Air Quality Technical Report

for the

9455 Towne Center Drive Redevelopment Project

Submitted To:

KLR Planning, Inc.
P.O. Box 882676
San Diego, CA 92186-2676

Prepared By:

sra
Scientific Resources Associated
1328 Kaimalino Lane
San Diego, CA 92109
Dr. Valorie L. Thompson, Principal
(858) 488-2987

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Glossary of Terms and Acronyms

APCD	Air Pollution Control District
ARB	California Air Resources Board
CAA	Clean Air Act (Federal)
CAAQS	California Ambient Air Quality Standard
CALINE4	California Line Source Dispersion Model (Version 4)
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CO	Carbon Monoxide
EPA	United States Environmental Protection Agency
H_2S	Hydrogen Sulfide
mg/m^3	Milligrams per Cubic Meter
$\mu g/m^3$	Micrograms per Cubic Meter
NAAQS	National Ambient Air Quality Standard
NOx	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
O_3	Ozone
$PM_{2.5}$	Fine Particulate Matter (particulate matter with an aerodynamic diameter of 2.5 microns or less
PM_{10}	Respirable Particulate Matter (particulate matter with an aerodynamic diameter of 10 microns or less
ppm	Parts per million
RAQS	San Diego County Regional Air Quality Strategy
ROCs	Reactive Organic Compounds
ROG	Reactive Organic Gases
SANDAG	San Diego Association of Governments
SDAB	San Diego Air Basin
SDAPCD	San Diego County Air Pollution Control District
SIP	State Implementation Plan
SOx	Oxides of Sulfur
SO_2	Sulfur Dioxide
TACs	Toxic Air Contaminants
T-BACT	Toxics Best Available Control Technology
VOCs	Volatile Organic Compounds

1.0 Introduction

This report presents an assessment of potential air quality impacts associated with the 9455 Towne Center Drive Redevelopment Project in the City of San Diego. The 9455 Towne Centre Drive Redevelopment project proposes the redevelopment of an existing office building with a new office building and parking structure. The 3.9-acre project site is located at 9455 Towne Centre Drive, San Diego, California 92121. The site is situated in the southeast quadrant of the Eastgate Mall and Towne Centre Drive Intersection in the University Community Plan Area of the City of San Diego and is within the Marine Corps Air Station (MCAS) Miramar Airport Influence Area.

The proposed project would demolish the existing 47,019 square foot office building and redevelop the project site with a five-story, 150,000 square-foot scientific research/office building. Outdoor employee amenity space, including a lounge deck, outdoor seating area, and green space, would be provided in the north-central portion of the project site, in the northwest corner of the project site, and in the south-central portion of the project site. Project materials would include cementitious panels, glass windows, a glass curtain wall system, a glass storefront, an equipment screen and an aluminum sunshade element. Materials for the parking garage would include architectural screening, glazing, composite panel with wood veneer, cable guardrail and vehicle barrier, and shade canopy. The project would increase the existing landscaping on the property and would provide a variety of trees, shrubs, and groundcover around the perimeter of the site and along the interior drive-court.

Parking would be accommodated within a five-story parking garage. The project would provide 600 parking spaces to include: 12 accessible spaces; 18 parking spaces for charging electric vehicles, with nine of those spaces having electric vehicle supply equipment installed to provide active electric vehicle charging; seven motorcycle spaces; and 60 carpool/vanpool and low-emitting/fuel efficient vehicle spaces. Additionally, the project would provide 35 short-term bicycle parking spaces and 35 long-term bicycle parking spaces.

Project access is currently provided from driveways on Towne Centre Drive and Eastgate Mall.

The entry off Towne Centre Drive would be retained in its current location with the proposed project, providing access to the project site and parking garage. The access from Eastgate Mall would be shifted further to the east and would provide direct access to the parking garage. An additional driveway with direct parking garage access and access to the parking garage would be added off Judicial Drive in the southeast corner of the project site.

The project would require grading of the project site to accommodate building construction and construction of the parking garage. The project site area equals 170,145 square feet, of which approximately 169,056 square feet would be graded. Earthwork would involve approximately 52,920 cubic yards of cut at a maximum depth of 26 feet and 310 cubic yards of fill at a maximum height of two feet. Approximately 52,610 cubic yards of material would be exported to a local private facility. Maximum slopes would occur in limited locations on the project site. Height of fill slopes would be approximately zero feet, and maximum of cut slopes would be approximately 17 feet in height. A total of 903 feet of retaining walls would be required, with a maximum height of 12.5 feet. Retaining walls would be located along project drive aisles, as well as along planting around the southern edge of the building as seat walls ranging in height between one foot and two feet.

Actions associated with the proposed project include a Community Plan Amendment (CPA) to increase the development intensity allocated to the project site by the University Community Plan via the transfer of development rights from two other parcels within the community to the project site, a Planned Development Permit (PDP) to replace the existing PID No. 90-0892 currently regulating development on the project site, and a Site Development Permit (SDP) to address the Airport Land Use Compatibility Overlay Zone (ALUCOZ) requirements.

This Air Quality Technical Report includes an evaluation of existing conditions in the project vicinity, an assessment of potential impacts associated with project construction, and an evaluation of project operational impacts.

2.0 Existing Conditions

As discussed in Section 1.0, the site is situated in the southeast quadrant of the Eastgate Mall and Towne Centre Drive Intersection in the University Community Plan Area of the City of San Diego and is within the Marine Corps Air Station (MCAS) Miramar Airport Influence Area. The site is currently occupied by a 47,019 square foot office building. The building and associated parking area would be demolished to make way for construction of the project.

The following section provides information about the existing air quality regulatory framework, climate, air pollutants and sources, and sensitive receptors in the project area.

2.1 Regulatory Framework

2.1.1 Federal Regulations

Air quality is defined by ambient air concentrations of specific pollutants identified by the United States Environmental Protection Agency (EPA) to be of concern with respect to health and welfare of the general public. The EPA is responsible for enforcing the Federal Clean Air Act (CAA) of 1970 and its 1977 and 1990 Amendments. The CAA required the EPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the EPA established both primary and secondary standards for seven pollutants (called "criteria" pollutants). The seven pollutants regulated under the NAAQS are as follows: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), respirable particulate matter (or particulate matter with an aerodynamic diameter of 10 microns or less, PM_{10}), fine particulate matter (or particulate matter with an aerodynamic diameter of 2.5 microns or less, $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). Primary standards are designed to protect human health with an adequate margin of safety. Secondary standards are designed to protect property and the public welfare from air pollutants in the atmosphere. Areas that do not meet the NAAQS for a particular pollutant are considered to be "non-attainment areas" for that pollutant.

In September 1997, the EPA promulgated 8-hour O_3 and 24-hour and annual $PM_{2.5}$ national standards. As a result, this action has initiated a new planning process to monitor and evaluate emission control measures for these pollutants. The San Diego Air Basin (SDAB) has been designated a marginal non-attainment area for the 8-hour NAAQS for O_3.

The following specific descriptions of health effects for each of the criteria air pollutants associated with project construction and operations are based on EPA (EPA 2007) and the California Air Resources Board (ARB) (ARB 2005).

Ozone. O_3 is considered a photochemical oxidant, which is a chemical that is formed when reactive organic gases (ROG) and oxides of nitrogen (NOx), both by-products of combustion, react in the presence of ultraviolet light. O_3 is considered a respiratory irritant and prolonged exposure can reduce lung function, aggravate asthma and increase susceptibility to respiratory infections. Children and those with existing respiratory diseases are at greatest risk from exposure to O_3.

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

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

Respirable Particulate Matter and Fine Particulate Matter. Respirable particulate matter, or PM_{10}, refers to particulate matter with an aerodynamic diameter of 10 microns or less. Fine particulate matter, or $PM_{2.5}$, refers to particulate matter with an aerodynamic diameter of 2.5 microns or less. Particulate matter in this size range has been determined to have the potential to lodge in the lungs and contribute to respiratory problems. PM_{10} and $PM_{2.5}$ arise from a variety of sources, including road dust, diesel exhaust, combustion, tire and brake wear, construction operations and windblown dust. PM_{10} and $PM_{2.5}$ can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases such as asthma and chronic bronchitis. $PM_{2.5}$ is considered to have the potential to lodge deeper in the lungs.

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

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

2.1.2 State Regulations

California Clean Air Act. The California Clean Air Act was signed into law on September 30, 1988, and became effective on January 1, 1989. The Act requires that local air districts implement regulations to reduce emissions from mobile sources through the adoption and enforcement of transportation control measures. The California Clean Air Act required the SDAB to achieve a five percent annual reduction in ozone precursor emissions from 1987 until the standards are attained. If this reduction cannot be achieved, all feasible control measures must be implemented. Furthermore, the California Clean Air Act required local air districts to implement a Best Available Control Technology rule and to require emission offsets for non-attainment pollutants.

The ARB is the state regulatory agency with authority to enforce regulations to both achieve and maintain air quality in the state. The ARB is responsible for the development, adoption, and enforcement of the state's motor vehicle emissions program, as well as the adoption of the California Ambient Air Quality Standards (CAAQS). The ARB also reviews operations and programs of the local air districts, and requires each air district with jurisdiction over a non-attainment area to develop its own strategy for achieving the NAAQS and CAAQS. The CAA allows states to adopt ambient air quality standards and other regulations provided they are at least as stringent as federal standards. The ARB has established the more stringent CAAQS for the six criteria pollutants through the California Clean Air Act of 1988, and also has established CAAQS for additional pollutants, including sulfates, hydrogen sulfide, vinyl chloride and visibility-reducing particles. The SDAB is currently classified as a non-attainment area under the CAAQS for O_3, PM_{10}, and $PM_{2.5}$. It should be noted that the ARB does not differentiate between attainment of the 1-hour and 8-hour CAAQS for O_3; therefore, if an air basin records exceedances of either standard the area is considered a non-attainment area for the CAAQS for O_3. The SDAB has recorded exceedances of both the 1-hour and 8-hour CAAQS for O_3. The following specific descriptions of health effects for the additional California criteria air pollutants are based on the ARB (ARB 2001).

Sulfates. Sulfates are the fully oxidized ionic form of sulfur. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to sulfur dioxide (SO_2) during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California due to regional meteorological features. The ARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in ventilatory function, aggravation of asthmatic symptoms and an increased risk of cardio-pulmonary disease. Sulfates are particularly effective in degrading visibility, and due to fact that they are usually acidic, can harm ecosystems and damage materials and property.

Hydrogen Sulfide. H_2S is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.

Breathing H_2S at levels above the standard would result in exposure to a very disagreeable odor. In 1984, an ARB committee concluded that the ambient standard for H_2S is adequate to protect public health and to significantly reduce odor annoyance.

Vinyl Chloride. Vinyl chloride, a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants and hazardous waste sites, due to microbial breakdown of chlorinated solvents. Short-term exposure to high levels of vinyl chloride in air causes central nervous system effects, such as dizziness, drowsiness and headaches. Long-term exposure to vinyl chloride through inhalation and oral exposure causes liver damage. Cancer is a major concern from exposure to vinyl chloride via inhalation. Vinyl chloride exposure has been shown to increase the risk of angiosarcoma, a rare form of liver cancer, in humans.

Visibility Reducing Particles. Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt. The CAAQS is intended to limit the frequency and severity of visibility impairment due to regional haze. A separate standard for visibility-reducing particles that is applicable only in the Lake Tahoe Air Basin is based on reduction in scenic quality.

Table 1 presents a summary of the ambient air quality standards adopted by the federal and California Clean Air Acts.

<table>
<tr><th colspan="8">Table 1
Ambient Air Quality Standards</th></tr>
<tr><th rowspan="2">POLLUTANT</th><th rowspan="2">AVERAGE TIME</th><th colspan="2">CALIFORNIA STANDARDS</th><th colspan="3">NATIONAL STANDARDS</th></tr>
<tr><th>Concentration</th><th>Method</th><th>Primary</th><th>Secondary</th><th>Method</th></tr>
<tr><td rowspan="2">Ozone (O_3)</td><td>1 hour</td><td>0.09 ppm (176 µg/m^3)</td><td rowspan="2">Ultraviolet Photometry</td><td>--</td><td>--</td><td rowspan="2">Ethylene Chemiluminescence</td></tr>
<tr><td>8 hour</td><td>0.070 ppm (137 µg/m^3)</td><td>0.075 ppm (147 µg/m^3)</td><td>0.075 ppm (147 µg/m^3)</td></tr>
<tr><td rowspan="2">Carbon Monoxide (CO)</td><td>8 hours</td><td>9.0 ppm (10 mg/m^3)</td><td rowspan="2">Non-Dispersive Infrared Spectroscopy (NDIR)</td><td>9 ppm (10 mg/m^3)</td><td rowspan="2">--</td><td rowspan="2">Non-Dispersive Infrared Spectroscopy (NDIR)</td></tr>
<tr><td>1 hour</td><td>20 ppm (23 mg/m^3)</td><td>35 ppm (40 mg/m^3)</td></tr>
<tr><td rowspan="2">Nitrogen Dioxide (NO_2)</td><td>Annual Average</td><td>0.030 ppm (56 µg/m^3)</td><td rowspan="2">Gas Phase Chemiluminescence</td><td>0.053 ppm (100 µg/m^3)</td><td>--</td><td rowspan="2">Gas Phase Chemiluminescence</td></tr>
<tr><td>1 hour</td><td>0.18 ppm (338 µg/m^3)</td><td>0.100 ppm (188 µg/m^3)</td><td>--</td></tr>
<tr><td rowspan="3">Sulfur Dioxide (SO_2)</td><td>24 hours</td><td>0.04 ppm (105 µg/m^3)</td><td rowspan="3">Ultraviolet Fluorescence</td><td>--</td><td>--</td><td rowspan="3">Pararosaniline</td></tr>
<tr><td>3 hours</td><td>--</td><td>--</td><td>0.5 ppm (1300 µg/m^3)</td></tr>
<tr><td>1 hour</td><td>0.25 ppm (655 µg/m^3)</td><td>0.075 ppm (196 µg/m^3)</td><td>--</td></tr>
<tr><td rowspan="2">Respirable Particulate Matter (PM_{10})</td><td>24 hours</td><td>50 µg/m^3</td><td rowspan="2">Gravimetric or Beta Attenuation</td><td>150 µg/m^3</td><td>150 µg/m^3</td><td rowspan="2">Inertial Separation and Gravimetric Analysis</td></tr>
<tr><td>Annual Arithmetic Mean</td><td>20 µg/m^3</td><td>--</td><td>--</td></tr>
<tr><td rowspan="2">Fine Particulate Matter ($PM_{2.5}$)</td><td>Annual Arithmetic Mean</td><td>12 µg/m^3</td><td rowspan="2">Gravimetric or Beta Attenuation</td><td>12 µg/m^3</td><td>15 µg/m^3</td><td rowspan="2">Inertial Separation and Gravimetric Analysis</td></tr>
<tr><td>24 hours</td><td>--</td><td>35 µg/m^3</td><td>--</td></tr>
<tr><td>Sulfates</td><td>24 hours</td><td>25 µg/m^3</td><td>Ion Chromatography</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td rowspan="3">Lead</td><td>30-day Average</td><td>1.5 µg/m^3</td><td rowspan="3">Atomic Absorption</td><td>--</td><td>--</td><td rowspan="3">Atomic Absorption</td></tr>
<tr><td>Calendar Quarter</td><td>--</td><td>1.5 µg/m^3</td><td>1.5 µg/m^3</td></tr>
<tr><td>3-Month Rolling Average</td><td>--</td><td>0.15 µg/m^3</td><td>0.15 µg/m^3</td></tr>
<tr><td>Hydrogen Sulfide</td><td>1 hour</td><td>0.03 ppm (42 µg/m^3)</td><td>Ultraviolet Fluorescence</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Vinyl Chloride</td><td>24 hours</td><td>0.010 ppm (26 µg/m^3)</td><td>Gas Chromatography</td><td>--</td><td>--</td><td>--</td></tr>
</table>

ppm= parts per million; µg/m^3 = micrograms per cubic meter ; mg/m^3= milligrams per cubic meter
Source: California Air Resources Board, www.arb.ca.gov, 2015, http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

Toxic Air Contaminants. In 1983, the California Legislature enacted a program to identify the health effects of Toxic Air Contaminants (TACs) and to reduce exposure to these contaminants to protect the public health (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.

The State of California has identified diesel particulate matter as a TAC. Diesel particulate matter is emitted from on- and off-road vehicles that utilize diesel as fuel. Following identification of diesel particulate matter as a TAC in 1998, the ARB has worked on developing strategies and regulations aimed at reducing the emissions and associated risk from diesel particulate matter. The overall strategy for achieving these reductions is found in the *Risk Reduction Plan to Reduce Particulate Matter from Diesel-Fueled Engines and Vehicles* (State of California 2000). A stated goal of the plan is to reduce the cancer risk statewide arising from exposure to diesel particulate matter by 75 percent by 2010 and by 85 percent by 2020. The *Risk Reduction Plan* contains the following three components:

- New regulatory standards for all new on-road, off-road and stationary diesel-fueled engines and vehicles to reduce diesel particulate matter emissions by about 90 percent overall from current levels;
- New retrofit requirements for existing on-road, off-road and stationary diesel-fueled engines and vehicles where determined to be technically feasible and cost-effective; and
- New Phase 2 diesel fuel regulations to reduce the sulfur content levels of diesel fuel to no more than 15 ppm to provide the quality of diesel fuel needed by the advanced diesel particulate matter emission controls.

As an ongoing process, the ARB reviews air contaminants and identifies those that are classified as TACs. The ARB also continues to establish new programs and regulations for the control of TACs, including diesel particulate matter, as appropriate.

The local air pollution control district (APCD) has the primary responsibility for the development and implementation of rules and regulations designed to attain the NAAQS and CAAQS, as well as the permitting of new or modified sources, development of air quality management plans, and adoption and enforcement of air pollution regulations. The San Diego APCD is the local agency responsible for the administration and enforcement of air quality regulations in San Diego County.

The APCD and the San Diego Association of Governments (SANDAG) are responsible for developing and implementing the clean air plan for attainment and maintenance of the ambient air quality standards in the SDAB. The San Diego County Regional Air Quality Strategy (RAQS) was initially adopted in 1991, and is updated on a triennial basis. The RAQS was updated in 1995, 1998, 2001, 2004 and most recently in 2009 (APCD 2009). The RAQS outlines APCD's plans and control measures designed to attain the state air quality standards for O_3. The RAQS does not address the state air quality standards for PM_{10} or $PM_{2.5}$. The APCD has also developed the air basin's input to the State Implementation Plan (SIP), which is required under the Federal Clean Air Act for areas that are out of attainment of air quality standards. The SIP includes the APCD's plans and control measures for attaining the O_3 NAAQS. The SIP is also updated on a triennial basis. The latest SIP update that has been approved by EPA was in 2007. The current SIP is the APCD's *Eight-Hour Ozone Attainment Plan for San Diego County* (hereinafter referred to as the Attainment Plan) (APCD 2007). The Attainment Plan forms the basis for the SIP update, as it contains documentation on emission inventories and trends, the APCD's emission control strategy, and an attainment demonstration that shows that the SDAB will meet the NAAQS for O_3. Emission inventories, projections, and trends in the Attainment Plan are based on the latest O_3 SIP planning emission projections compiled and maintained by ARB. The inventories are based on data submitted by stakeholder agencies, including the San Diego Association of Governments (SANDAG), based on growth projections in municipal General Plans.

The ARB compiles annual statewide emission inventories in its emission-related information database, the California Emission Inventory Development and Reporting System (CEIDARS). Emission projections for past and future years were generated using the California Emission Forecasting System (CEFS), developed by ARB to project emission trends and track progress towards meeting emission reduction goals and mandates. CEFS utilizes the most current growth and emissions control data available and agreed upon by the stakeholder agencies to provide comprehensive projections of anthropogenic (human activity-related) emissions for any year from 1975 through 2030. Local air districts are responsible for compiling emissions data for all point sources and many stationary area-wide sources. For mobile sources, CEFS integrates emission estimates from ARB's EMFAC and OFFROAD models. SANDAG incorporates data regarding highway and transit projects into their Travel Demand Models for estimating and projecting vehicle miles traveled (VMT) and speed. The ARB's on-road emissions inventory in EMFAC relies on these VMT and speed estimates.

Because the ARB mobile source emission projections and SANDAG growth projections are based on population and vehicle trends and land use plans developed by the cities and by the County as part of the development of General Plans, projects that propose development that is consistent with the growth anticipated by the general plans would be consistent with the RAQS and the Attainment Plan. In the event that a project would propose development which is less dense than anticipated within the general plan, the project would likewise be consistent with the RAQS and the Attainment Plan. If a project proposes development that is greater than that anticipated in the general plan and SANDAG's growth projections, the project might be in conflict with the RAQS and SIP, and might have a potentially significant impact on air quality.

2.1.3 Local Regulations

In San Diego County, the San Diego APCD is the regulatory agency that is responsible for maintaining air quality, including implementation and enforcement of state and federal regulations. The project site is located in the City of San Diego. The City of San Diego has adopted a General Plan that includes a Conservation Element that adopts policies to reduce air emissions and improve air quality within the City.

2.2 Climate and Meteorology

The project site is located in the SDAB. The climate of the SDAB is dominated by a semi-permanent high pressure cell located over the Pacific Ocean. This cell influences the direction of prevailing winds (westerly to northwesterly) and maintains clear skies for much of the year. The high pressure cell also creates two types of temperature inversions that may act to degrade local air quality.

Subsidence inversions occur during the warmer months as descending air associated with the Pacific high pressure cell comes into contact with cool marine air. The boundary between the two layers of air creates a temperature inversion that traps pollutants. The other type of inversion, a radiation inversion, develops on winter nights when air near the ground cools by heat radiation and air aloft remains warm. The shallow inversion layer formed between these two air masses also can trap pollutants. As the pollutants become more concentrated in the atmosphere, photochemical reactions occur that produce ozone, commonly known as smog.

Figure 1 provides a graphic representation of the prevailing winds in the project vicinity, as measured at MCAS Miramar, which is the closest meteorological monitoring station to the site.

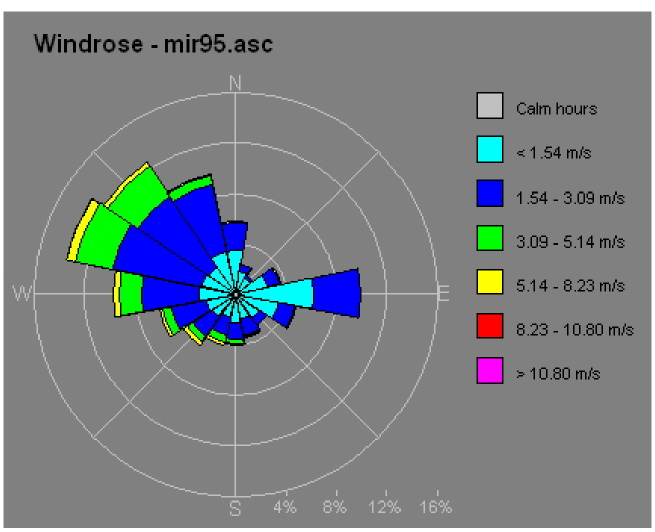

Figure 1. Wind Rose – MCAS Miramar

2.3 Background Air Quality

The APCD operates a network of ambient air monitoring stations throughout San Diego County. The purpose of the monitoring stations is to measure ambient concentrations of the pollutants and determine whether the ambient air quality meets the CAAQS and the NAAQS. The nearest ambient monitoring station to the project site is the Kearny Mesa monitoring station, approximately 7 miles southeast of the site, which measures O_3, NO_2, PM_{10}, and $PM_{2.5}$. The nearest station that measures CO is the downtown San Diego monitoring station, approximately 14 miles south of the site. Ambient concentrations of pollutants over the last three years are presented in Table 2.

The Kearny Mesa monitoring station measured one exceedance of the 8-hour NAAQS in 2012 and 2014. The station measured three exceedances of the 8-hour CAAQS in 2012, one exceedance of the CAAQS in 2013, and four exceedances of the CAAQS in 2014. The data from the monitoring station indicates that air quality is in attainment of all other air quality standards.

Table 2
Ambient Background Concentrations

Pollutant	2012	2013	2014
Ozone (O_3)			
Peak 1-hour value (ppm)	0.099	0.081	0.099
Days above state standard (0.09 ppm)	1	0	1
Peak 8-hour value (ppm)	0.076	0.070	0.081
Days above federal standard (0.075 ppm)(1,2)	1	0	1
Days above state standard (0.070 ppm)	3	1	4
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)			
Peak 24-hour value ($\mu g/m^3$)	20.1	22.0	20.2
24-hour 98th Percentile ($\mu g/m^3$)	NA	16.1	17.2
Days above federal standard (35 $\mu g/m^3$) (3)	0	0	0
Annual Average value ($\mu g/m^3$)	8.7	8.3	8.2
Particulate matter less than or equal to 10 microns in diameter (PM_{10})			
Peak 24-hour value (federal) ($\mu g/m^3$) (4)	35	39	39
Peak 24-hour value (state) ($\mu g/m^3$) (4)	35	38	39
Days above federal standard (150 $\mu g/m^3$)	0	0	0
Days above state standard (50 $\mu g/m^3$)	0	0	1
Annual Average value (federal) ($\mu g/m^3$) (4)	14.7	19.9	19.4
Annual Average value (state) ($\mu g/m^3$) (4)	16.0	20.0	19.5

Table 2 Ambient Background Concentrations			
Pollutant	**2012**	**2013**	**2014**
Carbon Monoxide (CO)			
Peak 1-hour value (ppm)	2.6	3.0	2.7
Days above federal and state standard (9 ppm)	0	0	0
Peak 8-hour value (ppm)	1.9	2.1	1.9
Days above federal standard (35 ppm)	0	0	0
Days above state standard (20 ppm)	0	0	0
Nitrogen Dioxide (NO_2)			
Peak 1-hour value (ppm)	0.057	0.067	0.051
Days above federal standard (0.100 ppm)	0	0	0
Days above state standard (0.18 ppm)	0	0	0
Annual Average value (ppm)	NA	0.011	0.010

Notes:

(1) The federal 8-hour O_3 standard was revised downward in 2008 to 0.075 ppm.

(2) The federal 8-hour O_3 standard was previously defined as 0.08 ppm (1 significant digit). Measurements were rounded up or down to determine compliance with the standard; therefore a measurement of 0.084 ppm is rounded to 0.08 ppm. The 8-hour O_3 ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average O_3 concentration is less than or equal to the standard.

(3) The federal $PM_{2.5}$ standard was revised downward in 2007 to 35 µg/m^3. 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.

(4) State and federal statistics may differ for the following reasons: (1) State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and federal statistics may therefore be based on different samplers. (2) State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

(5) The federal 1-hour SO_2 standard was adopted in 2010.

ppm = parts per million; µg/m^3 = micrograms per cubic meter; NA = data not available

Source: ARB http://www.arb.ca.gov/adam/topfour/topfourdisplay.php; Five-Year Summary, http://www.sdapcd.org/info/reports/5-year-summary.pdf.

2.4 Existing Conditions

The existing site is currently developed with a 47,019 square foot office building with surface parking. The existing building is vacant and has not been occupied for the past seven years. Therefore, the existing development does not currently contribute air emissions.

3.0 Thresholds of Significance

The City of San Diego has adopted its Significance Determination Thresholds (City of San Diego 2011) that are based on Appendix G of the State CEQA Guidelines. According to the Significance Determination Thresholds, a project would have a significant environmental impact if the project would result in:

- A conflict with or obstruct the implementation of the applicable air quality plan;
- A violation of any air quality standard or contribute substantially to an existing or projected air quality violation;
- Exposing sensitive receptors to substantial pollutant concentrations;
- Creating objectionable odors affecting a substantial number of people;
- Exceeding 100 pounds per day of particulate matter (PM) (dust); or
- Substantial alteration of air movement in the area of the project.

In their Significance Determination Thresholds, the City of San Diego has adopted emission thresholds based on the thresholds for an Air Quality Impact Assessment in the San Diego Air Pollution Control District's Rule 20.2. These thresholds are shown in Table 3.

Table 3
Significance Criteria for Air Quality Impacts

Pollutant	Emission Rate		
	Lbs/Hr	Lbs/Day	Tons/Year
Carbon Monoxide (CO)	100	550	100
Oxides of Nitrogen (NOx)	25	250	40
Respirable Particulate Matter (PM_{10})	--	100	15
Oxides of Sulfur (SOx)	25	250	40
Lead and Lead Compounds	--	3.2	0.6
Fine Particulate Matter ($PM_{2.5}$)	--	55	10
Volatile Organic Compounds (VOCs)	--	137	15

In addition to impacts from criteria pollutants, project impacts may include emissions of pollutants identified by the state and federal government as toxic air contaminants (TACs) or Hazardous Air Pollutants (HAPs). If a project has the potential to result in emissions of any TAC or HAP which may expose sensitive receptors to substantial pollutant concentrations, the project would be deemed to have a potentially significant impact. With regard to evaluating whether a project would have a significant impact on sensitive receptors, air quality regulators typically define sensitive receptors as schools (Preschool-12th Grade), hospitals, resident care facilities, or day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality.

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

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

4.0 Impacts

The 9455 Towne Center Drive Redevelopment Project would result in both construction and operational impacts. Construction impacts include emissions associated with the construction of the office building and parking structure. Operational impacts include emissions associated with the project, including traffic, at full buildout.

4.1 Consistency with the RAQS and SIP

The Proposed Project would have a significant impact if it conflicts with or obstructs implementation of the applicable air quality plans (the RAQS and SIP).

As discussed in Section 2.1, the SIP is the document that sets forth the state's strategies for attaining and maintaining the NAAQS. The APCD is responsible for developing the San Diego portion of the SIP, and has developed an attainment plan for attaining the 8-hour NAAQS for O_3. The RAQS sets forth the plans and programs designed to meet the state air quality standards. Through the RAQS and SIP planning processes, the APCD adopts rules, regulations, and programs designed to achieve attainment of the ambient air quality standards and maintain air quality in the SDAB.

Conformance with the RAQS and SIP determines whether a Project will conflict with or obstruct implementation of the applicable air quality plans. Because the CARB mobile source emission projections and SANDAG growth projections are based on population and vehicle trends and land use plans developed by the City of San Diego as part of the development of General Plans, projects that propose development that is consistent with the growth anticipated by the general plan would be consistent with the RAQS and SIP. In the event that a project would propose development which is less dense than anticipated within the general plan, the project would likewise be consistent with the RAQS and SIP.

The RAQS and SIP address air emissions and impacts from industrial sources, area-wide sources, and mobile sources. The programs also consider transportation control measures and indirect source review. Industrial sources are typically stationary air pollution sources that are subject to

APCD rules and regulations, and over which the APCD has regulatory authority. Area-wide sources include sources such as consumer products use, small utility engines, hot water heaters, and furnaces. Both the ARB and the APCD have authority to regulate these sources and have developed plans and programs to reduce emissions from certain types of area-wide sources. Mobile sources are principally emissions from motor vehicles. The ARB establishes emission standards for motor vehicles and establishes regulations for other mobile source activities including off-road vehicles.

Both the RAQS and SIP address emissions of ozone precursors (ROG and NOx), as the SDAB is classified as a basic non-attainment area for the NAAQS and a non-attainment area for the CAAQS. The RAQS and SIP do not address particulate matter. The California CAA requires an air quality strategy to achieve a 5% average annual ozone precursor emission reduction when implemented or, if that is not achievable, an expeditious schedule for adopting every feasible emission control measure under air district purview (California Health and Safety Code (H&SC) Section 40914). The current RAQS represents an expeditious schedule for adopting feasible control measures, since neither San Diego nor any air district in the State has demonstrated sustained 5% average annual ozone precursor reductions.

Most of the control measures adopted in the RAQS apply to industrial sources and specific source categories. SDAPCD Rule 55 would apply to construction of the project, and requires control of fugitive dust during construction. Should the properties include stationary sources such as boilers or emergency generators, these sources would be subject to SDAPCD rules and would be required to obtain a permit to operate.

As discussed in Section 1.0, the proposed project includes a Community Plan Amendment to increase the development intensity allocated to the project site by the University Community Plan, a Planned Development Permit to replace the existing PID No. 90-0892 currently regulating development on the project site, and a Site Development Permit to address the Airport Land Use Compatibility Overlay Zone (ALUCOZ) requirements. As part of the Community Plan Amendment, the project would transfer development rights (including the ADT associated with those development rights) from other properties in the University community to the project site. The CARB mobile source emission projections and SANDAG growth projections account for ADT associated with existing development rights. Therefore, even though the density on the project site would increase, with the transfer of development rights and associated trips, the 9455 Towne Centre Drive project would not add new trips to the overall University community. Thus, the project would not conflict with or obstruct implementation of the RAQS or SIP. Impacts would be less than significant.

4.2 Violation of an Air Quality Standard

The Proposed Project would have a significant impact if it violates any air quality standard or contributes substantially to an existing or projected air quality violation.

To address this significance threshold, an evaluation of emissions associated with both the construction and operational phases of the Project was conducted.

4.2.1 Construction Impacts

Emissions of pollutants such as fugitive dust and heavy equipment exhaust that are generated during construction are generally highest near the construction site. Emissions from the construction of the project were estimated using the CalEEMod Model (ENVIRON 2013). The CalEEMod Model provides default assumptions regarding horsepower rating, load factors for heavy equipment, and hours of operation per day. Default assumptions within the CalEEMod Model and assumptions for similar projects were used to represent operation of heavy construction equipment. Construction calculations within the CalEEMod Model utilize the number and type of construction equipment to calculate emissions from heavy construction equipment. Fugitive PM_{10} and $PM_{2.5}$ emissions estimates take into account compliance with Rule 55 requirements for fugitive dust suppression, which require that no visible dust be present beyond the site boundaries.

In addition to calculating emissions from heavy construction equipment, the CalEEMod Model contains calculation modules to estimate emissions of fugitive dust, based on the amount of earthmoving or surface disturbance required; emissions from heavy-duty truck trips or vendor trips during construction activities; emissions from construction worker vehicles during daily commutes; and emissions of ROG during application of architectural coatings. As part of the project design features, it was assumed that standard dust control measures (watering three times daily; reducing speeds to 15 mph on unpaved surfaces) and architectural coatings that comply with SDAPCD Rule 67.0.1 (assumed to meet a VOC content of 50 g/l for interior painting and 100 g/l for exterior painting) would be used during construction.

Table 4 provides the detailed emission estimates for each phase of construction as calculated with the CalEEMod Model. Appendix A provides CalEEMod Model outputs showing the construction calculations. As shown in Table 4, emissions of criteria pollutants during construction would be below the thresholds of significance for all project construction phases for all pollutants. Impacts would be less than significant. Project criteria pollutant emissions during construction would be temporary.

Table 4 **Estimated Maximum Daily Construction Emissions** **9455 Towne Center Drive Redevelopment Project**						
Emission Source	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Demolition						
Fugitive Dust	-	-	-	-	0.28	0.04
Offroad Equipment	4.29	45.66	35.03	0.04	2.29	2.14
Onroad Vehicles	0.06	0.91	0.65	0.002	0.07	0.03
Worker Trips	0.05	0.06	0.67	0.002	0.12	0.03
Subtotal	**4.40**	**46.63**	**36.35**	**0.04**	**2.76**	**2.24**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Grading						
Fugitive Dust	-	-	-	-	2.38	1.30
Offroad Equipment	3.46	35.98	25.38	0.03	2.04	1.88
Onroad Vehicles	0.94	12.74	9.73	0.04	1.05	0.40
Worker Trips	0.05	0.06	0.61	0.002	0.12	0.03
Subtotal	**4.45**	**48.78**	**35.72**	**0.072**	**5.59**	**3.61**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Paving/Foundations						
Offroad Equipment	1.66	16.80	12.48	0.02	1.01	0.93
Asphalt Offgassing	0.02	-	-	-	-	-
Worker Trips	0.06	0.07	0.81	0.002	0.17	0.04
Subtotal	**1.74**	**16.87**	**13.29**	**0.02**	**1.18**	**0.97**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Building Construction						
Offroad Equipment	6.25	42.30	33.33	0.05	2.89	2.78
Vendor Trips	0.61	5.42	6.68	0.02	0.50	0.19
Worker Trips	0.47	0.56	6.03	0.02	1.23	0.33
Subtotal	**7.33**	**48.28**	**46.04**	**0.09**	**4.62**	**3.30**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Architectural Coatings Application						
Architectural Coatings	17.12	-	-	-	-	-
Offroad Equipment	0.33	2.19	1.87	0.003	0.17	0.17
Worker Trips	0.10	0.11	1.21	0.003	0.25	0.07
Subtotal	**17.55**	**2.30**	**3.08**	**0.01**	**0.42**	**0.24**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Maximum Daily Emissions[a]	**26.62**	**67.45**	**62.41**	**0.11**	**6.22**	**4.52**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*

[a]Maximum emissions occur during simultaneous building construction, paving, and architectural coatings application.

4.2.2 Operational Impacts

Operational impacts associated with the 9455 Towne Center Drive Redevelopment Project would include impacts associated with vehicular traffic, as well as area sources such as energy use, landscaping, consumer products use, and architectural coatings use for maintenance purposes.

The *Traffic Impact Study – 9455 Towne Center Drive Redevelopment Project* (Urban Systems July 2016) calculated project trip generation rates based on the net increase in trips associated with the redevelopment at the site. Based on the City of San Diego's trip generation rates, the net increase in average daily trips (ADT) would be 830. These trip generation rates were accounted for within the CalEEMod Model runs for vehicular emissions. However, as discussed in the Traffic Impact Study, the proposed project would transfer trips from other sites within the Community Plan area to the project site, via the transfer of development rights. With the transfer of development rights, as shown in Table 16-1 of the Traffic Impact Study, the project would be "trip neutral".

Operational impacts associated with vehicular traffic and area sources including energy use, landscaping, and architectural coatings use for maintenance purposes were estimated using the CalEEMod Model. The CalEEMod Model calculates vehicle emissions based on emission factors from the EMFAC2011 model. It was assumed that the first year of full occupancy would be 2018. Based on the results of the EMFAC2011 model for subsequent years, emissions would decrease on an annual basis from 2018 onward due to phase-out of higher polluting vehicles and implementation of more stringent emission standards that are taken into account in the EMFAC2011 model. Table 5 presents the results of the emission calculations, in lbs/day, for the total development, along with a comparison with the significance criteria.

Table 5 Operational Emissions						
	ROG	**NOx**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Maximum Daily Emissions						
Summer Day, Lbs/day						
Area Sources	10.71	0.00	0.08	0.00	0.00	0.00
Energy Use	0.09	0.85	0.71	0.00	0.06	0.06
Vehicular Emissions	2.56	4.96	23.51	0.06	3.89	1.08
TOTAL	**13.36**	**5.80**	**24.30**	**0.06**	**3.96**	**1.15**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Winter Day, Lbs/day						
Area Sources	10.71	0.00	0.08	0.00	0.00	0.00
Energy Use	0.09	0.85	0.71	0.00	0.06	0.06
Vehicular Emissions	2.74	5.26	25.29	0.05	3.89	1.08
TOTAL	**13.54**	**6.11**	**26.08**	**0.06**	**3.96**	**1.15**
Significance Criteria	137	250	550	250	100	55
Significant?	*No*	*No*	*No*	*No*	*No*	*No*

Based on the estimates of the emissions associated with Project operations, the emissions of all criteria pollutants are below the significance thresholds. Impacts would be less than significant.

Projects involving traffic impacts may result in the formation of locally high concentrations of CO, known as CO "hot spots." To verify that the project would not cause or contribute to a violation of the CO standard, a screening evaluation of the potential for CO "hot spots" was conducted. Project-related traffic would have the potential to result in CO "hot spots" if project-related traffic resulted in a degradation in the level of service at any intersection to LOS E or F. The Traffic Impact Study evaluated eight intersections in the study area to assess whether or not there would be a decrease in the level of service at the intersections affected by the Project. The analysis included the following scenarios: Existing, Existing plus Project, Near Term, Near Term plus Project, Year 2035, and Year 2035 plus Project. Based on the Traffic Impact Study, intersections under all Existing scenarios would operate at LOS D or better, and would not be anticipated to experience a CO "hot spot".

Under both Near Term and Horizon Year (2035) conditions, two intersections would operate at LOS E or worse:

- La Jolla Village Drive and Towne Centre Drive
- Towne Center Drive and Executive Drive

Accordingly, to evaluate the potential for CO "hot spots" at the intersections for which the Traffic Impact Study predicted significant impacts, the procedures in the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol (Caltrans 1998) were used. As recommended in the Protocol, CALINE4 modeling was conducted for the intersections identified above for the scenarios with and without Project traffic. Modeling was conducted based on the guidance in Appendix B of the Protocol to calculate maximum predicted 1-hour CO concentrations. Predicted 1-hour CO concentrations were then scaled to evaluate maximum predicted 8-hour CO concentrations using the recommended scaling factor of 0.7 for urban locations.

Inputs to the CALINE4 model were obtained from the Traffic Impact Analysis. As recommended in the Protocol, receptors were located at locations that were approximately 3 meters from the mixing zone, and at a height of 1.8 meters. Average approach and departure speeds were assumed to be 5 mph to account for congestion at the intersection and provide a worst case estimate of emissions. Emission factors for those speeds were estimated from the EMFAC2014 for 2035.

In accordance with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol, it is also necessary to estimate future background CO concentrations in the project vicinity to determine the potential impact plus background and evaluate the potential for CO "hot spots" due to the project. As a conservative estimate of background CO concentrations, the existing maximum 1-hour background concentration of CO that was measured at the San Diego monitoring station for the period 2012 to 2014 of 3.0 ppm was used to represent future maximum background 1-hour CO concentrations. The existing maximum 8-hour background concentration of CO that was measured at the San Diego monitoring station during the period from 2012 to 2014 of 2.1 ppm was also used to provide a conservative estimate of the maximum 8-hour background concentrations in the project vicinity. CO concentrations in the future may be lower as inspection and maintenance programs and more stringent emission controls are placed on vehicles.

The CALINE4 model outputs are provided in Appendix A of this report. Table 6 presents a summary of the predicted CO concentrations (impact plus background) for the intersections evaluated. As shown in Table 6, the predicted CO concentrations would be substantially below the 1-hour and 8-hour NAAQS and CAAQS for CO shown in Table 1 of this report. Therefore, no exceedances of the CO standard are predicted, and the project would not cause or contribute to a violation of this air quality standard.

Table 6
CO "Hot Spots" Evaluation
Predicted CO Concentrations, ppm

Maximum 1-hour Concentration Plus Background, ppm CAAQS = 20 ppm; NAAQS = 35 ppm; Background 3.0 ppm		
Intersection		
Near Term		
	am	*pm*
La Jolla Village Drive and Towne Centre Drive	5.2	4.4
Towne Centre Drive and Executive Drive	3.6	3.7
Year 2035		
La Jolla Village Drive and Towne Centre Drive	3.7	3.7
Towne Centre Drive and Executive Drive	3.4	3.3
Maximum 8-hour Concentration Plus Background, ppm CAAQS = 20 ppm; NAAQS = 35 ppm; Background 2.1 ppm		
Near Term		
La Jolla Village Drive and Towne Centre Drive	3.64	
Towne Centre Drive and Executive Drive	2.59	
Year 2035		
La Jolla Village Drive and Towne Centre Drive	2.59	
Towne Centre Drive and Executive Drive	2.38	

4.3 Cumulatively Considerable Net Increase of Non-attainment Pollutants

The Proposed Project would have a significant impact if it results in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors.

As discussed in Section 2.0, the SDAB is considered a non-attainment area for the 8-hour NAAQS for O_3, and is considered a non-attainment area for the CAAQS for O_3, PM_{10}, and $PM_{2.5}$. An evaluation of emissions of non-attainment pollutants was conducted in Section 4.2. Based on that evaluation, emissions of non-attainment pollutants during construction would be below the significance thresholds for all nonattainment pollutants. This impact would be temporary. Emissions of all pollutants would be below the significance thresholds for operations.

There are no anticipated projects that would be under construction at the same time as the proposed project. Cumulative projects were considered in the Traffic Impact Study. The analysis in Section 4.2 demonstrated that no CO "hot spots" would result from cumulative traffic. Because operational emissions are below the significance thresholds for nonattainment pollutants, they would not result in a cumulatively considerable impact.

4.4 Exposure of Sensitive Receptors to Substantial Pollutant Concentrations

The Proposed Project would have a significant impact if it exposes sensitive receptors (including, but not limited to, schools, hospitals, resident care facilities, parks, or day-care centers) to substantial pollutant concentrations.

The threshold concerns whether the project could expose sensitive receptors to substantial pollutant concentrations of TACs. If a project has the potential to result in emissions of any TAC which result in a cancer risk of greater than 10 in 1 million or substantial non-cancer risk, the project would be deemed to have a potentially significant impact.

Air quality regulators typically define sensitive receptors as schools (Preschool-12th Grade), hospitals, resident care facilities, or day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. Residential land uses may also be considered sensitive receptors. The nearest sensitive receptors to the site include the Eastgate Christian School located on Eastgate Mall east of Genesee Avenue, the La Jolla Country Day School, located on Genesee Avenue just north of Eastgate Mall, and the Torah High School located to the south of the site at 9001 Towne Center Drive. The nearest residences are located approximately 500 feet to the south of the site at the corner of Towne Center Drive and Executive Drive.

Emissions of TACs are attributable to temporary emissions from construction emissions, and minor emissions associated with diesel truck traffic used for deliveries at the site. Truck traffic may result in emissions of diesel particulate matter, which is characterized by the State of California as a toxic air contaminant (TAC). Certain types of projects are recommended to be evaluated for impacts associated with TACs. In accordance with the SCAQMD's "Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis" (SCAQMD 2003), projects that should be evaluated for diesel particulate emissions include truck stops, distribution centers, warehouses, and transit centers which diesel vehicles would utilize and which would be sources of diesel particulate matter from heavy-duty diesel trucks. An office building would not attract a disproportionate amount of diesel trucks and would not be considered a source of TAC emissions. Based on the CalEEMod Model, heavy-duty diesel trucks would account for only 0.9 percent of the total trips associated with the project. Impacts to sensitive receptors from TAC emissions would therefore be less than significant.

4.5 Objectionable Odors

The Proposed Project would have a significant impact if it creates objectionable odors affecting a substantial number of people.

Project construction could result in minor amounts of odor compounds associated with diesel heavy equipment exhaust. These compounds would be emitted in various amounts and at various locations during construction. Sensitive receptors located in the vicinity of the construction site include the residences to the south of the site. Odors are highest near the source and would quickly dissipate offsite; any odors associated with construction would be temporary.

The Project is an office building and would not include land uses that would be sources of nuisance odors. Thus the potential for odor impacts associated with the project is less than significant.

5.0 Mitigation Measures

Standard best management practices to reduce emissions, including emissions of PM_{10}, will be employed during construction and operation of the project.

The Project is subject to the requirements of San Diego APCD Rule 55 and SDMC 142.0710, which requires that no visible dust be present beyond the site boundaries. Standard dust control measures will be employed during construction. These standard dust control measures include the following:

- Watering active grading sites a minimum of three times daily
- Apply soil stabilizers to inactive construction sites
- Replace ground cover in disturbed areas as soon as possible
- Control dust during equipment loading/unloading (load moist material, ensure at least 12 inches of freeboard in haul trucks
- Reduce speeds on unpaved roads to 15 mph or less
- Water unpaved roads a minimum of three times daily

These dust control measures will reduce the amount of fugitive dust generated during construction. In addition to dust control measures, architectural coatings applied to interior and exterior surfaces will be required to meet the ROG limitations of SDAPCD Rule 67.0, which limits the ROG content of most coatings to 150 grams/liter. Coatings will also be applied using high volume, low pressure spray equipment to reduce overspray to the extent possible.

Operational emissions would be below the significance thresholds for all pollutants. Air quality impacts are less than significant and no mitigation measures are required.

6.0 Summary and Conclusions

In summary, the proposed project would result in emissions of air pollutants for both the construction phase and operational phase of the project. The air quality impact analysis evaluated the potential for adverse impacts to the ambient air quality due to construction and operational emissions. Construction emissions would include emissions associated with fugitive dust, heavy construction equipment and construction worker commuting to and from the site. The project would employ dust control measures such as watering to control emissions during construction and use of low-ROG paints. Emissions are less than the significance thresholds for all pollutants during construction.

Operational emissions would include emissions associated with office and retail operations, including area sources, energy use, and vehicle traffic. As discussed in Section 4.0, the impacts would be below the significance thresholds for all pollutants. Impacts from project-related traffic were evaluated to assess whether impacts would exceed the ambient air quality standards for CO, and it was demonstrated that emissions of CO would not result in a significant air quality impact.

Emissions of TACs or odors would not result in a significant impact to the project, and project emissions of TACs and odors would be less than significant.

