWAY DESIGN MANUAL

CORNER SIGHT DISTANCE = **520.00'**

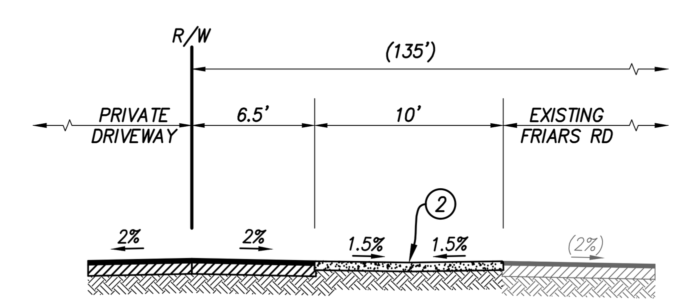
## DRIVEWAY SECTIONS




WEST DRIVEWAY WIDTH = 24'

**SECTION 'C'**

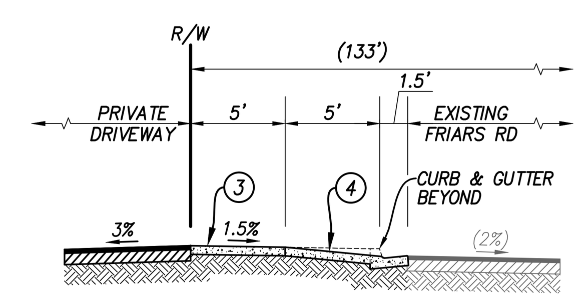
NOT TO SCALE




MAIN DRIVEWAY WIDTH = 52'

**SECTION 'D'**

NOT TO SCALE




EAST DRIVEWAY WIDTH = 24'

**SECTION 'E'**

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# FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

SHEET TITLE:
SITE PLAN

PROJECT NUMBER:
1351.00

DATE:
09/13/2016

SCALE
AS INDICATED

DRAWING NUMBER:
4 OF 29

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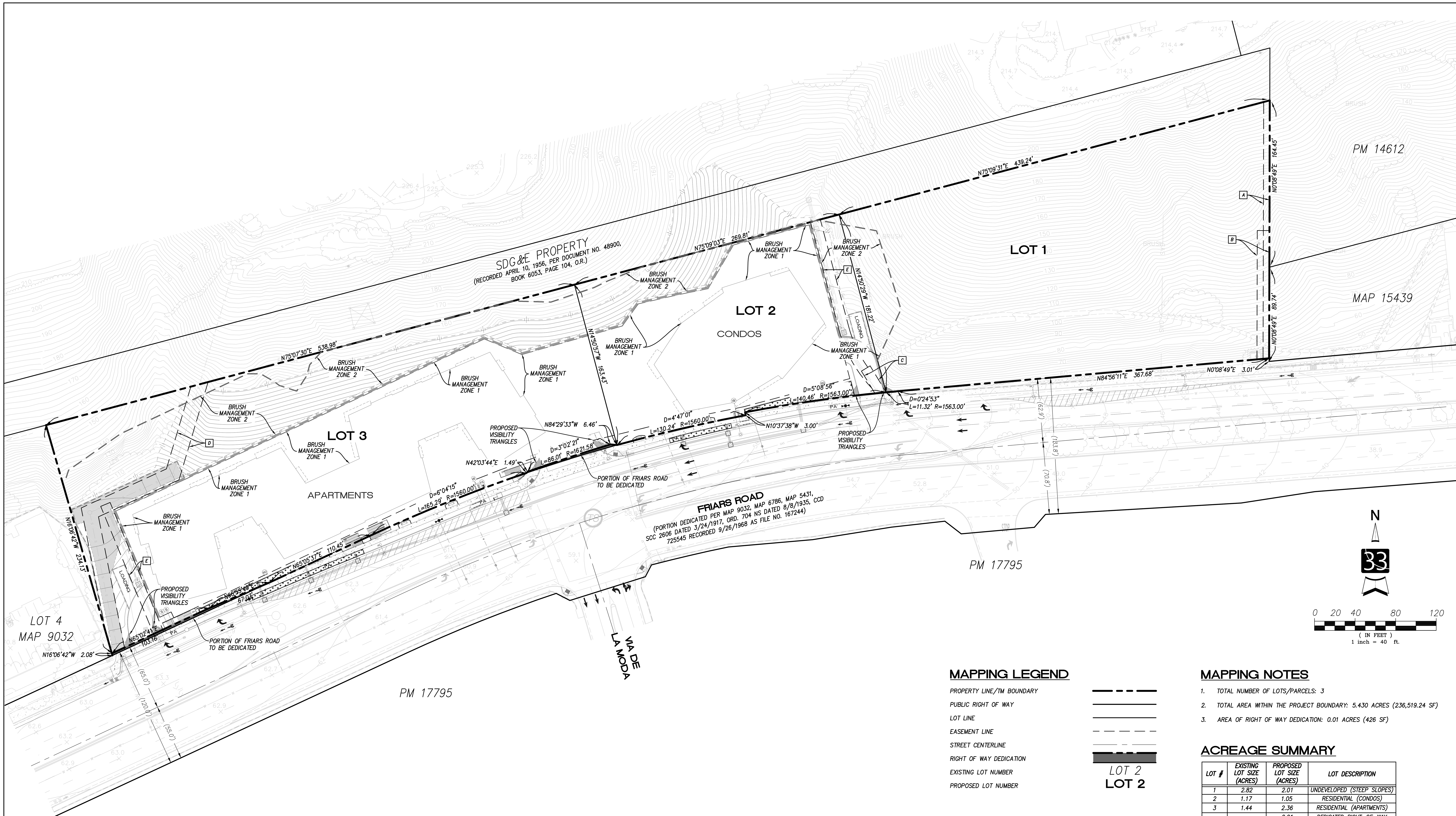


## MAPPING LEGEND

PROPERTY LINE/TM BOUNDARY

PUBLIC RIGHT OF WAY

LOT LINE

EASEMENT LINE

STREET CENTERLINE

RIGHT OF WAY DEDICATION

EXISTING LOT NUMBER — LOT 2

PROPOSED LOT NUMBER — **LOT 2**

## MAPPING NOTES

1. TOTAL NUMBER OF LOTS/PARCELS: 3
2. TOTAL AREA WITHIN THE PROJECT BOUNDARY: 5.430 ACRES (236,519.24 SF)
3. AREA OF RIGHT OF WAY DEDICATION: 0.01 ACRES (426 SF)

## ACREAGE SUMMARY

| LOT # | EXISTING LOT SIZE (ACRES) | PROPOSED LOT SIZE (ACRES) | LOT DESCRIPTION |
|---|---|---|---|
| 1 | 2.82 | 2.01 | UNDEVELOPED (STEEP SLOPES) |
| 2 | 1.17 | 1.05 | RESIDENTIAL (CONDOS) |
| 3 | 1.44 | 2.36 | RESIDENTIAL (APARTMENTS) |
| -- | -- | 0.01 | DEDICATED RIGHT-OF-WAY |
| TOTAL | 5.43 | 5.43 | TOTAL GROSS ACREAGE |

## EXISTING EASEMENTS

A — 6' ELECTRICAL EASEMENT GRANTED TO SDG&E IN BOOK 1259, PAGE 164 RECORDED OCTOBER 15, 1941, O.R.

B — 12' ELECTRICAL EASEMENT GRANTED TO SDG&E PER FILE NO. 60167 RECORDED APRIL 8, 1969, SERIES 10, BOOK 1969, O.R.

C — 10' DRAINAGE EASEMENT GRANTED TO CITY OF SAN DIEGO PER FILE NO. 55743 MARCH 31, 1970, O.R.

D — 15' SEWER EASEMENT GRANTED TO CITY OF SAN DIEGO PER FILE/PAGE 73-161424 RECORDED JUNE 13, 1973, BOOK 1973, O.R.

E — 10' DRAINAGE EASEMENT GRANTED TO CITY OF SAN DIEGO PER MAP 9032, RECORDED NOVEMBER 17, 1978 AS FILE NO. 78-498958, O.R.

## NON-PLOTTABLE EASEMENTS

AN EASEMENT FOR EITHER OR BOTH POLE LINES, UNDERGROUND CONDUITS TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS AND INCIDENTAL PURPOSES, IN FAVOR OF SAN DIEGO GAS AND ELECTRIC COMPANY, RECORDED JUNE 7, 1979 AS INSTRUMENT NO. 79-235015, O.R.

AN EASEMENT FOR EITHER OR BOTH POLE LINES, UNDERGROUND CONDUITS TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS AND INCIDENTAL PURPOSES, IN FAVOR OF PACIFIC TELEPHONE AND TELEGRPH COMPANY, RECORDED AUGUST 9, 1979 AS INSTRUMENT NO. 79-333697, O.R.

A NONEXCLUSIVE EASEMENT OF USE AND ENJOYMENT IN, TO AND THROUGHOUT THE PARKING AREA WITHIN THE OTHER LOTS FOR PARKING, INGRESS, EGRESS AND SUPPORT, AS MORE FULLY DEFINED AND SET FORTH IN THAT CERTAIN DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED DECEMBER 30, 1986 AS FILE NO. 86-616262, O.R.

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. SEMIC
Exp. 06-30-17
CIVIL
STATE OF CALIFORNIA

MATTHEW J. SEMIC
R.C.E. 71075

DATE REGISTRATION EXPIRES: 06/30/17


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# FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

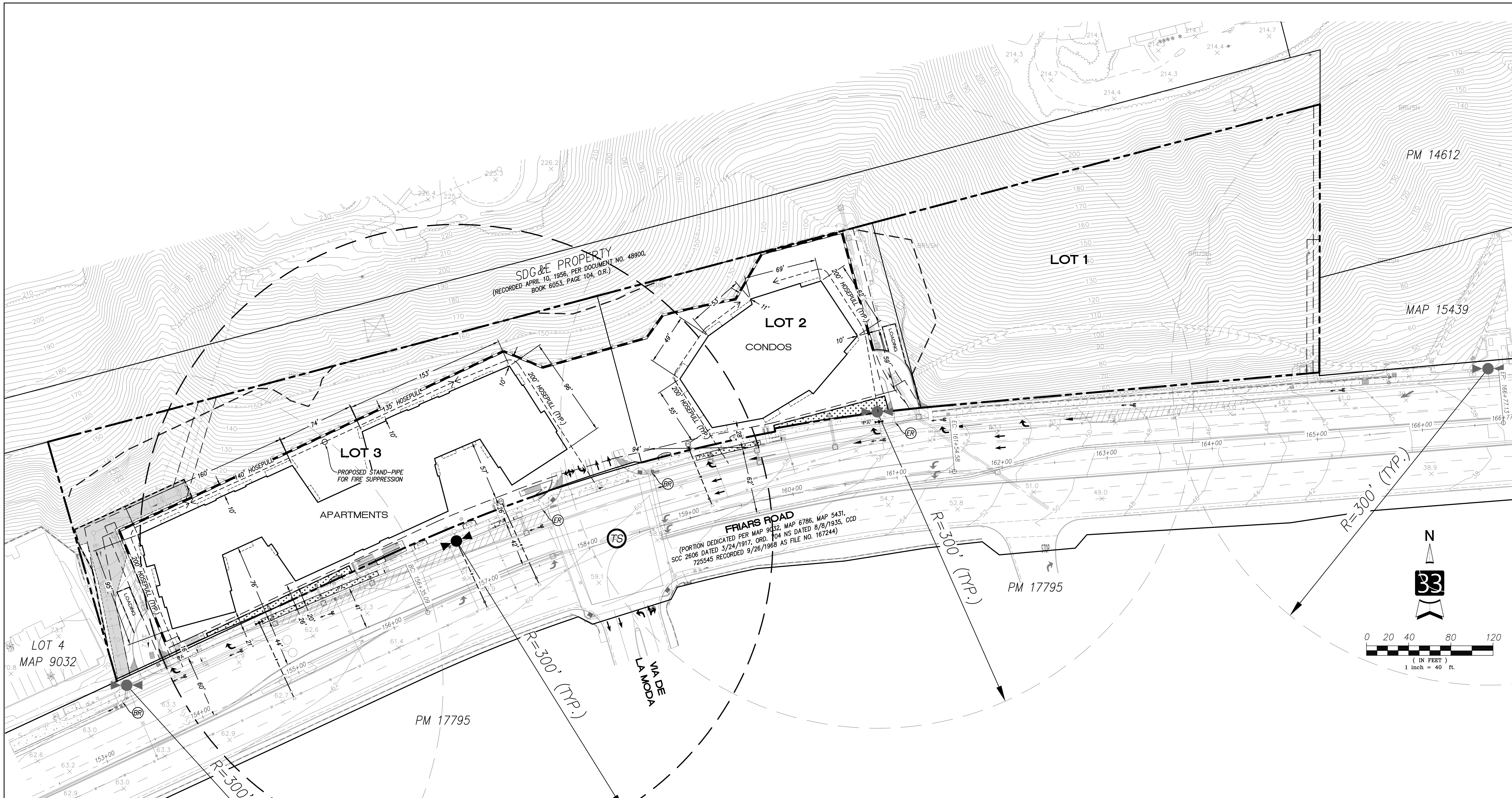
SHEET TITLE:
PROPOSED MAPPING PLAN

PROJECT NUMBER: 1351.00

DATE: 09/13/2016

SCALE: AS INDICATED

DRAWING NUMBER: 5 OF 29




## FIRE DEPARTMENT NOTES

1. FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION CFC 501.4.
2. PROVIDE BUILDING ADDRESS NUMBERS, VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY PER FHPS P-00-6.
3. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. CFC 503.2.3.
4. PROVIDE FIRE ACCESS ROADWAY SIGNS OR RED CURBS IN ACCORDANCE WITH FHPS POLICY A-08-01.
5. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE BUILDING.
6. CFC 507.5.5 – CLEAR SPACE AROUND HYDRANTS – A 3 FOOT CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF FIRE HYDRANTS, EXCEPT AS OTHERWISE REQUIRED OR APPROVED.
7. CFC 507.5.6 – PHYSICAL PROTECTION – WHERE FIRE HYDRANTS ARE SUBJECT TO IMPACT BY A MOTOR VEHICLE, GUARD POSTS OR OTHER APPROVED MEANS SHALL COMPLY WITH SECTION CFC 312.
8. DEAD-END FIRE APPARATUS ACCESS ROADS IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED AREA FOR TURNING AROUND FIRE APPARATUS. CFC 503.2.5.
9. WHERE SECURITY GATES ARE INSTALLED, THEY SHALL HAVE AN APPROVED MEANS OF EMERGENCY OPERATION. THE SECURITY GATES AND EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM F 2200.
10. AN APPROVED VEHICLE STROBE DETECTOR SYSTEM, WITH KNOX KEYSWITCH OVERRIDE, SATISFACTORY TO THE FIRE MARSHAL SHALL BE PROVIDED ON ALL VEHICLE MAIN ENTRY AND EMERGENCY ENTRY POINTS TO THE PROJECT.
11. STAIRWAYS EXITING DIRECTLY TO THE EXTERIOR OF A BUILDING FOUR OR MORE STORIES IN HEIGHT SHALL BE PROVIDED WITH A MEANS FOR EMERGENCY ENTRY FOR FIRE DEPARTMENT ACCESS.
12. VEGETATION SHALL BE SELECTED AND MAINTAINED IN SUCH A MANNER AS TO ALLOW IMMEDIATE ACCESS TO ALL HYDRANTS, VALVES, FIRE DEPARTMENT CONNECTIONS, PULL STATIONS, EXTINGUISHERS, SPRINKLER RISERS, ALARM CONTROL PANELS, RESCUE WINDOWS, AND OTHER DEVICES OR AREAS USED FOR FIREFIGHTING PURPOSES. VEGETATION OR BUILDING FEATURES SHALL NOT OBSTRUCT ADDRESS NUMBERS OR INHIBIT THE FUNCTIONING OF ALARM BELLS, HORNS OR STROBES.
13. CFC 105.4.4 – CONSTRUCTION DOCUMENTS APPROVED BY THE FIRE CODE OFFICIAL ARE APPROVED WITH THE INTENT THAT SUCH CONSTRUCTION DOCUMENTS COMPLY IN ALL RESPECTS WITH THIS CODE. REVIEW AND APPROVAL BY THE FIRE CODE OFFICIAL SHALL NOT RELIEVE THE APPLICANT OF THE RESPONSIBILITY OF COMPLIANCE WITH THIS CODE.
14. CBC SEC. 3003 – COMPLETE PLANS AND SPECIFICATIONS FOR THE OPERATION OF ELEVATORS UNDER FIRE OR OTHER EMERGENCY CONDITIONS SHALL BE SUBMITTED TO LIFE SAFETY FOR REVIEW AND APPROVALPRIOR TO INSTALLATION.
15. EMERGENCY SYSTEMS CONFORMING WITH CFC SECTION 604 AND THE CALIFORNIA ELECTRICAL CODE SHALL BE PROVIDED.

    NOTE: FUEL TANKS REQUIRE PLAN CHECK AND A APPROVAL FROM THE TECHNICAL SERVICES SECTION OF THE FIRE-RESCUE DEPARTMENT. OBTAIN PERMIT/TA NUMBER AT 1010 2ND AVE. STE. 300 (619) 533-4477. BUILDING FINAL WILL NOT BE APPROVED UNTIL THE TANK PERMIT HAS BEEN APPROVED.
16. CFC 1007.8 – A TWO-WAY COMMUNICATION SYSTEM BETWEEN THE CENTRAL CONTROL STATION AND ELEVATORS, ELEVATOR LOBBIES, EMERGENCY AND STANDBY POWER ROOMS, AND ENTRIES INTO ENCLOSED STAIRWAYS SHALL BE PROVIDED FOR FIRE DEPARTMENT USE.
17. CFC 3313.1 – EVERY BUILDING FOUR STORIES OR MORE IN HEIGHT SHALL BE PROVIDED WITH NOT LESS THAN ONE STANDPIPE FOR USE DURING CONSTRUCTION INSTALLED IN ACCORDANCE WITH CFC 3313.1. STANDPIPE SHALL BE INSTALLED WHEN THE PROGRESS OF CONSTRUCTION IS NOT MORE THAN 40 FEET IN HEIGHT ABOVE THE LOWEST LEVEL OF FIRE DEPARTMENT ACCESS.
18. CFC SEC. 906 – AT LEAST ONE FIRE EXTINGUISHER WITH A MINIMUM RATING OF 2-A-10-BC SHALL BE PROVIDED WITHIN 75 FEET MAXIMUM TRAVEL DISTANCE FOR EACH 6,000 SQUARE FEET OR PORTION THEREOF ON EACH FLOOR.
19. CFC SEC. 804 – DECORATIVE MATERIALS SHALL BE MAINTAINED IN A FLAME-RETARDANT CONDITION.
20. HIGH RISE BUILDINGS ARE REQUIRED TO HAVE A FIRE COMMAND CENTER. MINIMUM ROOM SIZE FOR THE FIRE COMMAND CENTER IS 200 SQUARE FEET IN AREA WITH A MINIMUM DIMENSION OF 10 FEET. (CFC 508.1.3)

## FIRE ACCESS LEGEND

PROJECT LINE/ TM BOUNDARY................................
PUBLIC RIGHT OF WAY...........................................
LOT LINE..............................................................
LOT NUMBER........................................................ LOT 5
SIGNALIZED INSTERSECTION.................................... TS
PROPOSED FIRE SERVICE AND BACKFLOW............ FS
FIRE HYDRANT ASSEMBLY.......................................
300' RADIUS AT EXISTING FIRE HYDRANT............
300' RADIUS AT PROPOSED FIRE HYDRANT...........
HOSE PULL LENGTH................................................ 200' (TYP.)
FIRE TRUCK ACCESS...............................................
BEGIN RED PAINTED CURB PER FPB POLICY A-08-1.... BR
END RED PAINTED CURB PER FPB POLICY A-08-1....... ER

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(P) 949.348.1104 (F) 949.481.6403

FRIARS ROAD MIXED USE
SAN DIEGO, CA 92108

SHEET TITLE:
FIRE ACCESS PLAN

PROJECT NUMBER: 1351.00
DATE: 09/13/2016
SCALE: AS INDICATED
DRAWING NUMBER: 6 OF 29

H:\1300\1351.00 - FRIARS ROAD (PLANNING)\ENGINEERING\PLANS\TM\1351.00 TM 06 FIRE ACCESS PLAN.DWG 6/29/2016 9:45 AM

# ATTACHMENT 5
# DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

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2016

# PRELIMINARY DRAINAGE STUDY

## FRIARS ROAD RESIDENTIAL

CITY OF SAN DIEGO

September 13, 2016

PREPARED BY: latitude 33 PLANNING & ENGINEERING

PREPARED FOR: Landcap Friars Road, LLC

JOB NUMBER: 1351.00

# PRELIMINARY
# DRAINAGE STUDY

# FRIARS ROAD RESIDENTIAL

6950, 7020, 7050 FRIARS ROAD
SAN DIEGO, CALIFORNIA 92108

**PTS NO. 432844**
**VTM 1586194**
**PDP 1586192**
**SDP 1586193**

SEPTEMBER 13, 2016

Prepared For:
**LANDCAP FRIARS ROAD, LLC**
27132 B Paseo Espada, Suite 1206
San Juan Capistrano, CA 92675

Prepared By:

latitude 33
PLANNING & ENGINEERING

9968 Hibert Street, 2nd Floor
San Diego, California 92131
Phone (858) 751-0633
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Matthew J. Semic, RCE 71075
Registration Expires 6/30/17

Prepared By: JRG
Checked By: MJS

# TABLE OF CONTENTS



# TABLE OF FIGURES



# LIST OF APPENDICES

## DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

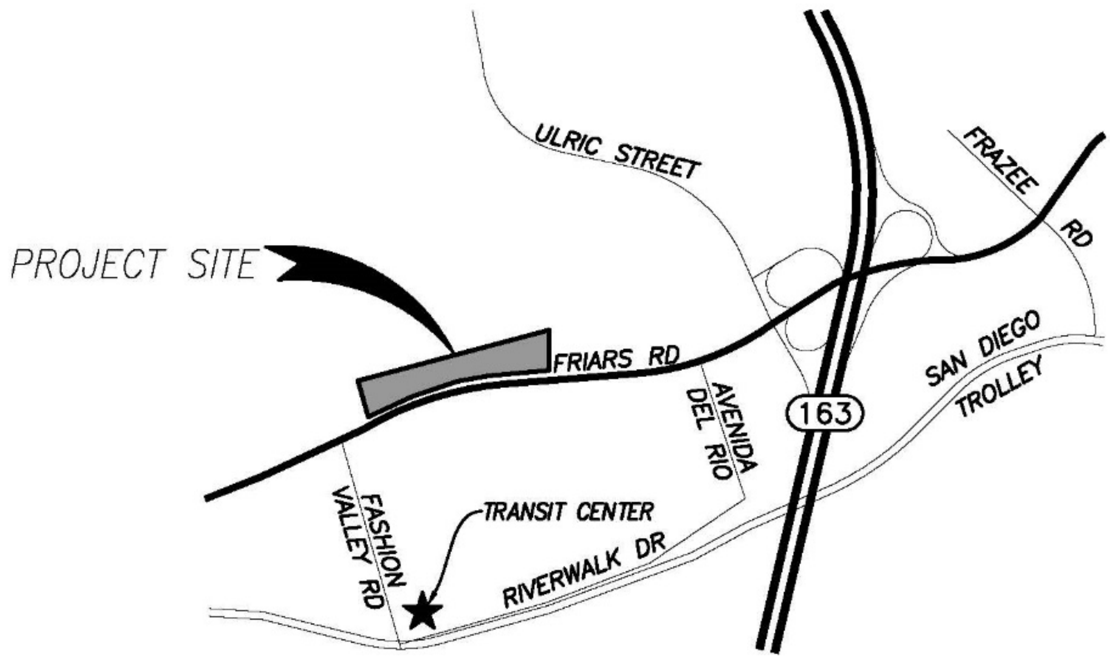
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

Matthew J. Semic R.C.E. 71075 DATE
REGISTERED CIVIL ENGINEER

## 1. PROJECT DESCRIPTION

The proposed development is a redevelopment project in Mission Valley within the city of San Diego. The planned work consists of 2 multi-story residential structures over 2 stories of underground parking on a 5.4 acre parcel. A vicinity map is shown below.

The project is a Priority Development Project as classified by the City of San Diego Storm Water Standards.




VICINITY MAP

NOT TO SCALE

## 2. EXISTING LAND USE AND TOPOGRAPHY

The existing property is a developed site located on the north side of Friars Road approximately 0.5 miles west of State Route 163. The development consists of 3 office buildings and surface parking lots. The entire existing site will be demolished and re-graded to accommodate the proposed development.


**Figure 1 - Existing Site Aerial**

The site is bounded by Friars Road on the south and a multifamily development to the west. The north and east sides of the property are bounded by steep hillsides. The hillsides are natural and have not been previously graded.

The existing site generally slopes from west to east. Runoff from the site congregates in the southeast corner of the property where it enters the public storm drain system in Friars Road. The public storm drain is a 30” RCP which runs south through Fashion Valley mall to the San Diego River.

Runoff from undeveloped areas north of the site enters the site and is conveyed through the site via a concrete drainage ditch.

The public storm drain is a stabilized conveyance system from the project site directly to the San Diego River. There is no stream or other native channel that the runoff enters prior to discharging into the San Diego River.

## 3. PROPOSED DRAINAGE DISCUSSION

In the proposed condition, drainage patterns for the site will not vary significantly from the existing drainage patterns. The most significant change will be the implementation of water quality devices as discussed in the project Storm Water Quality Management Plan which will capture and treat runoff before discharging to the 30” public RCP storm drain within Friars Road.

**Figure 2 - Proposed Site Aerial**

The steep hillsides to the north of the project will continue to contribute offsite runoff to the project site. This runoff will be captured in a concrete ditch behind the proposed soil nail retaining wall, collected within two proposed public catch basins on the east and west ends of the wall and piped/sheet flow directly to the public RCP storm drain, mimicking the existing condition. Additional runoff from the steep hillsides on Lot 1 of the project will continue to be captured in existing concrete ditches and piped directly to the public storm drain system.

All runoff collected on the roofs of the two residential towers and the podium deck of the parking structure will be conveyed by roof drains and area drains to two biofiltration basins located between the proposed buildings and the Friars Road right-of-way. In each of these cases, once the runoff has been treated it will outlet to a private storm drain pipe which will connect to the existing public storm drain system in Friars Road.

Small amounts of runoff will be generated by the driveways, public sidewalk, parkway, and newly widened portions of Friars Road. This runoff will be collected by storm drain inlets located at two points along Friars Road which will implement green streets and be captured in biofiltration basins. This runoff will be conveyed via newly constructed public storm drain which will connect to the existing public storm drain system within Friars Road.

## 4. HYDROLOGIC METHOD

The estimate of the proposed drainage flows has been performed in general conformance to the City of San Diego guidelines. Drainage basins are less than one square mile and therefore the Rational Method was utilized to estimate runoff. The 100-year, 10-year, and 2-year storm events have been used for runoff calculations to provide a comparison between the existing and proposed runoff. Inlet and pipe sizing calculation will be performed in the final design stage.

The project's existing land use designation per Table 2 of the City of San Diego Drainage Manual is "Commercial", but in the proposed condition will be "Multi-Units". This decreases the C Value for the developed portions of the site from C=0.85 to a value of C=0.70. This reduction in C value is largely offset by the increased development footprint of the site resulting in a small decrease in runoff from the site as summarized below.

| Peak Discharge Summary - Flow Change | | | |
|---|---|---|---|
| *Basin Name* | *2 yr Peak Discharge (CFS)* | *10 yr Peak Discharge (CFS)* | *100 yr Peak Discharge (CFS)* |
| DMA 1 (Bypass) | -0.34 | -0.47 | -0.63 |
| DMA 2 & 3 (Project) | 0.04 | -0.05 | 0.01 |
| DMA 4+5 (Public) | 0.17 | 0.20 | 0.18 |
| **Totals** | **-0.13** | **-0.32** | **-0.43** |

Figure 3 - Peak Discharge Summary

• The runoff coefficient (C) in Figure 3 above was selected specifically for this site's drainage basins using Table 2 of the City of San Diego Drainage Manual (see Appendix C).
• The intensity of rainfall was obtained from the "Intensity-Duration-Frequency Curves" from the City of San Diego Drainage Manual (see Appendix C).
• For Time of Concentration Calculations and Site Discharge Summary, see Appendix B.

## 5. WATER QUALITY

In accordance with City of San Diego requirements, the development of this property will include Best Management Practices (BMPs) to treat the runoff. The proposed water quality BMPs for the project is anticipated to include 4 biofiltration basins.

A separate Storm Water Quality Management Plan has been prepared for the project as required by the City of San Diego. See the Storm Water Quality Management Plan for more information regarding Water Quality and Hydromodification requirements.

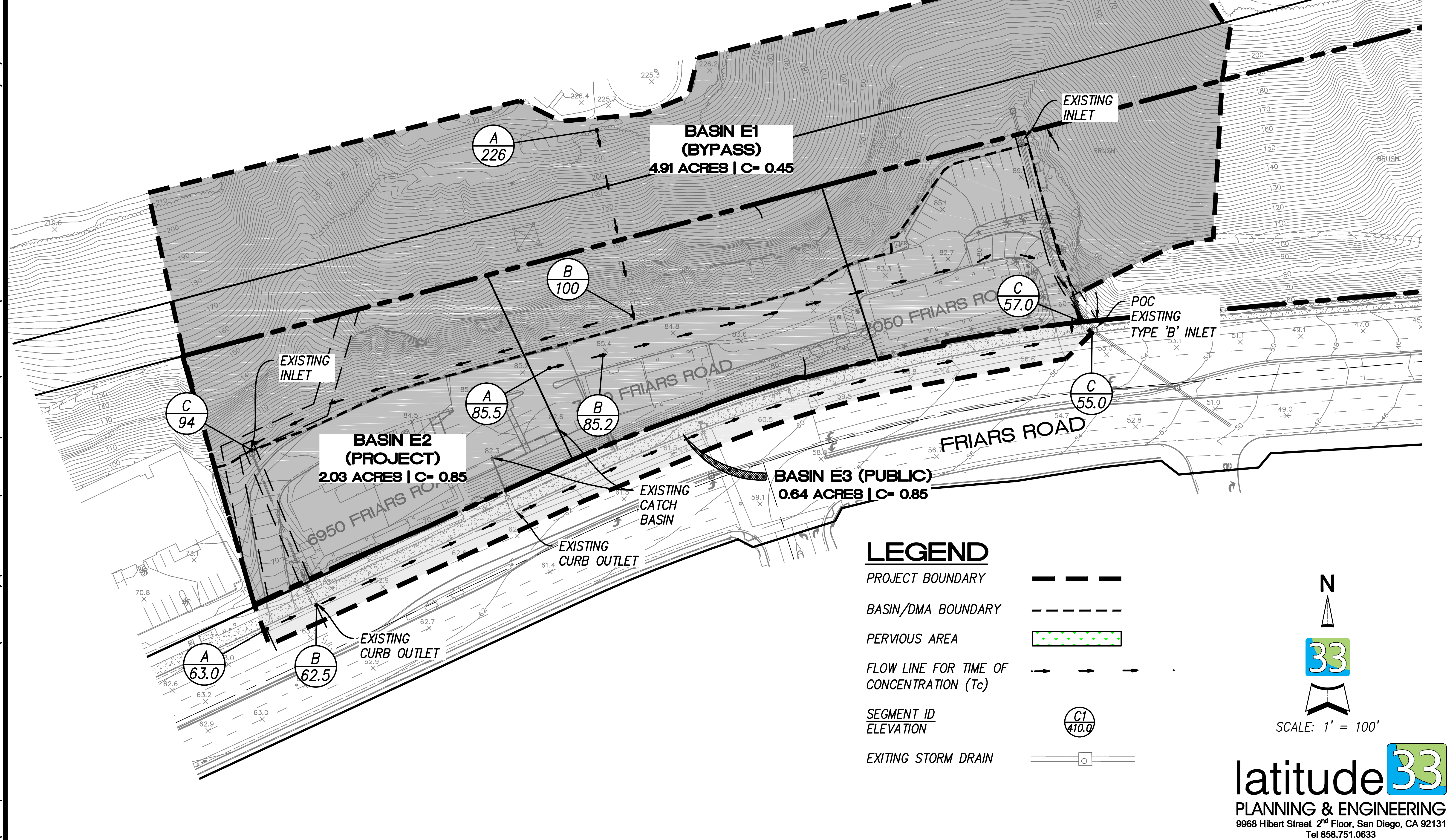
## 6. DISCUSSION AND CONCLUSIONS

Though the project does propose an increase in developed area, the implementation of treatment control BMPs coupled with the redefined Land Use has resulted in a net decrease in runoff from the site. As such, no impacts will arise from the proposed development.