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Appendix A

CALINE4 Model Output

CalEEMod Model Output

CALINE4 Outputs

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

                JOB: LJV and Towne Ctr Near Term am
                RUN: Hour 1           (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=   0.0 PPM
     SIGTH=   10. DEGREES       TEMP=  16.0 DEGREE (C)


  II.  LINK VARIABLES

       LINK       *  LINK COORDINATES (M)    *                 EF     H     W
    DESCRIPTION   *   X1    Y1    X2    Y2   * TYPE  VPH  (G/MI)  (M)   (M)
  ----------------*--------------------------*------------------------------
  A. LJV EB LA    *  -150     0     0     0  *  AG   413    5.6   0.0  10.0
  B. LJV EB TA    *  -150   -12     0   -12  *  AG  1333    5.6   0.0  10.0
  C. LJV EB RA    *  -150   -16     0   -16  *  AG   140    5.6   0.0  10.0
  D. LJV EB TD    *     0   -12   150   -12  *  AG  2051    5.6   0.0  10.0
  E. LJV WB LA    *   150     0     0     0  *  AG   372    5.6   0.0  10.0
  F. LJV WB TA    *   150     9     0     9  *  AG  1609    5.6   0.0  10.0
  G. LJV WB RA    *   150     9     0     9  *  AG   978    5.6   0.0  10.0
  H. LJV WB TD    *     0     9  -150     9  *  AG  1887    5.6   0.0  10.0
  I. TC NB LA     *     0  -150     0     0  *  AG   220    5.6   0.0  10.0
  J. TC NB TA     *     5  -150     5     0  *  AG   206    5.6   0.0  10.0
  K. TC NB RA     *     8  -150     8     0  *  AG   481    5.6   0.0  10.0
  L. TC NB TD     *     5     0     5   150  *  AG  1597    5.6   0.0  10.0
  M. TC SB LA     *     0   150     0     0  *  AG   237    5.6   0.0  10.0
  N. TC SB TA     *    -7   150    -7     0  *  AG    33    5.6   0.0  10.0
  O. TC SB RA     *    -7   150    -7     0  *  AG    58    5.6   0.0  10.0
  P. TC SB TD     *    -7     0    -7  -150  *  AG   545    5.6   0.0  10.0
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             CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                      JUNE 1989 VERSION
                      PAGE   2

                 JOB: LJV and Towne Ctr Near Term am
                 RUN: Hour 1           (WORST CASE ANGLE)
           POLLUTANT: Carbon Monoxide
```

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-19	-26	1.8
2. Recpt 2	-19	-46	1.8
3. Recpt 3	-19	-66	1.8
4. Recpt 4	-39	-26	1.8
5. Recpt 5	-59	-26	1.8
6. Recpt 6	18	-22	1.8
7. Recpt 7	18	-42	1.8
8. Recpt 8	18	-62	1.8
9. Recpt 9	38	-22	1.8
10. Recpt 10	58	-22	1.8
11. Recpt 11	15	19	1.8
12. Recpt 12	15	39	1.8
13. Recpt 13	15	59	1.8
14. Recpt 14	35	19	1.8
15. Recpt 15	55	19	1.8
16. Recpt 16	-17	19	1.8
17. Recpt 17	-17	39	1.8
18. Recpt 18	-17	59	1.8
19. Recpt 19	-37	19	1.8
20. Recpt 20	-57	19	1.8

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: LJV and Towne Ctr Near Term am
RUN: Hour 1 (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	71.	1.7	0.0	0.0	0.0	0.7	0.1	0.3	0.2	0.0
2. Recpt 2	19.	1.2	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.1
3. Recpt 3	15.	1.2	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1
4. Recpt 4	72.	1.6	0.0	0.2	0.1	0.4	0.1	0.3	0.2	0.0
5. Recpt 5	75.	1.5	0.0	0.3	0.1	0.3	0.1	0.3	0.2	0.0
6. Recpt 6	345.	1.9	0.0	0.0	0.0	0.6	0.1	0.3	0.2	0.0
7. Recpt 7	348.	1.4	0.0	0.0	0.0	0.3	0.1	0.2	0.1	0.0
8. Recpt 8	350.	1.2	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0
9. Recpt 9	288.	1.6	0.1	0.2	0.0	0.6	0.0	0.0	0.0	0.4
10. Recpt 10	288.	1.7	0.1	0.1	0.0	0.8	0.0	0.0	0.0	0.4
11. Recpt 11	249.	2.0	0.1	0.3	0.0	0.0	0.0	0.1	0.1	0.7
12. Recpt 12	198.	1.6	0.0	0.1	0.0	0.1	0.0	0.2	0.1	0.0
13. Recpt 13	193.	1.5	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1
14. Recpt 14	250.	1.9	0.1	0.3	0.0	0.0	0.0	0.5	0.3	0.2
15. Recpt 15	254.	2.0	0.1	0.3	0.0	0.0	0.1	0.6	0.4	0.2
16. Recpt 16	106.	2.2	0.0	0.0	0.0	0.4	0.1	0.7	0.4	0.1
17. Recpt 17	116.	1.4	0.0	0.0	0.0	0.3	0.1	0.3	0.2	0.0
18. Recpt 18	123.	1.1	0.0	0.0	0.0	0.2	0.1	0.2	0.2	0.0
19. Recpt 19	103.	1.9	0.0	0.0	0.0	0.4	0.1	0.5	0.3	0.4
20. Recpt 20	102.	1.8	0.0	0.0	0.0	0.4	0.1	0.3	0.2	0.6

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: LJV and Towne Ctr Near Term am
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2
2. Recpt 2	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.2
3. Recpt 3	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.2
4. Recpt 4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
6. Recpt 6	0.0	0.0	0.1	0.6	0.1	0.0	0.0	0.0
7. Recpt 7	0.0	0.0	0.1	0.5	0.1	0.0	0.0	0.0
8. Recpt 8	0.0	0.0	0.2	0.4	0.1	0.0	0.0	0.0
9. Recpt 9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
10. Recpt 10	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0
12. Recpt 12	0.1	0.0	0.1	0.5	0.0	0.0	0.0	0.2
13. Recpt 13	0.1	0.0	0.1	0.6	0.0	0.0	0.0	0.2
14. Recpt 14	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0
17. Recpt 17	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0
18. Recpt 18	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0

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

               JOB: LJV and Towne Ctr Near Term pm
               RUN: Hour 1           (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

         U=   1.0 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=  0.0 PPM
     SIGTH=   10. DEGREES       TEMP= 37.0 DEGREE (C)


  II.  LINK VARIABLES
```

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. LJV EB LA	-150	0	0	0	AG	109	5.6	0.0	10.0
B. LJV EB TA	-150	-12	0	-12	AG	1594	5.6	0.0	10.0
C. LJV EB RA	-150	-16	0	-16	AG	248	5.6	0.0	10.0
D. LJV EB TD	0	-12	150	-12	AG	3103	5.6	0.0	10.0
E. LJV WB LA	150	0	0	0	AG	515	5.6	0.0	10.0
F. LJV WB TA	150	9	0	9	AG	1560	5.6	0.0	10.0
G. LJV WB RA	150	9	0	9	AG	288	5.6	0.0	10.0
H. LJV WB TD	0	9	-150	9	AG	2049	5.6	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	192	5.6	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	70	5.6	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	523	5.6	0.0	10.0
L. TC NB TD	5	0	5	150	AG	467	5.6	0.0	10.0
M. TC SB LA	0	150	0	0	AG	986	5.6	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	380	5.6	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	297	5.6	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	1143	5.6	0.0	10.0

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

                JOB: LJV and Towne Ctr Near Term pm
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


 III.  RECEPTOR LOCATIONS

              *    COORDINATES (M)
   RECEPTOR   *    X      Y      Z
 -------------*---------------------
  1. Recpt 1  *    -19    -26   1.8
  2. Recpt 2  *    -19    -46   1.8
  3. Recpt 3  *    -19    -66   1.8
  4. Recpt 4  *    -39    -26   1.8
  5. Recpt 5  *    -59    -26   1.8
  6. Recpt 6  *     18    -22   1.8
  7. Recpt 7  *     18    -42   1.8
  8. Recpt 8  *     18    -62   1.8
  9. Recpt 9  *     38    -22   1.8
 10. Recpt 10 *     58    -22   1.8
 11. Recpt 11 *     15     19   1.8
 12. Recpt 12 *     15     39   1.8
 13. Recpt 13 *     15     59   1.8
 14. Recpt 14 *     35     19   1.8
 15. Recpt 15 *     55     19   1.8
 16. Recpt 16 *    -17     19   1.8
 17. Recpt 17 *    -17     39   1.8
 18. Recpt 18 *    -17     59   1.8
 19. Recpt 19 *    -37     19   1.8
 20. Recpt 20 *    -57     19   1.8
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: LJV and Towne Ctr Near Term pm
RUN: Hour 1 (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	71.	1.3	0.0	0.0	0.0	0.6	0.1	0.2	0.0	0.0
2. Recpt 2	60.	0.9	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0
3. Recpt 3	15.	0.9	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
4. Recpt 4	73.	1.1	0.0	0.1	0.1	0.4	0.1	0.2	0.0	0.0
5. Recpt 5	75.	1.1	0.0	0.2	0.1	0.3	0.1	0.2	0.0	0.0
6. Recpt 6	339.	1.4	0.0	0.0	0.0	0.6	0.1	0.1	0.0	0.0
7. Recpt 7	345.	1.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
8. Recpt 8	348.	0.9	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
9. Recpt 9	296.	1.3	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.2
10. Recpt 10	292.	1.4	0.0	0.0	0.0	0.8	0.1	0.1	0.0	0.2
11. Recpt 11	250.	1.2	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.5
12. Recpt 12	196.	0.9	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0
13. Recpt 13	195.	0.8	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
14. Recpt 14	250.	1.1	0.0	0.2	0.0	0.0	0.0	0.3	0.1	0.2
15. Recpt 15	250.	1.1	0.0	0.2	0.0	0.0	0.1	0.4	0.1	0.1
16. Recpt 16	111.	1.4	0.0	0.0	0.0	0.4	0.1	0.4	0.1	0.2
17. Recpt 17	118.	1.0	0.0	0.0	0.0	0.3	0.1	0.2	0.1	0.0
18. Recpt 18	158.	0.9	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
19. Recpt 19	107.	1.3	0.0	0.0	0.0	0.4	0.1	0.2	0.0	0.4
20. Recpt 20	106.	1.2	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.5

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            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   4

                JOB: LJV and Towne Ctr Near Term pm
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE)     (CONT.)
```

RECEPTOR	I	J	K	L	M	N	O	P
	CONC/LINK (PPM)							
1. Recpt 1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
2. Recpt 2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
3. Recpt 3	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
6. Recpt 6	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0
7. Recpt 7	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0
8. Recpt 8	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0
9. Recpt 9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0
12. Recpt 12	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2
13. Recpt 13	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2
14. Recpt 14	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
15. Recpt 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
16. Recpt 16	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
17. Recpt 17	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0
18. Recpt 18	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0
19. Recpt 19	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

    JOB: Executive and Towne Centre Near Term am
    RUN: Hour 1           (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide
```

I. SITE VARIABLES

```
    U=   1.0 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=  0.0 PPM
SIGTH=   10. DEGREES        TEMP= 37.0 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Ex EB LA	-150	0	0	0	AG	47	5.6	0.0	10.0
B. Ex EB TA	-150	-4	0	-4	AG	200	5.6	0.0	10.0
C. Ex EB RA	-150	-8	0	-8	AG	46	5.6	0.0	10.0
D. Ex EB TD	0	-4	150	-4	AG	865	5.6	0.0	10.0
E. Ex WB LA	150	0	0	0	AG	118	5.6	0.0	10.0
F. Ex WB TA	150	4	0	4	AG	60	5.6	0.0	10.0
G. Ex WB RA	150	8	0	8	AG	19	5.6	0.0	10.0
H. Ex WB TD	0	4	-150	4	AG	273	5.6	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	186	5.6	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	847	5.6	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	633	5.6	0.0	10.0
L. TC NB TD	5	0	5	150	AG	913	5.6	0.0	10.0
M. TC SB LA	0	150	0	0	AG	32	5.6	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	121	5.6	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	27	5.6	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	285	5.6	0.0	10.0

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

               JOB: Executive and Towne Centre Near Term am
               RUN: Hour 1           (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide


 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X      Y      Z
 ------------*---------------------
  1. Recpt 1  *    -18    -18   1.8
  2. Recpt 2  *    -18    -38   1.8
  3. Recpt 3  *    -18    -58   1.8
  4. Recpt 4  *    -38    -18   1.8
  5. Recpt 5  *    -58    -18   1.8
  6. Recpt 6  *     18    -14   1.8
  7. Recpt 7  *     18    -34   1.8
  8. Recpt 8  *     18    -54   1.8
  9. Recpt 9  *     38    -14   1.8
 10. Recpt 10 *     58    -14   1.8
 11. Recpt 11 *     15     18   1.8
 12. Recpt 12 *     15     38   1.8
 13. Recpt 13 *     15     58   1.8
 14. Recpt 14 *     35     18   1.8
 15. Recpt 15 *     55     18   1.8
 16. Recpt 16 *    -17     14   1.8
 17. Recpt 17 *    -17     34   1.8
 18. Recpt 18 *    -17     54   1.8
 19. Recpt 19 *    -37     14   1.8
 20. Recpt 20 *    -57     14   1.8
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: Executive and Towne Centre Near Term am
RUN: Hour 1 (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	75.	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
2. Recpt 2	45.	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3. Recpt 3	33.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
4. Recpt 4	78.	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
5. Recpt 5	80.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
6. Recpt 6	310.	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
7. Recpt 7	336.	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
8. Recpt 8	341.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	287.	0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
10. Recpt 10	285.	0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
11. Recpt 11	191.	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
12. Recpt 12	190.	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
13. Recpt 13	189.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	203.	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
15. Recpt 15	209.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
16. Recpt 16	162.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
17. Recpt 17	164.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	166.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	106.	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
20. Recpt 20	104.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: Executive and Towne Centre Near Term am
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	I	J	K	L	M	N	O	P
	CONC/LINK (PPM)							
1. Recpt 1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
2. Recpt 2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
3. Recpt 3	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
4. Recpt 4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
7. Recpt 7	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0
8. Recpt 8	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0
9. Recpt 9	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.1
12. Recpt 12	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1
13. Recpt 13	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.1
14. Recpt 14	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1
17. Recpt 17	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.1
18. Recpt 18	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

JOB: Executive and Towne Centre Near Term pm
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 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= 0.0 PPM	
SIGTH= 10. DEGREES	TEMP= 37.0 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Ex EB LA	-150	0	0	0	AG	21	5.6	0.0	10.0
B. Ex EB TA	-150	-4	0	-4	AG	85	5.6	0.0	10.0
C. Ex EB RA	-150	-8	0	-8	AG	127	5.6	0.0	10.0
D. Ex EB TD	0	-4	150	-4	AG	357	5.6	0.0	10.0
E. Ex WB LA	150	0	0	0	AG	509	5.6	0.0	10.0
F. Ex WB TA	150	4	0	4	AG	178	5.6	0.0	10.0
G. Ex WB RA	150	8	0	8	AG	29	5.6	0.0	10.0
H. Ex WB TD	0	4	-150	4	AG	442	5.6	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	183	5.6	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	167	5.6	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	256	5.6	0.0	10.0
L. TC NB TD	5	0	5	150	AG	217	5.6	0.0	10.0
M. TC SB LA	0	150	0	0	AG	16	5.6	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	730	5.6	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	81	5.6	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	1366	5.6	0.0	10.0

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

                JOB: Executive and Towne Centre Near Term pm
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


  III.  RECEPTOR LOCATIONS

               *    COORDINATES (M)
    RECEPTOR   *    X      Y      Z
  -------------*---------------------
   1. Recpt 1  *    -18    -18   1.8
   2. Recpt 2  *    -18    -38   1.8
   3. Recpt 3  *    -18    -58   1.8
   4. Recpt 4  *    -38    -18   1.8
   5. Recpt 5  *    -58    -18   1.8
   6. Recpt 6  *     18    -14   1.8
   7. Recpt 7  *     18    -34   1.8
   8. Recpt 8  *     18    -54   1.8
   9. Recpt 9  *     38    -14   1.8
  10. Recpt 10 *     58    -14   1.8
  11. Recpt 11 *     15     18   1.8
  12. Recpt 12 *     15     38   1.8
  13. Recpt 13 *     15     58   1.8
  14. Recpt 14 *     35     18   1.8
  15. Recpt 15 *     55     18   1.8
  16. Recpt 16 *    -17     14   1.8
  17. Recpt 17 *    -17     34   1.8
  18. Recpt 18 *    -17     54   1.8
  19. Recpt 19 *    -37     14   1.8
  20. Recpt 20 *    -57     14   1.8
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: Executive and Towne Centre Near Term pm
RUN: Hour 1 (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	73.	0.6	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
2. Recpt 2	45.	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
3. Recpt 3	26.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	77.	0.5	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
5. Recpt 5	79.	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
6. Recpt 6	284.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7. Recpt 7	337.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	340.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	286.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
10. Recpt 10	285.	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1
11. Recpt 11	195.	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
12. Recpt 12	193.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	191.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	207.	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
15. Recpt 15	238.	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
16. Recpt 16	165.	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
17. Recpt 17	168.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
18. Recpt 18	169.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	104.	0.5	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1
20. Recpt 20	102.	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1

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          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   4

              JOB: Executive and Towne Centre Near Term pm
              RUN: Hour 1           (WORST CASE ANGLE)
        POLLUTANT: Carbon Monoxide
```

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	*	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
2. Recpt 2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
3. Recpt 3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
4. Recpt 4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5. Recpt 5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
6. Recpt 6	*	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
7. Recpt 7	*	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
8. Recpt 8	*	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1
9. Recpt 9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
10. Recpt 10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	*	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2
12. Recpt 12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
13. Recpt 13	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
14. Recpt 14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
15. Recpt 15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
16. Recpt 16	*	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.4
17. Recpt 17	*	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.3
18. Recpt 18	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
19. Recpt 19	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
20. Recpt 20	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

              JOB: LJV and Towne Ctr Horizon am
              RUN: Hour 1           (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=  0.0 PPM
    SIGTH=   10. DEGREES       TEMP= 16.0 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. LJV EB LA	-150	0	0	0	AG	481	1.8	0.0	10.0
B. LJV EB TA	-150	-12	0	-12	AG	1373	1.8	0.0	10.0
C. LJV EB RA	-150	-16	0	-16	AG	144	1.8	0.0	10.0
D. LJV EB TD	0	-12	150	-12	AG	2112	1.8	0.0	10.0
E. LJV WB LA	150	0	0	0	AG	383	1.8	0.0	10.0
F. LJV WB TA	150	9	0	9	AG	1657	1.8	0.0	10.0
G. LJV WB RA	150	9	0	9	AG	1140	1.8	0.0	10.0
H. LJV WB TD	0	9	-150	9	AG	1944	1.8	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	227	1.8	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	240	1.8	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	495	1.8	0.0	10.0
L. TC NB TD	5	0	5	150	AG	1861	1.8	0.0	10.0
M. TC SB LA	0	150	0	0	AG	244	1.8	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	34	1.8	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	60	1.8	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	561	1.8	0.0	10.0

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

                JOB: LJV and Towne Ctr Horizon am
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide
```

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-19	-26	1.8
2. Recpt 2	-19	-46	1.8
3. Recpt 3	-19	-66	1.8
4. Recpt 4	-39	-26	1.8
5. Recpt 5	-59	-26	1.8
6. Recpt 6	18	-22	1.8
7. Recpt 7	18	-42	1.8
8. Recpt 8	18	-62	1.8
9. Recpt 9	38	-22	1.8
10. Recpt 10	58	-22	1.8
11. Recpt 11	15	19	1.8
12. Recpt 12	15	39	1.8
13. Recpt 13	15	59	1.8
14. Recpt 14	35	19	1.8
15. Recpt 15	55	19	1.8
16. Recpt 16	-17	19	1.8
17. Recpt 17	-17	39	1.8
18. Recpt 18	-17	59	1.8
19. Recpt 19	-37	19	1.8
20. Recpt 20	-57	19	1.8

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: LJV and Towne Ctr Horizon am
RUN: Hour 1 (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	71.	0.6	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0
2. Recpt 2	19.	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	15.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	72.	0.5	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.0
5. Recpt 5	75.	0.5	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.0
6. Recpt 6	345.	0.6	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0
7. Recpt 7	348.	0.5	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
8. Recpt 8	350.	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
9. Recpt 9	288.	0.5	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1
10. Recpt 10	288.	0.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
11. Recpt 11	225.	0.7	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.0
12. Recpt 12	198.	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
13. Recpt 13	193.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	250.	0.7	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.1
15. Recpt 15	253.	0.7	0.0	0.1	0.0	0.0	0.0	0.2	0.2	0.0
16. Recpt 16	106.	0.7	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.0
17. Recpt 17	116.	0.5	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0
18. Recpt 18	123.	0.4	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0
19. Recpt 19	103.	0.7	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1
20. Recpt 20	102.	0.6	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: LJV and Towne Ctr Horizon am
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2. Recpt 2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
3. Recpt 3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
7. Recpt 7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
8. Recpt 8	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
9. Recpt 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
12. Recpt 12	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
13. Recpt 13	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
14. Recpt 14	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
17. Recpt 17	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
18. Recpt 18	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

JOB: LJV and Towne Ctr Horizon pm
RUN: Hour 1 (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= 0.0 PPM	
SIGTH= 10. DEGREES	TEMP= 16.0 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. LJV EB LA	-150	0	0	0	AG	127	1.8	0.0	10.0
B. LJV EB TA	-150	-12	0	-12	AG	1642	1.8	0.0	10.0
C. LJV EB RA	-150	-16	0	-16	AG	255	1.8	0.0	10.0
D. LJV EB TD	0	-12	150	-12	AG	3197	1.8	0.0	10.0
E. LJV WB LA	150	0	0	0	AG	530	1.8	0.0	10.0
F. LJV WB TA	150	9	0	9	AG	1607	1.8	0.0	10.0
G. LJV WB RA	150	9	0	9	AG	336	1.8	0.0	10.0
H. LJV WB TD	0	9	-150	9	AG	2111	1.8	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	198	1.8	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	82	1.8	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	539	1.8	0.0	10.0
L. TC NB TD	5	0	5	150	AG	545	1.8	0.0	10.0
M. TC SB LA	0	150	0	0	AG	1016	1.8	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	391	1.8	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	306	1.8	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	1176	1.8	0.0	10.0

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

JOB: LJV and Towne Ctr Horizon pm
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-19	-26	1.8
2. Recpt 2	-19	-46	1.8
3. Recpt 3	-19	-66	1.8
4. Recpt 4	-39	-26	1.8
5. Recpt 5	-59	-26	1.8
6. Recpt 6	18	-22	1.8
7. Recpt 7	18	-42	1.8
8. Recpt 8	18	-62	1.8
9. Recpt 9	38	-22	1.8
10. Recpt 10	58	-22	1.8
11. Recpt 11	15	19	1.8
12. Recpt 12	15	39	1.8
13. Recpt 13	15	59	1.8
14. Recpt 14	35	19	1.8
15. Recpt 15	55	19	1.8
16. Recpt 16	-17	19	1.8
17. Recpt 17	-17	39	1.8
18. Recpt 18	-17	59	1.8
19. Recpt 19	-37	19	1.8
20. Recpt 20	-57	19	1.8

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: LJV and Towne Ctr Horizon pm
RUN: Hour 1 (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	71.	0.7	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0
2. Recpt 2	63.	0.5	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
3. Recpt 3	12.	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	75.	0.6	0.0	0.1	0.0	0.2	0.1	0.1	0.0	0.0
5. Recpt 5	76.	0.6	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.0
6. Recpt 6	340.	0.7	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
7. Recpt 7	346.	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
8. Recpt 8	348.	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
9. Recpt 9	296.	0.7	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.1
10. Recpt 10	292.	0.7	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.1
11. Recpt 11	252.	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3
12. Recpt 12	193.	0.5	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
13. Recpt 13	193.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	254.	0.6	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1
15. Recpt 15	254.	0.6	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.1
16. Recpt 16	107.	0.7	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.0
17. Recpt 17	119.	0.5	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
18. Recpt 18	159.	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
19. Recpt 19	106.	0.7	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.2
20. Recpt 20	104.	0.6	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.2

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: LJV and Towne Ctr Horizon pm
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2. Recpt 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3. Recpt 3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
7. Recpt 7	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
8. Recpt 8	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
9. Recpt 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
12. Recpt 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13. Recpt 13	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1
14. Recpt 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
17. Recpt 17	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
18. Recpt 18	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

                JOB: Towne Ctr and Executive Horizon am
                RUN: Hour 1           (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=   0.0 PPM
     SIGTH=   10. DEGREES       TEMP= 16.0 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Ex EB LA	-150	0	0	0	AG	58	1.8	0.0	10.0
B. Ex EB TA	-150	-4	0	-4	AG	206	1.8	0.0	10.0
C. Ex EB RA	-150	-8	0	-8	AG	54	1.8	0.0	10.0
D. Ex EB TD	0	-4	150	-4	AG	891	1.8	0.0	10.0
E. Ex WB LA	150	0	0	0	AG	138	1.8	0.0	10.0
F. Ex WB TA	150	4	0	4	AG	62	1.8	0.0	10.0
G. Ex WB RA	150	8	0	8	AG	24	1.8	0.0	10.0
H. Ex WB TD	0	4	-150	4	AG	282	1.8	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	192	1.8	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	1050	1.8	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	652	1.8	0.0	10.0
L. TC NB TD	5	0	5	150	AG	1132	1.8	0.0	10.0
M. TC SB LA	0	150	0	0	AG	33	1.8	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	141	1.8	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	28	1.8	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	333	1.8	0.0	10.0

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

               JOB: Towne Ctr and Executive Horizon am
               RUN: Hour 1           (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide
```