# APPENDIX A

EXISTING AND PROPOSED DRAINAGE EXHIBITS

# EXISTING DRAINAGE EXHIBIT

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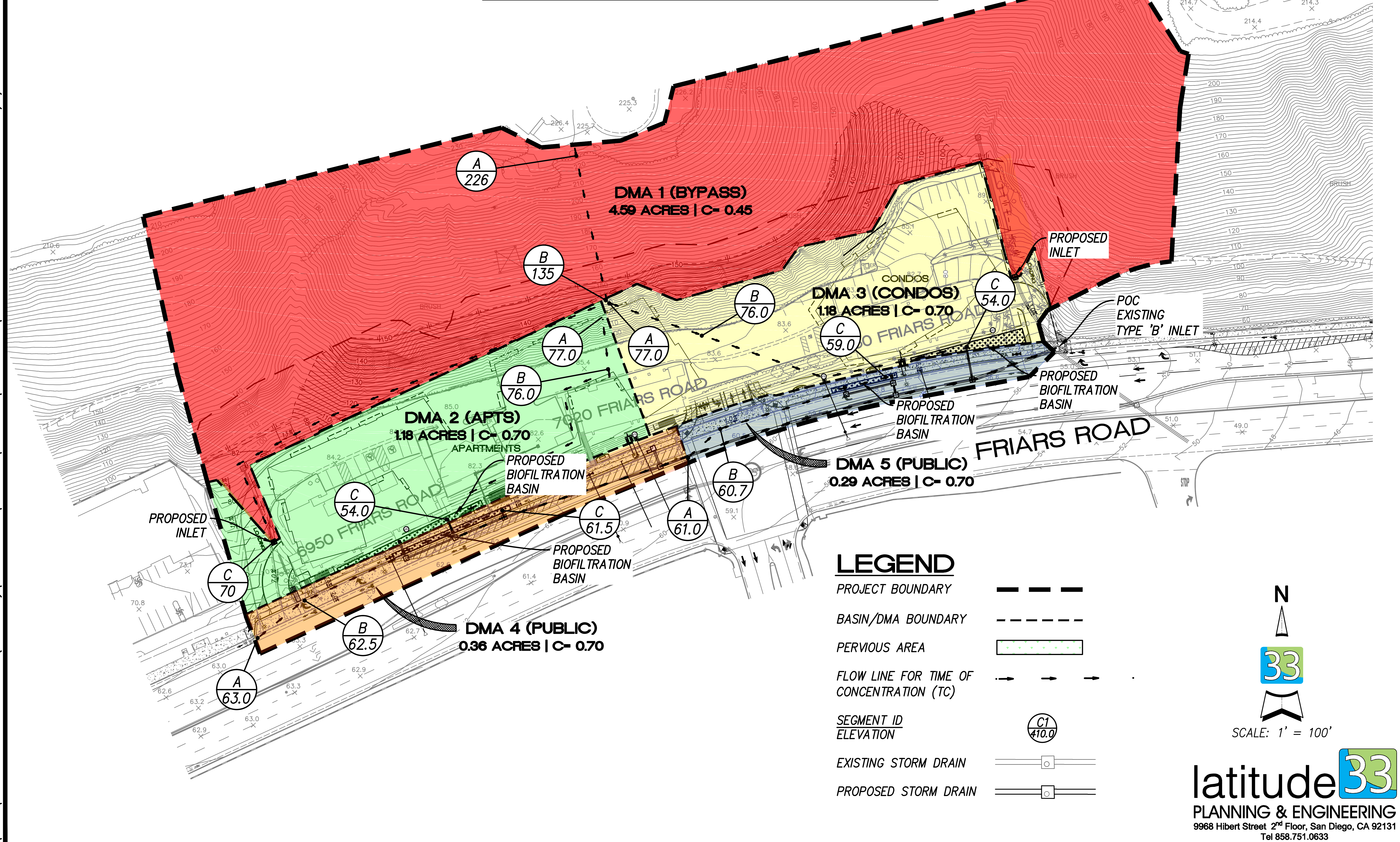
# PROPOSED DRAINAGE/DMA MAP

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# APPENDIX B

HYDROLOGIC CALCULATIONS

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E1 (Bypass) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| | Description | | | | |
| Flow Length, D | ft | | | | |
| Land Slope, S | ft/ft | 0.50 | | | |
| Runoff Coefficient, C | | 0.45 | | | |
| Travel Time, Ti | hr | | + | | = |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | AB | | | |
| Surface Description | | U | | | |
| Flow Length, L | ft | 183 | | | |
| Watercourse Slope, S | ft/ft | 0.50 | | | |
| Average Velocity, V | ft/s | 5.268 | | | |
| Travel Time, $T_t$ | hr | 0.010 | + | + | + |

Combined Travel Time, $T_t$ = 0.010

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | BC | | | |
| Pipe Diameter, D | ft | 2 | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 3.14 | | | |
| Wetted Perimeter, P | ft | 6.28 | | | |
| Hydraulic Radius, R | ft | 0.5 | | | |
| Channel Slope, S | ft/ft | 0.01 | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | | |
| Velocity, V | ft/s | 7.220 | | | |
| Flow Length, L | ft | 368 | | | |
| Travel Time, $T_t$ | hr | 0.014 | + | + | + |

Combined Travel Time, $T_t$ hr = 0.014

**Time of Concetration, $T_c$ hr = *0.024***

**min* = *5.0***

* Minimum 5 min Tc used

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E2 (Project) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Description | AB | | | | | |
| Flow Length, D | ft | 50 | | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | | |
| Runoff Coefficient, C | | 0.45 | | | | | |
| Travel Time, Ti | hr | 0.138 | + | | | = | 0.138 |

## Shallow Concentrated Flow

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | | |
| Surface Description | | P | | | | | | | |
| Flow Length, L | ft | 511 | | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | | |
| Travel Time, $T_t$ | hr | 0.081 | + | | + | | + | | |

Combined Travel Time, $T_t$ = 0.081

## Channel Flow

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Description | | | | | | | | |
| Pipe Diameter, D | ft | | | | | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | | | | | | | | |
| Wetted Perimeter, P | ft | | | | | | | | |
| Hydraulic Radius, R | ft | | | | | | | | |
| Channel Slope, S | ft/ft | | | | | | | | |
| Manning's Roughness Coefficient, n | | | | | | | | | |
| Velocity, V | ft/s | #DIV/0! | | | | | | | |
| Flow Length, L | ft | | | | | | | | |
| Travel Time, $T_t$ | hr | | + | | + | | + | | |

Combined Travel Time, $T_t$ hr =

**Time of Concetration, $T_c$ hr = *0.219***

**min = *13.1***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E3 (Public) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| Description | | AB | | | |
| Flow Length, D | ft | 50 | | | |
| Land Slope, S | ft/ft | 0.01 | | | |
| Runoff Coefficient, C | | 0.45 | | | |
| Travel Time, Ti | hr | 0.138 | + | | = 0.138 |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | BC | | | |
| Surface Description | | P | | | |
| Flow Length, L | ft | 742 | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | |
| Average Velocity, V | ft/s | 1.753 | | | |
| Travel Time, $T_t$ | hr | 0.118 | + | + | + |

Combined Travel Time, $T_t$ = 0.118

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | | | | |
| Pipe Diameter, D | ft | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | | | | |
| Wetted Perimeter, P | ft | | | | |
| Hydraulic Radius, R | ft | | | | |
| Channel Slope, S | ft/ft | | | | |
| Manning's Roughness Coefficient, n | | | | | |
| Velocity, V | ft/s | #DIV/0! | | | |
| Flow Length, L | ft | | | | |
| Travel Time, $T_t$ | hr | | + | + | + |

Combined Travel Time, $T_t$ hr =

**Time of Concetration, $T_c$ hr = *0.255***

**min = *15.3***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved — U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 1 (Bypass) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Description | | | | | | |
| Flow Length, D | ft | | | | | | |
| Land Slope, S | ft/ft | | | | | | |
| Runoff Coefficient, C | | | | | | | |
| Travel Time, Ti | hr | | + | | | | = |

## Shallow Concentrated Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | AB | | | | | | |
| Surface Description | | U | | | | | | |
| Flow Length, L | ft | 150 | | | | | | |
| Watercourse Slope, S | ft/ft | 0.50 | | | | | | |
| Average Velocity, V | ft/s | 5.268 | | | | | | |
| Travel Time, $T_t$ | hr | 0.008 | + | | + | | + | |

Combined Travel Time, $T_t$ = 0.008

## Channel Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | |
| Pipe Diameter, D | ft | 2 | | | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 3.14 | | | | | | |
| Wetted Perimeter, P | ft | 6.28 | | | | | | |
| Hydraulic Radius, R | ft | 0.5 | | | | | | |
| Channel Slope, S | ft/ft | 0.01 | | | | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | | | | | |
| Velocity, V | ft/s | 7.220 | | | | | | |
| Flow Length, L | ft | 458 | | | | | | |
| Travel Time, $T_t$ | hr | 0.018 | + | | + | | + | |

Combined Travel Time, $T_t$ hr = 0.018

**Time of Concetration, $T_c$ hr = *0.026***

**min* = *5.0***

* Minimum 5 min Tc used

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 2 (Apartments) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| | Description | AB | | | |
| Flow Length, D | ft | 50 | | | |
| Land Slope, S | ft/ft | 0.01 | | | |
| Runoff Coefficient, C | | 0.45 | | | |
| Travel Time, Ti | hr | 0.138 | + | | = 0.138 |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | BC | | | |
| Surface Description | | P | | | |
| Flow Length, L | ft | 251 | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | |
| Average Velocity, V | ft/s | 1.753 | | | |
| Travel Time, $T_t$ | hr | 0.040 | + | + | + |

Combined Travel Time, $T_t$ = 0.040

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | PIPE | PIPE | | |
| Pipe Diameter, D | ft | 1.5 | 2 | | |
| Cross Sectional Flow Area, A | $ft^2$ | 1.77 | 3.14 | | |
| Wetted Perimeter, P | ft | 4.71 | 6.28 | | |
| Hydraulic Radius, R | ft | 0.375 | 0.5 | | |
| Channel Slope, S | ft/ft | 0.01 | 0.01 | | |
| Manning's Roughness Coefficient, n | | 0.013 | 0.013 | | |
| Velocity, V | ft/s | 5.960 | 7.220 | | |
| Flow Length, L | ft | 222 | 387 | | |
| Travel Time, $T_t$ | hr | 0.010 | + 0.015 | + | + |

Combined Travel Time, $T_t$ hr = 0.025

**Time of Concetration, $T_c$ hr = *0.203***

**min = *12.2***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved — U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 3 (Condos) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Description | AB | | | | | |
| Flow Length, D | ft | 50 | | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | | |
| Runoff Coefficient, C | | 0.45 | | | | | |
| Travel Time, Ti | hr | 0.138 | + | | | = | 0.138 |

## Shallow Concentrated Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | |
| Surface Description | | P | | | | | | |
| Flow Length, L | ft | 259 | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | |
| Travel Time, $T_t$ | hr | 0.041 | + | | + | | + | |

Combined Travel Time, $T_t$ = 0.041

## Channel Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | PIPE | | PIPE | | | | |
| Pipe Diameter, D | ft | 1.5 | | 2.5 | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 1.77 | | 3.14 | | | | |
| Wetted Perimeter, P | ft | 4.71 | | 6.28 | | | | |
| Hydraulic Radius, R | ft | 0.375 | | 0.5 | | | | |
| Channel Slope, S | ft/ft | 0.01 | | 0.01 | | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | 0.013 | | | | |
| Velocity, V | ft/s | 5.960 | | 7.220 | | | | |
| Flow Length, L | ft | 29 | | 82 | | | | |
| Travel Time, $T_t$ | hr | 0.001 | + | 0.003 | + | | + | |

Combined Travel Time, $T_t$ hr = 0.005

**Time of Concetration, $T_c$ hr = *0.183***

**min = *11.0***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 4 (Public) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.70 | | | | |
| Travel Time, Ti | hr | 0.085 | + | | = | 0.085 |

## Shallow Concentrated Flow

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | BC | | | | |
| Surface Description | | P | | | | |
| Flow Length, L | ft | 205 | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | |
| Travel Time, $T_t$ | hr | 0.032 | + | + | + | |

Combined Travel Time, $T_t$ = 0.032

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | PIPE | PIPE | | |
| Pipe Diameter, D | ft | 1 | 2.5 | | |
| Cross Sectional Flow Area, A | $ft^2$ | 0.79 | 3.14 | | |
| Wetted Perimeter, P | ft | 3.14 | 6.28 | | |
| Hydraulic Radius, R | ft | 0.25 | 0.5 | | |
| Channel Slope, S | ft/ft | 0.01 | 0.01 | | |
| Manning's Roughness Coefficient, n | | 0.013 | 0.013 | | |
| Velocity, V | ft/s | 4.549 | 7.220 | | |
| Flow Length, L | ft | 160 | 385 | | |
| Travel Time, $T_t$ | hr | 0.010 + | 0.015 + | + | |

Combined Travel Time, $T_t$ hr = 0.025

**Time of Concetration, $T_c$ hr = *0.142***

**min = *8.5***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 5 (Public) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| Description | | AB | | | |
| Flow Length, D | ft | 50 | | | |
| Land Slope, S | ft/ft | 0.01 | | | |
| Runoff Coefficient, C | | 0.70 | | | |
| Travel Time, Ti | hr | 0.085 | + | | = 0.085 |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | BC | | | |
| Surface Description | | P | | | |
| Flow Length, L | ft | 177 | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | |
| Average Velocity, V | ft/s | 1.753 | | | |
| Travel Time, $T_t$ | hr | 0.028 | + | + | + |

Combined Travel Time, $T_t$ = 0.028

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | PIPE | PIPE | | |
| Pipe Diameter, D | ft | 1 | 2.5 | | |
| Cross Sectional Flow Area, A | $ft^2$ | 0.79 | 3.14 | | |
| Wetted Perimeter, P | ft | 3.14 | 6.28 | | |
| Hydraulic Radius, R | ft | 0.25 | 0.5 | | |
| Channel Slope, S | ft/ft | 0.01 | 0.01 | | |
| Manning's Roughness Coefficient, n | | 0.013 | 0.013 | | |
| Velocity, V | ft/s | 4.549 | 7.220 | | |
| Flow Length, L | ft | 25 | 156 | | |
| Travel Time, $T_t$ | hr | 0.002 + | 0.006 + | + | |

Combined Travel Time, $T_t$ hr = 0.008

**Time of Concetration, $T_c$** **hr** = ***0.120***

**min** = ***7.2***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

| Peak Discharge Summary - Existing Condition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Basin Name* | *C- Value* | *$I_2$ (in/hr)* | *$I_{10}$ (in/hr)* | *$I_{100}$ (in/hr)* | *Area (ac)* | *$Q_2$ (CFS)* | *$Q_{10}$ (CFS)* | *$Q_{100}$ (CFS)* | *$V_{100}$ (ft/s)* |
| E1 (Bypass) | 0.45 | 2.40 | 3.30 | 4.40 | 4.91 | 5.30 | 7.29 | 9.71 | 1.98 |
| E2 (Project) | 0.85 | 1.60 | 2.30 | 3.10 | 2.03 | 2.77 | 3.98 | 5.36 | 2.64 |
| E3 (Public) | 0.85 | 1.40 | 2.10 | 2.87 | 0.64 | 0.76 | 1.15 | 1.57 | 2.44 |
| | | | | **Totals** | **7.58** | **8.83** | **12.41** | **16.64** | **2.19** |

| Peak Discharge Summary - Proposed Condition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Basin Name* | *C- Value* | *$I_2$ (in/hr)* | *$I_{10}$ (in/hr)* | *$I_{100}$ (in/hr)* | *Area (ac)* | *$Q_2$ (CFS)* | *$Q_{10}$ (CFS)* | *$Q_{100}$ (CFS)* | *$V_{100}$ (ft/s)* |
| DMA 1 (Bypass) | 0.45 | 2.40 | 3.30 | 4.40 | 4.59 | 4.96 | 6.82 | 9.09 | 1.98 |
| DMA 2 (Apartments) | 0.70 | 1.60 | 2.38 | 3.18 | 1.18 | 1.32 | 1.97 | 2.63 | 2.23 |
| DMA 3 (Condos) | 0.70 | 1.70 | 2.50 | 3.30 | 1.18 | 1.40 | 2.07 | 2.73 | 2.31 |
| DMA 4 (Public) | 0.70 | 1.95 | 2.85 | 3.70 | 0.40 | 0.55 | 0.80 | 1.04 | 2.59 |
| DMA 5 (Public) | 0.70 | 2.16 | 3.06 | 3.96 | 0.26 | 0.39 | 0.55 | 0.72 | 2.77 |
| | | | | **Totals** | **7.61** | **8.62** | **12.20** | **16.19** | **2.13** |

| Peak Discharge Summary - Flow Change | | | | | | |
|---|---|---|---|---|---|---|
| *Basin Name* | *2 yr Peak Discharge (CFS)* | *10 yr Peak Discharge (CFS)* | *100 yr Peak Discharge (CFS)* | | | |
| DMA 1 (Bypass) | -0.34 | -0.47 | -0.63 | | | |
| DMA 2 & 3 (Project) | 0.04 | -0.05 | 0.01 | | | |
| DMA 4+5 (Public) | 0.17 | 0.20 | 0.18 | | | |
| **Totals** | **-0.13** | **-0.32** | **-0.43** | **Percent Decrease** | 2.39% | 1.71% | 2.71% |

* Formula used to find peak discharge: Q = C*I*A
* C-Value taken from Table 2 in the City of San Diego Drainage Design Manual
*Intensity (I) is found using the I-D-F Curves (Drainage Design Manual) based on Tc
*Tc found in Tc Calcs spreadsheet

# APPENDIX C

REFERENCE MATERIALS

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

| Land Use | Coefficient, C Soil Type (1) D |
|---|---|
| Residential: | |
| Single Family | .55 |
| Multi-Units | .70 |
| Mobile Homes | .65 |
| Rural (lots greater than 1/2 acre) | .45 |
| Commercial (2) 80% Impervious | .85 |
| Industrial (2) 90% Impervious | .95 |

NOTES:

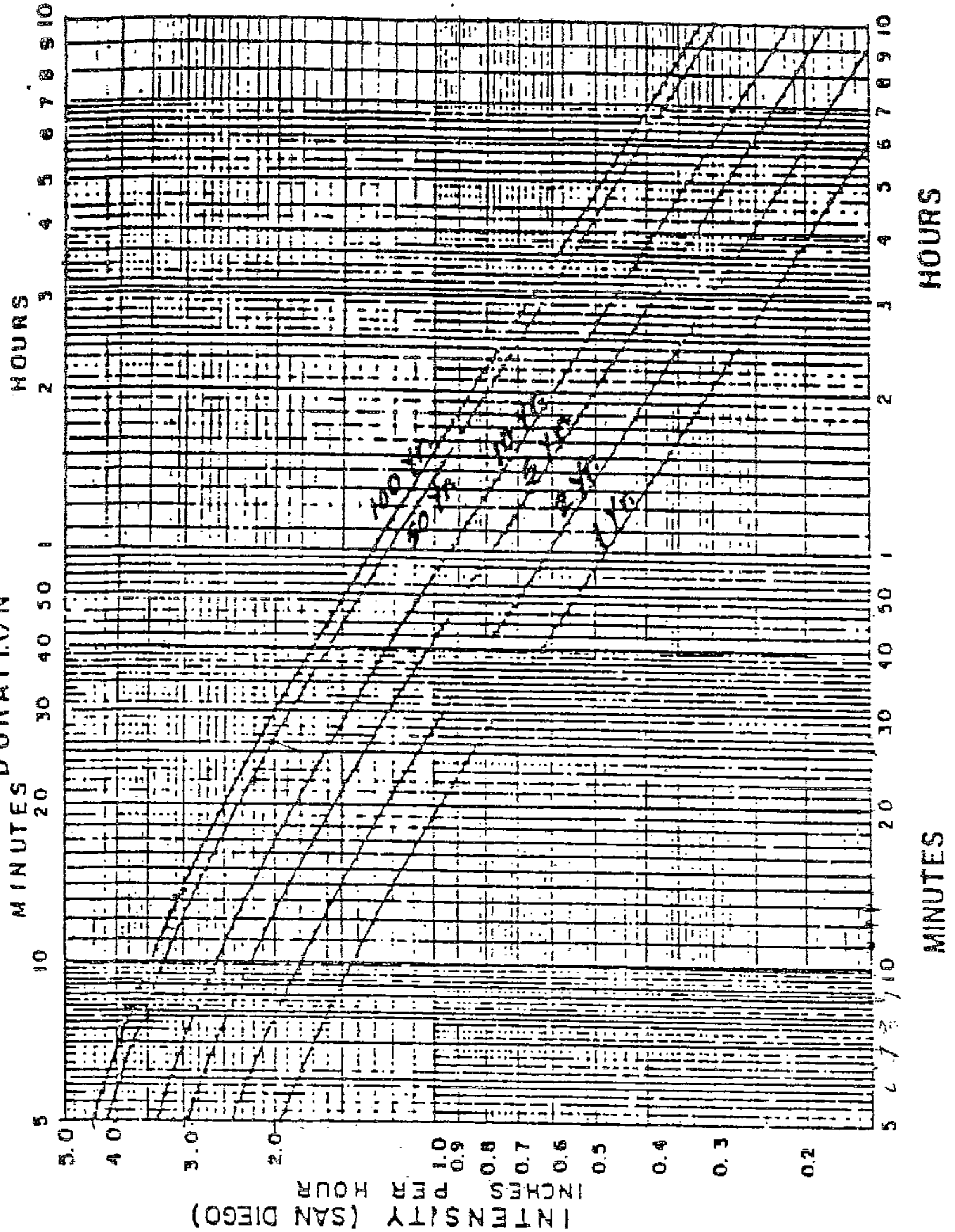
(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

Revised C = $\frac{50}{80} \times 0.85 = 0.53$




| ELEV. | FACTOR |
|---|---|
| 0–1500 | 1.00 |
| 1500–3000 | 1.25 |
| 3000–4000 | 1.42 |
| 4000–5000 | 1.60 |
| 5000–6000 | 1.70 |
| DESERT | 1.25 |

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

RAINFALL

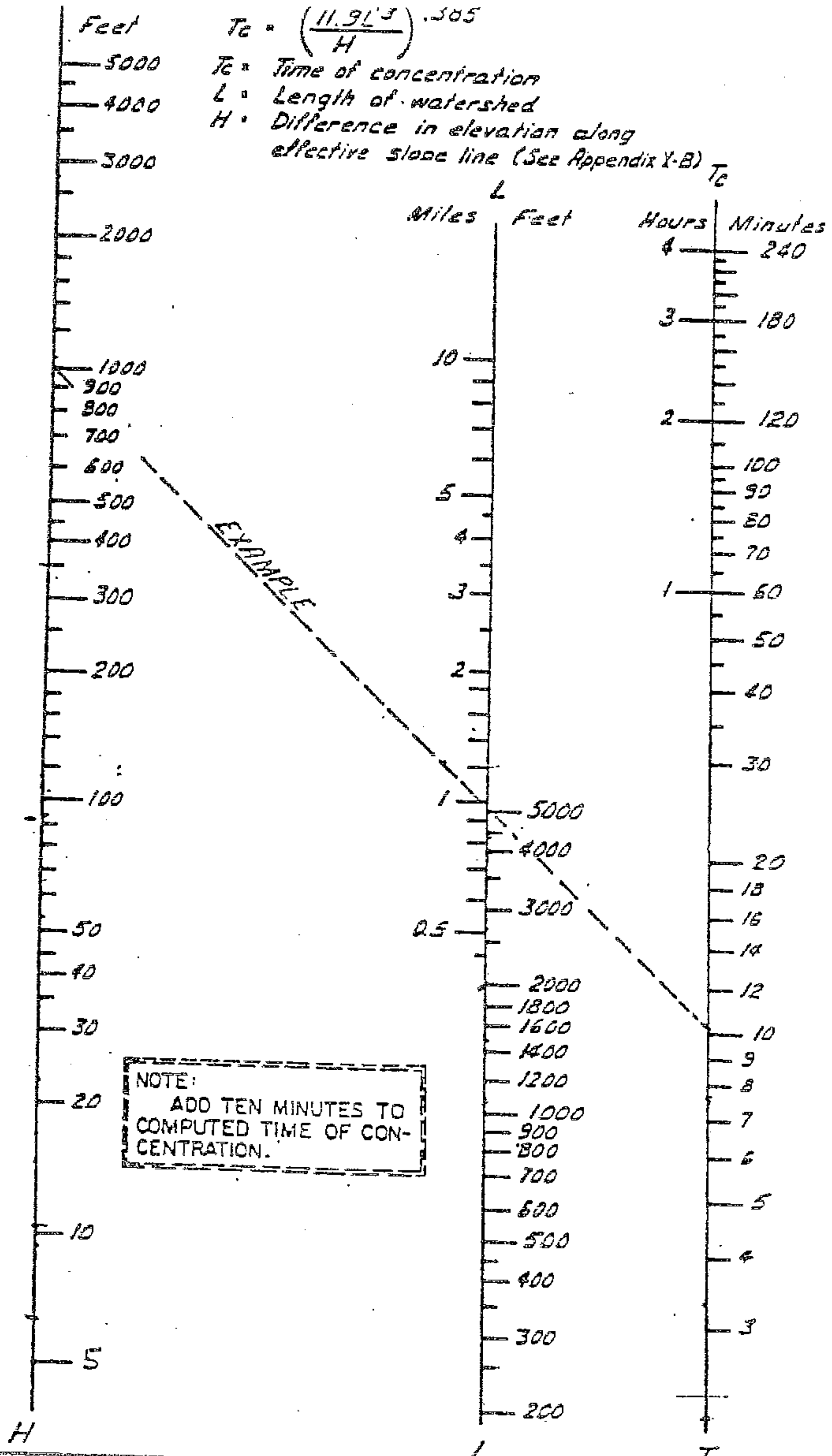
INTENSITY – DURATION – FREQUEN

CURVES

for

COUNTY OF SAN DIEGO

APPENDIX




SAN DIEGO COUNTY

DEPARTMENT OF SPECIAL DISTRICT SERVICES

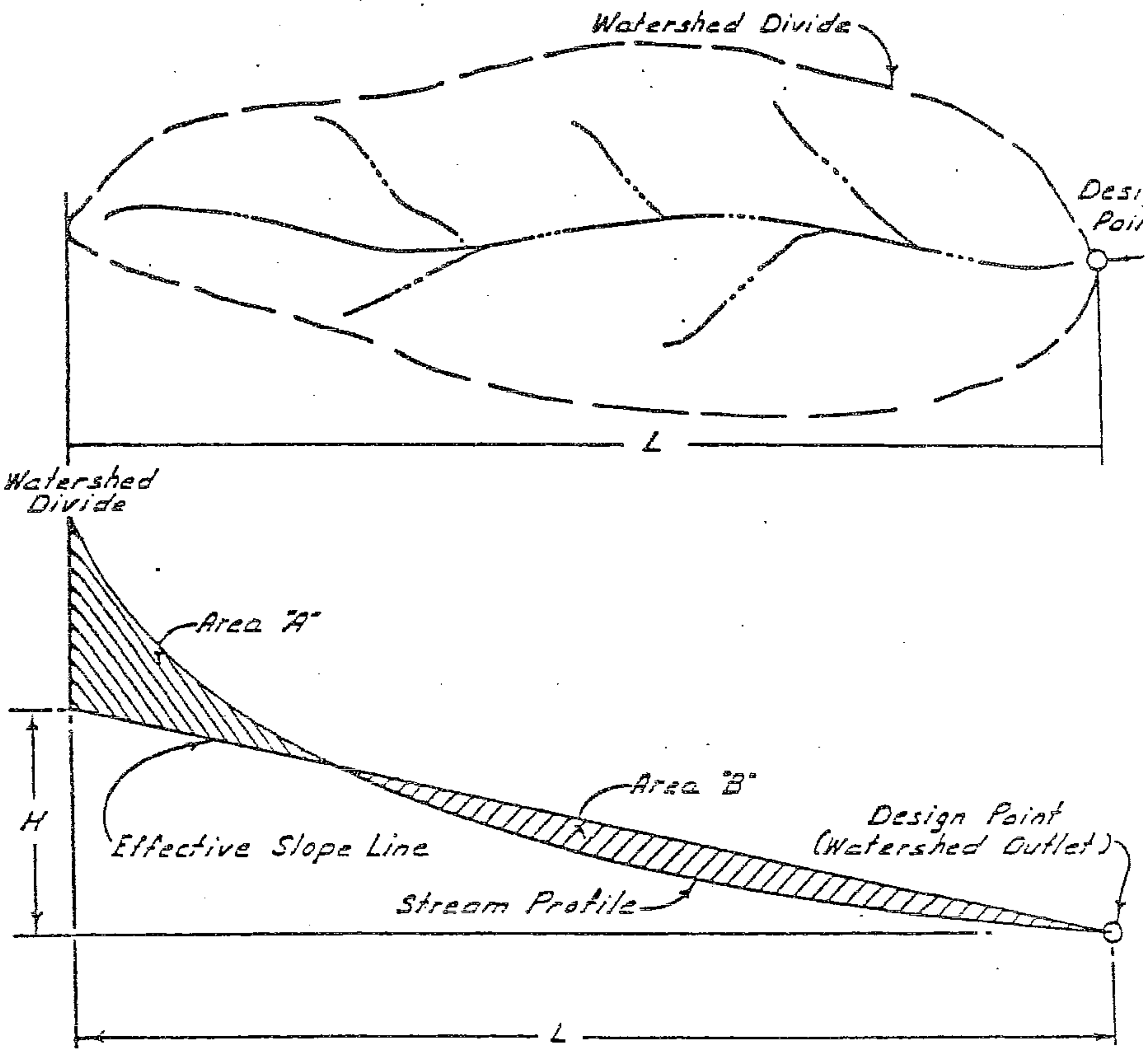
DESIGN MANUAL

APPROVED ______

NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS

DATE ______

APPENDIX




Area "A" = Area "B"

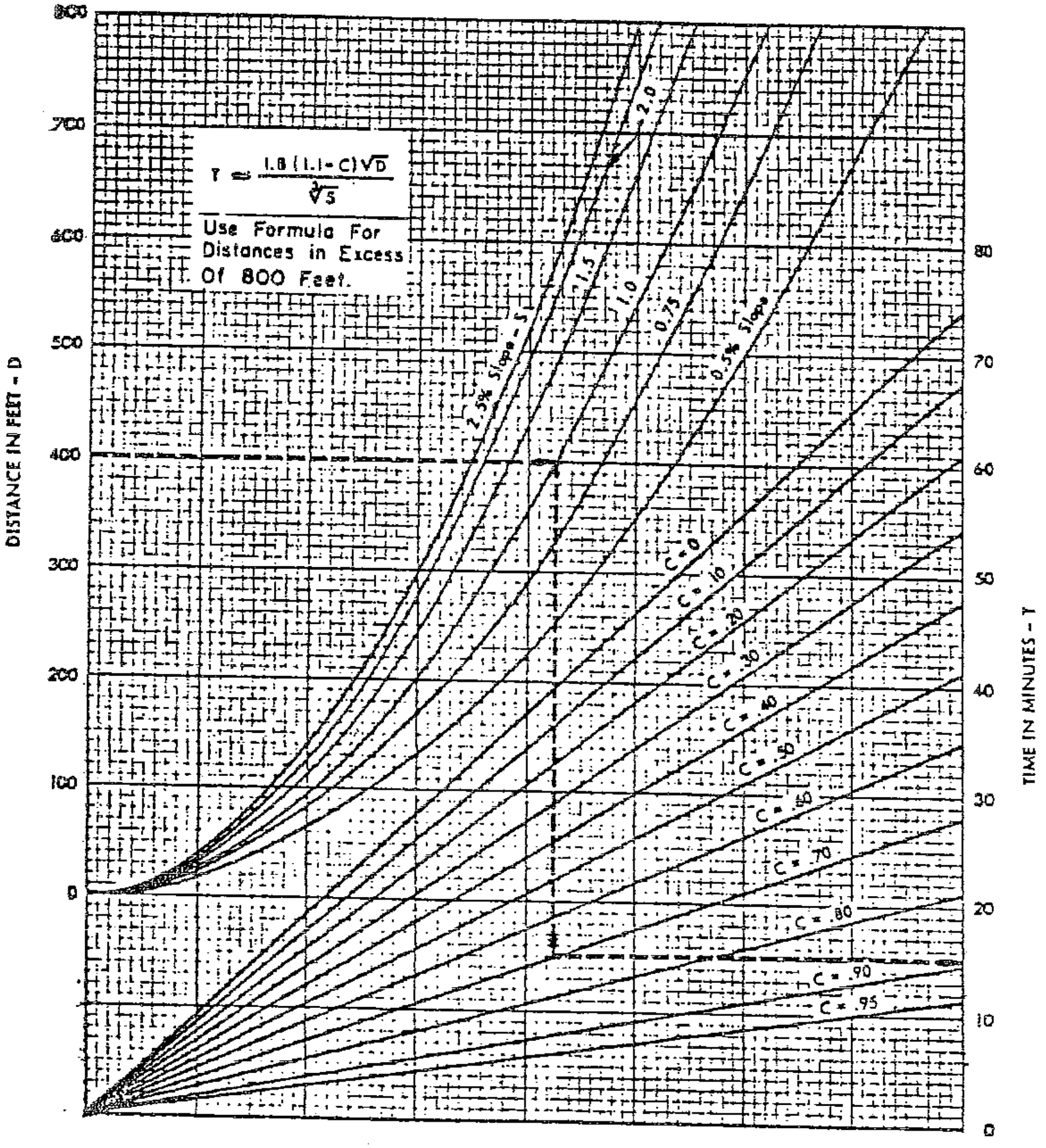
SAN DIEGO COUNTY
DEPARTMENT OF SPECIAL DISTRICT SERVICES
DESIGN MANUAL
APPROVED [illegible]

COMPUTATION OF EFFECTIVE SLOPE
FOR NATURAL WATERSHEDS

DATE [illegible]

APPENDIX

# URBAN AREAS OVERLAND TIME OF FLOW CURVES



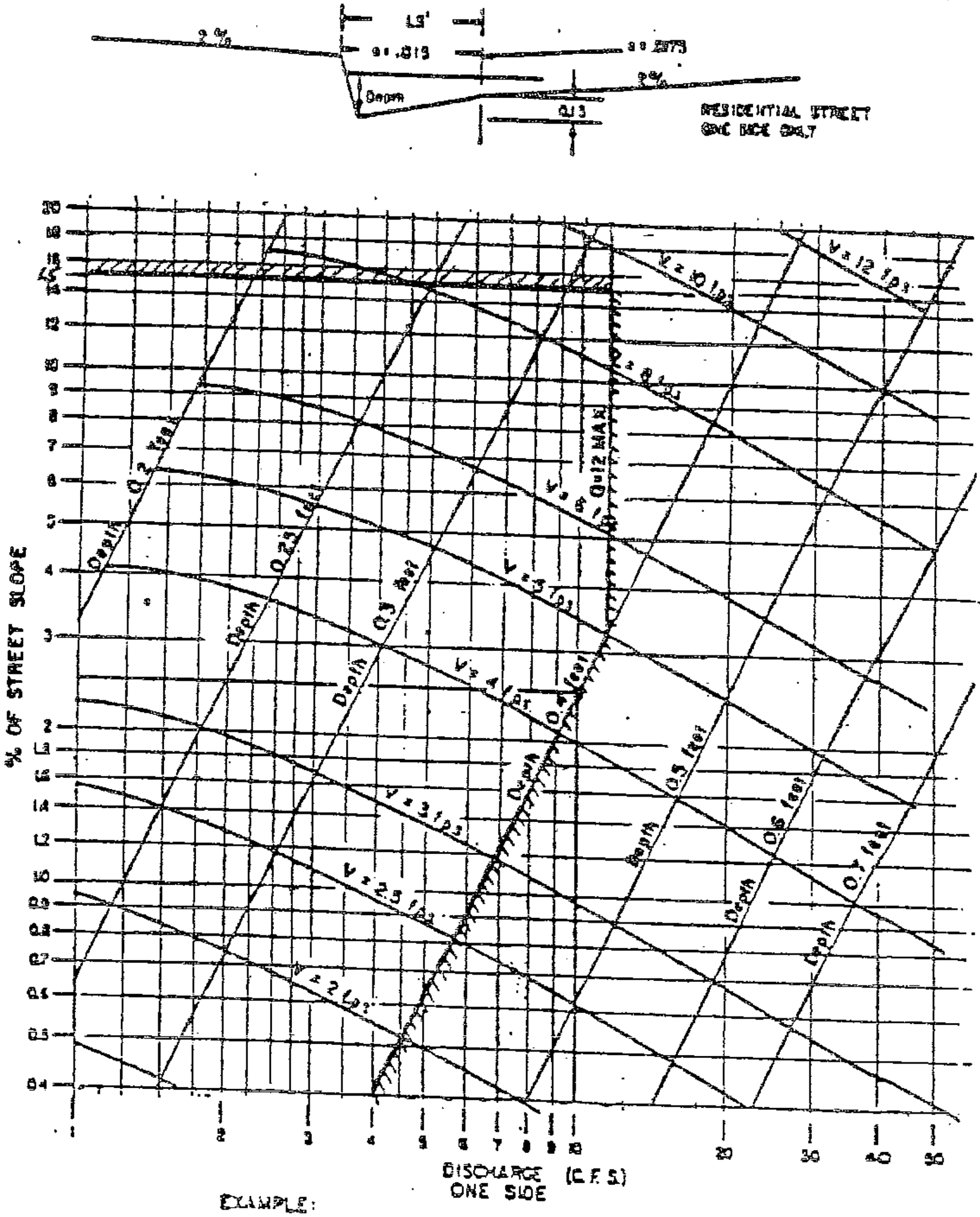

Surface Flow Time Curves

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.
SLOPE = 1.0 %
COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES

CHART I-104.12




EXAMPLE:

Given: Q = 10 S = 2.5 %
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

| REV. | | CITY OF SAN DIEGO - DESIGN GUIDE | SHT. NO. |
|---|---|---|---|
| | | GUTTER AND ROADWAY DISCHARGE - VELOCITY CHART | |
| | | | |
| | | | |

# ATTACHMENT 6
# GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

Corporate Headquarters
6280 Riverdale Street
San Diego, CA 92120
Toll Free: 877.215.4321
www.scst.com

# GEOTECHNICAL INVESTIGATION
# FRIARS ROAD APARTMENT DEVELOPMENT
# SAN DIEGO, CALIFORNIA

**PREPARED FOR:**

**MR. DOYLE BARKER**
**MANAGING DIRECTOR**
**LANDCAP FRIARS ROAD, LLC**
**27132 B PASEO ESPADA, SUITE 1206**
**SAN JUAN CAPISTRANO, CALIFORNIA 92675**

**PREPARED BY:**

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**
**6280 RIVERDALE STREET**
**SAN DIEGO, CALIFORNIA 92120**

*Providing Professional Engineering Services Since 1959*

SOUTHERN CALIFORNIA
SOIL & TESTING, INC.
SBE | SLBE | DVBE | SDVOSB

Corporate Headquarters
6280 Riverdale Street
San Diego, CA 92120
Toll Free: 877.215.4321
www.scst.com

October 15, 2014

**SCS&T No. 140338N**
**Report No. 1**

**Mr. Doyle Barker**
**Managing Director**
**LandCap Friars Road, LLC**
**27132 B Paseo Espada, Suite 1206**
**San Juan Capistrano, California 92675**

Subject: GEOTECHNICAL INVESTIGATION
FRIARS ROAD APARTMENT DEVELOPMENT
SAN DIEGO, CALIFORNIA

Dear Mr. Barker:

Southern California Soil & Testing Inc. (SCS&T) is pleased to present our report describing the geotechnical investigation performed for the subject project. SCS&T conducted the geotechnical investigation in general conformance with the scope of work presented in our proposal dated August 22, 2014. If you have any questions, please call us at (619) 280-4321.

Respectfully Submitted,
**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

REGISTERED PROFESSIONAL ENGINEER
THOMAS B. CANADY
No. 50057
Exp. 6/30/15
CIVIL
STATE OF CALIFORNIA

Thomas B. Canady, PE 50057
Senior Engineer

PROFESSIONAL GEOLOGIST
W. LEE VANDERHURST
No. 1125
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

W. Lee Vanderhurst, CEG 1125
Senior Engineering Geologist

TBC:WLV:ma:aw

(1) Addressee via e-mail at dbarker@landcapip.com

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**ATTACHMENTS**

**FIGURES**



**APPENDICES**

## EXECUTIVE SUMMARY

This report presents the results of the geotechnical investigation Southern California Soil & Testing, Inc. (SCS&T) performed for the subject project. We understand that the project will consist of the design and construction of three residential buildings, a leasing/recreation building, pavements and a pool. The residential buildings will be five stories over three levels of subterranean parking. The leasing building will have two stories and no basement. Details on the planned construction were not available at the time of this report. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project.

SCS&T explored the subsurface conditions by drilling six borings to depths between about 28 feet and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. An SCS&T geologist logged the borings and collected samples of the materials encountered for laboratory testing. SCS&T tested selected samples from the borings to evaluate pertinent soil classification and engineering properties to assist in developing geotechnical conclusions and recommendations. A refraction microtremor (ReMi) survey was performed at the eastern portion of the site. The survey was performed to develop a shear wave profile and characterize the strength of the subsurface materials.

The materials encountered in the borings consist of fill, alluvium and Stadium Conglomerate. The fill consists of dense silty to clayey gravel with varying amounts of cobbles. The alluvial deposits consist of dense silty gravel with varying amounts of cobbles. The Stadium Conglomerate sediments consist of very dense, weakly to strongly cemented conglomerate and silty to clayey sandstone. Groundwater was encountered in borings B-3 and B-4 at a depth of about 31 feet below the existing ground surface.

The main geotechnical considerations affecting the project are the presence of potentially compressible fill and alluvium, difficult excavations in rocky materials, and excavations extending below groundwater. To reduce the potential for settlement, the existing fill and alluvium should be excavated in their entirety beneath structures and improvements. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. These structures can be supported on shallow spread footings with bottom levels entirely on competent Stadium Conglomerate. The leasing/recreation building can be supported on shallow spread footings with bottom levels entirely on compacted fill. Gravel and cobbles should be anticipated in the fill, alluvium and Stadium Conglomerate. Strongly cemented zones should be anticipated within the Stadium Conglomerate. Groundwater should also be anticipated. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting materials with concretions, gravel and cobbles. We expect that temporary dewatering may be necessary during construction. The grading and foundation recommendations presented herein may need to be updated once final plans are developed. Global slope stability will need to be evaluated once project plans are developed.

# 1 INTRODUCTION

This report presents the results of the geotechnical investigation Southern California Soil & Testing, Inc. (SCS&T) performed for the subject project. We understand that the project will consist of the design and construction of three residential buildings, a leasing/recreation building, pavements and a pool. The residential buildings will be five stories over three levels of subterranean parking. The leasing/recreation building will have two stories and no basement. The planned building locations, basement elevations and site grading were not available at the time of this report. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project. Figure 1 presents a site vicinity map.

# 2 SCOPE OF WORK

## 2.1 FIELD INVESTIGATION

We explored the subsurface conditions by drilling six borings to depths between about 28 feet and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. Figure 2 shows the approximate locations of the borings. An SCS&T geologist logged the borings and collected samples of the materials encountered for laboratory testing. The logs of the borings are presented in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1. A refraction microtremor (ReMi) survey was performed at the eastern portion of the site. The survey was performed to develop a shear wave profile and characterize the strength of the subsurface materials. The results of this geophysical evaluation are presented in Appendix III.

## 2.2 LABORATORY TESTING

Selected samples obtained from the borings were tested to evaluate pertinent soil classification and engineering properties and enable development of geotechnical conclusions and recommendations. The laboratory tests consisted of:

- R-Value
- Expansion Index
- Corrosivity
- Direct Shear

The results of the laboratory tests, and brief explanations of test procedures, are presented in Appendix II.

## 2.3 ANALYSIS AND REPORT

The results of the field and laboratory tests were evaluated to develop conclusions and recommendations regarding:

- Subsurface conditions beneath the site
- Potential geologic hazards
- Criteria for seismic design in accordance with the 2013 California Building Code (CBC)
- Site preparation and grading

- Excavation characteristics
- Appropriate alternatives for foundation support along with geotechnical engineering criteria for design of the foundations
- Estimated foundation settlements
- Support for concrete slabs-on-grade
- Lateral pressures for the design of retaining walls
- Pavement sections
- Corrosion potential

## 3 SITE AND SUBSURFACE CONDITIONS

### 3.1 SITE DESCRIPTION

The site is located north of Friars Road and east of Fashion Valley Road in the Linda Vista community of the City of San Diego, California. The site is bordered by a San Diego Gas & Electric (SDG&E) transmission line on the north, a commercial development on the west, Friars Road on the south, and undeveloped land on the east. The site is located on the northern flank of Mission Valley. The northern portion of the site consists of a natural slope that ascends about 140 feet to the north at inclinations between about 1:1 (horizontal:vertical) and 1.6:1 (horizontal:vertical). The southern portion of the site consists of a fill slope that descends about 25 feet to the south at an inclination of about 1.5:1 (horizontal:vertical). Existing site improvements consist of three commercial buildings and associated pavement and landscape areas. Site elevations range from about 160 feet on the north to about 60 feet on the south.

### 3.2 SUBSURFACE CONDITIONS

The materials encountered in the borings consist of fill, alluvium and Stadium Conglomerate. Descriptions of the materials are presented below. Figure 2 presents the site-specific geology. Figures 3A through 3C present geologic cross sections. The cross sections can be updated to show the planned building locations once project plans are developed. Figure 4 presents the regional geology in the vicinity of the site.

**Fill** - The fill consists of dense silty to clayey gravel with varying amounts of cobbles. The fill extends to depths up to about 10 feet below the existing ground surface.

**Alluvium** - Alluvial deposits were encountered in borings B-6. The alluvium consists of dense silty gravel with varying amounts of cobbles.

**Stadium Conglomerate** - Eocene age Stadium Conglomerate sediments were encountered in each of our borings. The Stadium Conglomerate consists of very dense, weakly to strongly cemented conglomerate and silty to clayey sandstone. Difficult drilling conditions were encountered in the Stadium Conglomerate. Air rotary percussion methods were used to advance borings B-5 and B-6.

**Groundwater** - Groundwater was encountered in borings B-3 and B-4 at a depth of about 31 feet below the existing ground surface. The groundwater is believed to be a localized perched condition and not a regional groundwater table. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

## 4 GEOLOGIC HAZARDS

### 4.1 CITY OF SAN DIEGO SEISMIC SAFETY STUDY

The site is generally located in Geologic Hazard Category 52 on the City of San Diego Seismic Safety Study map. This category is defined as other level areas, gently sloping to steep terrain, with favorable geologic structure and low risk. The southeastern corner of the site is located in Geologic Hazard Category 32. This category is defined as minor drainages with fluctuating groundwater and low liquefaction potential. We anticipate that the planned subterranean parking will extend through potentially liquefiable deposits. In our opinion, the geologic risk is low.

### 4.2 CBC SEISMIC DESIGN PARAMETERS

A geologic hazard likely to affect the project is groundshaking as a result of movement along an active fault zone in the vicinity of the subject site. The site coefficients and adjusted maximum considered earthquake spectral response accelerations in accordance with the 2013 CBC are presented below:

Site Coordinates: Latitude 32.76970°
Longitude -117.17003°
Site Class: C
Site Coefficients, $F_a$ = 1.000
$F_v$ = 1.341
Mapped Spectral Response Acceleration at Short Periods, $S_s$ = 1.190g
Mapped Spectral Response Acceleration at 1-Second Period, $S_1$ = 0.459g
$S_{MS}=F_aS_s$ = 1.190g
$S_{M1}=F_vS_1$ = 0.615g
$S_{DS}=\frac{2}{3}\,S_{MS}$ = 0.793g
$S_{D1}=\frac{2}{3}\,S_{M1}$ = 0.410g
$PGA_M$ = 0.527g

### 4.3 FAULTING AND SURFACE RUPTURE

The closest known active fault is the Rose Canyon fault zone (San Diego section) located about 1.7 miles (2.8 kilometers) west-southwest of the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults are known to underlie or project toward the site. Therefore, the probability of fault rupture is negligible.

### 4.4 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction occurs when loose, saturated, generally fine sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid; resulting in large total and differential ground surface settlements as well as possible lateral spreading during an earthquake. Given the relatively dense nature of the materials beneath the site, the potential for liquefaction and dynamic settlement to occur is negligible.

### 4.5 LANDSLIDES AND SLOPE STABILITY

Evidence of deep-seated landslides or slope instabilities was not observed. Global stability of the existing natural slope will need to be evaluated once project plans are developed.

### 4.6 FLOODING, TSUNAMIS AND SEICHES

The site is not located within a flood zone or dam inundation area. The site is not located within a mapped area on the State of California Tsunami Inundation Maps (Cal EMA, 2009); therefore, damage due to flooding or tsunamis is considered negligible. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is negligible.

### 4.7 SUBSIDENCE

The site is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum); therefore, the potential for subsidence due to the extraction of fluids is negligible.

### 4.8 HYDRO-CONSOLIDATION

Hydro-consolidation can occur in recently deposited (less than 10,000 years old) sediments that were deposited in a semi-arid environment. Examples of such sediments are aolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore space between particle grains can re-adjust when inundated by groundwater causing the material to consolidate. The relatively dense materials underlying the site are not susceptible to hydro-consolidation.

## 5 CONCLUSIONS

The main geotechnical considerations affecting the project are the presence of potentially compressible fill and alluvium, difficult excavations in rocky materials, and excavations extending below groundwater. Site preparation will need to be performed in areas to receive at-grade structures, improvements or new fill to reduce the potential for distress. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. These structures can be supported on shallow spread footings with bottom levels entirely on competent Stadium Conglomerate. The leasing building can be supported on shallow spread footings with bottom levels entirely on compacted fill. Gravel and cobbles should be anticipated in the fill, alluvium and Stadium Conglomerate. Strongly cemented zones should be expected within the Stadium Conglomerate. Groundwater should also be anticipated. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting materials with concretions, gravel and cobbles. We expect that temporary dewatering may be necessary during construction.

# 6 RECOMMENDATIONS

## 6.1 SITE PREPARATION AND GRADING

### 6.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation and debris. The existing fill and alluvium should be excavated in its entirety beneath settlement sensitive structures and improvements. We anticipate that the bottoms of the basement levels for the proposed residential buildings will extend through the existing fill and alluvium and into Stadium Conglomerate. For at-grade structures and improvements, the excavation should extend horizontally at least 5 feet outside the planned perimeter foundations, at least 2 feet outside the perimeter of planned hardscape and pavements, or up to existing improvements, whichever is less. Hardscape should be underlain by at least 12 inches of material with an expansion index of 20 or less determined in accordance with ASTM D4829. An SCS&T representative should observe conditions exposed in the bottom of the excavation to determine if additional excavation is required.

### 6.1.2 Earthwork

Excavated material, except for roots, debris and rocks greater than 6 inches, can be used as compacted fill. Fill should be moisture conditioned to near optimum moisture content and compacted to at least 90% relative compaction. Fill should be placed in horizontal lifts at a thickness appropriate for the equipment spreading, mixing, and compacting the material, but generally should not exceed 8 inches in loose thickness. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D 1557. Utility trench backfill beneath structures, pavements and hardscape should be compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavements should be compacted to at least 95% relative compaction.

### 6.1.3 Expansive Material

The onsite materials tested have a very low to low expansion potential. The foundation recommendations presented in this report reflect a low expansion potential.

### 6.1.4 Imported Soil

Imported soil should consist of predominately granular soil free of organic matter and rocks greater than 6 inches. Imported soil should have an expansion index of 20 or less and should be inspected and, if appropriate, tested by SCS&T prior to transport to the site.

### 6.1.5 Site Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order. Difficult excavation should be anticipated in cemented zones within the Stadium Conglomerate. Gravel and cobbles should also be anticipated within the fill, alluvium and Stadium Conglomerate. Contract documents should specify that the contractor mobilize equipment capable of excavating and compacting strongly cemented materials with gravel and cobbles.

### 6.1.6 Temporary Excavations

Temporary excavations 3 feet deep or less can be made vertically. Deeper temporary excavations in fill or alluvium should be laid back no steeper than 1:1 (horizontal:vertical). Deeper temporary excavations in Stadium Conglomerate should be laid back no steeper than ¾:1 (horizontal:vertical). The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation. SCS&T should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces. Slopes steeper than those described above will require shoring. A shoring system consisting of soldier piles and lagging can be used.

### 6.1.7 Temporary Shoring

For design of cantilevered shoring with level backfill, an active earth pressure equal to a fluid weighing 35 pounds per cubic foot (pcf) can be used. The surcharge loads on shoring from traffic and construction equipment working adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring. For design of soldier piles embedded in Stadium Conglomerate, an allowable passive pressure of 350 pounds per square foot (psf) per foot of embedment (over twice the pile width) up to a maximum of 7,500 psf can be used. Soldier piles should be spaced at least three pile diameters, center to center.

**6.1.8 Dewatering**

Groundwater seepage may occur locally due to local irrigation or following heavy rain. Groundwater should be anticipated in the planned basement excavations. Dewatering can be accomplished by sloping the excavation bottom to a sump and pumping from the sump. A layer of gravel about 6 inches thick placed in the bottom of the excavation will facilitate groundwater flow and can be used as a working platform.

**6.1.9 Slopes**

Permanent cut or fill slopes constructed no steeper than 2:1 (horizontal:vertical) should generally have an adequate factor of safety. Fill slopes steeper than 2:1 will need to be reinforced with geotextile to have an adequate factor of safety. Compaction of fill slopes should be performed by back-rolling with a sheepsfoot compactor or other suitable equipment, or by overfilling and cutting back to expose dense material at design grade. Cut slopes constructed 1½:1 (horizontal:vertical) in competent Stadium Conglomerate should generally have an adequate factor of safety. The engineering geologist should observe all cut slopes during grading to ascertain that no unforeseen adverse conditions requiring revised recommendations are encountered. All slopes are susceptible to surficial slope failure and erosion. Water should not be allowed to flow over the top of slopes. Additionally, slopes should be planted with vegetation that will reduce the potential for erosion.

**6.1.10 Surface Drainage**

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

#### 6.1.11 Grading Plan Review

SCS&T should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

### 6.2 FOUNDATIONS

#### 6.2.1 Shallow Spread Footings

The proposed buildings can be supported on shallow spread footings with bottom levels either entirely on compacted fill or entirely on competent Stadium Conglomerate. Footings should extend at least 24 inches below lowest adjacent finished grade. A minimum width of 12 inches is recommended for continuous footings and 24 inches for isolated or retaining wall footings. An allowable bearing capacity of 2,500 psf can be used for footings on compacted fill. An allowable bearing capacity of 5,000 psf can be used for footings on Stadium Conglomerate. The bearing capacity values can be increased by 500 psf for each foot of depth below the minimum and 250 psf for each foot of width beyond the minimum up to a maximum of 5,000 psf on compacted fill and 7,500 psf on Stadium Conglomerate. The bearing value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. Footings located adjacent to or within slopes should be extended to a depth such that a minimum horizontal distance of 7 feet exists between the lower outside footing edge and the face of the slope.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using an allowable lateral pressure of 350 psf per foot of depth below the ground surface. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

#### 6.2.2 Settlement Characteristics

Total foundation settlements are estimated to be less than 1 inch. Differential settlements between adjacent columns, and between the middle and ends of continuous footings, are estimated to be less than ½ inch. Settlements should be completed shortly after structural loads are applied.

#### 6.2.3 Foundation Plan Review

SCS&T should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

#### 6.2.4 Foundation Excavation Observations

A representative from SCS&T should observe the foundation excavations prior to forming or placing reinforcing steel.

### 6.3 SLABS-ON-GRADE

#### 6.3.1 Parking Structure Slabs-on-Grade

Portland cement concrete pavement for the lower parking level should have a minimum thickness of 6 inches and be underlain by at least 6 inches of aggregate base. The pavements should be reinforced with at least No. 4 reinforcing bars placed at 18 inches on center each way. Reinforcement should be placed approximately at mid-height of the pavement. Concrete should have a minimum compressive strength of 3,250 pounds per square inch (psi) for the rigid pavements.

#### 6.3.2 Building Slabs-on-Grade

The project structural engineer should design the interior concrete slabs-on-grade floor. A moisture vapor retarder/barrier should be placed beneath slabs where moisture sensitive floor coverings will be installed. Typically, plastic is used as a vapor retardant. If plastic is used, a minimum 10-mil is recommended. The plastic should comply with ASTM E1745. Plastic installation should comply with ASTM E1643. Current construction practice typically includes placement of a 2-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture vapor to the underside of the slab that can increase the time required to reduce moisture vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The slab can be placed directly on the vapor retarder/barrier. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed.

#### 6.3.3 Exterior Slabs-on-Grade

The upper 1 foot of soil below exterior concrete slabs-on-grade should have an expansion index of 20 or less. Exterior slabs should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns.

A 1-inch maximum size aggregate mix is recommended for concrete for exterior slabs. The corrosion potential of on-site soils with respect to reinforced concrete will need to be taken into account in concrete mix design. Coarse and fine aggregate in concrete should conform to the "Greenbook" Standard Specifications for Public Works Construction.

## 6.4 CONVENTIONAL RETAINING WALLS

### 6.4.1 Foundations

The recommendations provided in the foundation section of this report are also applicable to conventional retaining walls.

### 6.4.2 Lateral Earth Pressures

The active earth pressure for the design of unrestrained earth retaining structures with level backfills can be taken as equivalent to the pressure of a fluid weighing 40 pcf. The at-rest earth pressure for the design of restrained earth retaining structures with level backfills can be taken as equivalent to the pressure of a fluid weighing 60 pcf. The above values assume a granular and drained backfill condition. An additional 20 pcf should be added to these values for walls with a 2:1 (horizontal: vertical) sloping backfill. An increase in earth pressure equivalent to an additional 2 feet of retained soil can be used to account for surcharge loads from light traffic. The above values do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. If any other surcharge loads are anticipated, SCS&T should be contacted for the necessary increase in soil pressure.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a backdrain to reduce the accumulation of hydrostatic pressures. Backdrains may consist of a 2-foot wide zone of ¾-inch crushed rock. The backdrain should be separated from the adjacent soils using a non-woven filter fabric, such as Mirafi 140N or equivalent. Weep holes should be provided or a perforated pipe (Schedule 40 PVC) should be installed at the base of the backdrain and sloped to discharge to a suitable storm drain facility. As an alternative, a geocomposite drainage system such as Miradrain 6000 or equivalent placed behind the wall and connected to a suitable storm drain facility can be used. The project architect should provide waterproofing specifications and details. Figure 5 shows typical conventional retaining wall backdrain details.

### 6.4.3 Seismic Earth Pressure

If required, the seismic earth pressures can be taken as equivalent to the pressure of a fluid weighing 20 pcf for flexible walls and 40 pcf for stiff walls. These values are for level backfill conditions and do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. This pressure is in addition to the un-factored static active pressures. The allowable passive pressure and bearing capacity can be increased by ⅓ in determining the stability of the wall.

#### 6.4.4 Backfill

All backfill soils should be compacted to at least 90% relative compaction. Expansive or clayey soil should not be used for backfill material. Additionally, fill within 3 feet from the back of the wall should not contain rocks greater than 3 inches in any dimension. The wall should not be backfilled until the grout has reached an adequate strength.

### 6.5 SOIL NAIL WALLS

It is anticipated that the soil nails will encounter Stadium Conglomerate. The following soil parameters can be used for the design of the soil nails.

- **Soil Unit Weight:** 125 pcf
- **Internal Friction Angle:** 35°
- **Cohesion:** 100 psf
- **Ultimate Bond Stress:** 2,000 psf

Bond stress capacity is influenced by soil conditions, method of construction and grouting techniques. The contractor should verify the bond stress capacity in the field prior to production nail installation.

### 6.6 MECHANICALLY STABILIZED EARTH RETAINING WALLS

The following soil parameters can be used for design of mechanically stabilized earth (MSE) retaining walls.

**MSE Wall Design Parameters**

| Soil Parameter | Reinforced Soil | Retained Soil | Foundation Soil |
|---|---|---|---|
| **Internal Friction Angle** | 32° | 32° | 32° |
| **Cohesion** | 0 | 0 | 0 |
| **Moist Unit Weight** | 125 pcf | 130 pcf | 130 pcf |

The bottom of MSE walls should extend to such a depth that a total of 5 feet exists between the bottom of the wall and the face of the slope. Figure 6 presents a typical MSE retaining wall backdrain detail.

### 6.7 PAVEMENT SECTION RECOMMENDATIONS

The pavement support characteristics of the soils encountered during our investigation are considered poor. An R-value of 10 was assumed for design of preliminary pavement sections. The actual R-value of the subgrade soils should be determined after grading and final pavement sections be provided. Based on an R-value of 10, the following pavement structural sections are recommended for the assumed Traffic Indices.