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-19	-18	1.8
2. Recpt 2	-19	-38	1.8
3. Recpt 3	-19	-58	1.8
4. Recpt 4	-39	-18	1.8
5. Recpt 5	-59	-18	1.8
6. Recpt 6	18	-14	1.8
7. Recpt 7	18	-34	1.8
8. Recpt 8	18	-54	1.8
9. Recpt 9	38	-14	1.8
10. Recpt 10	58	-14	1.8
11. Recpt 11	15	18	1.8
12. Recpt 12	15	38	1.8
13. Recpt 13	15	58	1.8
14. Recpt 14	35	18	1.8
15. Recpt 15	55	18	1.8
16. Recpt 16	-17	14	1.8
17. Recpt 17	-17	34	1.8
18. Recpt 18	-17	54	1.8
19. Recpt 19	-37	14	1.8
20. Recpt 20	-57	14	1.8

```
          CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                   JUNE 1989 VERSION
                   PAGE   3

              JOB: Towne Ctr and Executive Horizon am
              RUN: Hour 1           (WORST CASE ANGLE)
        POLLUTANT: Carbon Monoxide


  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   *   76. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
  2. Recpt 2   *   67. *   0.2 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
  3. Recpt 3   *   33. *   0.2 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  4. Recpt 4   *   79. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
  5. Recpt 5   *   81. *   0.2 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
  6. Recpt 6   *  310. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
  7. Recpt 7   *  336. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  8. Recpt 8   *  342. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  9. Recpt 9   *  286. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 10. Recpt 10  *  282. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 11. Recpt 11  *  191. *   0.4 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 12. Recpt 12  *  189. *   0.4 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 13. Recpt 13  *  188. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 14. Recpt 14  *  201. *   0.3 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 15. Recpt 15  *  209. *   0.2 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 16. Recpt 16  *  163. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 17. Recpt 17  *  166. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 18. Recpt 18  *  167. *   0.3 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 19. Recpt 19  *  105. *   0.2 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
 20. Recpt 20  *  102. *   0.2 *  0.0  0.0  0.0  0.1  0.0  0.0  0.0  0.0
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: Towne Ctr and Executive Horizon am
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2. Recpt 2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
7. Recpt 7	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
8. Recpt 8	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
13. Recpt 13	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
14. Recpt 14	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
17. Recpt 17	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

              JOB: Towne Ctr and Executive Horizon pm
              RUN: Hour 1            (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=  0.0 PPM
  SIGTH=   10. DEGREES       TEMP= 16.0 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Ex EB LA	-150	0	0	0	AG	26	1.8	0.0	10.0
B. Ex EB TA	-150	-4	0	-4	AG	88	1.8	0.0	10.0
C. Ex EB RA	-150	-8	0	-8	AG	148	1.8	0.0	10.0
D. Ex EB TD	0	-4	150	-4	AG	368	1.8	0.0	10.0
E. Ex WB LA	150	0	0	0	AG	593	1.8	0.0	10.0
F. Ex WB TA	150	4	0	4	AG	183	1.8	0.0	10.0
G. Ex WB RA	150	8	0	8	AG	36	1.8	0.0	10.0
H. Ex WB TD	0	4	-150	4	AG	454	1.8	0.0	10.0
I. TC NB LA	0	-150	0	0	AG	188	1.8	0.0	10.0
J. TC NB TA	5	-150	5	0	AG	207	1.8	0.0	10.0
K. TC NB RA	8	-150	8	0	AG	264	1.8	0.0	10.0
L. TC NB TD	5	0	5	150	AG	269	1.8	0.0	10.0
M. TC SB LA	0	150	0	0	AG	16	1.8	0.0	10.0
N. TC SB TA	-7	150	-7	0	AG	851	1.8	0.0	10.0
O. TC SB RA	-7	150	-7	0	AG	83	1.8	0.0	10.0
P. TC SB TD	-7	0	-7	-150	AG	1137	1.8	0.0	10.0

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

                JOB: Towne Ctr and Executive Horizon pm
                RUN: Hour 1            (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


  III.  RECEPTOR LOCATIONS

               *    COORDINATES (M)
    RECEPTOR   *    X       Y      Z
  ------------*---------------------
   1. Recept 1  *    -19     -18    1.8
   2. Recept 2  *    -19     -38    1.8
   3. Recept 3  *    -19     -58    1.8
   4. Recept 4  *    -39     -18    1.8
   5. Recept 5  *    -59     -18    1.8
   6. Recept 6  *     18     -14    1.8
   7. Recept 7  *     18     -34    1.8
   8. Recept 8  *     18     -54    1.8
   9. Recept 9  *     38     -14    1.8
  10. Recept 10 *     58     -14    1.8
  11. Recept 11 *     15      18    1.8
  12. Recept 12 *     15      38    1.8
  13. Recept 13 *     15      58    1.8
  14. Recept 14 *     35      18    1.8
  15. Recept 15 *     55      18    1.8
  16. Recept 16 *    -17      14    1.8
  17. Recept 17 *    -17      34    1.8
  18. Recept 18 *    -17      54    1.8
  19. Recept 19 *    -37      14    1.8
  20. Recept 20 *    -57      14    1.8
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: Towne Ctr and Executive Horizon pm
RUN: Hour 1 (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	74.	0.3	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
2. Recpt 2	66.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. Recpt 3	25.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. Recpt 4	78.	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
5. Recpt 5	80.	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
6. Recpt 6	282.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7. Recpt 7	341.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. Recpt 8	344.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9. Recpt 9	286.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	284.	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
11. Recpt 11	193.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Recpt 12	192.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Recpt 13	191.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14. Recpt 14	203.	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15. Recpt 15	241.	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
16. Recpt 16	166.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17. Recpt 17	167.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Recpt 18	169.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19. Recpt 19	102.	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
20. Recpt 20	100.	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: Towne Ctr and Executive Horizon pm
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. Recpt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2. Recpt 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3. Recpt 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
4. Recpt 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5. Recpt 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. Recpt 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7. Recpt 7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
8. Recpt 8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
9. Recpt 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. Recpt 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Recpt 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
12. Recpt 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13. Recpt 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
14. Recpt 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
15. Recpt 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16. Recpt 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
17. Recpt 17	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
18. Recpt 18	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
19. Recpt 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20. Recpt 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

9455 Towne Centre Drive

San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	150.00	1000sqft	2.90	150,000.00	0
Other Asphalt Surfaces	600.00		1.00	240,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	525.96	**CH4 Intensity (lb/MWhr)**	0.021	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Trips and VMT -

Area Coating - Rule 67.0.1 coatings

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	250.00	100.00
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	100
tblConstructionPhase	NumDays	18.00	132.00
tblConstructionPhase	NumDays	230.00	393.00
tblConstructionPhase	NumDays	20.00	66.00
tblConstructionPhase	NumDays	8.00	129.00

tblConstructionPhase	NumDays	18.00	132.00
tblConstructionPhase	PhaseEndDate	7/3/2018	12/31/2017
tblConstructionPhase	PhaseEndDate	1/2/2019	12/31/2017
tblConstructionPhase	PhaseEndDate	1/2/2017	12/31/2016
tblConstructionPhase	PhaseEndDate	6/29/2017	6/30/2017
tblConstructionPhase	PhaseEndDate	7/3/2018	12/31/2017
tblConstructionPhase	PhaseStartDate	1/1/2018	7/1/2017
tblConstructionPhase	PhaseStartDate	1/1/2018	7/1/2017
tblEnergyUse	T24E	5.69	4.44
tblEnergyUse	T24NG	16.83	14.00
tblGrading	AcresOfGrading	64.50	4.00
tblGrading	MaterialExported	0.00	52,610.00
tblLandUse	LotAcreage	3.44	2.90
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	5.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	720.49	525.96
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblProjectCharacteristics	OperationalYear	2014	2018
tblSequestration	NumberOfNewTrees	0.00	120.00
tblVehicleEF	HHD	0.02	0.03
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	2.97	3.16
tblVehicleEF	HHD	1.41	1.37
tblVehicleEF	HHD	69.82	65.60
tblVehicleEF	HHD	548.96	528.33
tblVehicleEF	HHD	1,611.58	1,547.78
tblVehicleEF	HHD	53.95	50.38
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.01	8.5820e-003

tblVehicleEF	LDA	0.94	0.82
tblVehicleEF	LDA	2.29	1.98
tblVehicleEF	LDA	266.09	236.93
tblVehicleEF	LDA	57.02	52.29
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	1.82	1.56
tblVehicleEF	LDT1	4.33	3.69
tblVehicleEF	LDT1	320.90	288.86
tblVehicleEF	LDT1	68.28	63.53
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.01	8.2780e-003
tblVehicleEF	LDT2	1.10	0.93
tblVehicleEF	LDT2	2.66	2.20
tblVehicleEF	LDT2	391.32	353.78
tblVehicleEF	LDT2	83.07	77.49
tblVehicleEF	LHD1	1.1810e-003	1.1720e-003
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	0.17	0.17
tblVehicleEF	LHD1	1.79	1.50
tblVehicleEF	LHD1	4.10	3.75
tblVehicleEF	LHD1	8.29	7.98
tblVehicleEF	LHD1	762.67	734.00
tblVehicleEF	LHD1	37.84	36.60
tblVehicleEF	LHD2	8.7600e-004	8.7100e-004
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	9.6180e-003
tblVehicleEF	LHD2	0.13	0.13
tblVehicleEF	LHD2	1.15	0.99

tblVehicleEF	LHD2	2.06	1.83
tblVehicleEF	LHD2	9.18	8.84
tblVehicleEF	LHD2	647.50	623.36
tblVehicleEF	LHD2	23.01	22.28
tblVehicleEF	MCY	29.57	28.19
tblVehicleEF	MCY	10.18	10.27
tblVehicleEF	MCY	159.85	156.52
tblVehicleEF	MCY	40.97	38.51
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	1.94	1.68
tblVehicleEF	MDV	4.76	4.19
tblVehicleEF	MDV	522.26	474.87
tblVehicleEF	MDV	109.79	103.31
tblVehicleEF	MH	3.13	2.03
tblVehicleEF	MH	7.80	6.63
tblVehicleEF	MH	707.64	681.06
tblVehicleEF	MH	29.65	28.25
tblVehicleEF	MHD	7.5000e-003	7.6150e-003
tblVehicleEF	MHD	6.4210e-003	5.1900e-003
tblVehicleEF	MHD	1.86	1.91
tblVehicleEF	MHD	1.01	0.77
tblVehicleEF	MHD	19.57	16.82
tblVehicleEF	MHD	590.85	572.06
tblVehicleEF	MHD	1,036.88	995.11
tblVehicleEF	MHD	53.28	49.80
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	2.8930e-003	2.8860e-003
tblVehicleEF	OBUS	2.48	2.74
tblVehicleEF	OBUS	1.65	1.34

tblVehicleEF	OBUS	12.02	10.77
tblVehicleEF	OBUS	554.85	534.88
tblVehicleEF	OBUS	1,075.89	1,037.87
tblVehicleEF	OBUS	34.25	32.81
tblVehicleEF	SBUS	4.3220e-003	4.4530e-003
tblVehicleEF	SBUS	5.2470e-003	5.3930e-003
tblVehicleEF	SBUS	0.99	1.05
tblVehicleEF	SBUS	6.19	4.24
tblVehicleEF	SBUS	38.94	34.11
tblVehicleEF	SBUS	563.29	547.00
tblVehicleEF	SBUS	1,069.34	1,024.49
tblVehicleEF	SBUS	126.56	116.73
tblVehicleEF	UBUS	3.27	3.03
tblVehicleEF	UBUS	5.79	5.66
tblVehicleEF	UBUS	2,074.59	1,981.57
tblVehicleEF	UBUS	23.77	22.78
tblVehicleTrips	CC_TL	7.30	5.80
tblVehicleTrips	CNW_TL	7.30	5.80
tblVehicleTrips	CW_TL	9.50	5.80
tblVehicleTrips	WD_TR	11.01	10.00
tblWaterMitigation	PercentReductionInFlowBathroomFaucet	32	36
tblWaterMitigation	PercentReductionInFlowKitchenFaucet	18	24
tblWaterMitigation	PercentReductionInFlowShower	20	27
tblWaterMitigation	PercentReductionInFlowToilet	20	31
tblWaterMitigation	UseWaterEfficientIrrigationSystemPercentReduction	6.1	20

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					
2016	4.4036	46.6260	36.3500	0.0439	0.8915	2.3055	3.1970	0.1560	2.1488	2.3048	0.0000	4,463.9380	4,463.9380	1.1203	0.0000	4,487.4649
2017	26.6158	67.4514	62.4134	0.1077	7.1186	4.1635	9.3298	3.5971	3.9693	5.6314	0.0000	10,033.9150	10,033.9150	1.6100	0.0000	10,067.7241
Total	**31.0194**	**114.0774**	**98.7635**	**0.1516**	**8.0101**	**6.4690**	**12.5268**	**3.7531**	**6.1181**	**7.9362**	**0.0000**	**14,497.8530**	**14,497.8530**	**2.7303**	**0.0000**	**14,555.1891**

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					
2016	4.4036	46.6260	36.3500	0.0439	0.4577	2.3055	2.7632	0.0903	2.1488	2.2391	0.0000	4,463.9380	4,463.9380	1.1203	0.0000	4,487.4649
2017	26.6158	67.4514	62.4134	0.1077	3.3901	4.1635	6.2231	1.5704	3.9693	4.5241	0.0000	10,033.9150	10,033.9150	1.6100	0.0000	10,067.7241
Total	**31.0194**	**114.0774**	**98.7635**	**0.1516**	**3.8478**	**6.4690**	**8.9862**	**1.6607**	**6.1181**	**6.7632**	**0.0000**	**14,497.8530**	**14,497.8530**	**2.7303**	**0.0000**	**14,555.1891**

	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**	**51.96**	**0.00**	**28.26**	**55.75**	**0.00**	**14.78**	**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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Energy	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Mobile	4.3095	7.4593	36.1194	0.0828	5.4824	0.0996	5.5820	1.4635	0.0918	1.5553		6,758.0702	6,758.0702	0.2734		6,763.8106
Total	**14.8484**	**8.1933**	**36.8130**	**0.0872**	**5.4824**	**0.1556**	**5.6380**	**1.4635**	**0.1478**	**1.6113**		**7,638.1699**	**7,638.1699**	**0.2907**	**0.0161**	**7,649.2749**

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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Energy	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Mobile	4.2035	6.8925	33.7292	0.0749	4.9341	0.0908	5.0249	1.3171	0.0837	1.4008		6,112.4750	6,112.4750	0.2503		6,117.7310
Total	**14.7423**	**7.6265**	**34.4228**	**0.0793**	**4.9341**	**0.1468**	**5.0810**	**1.3171**	**0.1397**	**1.4568**		**6,992.5746**	**6,992.5746**	**0.2676**	**0.0161**	**7,003.1953**

	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	**0.71**	**6.92**	**6.49**	**9.06**	**10.00**	**5.65**	**9.88**	**10.00**	**5.49**	**9.59**	**0.00**	**8.45**	**8.45**	**7.93**	**0.00**	**8.45**

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	10/1/2016	12/31/2016	5	66	
2	Grading	Grading	1/1/2017	6/30/2017	5	129	
3	Building Construction	Building Construction	7/1/2017	12/31/2017	5	393	
4	Paving	Paving	7/1/2017	12/31/2017	5	132	
5	Architectural Coating	Architectural Coating	7/1/2017	12/31/2017	5	132	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 585,000; Non-Residential Outdoor: 195,000 (Architectural Coating –

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	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	3	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	5	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	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	6	15.00	0.00	214.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	6,576.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	15	149.00	64.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2016

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					0.7111	0.0000	0.7111	0.1077	0.0000	0.1077			0.0000			0.0000
Off-Road	4.2876	45.6559	35.0303	0.0399		2.2921	2.2921		2.1365	2.1365		4,089.2841	4,089.2841	1.1121		4,112.6374
Total	**4.2876**	**45.6559**	**35.0303**	**0.0399**	**0.7111**	**2.2921**	**3.0032**	**0.1077**	**2.1365**	**2.2442**		**4,089.2841**	**4,089.2841**	**1.1121**		**4,112.6374**

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	0.0636	0.9086	0.6486	2.4200e-003	0.0572	0.0124	0.0696	0.0156	0.0114	0.0271		244.3742	244.3742	1.7400e-003		244.4107
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	0.0524	0.0615	0.6711	1.5600e-003	0.1232	9.2000e-004	0.1242	0.0327	8.5000e-004	0.0335		130.2798	130.2798	6.5300e-003		130.4169
Total	**0.1160**	**0.9702**	**1.3197**	**3.9800e-003**	**0.1804**	**0.0133**	**0.1937**	**0.0483**	**0.0123**	**0.0606**		**374.6540**	**374.6540**	**8.2700e-003**		**374.8276**

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					0.2773	0.0000	0.2773	0.0420	0.0000	0.0420			0.0000			0.0000
Off-Road	4.2876	45.6559	35.0303	0.0399		2.2921	2.2921		2.1365	2.1365	0.0000	4,089.2841	4,089.2841	1.1121		4,112.6374
Total	**4.2876**	**45.6559**	**35.0303**	**0.0399**	**0.2773**	**2.2921**	**2.5695**	**0.0420**	**2.1365**	**2.1785**	**0.0000**	**4,089.2841**	**4,089.2841**	**1.1121**		**4,112.6374**

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	0.0636	0.9086	0.6486	2.4200e-003	0.0572	0.0124	0.0696	0.0156	0.0114	0.0271		244.3742	244.3742	1.7400e-003		244.4107
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	0.0524	0.0615	0.6711	1.5600e-003	0.1232	9.2000e-004	0.1242	0.0327	8.5000e-004	0.0335		130.2798	130.2798	6.5300e-003		130.4169
Total	**0.1160**	**0.9702**	**1.3197**	**3.9800e-003**	**0.1804**	**0.0133**	**0.1937**	**0.0483**	**0.0123**	**0.0606**		**374.6540**	**374.6540**	**8.2700e-003**		**374.8276**

3.3 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					6.1123	0.0000	6.1123	3.3225	0.0000	3.3225			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757		3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**6.1123**	**2.0388**	**8.1511**	**3.3225**	**1.8757**	**5.1982**		**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

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	0.9359	12.7383	9.7252	0.0381	0.8831	0.1715	1.0546	0.2420	0.1578	0.3998		3,776.5701	3,776.5701	0.0261		3,777.1190
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	0.0477	0.0559	0.6070	1.5600e-003	0.1232	9.0000e-004	0.1241	0.0327	8.3000e-004	0.0335		125.2526	125.2526	6.0400e-003		125.3794
Total	**0.9835**	**12.7943**	**10.3322**	**0.0396**	**1.0063**	**0.1724**	**1.1788**	**0.2746**	**0.1586**	**0.4333**		**3,901.8227**	**3,901.8227**	**0.0322**		**3,902.4985**

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					2.3838	0.0000	2.3838	1.2958	0.0000	1.2958			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757	0.0000	3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**2.3838**	**2.0388**	**4.4226**	**1.2958**	**1.8757**	**3.1715**	**0.0000**	**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

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	0.9359	12.7383	9.7252	0.0381	0.8831	0.1715	1.0546	0.2420	0.1578	0.3998		3,776.5701	3,776.5701	0.0261		3,777.1190
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	0.0477	0.0559	0.6070	1.5600e-003	0.1232	9.0000e-004	0.1241	0.0327	8.3000e-004	0.0335		125.2526	125.2526	6.0400e-003		125.3794
Total	**0.9835**	**12.7943**	**10.3322**	**0.0396**	**1.0063**	**0.1724**	**1.1788**	**0.2746**	**0.1586**	**0.4333**		**3,901.8227**	**3,901.8227**	**0.0322**		**3,902.4985**

3.4 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	6.2461	42.2970	33.3269	0.0502		2.8931	2.8931		2.7849	2.7849		4,715.7854	4,715.7854	0.9302		4,735.3192
Total	**6.2461**	**42.2970**	**33.3269**	**0.0502**		**2.8931**	**2.8931**		**2.7849**	**2.7849**		**4,715.7854**	**4,715.7854**	**0.9302**		**4,735.3192**

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	0.6120	5.4240	6.6825	0.0152	0.4248	0.0796	0.5044	0.1212	0.0732	0.1944		1,501.1705	1,501.1705	0.0112		1,501.4047
Worker	0.4734	0.5555	6.0291	0.0155	1.2240	8.9000e-003	1.2329	0.3247	8.2100e-003	0.3329		1,244.1760	1,244.1760	0.0600		1,245.4358
Total	**1.0854**	**5.9795**	**12.7116**	**0.0307**	**1.6488**	**0.0885**	**1.7373**	**0.4459**	**0.0814**	**0.5273**		**2,745.3465**	**2,745.3465**	**0.0711**		**2,746.8405**

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	6.2461	42.2970	33.3269	0.0502		2.8931	2.8931		2.7849	2.7849	0.0000	4,715.7854	4,715.7854	0.9302		4,735.3192

Total	**6.2461**	**42.2970**	**33.3269**	**0.0502**		**2.8931**	**2.8931**		**2.7849**	**2.7849**	**0.0000**	**4,715.7854**	**4,715.7854**	**0.9302**		**4,735.3192**

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	0.6120	5.4240	6.6825	0.0152	0.4248	0.0796	0.5044	0.1212	0.0732	0.1944		1,501.1705	1,501.1705	0.0112		1,501.4047
Worker	0.4734	0.5555	6.0291	0.0155	1.2240	8.9000e-003	1.2329	0.3247	8.2100e-003	0.3329		1,244.1760	1,244.1760	0.0600		1,245.4358
Total	**1.0854**	**5.9795**	**12.7116**	**0.0307**	**1.6488**	**0.0885**	**1.7373**	**0.4459**	**0.0814**	**0.5273**		**2,745.3465**	**2,745.3465**	**0.0711**		**2,746.8405**

3.5 Paving - 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	1.6554	16.8035	12.4837	0.0186		1.0056	1.0056		0.9269	0.9269		1,873.8264	1,873.8264	0.5588		1,885.5609
Paving	0.0199					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6753**	**16.8035**	**12.4837**	**0.0186**		**1.0056**	**1.0056**		**0.9269**	**0.9269**		**1,873.8264**	**1,873.8264**	**0.5588**		**1,885.5609**

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	0.0635	0.0746	0.8093	2.0800e-003	0.1643	1.1900e-003	0.1655	0.0436	1.1000e-003	0.0447		167.0035	167.0035	8.0500e-003		167.1726
Total	**0.0635**	**0.0746**	**0.8093**	**2.0800e-003**	**0.1643**	**1.1900e-003**	**0.1655**	**0.0436**	**1.1000e-003**	**0.0447**		**167.0035**	**167.0035**	**8.0500e-003**		**167.1726**

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	1.6554	16.8035	12.4837	0.0186		1.0056	1.0056		0.9269	0.9269	0.0000	1,873.8264	1,873.8264	0.5588		1,885.5609
Paving	0.0199					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6753**	**16.8035**	**12.4837**	**0.0186**		**1.0056**	**1.0056**		**0.9269**	**0.9269**	**0.0000**	**1,873.8264**	**1,873.8264**	**0.5588**		**1,885.5609**

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					

	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
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	0.0635	0.0746	0.8093	2.0800e-003	0.1643	1.1900e-003	0.1655	0.0436	1.1000e-003	0.0447		167.0035	167.0035	8.0500e-003		167.1726
Total	**0.0635**	**0.0746**	**0.8093**	**2.0800e-003**	**0.1643**	**1.1900e-003**	**0.1655**	**0.0436**	**1.1000e-003**	**0.0447**		**167.0035**	**167.0035**	**8.0500e-003**		**167.1726**

3.6 Architectural Coating - 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					
Archit. Coating	17.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.0721
Total	**17.4502**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.0721**

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	0.0953	0.1118	1.2139	3.1200e-003	0.2464	1.7900e-003	0.2482	0.0654	1.6500e-003	0.0670		250.5052	250.5052	0.0121		250.7589
Total	**0.0953**	**0.1118**	**1.2139**	**3.1200e-003**	**0.2464**	**1.7900e-003**	**0.2482**	**0.0654**	**1.6500e-003**	**0.0670**		**250.5052**	**250.5052**	**0.0121**		**250.7589**

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	17.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.0721
Total	**17.4502**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.0721**

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	0.0953	0.1118	1.2139	3.1200e-003	0.2464	1.7900e-003	0.2482	0.0654	1.6500e-003	0.0670		250.5052	250.5052	0.0121		250.7589
Total	**0.0953**	**0.1118**	**1.2139**	**3.1200e-003**	**0.2464**	**1.7900e-003**	**0.2482**	**0.0654**	**1.6500e-003**	**0.0670**		**250.5052**	**250.5052**	**0.0121**		**250.7589**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Increase Transit Accessibility

Category	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
	lb/day										lb/day					
Mitigated	4.2035	6.8925	33.7292	0.0749	4.9341	0.0908	5.0249	1.3171	0.0837	1.4008		6,112.4750	6,112.4750	0.2503		6,117.7310
Unmitigated	4.3095	7.4593	36.1194	0.0828	5.4824	0.0996	5.5820	1.4635	0.0918	1.5553		6,758.0702	6,758.0702	0.2734		6,763.8106

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	1,500.00	355.50	147.00	1,974,745	1,777,270
Total	1,500.00	355.50	147.00	1,974,745	1,777,270

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
General Office Building	5.80	5.80	5.80	33.00	48.00	19.00	77	19	4

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.511818	0.073499	0.191840	0.131575	0.036332	0.005186	0.012677	0.022513	0.001864	0.002072	0.006564	0.000601	0.003458

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	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
	lb/day										lb/day					
NaturalGas Mitigated	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
NaturalGas Unmitigated	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	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
	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	7479.45	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Total		**0.0807**	**0.7333**	**0.6160**	**4.4000e-003**		**0.0557**	**0.0557**		**0.0557**	**0.0557**		**879.9355**	**879.9355**	**0.0169**	**0.0161**	**885.2907**

Mitigated

Land Use	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
	kBTU/yr	lb/day										lb/day					
General Office Building	7.47945	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907

Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0807**	**0.7333**	**0.6160**	**4.4000e-003**		**0.0557**	**0.0557**		**0.0557**	**0.0557**		**879.9355**	**879.9355**	**0.0169**	**0.0161**	**885.2907**

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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Unmitigated	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736

6.2 Area by SubCategory

<u>Unmitigated</u>

	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	2.1048					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.3460					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.4200e-003	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Total	**10.4582**	**7.3000e-004**	**0.0776**	**1.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**		**0.1641**	**0.1641**	**4.5000e-004**		**0.1736**

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	2.1048					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.3460					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.4200e-003	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Total	**10.4582**	**7.3000e-004**	**0.0776**	**1.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**		**0.1641**	**0.1641**	**4.5000e-004**		**0.1736**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Reclaimed Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

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

10.0 Vegetation

9455 Towne Centre Drive

San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	150.00	1000sqft	2.90	150,000.00	0
Other Asphalt Surfaces	600.00		1.00	240,000.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.6 **Precipitation Freq (Days)** 40

Climate Zone 13 **Operational Year** 2018

Utility Company San Diego Gas & Electric

CO2 Intensity (lb/MWhr) 525.96 **CH4 Intensity (lb/MWhr)** 0.021 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Trips and VMT -

Area Coating - Rule 67.0.1 coatings

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	250.00	100.00
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	100
tblConstructionPhase	NumDays	18.00	132.00
tblConstructionPhase	NumDays	230.00	393.00
tblConstructionPhase	NumDays	20.00	66.00
tblConstructionPhase	NumDays	8.00	129.00

tblConstructionPhase	NumDays	18.00	132.00
tblConstructionPhase	PhaseEndDate	7/3/2018	12/31/2017
tblConstructionPhase	PhaseEndDate	1/2/2019	12/31/2017
tblConstructionPhase	PhaseEndDate	1/2/2017	12/31/2016
tblConstructionPhase	PhaseEndDate	6/29/2017	6/30/2017
tblConstructionPhase	PhaseEndDate	7/3/2018	12/31/2017
tblConstructionPhase	PhaseStartDate	1/1/2018	7/1/2017
tblConstructionPhase	PhaseStartDate	1/1/2018	7/1/2017
tblEnergyUse	T24E	5.69	4.44
tblEnergyUse	T24NG	16.83	14.00
tblGrading	AcresOfGrading	64.50	4.00
tblGrading	MaterialExported	0.00	52,610.00
tblLandUse	LotAcreage	3.44	2.90
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	5.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	720.49	525.96
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblProjectCharacteristics	OperationalYear	2014	2018
tblSequestration	NumberOfNewTrees	0.00	120.00
tblVehicleEF	HHD	0.02	0.03
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	2.97	3.16
tblVehicleEF	HHD	1.41	1.37
tblVehicleEF	HHD	69.82	65.60
tblVehicleEF	HHD	548.96	528.33
tblVehicleEF	HHD	1,611.58	1,547.78
tblVehicleEF	HHD	53.95	50.38
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.01	8.5820e-003

tblVehicleEF	LDA	0.94	0.82
tblVehicleEF	LDA	2.29	1.98
tblVehicleEF	LDA	266.09	236.93
tblVehicleEF	LDA	57.02	52.29
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	1.82	1.56
tblVehicleEF	LDT1	4.33	3.69
tblVehicleEF	LDT1	320.90	288.86
tblVehicleEF	LDT1	68.28	63.53
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.01	8.2780e-003
tblVehicleEF	LDT2	1.10	0.93
tblVehicleEF	LDT2	2.66	2.20
tblVehicleEF	LDT2	391.32	353.78
tblVehicleEF	LDT2	83.07	77.49
tblVehicleEF	LHD1	1.1810e-003	1.1720e-003
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	0.17	0.17
tblVehicleEF	LHD1	1.79	1.50
tblVehicleEF	LHD1	4.10	3.75
tblVehicleEF	LHD1	8.29	7.98
tblVehicleEF	LHD1	762.67	734.00
tblVehicleEF	LHD1	37.84	36.60
tblVehicleEF	LHD2	8.7600e-004	8.7100e-004
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	9.6180e-003
tblVehicleEF	LHD2	0.13	0.13
tblVehicleEF	LHD2	1.15	0.99

tblVehicleEF	LHD2	2.06	1.83
tblVehicleEF	LHD2	9.18	8.84
tblVehicleEF	LHD2	647.50	623.36
tblVehicleEF	LHD2	23.01	22.28
tblVehicleEF	MCY	29.57	28.19
tblVehicleEF	MCY	10.18	10.27
tblVehicleEF	MCY	159.85	156.52
tblVehicleEF	MCY	40.97	38.51
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	1.94	1.68
tblVehicleEF	MDV	4.76	4.19
tblVehicleEF	MDV	522.26	474.87
tblVehicleEF	MDV	109.79	103.31
tblVehicleEF	MH	3.13	2.03
tblVehicleEF	MH	7.80	6.63
tblVehicleEF	MH	707.64	681.06
tblVehicleEF	MH	29.65	28.25
tblVehicleEF	MHD	7.5000e-003	7.6150e-003
tblVehicleEF	MHD	6.4210e-003	5.1900e-003
tblVehicleEF	MHD	1.86	1.91
tblVehicleEF	MHD	1.01	0.77
tblVehicleEF	MHD	19.57	16.82
tblVehicleEF	MHD	590.85	572.06
tblVehicleEF	MHD	1,036.88	995.11
tblVehicleEF	MHD	53.28	49.80
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	2.8930e-003	2.8860e-003
tblVehicleEF	OBUS	2.48	2.74
tblVehicleEF	OBUS	1.65	1.34

tblVehicleEF	OBUS	12.02	10.77
tblVehicleEF	OBUS	554.85	534.88
tblVehicleEF	OBUS	1,075.89	1,037.87
tblVehicleEF	OBUS	34.25	32.81
tblVehicleEF	SBUS	4.3220e-003	4.4530e-003
tblVehicleEF	SBUS	5.2470e-003	5.3930e-003
tblVehicleEF	SBUS	0.99	1.05
tblVehicleEF	SBUS	6.19	4.24
tblVehicleEF	SBUS	38.94	34.11
tblVehicleEF	SBUS	563.29	547.00
tblVehicleEF	SBUS	1,069.34	1,024.49
tblVehicleEF	SBUS	126.56	116.73
tblVehicleEF	UBUS	3.27	3.03
tblVehicleEF	UBUS	5.79	5.66
tblVehicleEF	UBUS	2,074.59	1,981.57
tblVehicleEF	UBUS	23.77	22.78
tblVehicleTrips	CC_TL	7.30	5.80
tblVehicleTrips	CNW_TL	7.30	5.80
tblVehicleTrips	CW_TL	9.50	5.80
tblVehicleTrips	WD_TR	11.01	10.00
tblWaterMitigation	PercentReductionInFlowBathroomFaucet	32	36
tblWaterMitigation	PercentReductionInFlowKitchenFaucet	18	24
tblWaterMitigation	PercentReductionInFlowShower	20	27
tblWaterMitigation	PercentReductionInFlowToilet	20	31
tblWaterMitigation	UseWaterEfficientIrrigationSystemPercentReduction	6.1	20

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					
2016	4.4140	46.6629	36.5202	0.0438	0.8915	2.3055	3.1970	0.1560	2.1489	2.3049	0.0000	4,455.4358	4,455.4358	1.1204	0.0000	4,478.9632
2017	26.7454	67.6704	64.5382	0.1064	7.1186	4.1643	9.3303	3.5971	3.9700	5.6318	0.0000	9,921.1394	9,921.1394	1.6103	0.0000	9,954.9549
Total	**31.1593**	**114.3332**	**101.0584**	**0.1502**	**8.0101**	**6.4698**	**12.5273**	**3.7531**	**6.1189**	**7.9367**	**0.0000**	**14,376.5752**	**14,376.5752**	**2.7306**	**0.0000**	**14,433.9180**

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					
2016	4.4140	46.6629	36.5202	0.0438	0.4577	2.3055	2.7632	0.0903	2.1489	2.2392	0.0000	4,455.4358	4,455.4358	1.1204	0.0000	4,478.9632
2017	26.7454	67.6704	64.5382	0.1064	3.3901	4.1643	6.2239	1.5704	3.9700	4.5248	0.0000	9,921.1394	9,921.1394	1.6103	0.0000	9,954.9548
Total	**31.1593**	**114.3332**	**101.0584**	**0.1502**	**3.8478**	**6.4698**	**8.9871**	**1.6607**	**6.1189**	**6.7640**	**0.0000**	**14,376.5752**	**14,376.5752**	**2.7306**	**0.0000**	**14,433.9180**

	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**	**51.96**	**0.00**	**28.26**	**55.75**	**0.00**	**14.78**	**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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Energy	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Mobile	4.6327	7.9079	39.7643	0.0787	5.4824	0.1002	5.5826	1.4635	0.0924	1.5558		6,435.0809	6,435.0809	0.2737		6,440.8279
Total	**15.1716**	**8.6419**	**40.4579**	**0.0831**	**5.4824**	**0.1562**	**5.6386**	**1.4635**	**0.1484**	**1.6119**		**7,315.1806**	**7,315.1806**	**0.2910**	**0.0161**	**7,326.2921**

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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Energy	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Mobile	4.5288	7.3032	37.5612	0.0712	4.9341	0.0914	5.0255	1.3171	0.0842	1.4014		5,820.7918	5,820.7918	0.2506		5,826.0544
Total	**15.0677**	**8.0372**	**38.2547**	**0.0756**	**4.9341**	**0.1474**	**5.0816**	**1.3171**	**0.1403**	**1.4574**		**6,700.8915**	**6,700.8915**	**0.2679**	**0.0161**	**6,711.5187**

	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	**0.68**	**7.00**	**5.45**	**9.02**	**10.00**	**5.63**	**9.88**	**10.00**	**5.47**	**9.58**	**0.00**	**8.40**	**8.40**	**7.92**	**0.00**	**8.39**

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	10/1/2016	12/31/2016	5	66	
2	Grading	Grading	1/1/2017	6/30/2017	5	129	
3	Building Construction	Building Construction	7/1/2017	12/31/2017	5	393	
4	Paving	Paving	7/1/2017	12/31/2017	5	132	
5	Architectural Coating	Architectural Coating	7/1/2017	12/31/2017	5	132	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 585,000; Non-Residential Outdoor: 195,000 (Architectural Coating –

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	3	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	5	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	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	6	15.00	0.00	214.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	6,576.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	15	149.00	64.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2016

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					0.7111	0.0000	0.7111	0.1077	0.0000	0.1077			0.0000			0.0000
Off-Road	4.2876	45.6559	35.0303	0.0399		2.2921	2.2921		2.1365	2.1365		4,089.284 1	4,089.2841	1.1121		4,112.6374
Total	**4.2876**	**45.6559**	**35.0303**	**0.0399**	**0.7111**	**2.2921**	**3.0032**	**0.1077**	**2.1365**	**2.2442**		**4,089.284 1**	**4,089.2841**	**1.1121**		**4,112.6374**

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	0.0707	0.9380	0.8380	2.4200e-003	0.0572	0.0125	0.0696	0.0156	0.0115	0.0271		243.8010	243.8010	1.7600e-003		243.8380
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	0.0556	0.0690	0.6519	1.4700e-003	0.1232	9.2000e-004	0.1242	0.0327	8.5000e-004	0.0335		122.3507	122.3507	6.5300e-003		122.4878
Total	**0.1263**	**1.0070**	**1.4899**	**3.8900e-003**	**0.1804**	**0.0134**	**0.1938**	**0.0483**	**0.0123**	**0.0606**		**366.1518**	**366.1518**	**8.2900e-003**		**366.3258**

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					0.2773	0.0000	0.2773	0.0420	0.0000	0.0420			0.0000			0.0000
Off-Road	4.2876	45.6559	35.0303	0.0399		2.2921	2.2921		2.1365	2.1365	0.0000	4,089.2841	4,089.2841	1.1121		4,112.6374
Total	**4.2876**	**45.6559**	**35.0303**	**0.0399**	**0.2773**	**2.2921**	**2.5695**	**0.0420**	**2.1365**	**2.1785**	**0.0000**	**4,089.2841**	**4,089.2841**	**1.1121**		**4,112.6374**

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					

	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
Hauling	0.0707	0.9380	0.8380	2.4200e-003	0.0572	0.0125	0.0696	0.0156	0.0115	0.0271		243.8010	243.8010	1.7600e-003		243.8380
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	0.0556	0.0690	0.6519	1.4700e-003	0.1232	9.2000e-004	0.1242	0.0327	8.5000e-004	0.0335		122.3507	122.3507	6.5300e-003		122.4878
Total	**0.1263**	**1.0070**	**1.4899**	**3.8900e-003**	**0.1804**	**0.0134**	**0.1938**	**0.0483**	**0.0123**	**0.0606**		**366.1518**	**366.1518**	**8.2900e-003**		**366.3258**

3.3 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					6.1123	0.0000	6.1123	3.3225	0.0000	3.3225			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757		3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**6.1123**	**2.0388**	**8.1511**	**3.3225**	**1.8757**	**5.1982**		**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

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	1.0383	13.1486	12.6403	0.0380	0.8831	0.1720	1.0551	0.2420	0.1582	0.4002		3,767.6999	3,767.6999	0.0265		3,768.2565
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	0.0504	0.0628	0.5868	1.4700e-003	0.1232	9.0000e-004	0.1241	0.0327	8.3000e-004	0.0335		117.6222	117.6222	6.0400e-003		117.7491
Total	**1.0886**	**13.2113**	**13.2271**	**0.0395**	**1.0063**	**0.1729**	**1.1792**	**0.2746**	**0.1590**	**0.4337**		**3,885.3221**	**3,885.3221**	**0.0326**		**3,886.0055**

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					2.3838	0.0000	2.3838	1.2958	0.0000	1.2958			0.0000			0.0000
Off-Road	3.4555	35.9825	25.3812	0.0297		2.0388	2.0388		1.8757	1.8757	0.0000	3,043.6667	3,043.6667	0.9326		3,063.2507
Total	**3.4555**	**35.9825**	**25.3812**	**0.0297**	**2.3838**	**2.0388**	**4.4226**	**1.2958**	**1.8757**	**3.1715**	**0.0000**	**3,043.6667**	**3,043.6667**	**0.9326**		**3,063.2507**

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	1.0383	13.1486	12.6403	0.0380	0.8831	0.1720	1.0551	0.2420	0.1582	0.4002		3,767.6999	3,767.6999	0.0265		3,768.2565
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	0.0504	0.0628	0.5868	1.4700e-003	0.1232	9.0000e-004	0.1241	0.0327	8.3000e-004	0.0335		117.6222	117.6222	6.0400e-003		117.7491
Total	**1.0886**	**13.2113**	**13.2271**	**0.0395**	**1.0063**	**0.1729**	**1.1792**	**0.2746**	**0.1590**	**0.4337**		**3,885.3221**	**3,885.3221**	**0.0326**		**3,886.0055**

3.4 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	6.2461	42.2970	33.3269	0.0502		2.8931	2.8931		2.7849	2.7849		4,715.7854	4,715.7854	0.9302		4,735.3192
Total	**6.2461**	**42.2970**	**33.3269**	**0.0502**		**2.8931**	**2.8931**		**2.7849**	**2.7849**		**4,715.7854**	**4,715.7854**	**0.9302**		**4,735.3192**

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	0.7057	5.5525	9.0752	0.0151	0.4248	0.0804	0.5052	0.1212	0.0740	0.1952		1,489.6247	1,489.6247	0.0115		1,489.8653
Worker	0.5002	0.6233	5.8284	0.0146	1.2240	8.9000e-003	1.2329	0.3247	8.2100e-003	0.3329		1,168.3807	1,168.3807	0.0600		1,169.6405
Total	**1.2059**	**6.1757**	**14.9037**	**0.0297**	**1.6488**	**0.0893**	**1.7381**	**0.4459**	**0.0822**	**0.5280**		**2,658.0055**	**2,658.0055**	**0.0714**		**2,659.5058**

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	6.2461	42.2970	33.3269	0.0502		2.8931	2.8931		2.7849	2.7849	0.0000	4,715.7854	4,715.7854	0.9302		4,735.3192

	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
Total	**6.2461**	**42.2970**	**33.3269**	**0.0502**		**2.8931**	**2.8931**		**2.7849**	**2.7849**	**0.0000**	**4,715.7854**	**4,715.7854**	**0.9302**		**4,735.3192**

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	0.7057	5.5525	9.0752	0.0151	0.4248	0.0804	0.5052	0.1212	0.0740	0.1952		1,489.6247	1,489.6247	0.0115		1,489.8653
Worker	0.5002	0.6233	5.8284	0.0146	1.2240	8.9000e-003	1.2329	0.3247	8.2100e-003	0.3329		1,168.3807	1,168.3807	0.0600		1,169.6405
Total	**1.2059**	**6.1757**	**14.9037**	**0.0297**	**1.6488**	**0.0893**	**1.7381**	**0.4459**	**0.0822**	**0.5280**		**2,658.0055**	**2,658.0055**	**0.0714**		**2,659.5058**

3.5 Paving - 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	1.6554	16.8035	12.4837	0.0186		1.0056	1.0056		0.9269	0.9269		1,873.8264	1,873.8264	0.5588		1,885.5609
Paving	0.0199					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6753**	**16.8035**	**12.4837**	**0.0186**		**1.0056**	**1.0056**		**0.9269**	**0.9269**		**1,873.8264**	**1,873.8264**	**0.5588**		**1,885.5609**

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	0.0671	0.0837	0.7823	1.9500e-003	0.1643	1.1900e-003	0.1655	0.0436	1.1000e-003	0.0447		156.8296	156.8296	8.0500e-003		156.9987
Total	**0.0671**	**0.0837**	**0.7823**	**1.9500e-003**	**0.1643**	**1.1900e-003**	**0.1655**	**0.0436**	**1.1000e-003**	**0.0447**		**156.8296**	**156.8296**	**8.0500e-003**		**156.9987**

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	1.6554	16.8035	12.4837	0.0186		1.0056	1.0056		0.9269	0.9269	0.0000	1,873.8264	1,873.8264	0.5588		1,885.5609
Paving	0.0199					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6753**	**16.8035**	**12.4837**	**0.0186**		**1.0056**	**1.0056**		**0.9269**	**0.9269**	**0.0000**	**1,873.8264**	**1,873.8264**	**0.5588**		**1,885.5609**

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					

	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
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	0.0671	0.0837	0.7823	1.9500e-003	0.1643	1.1900e-003	0.1655	0.0436	1.1000e-003	0.0447		156.8296	156.8296	8.0500e-003		156.9987
Total	**0.0671**	**0.0837**	**0.7823**	**1.9500e-003**	**0.1643**	**1.1900e-003**	**0.1655**	**0.0436**	**1.1000e-003**	**0.0447**		**156.8296**	**156.8296**	**8.0500e-003**		**156.9987**

3.6 Architectural Coating - 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					
Archit. Coating	17.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.0721
Total	**17.4502**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.0721**

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	0.1007	0.1255	1.1735	2.9300e-003	0.2464	1.7900e-003	0.2482	0.0654	1.6500e-003	0.0670		235.2444	235.2444	0.0121		235.4981
Total	**0.1007**	**0.1255**	**1.1735**	**2.9300e-003**	**0.2464**	**1.7900e-003**	**0.2482**	**0.0654**	**1.6500e-003**	**0.0670**		**235.2444**	**235.2444**	**0.0121**		**235.4981**

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	17.1179					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.0721
Total	**17.4502**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.0721**

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	0.1007	0.1255	1.1735	2.9300e-003	0.2464	1.7900e-003	0.2482	0.0654	1.6500e-003	0.0670		235.2444	235.2444	0.0121		235.4981
Total	**0.1007**	**0.1255**	**1.1735**	**2.9300e-003**	**0.2464**	**1.7900e-003**	**0.2482**	**0.0654**	**1.6500e-003**	**0.0670**		**235.2444**	**235.2444**	**0.0121**		**235.4981**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Increase Transit Accessibility

	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	4.5288	7.3032	37.5612	0.0712	4.9341	0.0914	5.0255	1.3171	0.0842	1.4014		5,820.791 8	5,820.7918	0.2506		5,826.0544
Unmitigated	4.6327	7.9079	39.7643	0.0787	5.4824	0.1002	5.5826	1.4635	0.0924	1.5558		6,435.080 9	6,435.0809	0.2737		6,440.8279

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	1,500.00	355.50	147.00	1,974,745	1,777,270
Total	1,500.00	355.50	147.00	1,974,745	1,777,270

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
General Office Building	5.80	5.80	5.80	33.00	48.00	19.00	77	19	4

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.511818	0.073499	0.191840	0.131575	0.036332	0.005186	0.012677	0.022513	0.001864	0.002072	0.006564	0.000601	0.003458

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	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
NaturalGas Unmitigated	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907

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					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	7479.45	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Total		**0.0807**	**0.7333**	**0.6160**	**4.4000e-003**		**0.0557**	**0.0557**		**0.0557**	**0.0557**		**879.9355**	**879.9355**	**0.0169**	**0.0161**	**885.2907**

Mitigated

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

General Office Building	7.47945	0.0807	0.7333	0.6160	4.4000e-003		0.0557	0.0557		0.0557	0.0557		879.9355	879.9355	0.0169	0.0161	885.2907