**Flexible Pavement Sections**

| Traffic Type | Traffic Index | Asphalt Concrete (inches) | Aggregate Base* (inches) |
|---|---|---|---|
| Parking Stalls | 4.5 | 3 | 8 |
| Drive Lanes | 6.0 | 4 | 11 |
| Heavy Traffic Areas | 7.0 | 5 | 13 |

***Aggregate Base should conform to Class 2 Aggregate Base in accordance with the Caltrans Standard Specifications or Crushed Miscellaneous Base in accordance with the Standard Specifications for Public Works Construction.**

**Portland Cement Concrete Pavement Sections**

| Traffic Type | Traffic Index | JPCP* (inches) | Aggregate Base* (inches) |
|---|---|---|---|
| Parking Stalls | 4.5 | 6 | 6 |
| Drive Lanes | 6.0 | 7 | 6 |
| Heavy Traffic Areas | 7.0 | 7 | 6 |

***Jointed Plain Concrete Pavement**

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be removed and replaced with compacted fill. If the subgrade consists of competent Stadium Conglomerate, scarification and recompaction need not be performed. The aggregate base material should be compacted to at least 95% relative compaction. All materials and methods of construction should conform to good engineering practices and the minimum standards of the City of San Diego.

### 6.8 SOIL CORROSIVITY

Representative samples of the onsite soils were tested to evaluate corrosion potential. The test results are presented in Appendix II. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

## 7 GEOTECHNICAL ENGINEERING DURING CONSTRUCTION

The geotechnical engineer should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

## 8 CLOSURE

SCS&T should be advised of any changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can, however, occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations, and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

## 9 REFERENCES

American Concrete Institute (ACI) (2012), Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary, August.

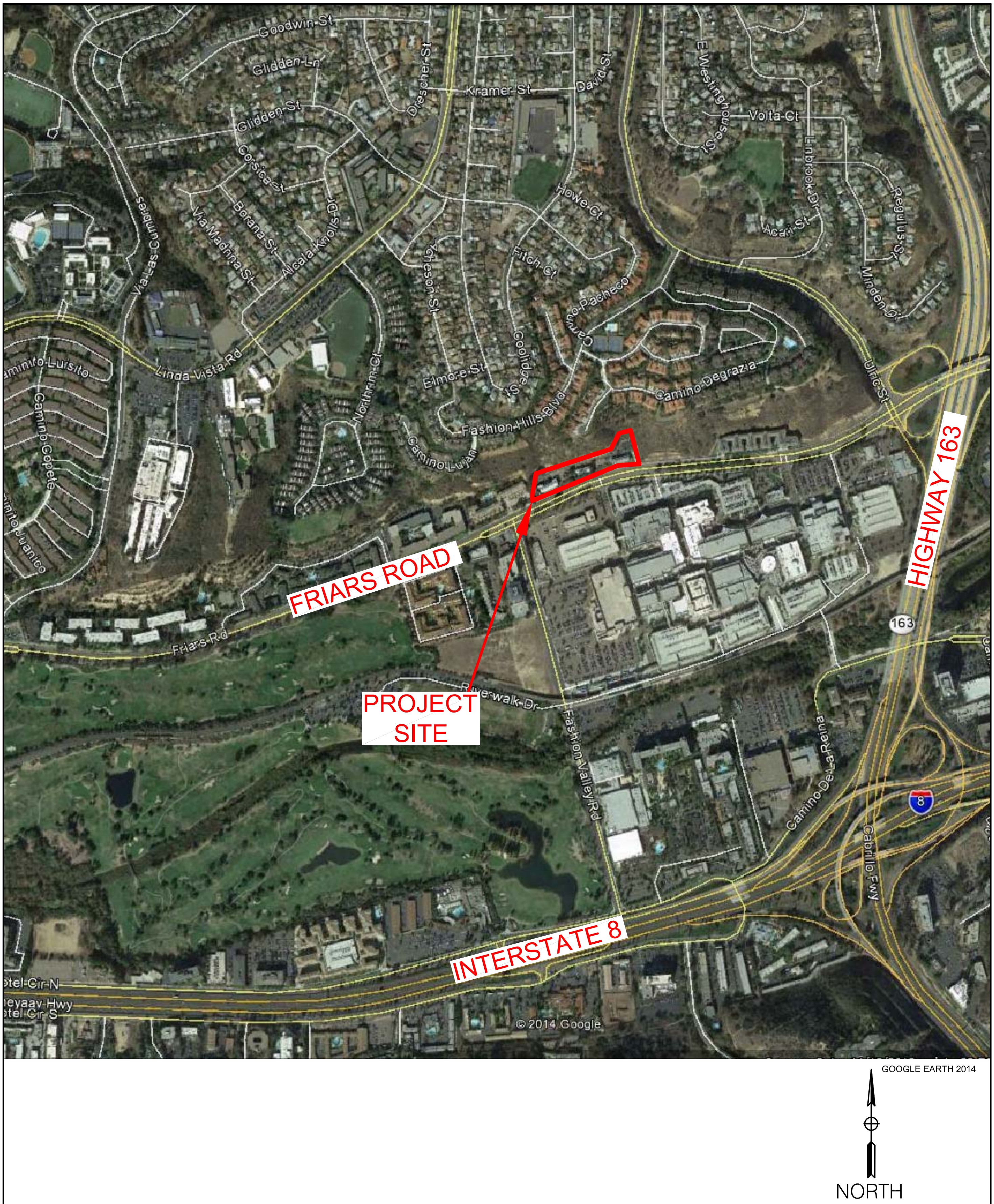
California Emergency Management Agency, California Geological Survey, University of Southern California (Cal EMA) (2009), Tsunami Inundation Map for Emergency Planning, Del Mar Quadrangle, June 1.

Caltrans (2010), Standard Specifications.

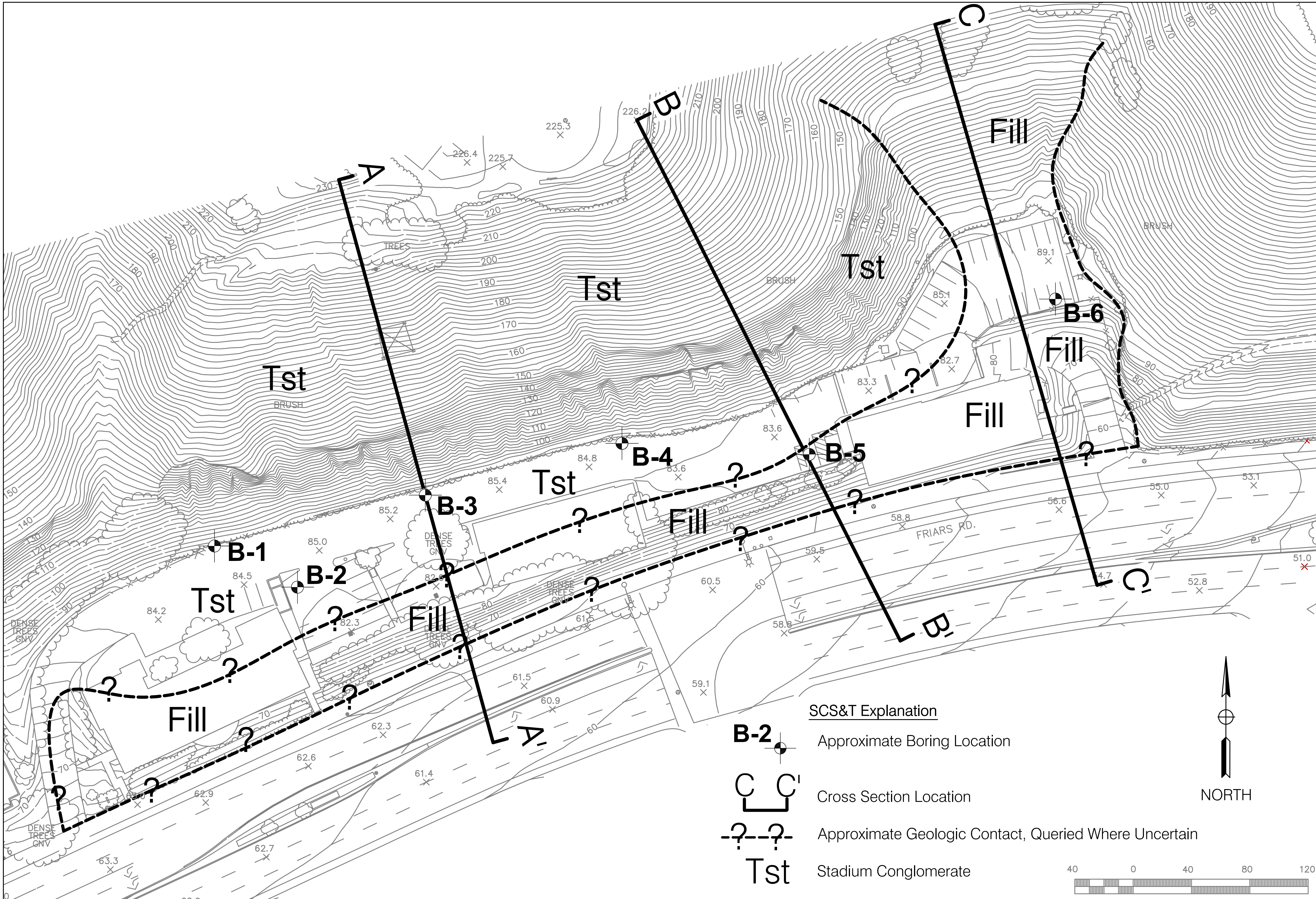
City of San Diego (2008), Seismic Safety Study, Geologic Hazards and Faults, Grid Tile: 21, Development Services Department, April 3.

International Code Council (2012), 2013 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Based on the 2012 International Existing Building Code, Effective Date: January 1, 2014.

Public Works Standards, Inc. (2011), "Greenbook," Standard Specifications for Public Works Construction, 2012 Edition.




| | | | |
|---|---|---|---|
| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | SITE LOCATION MAP<br>FRIARS ROAD<br>APARTMENT DEVELOPMENT<br><br>San Diego, California | Date: OCTOBER 2014<br>By: CTL<br>Job No.: 14-0338N-1<br>Scale: NOT TO SCALE | Figure:<br>1 |




Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
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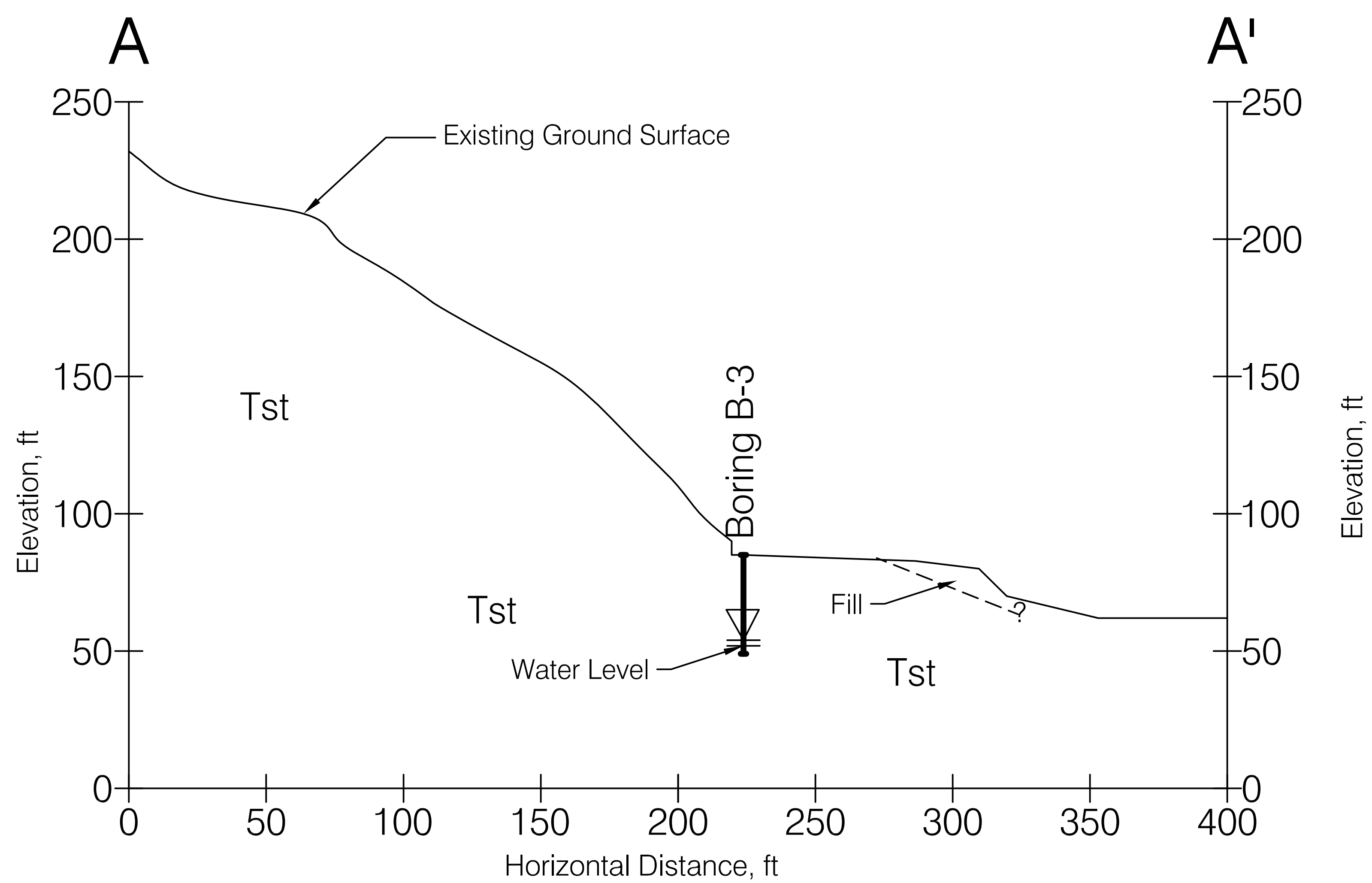
SUBSURFACE EXPLORATION AND GEOLOGY MAP
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 2




SCS&T Explanation

-?--?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

Tst Stadium Conglomerate

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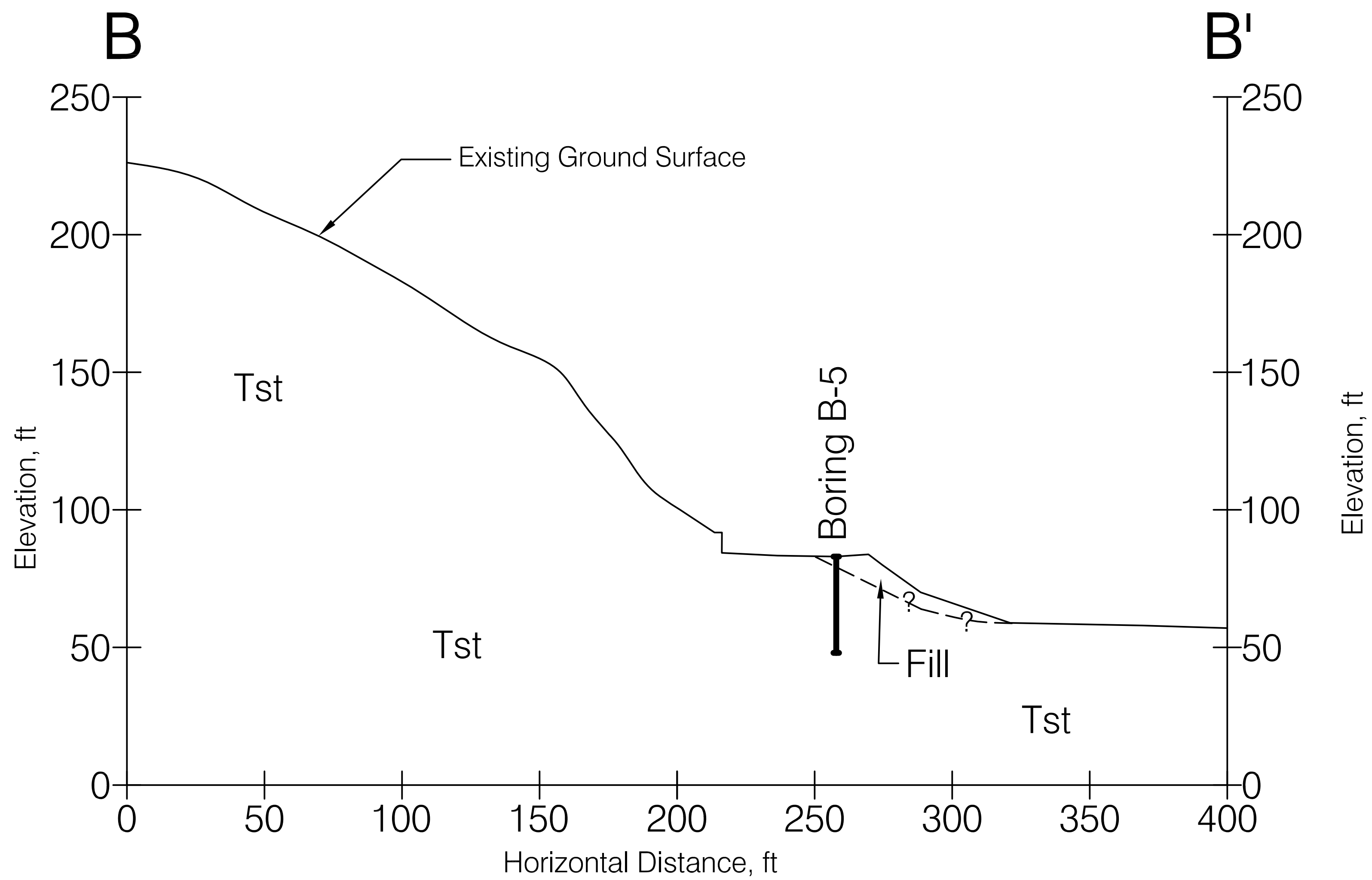
GEOLOGIC CROSS SECTION A-A'
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure:
3A




SCS&T Explanation

-?--?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

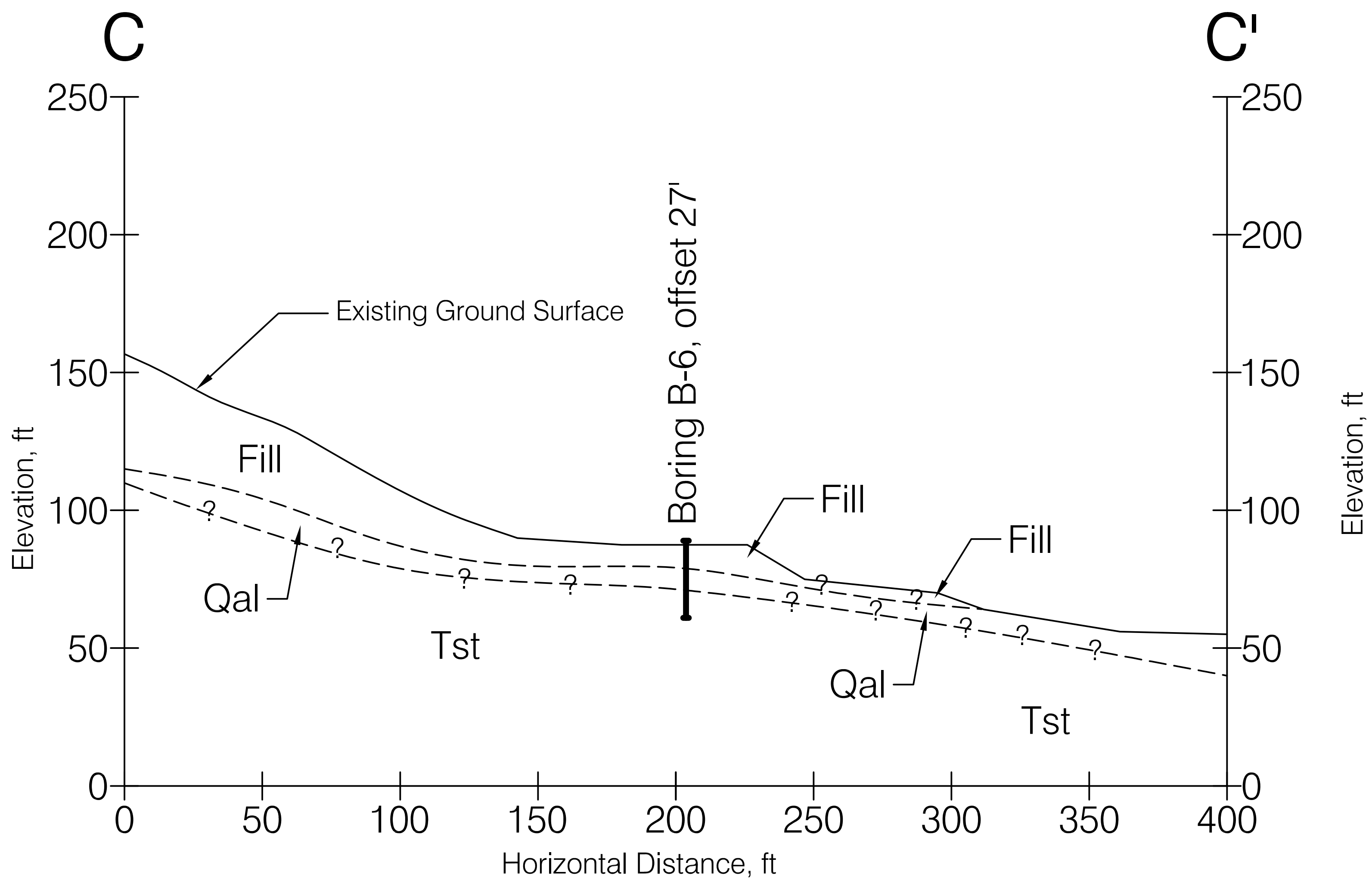
Tst Stadium Conglomerate

Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: SEE DRAWING

GEOLOGIC CROSS SECTION B-B'
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure:
3B




SCS&T Explanation

-?--?- Approximate Geologic Contact, Queried Where Uncertain

Qal Alluvium

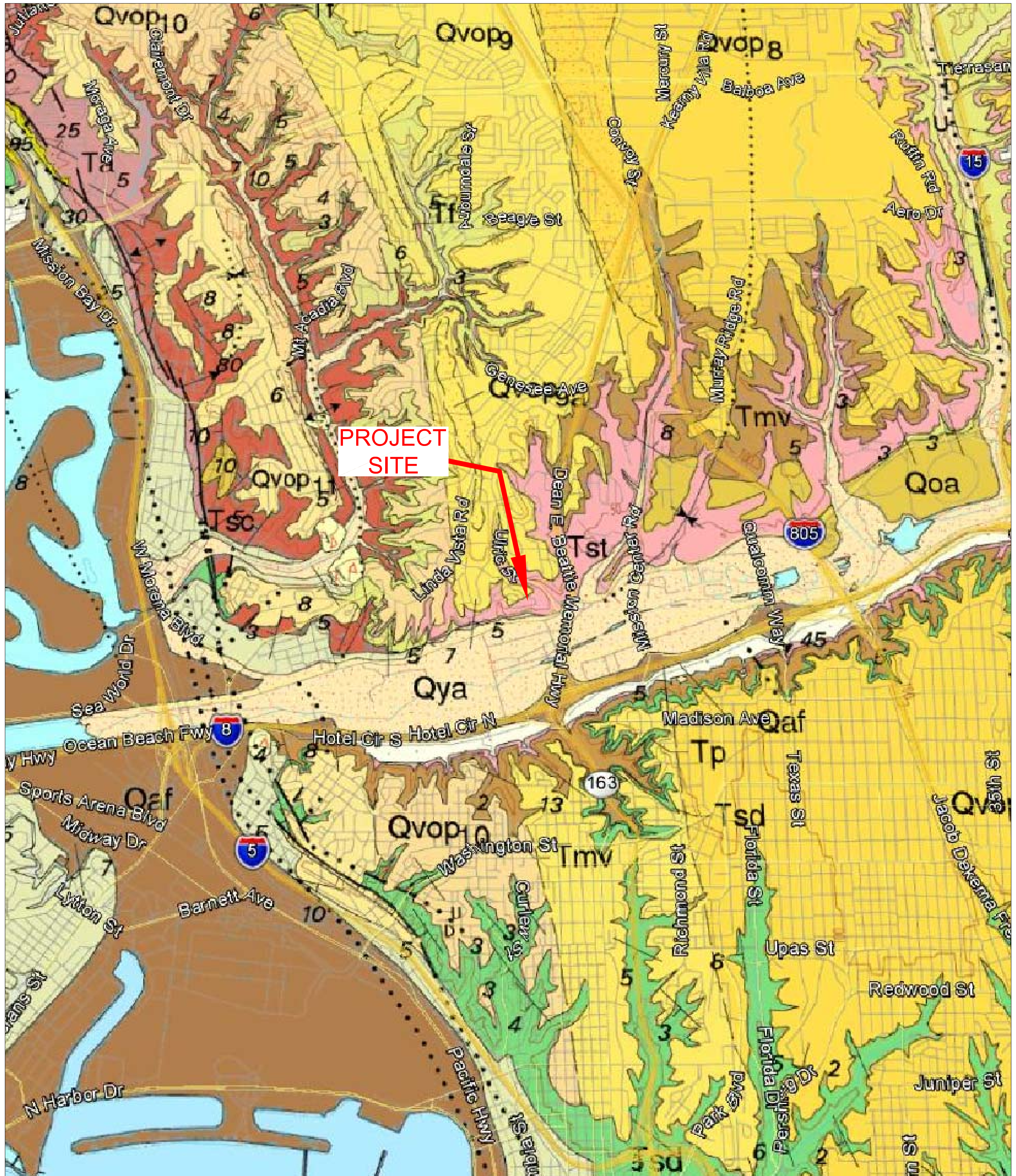
Tst Stadium Conglomerate

Date: OCTOBER 2014
By: CTL
Job No.: 14-0338N-1
Scale: SEE DRAWING

GEOLOGIC CROSS SECTION C-C'
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 3C




## MODERN SURFICIAL DEPOSITS

- af — Artificial fill (late Holocene)
- Qw — Wash deposits (late Holocene)
- Qls — Landslide deposits, undivided (Holocene and Pleistocene)
- Qmb — Marine beach deposits (late Holocene)
- Qpe — Paralic estuarine deposits (late Holocene)
- Qmo — Undivided marine deposits in offshore region (late Holocene)
- Qcf — Canyon fill deposits in offshore region (late Holocene)

## YOUNG SURFICIAL DEPOSITS

- Qya — Young alluvial flood-plain deposits (Holocene and late Pleistocene)
- Qyc — Young colluvial deposits (Holocene and late Pleistocene)
- Qct — Undivided canyon terrace deposits in offshore region (Holocene and Pleistocene)

## OLD SURFICIAL DEPOSITS

- Qoa — Old alluvial flood-plain deposits, undivided (late to middle Pleistocene)
- Qop — Old paralic deposits, undivided (late to middle Pleistocene)
  - Qop7 — Unit 7
  - Qop6 — Unit 6
  - Qop2-4 — Units 2-4, undivided

## VERY OLD SURFICIAL UNITS

- Qvoa — Very old alluvial flood-plain deposits, undivided (middle to early Pleistocene)
- Qvop — Very old paralic deposits, undivided (middle to early Pleistocene)

| | | | | | |
|---|---|---|---|---|---|
| Qvop7 | Unit 7 | | | | |
| Qvop6 | Unit 6 | Qvop13 | Unit 13 | | |
| Qvop5 | Unit 5 | Qvop12 | Unit 12 | | |
| Qvop4 | Unit 4 | Qvop11 | Unit 11 | Qvop11a | Unit 11a |
| Qvop3 | Unit 3 | Qvop10 | Unit 10 | Qvop10a | Unit 10a |
| Qvop2 | Unit 2 | Qvop9 | Unit 9 | Qvop9a | Unit 9a |
| Qvop1 | Unit 1 | Qvop8 | Unit 8 | Qvop8a | Unit 8a |

## SEDIMENTARY AND VOLCANIC BEDROCK UNITS

- QTso — Undivided sediments and sedimentary rocks in offshore region (Holocene, Pleistocene, Pliocene and Miocene)
- Tsd, Tsdcg, Tsdss — San Diego Formation (early Pleistocene and late Pliocene)
  - Tsd - undivided
  - Tsdcg - transitional marine and nonmarine pebble and cobble conglomerate
  - Tsdss - marine sandstone
- Tba — Basaltic-andesite dike (Miocene)
- Tmo — Undivided sedimentary rocks in offshore region (Miocene)
- Tmvo — Undivided volcanic rocks in offshore region (Miocene)
- Tmuo — Undivided volcanic and sedimentary rocks in offshore region (Miocene)
- To — Otay Formation (late Oligocene)
- Tp, Tpm — Pomerado Conglomerate (middle Eocene)
  - Tpm - Miramar Sandstone Member
- Tmv — Mission Valley Formation (middle Eocene)
- Tst — Stadium Conglomerate (middle Eocene)
- Tf — Friars Formation (middle Eocene)
- Tsc, Tscu — Scripps Formation (middle Eocene)
  - Tscu - upper unit
- Ta — Ardath Shale (middle Eocene)
- Tt — Torrey Sandstone (middle Eocene)
- Td — Delmar Formation (middle Eocene)
- Td+Tf — Delmar Formation and Friars Formation, undivided (middle Eocene)
- Tmss, Tmsc — Mount Soledad Formation (middle Eocene)
  - Tmss - sandstone
  - Tmsc - cobble conglomerate
- Teo — Undivided Eocene rocks in offshore region (Eocene)
- Kcs, Kccg — Cabrillo Formation (Upper Cretaceous)
  - Kcs - sandstone
  - Kccg - cobble conglomerate
- Kp — Point Loma Formation (Upper Cretaceous)
- Kl — Lusardi Formation (Upper Cretaceous)
- Kuo — Undivided rocks of the Rosario Group in the offshore area (Upper Cretaceous)

## UNNAMED CRETACEOUS ROCKS OF THE PENINSULAR RANGES BATHOLITH

- Kgu — Granodiorite and tonalite, undivided (mid-Cretaceous)
- Kgd — Granodiorite, undivided (mid-Cretaceous)
- Kt — Tonalite, undivided (mid-Cretaceous)
- Kd — Diorite, undivided (mid-Cretaceous)
- Kgh — Hypabyssal rocks, undivided (mid-Cretaceous)

## JURASSIC AND CRETACEOUS METAMORPHOSED AND UNMETAMORPHOSED VOLCANIC AND SEDIMENTARY ROCKS

- Mzu — Metamorphosed and unmetamorphosed volcanic and sedimentary rocks, undivided (Mesozoic)
- Mzo — Undivided metamorphic rocks in offshore region (Mesozoic)

Date: OCTOBER 2014
By: CTL
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Scale: NOT TO SCALE

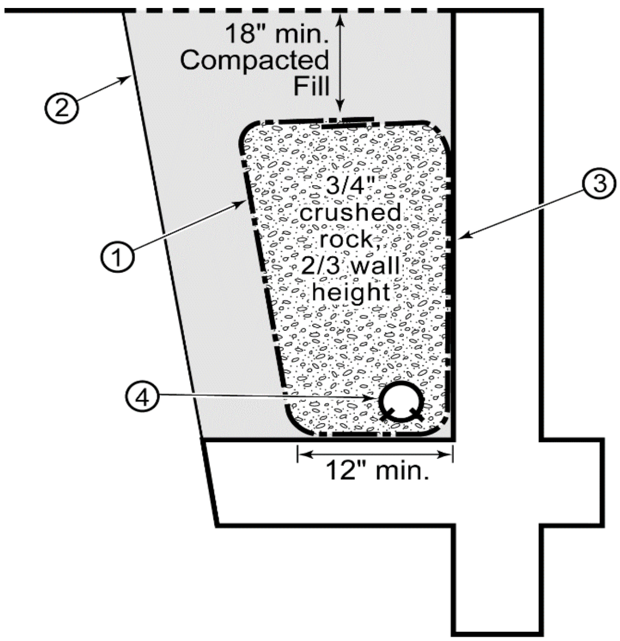
REGIONAL GEOLOGY MAP
FRIARS ROAD APARTMENT DEVELOPMENT
San Diego, California

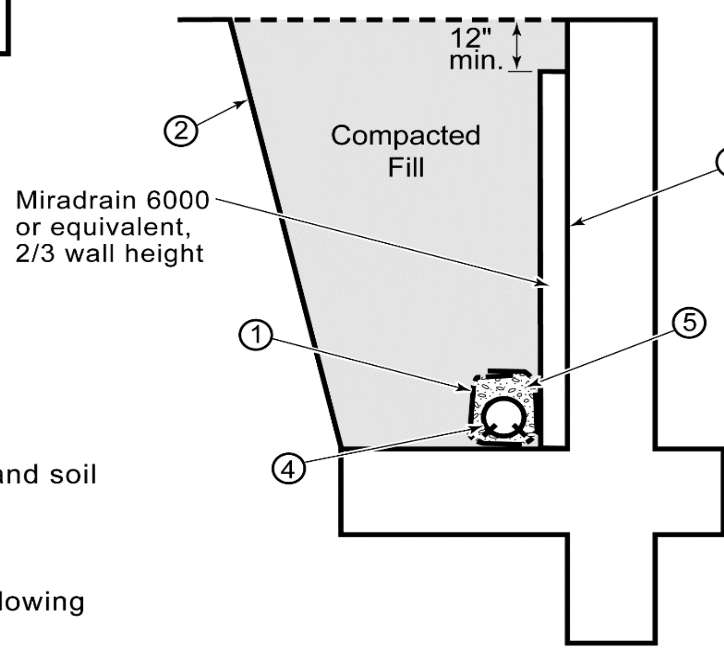
SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 4

## Typical Retaining Wall Backdrain Detail

Not to Scale




① Filter fabric between rock and soil

② Backcut

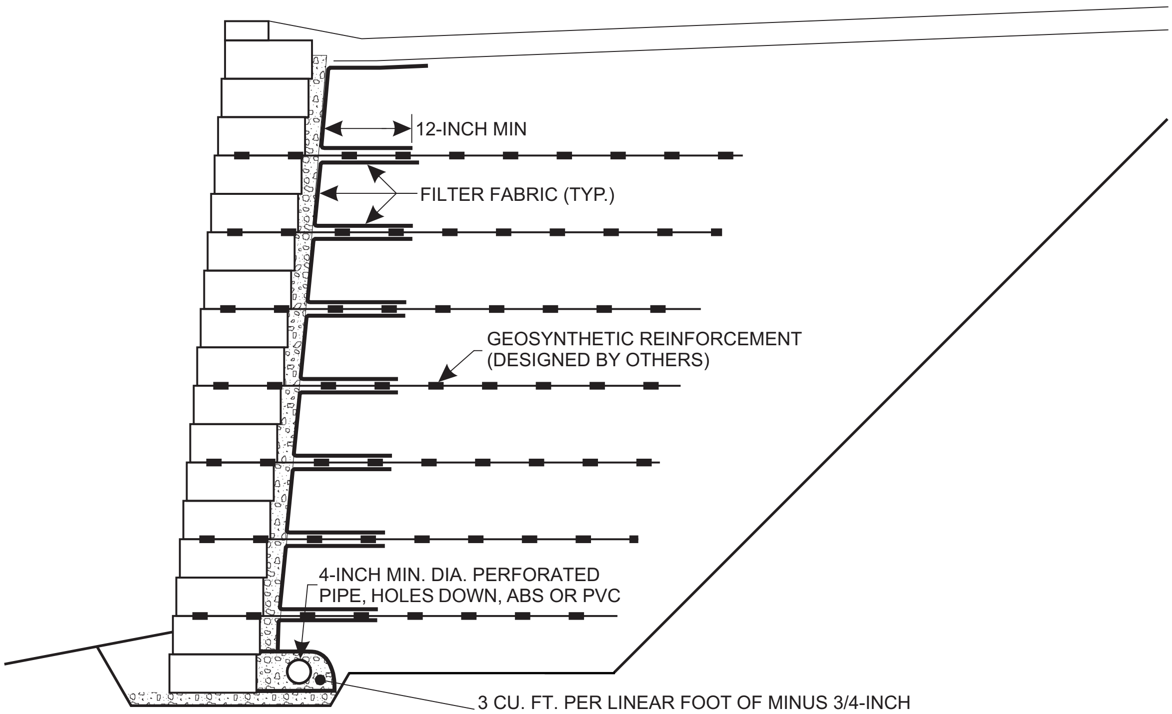
③ Waterproof back of wall following architect's specifications

④ 4" minimum perforated pipe, SDR35 or equivalent, holes down, 1% fall to outlet, encased in 3/4" crushed rock. Provide 3 cubic feet per linear foot crushed rock minimum. Crushed rock to be surrounded by filter fabric (Mirafi 140N or equivalent), with 6" minimum overlap. Provide solid outlet pipe at suitable location.

⑤ 3/4" crushed rock

| | | | | |
|---|---|---|---|---|
| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | | |
| | By: | CTL | Date: | 10/15/2014 |
| | Job Number: | 140338N-1 | Figure: | 5 |

## Typical MSE Retaining Wall
## Backdrain Detail
**Not to Scale**




### NOTES

1) Backcut as recommended by the geotechnical consultant.

2) Interceptor drain at excavation backcut may be recommended based on conditions observed during construction.

3) Filter fabric should be installed between crushed rock and soil. Filter fabric should consist of Mirafi 140N or equivalent. Filter fabric should be overlapped at least 6 inches.

4) Perforated pipe should outlet through a solid pipe to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.

5) Drain installation should be observed by the geotechnical consultant.

| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|---|
| | By: | TBC | Date: | 10/15/2014 |
| | Job Number: | 140338N-1 | Figure: | 6 |

## APPENDIX I
## FIELD INVESTIGATION

Our field investigation consisted of drilling six borings on September 10 through 12, 2014 using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion. Figure 3 shows the approximate locations of the borings. The field investigation was performed under the observation of an SCS&T geologist who also logged the borings and test hole and obtained samples of the materials encountered. Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. The CAL sampler was driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the sampler the final 12 inches of an 18-inch drive is noted on the borings logs as "Driving Resistance (blows/ft. of drive)." CAL sampler refusal was encountered when 50 blows were applied during any one of the three 6-inch intervals, a total of 100 blows was applied, or there was no discernible sampler advancement during the application of 10 successive blows. Disturbed bulk samples were obtained from the drill cuttings.

The soils are classified in accordance with the Unified Soil Classification System as illustrated on Figure I-1. Logs of the borings are presented on Figures I-2 through I-13.

# SUBSURFACE EXPLORATION LEGEND

## UNIFIED SOIL CLASSIFICATION CHART

| SOIL DESCRIPTION | | GROUP SYMBOL | TYPICAL NAMES |
|---|---|---|---|
| I. COARSE GRAINED, more than 50% of material is larger than No. 200 sieve size. | | | |
| GRAVELS<br>More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3". | CLEAN GRAVELS | GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| | | GP | Poorly graded gravels, gravel sand mixtures, little or no fines. |
| | GRAVELS WITH FINES (Appreciable amount of fines) | GM | Silty gravels, poorly graded gravel-sand-silt mixtures. |
| | | GC | Clayey gravels, poorly graded gravel-sand, clay mixtures. |
| SANDS<br>More than half of coarse fraction is smaller than No. 4 sieve size. | CLEAN SANDS | SW | Well graded sand, gravelly sands, little or no fines. |
| | | SP | Poorly graded sands, gravelly sands, little or no fines. |
| | | SM | Silty sands, poorly graded sand and silty mixtures. |
| | | SC | Clayey sands, poorly graded sand and clay mixtures. |
| II. FINE GRAINED, more than 50% of material is smaller than No. 200 sieve size. | | | |
| | SILTS AND CLAYS (Liquid Limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | OL | Organic silts and organic silty clays or low plasticity. |
| | SILTS AND CLAYS (Liquid Limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity. |
| III. HIGHLY ORGANIC SOILS | | PT | Peat and other highly organic soils. |

### FIELD SAMPLE SYMBOLS

| | |
|---|---|
| | - Bulk Sample |
| CAL | - Modified California penetration test sampler |
| CK | - Undisturbed chunk sample |
| MS | - Maximum Size of Particle |
| | - Water seepage at time of excavation or as indicated |
| SPT | - Standard penetration test sampler |
| ST | - Shelby Tube |
| | - Water level at time of excavation or as indicated |

### LABORATORY TEST SYMBOLS

| | |
|---|---|
| AL | - Atterberg Limits |
| CON | - Consolidation |
| COR | - Corrosivity Test |
| | - Sulfate |
| | - Chloride |
| | - pH and Resistivity |
| DS | - Direct Shear |
| EI | - Expansion Index |
| MAX | - Maximum Density |
| RV | - R Value |
| SA | - Sieve Analysis |
| UC | - Unconfined Compression |

SC ST
**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

| FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|
| By: | WLV | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure: | I-1 |

# LOG OF BORING B-1

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 4 | | | | X | | | | |
| 6 | | Cobbles to 10 inches in size. | | X | | | | COR |
| 8 | | | | X | | | | |
| 10 | | | | | | | | |
| 12 | | Gravel to 3 inches in size. | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-3.**

# LOG OF BORING B-1 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22, 24 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 2 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 26, 28, 30, 32 | | | | | | | | |
| 34 | | CLAYEY SANDSTONE, moist, very dense, fine grained moderately cemented. | CAL | | 57 | | | |
| 36 | | **BORING TERMINATED AT 36 FEET** | | | | | | |
| 38, 40 | | | | | | | | |

# LOG OF BORING B-2

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 84 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 1 inch asphalt concrete over 1 inch aggregate base | | | | | | |
| 2 | GC | **FILL (af)** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | X | | | | EI |
| 4 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | X | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | No sample recovery. | CAL | | 69 | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-5.**

| SOUTHERN CALIFORNIA SOIL & TESTING, INC. | FRIARS ROAD APARTMENT DEVELOPMENT | | |
|---|---|---|---|
| | By: WLV | Date: | 10/15/2014 |
| | Job Number: 140338N-1 | Figure | I-4 |

# LOG OF BORING B-2 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/10/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | Strongly cemented, very difficult drilling | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | **BORING TERMINATED AT 35 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| **SOUTHERN CALIFORNIA SOIL & TESTING, INC.** | FRIARS ROAD APARTMENT DEVELOPMENT | | | |
| | By: | WLV | Date: | 10/15/2014 |
| | Job Number: | 140338N-1 | Figure | I-5 |

# LOG OF BORING B-3

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 7 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst**) - CONGLOMERATE, light brown, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | X | | | | | RV |
| 4 | | | X | | | | | |
| 6 | | Orangish yellow, cobbles up to 12 inches in size. | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | Dark orangish brown. | X | | | | | |
| 14 | | | X | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-7.**

# LOG OF BORING B-3 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | 31 Feet |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 24 | | | | | | | | |
| 26 | | SILTY SANDSTONE, brown, fine grained, some gravel, wet, very dense, moderately cemented. | | | | | | |
| 28 | | No sample recovery, rock in shoe. | CAL | | 50/1" | | | |
| 30 | | ▽ Groundwater at 31 feet upon completion of drilling. | CAL | | 63 | | | DS |
| 32 | | | | | | | | |
| 34 | | | CAL | | 69/11" | | | |
| 36 | | **BORING TERMINATED AT 36 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

# LOG OF BORING B-4

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 4 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst**) - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | X | | | | | EI |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-9.**

# LOG OF BORING B-4 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/11/2014 | Logged by: | WLV |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | 31 Feet |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | Groundwater at 31 feet upon completion of drilling. | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | **BORING TERMINATED AT 35 FEET** | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

# LOG OF BORING B-5

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Hollow Stem Auger/Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | X | | | | |
| 2 | GC | **FILL (af)** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | X | | | | EI |
| 4 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 6 | | | | X | | | | |
| 8 | | | | X | | | | |
| 10 | | Very difficult drilling, changed to air percussion. | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-11.**

# LOG OF BORING B-5 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 – 34 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented, difficult drilling. | | | | | | |
| 36 – 40 | | **BORING TERMINATED AT 35 FEET** | | | | | | |

# LOG OF BORING B-6

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 89 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 3 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2, 4, 6, 8 | GM | **FILL (af)** - SILTY GRAVEL, light brown, rounded gravel and cobbles to 6 inches in size, moist, dense. | | | | | | |
| 10, 12, 14, 16 | GM | **ALLUVIUM (Qal)** - SILTY GRAVEL, pale brown, rounded gravel and cobbles to 6 inches in size, moist, dense. | | | | | | |
| 18, 20 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented. | | | | | | |

**BORING LOG CONTINUED ON FIGURE I-13.**

# LOG OF BORING B-6 (CONTINUED)

| | | | |
|---|---|---|---|
| Date Excavated: | 9/12/2014 | Logged by: | WLV |
| Equipment: | Air Percussion | Project Manager: | TBC |
| Surface Elevation (ft): | 89 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| 22 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty sandstone matrix, moist, very dense, weakly cemented. | | | | | | |
| 24 | | Caving. | | | | | | |
| 26 | | | | | | | | |
| 28 | | **BORING REFUSAL AT 28 FEET DUE TO CAVING** | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | | | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |

| | | | |
|---|---|---|---|
| **SOUTHERN CALIFORNIA SOIL & TESTING, INC.** | FRIARS ROAD APARTMENT DEVELOPMENT | | |
| By: | WLV | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure | I-13 |

## APPENDIX II
## LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were performed:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil
- **R-VALUE:** An R-value test was performed on one sample in accordance with California Test Method 301. Figure II-1 presents the test result.
- **EXPANSION INDEX:** The expansion index was determined on three samples in accordance with ASTM D4829. Figure II-1 presents the test results.
- **CORROSIVITY**: Corrosivity tests were performed on one sample. The pH and minimum resistivity were determined in general accordance with California Test 643. The soluble sulfate content was determined in accordance with California Test 417. The total chloride ion content was determined in accordance with California Test 422. Figure II-1 presents the test results.
- **DIRECT SHEAR:** A direct shear test was performed on one sample in accordance with ASTM D3080. The shear stress was applied at a constant rate of strain of 0.003 inch per minute. Figure II-2 presents the test results.

Soil samples not tested are now stored in our laboratory for future reference and analysis, if needed. Unless notified to the contrary, all samples will be disposed of 30 days from the date of this report.

## R-VALUE

CALIFORNIA TEST 301

| SAMPLE | DESCRIPTION | R- VALUE |
|---|---|---|
| B-3 at 1 Foot to 5 Feet | CONGLOMERATE, light brown | 10 |

## EXPANSION INDEX

ASTM D2489

| SAMPLE | DESCRIPTION | EXPANSION INDEX |
|---|---|---|
| B-2 at 0 Feet to 3 Feet | CLAYEY GRAVEL, moderate brown | 39 |
| B-4 at 0 Feet to 5 Feet | CONGLOMERATE, dark yellowish-orange | 1 |
| B-5 at 0 Feet to 3 Feet | CLAYEY GRAVEL, moderate brown | 39 |

***CLASSIFICATION OF EXPANSIVE SOIL*** [1]

| EXPANSION INDEX | POTENTIAL EXPANSION |
|---|---|
| 1 - 20 | Very Low |
| 21 - 50 | Low |
| 51 - 90 | Medium |
| 91 - 130 | High |
| Above 130 | Very High |

1. ASTM - D4829

## RESISTIVITY, pH, SOLUBLE CHLORIDE and SOLUBLE SULFATE

| SAMPLE | RESISTIVITY (Ω-cm) | pH | CHLORIDE (%) | SULFATE (%) |
|---|---|---|---|---|
| B-1 at 5 Feet to 10 Feet | 436 | 7.72 | 0.061 | 0.042 |

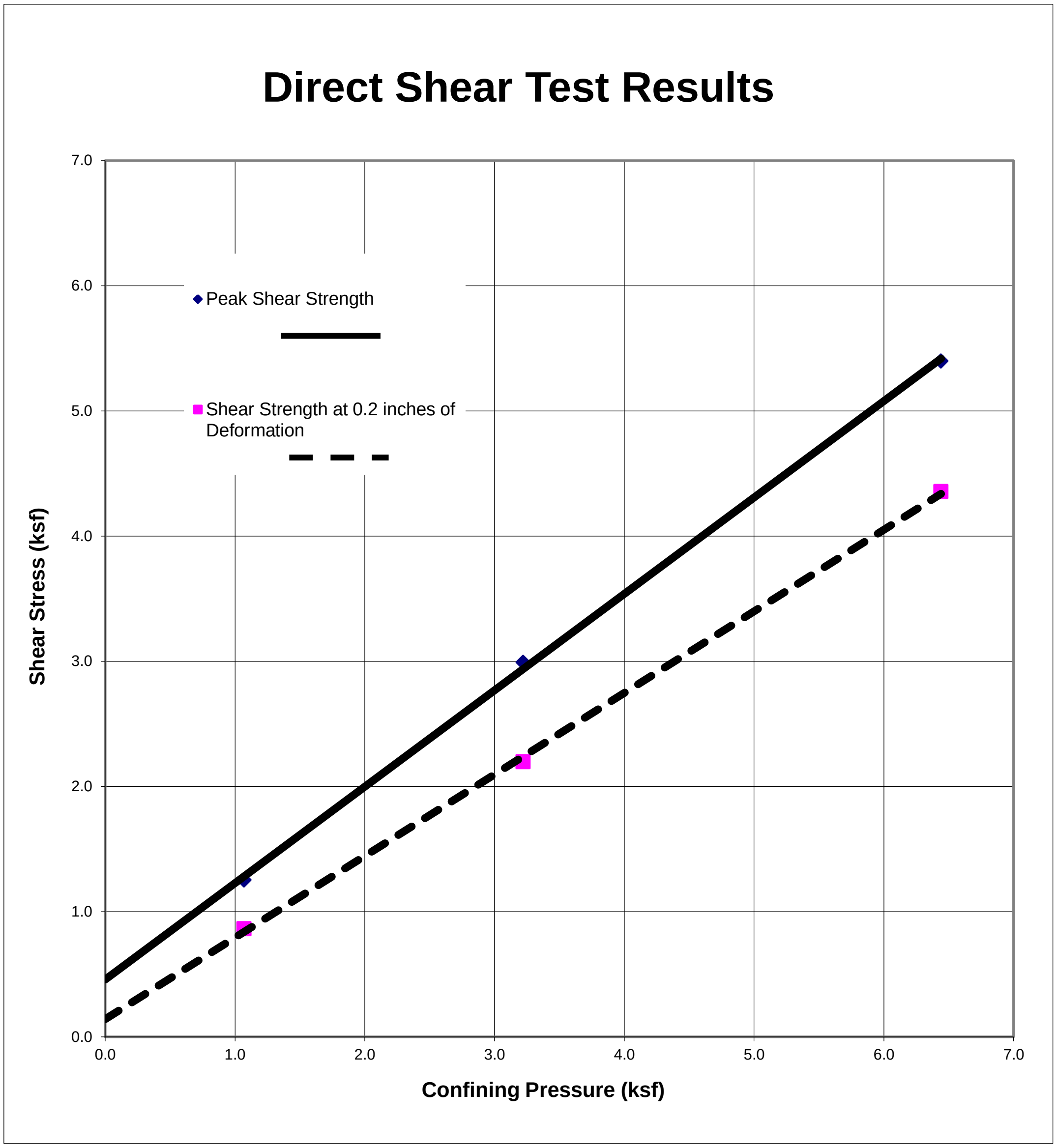
***SULFATE EXPOSURE CLASSES*** [2]

| Class | Severity | Water-Soluble Sulfate ($SO_4$) in Soil, Percent by Mass |
|---|---|---|
| S0 | Not applicable | $SO_4 < 0.10$ |
| S1 | Moderate | $0.10 \leq SO_4 < 0.20$ |
| S2 | Severe | $0.20 \leq SO_4 \leq 2.00$ |
| S3 | Very Severe | $SO_4 > 2.00$ |

2. ACI 318, Table 4.2.1

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

| FRIARS ROAD APARTMENT DEVELOPMENT | | | |
|---|---|---|---|
| By: | CTL | Date: | 10/15/14 |
| Job Number: | 14-0338N-1 | Figure: | II-1 |




| SAMPLE | DESCRIPTION | INTERNAL FRICTION ANGLE(DEG.) | COHESION INTERCEPT (PSF) |
|---|---|---|---|
| B-3 at 30 Feet | SILTY SANDSTONE, brown | | |
| | ***Peak Shear Strength:*** | 38 | 459 |
| | ***Shear Strength at 0.2 inch Horizontal Displacement:*** | 33 | 140 |

**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**

FRIARS ROAD APARTMENT DEVELOPMENT

| | | | |
|---|---|---|---|
| By: | TBC | Date: | 10/15/2014 |
| Job Number: | 140338N-1 | Figure: | II-2 |

# APPENDIX III
# GEOPHYSICAL EVALUATION

SOUTHWEST GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

October 1, 2014
Project No. 114395

Mr. Tom Canady
Southern California Soil & Testing
6280 Riverdale Street
San Diego, CA 92704

Subject: Geophysical Evaluation
7050 Friars Road
San Diego, California

Dear Mr. Canady:

In accordance with your authorization, we have performed geophysical survey services pertaining to the property located at 7050 Friars Road in San Diego, California (Figure 1). The purpose of our survey was to characterize the subsurface Shear-wave velocity conditions in the rear paved parking lot through the collection of surface wave data (Figure 2). This report presents the survey methodology, equipment used, analysis, and findings.

Our scope of services included the performance of a refraction microtremor (ReMi) survey. The ReMi technique uses recorded surface waves (specifically Rayleigh waves) that are contained in background noise to develop a Shear-wave velocity profile of the study area down to a depth, in this case, of approximately 70 feet. The ReMi survey included the use of a 24-channel Geometrics Geode seismograph and 24 14-Hz vertical component geophones. The geophones were spaced 5 feet apart, for a total line length of 115 feet. Fifteen records, each 32 seconds long, were recorded and then downloaded to a computer. The data were later processed using SeisOpt® ReMi™ software. Figures 2 and 3 depict the general site conditions at the project site. Figure 4 and Table 1 present the results from our survey.

**TABLE 1**
**ReMi Results**

| Line No. | Depth (feet) | Shear Wave Velocity (feet/second) |
|---|---|---|
| RL-1 | 0 – 18 | 1,127 |
| | 18 – 61 | 1,991 |
| | 61 – 70 | 3,283 |

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, Inc. should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Sincerely,
**SOUTHWEST GEOPHYSICS, INC.**

Hans van de Vrugt

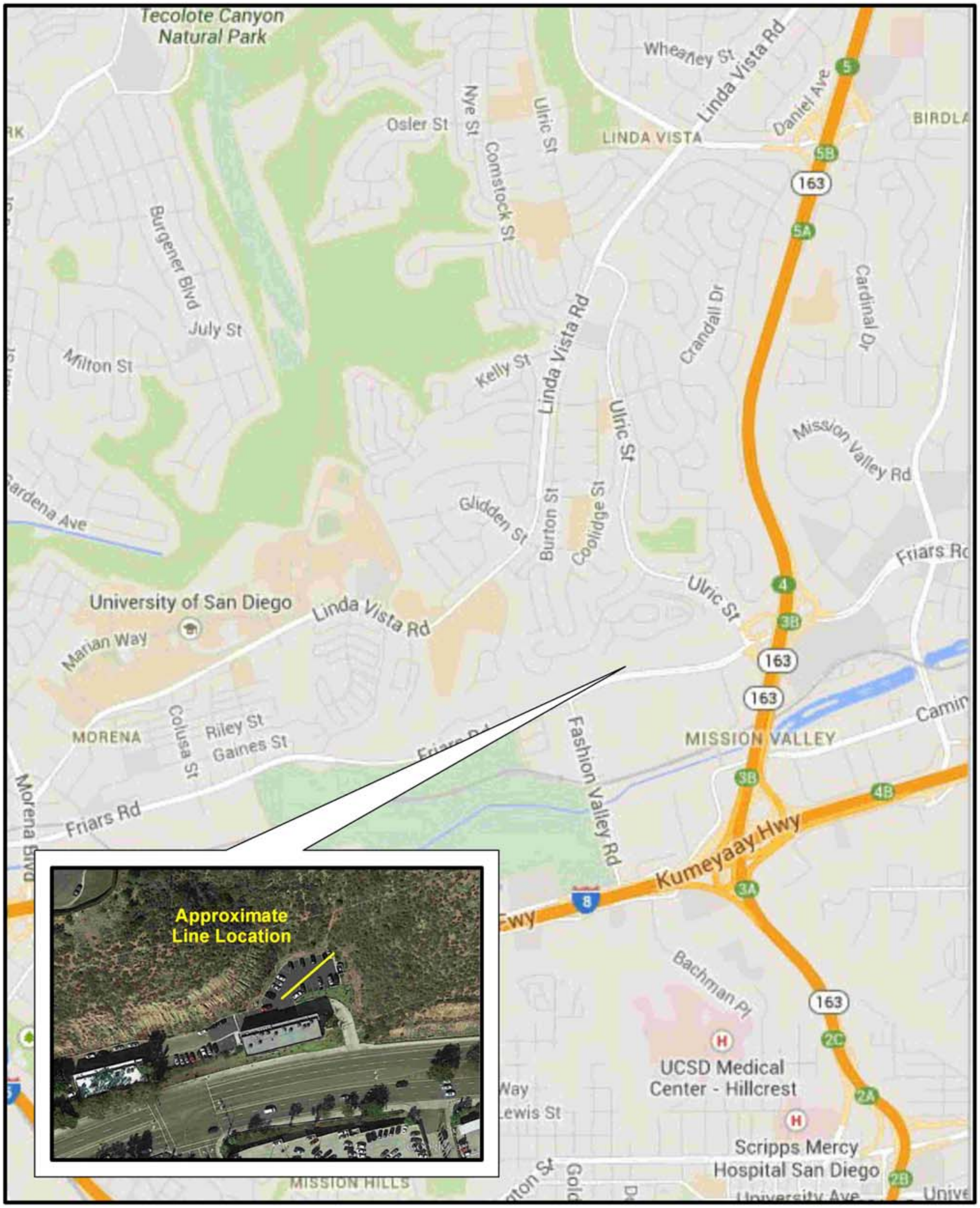
Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist

REGISTERED GEOPHYSICIST
Hans van de Vrugt
No 1012
Exp. 2/29/16
STATE OF CALIFORNIA

HV/hv

Attachments: Figure 1 – Site Location Map
Figure 2 – Line Location Map
Figure 3 – Site Photographs
Figure 4 – ReMi Results

Distribution: Addressee (electronic)

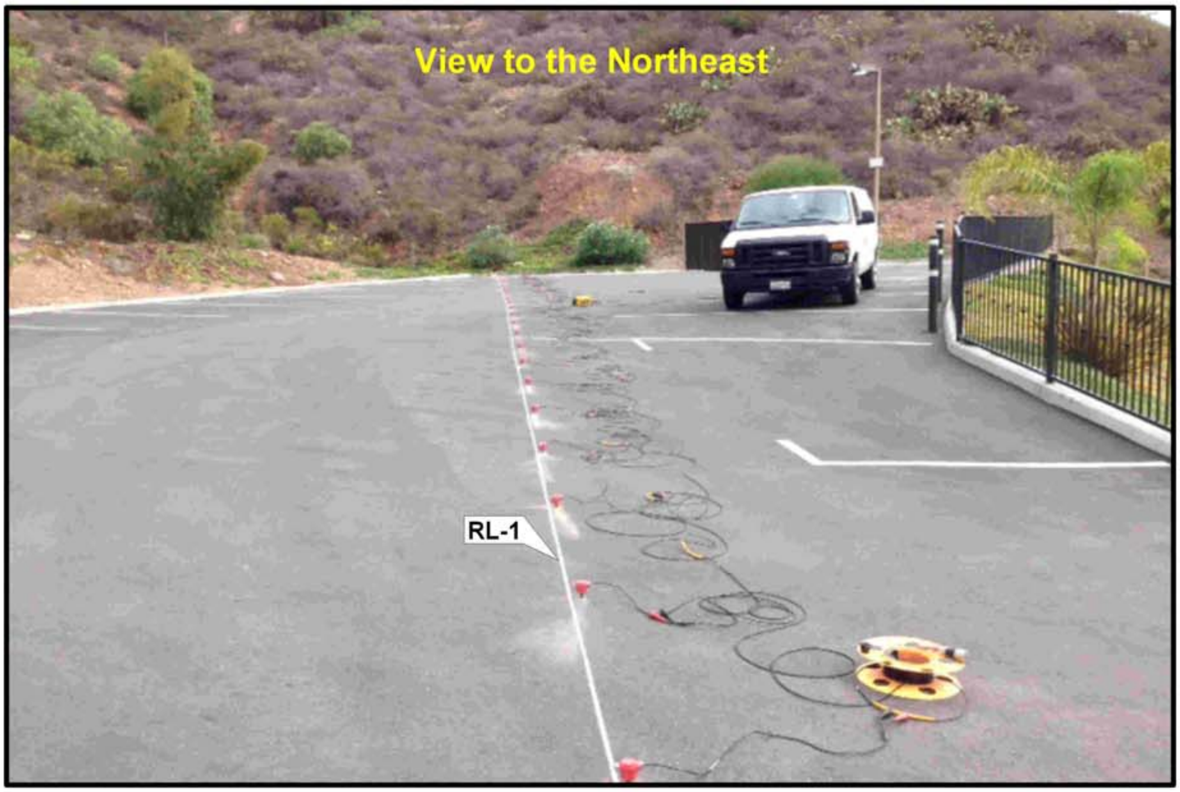



| SITE LOCATION MAP | N | 7050 Friars Road<br>San Diego, California | SOUTHWEST GEOPHYSICS INC. |
|---|---|---|---|
| | | Project No.: 114395 — Date: 10/14 | Figure 1 |


| | | | |
|---|---|---|---|
| **LINE LOCATION MAP** | N | 7050 Friars Road<br>San Diego, California<br>Project No.: 114395 Date: 10/14 | SOUTHWEST GEOPHYSICS INC.<br>Figure 2 |

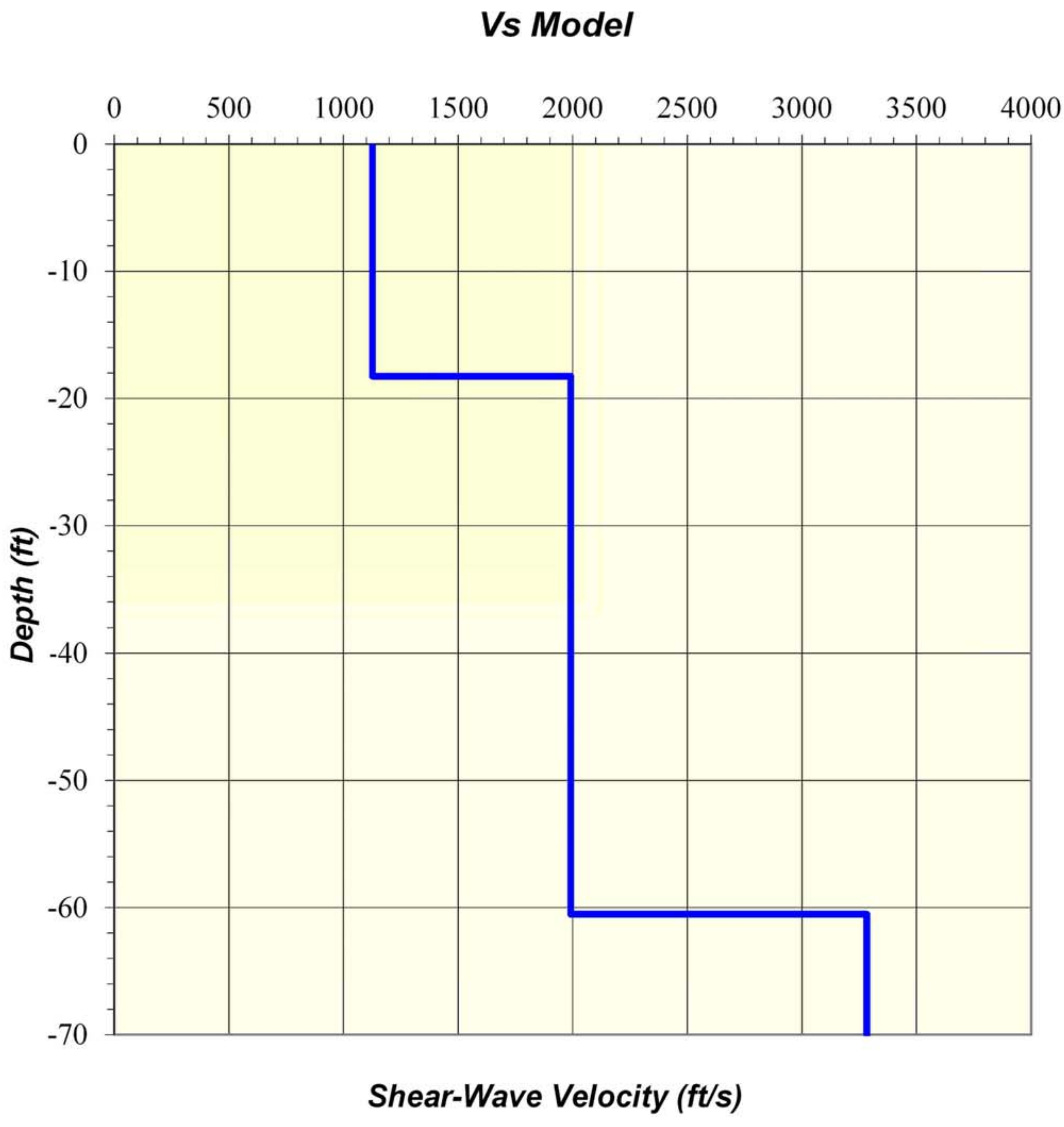
0 50 100

**approximate scale in feet**





| | | |
|---|---|---|
| **SITE PHOTOGRAPHS** | 7050 Friars Road<br>San Diego, California | SOUTHWEST GEOPHYSICS INC. |
| | Project No.: 114395 / Date: 10/14 | Figure 3 |




**ReMi RESULTS**

7050 Friars Road
San Diego, California

Project No.: 114395

Date: 10/14

SOUTHWEST GEOPHYSICS INC.