Total		**0.0807**	**0.7333**	**0.6160**	**4.4000e-003**		**0.0557**	**0.0557**		**0.0557**	**0.0557**		**879.9355**	**879.9355**	**0.0169**	**0.0161**	**885.2907**

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	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Unmitigated	10.4582	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736

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	2.1048					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.3460					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.4200e-003	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Total	**10.4582**	**7.3000e-004**	**0.0776**	**1.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**		**0.1641**	**0.1641**	**4.5000e-004**		**0.1736**

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	2.1048					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.3460					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	7.4200e-003	7.3000e-004	0.0776	1.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004		0.1641	0.1641	4.5000e-004		0.1736
Total	**10.4582**	**7.3000e-004**	**0.0776**	**1.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**		**0.1641**	**0.1641**	**4.5000e-004**		**0.1736**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Reclaimed Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

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

10.0 Vegetation

REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

JOB NO. 15-10932
15 December 2015

Prepared for:

Kilroy Realty, LP

Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING • GROUNDWATER • ENGINEERING GEOLOGY

15 December 2015

Kilroy Realty, LP
3661 Valley Centre Drive, Suite 250
San Diego, CA 92130
Attn: Mr. Jake Brehm

Job No. 15-10932

Subject: **Report of Preliminary Geotechnical Investigation**
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Brehm:

In accordance with your request ***Geotechnical Exploration, Inc***. has performed a preliminary geotechnical investigation for the subject project in San Diego, California. The fieldwork was performed on November 30 and December 1, 2015.

If the conclusions and recommendations presented in this report are incorporated into the design and construction of the proposed development, it is our opinion that the site is suitable for the project.

This opportunity to be of service is sincerely appreciated. Should you have any questions concerning the following report, please do not hesitate to contact us. Reference to our **Job No. 15-10932** will expedite a response to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer
Senior Project Geologist

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

Jonathan A. Browning
C.E.G. 2615/P.G. 9012

7420 TRADE STREET • SAN DIEGO, CA. 92121 • (858) 549-7222 • FAX: (858) 549-1604 • EMAIL: geotech@gei-sd.com

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REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

JOB NO. 15-10932

The following report presents the findings and recommendations of ***Geotechnical Exploration, Inc.*** for the subject project.

I. PROJECT SUMMARY AND SCOPE OF SERVICES

Based on our review of preliminary plans provided us, the project will consist of an on grade five-story, steel-frame office building and six-level concrete parking structure with two levels below grade on the north, south and west sides. It is our understanding that maximum combined dead plus live column loads for the office building and parking structure will be on the order of 1,040 kips and 740 kips, respectively. Based on our review of preliminary plans provided to us, grading to achieve the desired elevations will be minimal for the office building and require cuts up to 25 feet deep for the parking structure.

Based on the preceding, the scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, geotechnical engineering analysis of the field and laboratory data, and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for the project earthwork, building foundations, slab-on-grade floors, basement walls, and pavements.

II. SITE DESCRIPTION AND HISTORY

The site of the proposed office building and parking structure is currently developed with a two-story office building and parking lot on a previously graded, relatively level building pad located southeast of the intersection of Towne Centre Drive and Eastgate Mall in San Diego, California (see Vicinity Map, Figure No. I).

The rectangular-shaped property is bounded to the north by Eastgate Mall approximately 0 to 10 feet lower in elevation; to the south by two existing office buildings approximately 5 to 20 feet lower in elevation; to the east by Judicial Drive approximately 12 to 25 feet lower in elevation; and to the west by Towne Centre Drive at approximately the same elevation.

III. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program utilizing a truck-mounted, continuous-flight auger drill rig. Eight exploratory borings were drilled around the location of the proposed office building and in the area of the proposed parking garage on November 30 and December 1, 2015, to depths of 18½ to 37½ feet. The soils encountered in the borings were continuously logged in the field by our geologist and described in accordance with the Unified Soil Classification System (refer to Appendix A). The approximate locations of the borings are shown on Figure No. II.

Representative samples were obtained from the exploratory borings at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing. Standard penetration resistance blow counts were obtained by driving a 2-inch O.D. split spoon sampler with a 140-pound hammer dropping through a 30-inch free fall. The sampler was driven a maximum of 18 inches and the number of blows for each 6-inch interval was recorded. The blows per foot indicated on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches or portion thereof. Samples contained in liners were recovered by driving a 3.0-inch O.D. modified California sampler 18 inches into the soil using a 140-pound hammer.

Boring logs have been prepared on the basis of our observations and laboratory test results. Logs of the borings are attached as Figure Nos. IIIa-h. The following chart provides an in-house correlation between the number of blows and the relative density of the soil for the Standard Penetration Test and the 3-inch sampler.

SOIL	***DENSITY DESIGNATION***	***2-INCH O.D. SAMPLER BLOWS/FOOT***	***3-INCH O.D. SAMPLER BLOWS/FOOT***
Sand and Nonplastic Silt	Very loose Loose Medium Dense Very Dense	0-4 5-10 11-30 31-50 Over 50	0-7 8-20 21-53 54-98 Over 98
Clay and Plastic Silt	Very soft Soft Firm Stiff Very stiff Hard Very Hard	0-2 3-4 5-8 9-15 16-30 31-60 Over 60	0-2 3-4 5-9 10-18 19-45 46-90 Over 90

IV. LABORATORY TESTS

Laboratory tests were performed on relatively undisturbed and bulk samples of the soils encountered in order to evaluate their index, strength, expansion, and compressibility properties. The following tests were conducted on the sampled soils:

1. *Laboratory Compaction Characteristics (ASTM D1557-12)*
2. *Determination of Percentage of Particles Smaller than No. 200 Sieve (ASTM D1140-14)*
3. *Ring-lined Barrel Density Test (ASTM D3550-07)*
4. *Direct Shear Test (ASTM D3080-11)*

Laboratory compaction tests establish the laboratory maximum dry density and optimum moisture content of the tested soils and are also used to aid in evaluating the strength characteristics of the soils. The test results are presented on the boring logs at the appropriate sample depths.

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength. The test results are presented on the boring logs at the appropriate sample depths.

Laboratory dry density tests were performed on selected relatively undisturbed samples of the existing fill and formational materials encountered to aid in evaluating there densities. The test results are presented on the boring logs at the appropriate sample depths.

Two laboratory direct shear tests were performed to aid in evaluating the strength properties of the on-site soils. The tests were performed on relatively undisturbed samples of the formational sandstone materials encountered. The test results are shown on Figure No. V.

V. SOIL DESCRIPTION

The materials encountered in Borings 1 through 4, drilled in the area of the proposed new office building, consisted of AC pavement and base underlain in Borings 1, 2 and 4 by existing fill soils comprised of medium dense to dense clayey and silty sands to depths of 1½ to 5 feet. The materials encountered below the fill soils in Borings 1, 2 and 4, and below the pavement in Boring 3, consisted of very dense formational clayey and silty sands (Very Old Paralic deposits) to the depths explored of 18½ to 19 feet.

The materials encountered in Borings 5 through 8, drilled in the area of the proposed new parking structure, consisted of AC pavement and base in Borings 5 through 7, and a 6-inch-layer of poorly graded sand fill in Boring 8. These materials were underlain by existing fill soils comprised of medium dense to dense clayey and silty sands to depths of 5 to 14 feet. The materials encountered below the fill soils consisted predominantly of very dense formational clayey and silty sands (Very Old Paralic deposits) to the depth explored of 37½ feet. In Borings 5 and 7, layers of very dense pebble conglomerate were encountered between depths of 16½ and 24 feet.

The exploratory boring logs and related information depict subsurface conditions only at the specific locations shown on the site plan and on the particular dates designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes.

VI. GROUNDWATER

Free groundwater was not encountered in the exploratory borings. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification, rainfall, and other possible factors which may not have been evident at the time of our field investigation.

It should be kept in mind that grading operations can change surface drainage patterns and/or reduce permeabilities due to the densification of compacted soils. Such changes of surface and subsurface hydrologic conditions, plus irrigation of landscaping or significant increases in rainfall, may result in the appearance of surface or near-surface water at locations where none existed previously. The appearance of such water is expected to be localized and cosmetic in nature, if good positive drainage is implemented, as recommended in this report, during and at the completion of construction.

It must be understood that unless discovered during initial site exploration or encountered during site grading operations, it is extremely difficult to predict if or where perched or true groundwater conditions may appear in the future. When site fill or formational soils are fine-grained and of low permeability, water problems may not become apparent for extended periods of time.

Water conditions, where suspected or encountered during construction, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and property owner, however, must realize that post-construction appearances of groundwater may have to be dealt with on a site-specific basis.

VII. GEOLOGIC HAZARDS AND SEISMIC CONSIDERATIONS

Our review of some available published information including the City of San Diego Seismic Safety Study, Geologic Hazards and Faults Map (Sheet 34), indicates that the site is located in a nominal risk geologic hazard area designated as Category 51. Category 51 is defined as *"Level Mesas, underlain by terrace deposits and bedrock, nominal risk"*. Reference to the geologic map of the area, "*Geologic Map of San Diego, 30'x60' Quadrangle,* (Kennedy and Tan, 2008) Figure No. IV, indicates that the site is underlain by Pleistocene-age Very Old Paralic deposit ($Qvop_{9a}$) formational materials. Based on the Geologic Map of San Diego and the City of San Diego Seismic Safety Study, Geologic Hazards Map No. 34, there are no faults mapped on the site.

The San Diego area, as most of California, is located in a seismically active region. The San Diego area has been referred to as the eastern edge of the Southern California Continental Borderland, an extension of the Peninsular Ranges Geomorphic Province. The borderland is part of a broad tectonic boundary between the North American and Pacific Plates. The plate boundary is dominated by a complex system of active major strike-slip (right lateral), northwest-trending faults extending from the San Andreas Fault about 70 miles east, to the San Clemente Fault, about 50 miles west of the San Diego metropolitan area.

The prominent fault zones generally considered having the most potential for earthquake damage in the vicinity of the site are the active Rose Canyon and Coronado Bank fault zones mapped approximately 4 and 16 miles southwest of the site, respectively, and the active Elsinore and San Jacinto fault zones mapped approximately 34 and 57 miles northeast of the site, respectively.

Although research on earthquake prediction has greatly increased in recent years, geologists and seismologists have not yet reached the point where they can predict when and where an earthquake will occur. Nevertheless, on the basis of current technology, it is reasonable to assume that the site may be subject to the effects of at least one moderate to major earthquake during the design life of the project. During such an earthquake, the danger from fault offset through the site is remote, but relatively strong ground shaking is likely to occur.

Strong ground shaking not only can cause structures to shake, but it also has the potential for including other phenomena that can indirectly cause substantial ground movements or other hazards resulting in damage to structures. These phenomena include seismically induced waves such as tsunamis and seiches, inundation due to dam or embankment failure, soil liquefaction, landsliding, lateral spreading, differential compaction and ground cracking. Available information indicates that the location of and geotechnical conditions at the site are not conducive to any of these phenomena.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the field investigation conducted by our firm, our laboratory test results, our analysis of the field and laboratory data, and our experience with similar soils and formational materials.

The opinions, conclusions, and recommendations presented in this report are contingent upon ***Geotechnical Exploration, Inc.*** being retained to review the final plans and specifications as they are developed and to observe the site earthwork and installation of foundations. Accordingly, we recommend that the following paragraph be included on the grading and foundation plans for the project.

If the geotechnical consultant of record is changed for the project, the work shall be stopped until the replacement has agreed in writing to accept responsibility within their area of technical competence for approval upon completion of the work. It shall be the responsibility of the permittee to notify the City Engineer in writing of such change prior to the recommencement of grading and/or foundation installation work.

A. *Preparation of Soils for Site Development*

1. *Clearing and Stripping:* The site should be cleared of the existing building, pavements and utilities to be abandoned and any miscellaneous debris that may be present at the time of construction and stripped of all vegetation. The cleared and stripped materials should be properly disposed of off-site.

2. *Excavation:* Based on the results of our exploratory borings, as well as our experience with similar materials, it is our opinion that the natural formational materials can be excavated utilizing ordinary heavy earthmoving equipment. Contractors should not, however, be relieved of making their own independent evaluation of the excavatability of the on-site materials prior to submitting their bids.

3. *Subgrade Preparation:* After the site has been cleared, stripped, and the required excavations made, the exposed subgrade soils in areas to receive fill and/or building improvements should be scarified to a depth of 8 inches, moisture conditioned to at least 2 percent above the laboratory optimum, and compacted to the requirements for structural fill.

4. *Material for Fill:* All existing on-site soils with an organic content of less than 3 percent by volume are suitable for use as fill. Any required imported fill materials should not contain rocks or lumps more than 6 inches in greatest dimension, not more than 15 percent larger than 2½ inches, and no more than 25 percent of the fill should be larger than ¼-inch. All materials for use as fill should be approved by our representative prior to filling.

5. *Fill Compaction:* All structural fill should in general be compacted to a minimum degree of compaction of 90 percent at a moisture content at least 2 percent above the optimum based upon ASTM D1557-12. In addition, the upper 6 inches of subgrade soil beneath pavements should be scarified, moisture conditioned, and compacted to a minimum degree of compaction of 95 percent just prior to placement of the aggregate base layer for AC pavements or PCC pavements. Fill material should be spread and compacted in uniform horizontal lifts not exceeding 8 inches in uncompacted thickness. Before compaction begins, the fill should be brought to a moisture content that will permit proper compaction by either: (1) aerating and drying the fill if it is too wet, or (2) moistening the fill with water if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture.

6. *Permanent Slopes:* We recommend that any required permanent cut and fill slopes be constructed to an inclination no steeper than 2.0:1.0 (horizontal to vertical). The project plans and specifications should contain all necessary design features and construction requirements to prevent erosion of the on-site soils both during and after construction. Slopes and other exposed ground surfaces should be appropriately planted with a protective groundcover.

Fill slopes should be constructed to assure that the recommended minimum degree of compaction is attained out to the finished slope face. This may be accomplished by "backrolling" with a sheepsfoot roller or other suitable equipment as the fill is raised. Placement of fill near the tops of slopes should be carried out in such a manner as to assure that loose, uncompacted soils are not sloughed over the tops and allowed to accumulate on the slope face.

7. *Temporary Slopes:* Based on our subsurface investigation work, laboratory test results, and engineering analysis, temporary cut slopes up to 25 feet in height in the compacted fill over formational sandstone materials should be safe against mass instability at an inclination of 1.0:1.0 (horizontal to vertical).

   Some localized sloughing or ravelling of the soils exposed on the slopes, however, may occur. Since the stability of temporary construction slopes will depend largely on the contractor's activities and safety precautions (storage and equipment loadings near the tops of cut slopes, surface drainage provisions, etc.), it should be the contractor's responsibility to establish and maintain all temporary construction slopes at a safe inclination appropriate to the methods of operation.

8. *Trench and Retaining/Basement Wall Backfill:* All backfill soils placed in utility trenches or behind retaining/basement walls should be compacted to a minimum degree of compaction of 90 percent. Backfill material should be placed in lift thicknesses appropriate to the type of compaction equipment utilized and compacted to a minimum degree of 90 percent by mechanical means. In pavement areas, that portion of the trench backfill within the

pavement section should conform to the material and compaction requirements of the adjacent pavement section.

Our experience has shown that even shallow, narrow trenches, such as for irrigation and electrical lines, that are not properly compacted can result in problems, particularly with respect to shallow groundwater accumulation and migration.

9. *Surface Drainage:* Positive surface gradients should be provided adjacent to the building and parking structure, and roof gutters and downspouts should be installed so as to direct water away from foundations and slabs toward suitable discharge facilities. Ponding of surface water should not be allowed anywhere on the site. Appropriate erosion control measures should be taken at all times during and after construction to prevent surface runoff waters from entering footing excavations or ponding on finished building pad areas.

B. Foundation Recommendations

10. *Footings:* We recommend that the proposed 5-story office building and parking structure be supported on conventional, individual-spread and/or continuous footing foundations bearing on dense undisturbed formational sandstone materials. All footings should be founded at least 30 inches below the lowest adjacent finished grade.

At the recommended depths, footings may be designed for allowable bearing pressures of 8,000 pounds per square foot (psf) for combined dead and live loads and 10,700 psf for all loads, including wind or seismic. The footings should, however, have a minimum width of 24 inches.

Grade beams (or combined footings) should be designed using a subgrade modulus (k) of 400 kips per cubic foot.

11. <u>*General Criteria for All Footings*</u>: Footings located adjacent to the tops of slopes should be extended sufficiently deep so as to provide at least 10 feet of horizontal cover or 1½ times the width of the footing, whichever is greater, between the slope face and outside edge of the footing at the footing bearing level. Footings located adjacent to utility trenches should have their bearing surfaces situated below an imaginary 1.5 to 1.0 plane projected upward from the bottom edge of the adjacent utility trench.

All continuous footings should contain top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. We recommend that a minimum of two No. 5 top and two No. 5 bottom reinforcing bars be provided in the footings. A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing. In order for us to offer an opinion as to whether the footings are founded on soils of sufficient load bearing capacity, it is essential that our representative inspect the footing excavations prior to the placement of reinforcing steel or concrete.

NOTE: The project Civil/Structural Engineer should review all reinforcing schedules. The reinforcing minimums recommended herein are not to be construed as structural designs, but merely as minimum reinforcement to reduce the potential for cracking and separations.

12. *Seismic Design Criteria:* Site-specific seismic design criteria for the proposed structures are presented in the following table in accordance with the 2013 CBC, which incorporates by reference ASCE 7-10 for seismic design. We have determined the mapped spectral acceleration values for the site, based on a latitude of 32.8790 degrees and longitude of -117.2065 degrees, utilizing a tool provided by the USGS, which provides a solution for ASCE 7-10 (2013 CBC) utilizing digitized files for the Spectral Acceleration maps. We have assigned a Site Soil Classification of C.

TABLE I
Mapped Spectral Acceleration Values and Design Parameters

S_s	S_1	F_a	F_v	S_{ms}	S_{m1}	S_{ds}	S_{d1}
1.093g	0.420g	1.000	1.380	1.093g	0.580g	0.729g	0.387g

13. *Lateral Loads:* Lateral load resistance for the structure supported on footing foundations may be developed in friction between the foundation bottoms and the supporting subgrade. An allowable friction coefficient of 0.35 is considered applicable. An additional allowable passive resistance equal to an equivalent fluid weight of 350 pounds per cubic foot (pcf) acting against the foundations may be used in design provided the footings are poured neat against the adjacent undisturbed compacted fill or formational materials. These lateral resistance values assume a level surface in front of the footing for a minimum distance of three times the embedment depth of the footing and any shear keys.

14. *Settlement:* Settlements under building loads are expected to be within tolerable limits for the proposed structures. For footings designed in accordance with the recommendations presented in the preceding

paragraphs, we anticipate that total settlements should not exceed 1 inch and that post-construction differential settlements should be less than 1/4-inch in 25 feet.

15. *Retaining/Basement Walls*: Retaining walls must be designed to resist lateral earth pressures and any additional lateral pressures caused by surcharge loads on the adjoining retained surface. We recommend that unrestrained (cantilever) walls with level backfill be designed for an equivalent fluid pressure of 35 pcf. We recommend that restrained walls (i.e., basement walls or any walls with angle points that restrain them from rotation) with level backfill be designed for an equivalent fluid pressure of 35 pcf plus an additional uniform lateral pressure of 5H pounds per square foot, where H is equal to the height of backfill above the top of the wall footing in feet. Wherever walls will be subjected to surcharge loads, they should also be designed for an additional uniform lateral pressure equal to one-third the anticipated surcharge pressure in the case of unrestrained walls and one-half the anticipated surcharge pressure in the case of restrained walls.

    For seismic design of unrestrained walls, we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 11 pcf. For restrained walls we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 17 pcf added to the active static fluid pressure utilizing an equivalent fluid weight of 35 pcf.

    The preceding design pressures assume that the walls are backfilled with low expansion potential materials (Expansion Index less than 50) and that there is sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration. We recommend that drainage be provided by a composite drainage material such as Miradrain 6000/6200 or equivalent. The drain material should terminate 12 inches below the finish surface where the surface is covered by slabs or 18 inches below the finish surface in landscape areas.

Backfill placed behind the walls should be compacted to a minimum degree of compaction of 90 percent using light compaction equipment. If heavy equipment is used, the walls should be appropriately temporarily braced.

C. Concrete Slab-on-grade Criteria

16. *Minimum Floor Slab Thickness and Reinforcement:* Based on our experience, we have found that, for various reasons, floor slabs occasionally crack, causing brittle surfaces such as ceramic tiles to become damaged. Therefore, we recommend that all slabs-on-grade contain at least a minimum amount of reinforcing steel to reduce the separation of cracks, should they occur.

    16.1 Interior floor slabs should be a minimum of 5 inches actual thickness and be reinforced with No. 4 bars on 24-inch centers, both ways, placed at midheight in the slab. Slab subgrade soil should be verified by a ***Geotechnical Exploration, Inc.*** representative to have the proper moisture content within 48 hours prior to placement of the vapor barrier and pouring of concrete.

16.2 Following placement of any concrete floor slabs, sufficient drying time must be allowed prior to placement of floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

17. *Concrete Isolation Joints:* We recommend the project Civil/Structural Engineer incorporate isolation joints and sawcuts to at least one-fourth the thickness of the slab in any floor designs. The joints and cuts, if properly placed, should reduce the potential for and help control floor slab cracking. We recommend that concrete shrinkage joints be spaced no farther than approximately 20 feet apart, and also at re-entrant corners. However, due to a number of reasons (such as base preparation, construction techniques, curing procedures, and normal shrinkage of concrete), some cracking of slabs can be expected.

18. *Slab Moisture Protection and Vapor Barrier Membrane:* Although it is not the responsibility of geotechnical engineering firms to provide moisture protection recommendations, as a service to our clients we provide the following discussion and suggested minimum protection criteria. Actual recommendations should be provided by the architect and waterproofing consultants.

Soil moisture vapor can result in damage to moisture-sensitive floors, some floor sealers, or sensitive equipment in direct contact with the floor, in addition to mold and staining on slabs, walls and carpets. The common practice in Southern California is to place vapor retarders made of PVC, or of polyethylene. PVC retarders are made in thickness ranging from 10- to 60-mil. Polyethylene retarders, called visqueen, range from 5- to 10-mil in thickness. These products are no longer considered adequate for moisture protection and can actually deteriorate over time.

Specialty vapor retarding products possess higher tensile strength and are more specifically designed for and intended to retard moisture transmission into and through concrete slabs. The use of such products is highly recommended for reduction of floor slab moisture emission.

The following American Society for Testing and Materials (ASTM) and American Concrete Institute (ACI) sections address the issue of moisture transmission into and through concrete slabs: ASTM E1745-97 (2009) Standard Specification for Plastic Water Vapor Retarders Used in Contact Concrete Slabs; ASTM E154-88 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth; ASTM E96-95 Standard Test Methods for Water Vapor Transmission of Materials; ASTM E1643-98 (2009) Standard Practice for Installation of Water Vapor Retarders Used in Contact Under Concrete Slabs; and ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

18.1 Based on the above, we recommend that the vapor barrier consist of a minimum 15-mil extruded polyolefin plastic (no recycled content or woven materials permitted). Permeance as tested before and after mandatory conditioning (ASTM E1745 Section 7.1 and sub-paragraphs 7.1.1-7.1.5) should be less than 0.01 perms (grains/square foot/hour in Hg) and comply with the ASTM E1745 Class A requirements. Installation of vapor barriers should be in accordance with ASTM E1643. The basis of design is 15-mil StegoWrap vapor barrier placed per the manufacturer's guidelines. Reef Industries Vapor Guard membrane has also been shown to achieve a permeance of less than 0.01 perms. We recommend that the slab be poured directly on the vapor barrier, which is placed directly on the prepared subgrade soil.

18.2 Common to all acceptable products, vapor retarder/barrier joints must be lapped and sealed with mastic or the manufacturer's recommended tape or sealing products. In actual practice, stakes are often driven through the retarder material, equipment is dragged or rolled across the retarder, overlapping or jointing is not properly implemented, etc. All these construction deficiencies reduce the retarder's effectiveness. In no case should retarder/barrier products be punctured or gaps be allowed to form prior to or during concrete placement.

18.3 Vapor retarders/barriers do not provide full waterproofing for structures constructed below free water surfaces. They are intended to help reduce or prevent vapor transmission and/or capillary migration through the soil and through the concrete slabs. Waterproofing systems must be designed and properly constructed if full waterproofing is desired. The owner and project designers should be consulted to determine the specific level of protection required.

18.4 Following placement of concrete floor slabs, sufficient drying time must be allowed prior to placement of any floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

19. *Exterior Slab Thickness and Reinforcement:* As a minimum for protection of on-site improvements, we recommend that all exterior pedestrian concrete slabs be 4½ inches thick, founded on properly compacted and tested fill, and contain No. 4 bars at 24-inch centers, both ways, at the center of the slab, and contain adequate isolation and control joints. The performance of on-site improvements can be greatly affected by soil base preparation and the quality of construction. It is therefore important that all improvements are properly designed and constructed for the existing soil conditions. The improvements should not be built on loose soils or fills placed without our observation and testing.

For exterior slabs with the minimum shrinkage reinforcement, control joints should be placed at spaces no farther than 15 feet apart or the width of the slab, whichever is less, and also at re-entrant corners. Control joints in exterior slabs should be sealed with elastomeric joint sealant. The sealant should be inspected every 6 months and be properly maintained.

D. ***Pavements***

20. *Concrete Pavement:* We recommend that concrete pavements, including the garage slab, subject only to automobile and light truck traffic be 6 inches thick and be supported directly on properly prepared on-site subgrade soils. The concrete for truck loading docks should have a minimum thickness of 7 inches. The upper 8 inches of the subgrade below the slab should be compacted to a minimum degree of compaction of 95 percent just prior to paving. The concrete should conform to Section 201 of The Standard Specifications for Public Works Construction, 2000 Edition, for Class 560-C-3250.

In order to control shrinkage cracking, we recommend that saw-cut, weakened-plane joints be provided at about 15-foot centers both ways. The pavement slabs should be saw-cut as soon as practical but no more than 24 hours after the placement of the concrete. The depth of the joint should be one-quarter of the slab thickness and its width should not exceed 0.02-foot. Reinforcing steel is not necessary unless it is desired to increase the joint spacing recommended above.

21. *Asphalt Concrete Pavement*: Based on the results of our exploratory excavations and laboratory tests as well as our experience with soils similar to those encountered at the site, we anticipate that pavement sections for the proposed development will be on the order of 2 inches of asphalt concrete on 6½ inches of aggregate base for parking stalls and minor traffic channels (Traffic Index of 4.0), 2½ inches on 8½ inches for major automobile traffic channels (TI of 5.0), 3 inches on 9 inches for pavements subject to up to 13 heavy 2-axle trucks per week (TI of 5.5) and 3 inches on 10½ inches for pavements subject to up to 27 heavy 2-axle trucks per week (TI of 6.0). Final pavement section recommendations should be based on R-value (Resistance) tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the mass grading operations.

Asphalt concrete should consist of Type III-B3-PG-64-10 conforming to the Standard Specifications for Public Works Construction, 2000 Edition (Standard Specifications), Section 400-4 and be placed in accordance with Section 302-5. Aggregate base should conform to the requirements for Crushed Aggregate Base or Crushed Miscellaneous Base in Section 200-2 of the Standard Specifications. The upper 6 inches of the pavement subgrade soil as well as the aggregate base layer should be compacted to a minimum degree of compaction of 95 percent. Preparation of the subgrade and placement of the asphalt concrete and base materials should be performed under the observation of our representative.

E. ***General Recommendations***

22. *Project Start Up Notification:* In order to minimize any work delays during site development, this firm should be contacted 24 hours prior to any need for observation of footing excavations or field density testing of compacted fill soils. If possible, placement of formwork and steel reinforcement in footing excavations should not occur prior to observing the excavations; in the event that our observations reveal the need for deepening or redesigning foundation structures at any locations, any formwork or steel reinforcement in the affected footing excavation areas would have to be removed prior to correction of the observed problem (i.e., deepening the footing excavation, recompacting soil in the bottom of the excavation, etc.).

IX. GRADING NOTES

Geotechnical Exploration, Inc. recommends that we be retained to verify the actual soil conditions revealed during site grading work and footing excavation to be as anticipated in this "*Report of Preliminary Geotechnical Investigation*" for the project. In addition, the compaction of any fill soils placed during site grading work must be observed and tested by the soil engineer. It is the responsibility of the grading contractor to comply with the requirements on the grading plans and the local grading ordinance. All retaining wall and trench backfill should be properly compacted. ***Geotechnical Exploration, Inc.*** will assume no liability for damage occurring due to improperly or uncompacted backfill placed without our observations and testing.

X. LIMITATIONS

Our conclusions and recommendations have been based on available data obtained from our document review, field investigation and laboratory analysis, as well as our experience with similar soils and formational materials located in this area of San Diego. Of necessity, we must assume a certain degree of continuity between exploratory excavations. It is, therefore, necessary that all observations, conclusions, and recommendations be verified at the time grading operations begin or when footing excavations are placed. In the event discrepancies are noted, additional recommendations may be issued, if required.

The work performed and recommendations presented herein are the result of an investigation and analysis that meet the contemporary standard of care in our profession within the City of San Diego. No warranty is provided.

This report should be considered valid for a period of two (2) years, and is subject to review by our firm following that time. If significant modifications are made to the building plans, especially with respect to the height and location of any proposed structures, this report must be presented to us for immediate review and possible revision.

It is the responsibility of the owner and/or developer to ensure that the recommendations summarized in this report are carried out in the field operations and that our recommendations for design of this project are incorporated in the structural plans. We should be retained to review the project plans once they are available, to verify that our recommendations are adequately incorporated in the plans.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered to be unsafe.

The firm of ***Geotechnical Exploration, Inc.*** shall not be held responsible for changes to the physical condition of the property, such as addition of fill soils or changing drainage patterns, which occur subsequent to issuance of this report and the changes are made without our observations, testing, and approval.

Once again, should any questions arise concerning this report, please feel free to contact the undersigned. Reference to our **Job No. 15-10932** will expedite a reply to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

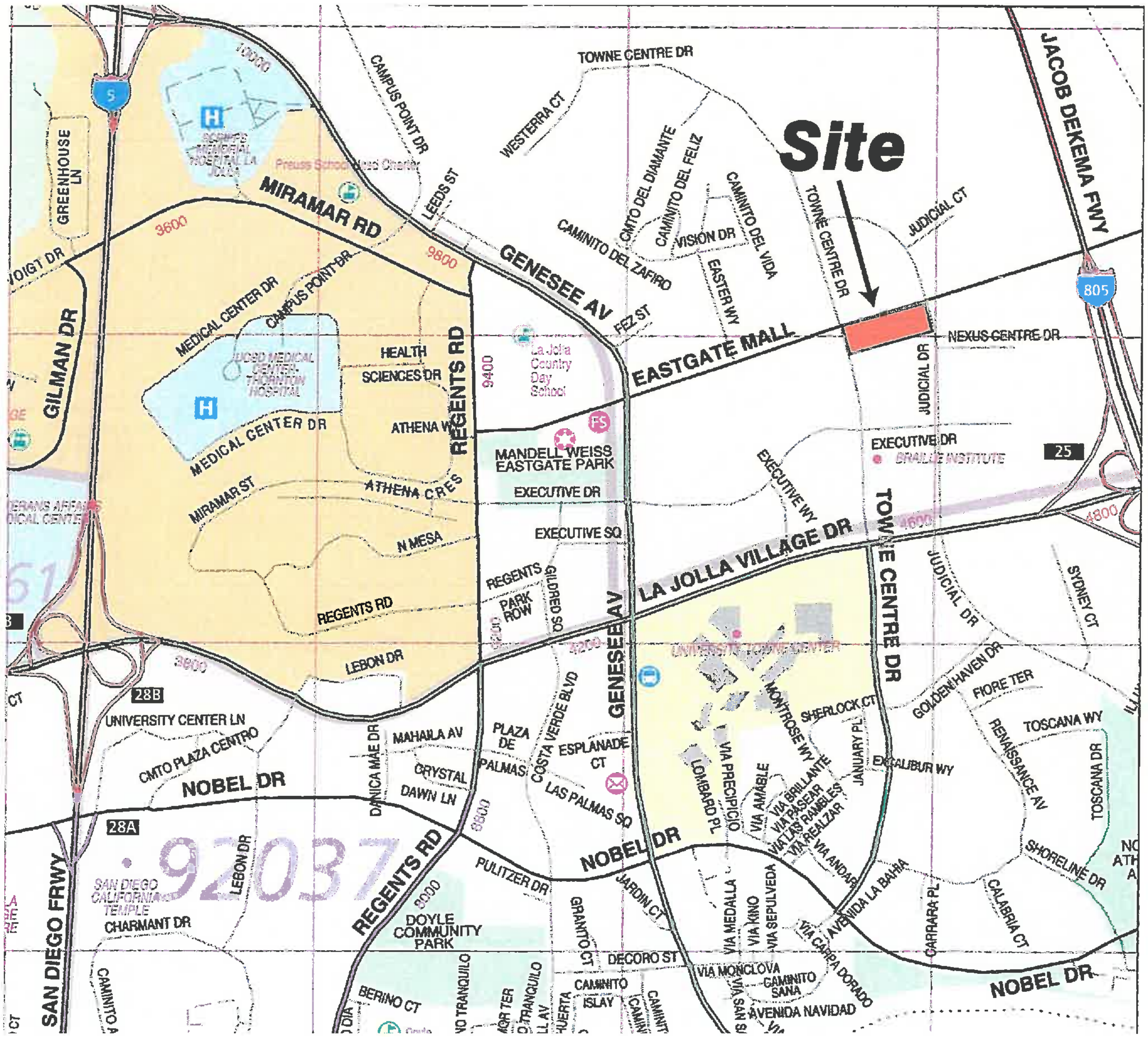
Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer
Senior Project Geologist

Jonathan A. Browning
C.E.G. 2615/P.G. 9012

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
JONATHAN A. BROWNING
No. 2615
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

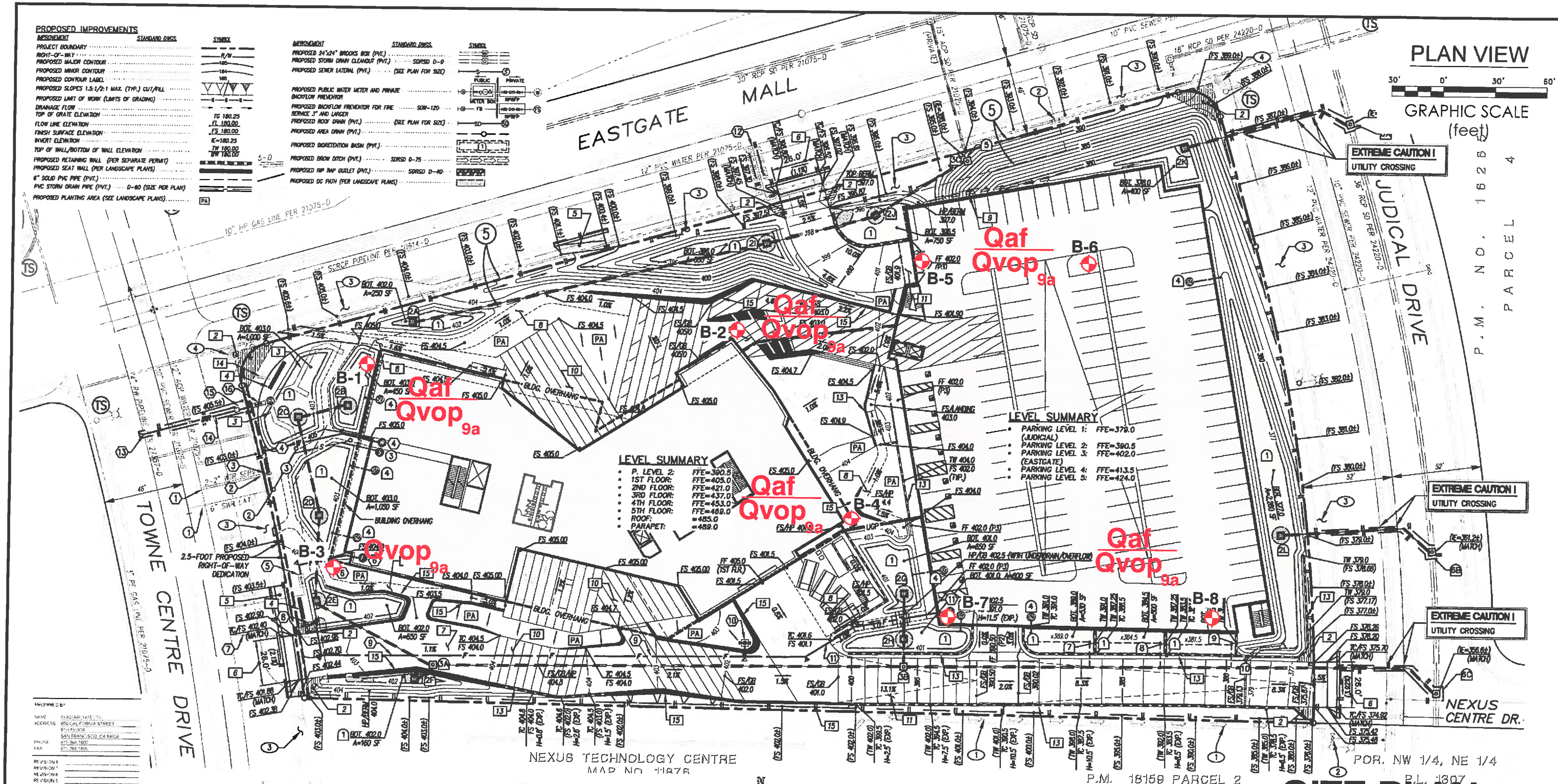
VICINITY MAP



Thomas Bros Guide San Diego County pg 1228-D2

Proposed 5-Story Office Building
and Parking Structure
9455 Towne Centre Drive
San Diego, CA.

Figure No. I
Job No. 15-10932



LEGEND

B-1	Indicates Approximate Location of Exploratory Boring	
Qaf	Artificial Fill	
Qvop 9a	Very Old Paralic Deposits	

REFERENCE: This Plot Plan was prepared from an existing PROPOSED GRADING DRAINAGE AND PRIVATE UTILITY PLAN dated 9/4/15 and from on-site field reconnaissance performed by GEI.

15-10932-p.ai

SITE PLAN

Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. II
Job No. 15-10932

Geotechnical Exploration, Inc.

December 2015

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	12-1-15
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 405' Mean Sea Level	Not Encountered	JAB

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			ASPHALT PAVEMENT, 4" thick.									
			SILTY SAND, with gravel, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown.	SM								
2			**BASE**	SM								
			SILTY SAND, with gravel, fine- to coarse-grained, with subrounded to rounded gravel to 1.5" in diameter (~25%). Dense. Moist. Dark red-brown.	SM	6.8						50/ 5"	3"
4												
6			**FILL (Qaf)**									
			SILTY SAND, fine- to medium-grained. Very dense. Slightly moist. Light red-brown.	SC								
8			**VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**									
			-- 17% passing #200 sieve.								83/ 11"	2"
			CLAYEY SAND, fine- to medium-grained, with trace of caliche and mica. Very dense. Moist. Red-brown.									
10												
			VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)									
12			Bulk sample from 12'- 14'.									
14											87/ 11"	2"
16												
18											90/ 11"	2"
20			Bottom @ 19'									

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- 1 IN-PLACE SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- S NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME: **Proposed Office Building & Parking Structure**		
SITE LOCATION: **9455 Towne Center Drive, San Diego, CA**		
JOB NUMBER: **15-10932**	REVIEWED BY: **WDH**	LOG No. **B-1**
FIGURE NUMBER: **IIIa**	GEI Geotechnical Exploration, Inc.	

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**11-30-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 405' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0	**ASPHALT PAVEMENT**, 4" thick.									
	SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
2–4	**SILTY SAND**, fine- to coarse-grained, with some fine gravel. Dense. Moist. Red-brown. **FILL (Qaf)** Bulk bag sample from 2'- 4'. -- 19% passing #200 sieve.	SM	9.3	114.8					69	3"
5–8	**SILTY SAND**, fine- to medium-grained. Very dense. Dry. Light red-brown. **VERY OLD PARALIC DEPOSITS (Qvop$_{9a}$)**	SM								
8–19	**CLAYEY SAND**, fine- to medium-grained. Very dense. Moist. Light brown-gray, with some iron oxide staining. **VERY OLD PARALIC DEPOSITS (Qvop$_{9a}$)** Bulk sample from 8'- 11'. -- 30% passing #200 sieve.	SC	10.3						52	2"
14	-- becomes mottled light brown-gray to red-brown, with some caliche.								83/ 11"	2"
18	-- trace coarse sand and fine rounded gravel to 3/8", light brown-gray.								83/ 11"	2"
19	Bottom @ 19'									

PERCHED WATER TABLE
BULK BAG SAMPLE
IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER **15-10932**	REVIEWED BY **WDH**	LOG No. **B-2**
FIGURE NUMBER **IIIb**	Geotechnical Exploration, Inc.	

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	12-1-15
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 405' Mean Sea Level	Not Encountered	JAB

FIELD DESCRIPTION AND CLASSIFICATION

DEPTH (feet)	SYMBOL	SAMPLE	DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0–2			**ASPHALT PAVEMENT**, 4" thick.									
			SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
				SM								
3–5			**SILTY SAND**, fine- to medium-grained. Very dense. Slightly moist. Light red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SC							50/ 2"	3"
5–8			**CLAYEY SAND**, fine- to medium-grained, with trace of caliche. Very dense. Moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** Bulk sample from 4'- 7'.									
8			-- becomes less clayey.								84	2"
13			-- increase in clay content, becomes mottled light brown-gray to red-brown.								68	2"
16			Bulk bag sample from 15'- 18'.									
18			-- trace manganese staining.								81/ 11"	2"
20			Bottom @ 19'									

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER 15-10932	REVIEWED BY WDH	LOG No. B-3
FIGURE NUMBER IIIc	Geotechnical Exploration, Inc.	