Figure 4

SCST, Inc.
Corporate Headquarters
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W www.scst.com

SDVOSB . DVBE

September 9, 2016

**SCST No. 140338N.2**
**Report No. 1**

**Mr. Jeffrey Holbrook**
**Manager**
**LCG Friars, LLC**
**27132 B Paseo Espada, Suite 1206**
**San Juan Capistrano, California 92675**

Subject: ADDENDUM GEOTECHNICAL REPORT
INFILTRATION TEST RESULTS AND RESPONSES TO REVIEW COMMENTS
FRIARS ROAD MIXED USE DEVELOPMENT
SAN DIEGO, CALIFORNIA

References: Latitude 33 Planning and Engineering (2016), Grading & Utility Plan, Friars Road Mixed Use, San Diego, CA 92108, February 11.

Southern California Soil & Testing, Inc. (SCS&T) (2014), Geotechnical Investigation, Friars Road Apartment Development, San Diego, CA, SCS&T No. 140338N-1, October 15.

Dear Mr. Holbrook:

SCST, Inc. prepared this addendum geotechnical report to provide in situ infiltration test results and respond to review comments from Patrick Thomas of The City of San Diego for the subject project. We understand that the currently proposed project will consist of the design and construction of an apartment building and a condominium building over a two-level, partial subterranean parking structure (podium) with a parking level 2 finished floor elevation of 55.0 feet. Our scope of work included performing three borehole percolation tests at the site.

## SITE DESCRIPTION

The site is located north of Friars Road and east of Fashion Valley Road in the Linda Vista community of the City of San Diego, California. Figure 1 presents a site location map. The site is bordered by an SDG&E transmission line on the north, a commercial development on the west, Friars Road and Fashion Valley mall on the south, and undeveloped land on the east. The site is located on the northern flank of Mission Valley. The northern portion of the site consists of a natural slope that ascends about 140 feet to the north at inclinations between about 1:1 (horizontal:vertical) and 1.6:1 (horizontal:vertical). The southern portion of the site consists of a fill slope that descends about 25 feet to the south towards Friars Road at an inclination of about 1.5:1 (horizontal:vertical). The toe of the fill slope is at the edge of the public right-of-way. Existing site improvements consist of three commercial buildings and associated pavement and landscape areas. Site elevations range from about 160 feet on the north to about 60 feet on the south.

## FIELD EXPLORATION

We explored the subsurface conditions by drilling three percolation test holes to depths between about 7 and 10 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger. We previously drilled six borings to depths between about 28 and 36 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger and air rotary percussion (SCS&T, 2014). Figure 2 presents the approximate locations of the current percolation test holes and previous borings. An SCST engineer logged the test holes and collected samples for laboratory testing. The logs of the test holes are presented in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1.

## SUBSURFACE CONDITIONS

The materials encountered in the percolation test holes consist of fill and Stadium Conglomerate. Descriptions of the materials are presented below.

**Fill (af):** Fill was encountered in percolation test hole P-3. The fill encountered in the test hole extends to a depth of about 5 feet below the existing ground surface and consists of dense clayey gravel.

**Stadium Conglomerate (Tst):** Eocene Stadium Conglomerate was encountered in each of the percolation test holes. The Stadium Conglomerate encountered in the test holes consists of very dense conglomerate in a weakly cemented silty to clayey sandstone matrix with varying amounts of gravel and cobbles. Difficult drilling was encountered in the conglomerate.

**Groundwater**: Groundwater was not encountered in the percolation test holes. However, it was encountered in borings B-3 and B-4, drilled in the north-middle portion of the site during our referenced geotechnical investigation (SCS&T, 2014), at a depth of about 31 feet below the existing ground surface, corresponding to an elevation of about 54 feet. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

## LABORATORY TESTING

Selected samples obtained from the percolation test holes were tested to determine soil classification and enable the development of geotechnical conclusions. The laboratory testing consisted of grain size distribution and Atterberg limits. The results of the laboratory testing and brief explanations of the test procedures are presented in Appendix II.

## PERCOLATION TESTING

Borehole percolation testing was performed at three locations at depths of about 7 and 10 feet below the existing ground surface. The testing was performed by an SCST engineer in general accordance with the BMP Design Manual percolation test procedure. The material encountered at the bottom of the percolation test holes consists of Stadium Conglomerate. Table 1 presents the tested infiltration rates. The results of the percolation testing are presented in Appendix III.

**Table 1: Infiltration Rate Test Results**

| Test Location | Test Depth (feet) | Material Type at Test Depth | Infiltration Rate (inches/hour) |
|---|---|---|---|
| P-1 | 7 | STADIUM CONGLOMERATE, clayey sanstone matrix, very dense, weakly cemented | < 0.1 |
| P-2 | 7 | STADIUM CONGLOMERATE, clayey sanstone matrix, very dense, weakly cemented | 0.0 |
| P-3 | 10 | STADIUM CONGLOMERATE, silty to clayey sanstone matrix, very dense, weakly cemented | 0.1 |

## CONCLUSIONS AND RECOMMENDATIONS

Evaluation of storm water infiltration feasibility was performed in general accordance with the City of San Diego BMP Design Manual, Appendix C. Worksheet C.4-1 is provided in Appendix IV. Please note that infiltration testing was not conducted at a minimum of two locations within 50 feet of each proposed BMP in accordance with Section D.4.5 of Appendix D, as we were unable to access the proposed BMP locations due to current site constraints (existing buildings and slope). Additional infiltration testing may need to be performed after the existing buildings have been demolished and the site cut to planned finish grade. In our opinion, the Stadium Conglomerate tested during this evaluation is generally representative of the Stadium Conglomerate that will be encountered below the proposed BMP locations.

The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates do not support full infiltration; however, they do barely support allowing partial infiltration based on the City of San Diego's definition of "any appreciable quantity" of greater than 0.01 inch per hour. To mitigate the increased risk associated with allowing storm water infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain consisting of 6-inch diameter perforated PVC pipe surrounded by drain rock wrapped in filter fabric should be placed at the bottom of the basins and connected to a suitable storm drain facility.

As previously mentioned, groundwater was encountered in the north-middle portion of the site during our referenced geotechnical investigation at an elevation of about 54 feet. However, the proposed storm water BMP basins have been strategically located in areas where groundwater was not encountered. Therefore, it is our opinion that the depth to groundwater requirement of more than 10 feet below the bottom of the BMP should be satisfied.

**RESPONSES TO CITY REVIEW COMMENTS**

The remainder of this report presents our responses to review comments from Patrick Thomas of The City of San Diego related to the grading plan submittal. We responded to the geotechnical issues.

Issue No. 11: *The project's geotechnical consultant must submit an addendum geotechnical report or update letter that specifically addresses the following:*

Response: We prepared this addendum geotechnical report to address the issues.

Issue No. 12: *Provide completed Worksheet C.4-1.*

Response: Worksheet C.4-1 is provided in Appendix IV. In accordance with Section C.4.4 of Appendix C, the project design engineer is responsible for completing criteria 4 and 8.

Issue No. 13: *The geotechnical consultant indicates BMP facilities that involve infiltration are not feasible due to the proximity of groundwater to the proposed finish floor of the proposed development. A geotechnical condition created by the proposed development may not be considered a valid geotechnical hazard or constraint as the constraint is proposed by the project.*

Response: Groundwater was encountered in the north-middle portion of the site during our referenced geotechnical investigation at an elevation of about 54 feet. However, the proposed storm water BMP basins have been strategically located in areas where groundwater was not encountered. Therefore, it is our opinion that this issue has been resolved.

Issue No. 14: *The project's geotechnical consultant must address the specific geologic or geotechnical hazard associated with any amount of storm water infiltration that cannot be mitigated to an acceptable level for proposed storm water BMP's. The analyses and supporting documentation must be submitted for review.*

Response: To mitigate the increased risk associated with allowing any amount of storm water infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain consisting of 6-inch diameter perforated PVC pipe surrounded by drain rock wrapped in filter fabric should be placed at the bottom of the basins and connected to a suitable storm drain facility.

If you have questions, please call us at (619) 280-4321.

Respectfully submitted,
**SCST, INC.**

Thomas B. Canady, PE 50057
Principal Engineer

W. Lee Vanderhurst, CEG 1125
Principal Geologist

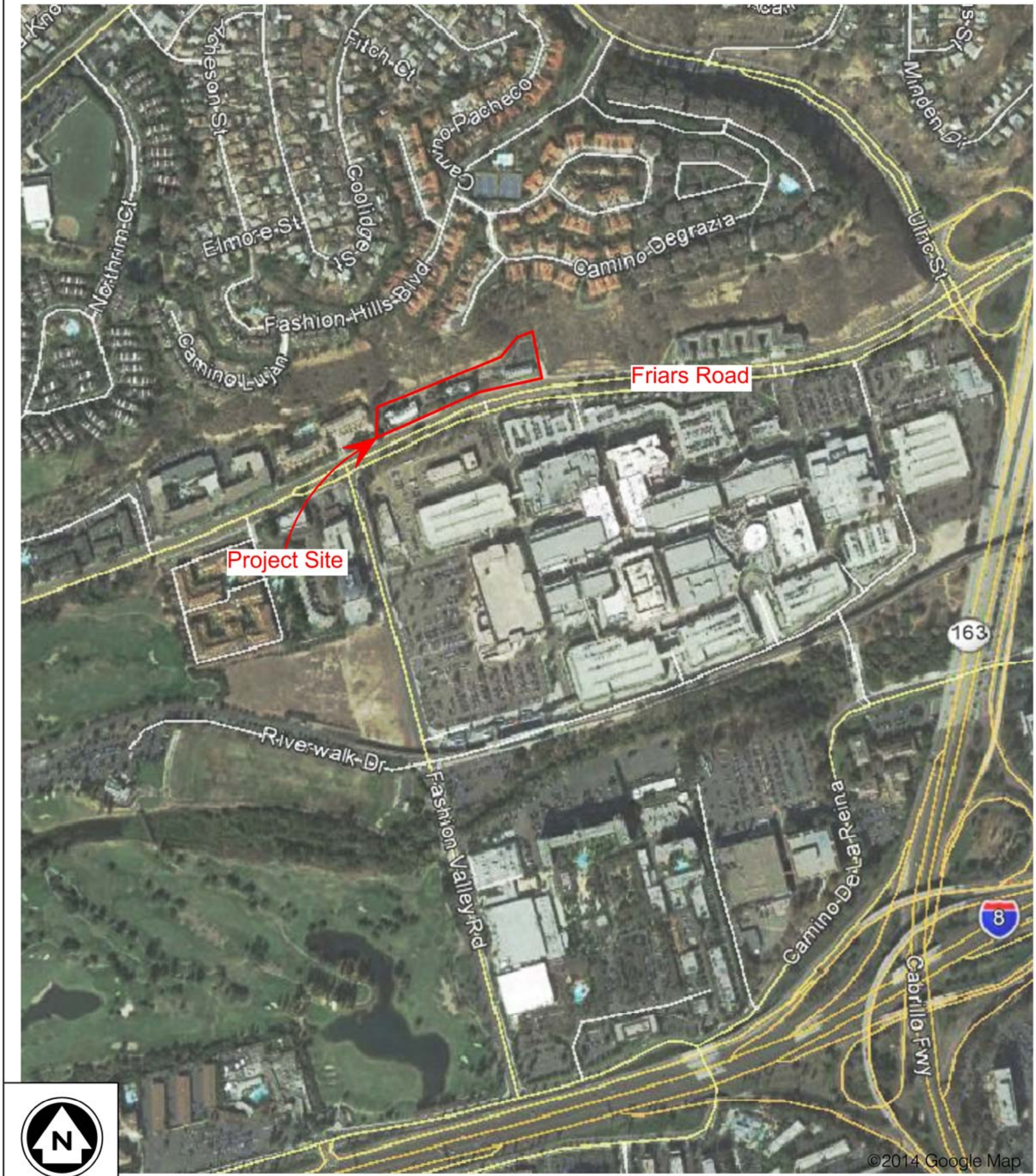
TBC:WLV

Attachments:

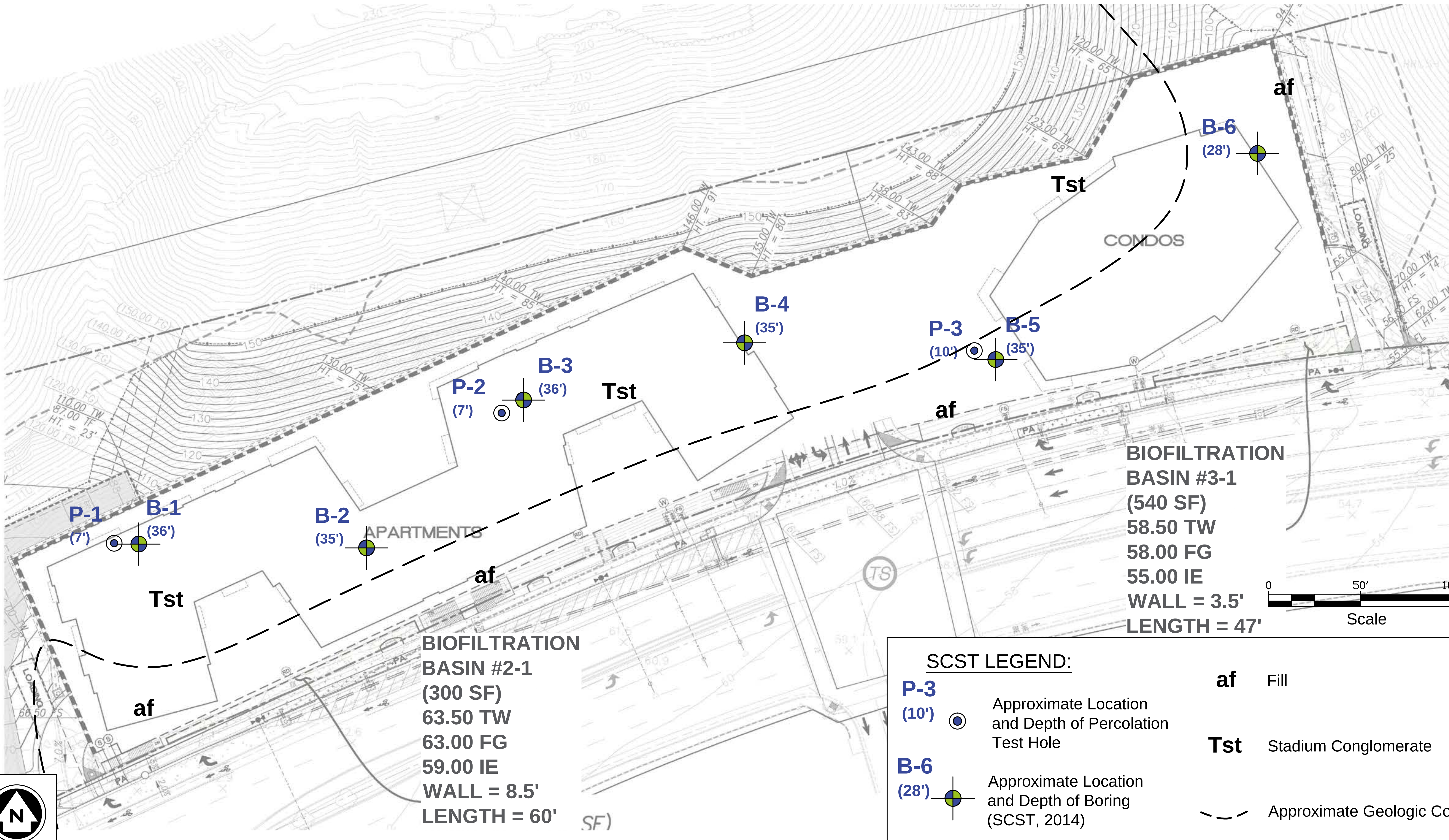
Figures
Figure 1 - Site Location Map
Figure 2 - Geotechnical Map

Appendices
Appendix I - Subsurface Exploration
Appendix II - Laboratory Testing
Appendix III - Infiltration Rate Test Results
Appendix IV - Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

(1) Addressee via e-mail at jholbrook@landcapip.com
(1) Justin Barrett via e-mail at justin.barrett@latitude33.com




| | | | |
|---|---|---|---|
| SCST, Inc. | SITE LOCATION MAP<br>Friars Road Mixed<br>Use Development<br>San Diego, California | Date: September, 2016<br>By: JCU<br>Job No.: 140338N.2-1 | Figure:<br>1 |




SCST LEGEND:

| | | | |
|---|---|---|---|
| P-3 (10') | Approximate Location and Depth of Percolation Test Hole | af | Fill |
| B-6 (28') | Approximate Location and Depth of Boring (SCST, 2014) | Tst | Stadium Conglomerate |
| | | | Approximate Geologic Contact |

SCST, Inc.

GEOTECHNICAL MAP

Friars Road Mixed Use Development
San Diego, California

Date: September, 2016
By: JCU
Job No.: 140338N.2-1

Figure: 2

## APPENDIX I
## SUBSURFACE EXPLORATION

The subsurface conditions were explored by drilling 3 percolation test holes on August 26, 2016 to depths between about 7 and 10 feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow stem auger. Figure 2 presents the approximate locations of the percolation test holes. The field investigation was performed by an SCST engineer who also logged the percolation test holes and obtained samples of the materials encountered.

The soils are classified in accordance with the Unified Soil Classification System as illustrated on Figure I-1. Logs of the percolation test holes are presented on Figures I-2 through I-4.

# SUBSURFACE EXPLORATION LEGEND

## UNIFIED SOIL CLASSIFICATION CHART

| SOIL DESCRIPTION | | GROUP SYMBOL | TYPICAL NAMES |
|---|---|---|---|
| I. COARSE GRAINED, more than 50% of material is larger than No. 200 sieve size. | | | |
| GRAVELS<br>More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3". | CLEAN GRAVELS | GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| | | GP | Poorly graded gravels, gravel sand mixtures, little or no fines. |
| | GRAVELS WITH FINES (Appreciable amount of fines) | GM | Silty gravels, poorly graded gravel-sand-silt mixtures. |
| | | GC | Clayey gravels, poorly graded gravel-sand, clay mixtures. |
| SANDS<br>More than half of coarse fraction is smaller than No. 4 sieve size. | CLEAN SANDS | SW | Well graded sand, gravelly sands, little or no fines. |
| | | SP | Poorly graded sands, gravelly sands, little or no fines. |
| | | SM | Silty sands, poorly graded sand and silty mixtures. |
| | | SC | Clayey sands, poorly graded sand and clay mixtures. |
| II. FINE GRAINED, more than 50% of material is smaller than No. 200 sieve size. | | | |
| | SILTS AND CLAYS (Liquid Limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | OL | Organic silts and organic silty clays or low plasticity. |
| | SILTS AND CLAYS (Liquid Limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity. |
| III. HIGHLY ORGANIC SOILS | | PT | Peat and other highly organic soils. |

### SAMPLE SYMBOLS

| | |
|---|---|
| ⊠ | - Bulk Sample |
| CAL | - Modified California sampler |
| CK | - Undisturbed Chunk sample |
| MS | - Maximum Size of Particle |
| ST | - Shelby Tube |
| SPT | - Standard Penetration Test sampler |

### GROUNDWATER SYMBOLS

▽ - Water level at time of excavation or as indicated

- Water seepage at time of excavation or as indicated

### LABORATORY TEST SYMBOLS

| | |
|---|---|
| AL | - Atterberg Limits |
| CON | - Consolidation |
| COR | - Corrosivity Tests (Resistivity, pH, Chloride, Sulfate) |
| DS | - Direct Shear |
| EI | - Expansion Index |
| MAX | - Maximum Density |
| RV | - R-Value |
| SA | - Sieve Analysis |
| UC | - Unconfined Compression |
| RW | - Response to Wetting |

| SCST, Inc. | Friars Road Mix Use Development<br>San Diego, California | | | |
|---|---|---|---|---|
| | By: | RS | Date: | September, 2016 |
| | Job Number: | 140338N.2-1 | Figure: | I-1 |

# LOG OF PERCOLATON TEST HOLE P-1

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES UNDISTURBED | SAMPLES BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2<br>4<br>6 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 3 inches in size, clayey sandstone matrix, dry, very dense, weakly cemented, difficult drilling. | | | | | | |
| 8<br>10<br>12<br>14<br>16<br>18<br>20 | | **TEST HOLE TERMINATED AT 7 FEET** | | | | | | |

SCST, Inc.

| | | | |
|---|---|---|---|
| Friars Road Mix Use Development<br>San Diego, California | | | |
| By: | RS | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure: | I-2 |

# LOG OF PERCOLATON TEST HOLE P-2

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 85 | Depth to Water (ft): | Not Encountered |

| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, light brown, rounded gravel and cobbles to 3 inches in size, clayey sandstone matrix, dry, very dense, weakly cemented, very difficult drilling. | | X | | | | |
| 4 | | | | X | | | | SA AL |
| 6 | | | | X | | | | |
| 8 | | **TEST HOLE TERMINATED AT 7 FEET** | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

| | | | |
|---|---|---|---|
| SCST, Inc. | Friars Road Mix Use Development<br>San Diego, California | | |
| | By: RS | Date: | September, 2016 |
| | Job Number: 140338N.2-1 | Figure | I-3 |

# LOG OF PERCOLATON TEST HOLE P-3

| | | | |
|---|---|---|---|
| Date Excavated: | 8/26/2016 | Logged by: | VAU |
| Equipment: | 6-inch Hollow Stem Auger | Project Manager: | TBC |
| Surface Elevation (ft): | 83 | Depth to Water (ft): | Not Encountered |

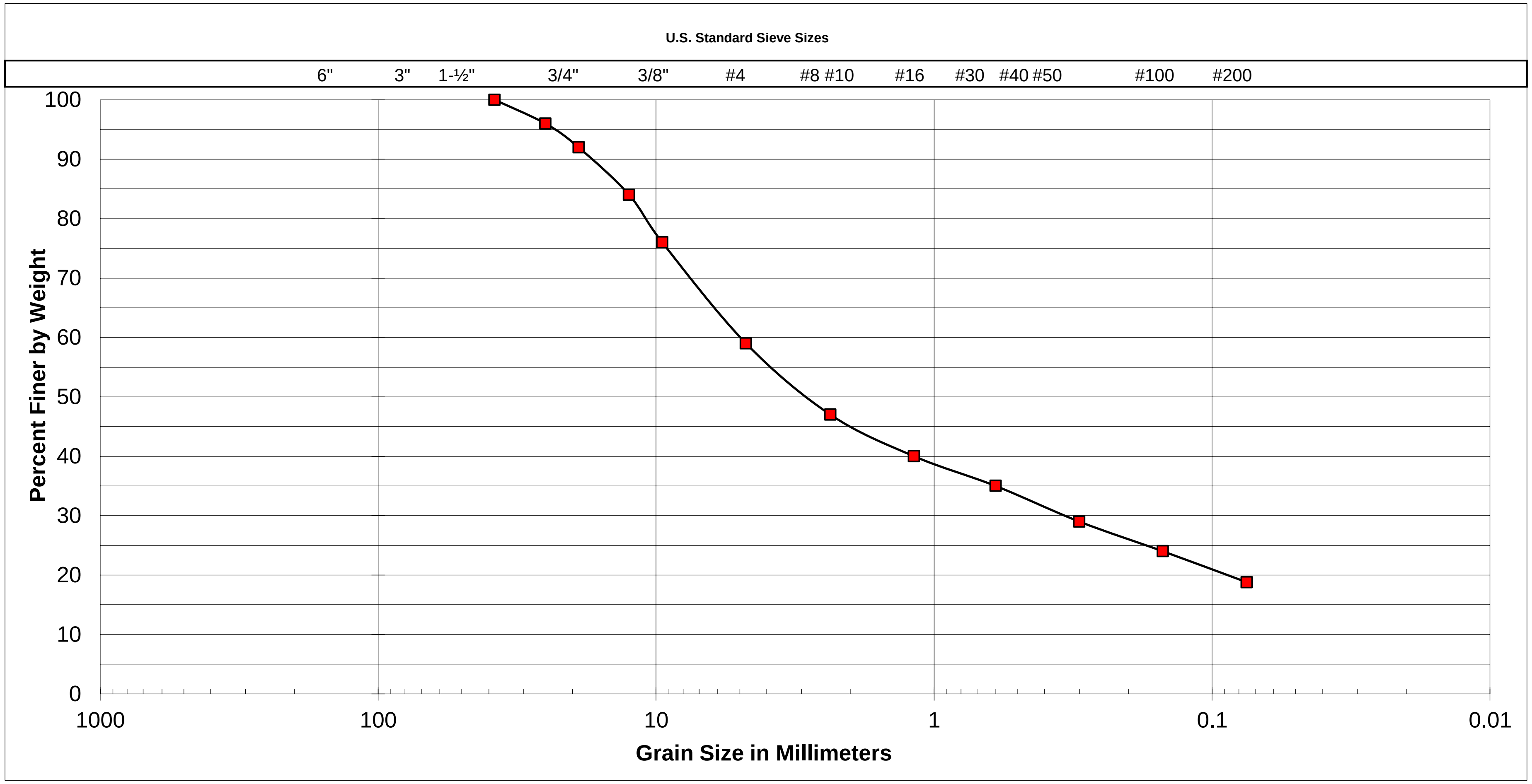
| DEPTH (ft) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | SAMPLES: UNDISTURBED | SAMPLES: BULK | DRIVING RESISTANCE (blows/ ft. of drive) | MOISTURE (%) | DRY UNIT WT. (pcf) | LABORATORY TESTS |
|---|---|---|---|---|---|---|---|---|
| | | 2 inches asphalt concrete over 6 inches aggregate base | | | | | | |
| 2 | GC | **FILL (af)** - CLAYEY GRAVEL, moderate brown, rounded gravel to 2 inches in size, moist, dense. | | | | | | |
| 4 | | | | | | | | |
| 6 | | **STADIUM CONGLOMERATE (Tst)** - CONGLOMERATE, dark yellowish orange, rounded gravel and cobbles to 4 inches in size, silty to clayey sandstone matrix, dry, very dense, weakly cemented, difficult drilling. | | | | | | |
| 8 | | | | | | | | |
| 10 | | **TEST HOLE TERMINATED AT 10 FEET** | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

| | | | |
|---|---|---|---|
| **SCST, Inc** | Friars Road Mix Use Development<br>San Diego, California | | |
| By: | RS | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure | I-4 |

## APPENDIX II
## LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were performed:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **GRAIN SIZE DISTRIBUTION:** The grain size distribution was determined on one sample in accordance with ASTM D422. Figure II-1 presents the test results.
- **ATTERBERG LIMITS:** The Atterberg limits were determined on one sample in accordance with ASTM D4318. Figure II-1 presents the test results.




| Cobbles | Gravel | | Sand | | | Silt or Clay |
|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | |

| SAMPLE LOCATION |
|---|
| P-2 at 1 to 7 feet |

| **UNIFIED SOIL CLASSIFICATION:** | CLAYEY SAND |
|---|---|
| **DESCRIPTION** | SC |

| ATTERBERG LIMITS | |
|---|---|
| LIQUID LIMIT | 34 |
| PLASTIC LIMIT | 16 |
| PLASTICITY INDEX | 18 |

**SCST, Inc.**

| Friars Road Mixed Use Development San Diego, California | | | |
|---|---|---|---|
| By: | DRB | Date: | September, 2016 |
| Job Number: | 140338N.2-1 | Figure: | II-1 |

## APPENDIX III
## INFILTRATION RATE TEST RESULTS

We performed falling head borehole percolation testing at three locations (P-1 through P-3) in general conformance with Appendix C of the BMP Design Manual. The percolation test holes were prepared for testing by placing about 4 to 6 inches of gravel in the bottom of the test hole and then installing a 2-inch diameter solid PVC pipe from the top of the pea gravel to the ground surface or higher. Pea gravel was placed in the annular space between the PVC pipe and the borehole sidewall between the depths of about 1½ feet and 1 foot below the existing ground surface, then hydrated bentonite chips were placed between the depths of about 1 and 6 inches below the existing ground surface. Prior to starting the percolation testing, the test holes were presoaked overnight (approximately 24 hours) by filling the holes with water. The percolation testing was performed immediately after presoaking by filling the test holes with clean potable water to about 3 to 8 feet above the bottom of the PVC pipe and measuring the drop in the water level every 30 minutes, until a constant rate was established. Figures III-1 through III-3 present the results of the borehole percolation testing.

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

| | | | |
|---|---|---|---|
| Project Name: | Friars Road Mixed Use Development | Test Number: | **P-1** |
| Job Number: | 140388N.2-1 | Tested By: | VAU |
| Date Drilled: | 8/26/2016 | Date Tested: | 8/27/2016 |
| Drilling Method: | 6-inch diameter hollow stem auger | Presoak Time: | 24 hours |
| Drilled Depth: | 7 feet | | |
| Pipe Interval: | 0-6½ feet | | |
| Pipe Diameter: | 2 inches | | |
| Test Hole Diameter: | 6 inches | | |

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:24<br>8:54 | 0:30 | 3.8 | 3.7 | 1.2 | 25 |
| 2 | 8:54<br>9:24 | 0:30 | 3.7 | 3.5 | 2.4 | 13 |
| 3 | 9:24<br>9:54 | 0:30 | 3.5 | 3.4 | 1.2 | 25 |
| 4 | 9:54<br>10:24 | 0:30 | 3.4 | 3.3 | 1.2 | 25 |
| 5 | 10:24<br>10:54 | 0:30 | 3.3 | 3.2 | 1.2 | 25 |
| 6 | 10:54<br>11:24 | 0:30 | 3.2 | 3.1 | 1.2 | 25 |
| 7 | | | | | | |
| 8 | | | | | | |
| Observed Rates: | | | | | | 25 min/in<br>2.4 in/hr |
| Gravel Correction Factor: | | | | | | 2.37 |
| Corrected Rates: | | | | | | 59 min/in<br>1.0 in/hr |
| ***Tested Infiltation Rate, $I_t$:** | | | | | | **< 0.1 in/hr** |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{1.2(60)(3)}{30((3 + 2(37.8))}$$

$$I_t = < 0.1 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

| | | | |
|---|---|---|---|
| Project Name: | Friars Road Mixed Use Development | Test Number: | **P-2** |
| Job Number: | 140388N.2-1 | Tested By: | VAU |
| Date Drilled: | 8/26/2016 | Date Tested: | 8/27/2016 |
| Drilling Method: | 6-inch diameter hollow stem auger | Presoak Time: | 24 hours |
| Drilled Depth: | 7 feet | | |
| Pipe Interval: | 0-6½ feet | | |
| Pipe Diameter: | 2 inches | | |
| Test Hole Diameter: | 6 inches | | |

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:17<br>8:47 | 0:30 | 4.3 | 3.5 | 9.6 | 3 |
| 2 | 8:47<br>9:17 | 0:30 | 3.5 | 3.0 | 6.0 | 5 |
| 3 | 9:17<br>9:47 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 4 | 9:47<br>10:17 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 5 | 10:17<br>10:47 | 0:30 | 4.1 | 4.1 | 0.0 | 0 |
| 6 | 10:47<br>11:17 | 0:30 | 4.1 | 4.0 | 1.2 | 25 |
| 7 | 11:17<br>11:47 | 0:30 | 4.0 | 4.0 | 0.0 | 0 |
| 8 | | | | | | |
| Observed Rates: | | | | | | 0 min/in<br>0.0 in/hr |
| Gravel Correction Factor: | | | | | | 2.37 |
| Corrected Rates: | | | | | | 0 min/in<br>0.0 in/hr |
| ***Tested Infiltation Rate, $I_t$:** | | | | | | **0.0 in/hr** |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{0.0(60)(3)}{30((3 + 2(48.0))}$$

$$I_t = 0.0 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

# Report of Falling Head Borehole Percolation Testing

**Storm Water Infiltration**

Project Name: Friars Road Mixed Use Development
Job Number: 140388N.2-1
Date Drilled: 8/26/2016
Drilling Method: 6-inch diameter hollow stem auger
Drilled Depth: 10 feet
Pipe Interval: 0-9½ feet
Pipe Diameter: 2 inches
Test Hole Diameter: 6 inches

Test Number: **P-3**
Tested By: VAU
Date Tested: 8/27/2016
Presoak Time: 24 hours

| Trial No. | Time | Time Interval, ΔT (min) | Initial Water Height, $H_o$ (ft) | Final Water Height, $H_f$ (ft) | Change in Water Height, ΔH (in) | Percolation Rate (min/in) |
|---|---|---|---|---|---|---|
| 1 | 8:08<br>8:38 | 0:30 | 8.4 | 6.4 | 24.0 | 1 |
| 2 | 8:38<br>9:08 | 0:30 | 8.1 | 6.9 | 14.4 | 2 |
| 3 | 9:08<br>9:38 | 0:30 | 8.3 | 7.1 | 14.4 | 2 |
| 4 | 9:38<br>10:08 | 0:30 | 7.1 | 5.8 | 15.6 | 2 |
| 5 | 10:08<br>10:38 | 0:30 | 7.4 | 7.1 | 3.6 | 8 |
| 6 | 10:38<br>11:08 | 0:30 | 6.7 | 6.4 | 3.6 | 8 |
| 7 | 11:08<br>11:38 | 0:30 | 6.4 | 6.1 | 3.6 | 8 |
| 8 | 11:38<br>12:08 | 0:30 | 7.5 | 7.2 | 3.6 | 8 |
| | | | | Observed Rates: | | 8 min/in<br>7.2 in/hr |
| | | | | Gravel Correction Factor: | | 2.37 |
| | | | | Corrected Rates: | | 20 min/in<br>3.0 in/hr |
| | | | | ***Tested Infiltation Rate, $I_t$:** | | **0.1 in/hr** |

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

$$I_t = \frac{3.6(60)(3)}{30((3 + 2(88.2))}$$

$$I_t = 0.1 \text{ in/hr}$$

$I_t$ = Tested infiltration rate [in/hr]

ΔH = Change in water head height over the time interval [in]

r = Test hole radius [in]

ΔT = Time interval [min]

$H_{avg}$ = Average water head height over the time interval = $12(H_o + H_f)/2$ [in]

# APPENDIX IV
## WORKSHEET C.4-1: CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION

**Worksheet C.4-1: Categorization of Infiltration Feasibility Condition**

| Categorization of Infiltration Feasibility Condition | | Worksheet C.4-1 | |
|---|---|---|---|
| **Part 1 - Full Infiltration Feasibility Screening Criteria**<br>**Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?** | | | |
| Criteria | Screening Question | **Yes** | **No** |
| 1 | **Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates do not support allowing infiltration greater than 0.5 inch per hour.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 2 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☐ | ☑ |
| Provide basis:<br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour. Allowing infiltration greater than 0.5 inch per hour will increase the risk of geotechnical hazards. Given the relatively impermeable nature of the Stadium Conglomerate beneath the site, allowing infiltration greater than 0.5 inch/hour will result in uncontrolled lateral migration of groundwater through permeable bedding material of utilities within the public right-of-way (Friars Road) and potentially negative impacts on the existing retaining wall that borders Fashion Valley mall that cannot be mitigated to an acceptable level. SCST does not recommend allowing infiltration greater than 0.5 inch/hour at the site.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |

| Worksheet C.4-1 Page 2 of 4 | | | |
|---|---|---|---|
| Criteria | Screening Question | **Yes** | **No** |
| 3 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| 4 | **Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3. | ☐ | ☑ |
| Provide basis:<br><br>Latitude 33 response: The tested infiltration rate at the site does not support allowing infiltration greater than 0.5 inch per hour.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. | | | |
| **Part 1 Result*** | If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration**<br><br>If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2 | | |

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by [City Engineer] to substantiate findings.

| Worksheet C.4-1 Page 3 of 4 | | | |
|---|---|---|---|
| **Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria**<br><br>**Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?** | | | |
| Criteria | Screening Question | **Yes** | **No** |
| 5 | **Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | ☑ | ☐ |
| Provide basis:<br><br>The tested infiltration rates range from 0.0 to 0.1 inch per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations. The tested infiltration rates barely support allowing partial infiltration based on the City of San Diego's definition of any appreciable quantity (greater than 0.01 inch per hour).<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates. | | | |
| 6 | **Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2. | ☑ | ☐ |
| Provide basis:<br><br>To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain. Groundwater was encountered in the north-middle portion of the site during our geotechnical investigation at an elevation of about 54 feet. However, the proposed BMPs are located in areas where groundwater was not encountered. Therefore, it is our opinion that the depth to groundwater requirement of more than 10 feet below the bottom of BMP should be satisfied.<br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates. | | | |

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Without pre-treatment, infiltration of stormwater pollutants could migrate laterally and adversely affect down-gradient sites. SCST would recommend pre-treatment of stormwater runoff. In SCST's opinion, allowing infiltration of pre-treated stormwater runoff in any appreciable quantity does not pose a significant risk to the regional groundwater table.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>☑</td><td>☐</td></tr>
<tr><td colspan="4">Provide basis:<br><br>Latitude 33 response: Ground water discharges directly to the San Diego River and there are no downstream water rights that exist within this area.<br><br>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.<br><br>If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

2016

# PRELIMINARY DRAINAGE STUDY

## FRIARS ROAD RESIDENTIAL

CITY OF SAN DIEGO

September 13, 2016

PREPARED BY: latitude 33 PLANNING & ENGINEERING

PREPARED FOR: Landcap Friars Road, LLC

JOB NUMBER: 1351.00

# PRELIMINARY
# DRAINAGE STUDY

# FRIARS ROAD RESIDENTIAL

6950, 7020, 7050 FRIARS ROAD
SAN DIEGO, CALIFORNIA 92108

**PTS NO. 432844**
**VTM 1586194**
**PDP 1586192**
**SDP 1586193**

SEPTEMBER 13, 2016

Prepared For:
**LANDCAP FRIARS ROAD, LLC**
27132 B Paseo Espada, Suite 1206
San Juan Capistrano, CA 92675

Prepared By:

latitude 33
PLANNING & ENGINEERING

9968 Hibert Street, 2nd Floor
San Diego, California 92131
Phone (858) 751-0633
Fax (858) 751-0634

Matthew J. Semic, RCE 71075
Registration Expires 6/30/17

Prepared By: JRG
Checked By: MJS

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## TABLE OF FIGURES



## LIST OF APPENDICES

## DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

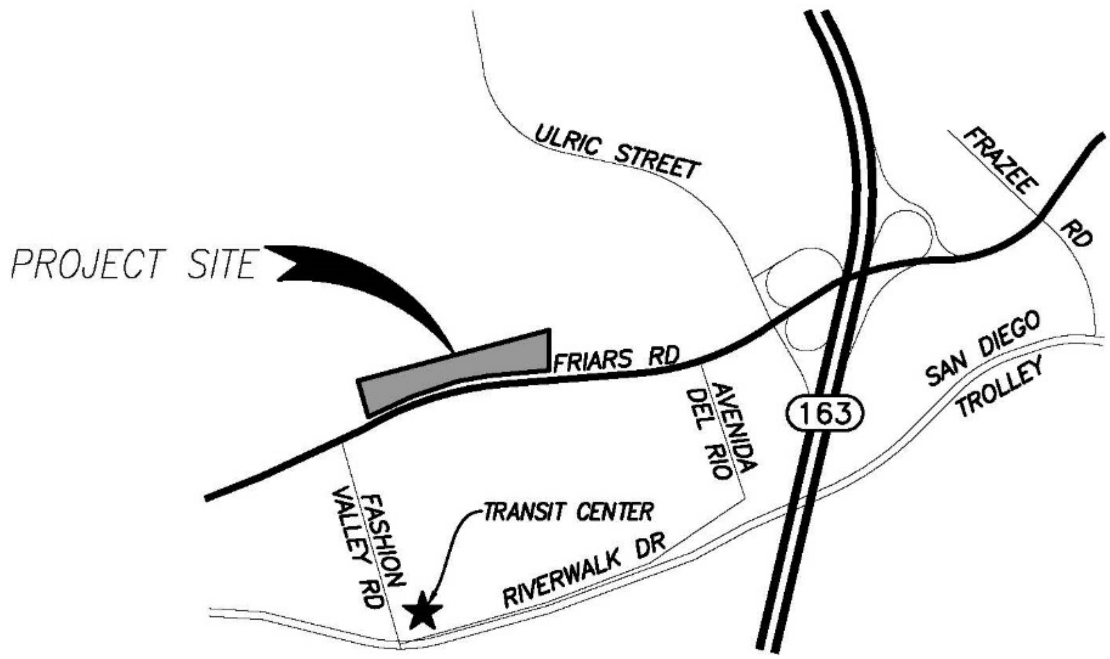
12-19-16

Matthew J. Semic R.C.E. 71075 DATE
REGISTERED CIVIL ENGINEER

## 1. PROJECT DESCRIPTION

The proposed development is a redevelopment project in Mission Valley within the city of San Diego. The planned work consists of 2 multi-story residential structures over 2 stories of underground parking on a 5.4 acre parcel. A vicinity map is shown below.

The project is a Priority Development Project as classified by the City of San Diego Storm Water Standards.




VICINITY MAP

NOT TO SCALE

## 2. EXISTING LAND USE AND TOPOGRAPHY

The existing property is a developed site located on the north side of Friars Road approximately 0.5 miles west of State Route 163. The development consists of 3 office buildings and surface parking lots. The entire existing site will be demolished and re-graded to accommodate the proposed development.


**Figure 1 - Existing Site Aerial**

The site is bounded by Friars Road on the south and a multifamily development to the west. The north and east sides of the property are bounded by steep hillsides. The hillsides are natural and have not been previously graded.

The existing site generally slopes from west to east. Runoff from the site congregates in the southeast corner of the property where it enters the public storm drain system in Friars Road. The public storm drain is a 30” RCP which runs south through Fashion Valley mall to the San Diego River.

Runoff from undeveloped areas north of the site enters the site and is conveyed through the site via a concrete drainage ditch.

The public storm drain is a stabilized conveyance system from the project site directly to the San Diego River. There is no stream or other native channel that the runoff enters prior to discharging into the San Diego River.

## 3. PROPOSED DRAINAGE DISCUSSION

In the proposed condition, drainage patterns for the site will not vary significantly from the existing drainage patterns. The most significant change will be the implementation of water quality devices as discussed in the project Storm Water Quality Management Plan which will capture and treat runoff before discharging to the 30” public RCP storm drain within Friars Road.

**Figure 2 - Proposed Site Aerial**

The steep hillsides to the north of the project will continue to contribute offsite runoff to the project site. This runoff will be captured in a concrete ditch behind the proposed soil nail retaining wall, collected within two proposed public catch basins on the east and west ends of the wall and piped/sheet flow directly to the public RCP storm drain, mimicking the existing condition. Additional runoff from the steep hillsides on Lot 1 of the project will continue to be captured in existing concrete ditches and piped directly to the public storm drain system.

All runoff collected on the roofs of the two residential towers and the podium deck of the parking structure will be conveyed by roof drains and area drains to two biofiltration basins located between the proposed buildings and the Friars Road right-of-way. In each of these cases, once the runoff has been treated it will outlet to a private storm drain pipe which will connect to the existing public storm drain system in Friars Road.

Small amounts of runoff will be generated by the driveways, public sidewalk, parkway, and newly widened portions of Friars Road. This runoff will be collected by storm drain inlets located at two points along Friars Road which will implement green streets and be captured in biofiltration basins. This runoff will be conveyed via newly constructed public storm drain which will connect to the existing public storm drain system within Friars Road.

## 4. HYDROLOGIC METHOD

The estimate of the proposed drainage flows has been performed in general conformance to the City of San Diego guidelines. Drainage basins are less than one square mile and therefore the Rational Method was utilized to estimate runoff. The 100-year, 10-year, and 2-year storm events have been used for runoff calculations to provide a comparison between the existing and proposed runoff. Inlet and pipe sizing calculation will be performed in the final design stage.

The project's existing land use designation per Table 2 of the City of San Diego Drainage Manual is "Commercial", but in the proposed condition will be "Multi-Units". This decreases the C Value for the developed portions of the site from C=0.85 to a value of C=0.70. This reduction in C value is largely offset by the increased development footprint of the site resulting in a small decrease in runoff from the site as summarized below.

| Peak Discharge Summary - Flow Change | | | |
|---|---|---|---|
| | | | |
| *Basin Name* | *2 yr Peak Discharge (CFS)* | *10 yr Peak Discharge (CFS)* | *100 yr Peak Discharge (CFS)* |
| DMA 1 (Bypass) | -0.34 | -0.47 | -0.63 |
| DMA 2 & 3 (Project) | 0.04 | -0.05 | 0.01 |
| DMA 4+5 (Public) | 0.17 | 0.20 | 0.18 |
| **Totals** | **-0.13** | **-0.32** | **-0.43** |

Figure 3 - Peak Discharge Summary

• The runoff coefficient (C) in Figure 3 above was selected specifically for this site's drainage basins using Table 2 of the City of San Diego Drainage Manual (see Appendix C).
• The intensity of rainfall was obtained from the "Intensity-Duration-Frequency Curves" from the City of San Diego Drainage Manual (see Appendix C).
• For Time of Concentration Calculations and Site Discharge Summary, see Appendix B.

## 5. WATER QUALITY

In accordance with City of San Diego requirements, the development of this property will include Best Management Practices (BMPs) to treat the runoff. The proposed water quality BMPs for the project is anticipated to include 4 biofiltration basins.

A separate Storm Water Quality Management Plan has been prepared for the project as required by the City of San Diego. See the Storm Water Quality Management Plan for more information regarding Water Quality and Hydromodification requirements.

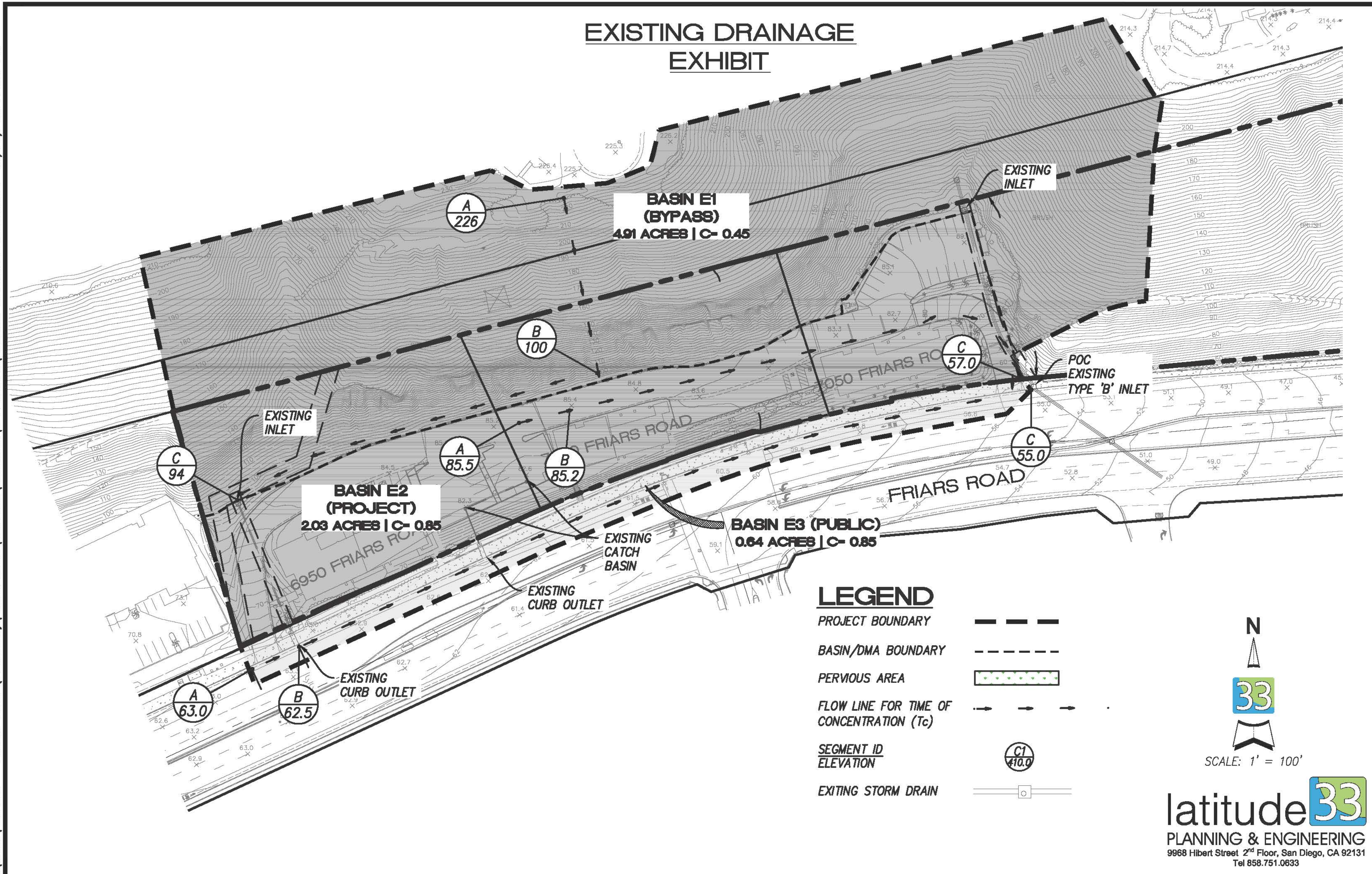
## 6. DISCUSSION AND CONCLUSIONS

Though the project does propose an increase in developed area, the implementation of treatment control BMPs coupled with the redefined Land Use has resulted in a net decrease in runoff from the site. As such, no impacts will arise from the proposed development.

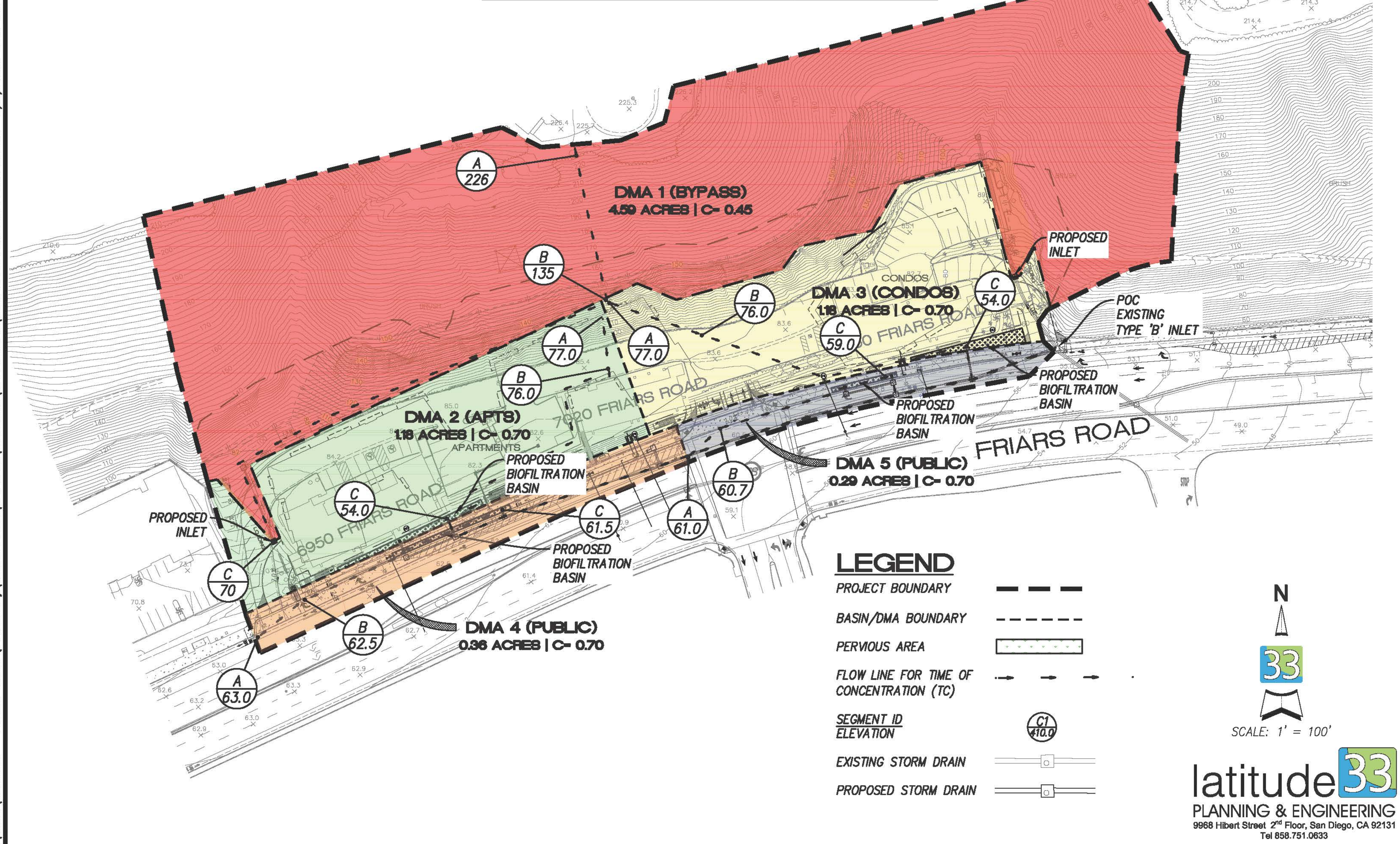
# APPENDIX A

EXISTING AND PROPOSED DRAINAGE EXHIBITS

H:\1300\1351.00 - FRIARS ROAD (PLANNING)\ENGINEERING\REPORTS\DRAINAGE\APPENDICES\EXISTING DRAINAGE EXHIBIT.DWG 10/27/2015 2:56 PM



# PROPOSED DRAINAGE/DMA MAP

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# APPENDIX B

HYDROLOGIC CALCULATIONS

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E1 (Bypass) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| Description | | | | | |
| Flow Length, D | ft | | | | |
| Land Slope, S | ft/ft | 0.50 | | | |
| Runoff Coefficient, C | | 0.45 | | | |
| Travel Time, Ti | hr | | + | | = |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | AB | | | |
| Surface Description | | U | | | |
| Flow Length, L | ft | 183 | | | |
| Watercourse Slope, S | ft/ft | 0.50 | | | |
| Average Velocity, V | ft/s | 5.268 | | | |
| Travel Time, $T_t$ | hr | 0.010 | + | + | + |

Combined Travel Time, $T_t$ = 0.010

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | BC | | | |
| Pipe Diameter, D | ft | 2 | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 3.14 | | | |
| Wetted Perimeter, P | ft | 6.28 | | | |
| Hydraulic Radius, R | ft | 0.5 | | | |
| Channel Slope, S | ft/ft | 0.01 | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | | |
| Velocity, V | ft/s | 7.220 | | | |
| Flow Length, L | ft | 368 | | | |
| Travel Time, $T_t$ | hr | 0.014 | + | + | + |

Combined Travel Time, $T_t$ hr = 0.014

**Time of Concetration, $T_c$ hr = *0.024***

**min* = *5.0***

* Minimum 5 min Tc used

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E2 (Project) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.45 | | | | |
| Travel Time, Ti | hr | 0.138 | + | | | = 0.138 |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | BC | | | |
| Surface Description | | P | | | |
| Flow Length, L | ft | 511 | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | |
| Average Velocity, V | ft/s | 1.753 | | | |
| Travel Time, $T_t$ | hr | 0.081 | + | + | + |

Combined Travel Time, $T_t$ = 0.081

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | | | | |
| Pipe Diameter, D | ft | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | | | | |
| Wetted Perimeter, P | ft | | | | |
| Hydraulic Radius, R | ft | | | | |
| Channel Slope, S | ft/ft | | | | |
| Manning's Roughness Coefficient, n | | | | | |
| Velocity, V | ft/s | #DIV/0! | | | |
| Flow Length, L | ft | | | | |
| Travel Time, $T_t$ | hr | | + | + | + |

Combined Travel Time, $T_t$ hr =

**Time of Concetration, $T_c$ hr = *0.219***

**min = *13.1***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| Basin E3 (Public) | Existing | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.45 | | | | |
| Travel Time, Ti | hr | 0.138 | + | | | = 0.138 |

## Shallow Concentrated Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | |
| Surface Description | | P | | | | | | |
| Flow Length, L | ft | 742 | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | |
| Travel Time, $T_t$ | hr | 0.118 | + | | + | | + | |

Combined Travel Time, $T_t$ = 0.118

## Channel Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | | | | | | | |
| Pipe Diameter, D | ft | | | | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | | | | | | | |
| Wetted Perimeter, P | ft | | | | | | | |
| Hydraulic Radius, R | ft | | | | | | | |
| Channel Slope, S | ft/ft | | | | | | | |
| Manning's Roughness Coefficient, n | | | | | | | | |
| Velocity, V | ft/s | #DIV/0! | | | | | | |
| Flow Length, L | ft | | | | | | | |
| Travel Time, $T_t$ | hr | | + | | + | | + | |

Combined Travel Time, $T_t$ hr =

**Time of Concetration, $T_c$ hr = *0.255***

**min = *15.3***

## Legend

| **Sheet Flow Surface Codes** | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 1 (Bypass) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | |
|---|---|---|---|---|---|
| Description | | | | | |
| Flow Length, D | ft | | | | |
| Land Slope, S | ft/ft | | | | |
| Runoff Coefficient, C | | | | | |
| Travel Time, Ti | hr | | + | | = |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | AB | | | |
| Surface Description | | U | | | |
| Flow Length, L | ft | 150 | | | |
| Watercourse Slope, S | ft/ft | 0.50 | | | |
| Average Velocity, V | ft/s | 5.268 | | | |
| Travel Time, $T_t$ | hr | 0.008 | + | + | + |

Combined Travel Time, $T_t$ = 0.008

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| Description | | BC | | | |
| Pipe Diameter, D | ft | 2 | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 3.14 | | | |
| Wetted Perimeter, P | ft | 6.28 | | | |
| Hydraulic Radius, R | ft | 0.5 | | | |
| Channel Slope, S | ft/ft | 0.01 | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | | |
| Velocity, V | ft/s | 7.220 | | | |
| Flow Length, L | ft | 458 | | | |
| Travel Time, $T_t$ | hr | 0.018 | + | + | + |

Combined Travel Time, $T_t$ hr = 0.018

**Time of Concetration, $T_c$ hr = *0.026***

**min* = *5.0***

* Minimum 5 min Tc used

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 2 (Apartments) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.45 | | | | |
| Travel Time, Ti | hr | 0.138 | + | | = | 0.138 |

## Shallow Concentrated Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | BC | | | |
| Surface Description | | P | | | |
| Flow Length, L | ft | 251 | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | |
| Average Velocity, V | ft/s | 1.753 | | | |
| Travel Time, $T_t$ | hr | 0.040 | + | + | + |