EXPLORATION LOG 10932 TOWN CENTER.GPJ GEO EXPL.GDT 12/16/15

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	11-30-15
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 405' Mean Sea Level	Not Encountered	JAB

DEPTH (feet)	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0	**ASPHALT PAVEMENT**, 4" thick.									
	SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
2–4	**CLAYEY SAND**, fine- to medium-grained, with some fine gravel. Very dense. Slightly moist. Red-brown. **FILL (Qaf)** Bulk bag sample from 2'- 4'.	SM							88/ 11"	3"
5–11	**SILTY SAND**, fine- to medium-grained. Very dense. Dry. Light red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** -- 28% passing #200 sieve.	SM			8.8	129.1			50/ 3"	2"
11–18.5	**CLAYEY SAND**, fine- to medium-grained. Very dense. Moist. Red-brown, with some manganese staining. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** -- 28% passing #200 sieve.	SC	10.3						80/ 11"	2"
	Bulk sample from 14'- 17'.									
18.5									50/ 5"	2"
20	Bottom @ 18.5'									

Legend	
▼	PERCHED WATER TABLE
☒	BULK BAG SAMPLE
1	IN-PLACE SAMPLE
■	MODIFIED CALIFORNIA SAMPLE
S	NUCLEAR FIELD DENSITY TEST
▨	STANDARD PENETRATION TEST

JOB NAME: **Proposed Office Building & Parking Structure**

SITE LOCATION: **9455 Towne Center Drive, San Diego, CA**

JOB NUMBER: **15-10932**

REVIEWED BY: **WDH**

Geotechnical Exploration, Inc.

FIGURE NUMBER: **IIId**

LOG No. **B-4**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	11-30-15
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 403' Mean Sea Level	Not Encountered	JAB

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0			**ASPHALT PAVEMENT**, 4" thick.									
			SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
2												
4			**CLAYEY SAND**, fine- to medium-grained, with some fine gravel. Medium dense to dense. Moist. Dark red-brown. **FILL (Qaf)**	SC								
6			**SILTY SAND**, fine- to medium-grained. Very dense. Slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SM								
8											74/ 9"	2"
10												
12			-- becomes moist. -- 18% passing #200 sieve.		8.6	105.2					100/ 8"	3"
14			Bulk bag sample from 14'- 16'. -- approximately 10%- 15% subrounded gravel to 2" in diameter.									
16												
			GRAVEL, well graded, with clay and fine- to coarse-grained sand and subrounded to rounded gravel to 2" in diameter. Very dense. Slightly moist. Red-brown.	GW-GC							50/ 4"	2"
18												
20			**VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**									
22			-- no sample recovery due to rock.								50/ 3"	2"

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME: Proposed Office Building & Parking Structure		
SITE LOCATION: 9455 Towne Center Drive, San Diego, CA		
JOB NUMBER: 15-10932	REVIEWED BY: WDH	LOG No.
FIGURE NUMBER: IIIe	Geotechnical Exploration, Inc.	B-5

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**11-30-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 403' Mean Sea Level	**Not Encountered**	**JAB**

FIELD DESCRIPTION AND CLASSIFICATION

DEPTH (feet)	SYMBOL	SAMPLE	DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
24			**CLAYEY SAND**, fine- to coarse-grained. Very dense. Moist. Dark red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SC								
26		Bulk bag	Bulk bag sample from 25'- 27'.									
28		Modified California			6.4	103.1					50/ 5"	3"
30												
32												
34			**POORLY GRADED SILTY SAND**, fine- to medium-grained. Very dense. Moist. Brown-yellow. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SM-SP								
36												
38			Bottom @ 37.5'									
40												
42												
44												

PERCHED WATER TABLE
BULK BAG SAMPLE
IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER: **15-10932**	REVIEWED BY: **WDH**	LOG No.
FIGURE NUMBER: **IIIf**	Geotechnical Exploration, Inc.	**B-5**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**12-1-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 402' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0			**ASPHALT PAVEMENT**, 4" thick.	SM								
			SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
2–4		Bulk	**CLAYEY SAND**, fine- to medium-grained, with some fine gravel. Medium dense to dense. Moist. Dark red-brown. **FILL (Qaf)** Bulk bag sample from 2'- 4'.	SC								
7.5		SPT	**CLAYEY SAND**, fine- to medium-grained. Very dense. Dry to slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**								50/ 5.5"	2"
9–12		Bulk	Bulk bag sample from 9'- 12'.									
12		SPT									50/ 4.5"	2"
17		SPT	-- becomes moist, less clayey, with some mica and manganese staining.								50/ 5"	2"
20												

EXPLORATION LOG 10932 TOWN CENTER.GPJ GEO_EXPL.GDT 12/16/15

Legend	JOB NAME: **Proposed Office Building & Parking Structure**
▼ PERCHED WATER TABLE	SITE LOCATION: **9455 Towne Center Drive, San Diego, CA**
☒ BULK BAG SAMPLE	JOB NUMBER: **15-10932**
[1] IN-PLACE SAMPLE	REVIEWED BY: **WDH**
■ MODIFIED CALIFORNIA SAMPLE	FIGURE NUMBER: **IIIg**
[S] NUCLEAR FIELD DENSITY TEST	Geotechnical Exploration, Inc.
▨ STANDARD PENETRATION TEST	LOG No. **B-6**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**12-1-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 402' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
22–25			**CLAYEY SAND**, fine- to medium-grained. Very dense. Dry to slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SC								
25–30			**SILTY SAND**, with some mica. Very dense. Slightly moist. Brown-yellow with iron-oxide staining. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** -- 17% passing #200 sieve.	SM	6.4						50/ 4.5"	3"
30–35			**CLAYEY SAND**, fine- to medium-grained. Very dense. Moist. Light brown-gray. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** Bulk bag sample from 30'- 33'.	SC								
35–37.5			**POORLY GRADED SILTY SAND**, with some mica. Very dense. Slightly moist. Light gray with some iron oxide staining. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SM-SP							50/ 5"	2"
			Bottom @ 37.5'									

PERCHED WATER TABLE
BULK BAG SAMPLE
IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION: **9455 Towne Center Drive, San Diego, CA**		
JOB NUMBER: **15-10932**	REVIEWED BY: **WDH**	LOG No.
FIGURE NUMBER: **IIIh**	Geotechnical Exploration, Inc.	**B-6**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**11-30-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 404' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0	**ASPHALT PAVEMENT**, 4" thick.									
	SILTY SAND WITH GRAVEL, fine- to coarse-grained. Medium dense. Slightly moist. Dark gray-brown. **BASE**	SM								
3.5	**CLAYEY SAND**, fine- to medium-grained, with some fine gravel. Medium dense to dense. Moist. Dark red-brown. **FILL (Qaf)**	SC								
5	**SILTY SAND**, fine- to medium-grained. Very dense. Dry. Light red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SM								
8									80/ 10"	2"
10	Bulk bag sample from 8'- 116'. -- 28% passing #200 sieve.				9.1	128.8				
12	-- becomes slightly moist and red-brown.								95/ 6"	3"
17.5									50/ 5"	2"
18	**GRAVEL**, well graded, with clayey fine- to coarse-grained sand and subrounded to rounded gravel to 2" in diameter. Very dense. Slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	GW-GC								
22	-- no sample recovery due to rock.									

▼ PERCHED WATER TABLE

☒ BULK BAG SAMPLE

1 IN-PLACE SAMPLE

■ MODIFIED CALIFORNIA SAMPLE

S NUCLEAR FIELD DENSITY TEST

▨ STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER **15-10932**	REVIEWED BY **WDH**	LOG No. **B-7**
FIGURE NUMBER **IIIi**	Geotechnical Exploration, Inc.	

EXPLORATION LOG 10932 TOWN CENTER.GPJ GEO_EXPL.GDT 12/16/15

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	11-30-15
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 404' Mean Sea Level	Not Encountered	JAB

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
25–36			**CLAYEY SAND**, fine- to medium-grained, with some mica; slightly cemented. Very dense. Slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SC								
27		Modified California			4.5						50/ 4"	3"
27–30		Bulk	Bulk bag sample from 27'- 30'. -- 7% passing #200 sieve.									
36–37.5			**SILTY SAND**, fine-grained. Very dense. Slightly moist. pale yellow. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** -- 15% passing #200 sieve.	SM-SP								
37		SPT			7.7						50/ 5"	2"
37.5			Bottom @ 37.5'									

Depth scale: 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER 15-10932	REVIEWED BY WDH	LOG No. B-7
FIGURE NUMBER IIIj	Geotechnical Exploration, Inc.	

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	**8-inch diameter Boring**	**12-1-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 403' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0			**POORLY GRADED SAND**, fine- to medium-grained. Loose. Moist. Light brown-gray.	SP								
			FILL/ VOLLEYBALL COURT SAND (Qaf)	SC								
2–3			**CLAYEY SAND**, fine- to medium-grained, with some fine gravel. Medium dense to dense. Slightly moist. Dark red-brown.									
			FILL (Qaf)									
6			-- becomes moist.									
8		SPT	-- becomes dense.								47	2"
10–13		Bulk	Bulk bag sample from 10'- 13'.									
12–13.5		SPT									32	2"
14			**CLAYEY SAND**, fine- to medium-grained. Very dense. Slightly moist. Red-brown.	SC								
			VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)									
17		SPT	-- fine- to coarse-grained sand lens, 0.5' thick.								50/ 5"	2"
17–19		Bulk	Bulk bag sample from 17'- 19'. -- 15% passing #200 sieve.									
20												

Legend:
- PERCHED WATER TABLE
- BULK BAG SAMPLE
- IN-PLACE SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME	**Proposed Office Building & Parking Structure**
SITE LOCATION	**9455 Towne Center Drive, San Diego, CA**
JOB NUMBER	**15-10932**
REVIEWED BY	**WDH**
FIGURE NUMBER	**IIIk**
LOG No.	**B-8**

Geotechnical Exploration, Inc.

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Truck-mounted Auger Drill Rig	8-inch diameter Boring	12-1-15
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 403' Mean Sea Level	Not Encountered	JAB

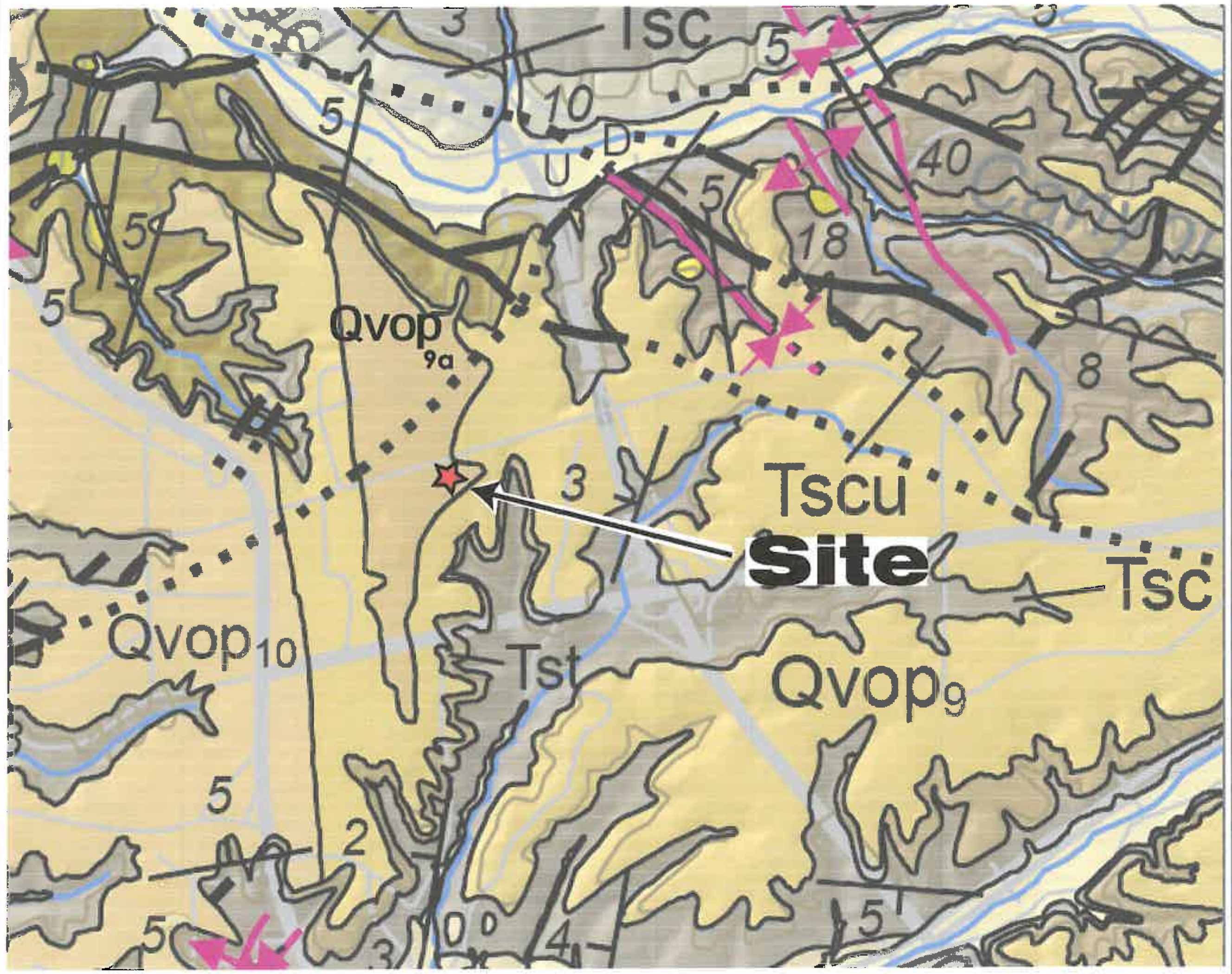
DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
24–26			**CLAYEY SAND**, fine- to medium-grained. Very dense. Slightly moist. Red-brown. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)**	SC								
28–30		1	**SILTY SAND**, fine-grained, with some mica. Very dense. Slightly moist. Red-brown, with some manganese staining. **VERY OLD PARALIC DEPOSITS ($Qvop_{9a}$)** -- 13% passing #200 sieve. From 30' to 31.5' -- lense of subrounded to rounded gravel to 2" in diameter.	SM							50/ 6"	3"
32–36												
38			-- becomes mottled light gray to red-brown, with occasional gray fine-grained sand lenses.								87/ 8"	2"
40–42			Bottom @ 37.6'									

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- 1 IN-PLACE SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- S NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME		
Proposed Office Building & Parking Structure		
SITE LOCATION		
9455 Towne Center Drive, San Diego, CA		
JOB NUMBER 15-10932	REVIEWED BY WDH	LOG No.
FIGURE NUMBER IIII	Geotechnical Exploration, Inc.	B-8

GEOLOGIC MAP
2008

compiled by Michael P. Kennedy
and Siang S Tan



Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.

EXCERPT FROM GEOLOGIC MAP OF THE SAN DIEGO 30' x 60' QUADRANGLE, CALIFORNIA

By
Michael P. Kennedy[1] and Siang S. Tan[1]
2008
Digital preparation by
Kelly R. Bovard[2], Anne G. Garcia[2], Diane Burns[2], and Carlos I. Gutierrez[1]
1. Department of Conservation, California Geological Survey
2. U.S. Geological Survey Department of Earth Sciences, University of California, Riverside

ONSHORE MAP SYMBOLS

Contact—Contact between geologic units; dotted where concealed.

70 U D — Fault—Solid where accurately located; dashed where approximately located; dotted where concealed. U = upthrown block, D = downthrown block. Arrow and number indicate direction and angle of dip of fault plane.

Anticline—Solid where accurately located; dotted where concealed.

Syncline—Solid where accurately located; dotted where concealed.

Kgd—granite pegmatite dike

Closed depression—Closed depression in Elsinore fault zone.

Landslide—Arrows indicate principal direction of movement. Queried where existence is questionable.

Strike and dip of beds
- 70 Inclined
- 70 Overturned
- Vertical
- Horizontal

Strike and dip of igneous foliation
- 45 Inclined
- Vertical

Strike and dip of igneous joints
- 60 Inclined
- Vertical

Strike and dip of metamorphic foliation
- 55 Inclined

Strike and dip of sedimentary joints
- Vertical

DESCRIPTION OF MAP UNITS

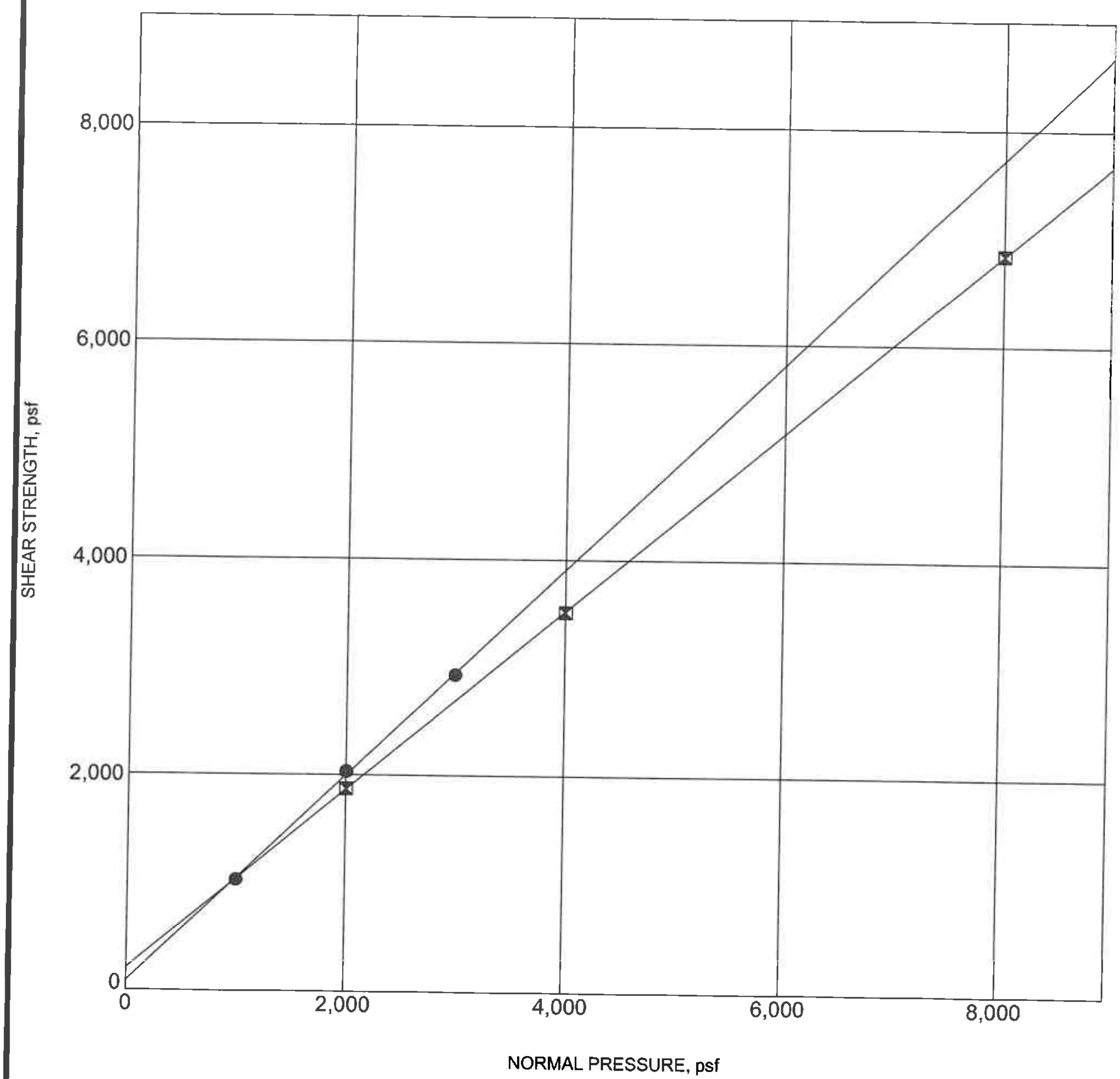
Qvop9a — Unit 9a — Very old paralic deposits, undivided (middle to early Pleistocene)

Figure No. IV
Job No.15-10932

Geotechnical Exploration, Inc.

December 2015

5-story-geo-comb.ai



	Specimen Identification	Classification	γ_d	MC%	c	ϕ
●	B-5 @ 12.0'	**SILTY SAND (SM), Red-brown**			**90**	**44**
⊠	B-5 @ 27.0'	**CLAYEY SAND (SC), Red-brown**			**209**	**40**

Geotechnical Exploration, Inc.

DIRECT SHEAR TEST

Figure Number: V
Job Name: Proposed Office Building & Parking Structure
Site Location: 9455 Towne Center Drive, San Diego, CA
Job Number: 15-10932

US DIRECT SHEAR 10932 TOWN CENTER.GPJ GEO EXPL.GDT 12/16/15

APPENDIX A
UNIFIED SOIL CLASSIFICATION CHART
SOIL DESCRIPTION

Coarse-grained (More than half of material is larger than a No. 200 sieve)

GRAVELS, CLEAN GRAVELS (More than half of coarse fraction is larger than No. 4 sieve size, but smaller than 3")	GW	Well-graded gravels, gravel and sand mixtures, little or no fines.
	GP	Poorly graded gravels, gravel and sand mixtures, little or no fines.
GRAVELS WITH FINES (Appreciable amount)	GC	Clay gravels, poorly graded gravel-sand-silt mixtures
SANDS, CLEAN SANDS (More than half of coarse fraction is smaller than a No. 4 sieve)	SW	Well-graded sand, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines.
SANDS WITH FINES (Appreciable amount)	SM	Silty sands, poorly graded sand and silty mixtures.
	SC	Clayey sands, poorly graded sand and clay mixtures.

Fine-grained (More than half of material is smaller than a No. 200 sieve)

SILTS AND CLAYS

Liquid Limit Less than 50	ML	Inorganic silts and very fine sands, rock flour, sandy silt and clayey-silt sand mixtures with a slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, clean clays.
	OL	Organic silts and organic silty clays of low plasticity.
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.
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

(rev. 6/05)

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

08 February 2016

Kilroy Realty, LP
3661 Valley Centre Drive, Suite 250
San Diego, CA 92130
Attn: Mr. Jake Brehm

Job No. 15-10932

Subject: **Response to City Plan Check-City Project No. Nbr 465929**
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Brehm:

In accordance with the request of your civil engineer we have prepared this response to review questions by the City (LDR Geology). We previously performed a preliminary geotechnical investigation for the project, the results of which were presented in our report dated December 15, 2015. Our responses corresponding to the review questions related to geotechnical issues (see attached review document) are presented in the following paragraphs.

Issue No. 4: With regard to circumscribing the limits of remedial grading, no remedial grading was recommended in our investigation report.

Issue No. 5: The attached Figure No. I indicates the locations of two geologic cross sections and the cross sections are presented on the attached Figure No. II.

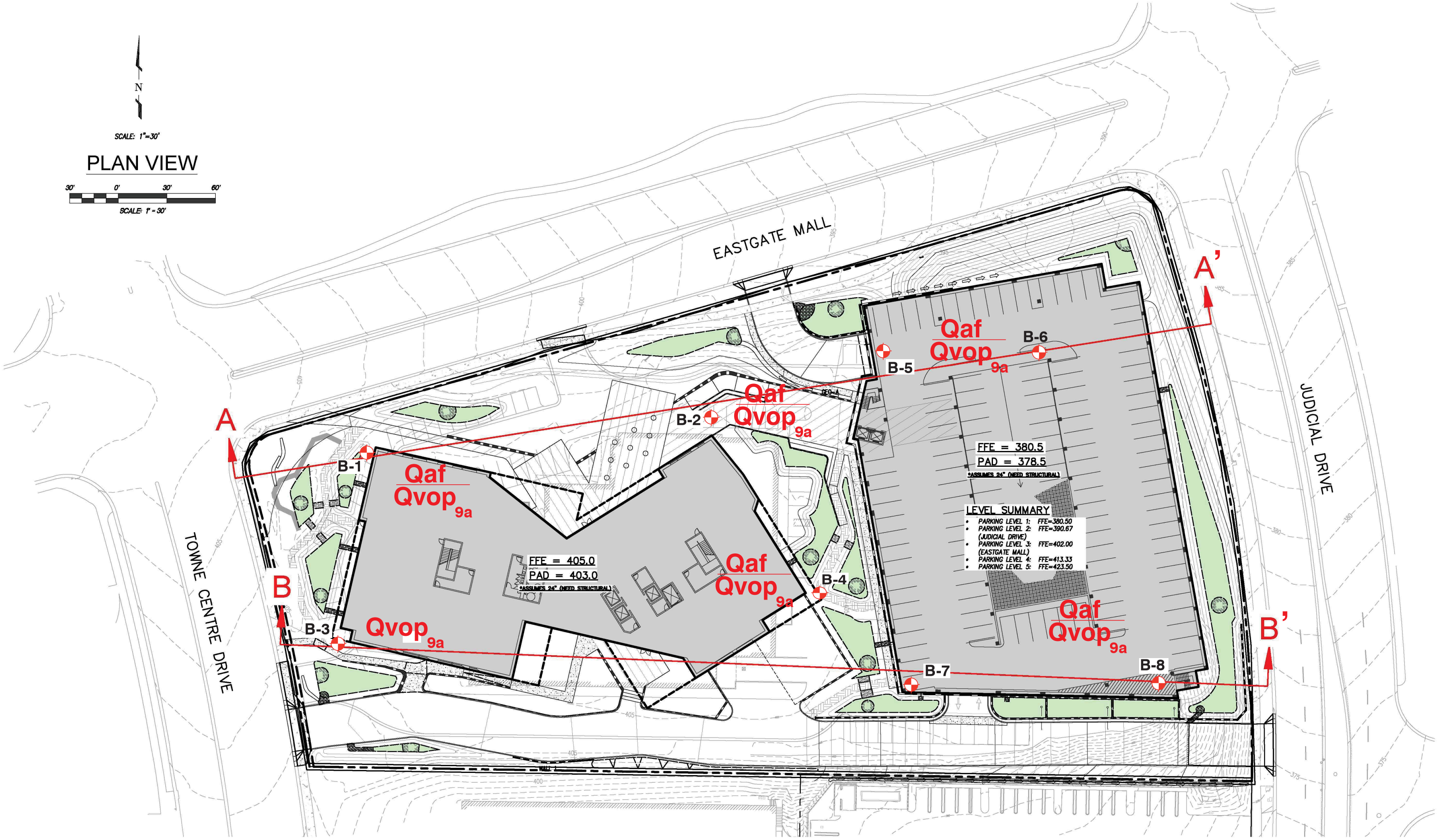
This opportunity to be of continued service is sincerely appreciated. Should you have any questions, please do not hesitate to contact us. Reference to our **Job No. 15-10932** will expedite a response to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA



LEGEND

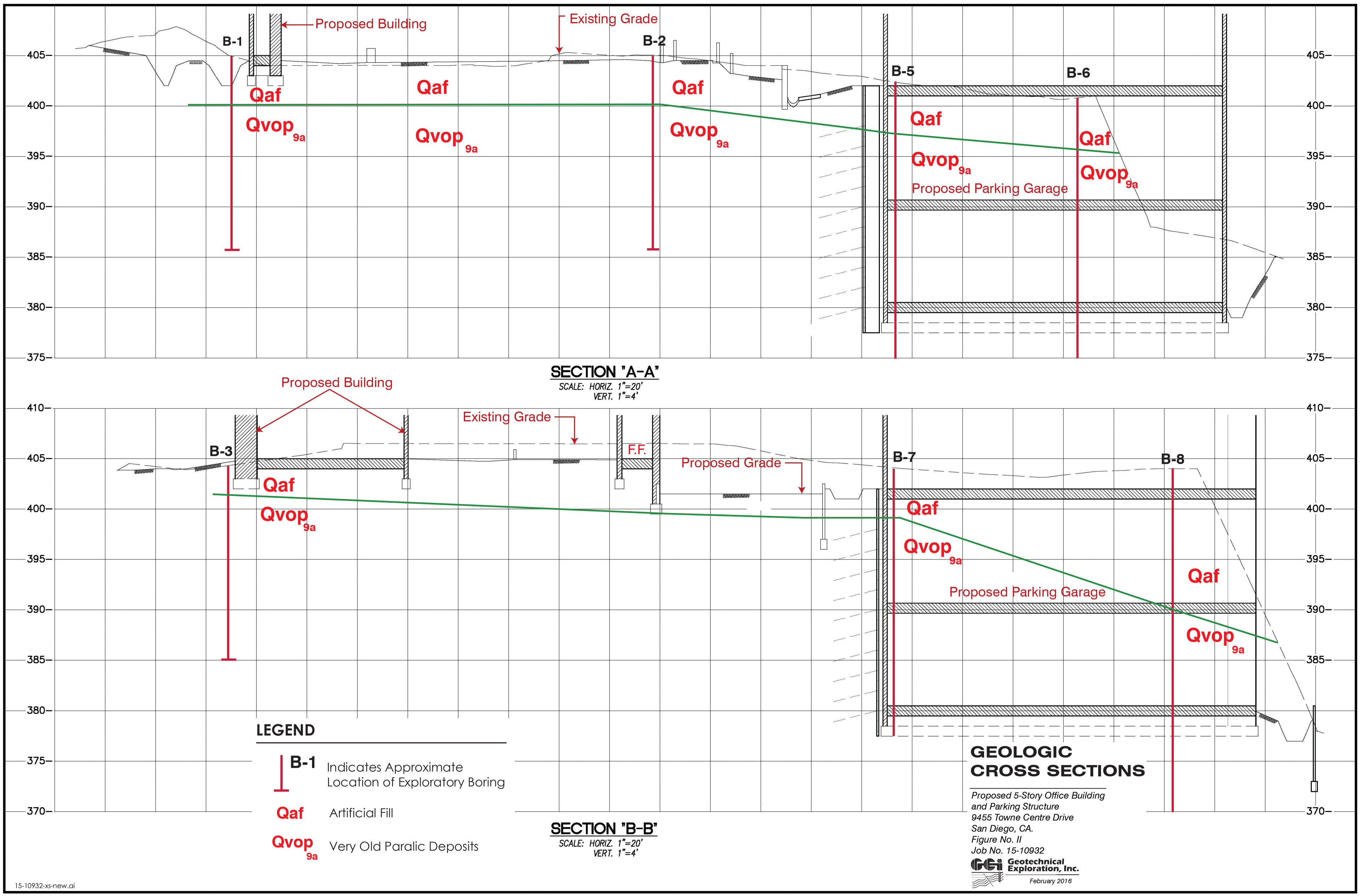
B-1	Indicates Approximate Location of Exploratory Boring
Qaf	Artificial Fill
$Qvop_{9a}$	Very Old Paralic Deposits

15-10932-p-30-scale.ai

SITE PLAN

Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. I
Job No. 15-10932

Geotechnical Exploration, Inc.
February 2016


Proposed Building
Existing Grade
B-1
B-2
B-5
B-6
Qaf
Qvop9a
Proposed Parking Garage
405
400
395
390
385
380
375
SECTION "A-A"
SCALE: HORIZ. 1"=20'
VERT. 1"=4'
Proposed Building
Existing Grade
F.F.
Proposed Grade
B-3
B-7
B-8
410
370
SECTION "B-B"
SCALE: HORIZ. 1"=20'
VERT. 1"=4'
LEGEND
B-1 Indicates Approximate Location of Exploratory Boring
Qaf Artificial Fill
Qvop9a Very Old Paralic Deposits
GEOLOGIC CROSS SECTIONS
Proposed 5-Story Office Building
and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. II
Job No. 15-10932
Geotechnical Exploration, Inc.
February 2016
15-10932-xs-new.ai

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING • GROUNDWATER • ENGINEERING GEOLOGY

04 August 2016

KILROY REALTY CORP.
3611 Valley Centre Drive, Suite 550
San Diego, CA 92130-3318
Attn: Mr. Bob Little

Job No. 15-10932

Subject: **Addendum Geotechnical Report Response to City Reviewer**
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Little:

In accordance with your request, ***Geotechnical Exploration, Inc***. herein responds to the City of San Diego LDR-Geology, Cycle 49, review comments dated June 9, 2016, with respect to the planned office building and parking structure project at the subject property in San Diego, California. We previously submitted our "Report of Preliminary Geotechnical Investigation" dated December 15, 2015, our "Response to City Plan Check-City Project No. Nbr 465929" dated February 8, 2016, and our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMPs," dated May 23, 2016.

Issue No. 2: *Submit an addendum geotechnical report or update letter that specifically addresses the following: (New Issue).*

GEI Response: We submit this letter as our "Addendum Geotechnical Report" in response to the City reviewer's comments.

Issue No. 3: *Provide the percolation data for tests INF-1 through INF-5. (New Issue).*

GEI Response: Attached with this addendum geotechnical report, we have included a site plan showing the test locations, percolation test data and calculations for the conversion of percolation test rates to infiltration rates for tests INF-1 through INF-5.

7420 TRADE STREET • SAN DIEGO, CA. 92121 • (858) 549-7222 • FAX: (858) 549-1604 • EMAIL: geotech@gei-sd.com

Issue No. 4: *The referenced limited geotechnical investigation and Form I-8 provide converted infiltration rates ranging from 0.007 to 0.102 inches per hour indicating the soil conditions allow for an appreciable amount of infiltration. Criteria 5 should be marked "yes."*

GEI Response: Please note, we are now using worksheet C.4-1 for the characterization of infiltration feasibility conditions on the site. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we have revised worksheet C.4-1 accordingly as directed by the reviewer. Our revised worksheet C.4-1 form is attached.

Issue No. 5: *For Criteria 6, provide the specific geologic and/or geotechnical hazard(s) that cannot be mitigated to an acceptable level for each location tested per Appendix C.2*

GEI Response: The specific geologic/geotechnical hazards for each infiltration test location, per Appendix C.2, are presented below based on the following detailed information regarding our evaluation of the anticipated groundwater seepage regimen at the site.

C.2.1 Soil and Geologic Conditions

1. Infiltration Testing and Subsurface Flow Findings and Discussion

As indicated in our reports dated December 15, 2015, and February 8, 2016, the site is underlain by a relatively thin layer of compacted fill soils overlying Very Old Paralic deposits consisting of dense to very dense sands. The contact between the fills and formational materials in general slopes down to the east.

Infiltration Tests 1, 2 and 5 indicated calculated infiltration rates of 0.0035, 0.0035 and 0.033 inches per hour, respectively, with a factor of safety of 2 applied. The water column for these tests was completely within the formational deposits. Infiltration Test 3 indicated a calculated infiltration rate of 0.044 inches per hour with a factor of safety of 2 applied. The water column for this test was half in fill soil and half within the formational deposits. Infiltration Test 4 indicated a calculated infiltration rate of 0.014 inches per hour with a factor of safety of 2 applied. The water column for this test was completely within fill soils with the exception of the bottom few inches which were formational. The infiltration rates were determined utilizing percolation test procedures which are corrected by the Porchet equation to determine the vertical infiltration rates. It should be noted that the Porchet equation assumes that the entire bottom and sidewall of the test hole exposed to the water column is the same material, which was not the case for Tests 3 and 4. Based on the preceding, it is our opinion that in general the infiltration rates for formational materials only would be less than 0.005 inches per hour with a minimum factor of safety of 2. The obvious conclusion from the preceding is that infiltration will result primarily in lateral spreading of a "perched" groundwater condition although long term infiltration will include vertical movement of the water into the underlying foundation soils for the proposed structures.

C.2.4 Utility Considerations

Due to the anticipated perched seepage condition as previously discussed, it is our opinion that the infiltration would result in water intrusion into new on-site utility trench lines as well as existing trench lines and vaults for City utilities along Judicial Drive, Eastgate Mall and Towne Centre Drive and the adjacent property to the south, which are both lower in elevation.

C.2.6 Retaining Walls and Foundations

1. Infiltration Effects on the Proposed Structures

The allowable bearing pressures for footings presented in our investigation report dated December 15, 2015, were governed by anticipated settlements. Utilizing Standard Penetration test results we recommended allowable dead plus live load bearing values to limit anticipated total settlements to a maximum of 1 inch. As indicated above, it is our opinion that over an extended period of time the formational soils below footings would become essentially saturated. For that condition our settlement calculations indicate an additional post construction settlement of 1 inch. Further, given the very high Standard Penetration test values measured during our field exploration, it is our opinion that the formational materials possess a carbonate type cementing and, as a result, the actual settlement of the proposed building footings may initially be negligible but then begin to occur as the materials become wetted. This would result in post construction settlements on the order of 2 inches that would occur randomly over an extended period of time as the wetting front progresses.

2. Infiltration Effects on the Proposed Permanent Soil Nail and Tied-Back Shoring Walls

Wetting of the soils behind these walls will result in an increased load on the walls due to an increase in soil weight. Of more concern, however, is that the soil anchors will be tensioned and locked off based on the resistance of the materials in their existing dry condition. As the soils surrounding the anchors become wetted, however, we anticipate yielding of the anchors that would at a minimum result in architectural damage to the walls. This would also apply to the existing lagging wall on the lower property to the south.

C.2.4 Utility Considerations and
C.2.6 Retaining Walls and Foundations

A discussion of the geotechnical hazards per Appendix C.2, specific to each infiltration test location, is presented below:

INF-1: Is proposed adjacent to Eastgate Mall with several existing utility lines and vaults. The infiltration rate with a minimum factor of safety of 2 is 0.0035 inches per hour which is less than required for partial infiltration. In addition, the proposed infiltration basin would be located within 20 feet of the proposed 5-story office building. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Eastgate Mall and detrimental post construction settlement of the proposed office building.

INF-2: Is proposed adjacent (within 7 feet) of the proposed 5-story office building. The infiltration rate with a minimum factor of safety of 2 is 0.0035 inches per hour which is less than required for partial infiltration. The geotechnical hazards associated with this infiltration basin include water intrusion into buried existing utility lines and/or vaults on the subject site and Towne Center Drive and detrimental post construction settlement of the proposed office building.

INF-3: Is proposed adjacent to Eastgate Mall with several existing utility lines and vaults. In addition, the proposed infiltration basin would be immediately adjacent to the proposed 6-story parking structure and permanent tied-back and soil nail site retaining walls. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Eastgate Mall, detrimental post construction settlement of the proposed parking structure and detrimental yielding of the permanent tied-back and soil nail site retaining walls.

INF-4: Is proposed adjacent to the proposed 6-story parking structure and permanent tied-back and soil nail site retaining walls as well as an existing permanent shoring wall on the adjacent property to the south. The geotechnical hazards associated with this infiltration basin include detrimental post construction settlement of the proposed parking structure and detrimental yielding of the proposed soil nail and tie-back retaining walls and adjacent off-site existing permanent shoring wall on the adjacent property to the south.

INF-5: Is proposed adjacent to Judicial Drive with several existing utility lines and vaults. In addition, the proposed infiltration basin would be immediately adjacent to the proposed 6-story parking structure. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Judicial Drive and detrimental post construction settlement of the proposed parking structure.

In summary, it is our opinion that infiltration at any location on the site would result in the geotechnical hazards previously discussed, such as damaging post-construction building settlement, yielding and damage to the proposed permanent tied-back and soil nail shoring walls, and intrusion into both on-site and adjacent off-site trenches and vaults. The geotechnical hazards associated with the proposed infiltration basin locations cannot be reasonable mitigated.

Issue No. 6: *Based on the answer provided in Criteria 7, provide specific geologic/geotechnical hazards associated to shallow perched seepage at the site.*

GEI Response: The specific geologic/geotechnical hazards associated with shallow perched seepage at the site include detrimental post construction settlements of the proposed 5-story office building and 6-story parking structure, yielding of the proposed permanent soil nail and tie-back retaining walls, water intrusion into proposed site underground utility lines and/or vaults as well as existing lines and vaults in the surrounding streets as well as on the lower adjacent existing development to the south.

Issue No. 7: *Provide a response to Criteria 8 based on Appendix C.3.*

GEI Response: In accordance with "*The City of San Diego, Storm Water Standards, BMP Design Manual,*" Appendix C.4.4, the project design engineer has the responsibility to complete Criteria's 4 and 8 of worksheet C.4-1. The attached worksheet C.4-1 includes responses to Criteria's 4 and 8.

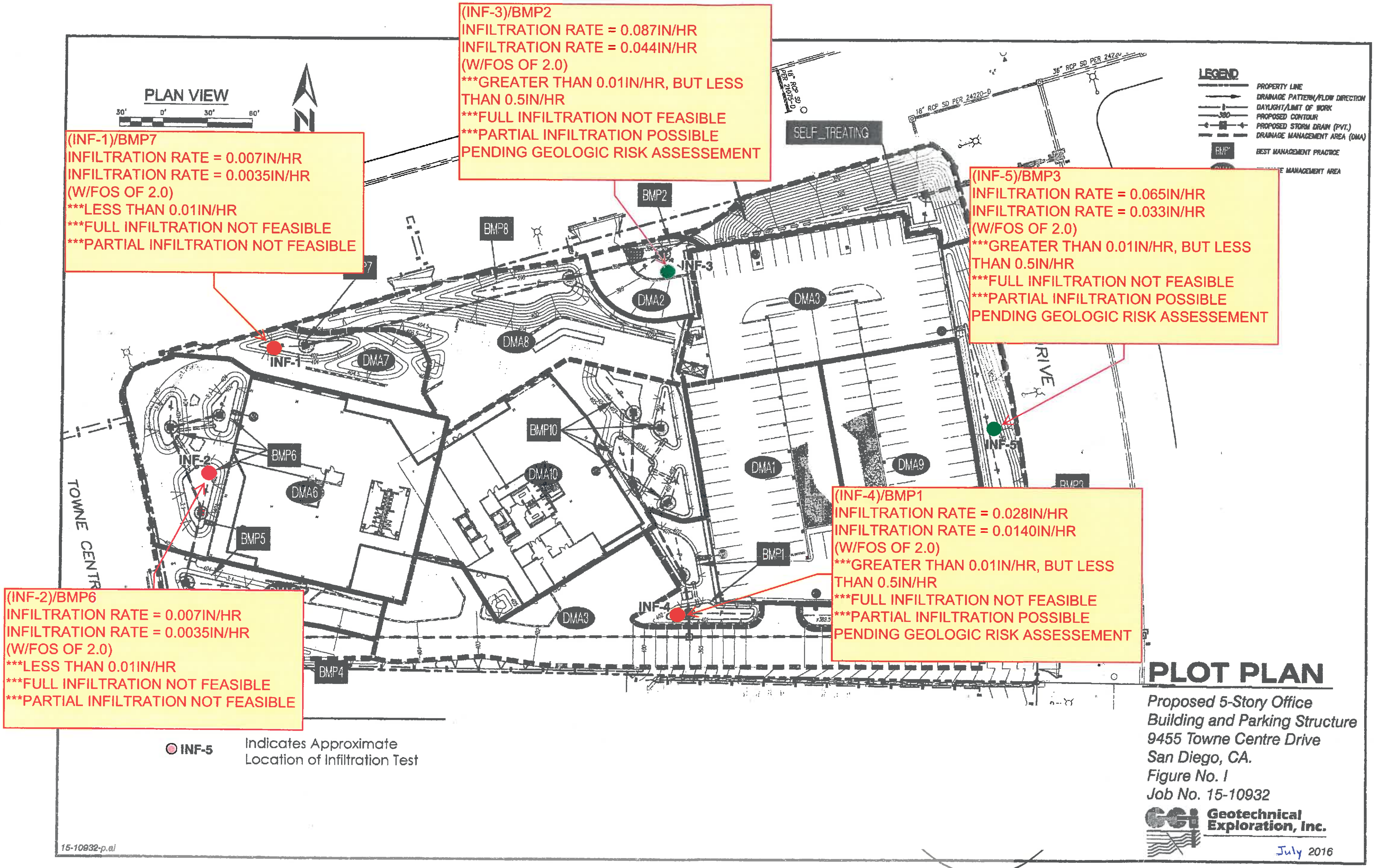
If you have further questions regarding this matter, please contact our office. Reference to our **Job No. 15-10932** will help expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA



PLAN VIEW
30' 0' 30' 60'
N
(INF-3)/BMP2
INFILTRATION RATE = 0.087IN/HR
INFILTRATION RATE = 0.044IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE PENDING GEOLOGIC RISK ASSESSEMENT
(INF-1)/BMP7
INFILTRATION RATE = 0.007IN/HR
INFILTRATION RATE = 0.0035IN/HR
(W/FOS OF 2.0)
***LESS THAN 0.01IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION NOT FEASIBLE
(INF-5)/BMP3
INFILTRATION RATE = 0.065IN/HR
INFILTRATION RATE = 0.033IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE PENDING GEOLOGIC RISK ASSESSEMENT
(INF-4)/BMP1
INFILTRATION RATE = 0.028IN/HR
INFILTRATION RATE = 0.0140IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE PENDING GEOLOGIC RISK ASSESSEMENT
(INF-2)/BMP6
INFILTRATION RATE = 0.007IN/HR
INFILTRATION RATE = 0.0035IN/HR
(W/FOS OF 2.0)
***LESS THAN 0.01IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION NOT FEASIBLE
LEGEND
PROPERTY LINE
DRAINAGE PATTERN/FLOW DIRECTION
DAYLIGHT/LIMIT OF WORK
PROPOSED CONTOUR
PROPOSED STORM DRAIN (PVT.)
DRAINAGE MANAGEMENT AREA (DMA)
BEST MANAGEMENT PRACTICE
SELF_TREATING
BMP1
BMP2
BMP4
BMP5
BMP6
BMP8
BMP10
DMA1
DMA2
DMA3
DMA6
DMA7
DMA8
DMA9
DMA10
INF-1
INF-2
INF-3
INF-4
INF-5
TOWNE CENTR
RIVE
INF-5 Indicates Approximate Location of Infiltration Test
PLOT PLAN
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. I
Job No. 15-10932
Geotechnical Exploration, Inc.
July 2016
15-10932-p.al

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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 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Borehole percolation testing was performed at 5 locations on the site within or adjacent to the proposed infiltration basins in accordance with Appendix D of the City of San Diego BMP design manual. In addition, a comprehensive evaluation of the site was conducted in accordance with Appendix C.2. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated geotechnical hazards that cannot be mitigated to an acceptable level is not applicable. 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated risk of groundwater contamination that cannot be mitigated to an acceptable level is not applicable. 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: The response to Criteria #1 - #3 is No, therefore full infiltration is not feasible and Criteria #4 is "N/A" --- Kettler Leweck Engineering 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 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	No	

*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.	X	
Provide basis: The City of San Diego BMP Design Manual, Appendix C and Appendix D, do not provide values considered for appreciable rates. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we answered yes to this screening question as directed by the reviewer. Measured infiltration rates varied from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.		X
Provide basis: In our opinion, any long term infiltration at the site will result in geotechnical hazards which cannot be reasonable mitigated to an acceptable level. Based on our comprehensive evaluation in accordance with Appendix C.2, the anticipated geotechnical hazards are outlined below: C.2.6 Retaining Walls and Foundations 1. Damaging post construction differential settlements of up to 2 inches for the proposed office building and parking structure. 2. Damaging post construction yielding of the permanent tied-back and soil nail walls. 3. Increase in lateral pressures and reduction of soil strength of the permanent shoring wall and surfacing seepage in the slope that descends to the lower existing development to the south. C.2.4 Utility Considerations Water intrusion into existing utility lines and vaults both on-site and off-site including the adjacent public streets (Judicial Drive and Towne Centre Drive) and existing development which bounds the southern property boundary at a lower elevation. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.			

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	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.		X
Provide basis: In review of our "Report of Preliminary Geotechnical Investigation" dated December 15, 2015, groundwater was not encountered to a depth of 38.5 feet below existing ground surface. Although groundwater was not encountered to the aforementioned depth, the risk for groundwater related concerns include shallow perched seepage due to the practically impermeable dense to very dense nature of the formational soils across the site. Based on our comprehensive evaluation in accordance with Appendix C.3, the anticipated risk for groundwater related concerns are outlined below: C.3.7 Other Factors Inadequate infiltration treatment of shallow perched seepage surfacing on the adjacent slopes to the north and south potentially transporting storm water pollutants or other factors. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.			
8	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.		
Provide basis: The response to Criteria #6 and #7 is No, therefore partial infiltration is not feasible and Criteria #8 is "N/A" --- Kettler Leweck Engineering 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.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. 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.		No

*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

Porchet Corrections

Infiltration rate=((delta h*60r)/(delta t*(r+2 h avg))

Test No.	Delta T (min)	h 1 (inches)	h 2 (inches)	delta h (inches)	h avg (inches)	r (radius) (inches)	delta h*60r	delta t*(r+2 h avg)	Infiltration rate (in/hr)
1	60	31.750	31.875	0.125	31.813	4	30	4057.5	0.007
2	60	32.250	32.375	0.125	32.313	4	30	4117.5	0.007
3	60	37.500	39.250	1.750	38.375	4	420	4845	0.087
4	60	33.375	33.875	0.500	33.625	4	120	4275	0.028
5	60	28.500	29.500	1.000	29.000	4	240	3720	0.065

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-1 TEST HOLE SIZE: 8"

SOIL CLASSIFICATION: SILTY SAND / CLAYEY SAND ~1.5' FILL

DEPTH OF TEST HOLE: 58" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 8:54 5/16/16 Stop 0638 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE w/ 11" STICK UP

3" PEAGRAVEL

57" TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRE-SOAK	8:54		22.25			
	0638					
	0735	57	31.125	31.25	0.125	456
	0735					
	0832	57	31.25	31.375	0.125	456
	0832					
	0932	60	31.375	31.5	0.125	480
	0932					
	1032	60	31.5	31.625	0.125	480
	1032					
	1132	60	31.625	31.75	0.125	480
	1132					
	1232	60	31.75	31.875	0.125	480

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-2 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: SILTY SAND / CLAYEY SAND ~1.5' FILL

DEPTH OF TEST HOLE: 56" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 9:20 5-16-16 Stop 0630 5-17-16

AMOUNT OF WATER USED: ~ 10 GALLONS

4" PVC PERFORATED PIPE W/ 11" STICK UP

2" PEAGRAVEL

61 ½" FROM TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRE-SOAK	920		21.0			
	0630					
	0730	60	31.625	31.75	0.125	480
	0730					
	0830	60	31.75	31.875	0.125	480
	0830					
	0930	60	31.875	32.0	0.125	480
	0930					
	1030	60	32.0	32.125	0.125	480
	1030					
	1130	60	32.125	32.25	0.125	480
	1130					
	1230	60	32.25	32.375	0.125	480

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-3 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: SILTY SAND/CLAYEY SAND ~4' FILL

DEPTH OF TEST HOLE: 58" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 9:44 5-16-16 Stop 0642 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE w/ 6" STICK UP

60" TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

2" PEAGRAVEL

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
E-SOAK	944		15.75			
	0642 0738	56	28.25	30.5	2.25	24.9
	0738 0834	56	30.5	32.25	1.75	32
	0834 0934	60	32.25	34.0	1.75	34.3
	0934 1034	60	34.0	35.75	1.75	34.3
	1034 1134	60	35.75	37.5	1.75	34.3
	1134 1234	60	37.5	39.25	1.75	34.3

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-4 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: CLAYEY SAND (FILL)

DEPTH OF TEST HOLE: 58" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 10:08 5-16-16 Stop 0645 5-17-16

AMOUNT OF WATER USED: ~ 10 GALLONS

4" PVC PERFORATED PIPE w/ 9" STICK UP 59 3/4 TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD 1 3/4" PEA GRAVEL

Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRE-SOAK 1008		18.5			
0645 / 0741	56	31.0	31.25	0.25	224
0741 / 0836	55	31.25	31.875	0.625 ~~0.75~~	88 ~~73.3~~
0836 / 0936	60	31.875	32.375	0.5	120
0936 / 1036	60	32.375	32.875	0.5	120
1036 / 11 36	60	32.875	33.375	0.5	120
1136 / 1236	60	33.375	33.875	0.5	120

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-5 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: CLAYEY SAND (SC) ~2' FILL

DEPTH OF TEST HOLE: 60" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 10:42 5-16-16 Stop 0650 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE w/ 2" STICK UP

2" PEA GRAVEL

58" FROM TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRESOAK	1042		12.25			
	0650 0745	55	22.625	23.5	0.825	~~66.6~~ 66 OK
	0745 0840	55	23.5	24.5	1.0	55
	0840 0940	60	24.5	26.125	1.625	36.9
	0940 1050	60	26.125	27.5	1.375	43.6
	1050 1150	60	27.5	28.5	1.0	60
	1150 1250	60	28.5	29.5	1.0	60

Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

23 May 2016

KILROY REALTY CORP. **Job No. 15-10932**
3611 Valley Centre Drive, Suite 550
San Diego, CA 92130-3318
Attn: Mr. Bob Little

Subject: **Report of Limited Geotechnical Investigation**
Proposed Storm Water Infiltration BMP's
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Little:

In accordance with your request, and our proposal dated April 21, 2016, we herein provide this limited geotechnical investigation to allow evaluation of the feasibility of utilizing storm water infiltration BMPs at the location of the proposed 5-Story Office Building and Parking Structure site. On May 16, 2016, we placed five borings on the site for evaluation of storm water infiltration BMPs, per the requirements of the City of San Diego's Storm Water Standards, BMP Design Manual in accordance with the Guidelines for Geotechnical Reports (Appendix C), and Approved Infiltration Rate Assessment Methods (Appendix D).

I. PROJECT SUMMARY AND SCOPE OF SERVICES

It is our understanding that the project will consist of an on-grade five-story, steel-frame office building and six-level concrete parking structure with two levels below grade on the north, south and west sides and associated improvements. We have reviewed the preliminary site plan of the property prepared by Kettler Leweck Engineering.

The scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, percolation testing within the location of the proposed infiltration basins, and the preparation of this report. The data obtained and the analyses performed were to allow evaluation of the feasibility of the proposed storm water infiltration BMPs.

II. SITE DESCRIPTION

The site of the proposed office building and parking structure is currently developed with a two-story office building and parking lot on a previously graded, relatively level building pad located southeast of the intersection of Towne Centre Drive and Eastgate Mall in San Diego, California (see Vicinity Map, Figure No. I).

The rectangular-shaped property is bounded to the north by Eastgate Mall approximately 0 to 10 feet lower in elevation; to the south by two existing office buildings approximately 5 to 20 feet lower in elevation; to the east by Judicial Drive approximately 12 to 25 feet lower in elevation; and to the west by Towne Centre Drive at approximately the same elevation.

III. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program utilizing a truck-mounted, continuous-flight auger drill rig to investigate, sample and perform infiltration testing of the subsurface soils. Five exploratory borings were drilled to a maximum depth of 5 feet within the area of the proposed infiltration basins on May 16, 2016. Infiltration testing was conducted from approximately 3 to 5 feet in depth in the bottom of our borings. In addition, based on our *"Report of Preliminary Geotechnical Investigation,"* dated December

15, 2015, groundwater was not encountered below the subject site to a depth of 37½ feet. The soils encountered in the exploratory borings were continuously logged in the field by our certified engineering geologist and described in accordance with the Unified Soil Classification System. The approximate locations of the exploratory borings and percolation testing are shown on the Plot Plan, Figure No. II.

Representative samples were obtained from the exploratory excavations at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing.

IV. SOIL DESCRIPTION

Our subsurface exploration program revealed that the areas of the proposed storm water infiltration basins is underlain by approximately 1½ to 4½ feet of existing fill soils, consisting of medium dense to dense clayey and silty sands. Quaternary-Age Very Old Paralic Deposit (Qvop9a) formational materials, consisting of very dense clayey and silty sands, were encountered beneath the fill soils.

The exploratory borings and related information depict subsurface conditions only at the specific locations shown on the site plan and on the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes.

IV. LABORATORY TESTS AND SOIL INFORMATION

The following test was conducted on the sampled soils:

1. Determination of Percentage of Particles Passing #200 Sieve (ASTM D1140-14)

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength. Based on our laboratory test results, 25 to 41% of the soils tested passed the #200 sieve.

V. GROUNDWATER

Free groundwater was not encountered in the exploratory excavations at the time of excavation. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification, rainfall, and other possible factors that may not have been evident at the time of our field investigation.

VI. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the field investigation conducted by our firm, our laboratory test results, infiltration test results, and our experience with similar soils and formational materials.

We performed percolation testing at five locations at a depth between 36 and 60 inches per the requirements of the City of San Diego's Storm Water Standards, BMP Design Manual, in accordance with Appendix D. The infiltration basins have been proposed predominately to the west of the proposed office structure, in between the proposed office structure and proposed parking structure and to the east and southeast of the proposed parking structure. Testing at the five locations, (INF-1 through INF-5), revealed percolation rates of 0.125- to 1.75-inch/hour. The percolation test rate results have been converted to infiltration rates, using the Porchet Method and are presented in the table below. The infiltration rates presented in the table below do not include an applied factor of safety.

Proposed Infiltration Basin ID	Borehole Percolation Test ID	Percolation Rates (inches/hour)	Converted Infiltration Rates (inches/hour)
BMP 1	(INF-4)	0.5	0.029
BMP 2	(INF-3)	1.75	0.102
BMP 3	(INF-5)	1.0	0.073
BMP 6	(INF-2)	0.125	0.007
BMP 7	(INF-1)	0.125	0.007

Based on the results of our percolation testing and review of USDA soil maps, the site has been assigned to hydrologic soil group (HSG) D. As part of our geologic/geotechnical site evaluation, we considered the following issues:

1. The site is ***not*** subject to high groundwater conditions (within 10 feet of the base of the infiltration facility.

2. The site is ***not*** in close proximity to a known contaminated soil site.

3. The site ***is*** underlain by artificial fill over very dense formational clayey and silty sand soils, but ***not*** subject to hydroconsolidation.

4. The site ***has*** infiltration rates between 0.007 to 0.102-inch/hour without applying a factor of safety.

5. The site ***does not*** have a silt plus clay percentage of greater than 50.

6. The site ***is*** underlain by practically impermeable formational soils encountered below 1½ to 4½ feet in depth.

7. The site is ***not*** located within 100 feet from a drinking water well.

8. The site is ***not*** located within 100 feet from an on-site septic system or designated expansion area.

9. The site ***is*** located adjacent to a slope steeper than 25 percent.