Combined Travel Time, $T_t$ = 0.040

## Channel Flow

| | | | | | |
|---|---|---|---|---|---|
| | Description | PIPE | PIPE | | |
| Pipe Diameter, D | ft | 1.5 | 2 | | |
| Cross Sectional Flow Area, A | $ft^2$ | 1.77 | 3.14 | | |
| Wetted Perimeter, P | ft | 4.71 | 6.28 | | |
| Hydraulic Radius, R | ft | 0.375 | 0.5 | | |
| Channel Slope, S | ft/ft | 0.01 | 0.01 | | |
| Manning's Roughness Coefficient, n | | 0.013 | 0.013 | | |
| Velocity, V | ft/s | 5.960 | 7.220 | | |
| Flow Length, L | ft | 222 | 387 | | |
| Travel Time, $T_t$ | hr | 0.010 | + 0.015 | + | + |

Combined Travel Time, $T_t$ hr = 0.025

**Time of Concetration, $T_c$ hr = *0.203***

**min = *12.2***

## Legend

| Sheet Flow Surface Codes | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

| Shallow Concentrated Surface Codes | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

| Channel Flow Roughness Condtion | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 3 (Condos) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.45 | | | | |
| Travel Time, Ti | hr | 0.138 | + | | = | 0.138 |

## Shallow Concentrated Flow

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | | |
| Surface Description | | P | | | | | | | |
| Flow Length, L | ft | 259 | | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | | |
| Travel Time, $T_t$ | hr | 0.041 | + | | + | | + | | |

Combined Travel Time, $T_t$ = 0.041

## Channel Flow

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Description | PIPE | | PIPE | | | | | |
| Pipe Diameter, D | ft | 1.5 | | 2.5 | | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 1.77 | | 3.14 | | | | | |
| Wetted Perimeter, P | ft | 4.71 | | 6.28 | | | | | |
| Hydraulic Radius, R | ft | 0.375 | | 0.5 | | | | | |
| Channel Slope, S | ft/ft | 0.01 | | 0.01 | | | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | 0.013 | | | | | |
| Velocity, V | ft/s | 5.960 | | 7.220 | | | | | |
| Flow Length, L | ft | 29 | | 82 | | | | | |
| Travel Time, $T_t$ | hr | 0.001 | + | 0.003 | + | | + | | |

Combined Travel Time, $T_t$ hr = 0.005

**Time of Concetration, $T_c$ hr = *0.183***

**min = *11.0***

## Legend

| Sheet Flow Surface Codes | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

| Channel Flow Roughness Condtion | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 4 (Public) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Description | AB | | | | | |
| Flow Length, D | ft | 50 | | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | | |
| Runoff Coefficient, C | | 0.70 | | | | | |
| Travel Time, Ti | hr | 0.085 | + | | | = | 0.085 |

## Shallow Concentrated Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | |
| Surface Description | | P | | | | | | |
| Flow Length, L | ft | 205 | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | |
| Travel Time, $T_t$ | hr | 0.032 | + | | + | | + | |

Combined Travel Time, $T_t$ = 0.032

## Channel Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | PIPE | | PIPE | | | | |
| Pipe Diameter, D | ft | 1 | | 2.5 | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 0.79 | | 3.14 | | | | |
| Wetted Perimeter, P | ft | 3.14 | | 6.28 | | | | |
| Hydraulic Radius, R | ft | 0.25 | | 0.5 | | | | |
| Channel Slope, S | ft/ft | 0.01 | | 0.01 | | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | 0.013 | | | | |
| Velocity, V | ft/s | 4.549 | | 7.220 | | | | |
| Flow Length, L | ft | 160 | | 385 | | | | |
| Travel Time, $T_t$ | hr | 0.010 | + | 0.015 | + | | + | |

Combined Travel Time, $T_t$ hr = 0.025

**Time of Concetration, $T_c$ hr = *0.142***

**min = *8.5***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

| | | | |
|---|---|---|---|
| P | Paved | U | Unpaved |

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

# TIME OF CONCENTRATION

## Project Information

| Project | Jurisdiction | Date | Project No. |
|---|---|---|---|
| Friars Road Residential | City of San Diego | 9/9/2016 | 1351.00 |
| **Location** | **Condtion** | **By** | **Checked** |
| DMA 5 (Public) | Proposed | JRG | |

## Initial Time ($T_i$)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Description | AB | | | | |
| Flow Length, D | ft | 50 | | | | |
| Land Slope, S | ft/ft | 0.01 | | | | |
| Runoff Coefficient, C | | 0.70 | | | | |
| Travel Time, Ti | hr | 0.085 | + | | = | 0.085 |

## Shallow Concentrated Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | BC | | | | | | |
| Surface Description | | P | | | | | | |
| Flow Length, L | ft | 177 | | | | | | |
| Watercourse Slope, S | ft/ft | 0.01 | | | | | | |
| Average Velocity, V | ft/s | 1.753 | | | | | | |
| Travel Time, $T_t$ | hr | 0.028 | + | | + | | + | |

Combined Travel Time, $T_t$ = 0.028

## Channel Flow

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Description | PIPE | | PIPE | | | | |
| Pipe Diameter, D | ft | 1 | | 2.5 | | | | |
| Cross Sectional Flow Area, A | $ft^2$ | 0.79 | | 3.14 | | | | |
| Wetted Perimeter, P | ft | 3.14 | | 6.28 | | | | |
| Hydraulic Radius, R | ft | 0.25 | | 0.5 | | | | |
| Channel Slope, S | ft/ft | 0.01 | | 0.01 | | | | |
| Manning's Roughness Coefficient, n | | 0.013 | | 0.013 | | | | |
| Velocity, V | ft/s | 4.549 | | 7.220 | | | | |
| Flow Length, L | ft | 25 | | 156 | | | | |
| Travel Time, $T_t$ | hr | 0.002 | + | 0.006 | + | | + | |

Combined Travel Time, $T_t$ hr = 0.008

**Time of Concetration, $T_c$ hr = *0.120***

**min = *7.2***

## Legend

**Sheet Flow Surface Codes**

| | | | |
|---|---|---|---|
| A | Smooth Surfaces | F | Grass, Dense |
| B | Fallow (No Residue) | G | Grass, Bermuda |
| C | Cultivated (< 20% Residue) | H | Woods, Light |
| D | Cultivated (> 20% Residue) | I | Woods, Dense |
| E | Grass-Range, Short | J | Range, Natural |

**Shallow Concentrated Surface Codes**

P Paved U Unpaved

**Channel Flow Roughness Condtion**

| | | | |
|---|---|---|---|
| A | Clean Earth | D | Dense Brush |
| B | Short Grass | E | Natural Channel |
| C | Dense Weeds | F | |

| Peak Discharge Summary - Existing Condition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Basin Name* | *C- Value* | *$I_2$ (in/hr)* | *$I_{10}$ (in/hr)* | *$I_{100}$ (in/hr)* | *Area (ac)* | *$Q_2$ (CFS)* | *$Q_{10}$ (CFS)* | *$Q_{100}$ (CFS)* | *$V_{100}$ (ft/s)* |
| E1 (Bypass) | 0.45 | 2.40 | 3.30 | 4.40 | 4.91 | 5.30 | 7.29 | 9.71 | 1.98 |
| E2 (Project) | 0.85 | 1.60 | 2.30 | 3.10 | 2.03 | 2.77 | 3.98 | 5.36 | 2.64 |
| E3 (Public) | 0.85 | 1.40 | 2.10 | 2.87 | 0.64 | 0.76 | 1.15 | 1.57 | 2.44 |
| | | | | **Totals** | **7.58** | **8.83** | **12.41** | **16.64** | **2.19** |

| Peak Discharge Summary - Proposed Condition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Basin Name* | *C- Value* | *$I_2$ (in/hr)* | *$I_{10}$ (in/hr)* | *$I_{100}$ (in/hr)* | *Area (ac)* | *$Q_2$ (CFS)* | *$Q_{10}$ (CFS)* | *$Q_{100}$ (CFS)* | *$V_{100}$ (ft/s)* |
| DMA 1 (Bypass) | 0.45 | 2.40 | 3.30 | 4.40 | 4.59 | 4.96 | 6.82 | 9.09 | 1.98 |
| DMA 2 (Apartments) | 0.70 | 1.60 | 2.38 | 3.18 | 1.18 | 1.32 | 1.97 | 2.63 | 2.23 |
| DMA 3 (Condos) | 0.70 | 1.70 | 2.50 | 3.30 | 1.18 | 1.40 | 2.07 | 2.73 | 2.31 |
| DMA 4 (Public) | 0.70 | 1.95 | 2.85 | 3.70 | 0.40 | 0.55 | 0.80 | 1.04 | 2.59 |
| DMA 5 (Public) | 0.70 | 2.16 | 3.06 | 3.96 | 0.26 | 0.39 | 0.55 | 0.72 | 2.77 |
| | | | | **Totals** | **7.61** | **8.62** | **12.20** | **16.19** | **2.13** |

| Peak Discharge Summary - Flow Change | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Basin Name* | *2 yr Peak Discharge (CFS)* | *10 yr Peak Discharge (CFS)* | *100 yr Peak Discharge (CFS)* | | | | |
| DMA 1 (Bypass) | -0.34 | -0.47 | -0.63 | | | | |
| DMA 2 & 3 (Project) | 0.04 | -0.05 | 0.01 | | | | |
| DMA 4+5 (Public) | 0.17 | 0.20 | 0.18 | | | | |
| **Totals** | **-0.13** | **-0.32** | **-0.43** | **Percent Decrease** | 2.39% | 1.71% | 2.71% |

* Formula used to find peak discharge: Q = C*I*A
* C-Value taken from Table 2 in the City of San Diego Drainage Design Manual
*Intensity (I) is found using the I-D-F Curves (Drainage Design Manual) based on Tc
*Tc found in Tc Calcs spreadsheet

# APPENDIX C

REFERENCE MATERIALS

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

| Land Use | Coefficient, C<br>Soil Type (1) |
|---|---|
| Residential: | D |
| Single Family | .55 |
| Multi-Units | .70 |
| Mobile Homes | .65 |
| Rural (lots greater than 1/2 acre) | .45 |
| Commercial (2)<br>80% Impervious | .85 |
| Industrial (2)<br>90% Impervious | .95 |

NOTES:

(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

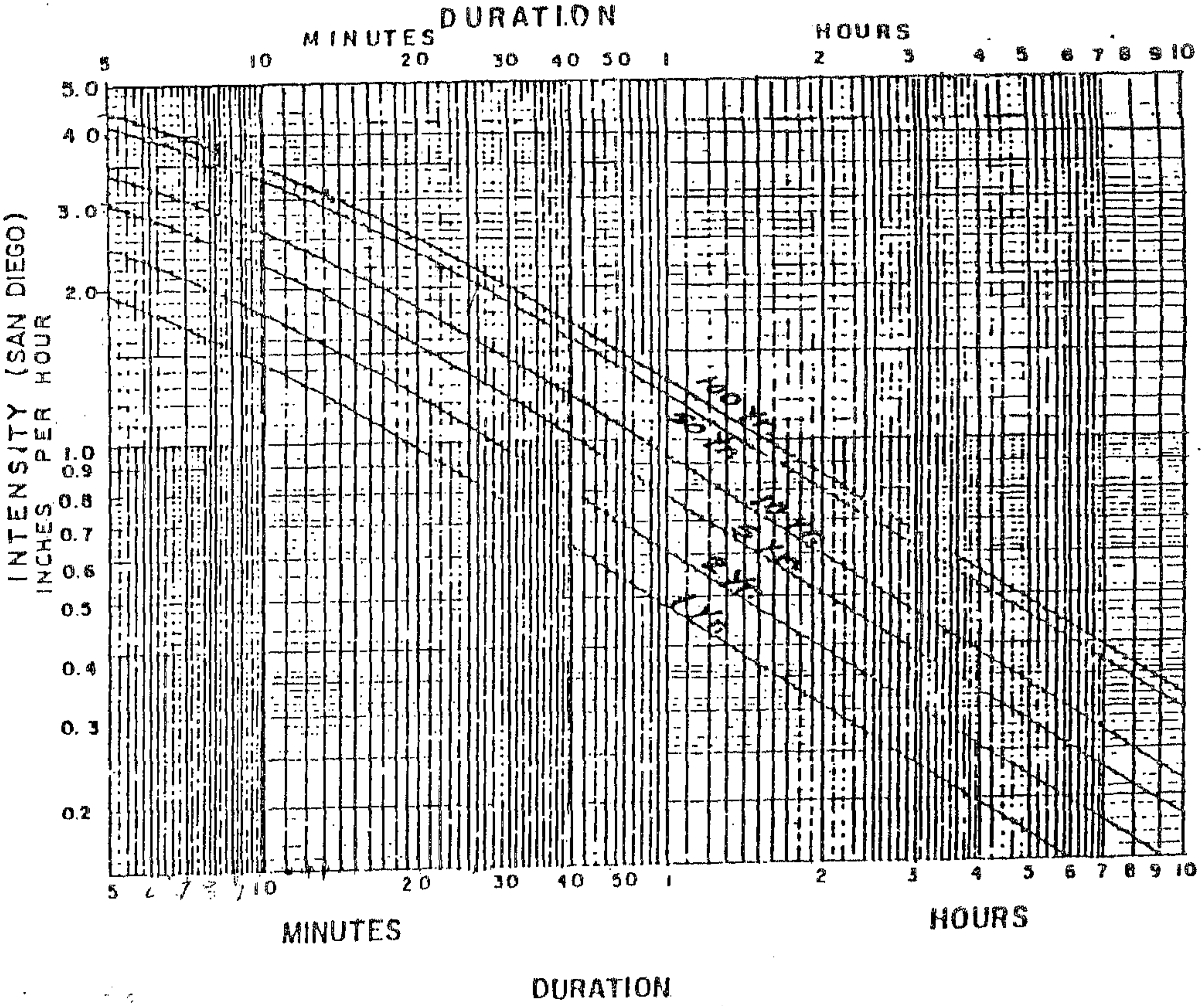
Actual imperviousness = 50%

Tabulated imperviousness = 80%

Revised C = $\frac{50}{80} \times 0.85$ = 0.53

| ELEV. | FACTOR |
|---|---|
| 0–1500 | 1.00 |
| 1500–3000 | 1.25 |
| 3000–4000 | 1.42 |
| 4000–5000 | 1.60 |
| 5000–6000 | 1.70 |
| DESERT | 1.25 |

To obtain correct intensity, multiply intensity on chart by factor for design elevation.




RAINFALL

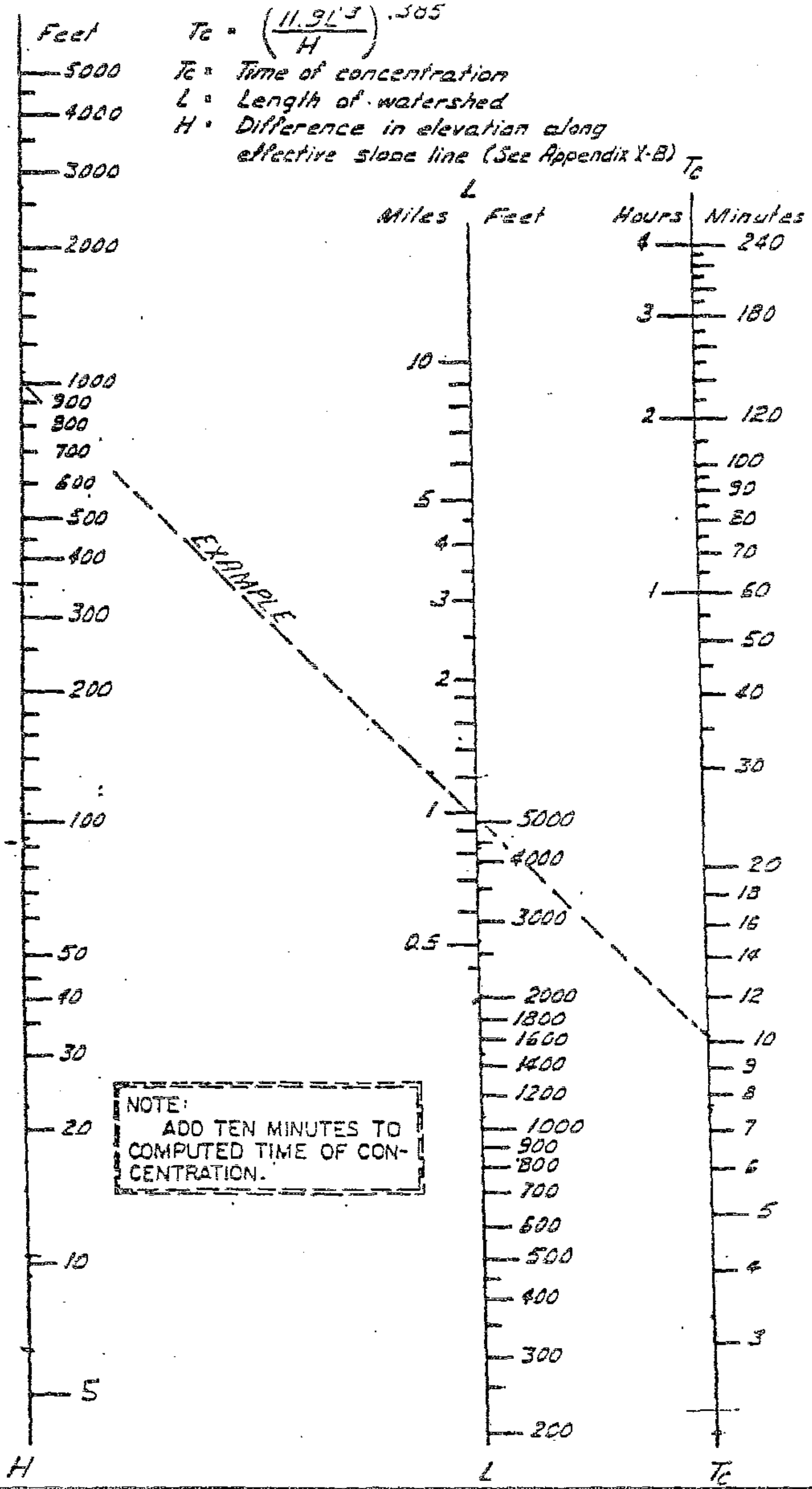
INTENSITY - DURATION - FREQUENCY

CURVES

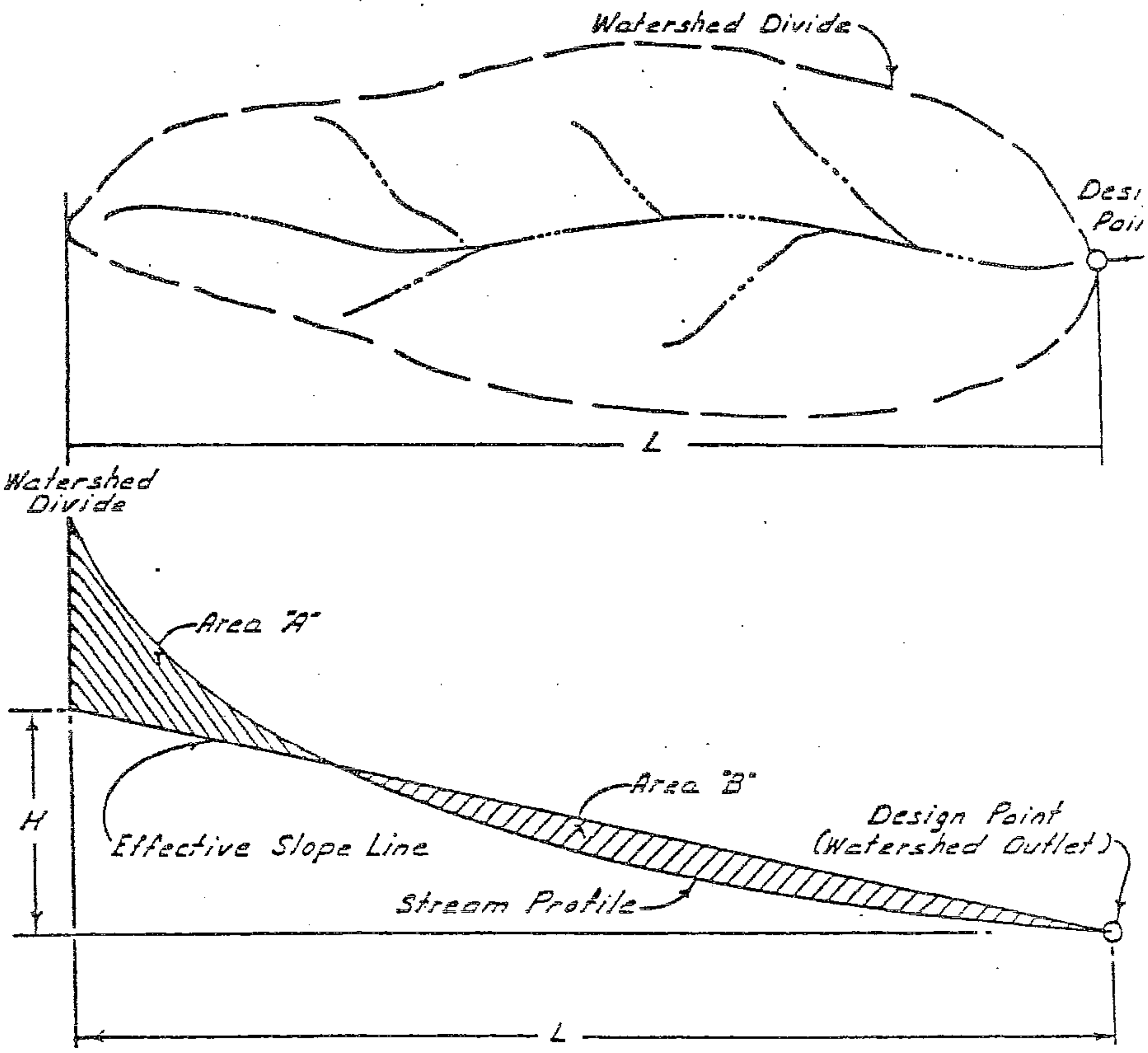
for

COUNTY OF SAN DIEGO

APPENDIX



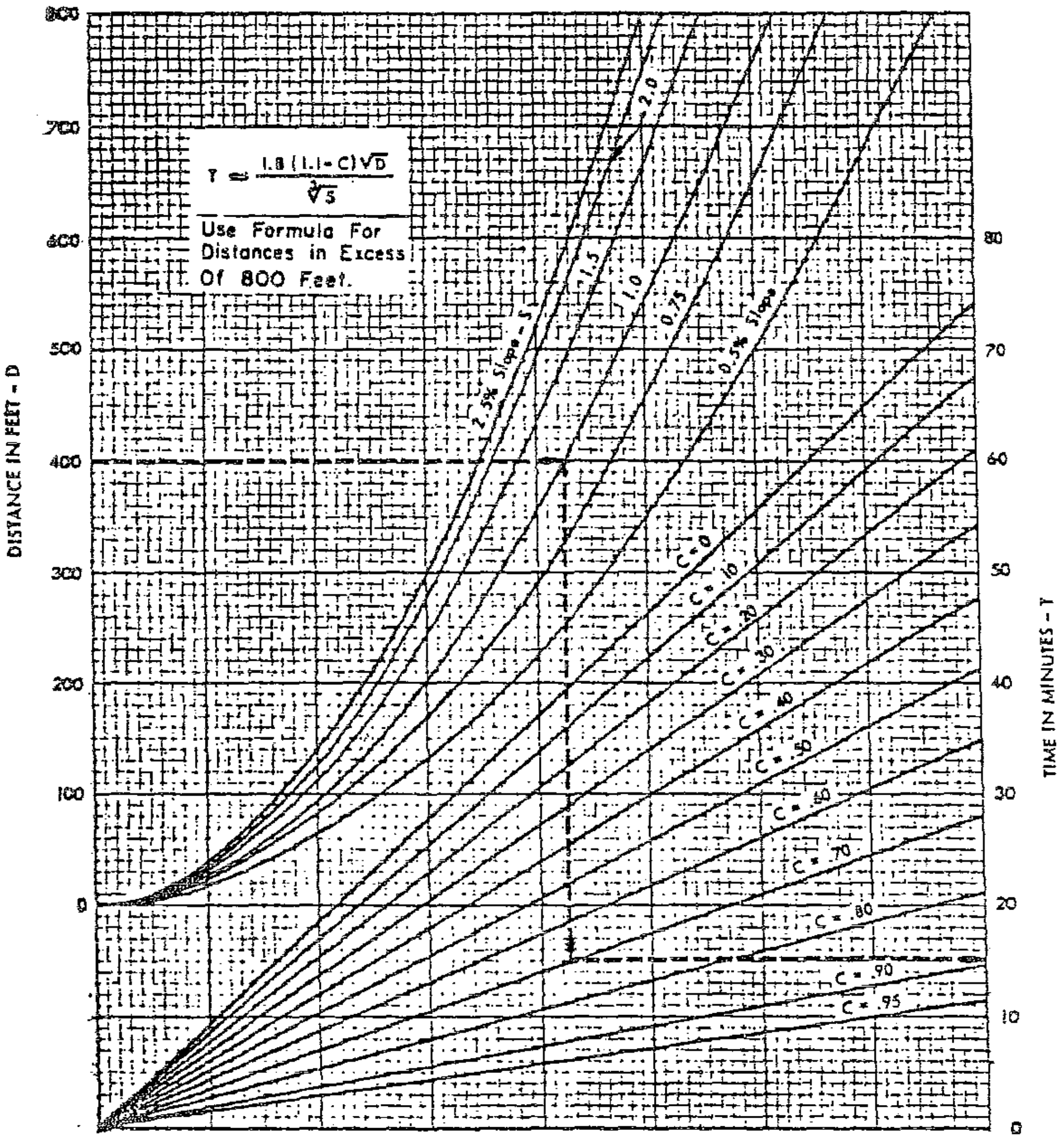

| | |
|---|---|
| SAN DIEGO COUNTY<br>DEPARTMENT OF SPECIAL DISTRICT SERVICES<br>DESIGN MANUAL | NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS |
| APPROVED ______ | DATE ______ \| APPENDIX |




Area "A" = Area "B"

| SAN DIEGO COUNTY<br>DEPARTMENT OF SPECIAL DISTRICT SERVICES<br>DESIGN MANUAL<br>APPROVED [illegible] | COMPUTATION OF EFFECTIVE SLOPE<br>FOR NATURAL WATERSHEDS<br>DATE [illegible] | APPENDIX |
|---|---|---|

# URBAN AREAS OVERLAND TIME OF FLOW CURVES




Surface Flow Time Curves

EXAMPLE:

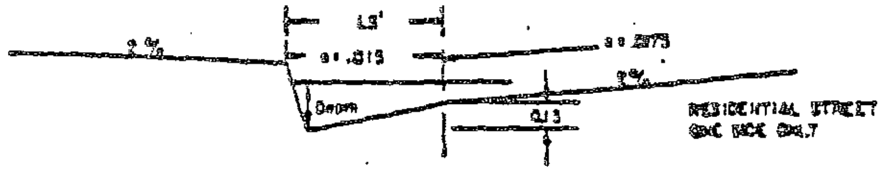
GIVEN: LENGTH OF FLOW = 400 FT.

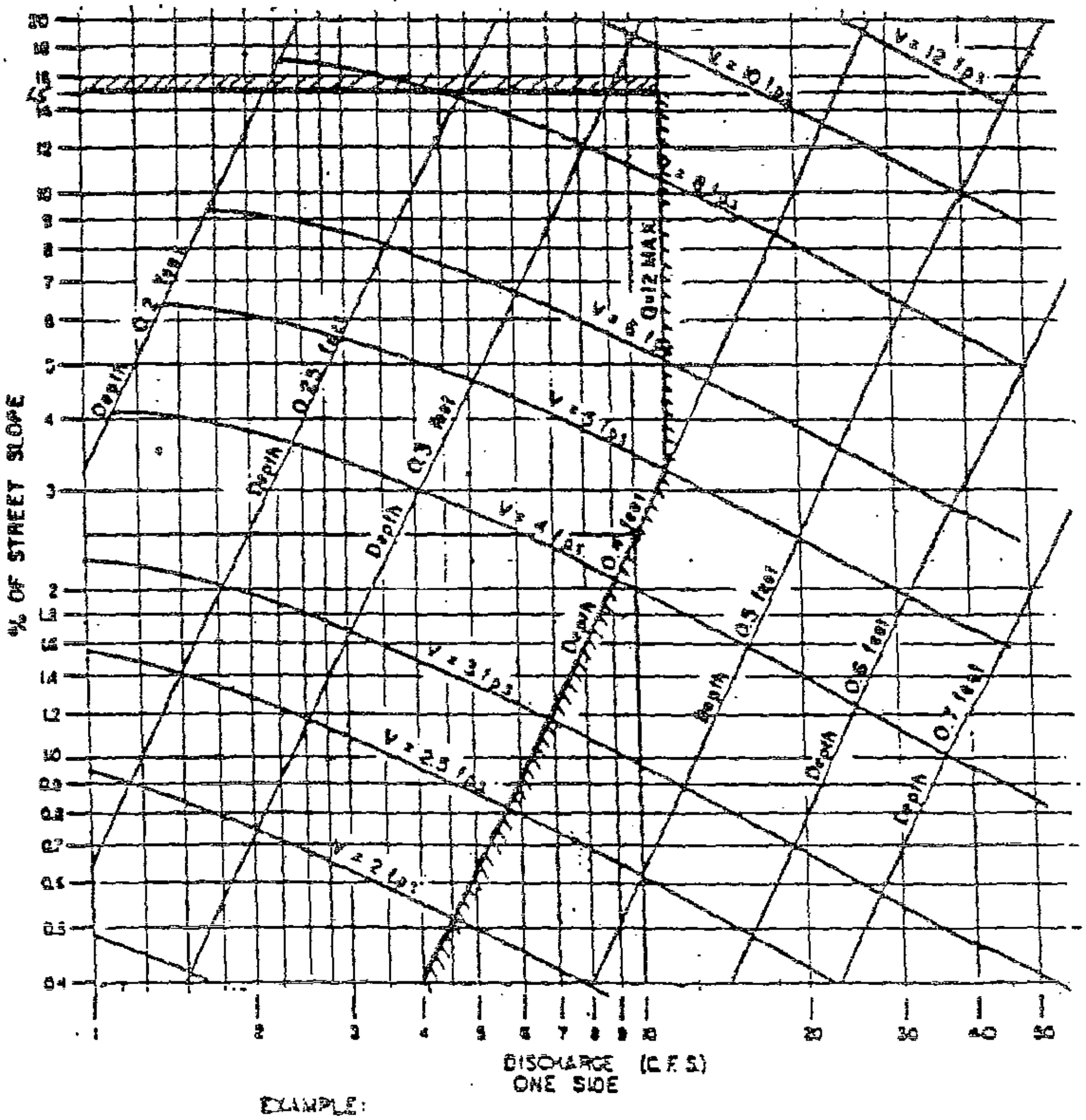
SLOPE = 1.0 %

COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES

CHART 1-104.12




EXAMPLE:

Given: Q = 10 S = 2.5 %
Chart gives: Depth = 0.4, Velocity = 4.4 fps.

| REV. | | CITY OF SAN DIEGO - DESIGN GUIDE | SHT. NO. |
|---|---|---|---|
| | | GUTTER AND ROADWAY | |
| | | DISCHARGE - VELOCITY CHART | |
| | | | |