Based on the results of our percolation testing and evaluation of the infiltration rates, it is our professional opinion that this site does not have favorable soil conditions and appreciable infiltration rates for the design of full or partial infiltration BMPs. Further, any long term infiltration could result in unmitigatable geotechnical hazards such as post construction building settlement and yielding of soil nail and tie-back retaining walls. Accordingly, we recommend that all storm water BMPs be lined with impermeable liners and drained with perforated subdrain pipes.

LIMITATIONS

The findings, opinions, and conclusions presented herein have been made in accordance with generally accepted principles and practice in the field of geotechnical engineering within the County of San Diego. No warranty, either expressed or implied, is made.

If you have any questions regarding this letter, please contact our office. Reference to our **Job No. 15-10932** will help expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

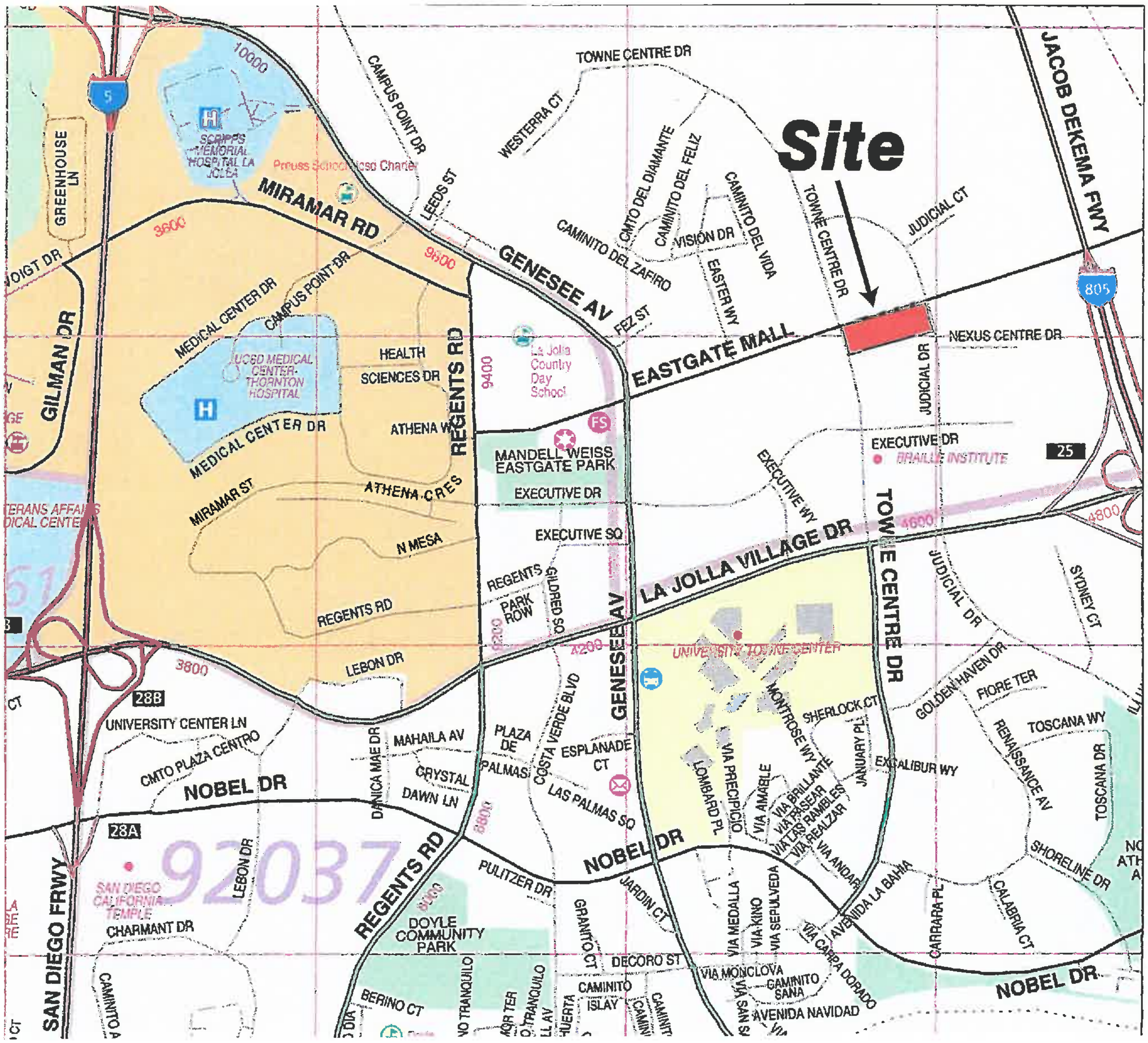
Jonathan A. Browning
P.G. 9012/C.E.G. 2615
Senior Project Geologist

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

PROFESSIONAL GEOLOGIST
JONATHAN A. BROWNING
No. 2615
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

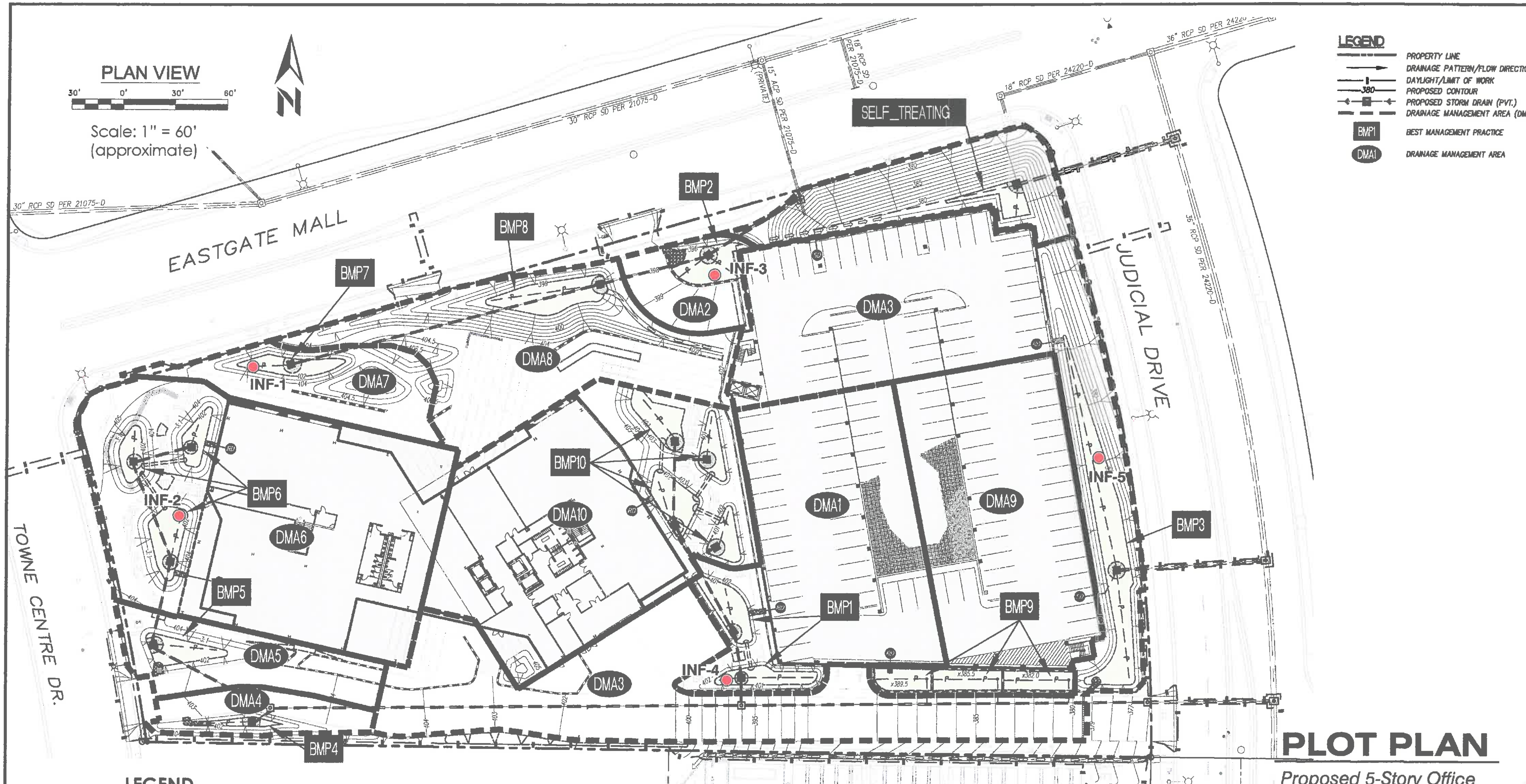
VICINITY MAP



Thomas Bros Guide San Diego County pg 1228-D2

Proposed 5-Story Office Building
and Parking Structure
9455 Towne Centre Drive
San Diego, CA.

Figure No. I
Job No. 15-10932



PLOT PLAN

Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. II
Job No. 15-10932

Geotechnical Exploration, Inc.

May 2016

LEGEND

INF-5 — Indicates Approximate Location of Infiltration Test

STEVEN C. KETTLER R.C.E. NO. C48358 DATE
EXP. 6-30-2016
KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

REFERENCE: This Plot Plan was prepared from an existing undated Drainage Management Area Plan & Private Storm Drain Profile plan by KETTLER LEWECK ENGINEERING and from on-site field reconnaissance performed by GEI.

15-10932-p.ai

CAP CONSISTENCY CHECKLIST SUBMITTAL APPLICATION

- ✓ The Checklist is required only for projects subject to CEQA review.[2]
- ✓ If required, the Checklist must be included in the project submittal package. Application submittal procedures can be found in Chapter 11: Land Development Procedures of the City's Municipal Code.
- ✓ The requirements in the Checklist will be included in the project's conditions of approval.
- ✓ The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Department.

Application Information

Contact Information

Project No./Name: 291342 / 9455 Towne Centre Drive Redevelopment Project

Property Address: 9455 Towne Centre Drive, San Diego, CA 92121

Applicant Name/Co.: Kim Elliott / Kilroy Realty, L.P.

Contact Phone: (858) 523-2239 Contact Email: kelliott@kilroyrealty.com

Was a consultant retained to complete this checklist? ☑ Yes ☐ No If Yes, complete the following

Consultant Name: Karen L. Ruggels Contact Phone: (619) 578-9505

Company Name: KLR PLANNING Contact Email: karen@klrplanning.com

Project Information

1. What is the size of the project (acres)? 3.9 acres
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units):
   - ☐ Residential (indicate # of multi-family units):
   - ☐ Commercial (total square footage):
   - ☑ Industrial (total square footage):
   - ☑ Other (describe): Replacing existing 47,091 sq. ft. scientific research office bldg. with new 150,000 sq. ft. scientific research office building and parking garage.
3. Is the project located in a Transit Priority Area? ☑ Yes ☐ No
4. Provide a brief description of the project proposed: See Attachment A.

[2] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

The first step in determining CAP consistency for discretionary development projects is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
1. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR, 2. If the proposed project is not consistent with the existing land use plan and zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?; OR, 3. If the proposed project is not consistent with the existing land use plan and zoning designations, and includes a land use plan and/or zoning designation amendment that would result in an increase in GHG emissions when compared to the existing designations, would the project be located in a Transit Priority Area (TPA) and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?	☑	☐

If "***Yes***," proceed to Step 2 of the Checklist. For questions 2 and 3 above, provide estimated project emissions under both existing and proposed designation(s) for comparison. For question 3 above, complete Step 3.

If "***No***," in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant. The project must nonetheless incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete Step 2 of the Checklist.

[3] This question may also be answered in the affirmative if the project is consistent with SANDAG Series 12 growth projections, which were used to determine the CAP projections, as determined by the Planning Department.

Step 2: CAP Strategies Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that would require a certificate of occupancy from the Building Official or projects comprised of one and two family dwellings or townhouses as defined in the California Residential Code and their accessory structures.[4] All other development projects that would not require a certificate of occupancy from the Building Official shall implement Best Management Practices for construction activities as set forth in the Greenbook (for public projects).

<table>
<tr><th colspan="4">Step 2: CAP Strategies Consistency</th></tr>
<tr><td>Checklist Item
(Check the appropriate box and provide explanation for your answer)</td><td>Yes</td><td>No</td><td>N/A</td></tr>
<tr><td colspan="4">Strategy 1: Energy & Water Efficient Buildings</td></tr>
<tr><td>1. Cool/Green Roofs.
• Would the project include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under California Green Building Standards Code (Attachment A)?; OR
• Would the project roof construction have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot as specified in the voluntary measures under California Green Building Standards Code?; OR
• Would the project include a combination of the above two options?
Check "N/A" only if the project does not include a roof component.</td><td>☑</td><td>☐</td><td>☐</td></tr>
<tr><td>2. Plumbing fixtures and fittings
With respect to plumbing fixtures or fittings provided as part of the project, would those low-flow fixtures/appliances be consistent with each of the following:

Residential buildings:
• Kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute at 60 psi;
• Standard dishwashers: 4.25 gallons per cycle;
• Compact dishwashers: 3.5 gallons per cycle; and
• Clothes washers: water factor of 6 gallons per cubic feet of drum capacity?

Nonresidential buildings:
• Plumbing fixtures and fittings that do not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the California Green Building Standards Code (See Attachment A); and
• Appliances and fixtures for commercial applications that meet the provisions of Section A5.303.3 (voluntary measures) of the California Green Building Standards Code (See Attachment A)?
Check "N/A" only if the project does not include any plumbing fixtures or fittings.</td><td>☑</td><td>☐</td><td>☐</td></tr>
</table>

[4] Actions that are not subject to Step 2 would include, for example: 1) discretionary map actions that do not propose specific development, 2) permits allowing wireless communication facilities, 3) special events permits, 4) use permits that do not result in the expansion or enlargement of a building, and 5) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 2: Clean & Renewable Energy			
3. *Energy Performance Standard / Renewable Energy* Is the project designed to have an energy budget that meets the following performance standards when compared to the Title 24, Part 6 Energy Budget for the Proposed Design Building as calculated by Compliance Software certified by the California Energy Commission (percent improvement over current code): • Low-rise residential – 15% improvement? • Nonresidential with indoor lighting OR mechanical systems, but not both – 5% improvement? • Nonresidential with both indoor lighting AND mechanical systems – 10% improvement?[5] The demand reduction may be provided through on-site renewable energy generation, such as solar, or by designing the project to have an energy budget that meets the above-mentioned performance standards, when compared to the Title 24, Part 6 Energy Budget for the Proposed Design Building (percent improvement over current code). Check "N/A" only if the project does not contain any residential or non-residential buildings.	☑	☐	☐
Strategy 3: Bicycling, Walking, Transit & Land Use			
4. *Electric Vehicle Charging* • Single-family projects: Would the required parking serving each new single-family residence and each unit of a duplex be constructed with a listed cabinet, box or enclosure connected to a raceway linking the required parking space to the electrical service, to allow for the future installation of electric vehicle supply equipment to provide an electric vehicle charging station for use by the resident? • Multiple-family projects of 10 dwelling units or less: Would 3% of the total parking spaces required, or a minimum of one space, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official, to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents? • Multiple-family projects of more than 10 dwelling units: Would 3% of the total parking spaces required, or a minimum of one space, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official? Of the total listed cabinets, boxes or enclosures provided, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents? • Non-residential projects: If the project includes new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A, would 3% of the total parking spaces required, or a minimum of one space, be provided with a listed cabinet, box or enclosure connected to a conduit	☑	☐	☐

[5] CALGreen defines mechanical systems as equipment, appliances, fixtures, fittings and/or appurtenances, including ventilating, heating, cooling, air-conditioning and refrigeration systems, incinerators and other energy-related systems.

<table>
<tr><th colspan="4">Step 2: CAP Strategies Consistency</th></tr>
<tr><th>Checklist Item
(Check the appropriate box and provide explanation for your answer)</th><th>Yes</th><th>No</th><th>N/A</th></tr>
<tr><td>linking the parking spaces with the electrical service, in a manner approved by the building and safety official? Of the total listed cabinets, boxes or enclosures provided, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use?

Check "N/A" only if the project is does not include new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A.</td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Strategy 3: Bicycling, Walking, Transit & Land Use
(Complete this section if project includes non-residential or mixed uses)</td></tr>
<tr><td>5. Bicycle Parking Spaces

Would the project provide more short- and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5)?[6]

Check "N/A" only if the project is a residential project.</td><td>☑</td><td>☐</td><td>☐</td></tr>
<tr><td>6. Shower facilities

If the project includes nonresidential development that would accommodate over 10 tenant occupants (employees), would the project include changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code as shown in the table below?

<table><tr><th>Number of Tenant Occupants (Employees)</th><th>Shower/Changing Facilities Required</th><th>Two-Tier (12" X 15" X 72") Personal Effects Lockers Required</th></tr><tr><td>0-10</td><td>0</td><td>0</td></tr><tr><td>11-50</td><td>1 shower stall</td><td>2</td></tr><tr><td>51-100</td><td>1 shower stall</td><td>3</td></tr><tr><td>101-200</td><td>1 shower stall</td><td>4</td></tr><tr><td>Over 200</td><td>1 shower stall plus 1 additional shower stall for each 200 additional tenant-occupants</td><td>1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants</td></tr></table>
Check "N/A" only if the project is a residential project, or if it does not include nonresidential development that would accommodate over 10 tenant occupants (employees).</td><td>☑</td><td>☐</td><td>☐</td></tr>
</table>

[6] Non-portable bicycle corrals within 600 feet of project frontage can be counted towards the project's bicycle parking requirements.

<table>
<tr><th colspan="4">Step 2: CAP Strategies Consistency</th></tr>
<tr><th>Checklist Item
(Check the appropriate box and provide explanation for your answer)</th><th>Yes</th><th>No</th><th>N/A</th></tr>
<tr><td>7. Designated Parking Spaces

If the project includes an employment use in a TPA, would the project provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles in accordance with the following table?

<table>
<tr><th>Number of Provided Parking Spaces</th><th>Number of Designated Parking Spaces</th></tr>
<tr><td>0-9</td><td>0</td></tr>
<tr><td>10-25</td><td>2</td></tr>
<tr><td>26-50</td><td>4</td></tr>
<tr><td>51-75</td><td>6</td></tr>
<tr><td>76-100</td><td>9</td></tr>
<tr><td>101-150</td><td>11</td></tr>
<tr><td>151-200</td><td>18</td></tr>
<tr><td>201 and over</td><td>At least 10% of total</td></tr>
</table>

This measure does not cover electric vehicles. See Question 4 for electric vehicle parking requirements.

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it.

Check “N/A” only if the project is a residential project, or if it does not include an employment use in a TPA.</td><td>☑</td><td>☐</td><td>☐</td></tr>
<tr><td>8. Transportation Demand Management Program

If the project would accommodate over 50 tenant-occupants (employees), would it include a transportation demand management program that would be applicable to existing tenants and future tenants that includes:

At least one of the following components:
• Parking cash out program
• Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools
• Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development

And at least three of the following components:
• Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees
• On-site carsharing vehicle(s) or bikesharing
• Flexible or alternative work hours
• Telework program
• Transit, carpool, and vanpool subsidies</td><td>☑</td><td>☐</td><td>☐</td></tr>
</table>

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
• Pre-tax deduction for transit or vanpool fares and bicycle commute costs • Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within 1,320 feet (1/4 mile) of the structure/use? Check “N/A” only if the project is a residential project or if it would not accommodate over 50 tenant-occupants (employees).			

Step 3: Project CAP Conformance Evaluation (if applicable)

Not Applicable.

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option 3. The purpose of this step is to determine whether a project that is located in a TPA but that includes a land use plan and/or zoning designation amendment that would result in an increase in GHG emissions when compared to the existing designations, is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. The following questions must each be answered in the affirmative and fully explained.

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?**

   Considerations for this question:
   - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
   - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
   - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?**

   Considerations for this question:
   - Does the proposed project support/incorporate identified transit routes and stops/stations?
   - Does the project include transit priority measures?

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?**

   Considerations for this question:
   - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
   - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?**

   Considerations for this question:
   - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
   - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?**

   Considerations for this question:
   - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
   - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
   - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?**

   Considerations for this question:
   - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
   - Does the proposed project include policies or strategies for preserving existing trees?
   - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

ATTACHMENT A

PROJECT DESCRIPTION

The 9455 Towne Centre Drive Redevelopment project proposes the redevelopment of an existing office building with a new office building and parking structure. The 3.9-acre project site is located at 9455 Towne Centre Drive, San Diego, California 92121. The site is situated in the southeast quadrant of the Eastgate Mall and Towne Centre Drive Intersection in the University Community Plan Area of the City of San Diego and is within the Marine Corps Air Station (MCAS) Miramar Airport Influence Area.

The proposed project would demolish the existing 47,091 square foot office building and redevelop the project site with a five-story, 150,000 square-foot scientific research/office building. Outdoor employee amenity space, including a lounge deck, outdoor seating area, and green space, would be provided in the north-central portion of the project site, in the northwest corner of the project site, and in the south-central portion of the project site. The project would increase the existing landscaping on the property and would provide a variety of trees, shrubs, and groundcover around the perimeter of the site and along the interior drive-court.

Parking would be accommodated within a five-story parking garage. The project would provide 600 parking spaces, including 12 accessible spaces, 18 electric vehicle charging station spaces, seven motorcycle spaces, and 60 spaces designated for a combination of low-emitting fuel-efficient carpool/vanpool vehicles (48 of those would specifically be reserved for carpool/zero emission vehicles). Additionally, the project would include 35 short-term bicycle parking spaces and 35 long-term bicycle parking spaces.

Project access is currently provided from driveways on Towne Centre Drive and Eastgate Mall. The entry off Towne Centre Drive would be retained in its current location to provide access to the project site and parking garage. The access from Eastgate Mall would be shifted further to the east and would provide direct access to the parking garage. An additional driveway with direct parking garage access would be added off Judicial Drive in the southeast corner of the project site.

The project would require grading of the project site to accommodate construction of the building and parking garage. The project site area equals 170,145 square feet, of which approximately 169,056 square feet would be graded. Earthwork would involve approximately 52,920 cubic yards of cut at a maximum depth of 26 feet and 310 cubic yards of fill at a maximum height of two feet. Approximately 52,610 cubic yards of material would be exported to a local private facility. Maximum slopes would occur in limited locations on the project site. Height of fill slopes would be approximately zero feet, and cut slopes would be a maximum of 17 feet in height. A total of 903 feet of retaining walls would be required, with a maximum height of 12.5 feet. Retaining walls would be located along project drive aisles, as well as along planting around the southern edge of the building as seat walls ranging in height between one foot and two feet.

9455 Towne Centre Drive Redevelopment Project (Project No. 291342)

CAP CONSISTENCY CHECKLIST SUPPORTING DOCUMENTATION

Land Use Consistency

1. The project is consistent with the land use designations in the City's General Plan (Industrial) and the University Community Plan (Scientific Research). The project is consistent with the underlying zone (IP-1-1).

   The project involves a Community Plan Amendment to allow an increase in the allowable development intensity for the project site; however, no change in land use or zone is required. The Community Plan's Land Use and Development Intensity table (Table 3) is meant to ensure a balance of land uses in the community while helping to also ensure a workable circulation system. The Community Plan Amendment for the 9455 Towne Centre Drive Redevelopment project proposes an increase to the allowable development intensity of the project site in Table 3 from the existing 47,091 square feet to 150,000 square feet, for an increase of 102,909 square feet. Of that square footage increase, 36,687 square feet would be transferred from Subarea 12, and 49,482 square feet would be transferred from Subarea 37. The overall development intensity of the University community would be increased by 16,740 square feet, and the development intensity of Subarea 12 would be increased by 66,222 square feet (49,482 square feet of which would be transferred from in Subarea 37). The Community Plan Land Use and Development Intensity table (Table 3) would be modified to show an increase in the Eastgate Technology Park Subarea (Subarea 12) from 2,356,990 square feet to 2,423,212 square feet. ~~To accomplish this, development right from two other parcels in the University community will be transferred to the project site such that development intensity and the overall trip generation within the community are not increased.~~ Additionally, the Community Plan Amendment would redesignate one of the off-site transfer parcels from Industrial to Open Space and would change the zone of that parcel IP-2-1 to OP-2-1 to reflect the transfer of development rights and subsequent change in land use. However, as noted, no change in land use or zone is required for the project site.

CAP Strategies Consistency

STRATEGY 1: ENERGY & WATER EFFICIENT BUILDINGS

1. **Cool/Green Roofs** – The project will include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under the *California Green Building Standards Code*.

2. **Plumbing fixtures and fittings** – The project will use low-flow fixtures and appliances that are consistent with the following:
   - Plumbing fixtures and fittings will not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the *California Green Building Standards Code*.
   - Appliances and fixtures will meet the provisions of Section A5.303.3 (voluntary measures) of the *California Green Building Standards*.

STRATEGY 2: CLEAN & RENEWABLE ENERGY

3. **Clean & Renewable Energy** – The project is designed to have an energy budget that shows a 10% improvement when compared to Title 24 (2013), Part 6 Energy Budget for Proposed

Design Building as calculated by Compliance Software certified by the California Energy Commission, for both indoor lighting and mechanical systems.

STRATEGY 3: BICYCLE, WALKING, TRANSIT & LAND USE

4. **Electric Vehicle Charging** – A total of 18 parking spaces (3% of the total parking spaces required for the project) will be provided with a listed cabinet, box, or enclosure connected to a conduit linking the parking spaces with electrical service in a manner approved by the building and safety official. Of those 18 parking spaces, 9 parking spaces (50%) will have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use.

5. **Bicycle Parking Spaces** – The project will provide 35 short-term and 35 long-term parking spaces, which exceeds the City's Municipal Code (Chapter 14, Article 2, Division 5) of 30 short-term and 30 long-term bicycle parking spaces.

6. **Shower Facilities** – The project will provide 3 shower stalls and 12, 2-tiered personal effects lockers (24 total) in accordance with the voluntary measures under the *California Green Building Standards Code*.

7. **Designated Parking Spaces** – The project will provide 600 parking spaces. Of those spaces, the project will provide 60 designated spaces (at least 10% of total parking provided, not including electric vehicle charging stations/parking) as parking designated for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles.

8. **Transportation Demand Management Program** – The project will accommodate over 50 tenant-occupants (employees). Therefore, the project will implement the *Transportation Demand Management Program for the 9455 Towne Centre Drive Redevelopment Project* on file with the City of San Diego Development Services Department. In accordance with the CAP Strategies, the project's *Transportation Demand Management Program* specifically addresses the following:

   - Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools.

   - Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees.

   - Flexible or alternative work hours.

   - Access to services that reduce the need to drive. Figure 1 shows services that are available within 1,320 feet (1/4 mile) of the project site.

FIGURE 1. SERVICES LOCATED WITHIN 1/4-MILE RADIUS OF PROJECT SITE

SAN DIEGO COUNTY
REGIONAL AIRPORT AUTHORITY

P.O. BOX 82776, SAN DIEGO, CA 92138-2776
619.400.2400 WWW.SAN.ORG

June 3, 2013

Mr Paul Godwin
City of San Diego
Development Services Department
1222 First Avenue
San Diego, California 92101

Re: Airport Land Use Commission Consistency Determination – Community Plan Amendment to Construct an Office Building and Parking Structure at 9455 Towne Centre Drive, City of San Diego; APN 343-122-16

Dear Mr Godwin:

As the Airport Land Use Commission (ALUC) for San Diego County, the San Diego County Regional Airport Authority acknowledges receipt of an application for a determination of consistency for the project described above. This project is located within the Airport Influence Area (AIA) for the Marine Corps Air Station (MCAS) Miramar Airport Land Use Compatibility Plan (ALUCP).

ALUC staff has reviewed your application and accompanying materials and has determined that it meets our requirements for completeness. In accordance with ALUC Policies and applicable provisions of the State Aeronautics Act (Cal. Pub. Util. Code §21670-21679.5), ALUC staff has determined that the proposed project is **consistent** with the MCAS Miramar ALUCP based upon the facts and findings summarized below:

(1) The proposed project involves the construction of an office building and parking structure.

(2) The proposed project is located within the 60-65 dB CNEL noise contour. The ALUCP identifies office and parking uses located within the 60-65 dB CNEL noise contour as compatible with airport uses.

(3) The proposed project is in compliance with the ALUCP airspace protection surfaces because a determination of no hazard to air navigation has been issued by the Federal Aviation Administration (FAA).

(4) The proposed project is located partially within the Transition Zone (TZ). The ALUCP identifies office and parking uses located within the TZ as compatible with airport uses.

(5) Therefore, the proposed project is consistent with the adopted MCAS Miramar ALUCP.

(6) This determination of consistency is not a "project" as defined by the California Environmental Quality Act (CEQA), Cal. Pub. Res. Code §21065.

Please contact Ed Gowens at (619) 400-2244 if you have any questions regarding this letter.

Yours truly,

Angela Jamison

Angela Jamison
Manager, Airport Planning

cc: Amy Gonzalez, SDCRAA – General Counsel
Ron Bolyard, Caltrans – Division of Aeronautics
Chris Schmidt, Caltrans, District 11
Tait Galloway, City of San Diego
C. Laura Thornton, MCAS Miramar, Community Plans & Liaison

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-2233-OE

Issued Date: 05/10/2013

Justine Nielsen
Kilroy Realty Company
450 B Street
Suite 19000
San Diego, CA 92101

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building Towne Centre Drive
Location:	San Diego, CA
Latitude:	32-52-44.43N NAD 83
Longitude:	117-12-23.26W
Heights:	405 feet site elevation (SE) 91 feet above ground level (AGL) 496 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 11/10/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

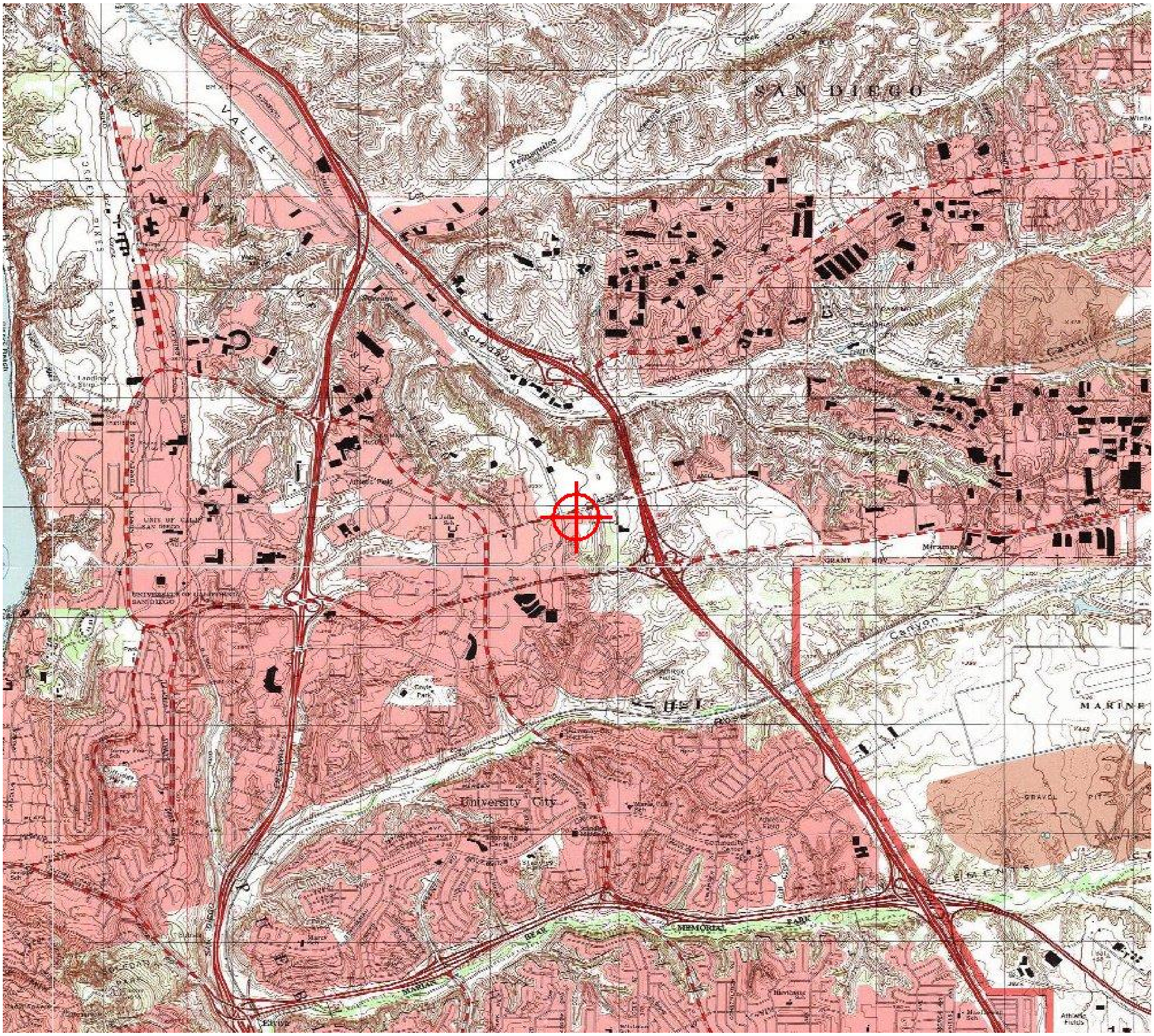
If we can be of further assistance, please contact our office at (817) 321-7760. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-2233-OE.

Signature Control No: 187885375-189455931 (DNE)

Joan Tengowski
Technician

Attachment(s)
Map(s)

TOPO Map for ASN 2013-AWP-2233-OE



The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

9455 Towne Centre Drive
PTS No. 291342
IO No. 24006426

REGISTERED PROFESSIONAL ENGINEER
WAYNE W. CHANG
No. 46548
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA

ENGINEER OF WORK:

Wayne W. Chang, MS, PE 46548

Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Kilroy Realty Corporation
3611 Valley Centre Drive, Suite 550
San Diego, CA 92101
(858) 523-0300

PREPARED BY:

Chang Consultants
Civil Engineering•Hydrology•Hydraulics•Sedimentation

Chang Consultants
P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

DATE:
August 17, 2016

Approved by: City of San Diego Date

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Project Name: 9455 Towne Centre Drive

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: 9455 Towne Centre Drive
Permit Application Number: IO No. 24006426, PTS No. 291342

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.

PE 46548, Expires 6/30/2017

Engineer of Work's Signature, PE Number & Expiration Date

Wayne W. Chang

Print Name

Chang Consultants

Company

August 17, 2016

Date

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Project Name: 9455 Towne Centre Drive

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 plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	5/25/16	◉ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	8/17/16	◉ Preliminary Design/Planning/CEQA ☐ Final Design	Second Submittal
3	Enter a date.	☐ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.
4	Enter a date.	☐ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.

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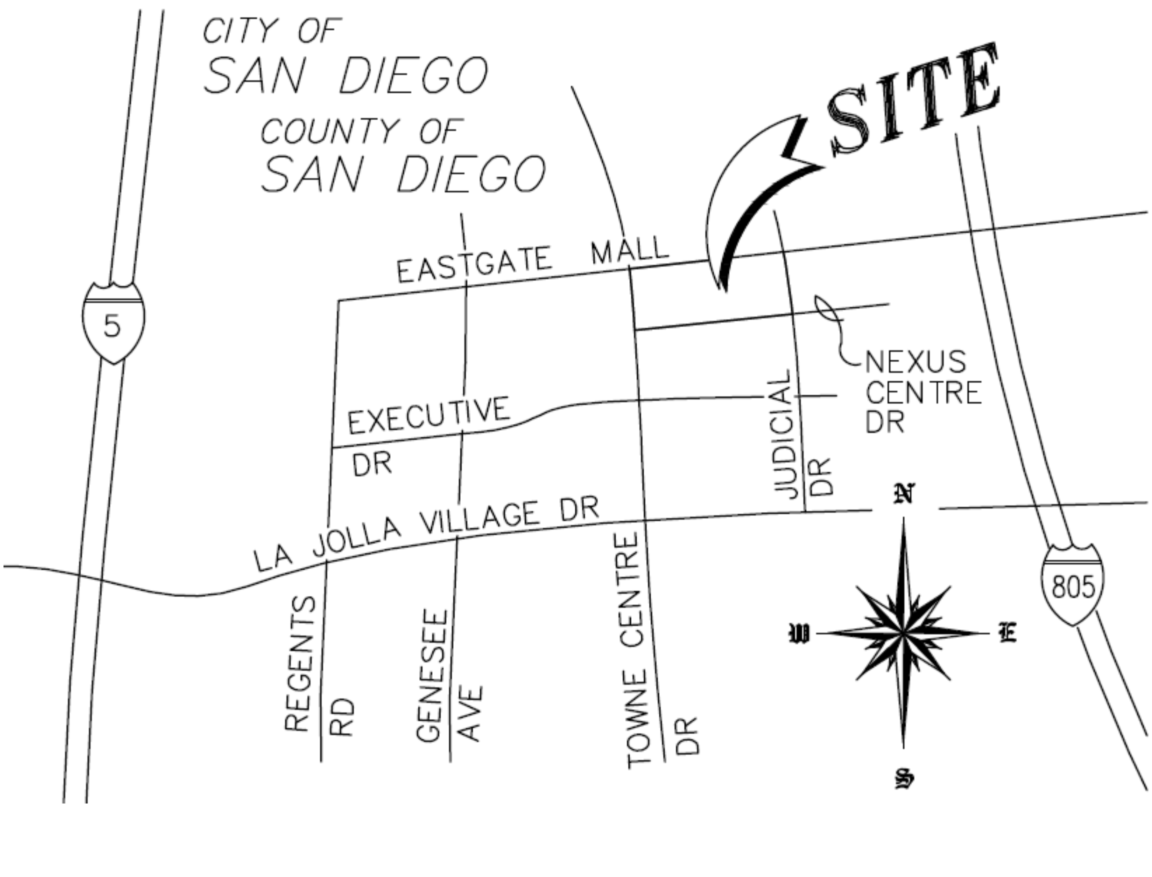
PROJECT VICINITY MAP

Project Name: 9455 Towne Centre Drive
Permit Application Number: IO No. 24006426, PTS No. 291342



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THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Storm Water Requirements Applicability Checklist**	FORM **DS-560** February 2016

Project Address: 9455 Towne Centre Drive San Diego, CA 92121	Project Number *(for the City Use Only)*: Click here to enter project number

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administrated by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with construction activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity that results in ground disturbance and contact with storm water runoff?

   ☐ Yes; WPCP required, skip questions 3-4 ☒ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (projects such as pipeline/utility replacement)

   ☐ Yes; WPCP required, skip questions 4 ☒ No; next question

4. Does the project only include the following Permit types listed below?
   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include one of the following activities and associated curb/ sidewalk repair: water services, sewer lateral, storm drain lateral, or dry utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes to the right, and continue to PART B:

× If you checked "Yes" for question 1,
a SWPPP is REQUIRED. Continue to PART B

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3,
a WPCP is REQUIRED. If the project processes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all question 1-3, and checked "Yes" for question 4
PART B **does not apply and no document is required. Continue to Section 2.**

More information on the City's construction BMP requirements as well as CGP requirements can be found at:
www.sandiego.gov/stormwater/regulations/swguide/constructing.shtml

PART B: Determine Construction Site Priority.
This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk. Determination approach of the Stat e Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed. A map of the ASBS watershed can he found here *www.swrcb.ca.gov/water_issues/programs/ocean/asbs_map.shtml*

2. ☐ **High Priority**
   a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.
   b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☒ **Medium Priority**
   a. Projects 1 acre or more but not subject to an ASBS or high priority designation.
   b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**
   a. Projects not subject to ASBS, high or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.
Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	○ Yes ◉ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	○ Yes ◉ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	○ Yes ◉ No

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."
If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

   • Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
   • Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;
   • Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; PDP not exempt. PDP requirements apply.

PART E: Determine if Project is a Priority Development Project (PDP). Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".
If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☒ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒ Yes ☐ No
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface.	☐ Yes ☒ No
4.	**New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.	☐ Yes ☒ No

Page 4 of 4 City of San Diego • Development Services Department • Storm Water Requirements Applicability Checklist	
5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☒ Yes ☐ No
6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☒ Yes ☐ No
7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging- directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☐ Yes ☒ No
8. **New development or redevelopment projects of a retail gasoline outlet that creates and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic of 100 or more vehicles per day.	☐ Yes ☒ No
9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No
PART F: Select the appropriate category based on the outcomes of PART C through PART E.	
1. The project is **NOT SUBJECT TO STORM WATER REQUIREMENTS**.	☐
2. The project is a **STANDARD PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires hydromodification management.	☐x
Name of Owner or Agent *(Please Print)*: Robert Little, Kilroy Realty Corporation	Title: Senior Vice President
Signature:	Date: Insert Date

<table>
<tr><td colspan="2">Applicability of Permanent, Post-Construction Storm Water BMP Requirements
(Storm Water Intake Form for all Development Permit Applications)</td><td>**Form I-1**</td></tr>
<tr><td colspan="3">Project Identification</td></tr>
<tr><td colspan="3">Project Name: 9455 Towne Centre Drive</td></tr>
<tr><td colspan="2">Permit Application Number: IO No. 24006426, PTS No. 291342</td><td>Date: 8/17/16</td></tr>
<tr><td colspan="3">Determination of Requirements</td></tr>
<tr><td colspan="3">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.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.</td></tr>
<tr><td>Step</td><td>Answer</td><td>Progression</td></tr>
<tr><td rowspan="2">Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>☒ Yes</td><td>Go to Step 2.</td></tr>
<tr><td>☐ No</td><td>Stop.
Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.</td></tr>
<tr><td colspan="3">Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):
N/A.</td></tr>
<tr><td rowspan="3">Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions?
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.</td><td>☐ Standard Project</td><td>Stop.
Standard Project requirements apply.</td></tr>
<tr><td>☒ PDP</td><td>PDP requirements apply, including PDP SWQMP.
Go to Step 3.</td></tr>
<tr><td>☐ PDP Exempt</td><td>Stop.
Standard Project requirements apply. Provide discussion and list any additional requirements below.</td></tr>
</table>

Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable: N/A

<table>
<tr><th colspan="3">Form I-1 Page 2</th></tr>
<tr><th>Step</th><th>Answer</th><th>Progression</th></tr>
<tr><td rowspan="2">Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval?
See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>○ Yes</td><td>Consult the City Engineer to determine requirements.
Provide discussion and identify requirements below.
Go to Step 4.</td></tr>
<tr><td>◉ No</td><td>BMP Design Manual PDP requirements apply.
Go to Step 4.</td></tr>
<tr><td colspan="3">Discussion / justification of prior lawful approval, and identify requirements (<u>not required if prior lawful approval does not apply</u>):
N/A</td></tr>
<tr><td rowspan="2">Step 4. Do hydromodification control requirements apply?
See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>◉ Yes</td><td>PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6).
Go to Step 5.</td></tr>
<tr><td>○ No</td><td>Stop.
PDP structural BMPs required for pollutant control (Chapter 5) only.
Provide brief discussion of exemption to hydromodification control below.</td></tr>
<tr><td colspan="3">Discussion / justification if hydromodification control requirements do <u>not</u> apply:
N/A</td></tr>
<tr><td rowspan="2">Step 5. Does protection of critical coarse sediment yield areas apply?
See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>○ Yes</td><td>Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2).
Stop.</td></tr>
<tr><td>◉ No</td><td>Management measures not required for protection of critical coarse sediment yield areas.
Provide brief discussion below.
Stop.</td></tr>
</table>

Discussion / justification if protection of critical coarse sediment yield areas does not apply: The site currently is fully developed, so there are no natural on-site coarse sediment yield areas. In addition, the site is not identified as containing critical coarse sediment yield areas on the San Diego County Regional Watershed Management Area Analysis (WMAA).

Project Name: 9455 Towne Centre Drive

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	9455 Towne Centre Drive
Project Address	9455 Towne Centre Drive, San Diego, CA 92121
Assessor's Parcel Number(s) (APN(s))	343-122-16
Permit Application Number	IO No. 24006426, PTS No. 291342
Project Watershed	Select One: ○ San Dieguito River ◉ Penasquitos ○ Mission Bay ○ San Diego River ○ San Diego Bay ○ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal paces (9XX.XX)	Miramar Hydrologic Area (906.40)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-	3.906 Acres ([SQFT] Square Feet)
Area to be disturbed by the project (Project Footprint)	3.906 Acres (170,145 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	2.597 Acres (113,118 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	1.309 Acres (57,027 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.	Project increases by 17 %

Project Name: 9455 Towne Centre Drive

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

× Existing development

☐ Previously graded but not built out

☐ Agricultural or other non-impervious use

☐ Vacant, undeveloped/natural

Description / Additional Information:

The site contains a vacant two-story 47,091 square foot office building with surface parking. The existing office building and parking will be demolished as part of redevelopment.

Existing Land Cover Includes (select all that apply):

× Vegetative Cover

☐ Non-Vegetated Pervious Areas

× Impervious Areas

Description / Additional Information:

The existing site is mostly impervious as a result of the office building, surface parking, and hardscape. The pervious areas consist primarily of landscaping and some natural slope perimeter slopes.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

☐ NRCS Type A

☐ NRCS Type B

☐ NRCS Type C

× NRCS Type D

Approximate Depth to Groundwater (GW):

○ GW Depth < 5 feet

○ 5 feet < GW Depth < 10 feet

○ 10 feet < GW Depth < 20 feet

● GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

☐ Watercourses

☐ Seeps

☐ Springs

☐ Wetlands

× None

Description / Additional Information:

The current site is fully developed and the surrounding area contains similar development. There are no natural hydrologic features on-site nor immediately adjacent to the site.

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: 1. Whether existing drainage conveyance is natural or urban; 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; 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; 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:

Under existing conditions, storm runoff from the site is conveyed over urban (improved or graded) areas as follows. Runoff from the southwesterly portion sheet flows onto Towne Centre Drive primarily from the site's westerly driveway entrance. A small portion of runoff from this area sheet flows directly onto the adjacent Towne Centre Drive. Runoff from the northwesterly/northerly portion sheet flows onto Eastgate Mall either directly or from the site's northerly driveway entrance. Runoff from the rear of the site flows into a catch basin at the northeasterly corner of the main parking lot. A storm drain lateral conveys runoff from the catch basin north to an existing public storm drain system in Eastgate Mall. This storm drain continues east in Eastgate Mall, then south in Judicial Drive. Finally, runoff from the slope along the southerly and easterly site perimeters flows to Judicial Drive either directly or via the property to the south. The site runoff to Eastgate Mall and Judicial Drive is ultimately collected by the Judicial Drive storm drain system, i.e., the majority of the site runoff will enter the Judicial Drive storm drain. The only site runoff not collected by the Judicial Drive storm drain is the small area of runoff onto Towne Centre Drive.

The 50-year flow rate onto Towne Centre Drive is 1.2 cfs from 0.55 acres, onto Eastgate Mall is 1.7 cfs from 0.92 acres, to the Eastgate Mall storm drain lateral is 4.5 cfs from 1.54 acres, and to Judicial Drive is 1.0 cfs from 0.71 acres.

There is no off-site runoff tributary to the site.

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: The site currently contains a two-story 47,091 square foot office building with surface parking on a nearly level pad. The existing building and parking will be demolished prior to construction of the proposed project. The project will construct a 150,000 square foot, 5-story office building and 5-level parking structure. The office building is anticipated to support scientific research and general office uses. The office building will have a maximum height of 96 feet (top of mechanical screen), while the parking structure will have a maximum height of 54 feet (top of trellis).
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): The primary impervious feabures will include the office building, parking structure, and driveways. Smaller impervious areas include walkways, a small section of curb/gutter/sidewalk, cross-gutters, drainage ditches, and wood decks
List/describe proposed pervious features of the project (e.g., landscape areas): The pervious features include the biofitration basins, landscaping, and decomposed granite paths.
Does the project include grading and changes to site topography? ☒ Yes ☐ No Description / Additional Information: The existing site consists of a nearly level pad over the majority of the central portion surround by perimeter slopes. The site will be regraded to accommodate the new office building, parking structure, driveways, and landscape areas. There will be approximately 49,350 cubic yards of cut and 330 cubic yards of fill, or 49,020 cubic yards of export. The maximum fill depth is about 2 feet and cut depth is about 24 feet.

Form I-3B Page 5 of 11

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

- [x] 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:

After development, storm runoff from the majority of the project will be conveyed by proposed private on-site storm drain systems directly to the Judicial Drive storm drain system. The on-site storm drains will connect to the Judicial Drive storm drain at three locations east of the site. A reduced amount of site runoff will continue to be conveyed to the existing storm drain lateral in Eastgate Mall. This runoff will also reach the Judicial Drive storm drain. Storm runoff will no longer be directed onto Towne Centre Drive or onto Eastgate Mall. The project includes a series of biofiltration basins at various locations throughout the site to meet treatment control and hydromodification requirements.

The table below provides a comparison of the existing and mitigated (reflects detention) 50-year flow rates at the site. The table shows that the project will not increase flow rates in any direction and will cause a net decrease in the overall flow rate. All of the private on-site storm drains conveying the project flow will be 12" pipes. These have capacity for the flows. See the March 18, 2016, "Drainage Report for Kilroy Realty Corporation Office Building & Parking Structure, 9455 Towne Center Drive," for complete drainage details.

Discharge Location	Existing Condition 50-Year Flow Rate, cfs	Mitigated Prop. Cond. 50-Year Flow Rate, cfs
Towne Centre Drive	1.1	0
Eastgate Mall	1.7	0
Eastgate Mall Storm Drain Lateral	4.5	0.9
Judicial Drive	1.0	6.0
Total Flow Rate	8.3	6.9

There are no natural water bodies in the vicinity of the site. The adjacent area is fully developed. Therefore, there is a large buffer between the site and natural water bodies.

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):

× On-site storm drain inlets
× Interior floor drains and elevator shaft sump pumps
× Interior parking garages
× Need for future indoor & structural pest control
× Landscape/Outdoor Pesticide Use
☐ Pools, spas, ponds, decorative fountains, and other water features
☐ Food service
× Refuse areas
☐ Industrial processes
☐ Outdoor storage of equipment or materials
☐ Vehicle and Equipment Cleaning
☐ Vehicle/Equipment Repair and Maintenance
☐ Fuel Dispensing Areas
× Loading Docks
× Fire Sprinkler Test Water
× Miscellaneous Drain or Wash Water
× Plazas, sidewalks, and parking lots
☐ Large Trash Generating Facilities
☐ Animal Facilities
☐ Plant Nurseries and Garden Centers
☐ Automotive-related Uses

Description / Additional Information:

The project will have a private on-site drainage system with a series of inlets and pipes. The 5-story office building and 5-story parking garage will have elevators. Since the garage is multi-level it will contain interior parking and floor drains. Pesticided control will be used for outdoor areas, as needed. The project will include a designated refuse storage area and loading dock. Fire sprinklers will be installed per code. The building will generate miscellaneous drain water typical of an office building. Wood decks, walkways, and decomposed granite paths are part of the site layout.

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) The storm drain system that captures the project runoff will discharge into an unnamed natural channel approximately 1 mile south of the site. The discharge location is on the south side of Nobel Drive just east of Towne Centre Drive. The natural channel continues approximately 500 feet south to a confluence with Rose Creek. Rose Creek continues west for approximately 1.5 miles to Interstate 5, then turns south and flows generally parallel to Interstate 5 for nearly 4 miles before it outlets into Mission Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. The existing beneficial uses from the Basin Plan (Hydrologic Unit 906.40) for inland surface waters include REC1, REC2, WARM, and WILD, and a potential beneficial use is IND. A potential groundwater beneficial use is IND.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations. There are no ASBS receiving waters downstream of the project.
Provide distance from project outfall location to impaired or sensitive receiving waters. The following impaired receiving waters are downstream of the site. Rose Creek (approximatley 1.1 miles south of the site) is impaired for selenium and toxicity pursuant to the 2010 303(d) list of water quality limited segments. In addition, Mission Bay (approximately 5.8 miles south of the site) at the mouth of Rose Creek is 303(d) listed for eutrophic and lead.
Sumarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The site is within a fully developed area. There are no MHPA or enviromentally sensitive lands impacted by the project.

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
Rose Creek	Selenium, toxicity	TMDL req'd but not completed
Mission Bay	Eutophic, lead	TMDL req'd but not completed

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) 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	☐	☒	☐
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): N/A
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, No critical coarse sediment yield areas to be protected based on WMAA maps Discussion / Additional Information: The site currently is fully developed, so there are no natural on-site coarse sediment yield areas. In addition, the site is not identified as containing critical coarse sediment yield areas on the San Diego County Regional Watershed Management Area Analysis (WMAA).

Form I-3B Page 10 of 11
Flow Control for Post-Project Runoff* *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. The project has a single POC as follows. The project runoff will be conveyed approximately 1 mile south away from the site in a public storm drain system to an unnamed natural drainage course. The outlet into the unnamed natural drainage course is just south of Nobel Drive and east of Towne Centre Drive. The location where the storm drain discharges into the unnamed natural drainage course is the point of compliance for the project. Since there is only one it is identified as the "POC."
Has a geomorphic assessment been performed for the receiving channel(s)? ☐ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☒ Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide title, date, and preparer: Chang Consultants' August 30, 2015, "Hydromodification Screening for Kilroy Realty Corporation Office Building & Parking Structure, 9455 Towne Centre Drive," has been reviewd and approved by the City of San Diego. The report determied a low flow threshold of 0.5Q2.
Discussion / Additional Information: (optional) See above.

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. N/A.
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. N/A.

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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. Answer each category below pursuant to the following. • "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. • "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 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: N/A.			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: N/A.			
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: N/A.			
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: N/A.			
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: N/A.

Project Name: 9455 Towne Centre Drive

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 <u>all</u> "No" answers shown above. N/A.			

Project Name: 9455 Towne Centre Drive

Site Design BMP Checklist for All Development Projects			Form I-5
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 Draiange Pathways and Hydrologic Features	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-1 not implemented: N/A			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☒ N/A
1-2 Are street trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
1-3 Implemented street trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☒ N/A
1-4 Is street tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
SD-2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☐ No	☒ N/A

Discussion / justification if SD-2 not implemented: N/A.

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: N/A.			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented: N/A.			
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-5 not implemented: Impervious areas are dispersed to pervious areas. However, the dispersion is not used to reduce the DCV nor to generate self-retaining areas as outlined in SD-5.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☒ Yes	☐ No	
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	

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	

Project Name: 9455 Towne Centre Drive

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: Green roofs and permeable pavement are not proposed. The post-construction structural BMPs selected are biofiltration basins.			
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	☐ N/A
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 map?	☐ Yes	☒ No	☐ N/A
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☒ No	☐ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented: N/A.			
SD-8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-8 not implemented: The 36-hour demand is less than 0.25 DCV, so harvest and use is considered to be infeasible per Worksheet B.3-1 from the City "Storm Water Standards, Part 1: BMP Design Manual - Appendices."			

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	☐ N/A
8-2	Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☒ No	☐ N/A

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:
See Attachment 1 and 4 for Plan Sheets Showing BMPs

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).	

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. The project must meet pollutant control and hydromodification control requirements. The City of San Diego's 2016 "Storm Water Standards" outlines steps in selecting structural BMPs. Harvest and use is considered first. As discussed in SD-8 above, harvest and use is not feasible for the site because the demand compared to the design capture volume does not meet the requirements. Infiltration is considered next. Infiltration is infeasible for several reasons. First, the soil group is D, which represents soils with a very low infiltration rate. Second, the site has supported development for years that primarily consisted of a large office building and parking. The soil was compacted for the development and compaction would have increased over time due to loading on the improved surfaces. Third, the project's geotechnical engineer, Geotechnical Exploration, Inc., has opined that the site is not suitable for infiltration. Biofiltration is the third BMP in the heirarchy. The project adopts this BMP, and has incorporated a series of biofiltration basins throughout the site. Each biofiltration basin has been sized to meet both pollutant control and hydromodification control requirements per the 2016 "Storm Water Standards." Therefore, the biofiltration basins has been designed for the current criteria. Some of the biofiltration basins are interconnected with dual 4" PVC pipes to form an overall basin that meets the sizing requirements. The biofiltration basins contain overflow catch basins set 12" above the basin floor to convey the flow rates in excess of the water quality flows. (Continue on page 2 as necessary.)

Project Name: 9455 Towne Centre Drive

Form I-6 Page 2 of X
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Biofiltration Basins 1 through 10	
Construction Plan Sheet No. 4, 5 and 8	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☒ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below) ☐ 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) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☒ Pre-treatment/forebay for another structural BMP ☐ 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	Robert Little, Kilroy Realty Corporation, 3611 Valley Centre Drive, Suite 550, San Diego, CA 92101, (858) 523-0300
Who will be the final owner of this BMP?	Kilroy Realty Corporation
Who will maintain this BMP into perpetuity?	Owner and their management company will employ maintenance staff
What is the funding mechanism for maintenance?	Kilroy will include BMP maintenance in the yearly operations budget.

Form I-6 Page 4 of X (Copy as many as needed)
Structural BMP ID No. N/A.
Construction Plan Sheet No. N/A.
Discussion (as needed): N/A.

Project Name: 9455 Towne Centre Drive

THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Permenant BMP Construction** **Self Certification Form**	FORM DS-563 January 2016

Date Prepared: March 18, 2016	Project No.: IO No. 24006426, PTS No. 291342
Project Applicant: Kilroy Realty Corporation	Phone: (858) 523-0300
Project Address: 9455 Towne Centre Drive, San Diego, CA 92121	
Project Engineer: Kettler-Leweck Engineering	Phone: (619) 269-3444

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. Click here to enter text.; 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 (12-15)

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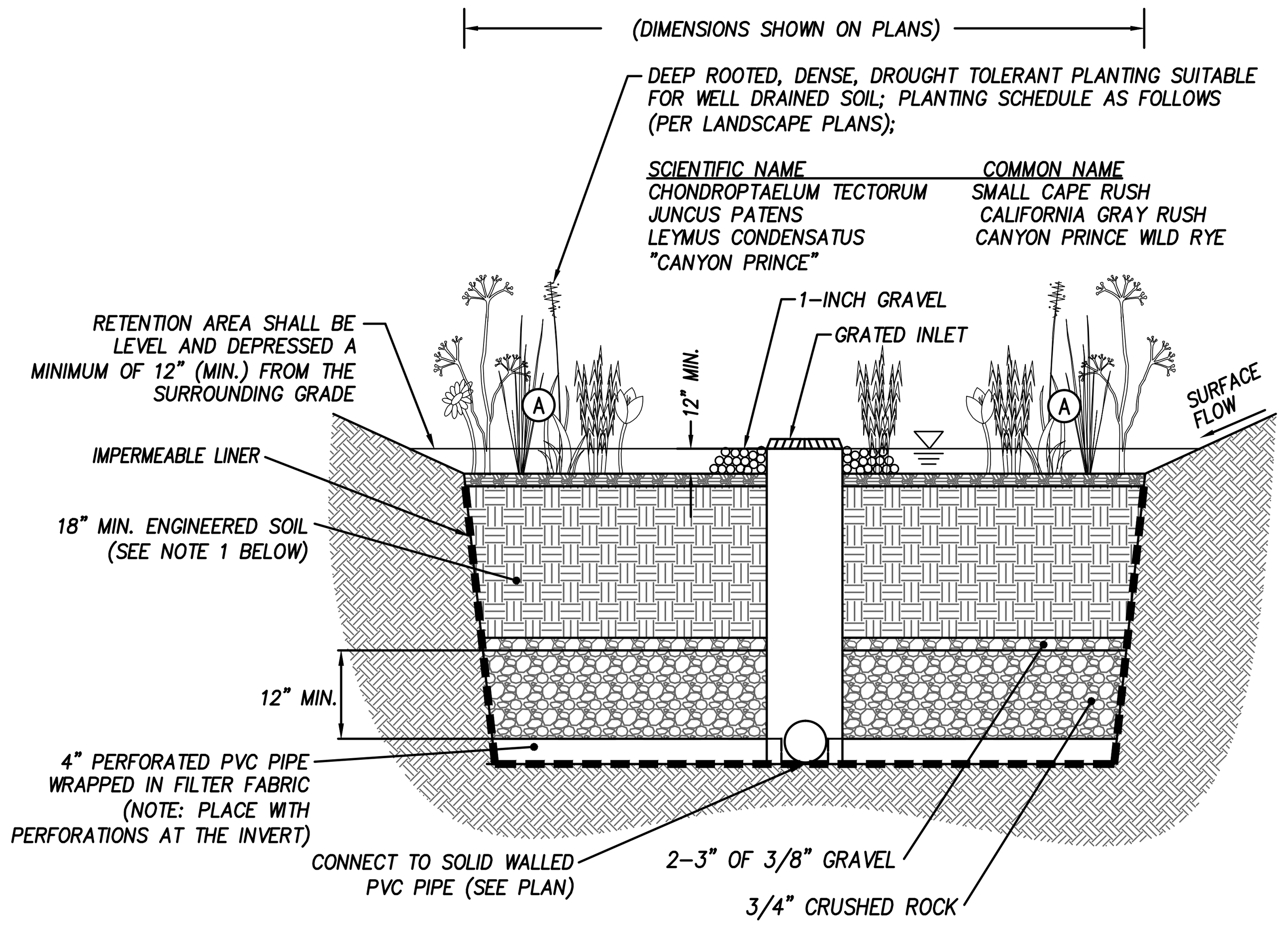
ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Project Name: **9455 Towne Centre Drive**

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	× Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	◉ Included on DMA Exhibit in Attachment 1a ○ 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) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	◉ Included ○ 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) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	◉ Included ○ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	× Included

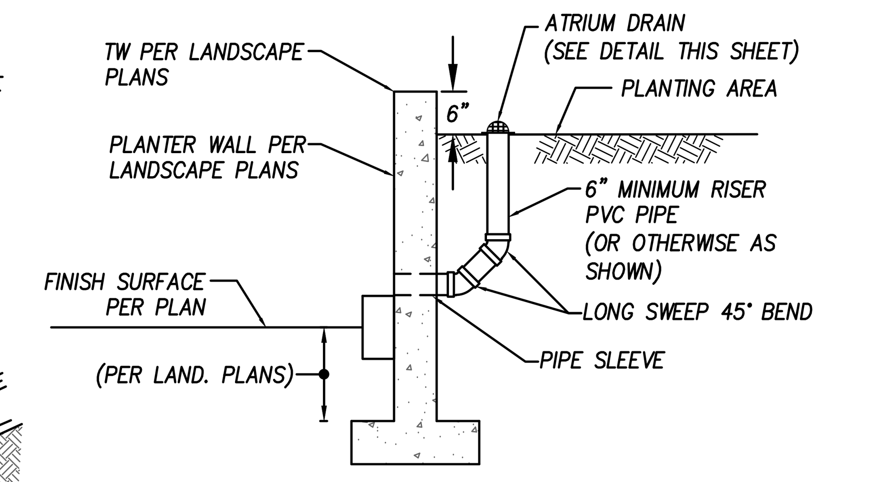


BIORETENTION (PVT.) DETAIL (A)

NTS

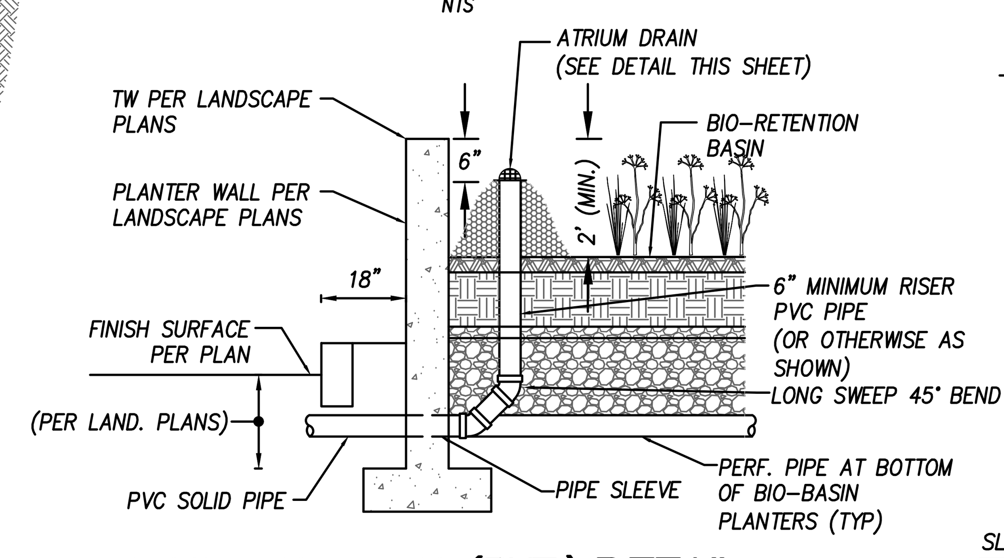
BIORETENTION NOTES

1. BIORETENTION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 24" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.



NDS ATRIUM AD (PVT.) DETAIL (B)
(AT TYPICAL PLANTER WALL)

NTS



NDS ATRIUM AD (PVT.) DETAIL (C)
(AT BIO BASIN PLANTER WALL)

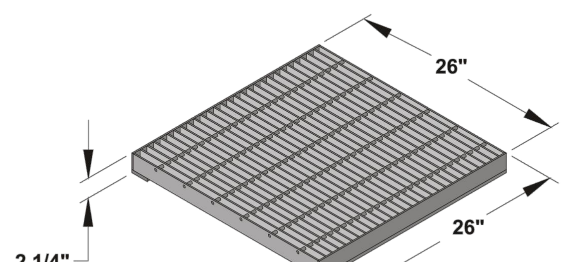
NTS

2424 CAST IRON GRATE

PARKWAY 112 lbs.

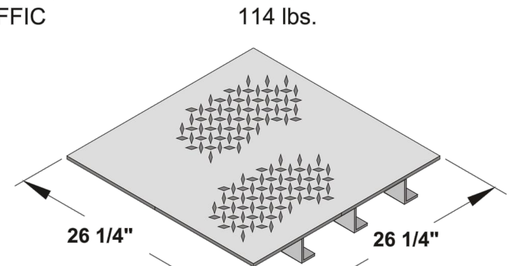
2424 STEEL GRATES

PARKWAY 48 lbs.
TRAFFIC 103 lbs.

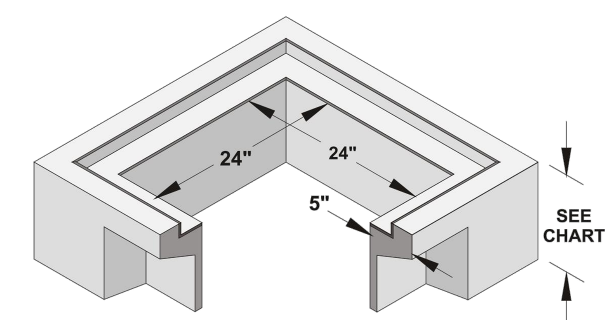


2424 STEEL COVER

PARKWAY 81 lbs.
TRAFFIC 114 lbs.

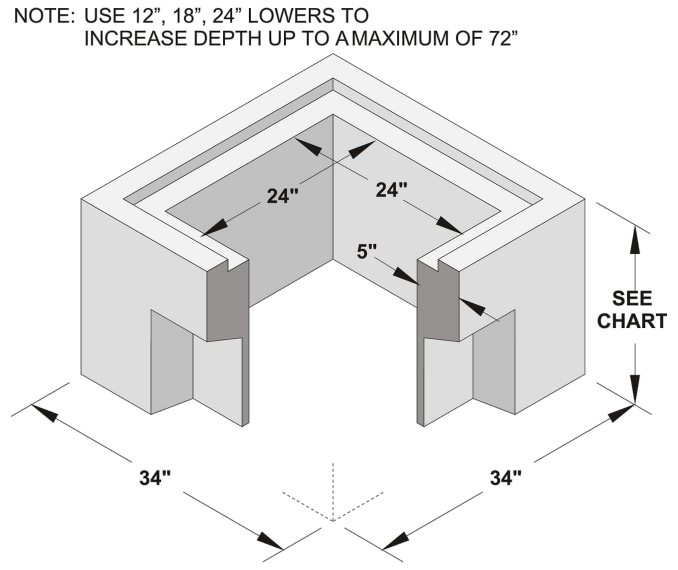


2424 TOP SECTION (WITH GALVANIZED FRAME)

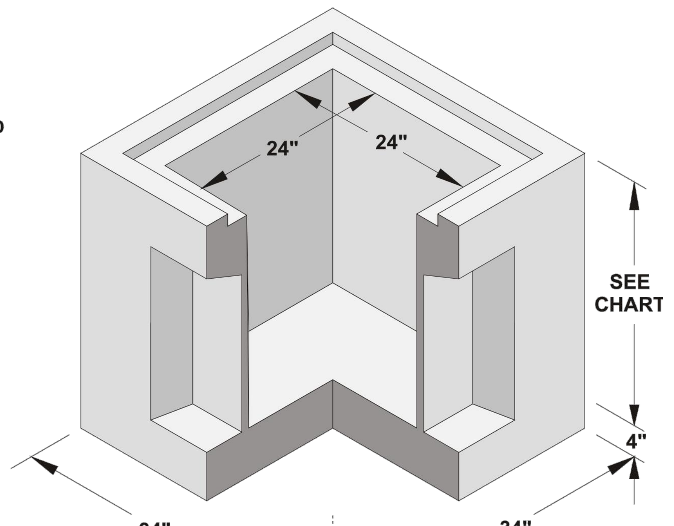


2424 LOWER SECTION (NO FRAME)

NOTE: USE 12", 18", 24" LOWERS TO INCREASE DEPTH UP TO A MAXIMUM OF 72"



2424 BOTTOM SECTION (WITH OR WITHOUT FRAME)



NOTES:
1. GRATES AND COVERS AVAILABLE PAINTED BLACK OR GALVANIZED
2. "ADA" GRATES AVAILABLE IN PARKWAY & TRAFFIC .
3. "HEEL PROOF" GRATES AVAILABLE IN PARKWAY ONLY
4. A TOP SECTION WITH FRAME MUST BE USED IF BOLT DOWN REQUIRED

TOP SECTION	HT.	LBS	KNOCK-OUTS
2424 T6	6"	270	NONE
2424 T12	12"	495	(4) 6" x 11"
2424 T18	18"	745	(4) 9" x 12"
2424 T24	24"	870	(4) 14" x 14"

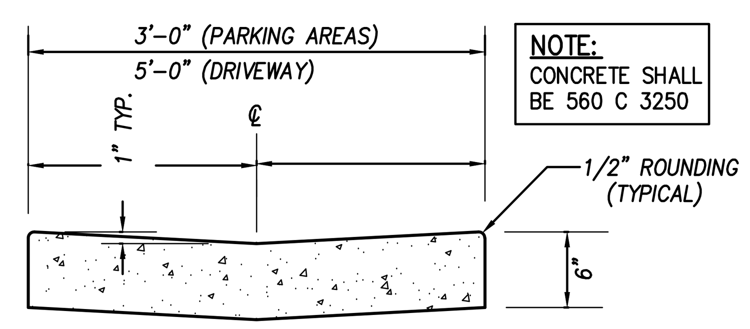
EXTENSION SECTION	HT.	LBS	KNOCK-OUTS
2424 E6	6"	270	NONE

LOWER SECTION	HT.	LBS	KNOCK-OUTS
2424 L12	12"	495	(4) 6" x 11"
2424 L18	18"	745	(4) 9" x 12"
2424 L24	24"	870	(4) 14" x 14"

BOTTOM SECTION	HT.	LBS	KNOCK-OUTS
2424 B30	30"	1595	(4) 18" x 18"
2424 B36	36"	1905	(4) 18" x 18"

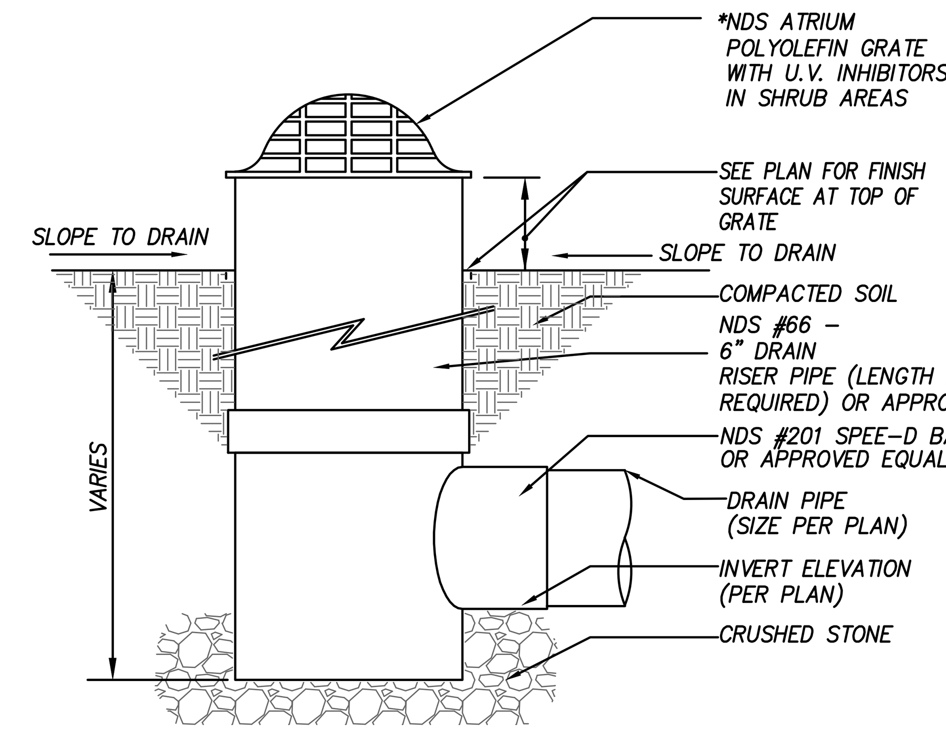
PRIVATE 24"x24" BROOKS BOX DETAILS (G)

NTS



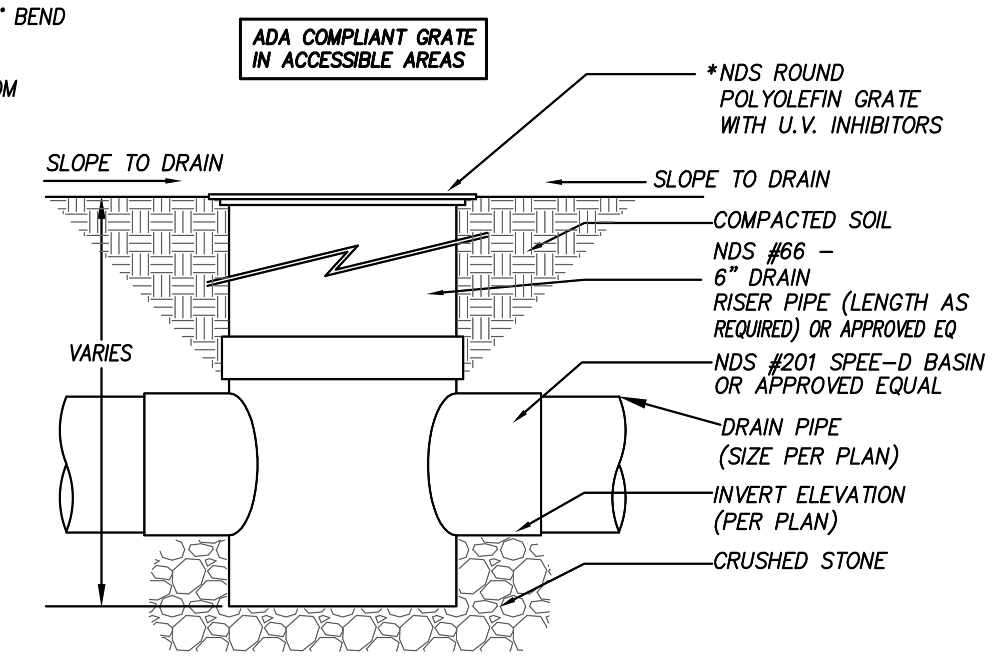
RIBBON GUTTER (PVT.) DETAIL (F)

NTS



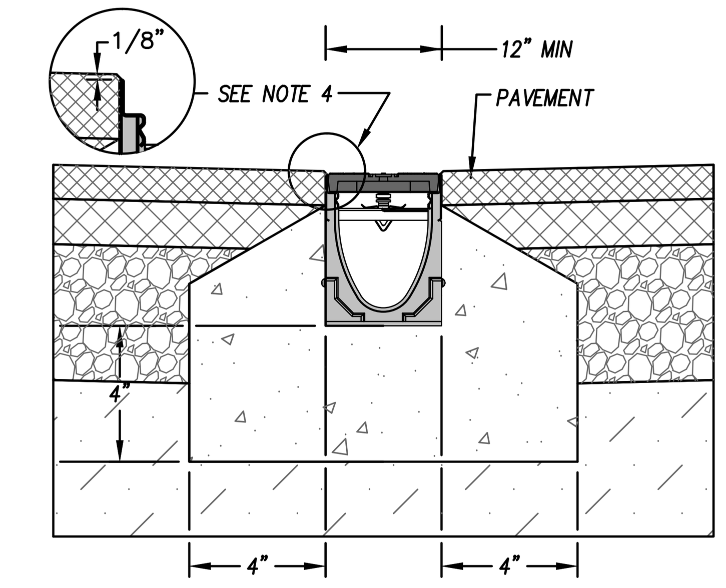
NDS ATRIUM AREA DRAIN (PVT.) DETAIL (D)

NTS
(IN LANDSCAPE AREAS)



NDS ATRIUM AREA DRAIN (PVT.) DETAIL (E)

NTS
(IN HARDSCAPE AREAS)



ACO TRENCH (PVT.) DRAIN DET. (H)

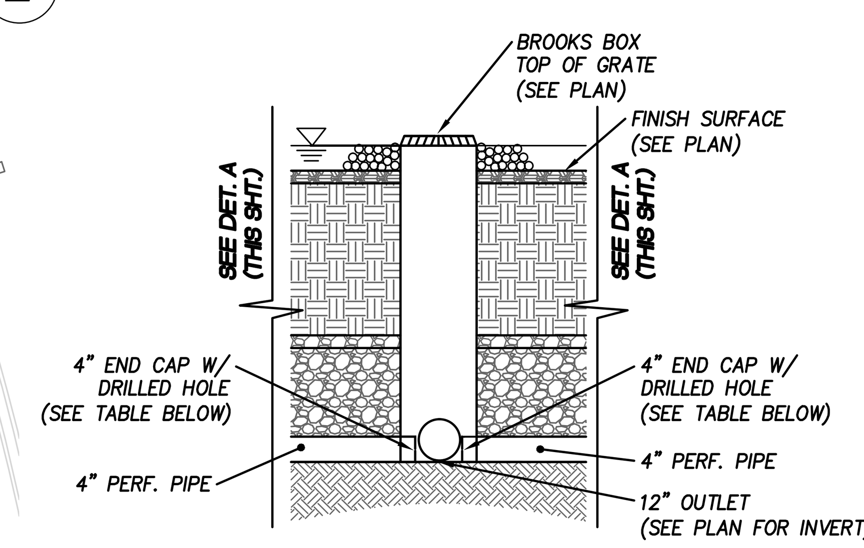
NTS

ACO TRENCH DRAIN NOTES

1. IT IS NECESSARY TO ENSURE MINIMUM DIMENSIONS SHOWN ARE SUITABLE FOR EXISTING GROUND CONDITIONS. ENGINEERING ADVICE MAY BE REQUIRED.
2. MINIMUM CONCRETE STRENGTH OF 4,000 PSI IS RECOMMENDED. CONCRETE SHOULD BE VIBRATED TO ELIMINATE AIR POCKETS.
3. EXPANSION AND CONTRACTION CONTROL JOINTS AND REINFORCEMENT ARE RECOMMENDED TO PROTECT CHANNEL AND CONCRETE SURROUND. ENGINEERING ADVICE MAY BE REQUIRED.
4. THE FINISHED LEVEL OF THE CONCRETE SURROUND MUST BE APPROX. 1/8" ABOVE THE TOP OF THE CHANNEL EDGE.
5. CONCRETE BASE THICKNESS SHOULD MATCH SLAB THICKNESS. ENGINEERING ADVICE MAY BE REQUIRED TO DETERMINE PROPER LOAD CLASS.
6. REFER TO ACO'S LATEST INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS.
7. THE SURFACE DRAINAGE SYSTEM SHALL BE POLYMER CONCRETE K100 CHANNEL SYSTEM WITH GALVANIZED STEEL EDGE RAILS AS MANUFACTURED BY ACO POLYMER PRODUCTS, INC.
8. THE SYSTEM SHALL BE 4" (100MM) NOMINAL INTERNAL WIDTH WITH A 5.1" (130MM) OVERALL WIDTH AND A BUILT-IN SLOPE OF 0.5%. CHANNEL INVERT SHALL HAVE DEVELOPED "V" SHAPE. ALL CHANNELS SHALL BE INTERLOCKING WITH A MALE/FEMALE JOINT.
9. THE COMPLETE DRAINAGE SYSTEM SHALL BE BY ACO POLYMER PRODUCTS, INC. ANY DEVIATION OR PARTIAL SYSTEM DESIGN AND/OR IMPROPER INSTALLATION WILL VOID ANY AND ALL WARRANTIES PROVIDED BY ACO POLYMER PRODUCTS, INC.
10. CHANNEL SHALL WITHSTAND LOADING TO PROPER LOAD CLASS AS OUTLINED BY EN 1433. GRATE TYPE SHALL BE APPROPRIATE TO MEET THE SYSTEM LOAD CLASS SPECIFIED AND INTENDED APPLICATION. GRATES SHALL BE SECURED USING 'QUICKLOK' BOLTLESS LOCKING SYSTEM. CHANNEL AND GRATE SHALL BE CERTIFIED TO MEET THE SPECIFIED EN 1433 LOAD CLASS. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

<u>MATERIALS</u>
CHANNELS SHALL BE MANUFACTURED FROM POLYESTER RESIN POLYMER CONCRETE WITH AN INTEGRALLY CAST-IN GALVANIZED STEEL EDGE RAIL. MINIMUM PROPERTIES OF POLYMER CONCRETE WILL BE AS FOLLOWS:

COMPRESSIVE STRENGTH:	14,000 PSI
FLEXURAL STRENGTH:	4,000 PSI
TENSILE STRENGTH:	1,500 PSI
WATER ABSORPTION:	0.07%
FROST PROOF:	YES
DILUTE ACID AND AKALI RESISTANT:	YES
B117 SALT SPRAY TEST COMPLIANT:	YES

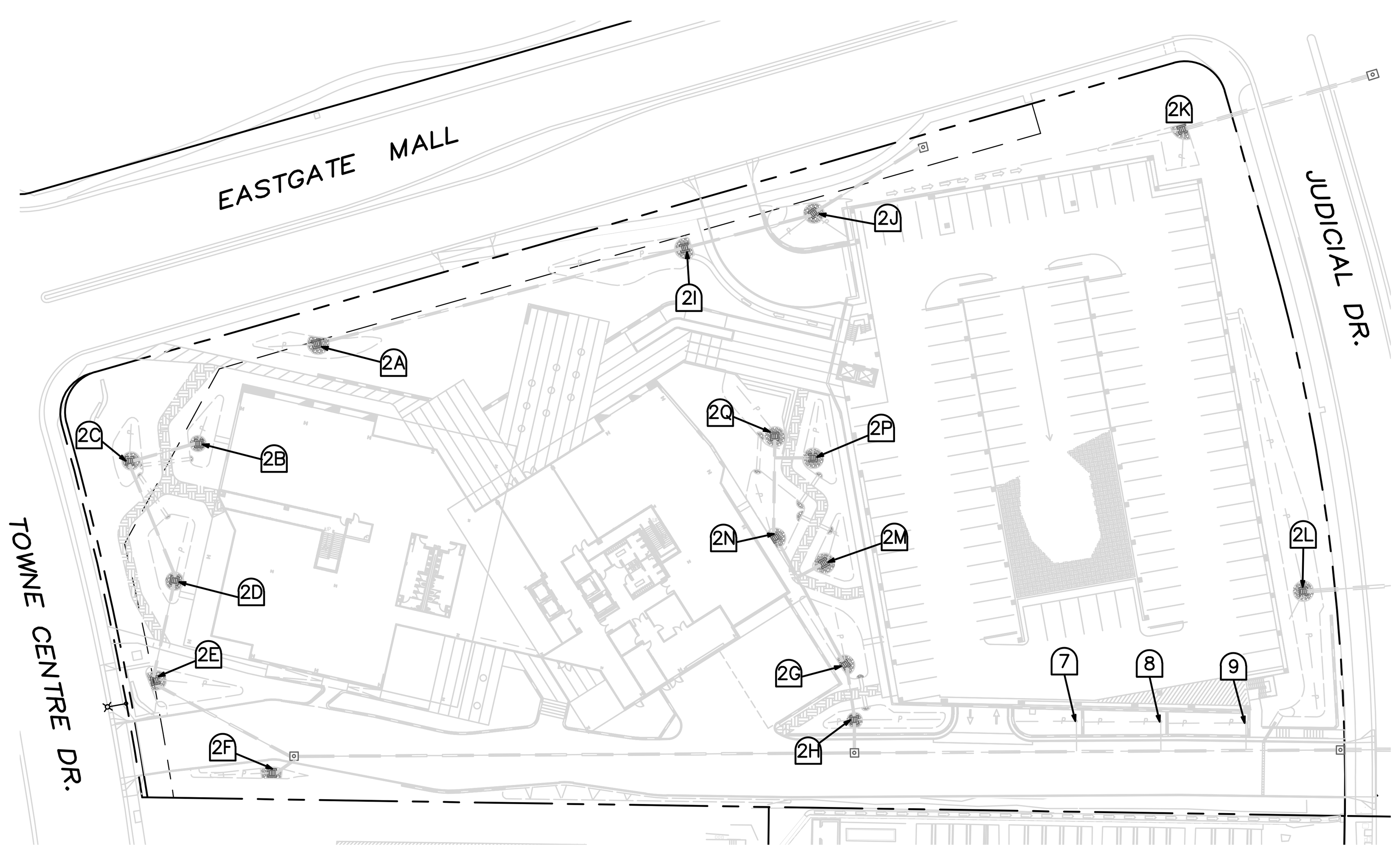


BIO-BASIN ORIFICE DETAIL (H)

NTS

# NO.	ORIFICE SIZING CHART ORIFICE SIZE
2A	1-1/4" (SEE DET. ABOVE)
2B	1-1/4" (SEE DET. ABOVE)
2C	1-1/4" (SEE DET. ABOVE)
2D	1-1/4" (SEE DET. ABOVE)
2E	1/2" (SEE DET. ABOVE)
2F	1/2" (SEE DET. ABOVE)
2G	1" (SEE DET. ABOVE)
2H	1" (SEE DET. ABOVE)
2I	1" (SEE DET. ABOVE)
2J	1/2" (SEE DET. ABOVE)

NO.	ORIFICE SIZING CHART ORIFICE SIZE
2K	N/A (SELF RETAINING)
2L	1" (SEE DET. ABOVE)
2M	1-1/4" (SEE DET. ABOVE)
2N	1-1/4" (SEE DET. ABOVE)
2O	NOT USED
2P	1-1/4" (SEE DET. ABOVE)
2Q	1-1/4" (SEE DET. ABOVE)
2R	1" (SEE DET. ABOVE)
2S	1" (SEE DET. ABOVE)
2T	1" (SEE DET. ABOVE)



BIO-BASIN ORIFICE SIZING KEY MAP/DIAGRAM

SCALE: 1"=60'

	# STORM DRAIN PIPE DATA (PRIVATE) NO.	BEARING	DISTANCE	REMARKS
	1	N89°38'41"E	68.46'	18" RCP PIPE @ 18.18%
	2	N89°38'41"E	231.12'	12" PVC PIPE (SDR-35) @ 10.00%
	3	N89°38'41"E	267.11'	12" PVC PIPE (SDR-35) @ 1.11%
	4	N61°54'10"W	73.50'	12" PVC PIPE (SDR-35) @ 1.00%
	5	N54°29'41"E	10.51'	12" PVC PIPE (SDR-35) @ 19.00%
	6	N12°25'01"E	45.60'	12" PVC PIPE (SDR-35) @ 1.00%
	7	N22°17'10"W	58.30'	12" PVC PIPE (SDR-35) @ 1.00%
	8	N74°16'54"E	30.59'	12" PVC PIPE (SDR-35) @ 1.00%
(1)	9	N00°21'19"W	12.06'	12" PVC PIPE (SDR-35) @ 1.00% **
	10	N83°41'51"W	23.24'	12" PVC PIPE (SDR-35) @ 14.0%
	11	N86°18'09"E	81.92'	18" RCP PIPE @ 14.89%
	12	NOT USED		
	13	N74°00'50"E	91.44'	18" RCP PIPE @ 3.61%
	14	NOT USED		
	15	N58°21'42"E	57.94'	12" PVC PIPE (SDR-35) @ 7.57%
(1)	16	N75°30'47"E	60.86'	12" PVC PIPE (SDR-35) @ 1.00% **
	17	N75°21'33"E	179.90'	12" PVC PIPE (SDR-35) @ 3.33%
(1)	18	N00°21'19"W	13.70'	4" PVC SOLID PIPE (SDR-35) @ (VARIES) **
(1)	19	N00°21'19"W	13.21'	4" PVC SOLID PIPE (SDR-35) @ (VARIES) **
(1)	20	N00°21'19"W	12.38'	4" PVC SOLID PIPE (SDR-35) @ (VARIES) **
	21	N89°38'41"E	36.96'	4" PERFORATED PIPE (SDR-35)
	22	N89°38'41"E	36.60'	"
	23	N89°38'41"E	28.64'	"
	24	N89°38'41"E	39.50'	"
	25	N82°23'46"E	10.60'	"
	26	N11°46'26"W	23.12'	"
	27	N87°42'46"E	24.08'	"
	28	N84°19'48"W	43.03'	"
	29	N11°48'00"E	26.71'	"
	30	N19°37'28"E	11.64'	"
	31	N02°52'47"E	15.67'	"
	32	N15°29'07"W	20.53'	"
	33	N87°22'56"E	21.30'	"
	34	N81°40'19"E	61.30'	"
	35	N52°30'00"E	17.70'	"
	36	N56°07'58"W	17.51'	"
	37	NOT USED		
	38	N02°42'26"E	15.79'	4" PERFORATED PIPE (SDR-35)
	39	N12°46'05"W	130.50'	"
	40	N06°41'02"W	55.15'	"
	41	N28°21'44"W	65.98'	12" PVC PIPE (SDR-35) @ 1.00%
	42	N00°48'35"W	45.26'	12" PVC PIPE (SDR-35) @ 1.00%
	43	N17°15'28"E	25.69'	4" PERFORATED PIPE (SDR-35)
(2)	44	N10°19'53"W	9.00'	2-4" PVC SOLID PIPE (SDR-35)
(2)	45	N64°30'23"W	14.21'	2-4" PVC SOLID PIPE (SDR-35)
(2)	46	N33°46'31"W	23.49'	2-4" PVC SOLID PIPE (SDR-35)
(2)	47	N82°34'57"E	23.00'	2-4" PVC SOLID PIPE (SDR-35)
(2)	48	N31°02'22"E	11.00'	12" PVC SOLID PIPE (SDR-35) @ 1.0%
	49	N61°38'16"W	12.00'	12" PVC PIPE (SDR-35) @ 0.6%
(2)	50	N33°37'38"E	15.35'	2-4" PVC SOLID PIPE (SDR-35)
	51	N06°46'35"E	22.98'	4" PERFORATED PIPE (SDR-35)
	52	N00°00'00"W	16.02'	12" PVC PIPE (SDR-35) @ 1.00%
	53	N39°11'41"E	28.72'	4" PERFORATED PIPE (SDR-35)
(2)	54	N02°54'40"E	16.36'	2-4" PVC SOLID PIPE (SDR-35)

(SEE SHEET 6 FOR LOCATION)
NOTES:
(1) ** PIPE SLEEVE AT WALL REQUIRED
(2) INSTALL RIP RAP AT PIPE OUTLET BOT. OF BASIN

# SHORING WALL SUBDRAIN/PIPE DATA (PRIVATE) NO.	BEARING	DISTANCE	REMARKS
55	N77°39'17"E	118.15'	6" PVC SOLID PIPE (SDR-35) @ 3.2%
56	N28°8'38"E	12.70'	6" PVC SOLID PIPE (SDR-35) @ 18.1%

# RIP RAP SPECIFICATIONS (CONT.) RIPRAP NO.	ROCK SIZE	THICKNESS	LENGTH	BOTTOM WIDTH
RR1	NO. 2 BACKING	1.1'	5'	2'
RR2	"	1.1'	5'	2'
RR3	"	1.1'	5'	2'
RR4	"	1.1'	5'	2'
RR5	"	1.1'	5'	2'
RR6	"	1.1'	5'	2'
RR7	"	1.1'	5'	2'
RR8	"	1.1'	5'	2'
RR9	"	1.1'	5'	2'
RR10	"	1.1'	5'	2'
RR11	"	1.1'	5'	2'

(SEE SHEET 6 FOR LOCATION)

STEVEN C. KETTLER R.C.E. NO. C48358 DATE
EXP. 6-30-2016

KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

PRIVATE CONTRACT

DETAILS FOR:

9455 TOWNE CENTRE DRIVE

PARCEL 3 OF PARCEL MAP NO. 16265

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 4 OF 20 SHEETS

I.O. NO. 24006426
PROJECT NO. 465929

FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KLE			
AS-BUILTS				

1900-6265
NAD83 COORDINATES

260-1705
LAMBERT COORDINATES

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

39204-4 -D

ATTACHMENT 1A - SHEET 1

BMP1 DMA1

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA1	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	15409	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1079	898	647
PERVIOUS	2989	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	21	17	13
Total BMP Area	18398							Minimum BMP Size	1099.553	916	660
								Proposed BMP Size*	1100	1100	660
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.99	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP2 DMA2

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA2	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2210	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	155	129	93
PERVIOUS	1051	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	3261							Minimum BMP Size	162.057	135	97
								Proposed BMP Size*	750	750	450
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	2.16	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP3 DMA3

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA3	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	31679	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	2218	1847	1331
PERVIOUS	9050	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	63	53	38
Total BMP Area	40729							Minimum BMP Size	2280.88	1900	1369
								Proposed BMP Size*	2400	2400	1440
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.50	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP4 DMA4

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA4	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	1817	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	127	106	76
PERVIOUS	1059	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	2876							Minimum BMP Size	134.603	112	81
								Proposed BMP Size*	160	160	96
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	8.41	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP5 DMA5

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA5	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2853	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	200	166	120
PERVIOUS	2415	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	17	14	10
Total BMP Area	5268							Minimum BMP Size	216.615	180	130
								Proposed BMP Size*	520	520	312
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	4.16	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP6 DMA6

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA6	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	17562	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1229	1024	738
PERVIOUS	8353	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	58	49	35
Total BMP Area	25915							Minimum BMP Size	1287.811	1073	773
								Proposed BMP Size*	1320	1320	792
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.75	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP7 DMA7

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA7	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	1583	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	111	92	66
PERVIOUS	4014	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	28	23	17
Total BMP Area	5597							Minimum BMP Size	138.908	116	83
								Proposed BMP Size*	480	480	288
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	2.89	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP8 DMA8

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA8	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	6662	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	466	388	280
PERVIOUS	6975	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	49	41	29
Total BMP Area	13637							Minimum BMP Size	515.165	429	309
								Proposed BMP Size*	950	950	570
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	5.42	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP9 DMA9

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA9	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	16981	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1189	990	713
PERVIOUS	1290	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	9	8	5
Total BMP Area	18271							Minimum BMP Size	1197.7	998	719
								Proposed BMP Size*	1285	1285	771
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.32	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

BMP10 DMA10

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA10	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	16362	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1145	954	687
PERVIOUS	5442	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	38	32	23
Total BMP Area	21804							Minimum BMP Size	1183.434	986	710
								Proposed BMP Size*	1955	1955	1173
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	6.05	in	
								Maximum Ponding Depth		in	
								Selected Ponding Depth	12.00	in	

NOTE: SEE SHEET 9 FOR LOCATIONS

ATTACHMENT 1A - SHEET 2

STEVEN C. KETTLER R.C.E. NO. C48358 DATE
EXP. 6-30-2016

KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

PRIVATE CONTRACT

DRAINAGE MANAGEMENT AREA BMP SIZING CALCULATIONS FOR:

9455 TOWNE CENTRE DRIVE

PARCEL 3 OF PARCEL MAP NO. 16265

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 8 OF 20 SHEETS

I.O. NO. 24006426
PROJECT NO. 465929

FOR CITY ENGINEER DATE

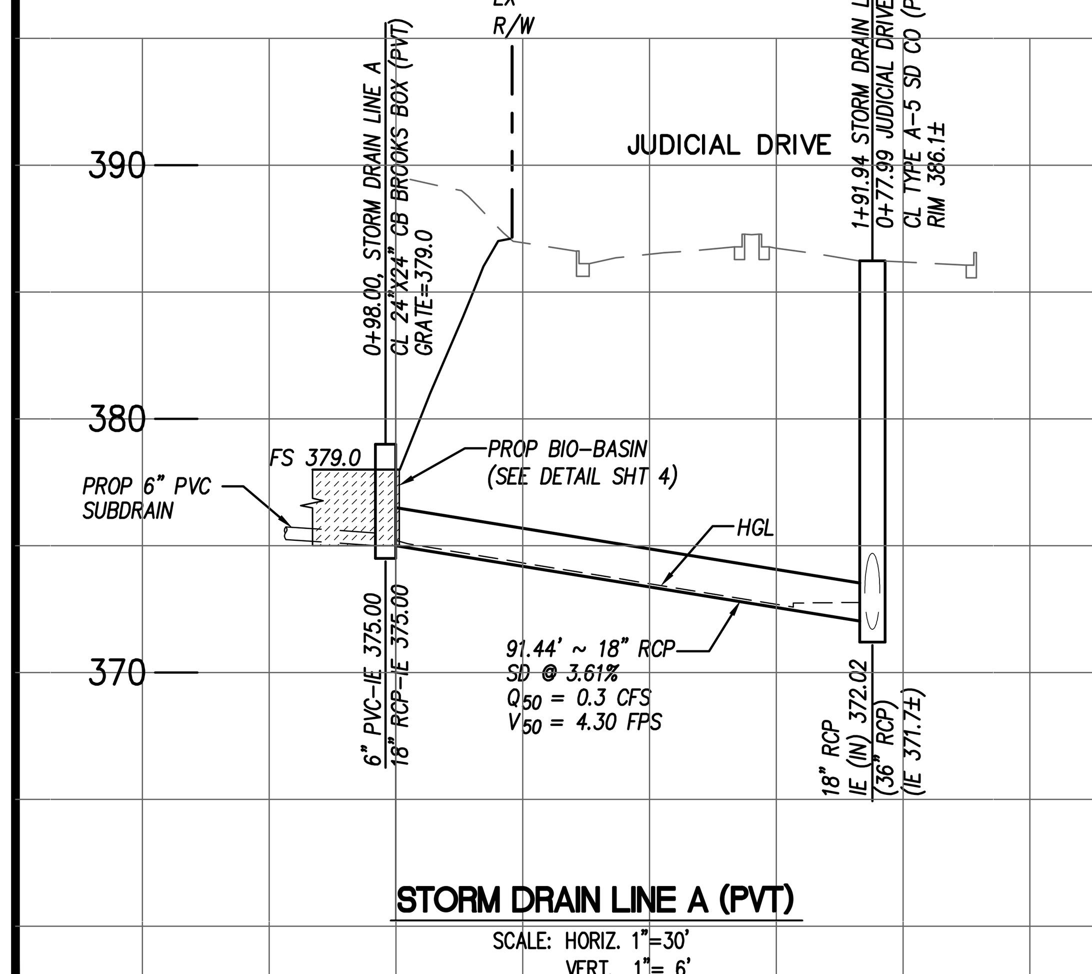
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KLE			
AS-BUILTS				

1900-6265
NAD83 COORDINATES

260-1705
LAMBERT COORDINATES

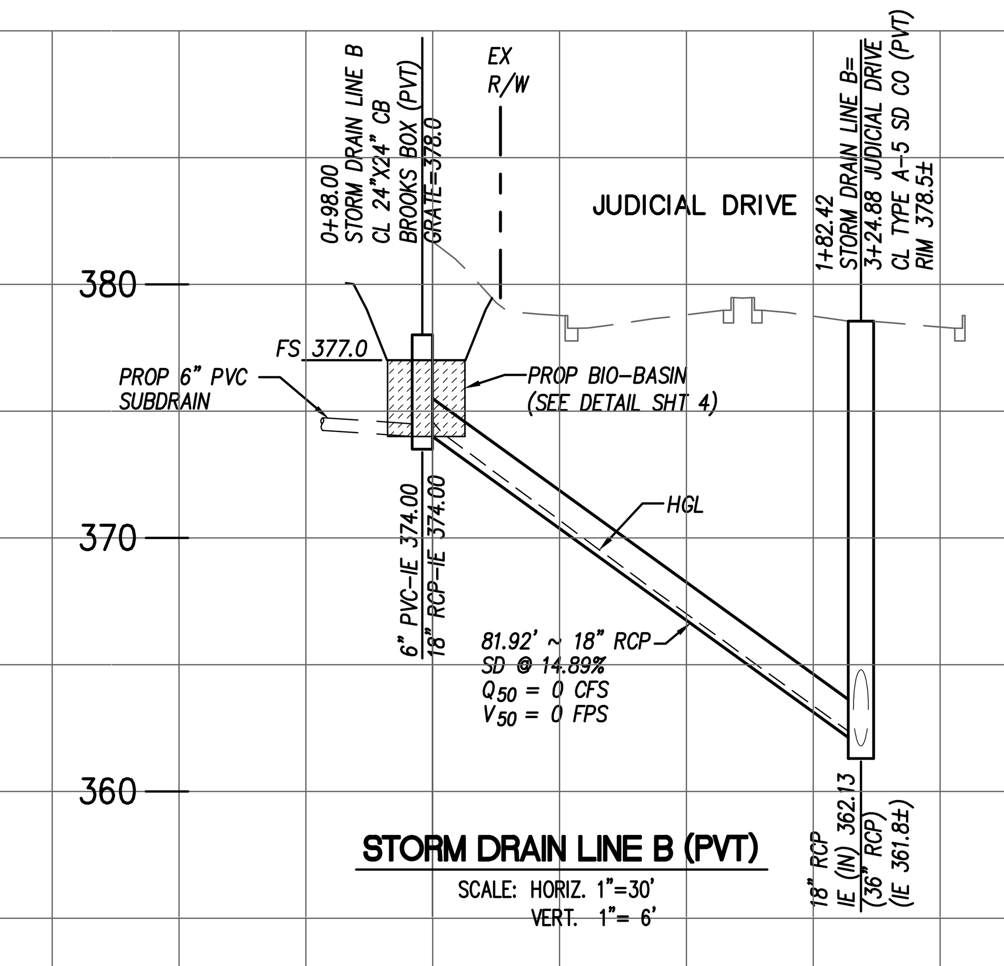
CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

39204-8 -D



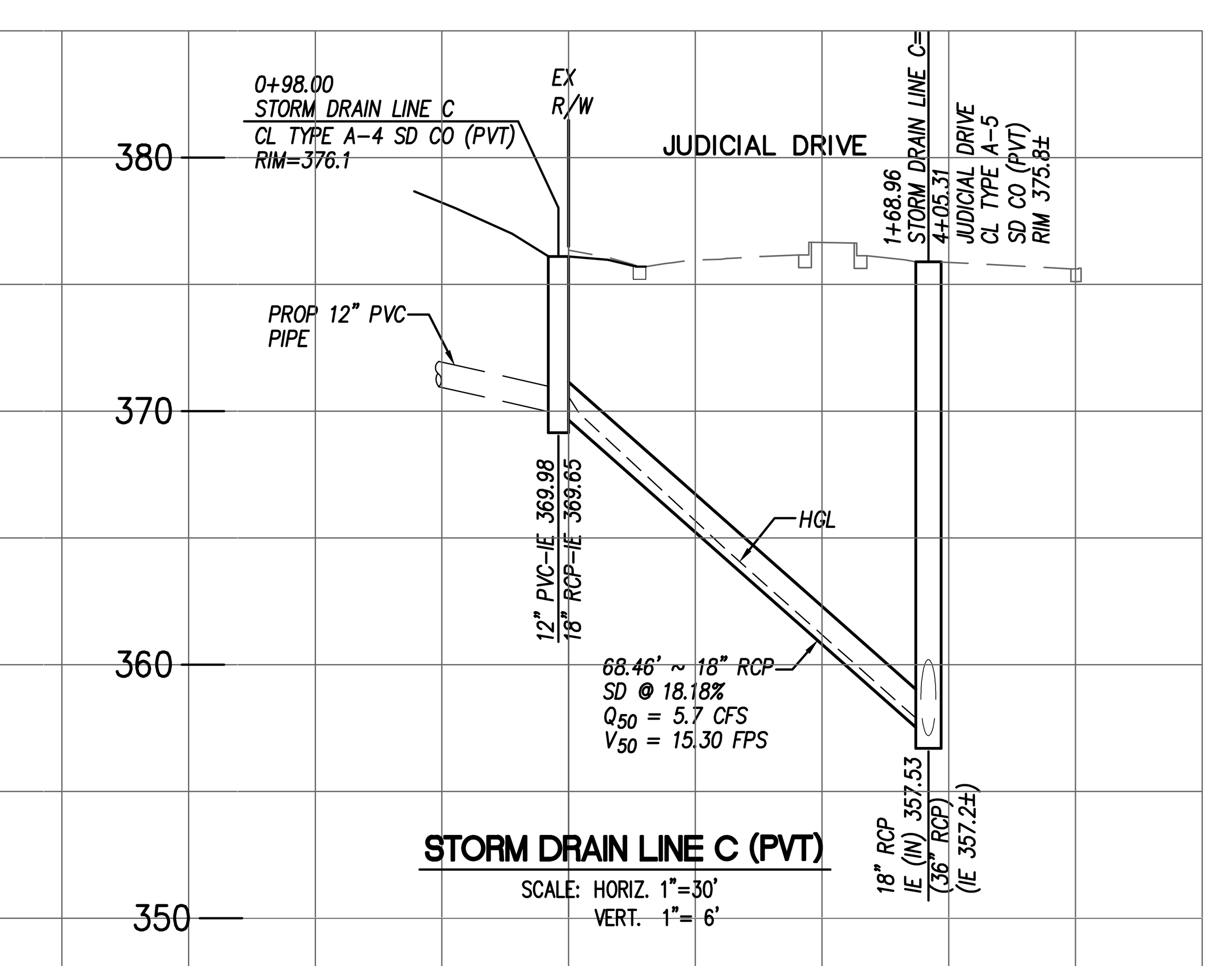
STORM DRAIN LINE A (PVT)

SCALE: HORIZ. 1"=30'
VERT. 1"= 6'



STORM DRAIN LINE B (PVT)

SCALE: HORIZ. 1"=30'
VERT. 1"= 6'



STORM DRAIN LINE C (PVT)

SCALE: HORIZ. 1"=30'
VERT. 1"= 6'

LEGEND

- PROPERTY LINE
- DRAINAGE PATTERN/FLOW DIRECTION
- DAYLIGHT/LIMIT OF WORK
- 380 PROPOSED CONTOUR
- PROPOSED STORM DRAIN (PVT.)
- DRAINAGE MANAGEMENT AREA (DMA)
- BMP1 BEST MANAGEMENT PRACTICE
- DMA1 DRAINAGE MANAGEMENT AREA

WATER QUALITY AND HYDROMODIFICATION

1. THE PROPOSED PROJECT RESULTS IN A REDUCTION IN PEAK STORM RUNOFF.
2. THIS PROJECT INCLUDES PROVISIONS FOR THE STATE'S HYDRO-MODIFICATION REQUIREMENTS.
3. THE PROPOSED GRADING AND DRAINAGE DESIGN INCLUDES DIRECTING RUNOFF TO NATURAL BMPS WHERE IT WILL BE TREATED BEFORE DISCHARGING OFFSITE.
4. THE PROPOSED BMPS FOR THE PROJECT INCLUDE LANDSCAPING, BIO-RETENTION, AND SELF-RETAINING AREAS.
5. THIS PLAN IS CONSISTENT WITH THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THE FOLLOWING REPORTS;

- FINAL STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR 9455 TOWNE CENTRE DRIVE OFFICE BUILDING AND PARKING STRUCTURE DATED:
  ORIGINAL: JANUARY 11, 2016
  REVISED: MARCH 18, 2016
- FINAL DRAINAGE STUDY FOR 9455 TOWNE CENTRE DRIVE OFFICE BUILDING AND PARKING STRUCTURE DATED:
  ORIGINAL: JANUARY 11, 2016
  REVISED: MARCH 18, 2016

POST CONSTRUCTION BMPS

1. THE PROJECT IS A PRIORITY DEVELOPMENT PROJECT PER THE CITY'S STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST (DS-560).
2. THE OWNER SHALL MAINTAIN THE LANDSCAPE AREAS.
3. SEE THIS SHEET 2 FOR POST CONSTRUCTION BMP (I.E. BIORETENTION) DETAILS.
4. ALL PERMANENT BMP'S SHALL BE IN COMPLIANCE WITH THE APPROVED SWQMP AND SWMDCMA.

BIO-RETENTION SIZING TABLE SUMMARY

BMP DESCRIPTION	BMP SIZE LENGTH (FT)	WIDTH (FT)	A1 (SF) PROVIDED	V1 (SF) PROVIDED	V2 (SF) PROVIDED	DMA
BIORETENTION 1A	47	6	160	160	96	DMA4
BIORETENTION 1B	44	20	520	520	312	DMA5
BIORETENTION 1C	43	21	630	630	378	DMA6
BIORETENTION 1D	35	13	340	340	204	
BIORETENTION 1E	34	13	350	350	210	
		TOTAL	1,320	1,320	792	
BIORETENTION 1F	61	10	480	480	288	DMA7
BIORETENTION 1G	70	19	950	950	570	DMA8
BIORETENTION 1H	39	21	750	750	450	DMA2
BIORETENTION 1K	48	17	600	600	360	DMA1
BIORETENTION 1L	59	11	500	500	300	
		TOTAL	1,100	1,100	660	
BIORETENTION 1M	33	13	395	395	237	DMA9
BIORETENTION 1N	40	12	460	460	276	
BIORETENTION 1O	41	11	430	430	258	
		TOTAL	1,285	1,285	771	
BIORETENTION 1P	205	15	2,400	2,400	1,440	DMA3
BIORETENTION 1Q	42	14	385	385	231	DMA10
BIORETENTION 1R	42	22	600	600	360	
BIORETENTION 1I	46	22	590	590	354	
BIORETENTION 1J	34	19	380	380	228	
		TOTAL	1,995	1,995	1,173	

NOTE: SEE 39204-8-D FOR BMP SIZING CALCULATIONS

NOTE: SEE 39204-4-D FOR ORIFICE SIZING

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

STEVEN C. KETTLER R.C.E. NO. C48358 DATE
EXP. 6-30-2016

KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

ATTACHMENT 1A - SHEET 3

PRIVATE CONTRACT

DRAINAGE MANAGEMENT AREA PLAN & PRIVATE STORM DRAIN PROFILES FOR:

9455 TOWNE CENTRE DRIVE

PARCEL 3 OF PARCEL MAP NO. 16265

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 9 OF 20 SHEETS

I.O. NO. 24006426
PROJECT NO. 465929

FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KLE			
AS-BUILTS				

1900-6265
NAD83 COORDINATES

260-1705
LAMBERT COORDINATES

CONTRACTOR ______ DATE STARTED ______
INSPECTOR ______ DATE COMPLETED ______

39204-9 -D

Attachment 1c

<table>
<tr><th colspan="2">Harvest and Use Feasibility Checklist</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?
☒ Toilet and urinal flushing
☐ Landscape irrigation
☐ 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.
[Provide a summary of calculations here]

For the proposed office building, the demand is based on the number of employees and their usage from attached Table B.3-1. Per the architect the maximum employees is estimated at 750. Table B.3-1 lists 7 gallons per employee. The demand is 750 x 7 = 5,250 gallons or 702 cubic feet. The demand is less than 25 percent of the DCV (25% DCV = 1,149 cubic feet). Therefore, harvest and use is considered to be infeasible.</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.
DCV = 4,595 (cubic feet) See attached for DCV analysis.</td></tr>
<tr><td>3a. Is the 36 hour demand greater than or equal to the DCV?
☐ Yes / ☐ No ⇨
⇩</td><td>3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?
☐ Yes / ☐ No ⇨
⇩</td><td>3c. Is the 36 hour demand less than 0.25DCV?
☒ 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?
☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☐ No, select alternate BMPs.</td></tr>
</table>

Table B.3-1: Toilet and Urinal Water Usage per Resident or Employee

Land Use Type	Toilet User Unit of Normalization	Per Capita Use per Day		Visitor Factor[4]	Water Efficiency Factor	Total Use per Resident or Employee
		Toilet Flushing[1,2]	Urinals[3]			
Residential	Resident	18.5	NA	NA	0.5	9.3
Office	Employee (non-visitor)	9.0	2.27	1.1	0.5	7 (avg)
Retail	Employee (non-visitor)	9.0	2.11	1.4	0.5	
Schools	Employee (non-student)	6.7	3.5	6.4	0.5	33
Various Industrial Uses (excludes process water)	Employee (non-visitor)	9.0	2	1	0.5	5.5

[1]Based on American Waterworks Association Research Foundation, 1999. Residential End Uses of Water. Denver, CO: AWWARF

[2]Based on use of 3.45 gallons per flush and average number of per employee flushes per subsector, Table D-1 for MWD (Pacific Institute, 2003)

[3]Based on use of 1.6 gallons per flush, Table D-4 and average number of per employee flushes per subsector, Appendix D (Pacific Institute, 2003)

[4]Multiplied by the demand for toilet and urinal flushing for the project to account for visitors. Based on proportion of annual use allocated to visitors and others (includes students for schools; about 5 students per employee) for each subsector in Table D-1 and D-4 (Pacific Institute, 2003)

[5]Accounts for requirements to use ultra-low flush toilets in new development projects; assumed that requirements will reduce toilet and urinal flushing demand by half on average compared to literature estimates. Ultra low flush toilets are required in all new construction in California as of January 1, 1992. Ultra low flush toilets must use no more than 1.6 gallons per flush and Ultra low flush urinals must use no more than 1 gallon per flush. Note: If zero flush urinals are being used, adjust accordingly.

B.3.2.2 General Requirements for Irrigation Demand Calculations

The following guidelines should be followed for computing harvested water demand from landscape irrigation:

- If reclaimed water is planned for use for landscape irrigation, then the demand for harvested storm water should be reduced by the amount of reclaimed water that is available during the wet season.
- Irrigation rates should be based on the irrigation demand exerted by the types of landscaping that are proposed for the project, with consideration for water conservation requirements.
- Irrigation rates should be estimated to reflect the average wet season rates (defined as November through April) accounting for the effect of storm events in offsetting harvested water demand. In the absence of a detailed demand study, it should be assumed that irrigation demand is not present during days with greater than 0.1 inches of rain and the subsequent 3-day period. This irrigation shutdown period is consistent with standard practice in land application of wastewater and is applicable to storm water to prevent irrigation from resulting in dry weather runoff. Based on a statistical analysis of San Diego County rainfall patterns, approximately 30 percent of wet season days would not have a demand for irrigation.

Worksheet B.2-1 DCV

	Design Capture Volume	Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52 3.58	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.68 0	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	4,59 5	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

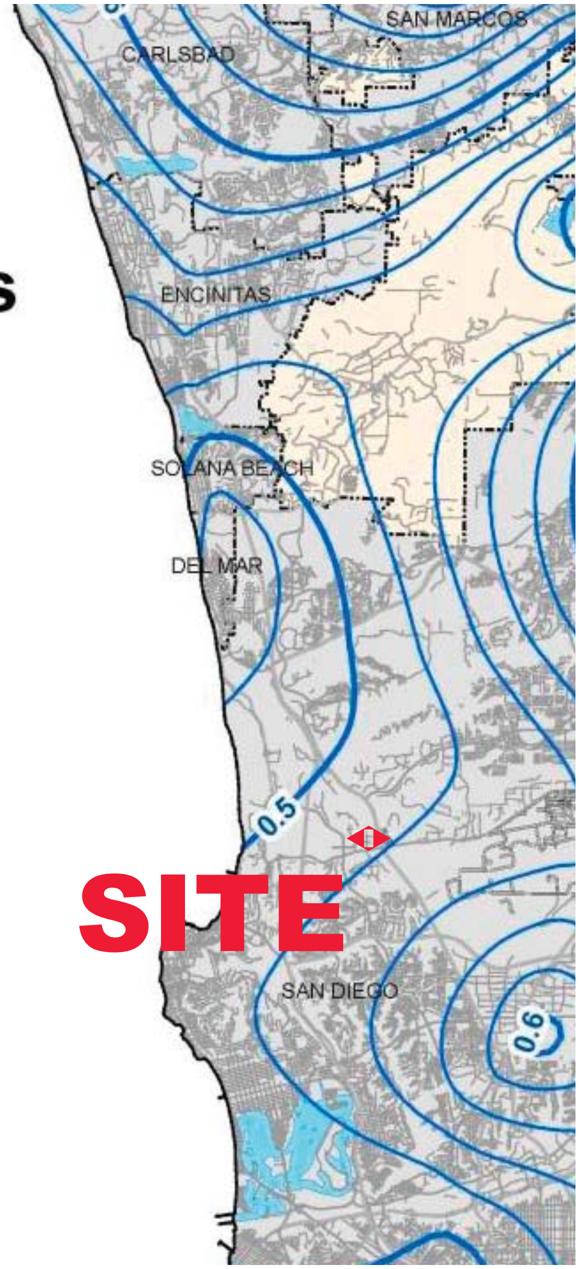
San Diego County
85 th Percentile Isopluvials

Legend

85th PERCENTILE ISOPLUVIAL

INCORPORATED CITY

NOTE:
The 85th percentile is a 24 hour rainfall total. It represetns a value such that 85% of the observed 24 hour rainfall totals will be less than that value.



PRECIPITATION = 0.52"

EXCERPT FROM FIGURE B.1-1

Attachment 1d

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
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:

a minimum factor of safety of 2 applied. Borehole percolation testing was performed at 5 locations on the site within or adjacent to the proposed infiltration basins in accordance with Appendix D of the City of San Diego BMP
design manual. In addition, a comprehensive evaluation of the site was conducted in accordance to Appendix C.
2.
Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Criteria	Screening Question	Yes	No
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:

The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated geotechnical hazards that cannot be mitigated to an acceptable level is not applicable.

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 is the same as Form I-8.

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: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated risk of groundwater contamination that cannot be mitigated to an acceptable level is not applicable. 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: The response to Criteria #1 - #3 is No, therefore full infiltration is not feasible and Criteria #4 is "N/A" --- Kettler Leweck Engineering 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 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		No

*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 City of San Diego BMP Design Manual, Appendix C and Appendix D, do not provide values considered for appreciable rates. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we answered yes to this screening question as directed by the reviewer. Measured infiltration rates varied from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study.

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:

In our opinion, any long term infiltration at the site will result in geotechnical hazards which cannot be mitigated to an acceptable level. Based on our comprehensive evaluation in accordance to Appendix C.2, the anticipated geotechnical hazards are outlined below:

C.2.6 Retaining Walls and Foundations

1. Damaging post construction differential settlements of up to 2 inches for the proposed office building and parking structure.
2. Damaging post construction yielding of the permanent tied-back and soil nail walls.
3. Increase in lateral pressures and reduction of soil strength of the permanent shoring wall and surfacing seepage in the slope that descends to the lower existing development to the south.

C.2.4 Utility Considerations

Water intrusion into existing utility lines and vaults both on-site and off-site including the adjacent public streets (Judicial Drive and Towne Centre Drive) and existing development which bounds the southern property boundary at a lower elevation.

Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study.

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.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	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.		
Provide basis: In review of our "Report of Preliminary Geotechnical Investigation" dated December 15, 2015, groundwater was not encountered to a depth of 38.5 feet below existing ground surface. Although groundwater was not encountered to the aforementioned depth, the risk for groundwater related concerns include shallow perched seepage due to the practically impermeable dense to very dense nature of the formational soils across the site. Based on our comprehensive evaluation in accordance to Appendix C.3, the anticipated risk for groundwater related concerns are outlined below: C.3.7 Other Factors Inadequate proper infiltration durations and treatment of shallow perched seepage runoff on the adjacent slopes migrating to adjacent properties potentially transporting storm water pollutants or other factors. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study 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.			
8	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.		
Provide basis: The response to Criteria #6 and #7 is No, therefore partial infiltration is not feasible and Criteria #8 is "N/A" --- Kettler Leweck Engineering 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.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. 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.		No

*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

ATTACHMENT 1e
POLLUTANT CONTROL BMP DESIGN

Pollutant control BMPs were selected to treat the project's pollutants of concern identified on Form I-3B. A series of ten biofiltration basins (see the Attachment 1a/b exhibit – Drainage Management Area Plan) were used because they have a high pollutant removal efficiency for the project's pollutants of concern. Some of the biofiltration basins are interconnected with dual 4" PVC pipes to form a single overall basin that meets the sizing requirements. The biofiltration basins contain overflow catch basins set 12" above the basin floor to convey the flow rates in excess of the water quality flows.

The biofiltration basin sizing has been performed in accordance with the City's 2016 *Storm Water Standards, Part 1: BMP Design Manual - Appendices*. The design capture volume (DCV) to each biofiltration basin was determined first (see attached tables). The design capture volume is the 24-hour, 85th percentile storm volume at the site, which is determined by multiplying the 24-hour, 85th percentile precipitation by the average runoff factor and tributary area. The 24-hour, 85th percentile precipitation is 0.52 inches (see Attachment 1c). The average runoff factor was determined from the pervious and impervious areas from the DMA Plan. The average runoff factor is the total impervious area multiplied by a runoff factor of 1.0 plus the pervious area multiplied by a runoff factor of 0.1 divided by the total area, i.e., C = [(impervious area × 1.0) + pervious area × 0.1)] ÷ total area.

After the DCV is determined for each the ten DMAs, each biofiltration basin is sized using Worksheet B.5-1 from the BMP Design Manual. The sizing of each basin using the worksheet is attached. As mentioned above, some of biofiltration basins consist of individual biofiltration areas interconnected by dual 4" PVC pipes to meet the overall area requirement.

The biofiltration sizing is then compared against the hydromodification sizing in Attachment 2, and the most conservative sizing is used. Table 1 summarizes the sizing for each basin.

BIO-RETENTION SIZING TABLE SUMMARY						
BMP DESCRIPTION	BMP SIZE		A1 (SF)	V1 (SF)	V2 (SF)	DMA
	LENGTH (FT)	WIDTH (FT)	PROVIDED	PROVIDED	PROVIDED	
BIORETENTION 1A	47	6	160	160	96	DMA4
BIORETENTION 1B	44	20	520	520	312	DMA5
BIORETENTION 1C	43	21	630	630	378	DMA6
BIORETENTION 1D	35	13	340	340	204	
BIORETENTION 1E	34	13	350	350	210	
		TOTAL	1,320	1,320	792	
BIORETENTION 1F	61	10	480	480	288	DMA7
BIORETENTION 1G	70	19	950	950	570	DMA8
BIORETENTION 1H	39	21	750	750	450	DMA2
BIORETENTION 1K	48	17	600	600	360	DMA1
BIORETENTION 1L	59	11	500	500	300	
		TOTAL	1,100	1,100	660	
BIORETENTION 1M	33	13	395	395	237	DMA9
BIORETENTION 1N	40	12	460	460	276	
BIORETENTION 1O	41	11	430	430	258	
		TOTAL	1,285	1,285	771	
BIORETENTION 1P	205	15	2,400	2,400	1,440	DMA3
BIORETENTION 1Q	42	14	385	385	231	DMA10
BIORETENTION 1R	42	22	600	600	360	
BIORETENTION 1I	46	22	590	590	354	
BIORETENTION 1J	34	19	380	380	228	
		TOTAL	1,995	1,995	1,173	

Note: The DMAs correspond to the attached calculation sheets.

Table 1. BMP Sizing Summary

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and the following equation.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x = Runoff factor for area X

A_x = Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.

[2]Surface shall be designed in accordance with SD-4 (Amended soils) fact sheet in Appendix E

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.42 0.77	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	614	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 1

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.5	inches
2	Area tributary to BMP (s)	A=	2 0.0	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	7 0.6	unitless
4	Trees Credit Volume	TCV=	4	cubic-feet
5	Rain barrels Credit Volume	RCV=	0 0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	91	cubic-feet

Biofiltration Basin 2

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52 0.94	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	1,27 5	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 3

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.5	inches
2	Area tributary to BMP (s)	A=	2 0.0	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	7 0.6	unitless
4	Trees Credit Volume	TCV=	1	cubic-feet
5	Rain barrels Credit Volume	RCV=	0 0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	75	cubic-feet

Biofiltration Basin 4

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.12 0.53	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	122	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 5

Worksheet B.2-1 DCV

	Design Capture Volume	Worksheet B.2-1		
1	85^{th} percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.59 0.64	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	721	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 6

Worksheet B.2-1 DCV

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=	0.13	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.33	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	79	cubic-feet

Biofiltration Basin 7

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.31 0.49	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	290	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 8

Worksheet B.2-1 DCV

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=	0.42	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.84	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	668	cubic-feet

Biofiltration Basin 9

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=	0.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.50 0.70	unitless
4	Trees Credit Volume	TCV=	0 0	cubic-feet
5	Rain barrels Credit Volume	RCV=	662	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

Biofiltration Basin 10

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	614	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 1

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	921	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	219	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]	460	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	271	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	18,398	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.77	
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]	425	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	425	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	91	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 2

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	136	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	32	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]	68	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	40	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	3,261	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.64	
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]	63	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	63	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	1,275	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 3

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	1,912	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	455	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]	956	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	562	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	40,729	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.72	
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]	882	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	882	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

	Simple Sizing Method for Biofiltration BMPs	Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	75	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 4

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	113	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	27	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]	57	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	33	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	2,876	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.61	
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]	52	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	52	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	122	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 5

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	183	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	43	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]	91	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	54	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	5,268	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.53	
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]	84	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	84	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	721	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 6

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	1,082	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	258	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]	541	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	318	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	25,915	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.64	
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]	499	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	499	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	79	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 7

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	119	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	28	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]	59	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	35	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	5,597	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.33	
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]	55	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	55	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	290	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 8

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	435	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	104	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]	218	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	128	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	13,637	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
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]	201	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	201	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	668	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 9

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	1,002	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	239	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]	501	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	295	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	18,271	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.84	
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]	462	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	462	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	662	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	N/A	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]	N/A	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	N/A	inches
7	Assumed surface area of the biofiltration BMP	N/A	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	N/A	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	N/A	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	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	12	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	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)]	20.4	inches
19	Total Depth Treated [Line 17 + Line 18]	50.4	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)

Biofiltration Basin 10

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	993	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	236	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]	496	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	292	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	21,804	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.70	
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]	458	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	458	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]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes ☐ No N/A	

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.

Project Name: 9455 Towne Centre Drive

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	× Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	× Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	○ Not Performed ○ Included ◉ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	◉ Included ○ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ◉ Not required because BMPs will drain in less than 96 hours

HYDROMODIFICATION CONTROL BMP DESIGN

The DMA Plan in Attachment 1a/b shows the hydromodification management elements.

Attachment 2b shows that there are no Critical Coarse Sediment Yield Areas on-site. The current site is fully developed, so natural coarse sediment is not expected.

The sizing must meet both the pollutant control (from Attachment 1e) and hydromodification sizing requirements, i.e., it must be designed for the larger of the two sizing results. Hydromodification sizing was performed using the County of San Diego's BMP Sizing Spreadsheet (attached). The DMA Plan shows the ten DMA areas. The project is in the Oceanside rain gauge, Soil Group D, and the low flow threshold is based on $0.5Q_2$ due to Chang Consultants' approved report, *Hydromodification Screening for Kilroy Realty Corporation Office Building & Parking Structure, 9455 Towne Centre Drive.* The BMP Sizing Spreadsheet results are attached. Comparison of the pollutant control and hydromodification results for each biofiltration basin reveals that hydromodification sizing governs in all cases. The sizes on the plans meet or exceed the hydromodification requirements. See Table 1 in Attachment 1e for a summary of the basin sizes.

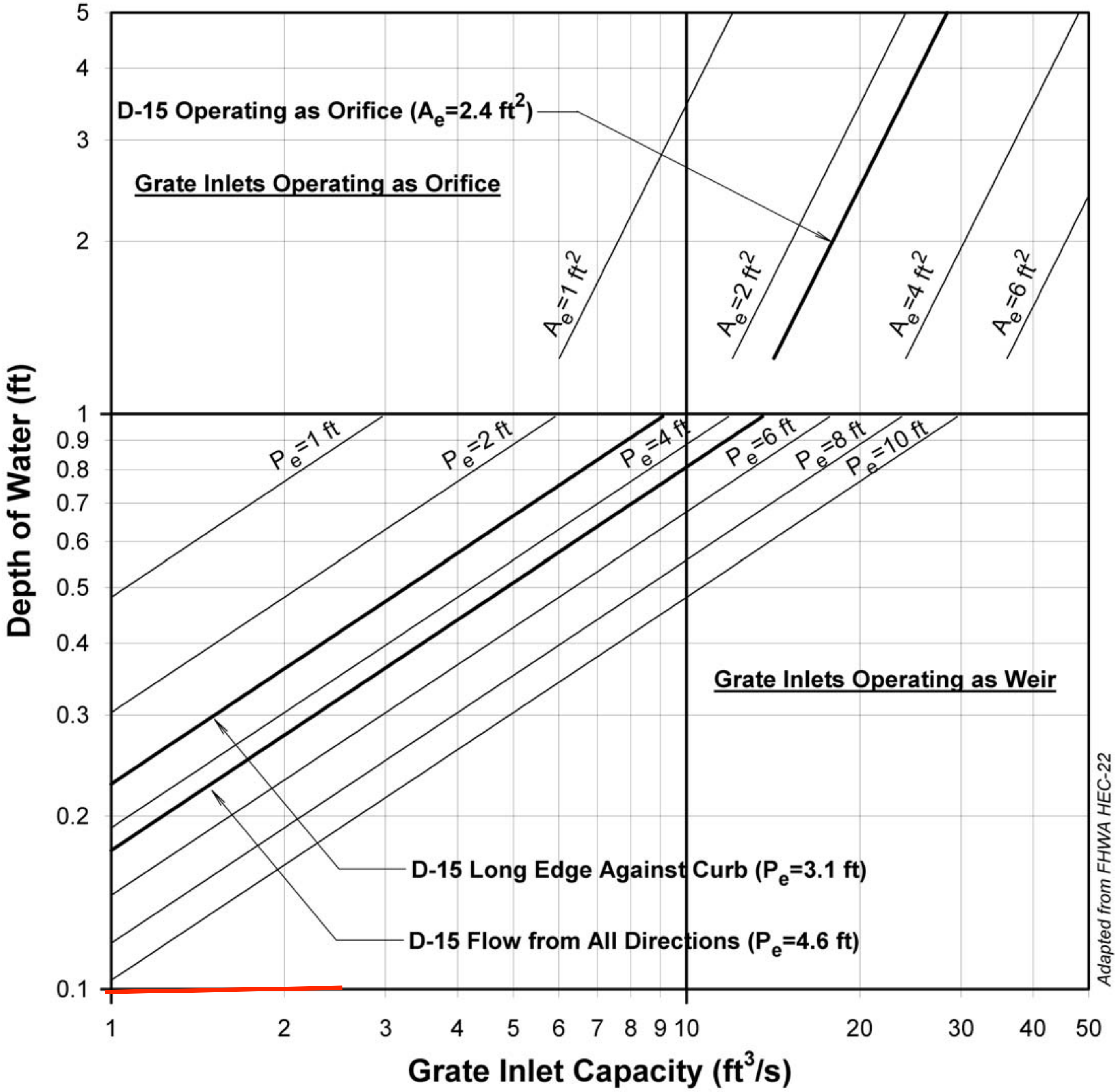
The project footprint contains one self-treating area at the northeast corner of the site (see the DMA Plan). This area is entirely pervious with landscaping and its runoff will enter a storm drain system and be conveyed off-site. Therefore, this area meets the definition of a self-treating area and additional BMPs are not needed.

Attachment 2b

The project site is in yellow and critical coarse sediment yield areas are in re
There are no CCSYA's at the site.

Figure 2-7

Attachment 2d



iltration basin contains a 24"x24" Brooks Box set 1 foot above the basin floor for 50-
This chart represents the highest 50-year flow rate (2.5 cfs) at a biofiltration basi
that the water will pond approximately 0.29 feet above the grated inlet (assumes the
50% clogged). The basins are designed for this ponded depth.
wing pages from the BMP Sizing Spreadsheet show that the maximum drawdown time of
is met.

Figure 2-7 Capacity of Grate Inlets in Sump Locations

BMP Sizing Spreadsheet V1.04

Project Name:	9455 Towne Centre Dr
Project Applicant:	Kilroy Realty Corp.
Jurisdiction:	City of San Diego
Parcel (APN):	343-122-16
Hydrologic Unit:	San Diego
Rain Gauge:	Oceanside
Total Project Area (sf):	155756
Channel Susceptibility:	Low

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 1	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	15409	D	Flat	Impervious	1.0	0.07	0.0583	0.042	1079	898	647
Pervious	2989	D	Flat	Pervious	0.1	0.07	0.0583	0.042	21	17	13
Total BMP Area	18398										
								Minimum BMP Size	1099.553	916	660
								Proposed BMP Size*	1100	1100	660
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.99	in	
								Maximum Ponding Depth	138.83	in	
								Selected Ponding Depth	12.00	in	

Describe the BMP's in sufficient detail in your SWMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This Sizing Calculator has been developed in compliance with the Countywide Model SUSMP. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 1	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.354	0.031	**0.76**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.069	0.006	**0.15**

0.037	**0.90**	**1.07**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.037	**0.90**	**1.07**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	8.3

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 2	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	2210	D	Flat	Impervious	1.0	0.07	0.0583	0.042	155	129	93
Pervious	1051	D	Flat	Pervious	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	3261										
								Minimum BMP Size	162.057	135	97
								Proposed BMP Size*	750	750	450
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	2.16	in	
								Maximum Ponding Depth	36.02	in	
								Selected Ponding Depth	12.00	in	

Describe the BMP's in sufficient detail in your SWMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

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Designated Staff have final review and approval authority over the project design.

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 2	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.051	0.004	**0.11**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.024	0.002	**0.05**

0.007	**0.16**	**0.45**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.007	**0.16**	**0.45**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	32.0

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	DMA 3	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	31679	D	Flat	Impervious	1.0	0.07	0.0583	0.042	2218	1847	1331
Pervious	9050	D	Flat	Pervious	0.1	0.07	0.0583	0.042	63	53	38
Total BMP Area	40729										
								Minimum BMP Size	2280.88	1900	1369
								Proposed BMP Size*	2400	2400	1440
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.50	in	
								Maximum Ponding Depth	140.51	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	DMA 3	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.727	0.064	**1.55**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.208	0.018	**0.44**

0.082	**2.00**	**1.59**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.081	**1.99**	**1.59**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	8.2

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 4	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	1817	D	Flat	Impervious	1.0	0.07	0.0583	0.042	127	106	76
Pervious	1059	D	Flat	Pervious	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	2876										
								Minimum BMP Size	134.603	112	81
								Proposed BMP Size*	160	160	96
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		8.41	in
								Maximum Ponding Depth		147.06	in
								Selected Ponding Depth		12.00	in

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 4	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - %Q_2 (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.042	0.004	**0.09**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.024	0.002	**0.05**

0.006	**0.14**	**0.42**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.006	**0.14**	**0.42**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	7.8

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 5	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	2853	D	Flat	Impervious	1.0	0.07	0.0583	0.042	200	166	120
Pervious	2415	D	Flat	Pervious	0.1	0.07	0.0583	0.042	17	14	10
Total BMP Area	5268										
								Minimum BMP Size	216.615	180	130
								Proposed BMP Size*	520	520	312
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	4.16	in	
								Maximum Ponding Depth	83.34	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 5	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.065	0.006	**0.14**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.055	0.005	**0.12**

0.011	**0.26**	**0.57**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.010	**0.26**	**0.57**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	13.8

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 6	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	17562	D	Flat	Impervious	1.0	0.07	0.0583	0.042	1229	1024	738
Pervious	8353	D	Flat	Pervious	0.1	0.07	0.0583	0.042	58	49	35
Total BMP Area	25915							Minimum BMP Size	1287.811	1073	773
								Proposed BMP Size*	1320	1320	792
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.75	in	
								Maximum Ponding Depth	162.99	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 6	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.403	0.035	**0.86**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.192	0.017	**0.41**

0.052	**1.27**	**1.27**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.052	**1.27**	**1.27**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	7.1

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 7	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	1583	D	Flat	Impervious	1.0	0.07	0.0583	0.042	111	92	66
Pervious	4014	D	Flat	Pervious	0.1	0.07	0.0583	0.042	28	23	17
Total BMP Area	5597										
								Minimum BMP Size	138.908	116	83
								Proposed BMP Size*	480	480	288
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	2.89	in	
								Maximum Ponding Depth	96.74	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 7	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.036	0.003	**0.08**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.092	0.008	**0.20**

0.011	**0.27**	**0.59**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.011	**0.27**	**0.59**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	11.9

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 8	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	6662	D	Flat	Impervious	1.0	0.07	0.0583	0.042	466	388	280
Pervious	6975	D	Flat	Pervious	0.1	0.07	0.0583	0.042	49	41	29
Total BMP Area	13637							Minimum BMP Size	515.165	429	309
								Proposed BMP Size*	950	950	570
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	5.42	in	
								Maximum Ponding Depth	118.84	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 8	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.153	0.013	**0.33**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.160	0.014	**0.34**

0.027	**0.67**	**0.92**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.027	**0.66**	**0.92**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	9.7

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 9	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	16981	D	Flat	Impervious	1.0	0.07	0.0583	0.042	1189	990	713
Pervious	1290	D	Flat	Pervious	0.1	0.07	0.0583	0.042	9	8	5
Total BMP Area	18271							Minimum BMP Size	1197.7	998	719
								Proposed BMP Size*	1285	1285	771
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	9.32	in	
								Maximum Ponding Depth	118.85	in	
								Selected Ponding Depth	12.00	in	

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BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 9	BMP Type:	Flow-Through Planter

DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - %Q_2 (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.390	0.034	**0.83**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.030	0.003	**0.06**

0.037	**0.90**	**1.07**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.037	**0.90**	**1.07**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	9.7

BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name:	BMP 10	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
Impervious	16362	D	Flat	Impervious	1.0	0.07	0.0583	0.042	1145	954	687
Pervious	5442	D	Flat	Pervious	0.1	0.07	0.0583	0.042	38	32	23
Total BMP Area	21804										
								Minimum BMP Size	1183.434	986	710
								Proposed BMP Size*	1955	1955	1173
								Soil Matrix Depth	18.00	in	
								Minimum Ponding Depth	6.05	in	
								Maximum Ponding Depth	93.40	in	
								Selected Ponding Depth	12.00	in	

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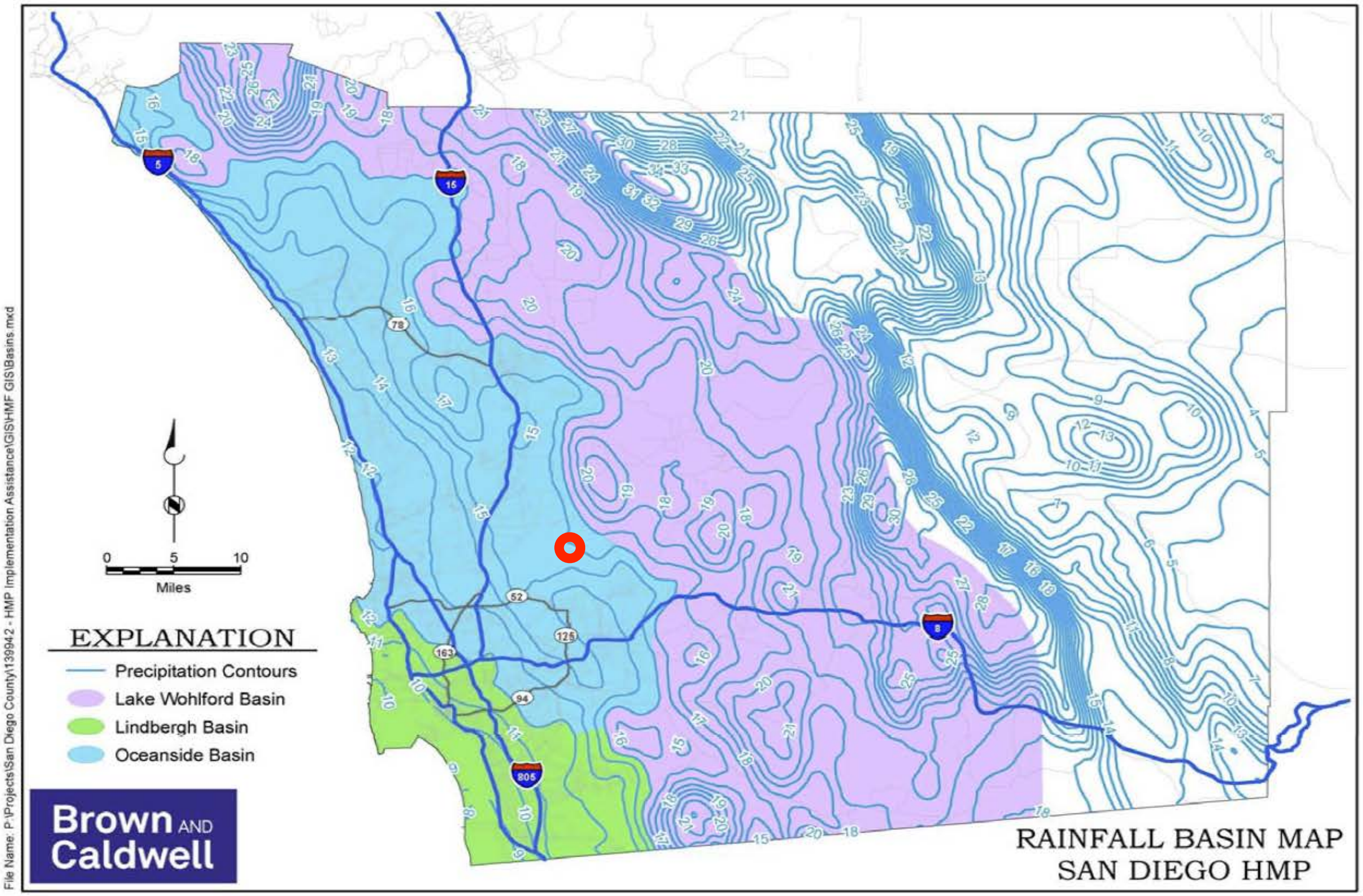
BMP Sizing Spreadsheet V1.04			
Project Name:	9455 Towne Centre Dr	Hydrologic Unit:	San Diego
Project Applicant:	Kilroy Realty Corp.	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	155756
Parcel (APN):	343-122-16	Low Flow Threshold:	0.5Q2
BMP Name	BMP 10	BMP Type:	Flow-Through Planter

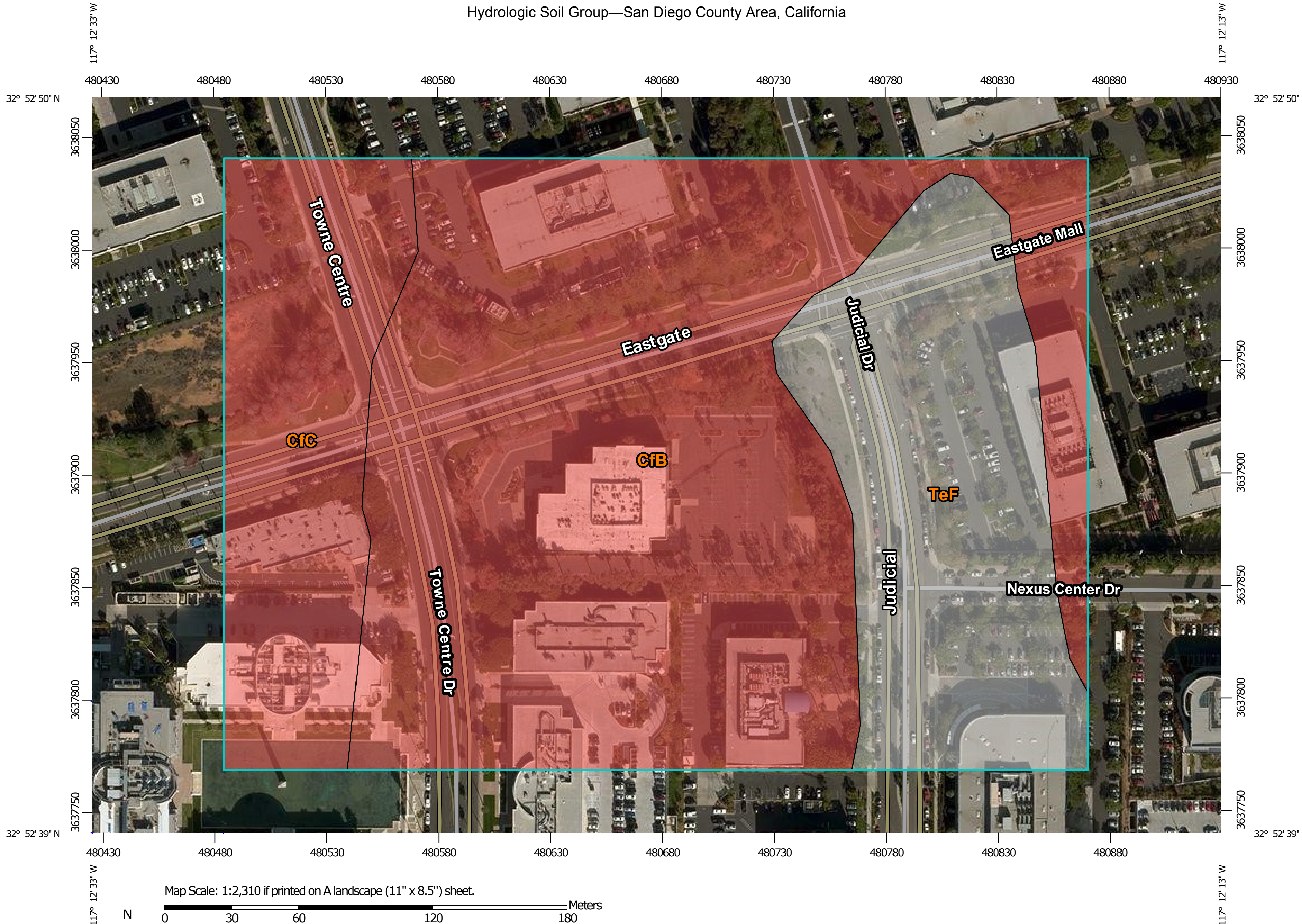
DMA Name	Rain Gauge	Existing Condition			Q2 Sizing Factor (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	**Orifice Area (in2)**
		Soil Type	Cover	Slope				
Impervious	Oceanside	D	Scrub	Flat	0.175	0.376	0.033	**0.80**
Pervious	Oceanside	D	Scrub	Flat	0.175	0.125	0.011	**0.27**

0.044	**1.07**	**1.17**
Tot. Allowable Orifice Flow (cfs)	**Tot. Allowable Orifice Area (in2)**	**Max Orifice Diameter (in)**

0.044	**1.08**	**1.17**
Actual Orifice Flow (cfs)	Actual Orifice Area (in2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	12.3


EXPLANATION
Precipitation Contours
Lake Wohlford Basin
Lindbergh Basin
Oceanside Basin
0 5 10
Miles
Brown AND Caldwell
File Name: P:\Projects\San Diego County\139942 - HMP Implementation Assistance\GIS\HMF GIS\Basins.mxd
RAINFALL BASIN MAP
SAN DIEGO HMP



Map Scale: 1:2,310 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CfB	Chesterton fine sandy loam, 2 to 5 percent slopes	D	15.6	59.7%
CfC	Chesterton fine sandy loam, 5 to 9 percent slopes	D	4.6	17.6%
TeF	Terrace escarpments		5.9	22.7%
Totals for Area of Interest			**26.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Project Name: 9455 Towne Centre Drive

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	× Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	◉ Included ○ Not Applicable

ATTACHMENT 3a
STRUCTURAL BMP MAINTENANCE

The project proposes biofiltration basins for its structural BMPs. Some of the biofiltration basins are interconnected with dual 4" PVC pipes to form a single overall basin that meets the sizing requirements. The biofiltration basins contain 24” by 24” overflow catch basins (Brooks Box 2424 parkway grate) set 12" above the basin floor to convey the flow rates in excess of the water quality flows.

Biofiltration basins are shallow, vegetated basins underlain by an engineered soil media and gravel. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the BMP from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter.

The landscape maintenance staff shall inspect each basin during routine weekly landscaping maintenance visits. Access will be from adjacent walkways, landscape areas, or paved areas. The vegetation shall be replanted, trimmed, pruned, removed, as needed, to maintain proper coverage and growth. The irrigation system shall be maintained, as needed. The drainage overflow from the basins and interconnecting dual 4” PVC pipes shall be inspected monthly and after large storm events. Debris, sediment, and other obstructions shall be removed immediately from each basin, its outlet, and the interconnecting pipes. The infiltration rate shall be reviewed during storm events and the underlying soil/gravel shall be replaced as needed to maintain the required drawdown time.

E.12 BF-1 Biofiltration

Photo Credit: San Diego Low Impact Development Design Manual

MS4 Permit Category
Biofiltration

BMP Manual Category
Biofiltration

Applicable Performance Standard
Pollutant Control
Flow Control

Primary Benefits
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation (Optional)

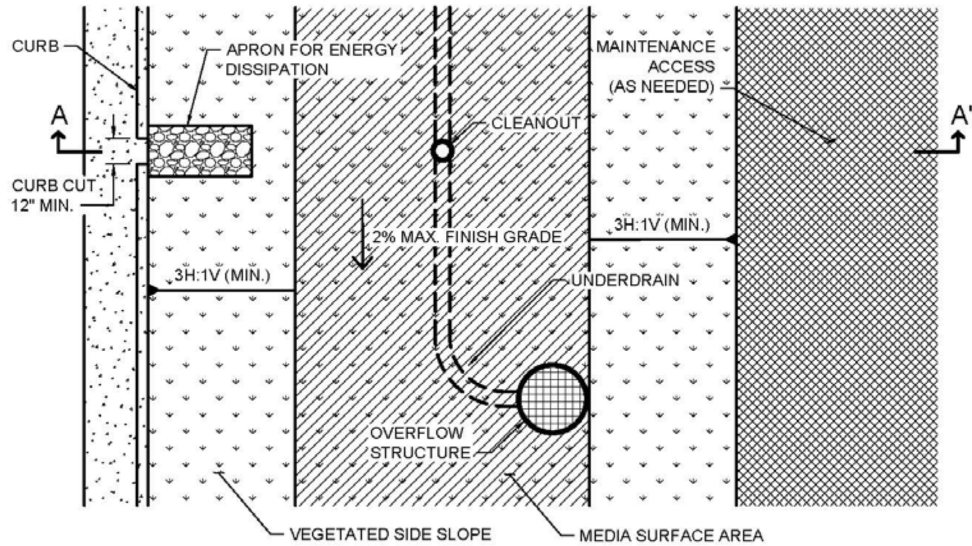
Description

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.

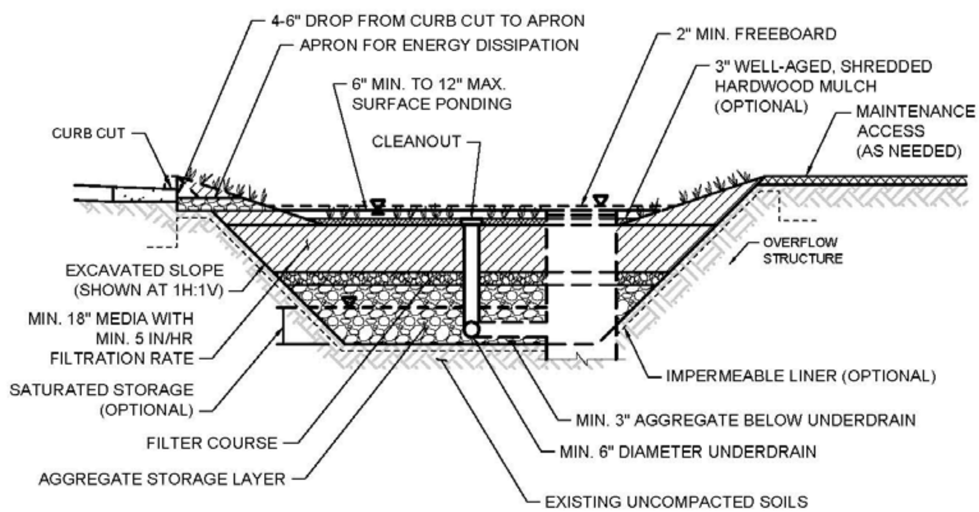
Typical bioretention with underdrain components include:

- 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 (Optional)
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course 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



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Design Adaptations for Project Goals

Biofiltration Treatment BMP for storm water pollutant control. The system is lined or unlined 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:

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)	Higher ratios increase the potential for clogging
☐	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.
Surface Ponding		
☐	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hour for plant health
☐	Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns.

☐	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.15	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 (Optional)		
☐	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		
☐	Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. A minimum initial filtration rate of 10 in/hr is recommended.	A high filtration rate through the media minimized clogging potential and allows flows to quickly enter the aggregate storage layer, thereby minimizing bypass.
☐	Media is a minimum 18 inches deep, meeting either of these two media specifications: City of San Diego Low Impact Development Design Manual, July 2011 (page B-18) or County of San Diego Low Impact Development Handbook, June 2014: Appendix G -Bioretention Soil Specification	A deep media layer provides additional filtration and supports plants with deeper roots.
☐	Media surface area is 3% of tributary impervious area or greater.	Greater surface area to tributary area ratios decrease loading rates per square foot and therefore increase longevity.
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. Filter fabric is more likely to clog.
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☐	Filter course calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
Aggregate Storage Layer		
☐	Class 2 Permeable per Caltrans specification 68-1.025 is recommended for the storage layer. Washed, open-graded crushed rock may be used, however a 4-6 inch washed pea gravel filter course layer at the top of the crushed rock is required.	Washing aggregate will help eliminate fines that could clog the aggregate storage layer void spaces or subgrade.
☐	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 6 inches	Smaller diameter underdrains are prone to clogging.
☐	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 6-inch diameter and lockable cap is placed every 250 to 300 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.

THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

Kilroy Realty, L.P.

3661 Valley Center Drive, Suite 250

San Diego, CA 92130

DRAFT - FOR REFERENCE ONLY

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
1642330	343-122-16	465929

This agreement is made by and between the City of San Diego, a municipal corporation [City] and Kilroy Realty, L.P., a Delaware Limited Partnership,

the owner or duly authorized representative of the owner [Property Owner] of property located at
9455 Towne Centre Drive, San Diego, CA 92121
(Property Address)

and more particularly described as: Parcel 3 of Parcel Map 16265
(Legal Description of Property)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Water Quality Technical Report [WQTR] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): Grading Plan 39204-D.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): Grading Plan 39204-D.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): 39204-D.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) 39204-D.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): 'A', 'B', 'C', 'D', & 'E'

____
(Owner Signature)

Robert Little, Senior VP Development
(Print Name and Title)

Kilroy Realty, L.P.
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control Engineer Signature)

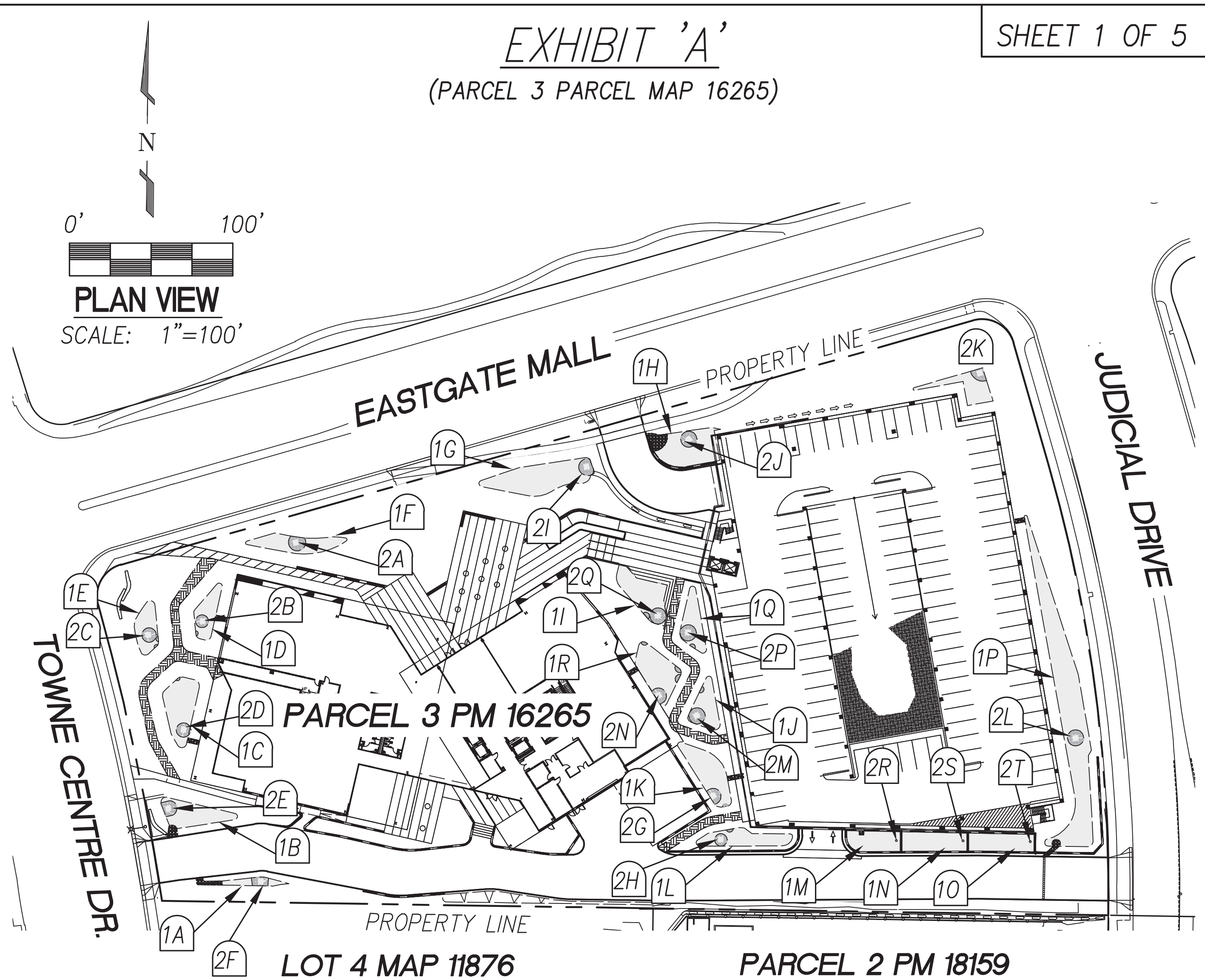
____
(Print Name)

____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.

EXHIBIT 'A'

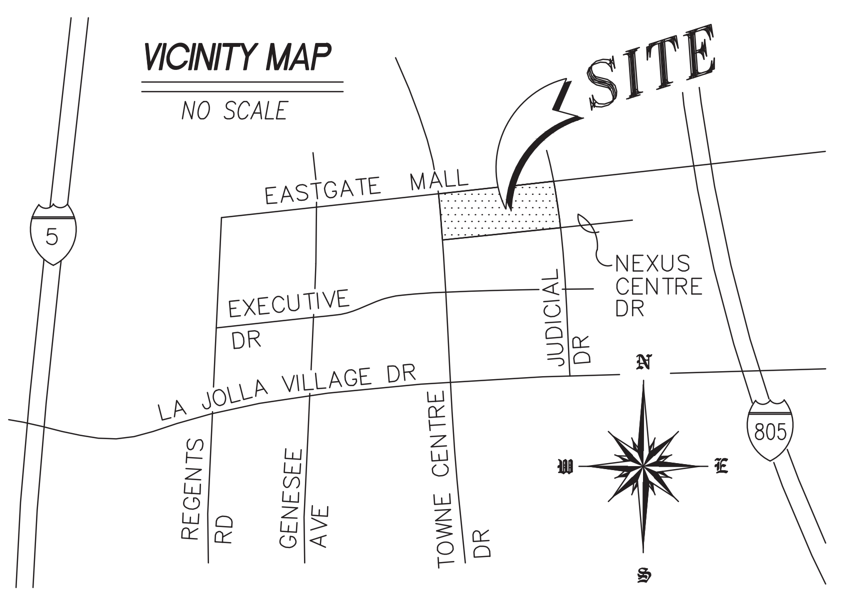
(PARCEL 3 PARCEL MAP 16265)



LEGEND

1# BIORETENTION BASIN (SEE EXHIBIT "D" FOR DETAIL) (SEE EXHIBIT "E" FOR TABLE)

2# ORIFICE DESIGNATION (SEE EXHIBIT "D" FOR DETAIL AND TABLE)



KETTLER LEWECK ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

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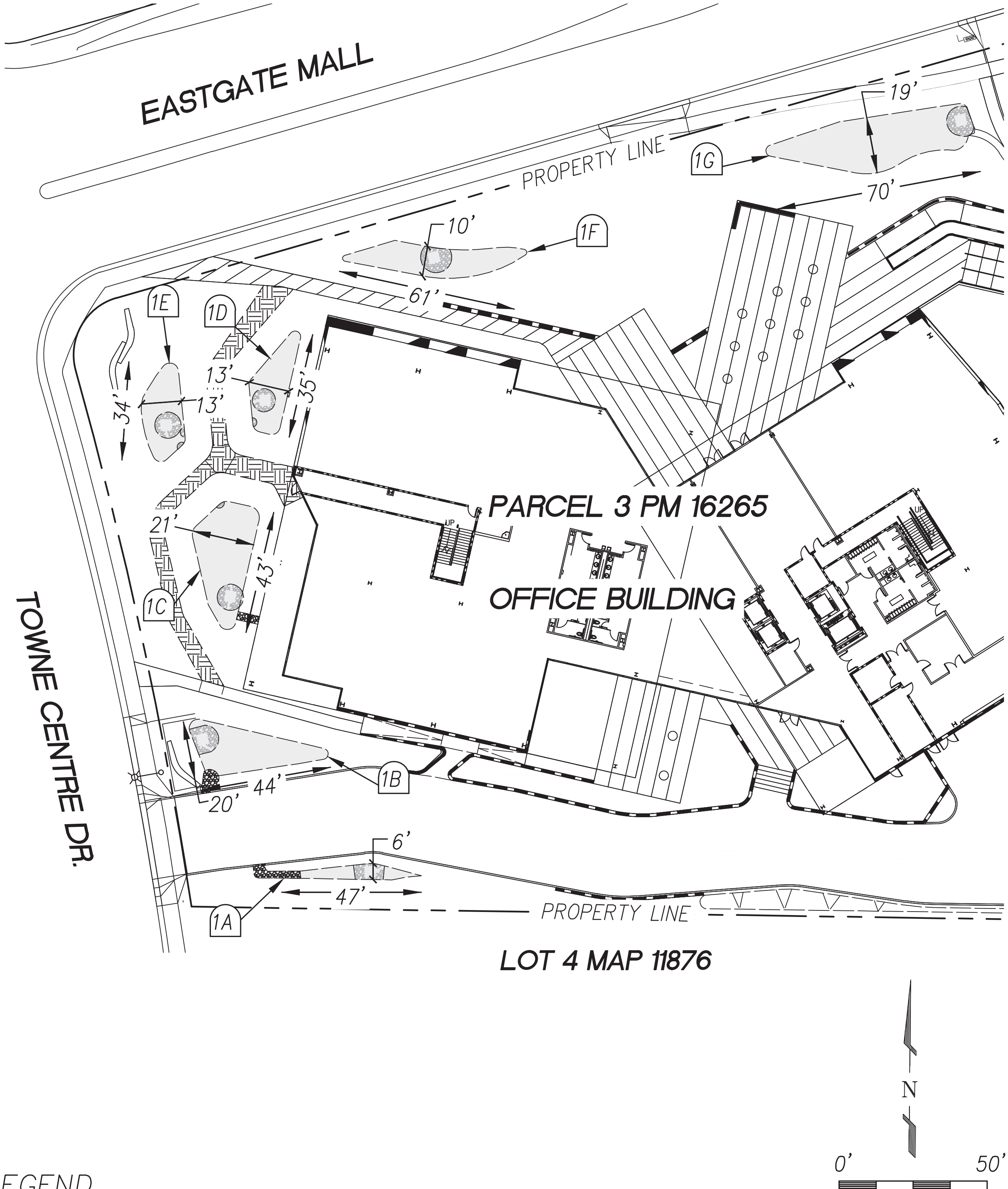
EXHIBIT 'B'

(PARCEL 3 PARCEL MAP 16265)



PLAN VIEW

SCALE: 1"=50'

LEGEND

1# BIORETENTION BASIN
(SEE EXHIBIT "D" FOR DETAIL)

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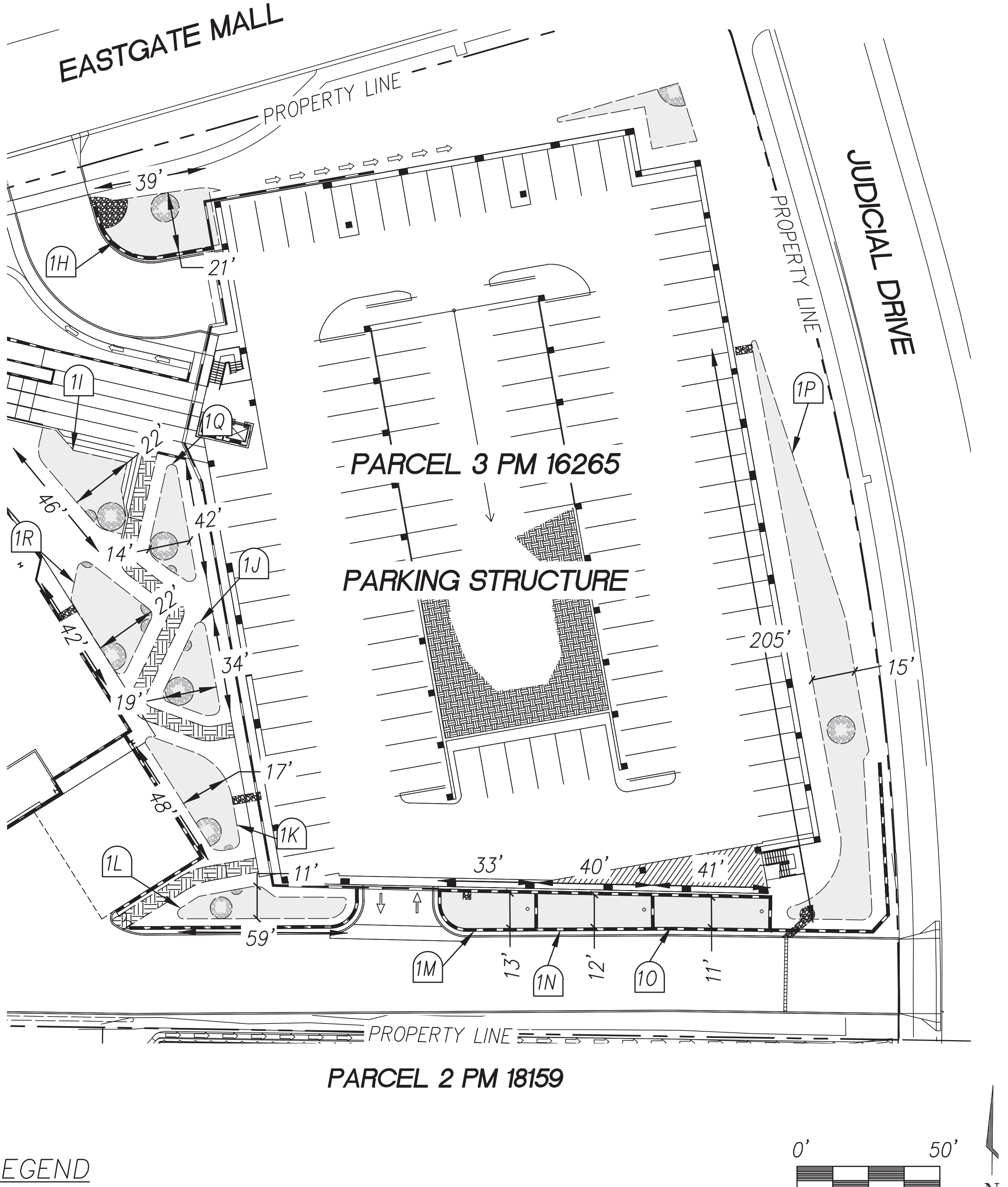
EXHIBIT 'C'

(PARCEL 3 PARCEL MAP 16265)



LEGEND

1# BIORETENTION BASIN
(SEE EXHIBIT "D" FOR DETAIL)

DRAFT - FOR REFERENCE ONLY

EXHIBIT 'D'

(PARCEL 3 PARCEL MAP 16265)

BIORETENTION NOTES

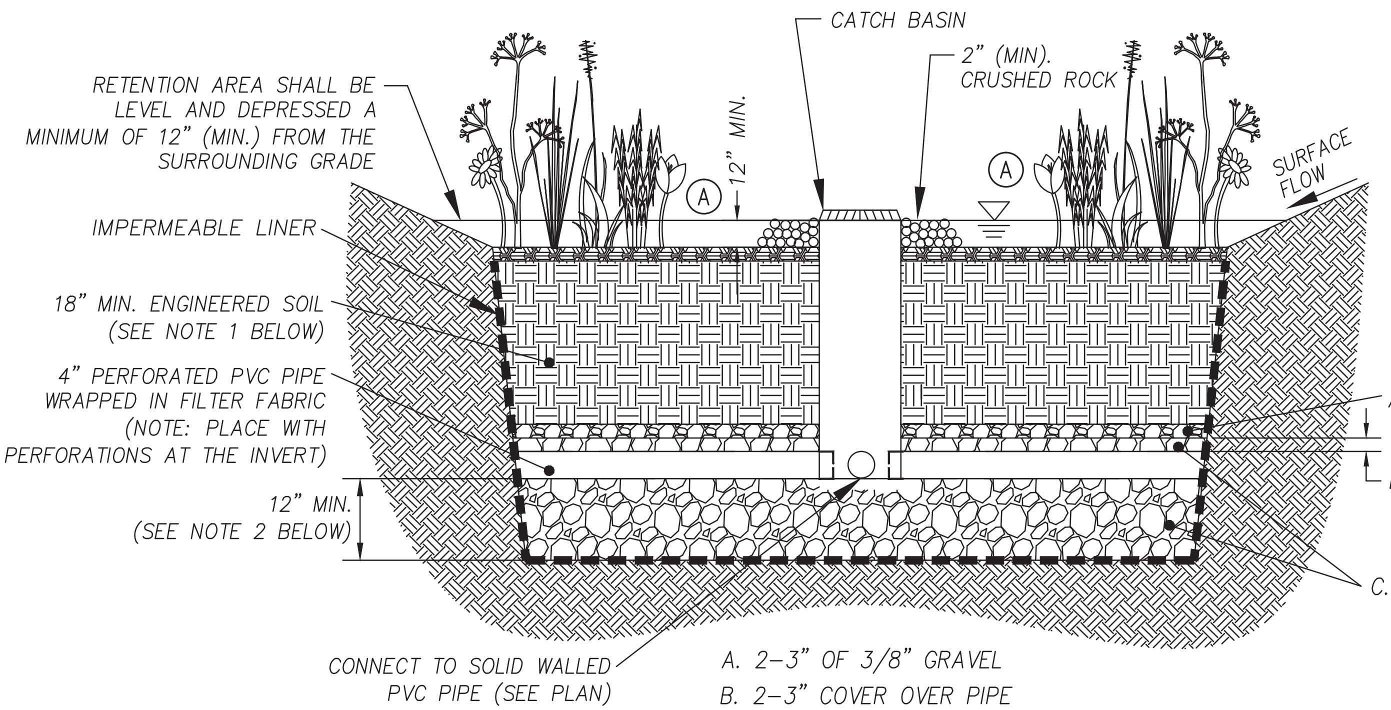
1. BIORETENTION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50–60% SAND, 20–30% COMPOST OR HARDWOOD MULCH, AND 20–30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

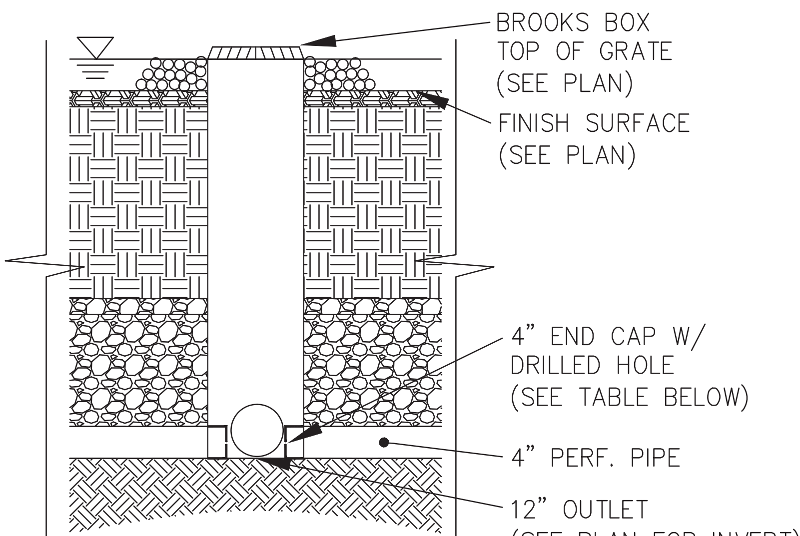
(A) DEEP ROOTED, DENSE, DROUGHT TOLERANT PLANTING SUITABLE FOR WELL DRAINED SOIL; PLANTING SCHEDULE AS FOLLOWS (PER LANDSCAPE PLANS);

SCIENTIFIC NAME	COMMON NAME
CHONDROPTAELUM TECTORUM	SMALL CAPE RUSH
JUNCUS PATENS	CALIFORNIA GRAY RUSH
LEYMUS CONDENSATUS "CANYON PRINCE"	CANYON PRINCE WILD RYE

BIORETENTION DETAIL

NOT TO SCALE





ORIFICE DETAIL

NTS

#	ORIFICE SIZING CHART		
NO.	ORIFICE SIZE	NO.	ORIFICE SIZE
2A	1-1/4"	2K	N/A
2B	1-1/4"	2L	1"
2C	1-1/4"	2M	1-1/4"
2D	1-1/4"	2N	1-1/4"
2E	1/2"	2O	NOT USED
2F	1/2"	2P	1-1/4"
2G	1"	2Q	1-1/4"
2H	1"	2R	1"
2I	1"	2S	1"
2J	1/2"	2T	1"

NOTE: SEE EXHIBIT 'A' FOR LOCATION

DRAFT – FOR REFERENCE ONLY

EXHIBIT 'E'

(PARCEL 3 PARCEL MAP 16265)

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS					
STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.: 1642330					
O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER (KILROY REALTY, L.P.)					
BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER
BIORETENTION	ANNUAL	SEMI - ANNUAL	VISUAL INSPECTION (REMOVE DIRT, TRASH, DEBRIS)	18	39204-6-D

BIO-RETENTION SIZING TABLE SUMMARY

BMP DESCRIPTION	BMP SIZE (SEE EXHIBIT "A" FOR LOCATION)	
	LENGTH (FT)	WIDTH (FT)
BIORETENTION 1A	47	6
BIORETENTION 1B	44	20
BIORETENTION 1C	43	21
BIORETENTION 1D	35	13
BIORETENTION 1E	34	13
BIORETENTION 1F	61	10
BIORETENTION 1G	70	19
BIORETENTION 1H	39	21
BIORETENTION 1I	46	22
BIORETENTION 1J	34	19
BIORETENTION 1K	48	17
BIORETENTION 1L	59	11
BIORETENTION 1M	33	13
BIORETENTION 1N	40	12
BIORETENTION 1O	41	11
BIORETENTION 1P	205	15
BIORETENTION 1Q	42	14
BIORETENTION 1R	42	22

NOTES:
1. DIMENSIONS NOTED ABOVE ARE MAXIMUM LENGTHS/WIDTHS.
2. BASIN BOTTOM FOOTPRINT SHAPE VARIES (SEE EXHIBIT "A").

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

See Attachment 1A
Sheets 1 through 3
for Plan Sheets

ATTACHMENT 5
DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

DRAINAGE REPORT

FOR

KILROY REALTY CORPORATION

OFFICE BUILDING & PARKING STRUCTURE

9455 TOWNE CENTRE DRIVE

(IO No. 24006426, PTS No. 291342)

March 18, 2016

REGISTERED PROFESSIONAL ENGINEER
WAYNE W. CHANG
No. 46548
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA

Wayne W. Chang, MS, PE 46548

Chang Consultants

Civil Engineering ◦ Hydrology ◦ Hydraulics ◦ Sedimentation

P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

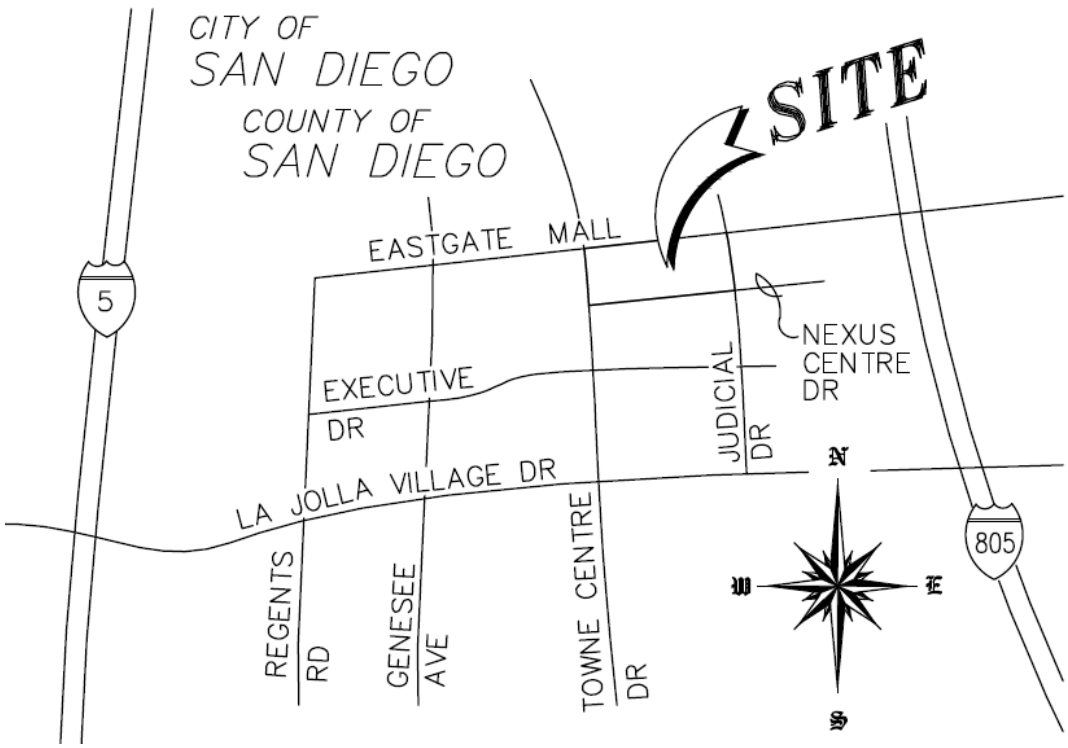
-TABLE OF CONTENTS -

APPENDIX

MAP POCKET

INTRODUCTION

Kilroy Realty Corporation is proposing to redevelop an existing 3.91 acre office building site located at 9455 Towne Centre Drive in the city of San Diego (see Vicinity Map). The site is bounded by Towne Centre Drive to the west, Eastgate Mall to the north, Judicial Drive to the east, and existing office buildings to the south. The site currently contains a two-story 47,091 square foot office building with surface parking. The existing building and parking will be demolished prior to construction of the proposed 150,000 square foot, 5-story office building and 5-level parking structure.



Vicinity Map

Under existing conditions, storm runoff from the site is conveyed as follows (see the Existing Condition Rational Method Work Map in the map pocket). Runoff from the southwesterly portion sheet flows onto Towne Centre Drive primarily from the site's westerly driveway entrance. A small portion of runoff from this area sheet flows directly onto the adjacent Towne Centre Drive. Runoff from the northwesterly/northerly portion sheet flows onto Eastgate Mall either directly or from the site's northerly driveway entrance. Runoff from the rear of the site flows into a catch basin at the northeasterly corner of the main parking lot. A storm drain lateral conveys runoff from the catch basin north to an existing public storm drain system in Eastgate Mall. This storm drain continues east in Eastgate Mall, then south in Judicial Drive. Finally, runoff from the slope along the southerly and easterly site perimeters flows to Judicial Drive either directly or via the property to the south. The site runoff to Eastgate Mall and Judicial Drive is ultimately collected by the Judicial Drive storm drain system, i.e., the majority of the site runoff will enter the Judicial Drive storm drain. The only site runoff not collected by the Judicial Drive storm drain is the small area of runoff onto Towne Centre Drive.

After development, storm runoff from the majority of the project will be conveyed by proposed private on-site storm drain systems directly to the Judicial Drive storm drain system (see the Proposed Condition Rational Method Work Map in the map pocket). The on-site storm drains will connect to the Judicial Drive storm drain at three locations east of the site. A reduced amount of site runoff will continue to be conveyed to the existing storm drain lateral in Eastgate Mall. This runoff will also reach the Judicial Drive storm drain. Storm runoff will no longer be directed onto Towne Centre Drive or onto Eastgate Mall. The project includes a series of biofiltration basins at various locations throughout the site to meet pollutant control and hydromodification requirements.

The proposed storm drain and water quality design provides the following benefits. First, the recent (after February 16, 2016) pollutant control and hydromodification criteria will be met by the biofiltration basins (see the associated *Storm Water Quality Management Plan* report). Second, the pre-project runoff onto Towne Centre Drive, Eastgate Mall, and to the existing lateral in Eastgate Mall will be eliminated or reduced, which provides increased flow capacity for these areas. Third, biofiltration basins will provide detention benefits so that the future site runoff to the Judicial Drive storm drain will not increase over existing conditions. Since the post-project runoff will primarily enter the Judicial Drive storm drain further downstream in this system than under existing conditions, the project will provide increased flow capacity in a portion of the existing Judicial Drive and Eastgate Mall public storm drains. In summary, the project will provide flow capacity benefits to some surrounding areas, and will not increase the flow in the existing Judicial Drive storm drain.

This drainage report has been prepared in support of Kettler Leweck Engineering's plans for the final engineering. This report provides hydrologic analyses in order to provide flow rates and hydraulic analyses for the private on-site pipe and inlet sizing.

HYDROLOGIC ANALYSES

The overall drainage basin covers 3.71 acres so the City of San Diego's 1984 *Drainage Design Manual's* rational method procedure was the basis for the existing and proposed condition hydrologic analyses. The *Manual* states that "the underground storm drain system shall be based upon a 50-year frequency storm." Since the post-project runoff will connect directly to existing public underground storm drain systems, 50-year analyses have been performed. The CivilDesign Rational Method Hydrology Program is based on the City criteria and was used for the analyses. The rational method input parameters are summarized below and the supporting data is included in Appendix A:

- Intensity-Duration-Frequency: The City's 50-year Intensity-Duration-Frequency curve from the *Drainage Design Manual* was used.

- Drainage area: The existing condition drainage basins were delineated from the base topographic mapping prepared for the project, and the proposed condition drainage basins were delineated using Kettler Leweck Engineering's grading plan. The overall existing condition drainage basin boundary was set equal to the overall proposed condition boundary to allow a comparison of results. The drainage basin boundaries and grading are shown on the Rational Method Work Maps in the map pocket.

- Hydrologic soil groups: The soil group within the site is entirely 'D' according to the City criteria (and confirmed with the Web Soil Survey).

- Runoff coefficients: The existing and proposed condition runoff coefficients were determined by first delineating the existing and proposed pervious/impervious areas within each drainage subarea. The existing condition pervious/impervious areas are included on the Existing Condition Rational Method Work Map in the map pocket and the proposed condition pervious/impervious areas were obtained from Kettler Leweck Engineering's DMA Plan, which is included in the map pocket. The existing and proposed pervious and impervious areas are summarized in Table 1 below. The formula given in Note 2 of Table 2 from the *Manual* was used along with a minimum C value of 0.45 and maximum value of 0.99.

Condition	Receiving Node	Impervious Area, sf	Pervious Area, sf	Total Area, sf	Total Area, ac	Percent Impervious	C Value
Existing	12	14,447	9,075	23,522	0.54	61.42	0.65
Existing	22	21,486	18,471	39,957	0.92	53.77	0.57
Existing	32	54,226	12,747	66,973	1.54	80.97	0.86
Existing	42	0	30,928	30,928	0.71	0.00	0.45
Proposed	126, 130	15,409	2,989	18,398	0.42	83.75	0.89
Proposed	406	2,210	1,051	3,261	0.08	67.77	0.72
Proposed	202, 204, 212	31,679	9,050	40,729	0.94	77.78	0.83
Proposed	110	1,817	1,059	2,876	0.06	63.18	0.67
Proposed	108	2,853	2,415	5,268	0.12	54.16	0.58
Proposed	102, 104, 106	17,562	8,353	25,915	0.58	67.77	0.72
Proposed	402	1,583	4,014	5,597	0.13	28.28	0.45
Proposed	404	6,662	6,975	13,637	0.31	48.85	0.52
Proposed	132	16,981	1,290	18,271	0.42	92.94	0.99
Proposed	122, 124	16,362	5,442	21,804	0.50	75.04	0.80

Table 1. Summary of Impervious and Pervious Area within Each Rational Method Drainage Subarea for Computing C Value

- Flow lengths and elevations: The flow lengths and elevations were obtained from the topographic mapping and grading plan.

The rational method results are included in Appendix A and summarized in Table 2. The table provides the existing and proposed condition flow to various receiving locations. The existing flow onto Towne Centre Drive is 1.1 cfs, which will be eliminated under proposed conditions. Similarly, the existing flow of 1.7 cfs onto the surface of Eastgate Mall will be eliminated. The existing flow into the Eastgate Mall lateral pipe will be reduced from 4.5 to 0.9 cfs by the project.

Discharge Location	**Existing Condition 50-Year Flow Rate, cfs**	**Proposed Condition 50-Year Flow Rate, cfs**	**Mitigated Prop. Cond. 50-Year Flow Rate, cfs**
Towne Centre Drive	1.1 (Node 12)	0	0
Eastgate Mall	1.7 (Node 22)	0	0
Eastgate Mall Storm Drain Lateral	4.5 (Node 32)	0.9 (Node 408)	0.9
Judicial Drive	1.0 (Node 42)	8.5 (Node 134, 214, and 304)	6.0
Total Flow Rate	8.3	9.4	6.9

Table 2. Comparison of Rational Method Results

The project will increase the unmitigated 50-year flow rate to Judicial Drive. Under existing conditions, runoff onto the surface of Judicial Drive will be 1.0 cfs from Table 2. This runoff along with the 1.7 and 4.5 cfs from Eastgate Mall will ultimately enter the Judicial Drive storm drain, i.e., the total existing condition runoff into the Judicial Drive storm drain will be 7.2 cfs (1.0+4.5+1.7 = 7.2). Under proposed conditions, site runoff will not flow onto the surface of Judicial Drive, but will be conveyed to its storm drain. Therefore, the project will reduce the surface flow on Judicial Drive. Table 2 shows that the proposed condition flow rate from the direct connections to the Judicial Drive storm drain is 8.5 cfs. An additional 0.9 cfs is added from the East Gate Mall lateral, for a total flow rate of 9.4 cfs. Therefore, the unmitigated runoff associated with the project will increase the 50-year flow rate towards the Judicial Drive storm drain from 7.2 to 9.4 cfs or by 2.2 cfs.

The proposed condition 50-year flow rate can be mitigated by the easterly most biofiltration basin along Judicial Drive. This basin has capacity to store the entire tributary 50-year storm volume. Storing the entire volume will essentially eliminate the outflow from the basin, which is 2.5 cfs from proposed condition rational method node 204 to 214. This more than offsets the 2.2 cfs increase from the project. The 50-year flow volume at the basin is determined by multiplying the 50-year, 6-hour precipitation (2.0 inches) by the tributary area (0.94 acres) and runoff coefficient (0.83). Based on these values, the volume is 5,664 cubic feet [(2.0/12) × (0.94×43,560) × 43,560 = 5,664]. This volume is stored in the basin at elevation 378.73 feet or 1.73 feet above the basin floor. Therefore, setting the crest of the outflow riser at elevation 378.73 feet will store the 50-year storm volume and mitigate for the small flow increase by the project. The mitigated proposed condition flow rates are included in Table 2.

HYDRAULIC ANALYSES

The on-site storm drain system will be private and the pipes included in the proposed condition rational method analysis are all 12” PVC pipe. The analysis contains pipe flow routines that model each proposed pipe segment based on the invert elevations and pipe lengths from the plans. The pipe flow routines provide the normal depth within each pipe segment for the 50-year flow. The results confirm that that each pipe has capacity for the 50-year flow rate.

Each biofiltration basin will contain a riser to convey the overflow out of the basin. Each riser outflow structure consists of a Brooks 24” by 24” grated catch basin (Model No. 2424 CB). An analysis was performed to determine the head required to direct the 50-year flow out of a catch basin. The analysis was based on the highest flow rate at one of the catch basins (2.5 cfs at Node 204) in order to yield the most conservative results. Figure 2-7 from the County of San Diego’s *Hydraulic Design Manual* was used to determine the head and is included after this report text. The catch basin was assumed to be 50 percent clogged and the bar area on the grate was excluded. The results show that the 50-year flow will pond 0.29 feet over the grated inlet. The basins were designed to account for this head.

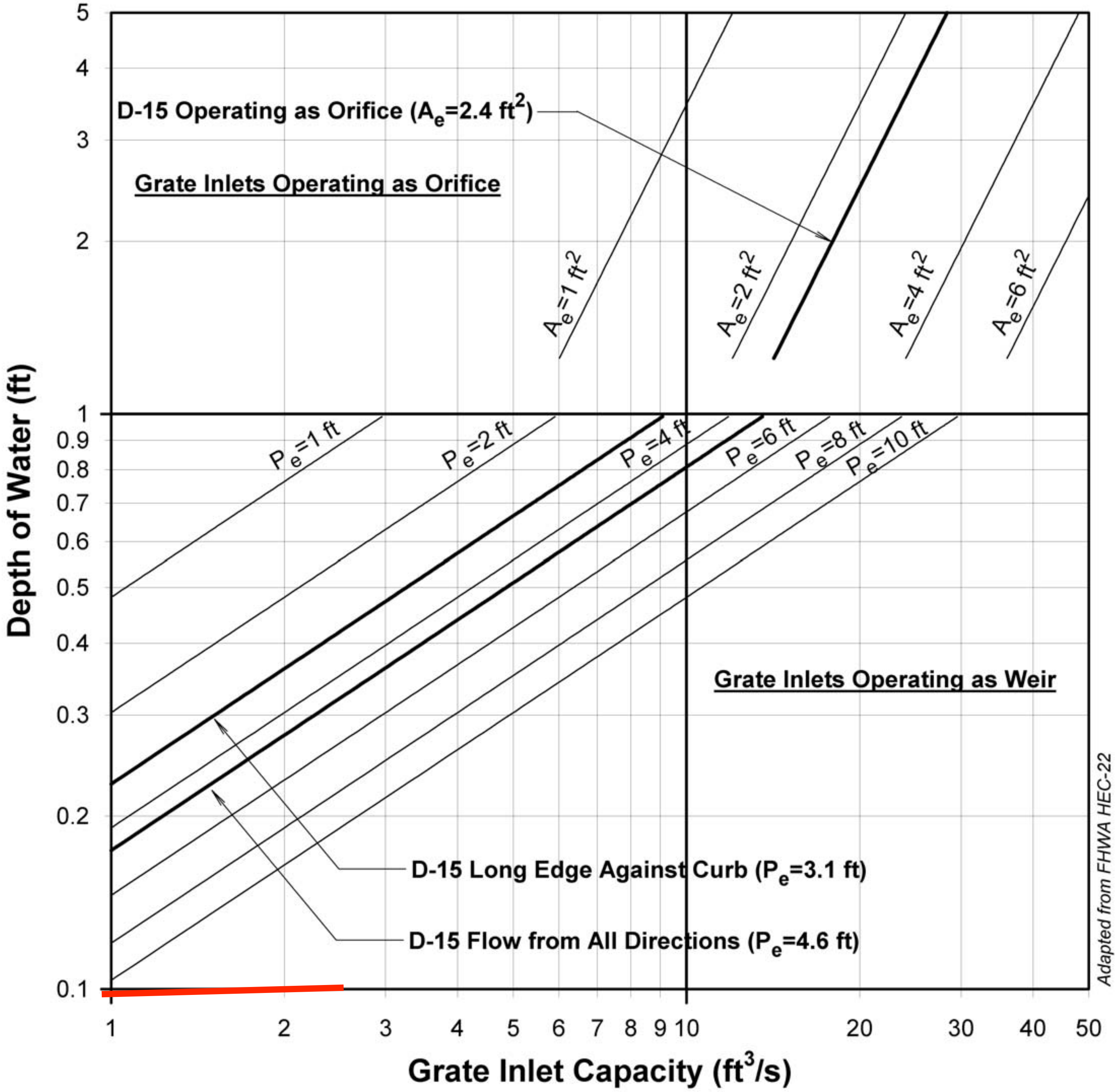
CONCLUSION

The analyses in this drainage report show that the project will reduce the 50-year flow rate from the site onto the surface of Towne Centre Drive, Eastgate Mall, and Judicial Drive. The project will also reduce the flow rate to the Eastgate Mall storm drain lateral. On the other hand, the unmitigated flow to the Judicial Drive storm drain will increase by 2.2 cfs. This increase is not excessive and it is possible the existing storm drain infrastructure can convey the increase. Nonetheless, this increase can be mitigated by storing the runoff volume in the proposed biofiltration basin along Judicial Drive.

The biofiltration basins will delay (lengthen) the time of concentration, which will further reduce intensity and flow rate.

In summary, the analyses have demonstrated that the design flow rates are a relatively minor portion of the surrounding drainage area (as-built drawing 24220-4-D shows that the receiving storm drain in Judicial Drive was designed for nearly 90 cfs). The project will benefit the off-site flood carrying capacity in several adjacent street areas and storm drain segments. The project can mitigate for its minor flow increase.

Figure 2-7



Inlet analysis to determine maximum head over proposed 24"x24" grated inlet. This occurs during hi
50-year flow of 2.5 cfs at proposed condition Node 52.

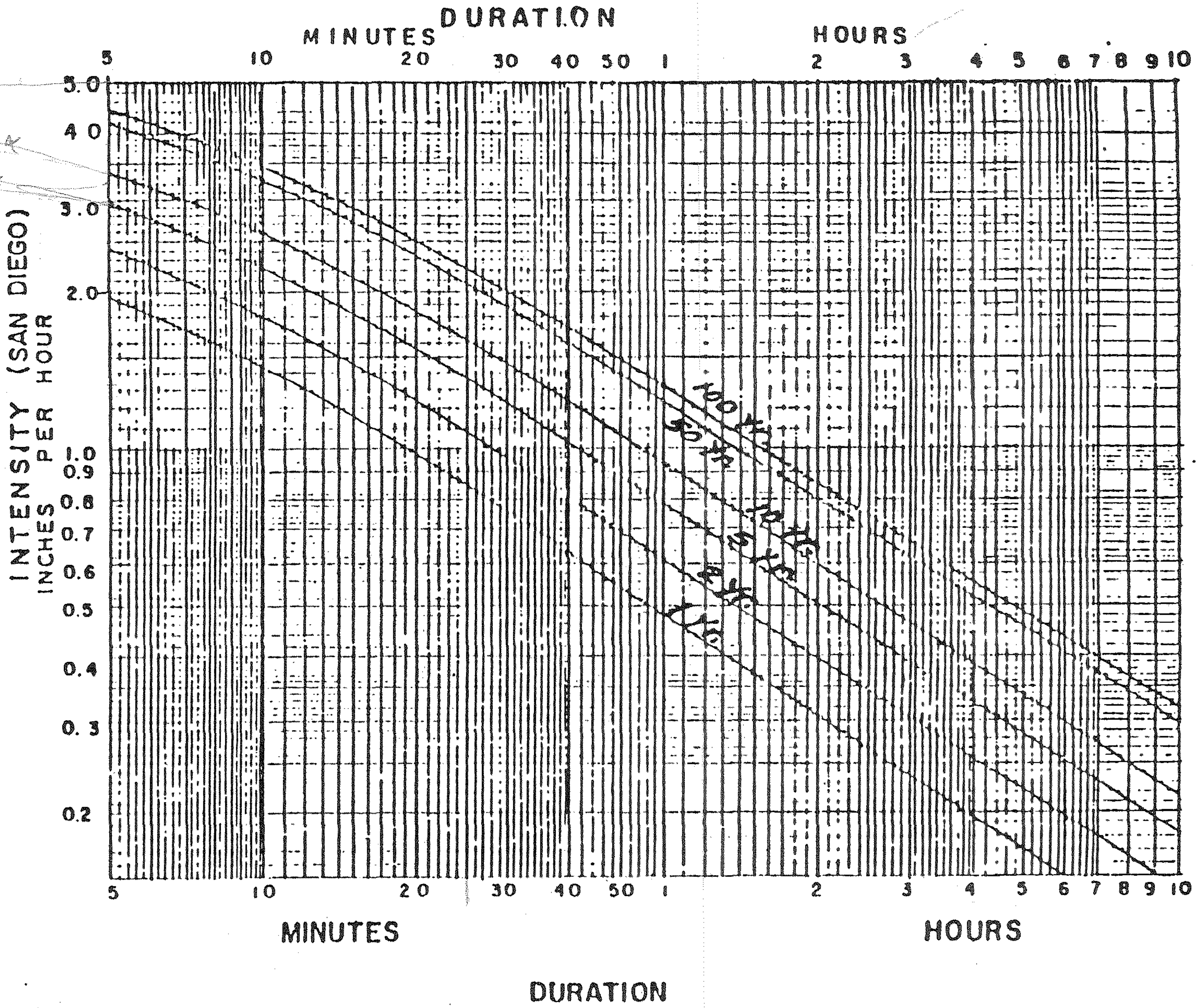
Figure 2-7 Capacity of Grate Inlets in Sump Locations

APPENDIX A

RATIONAL METHOD RESULTS

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 - FREQUENC
CURVES
for
COUNTY OF SAN DIEGO

APPENDIX I-

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
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:

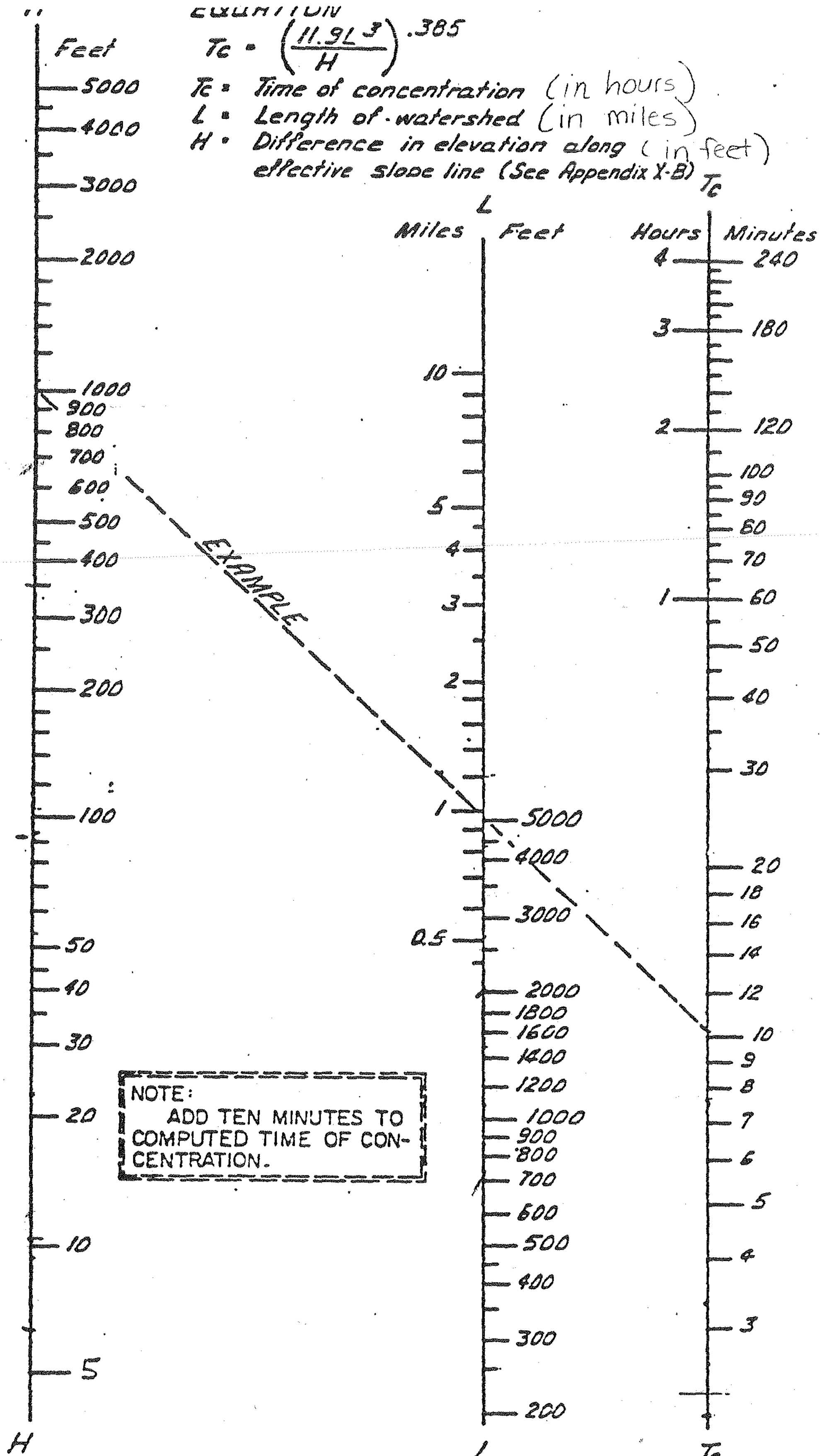
(1) Type D soil to be used for all areas.

(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%

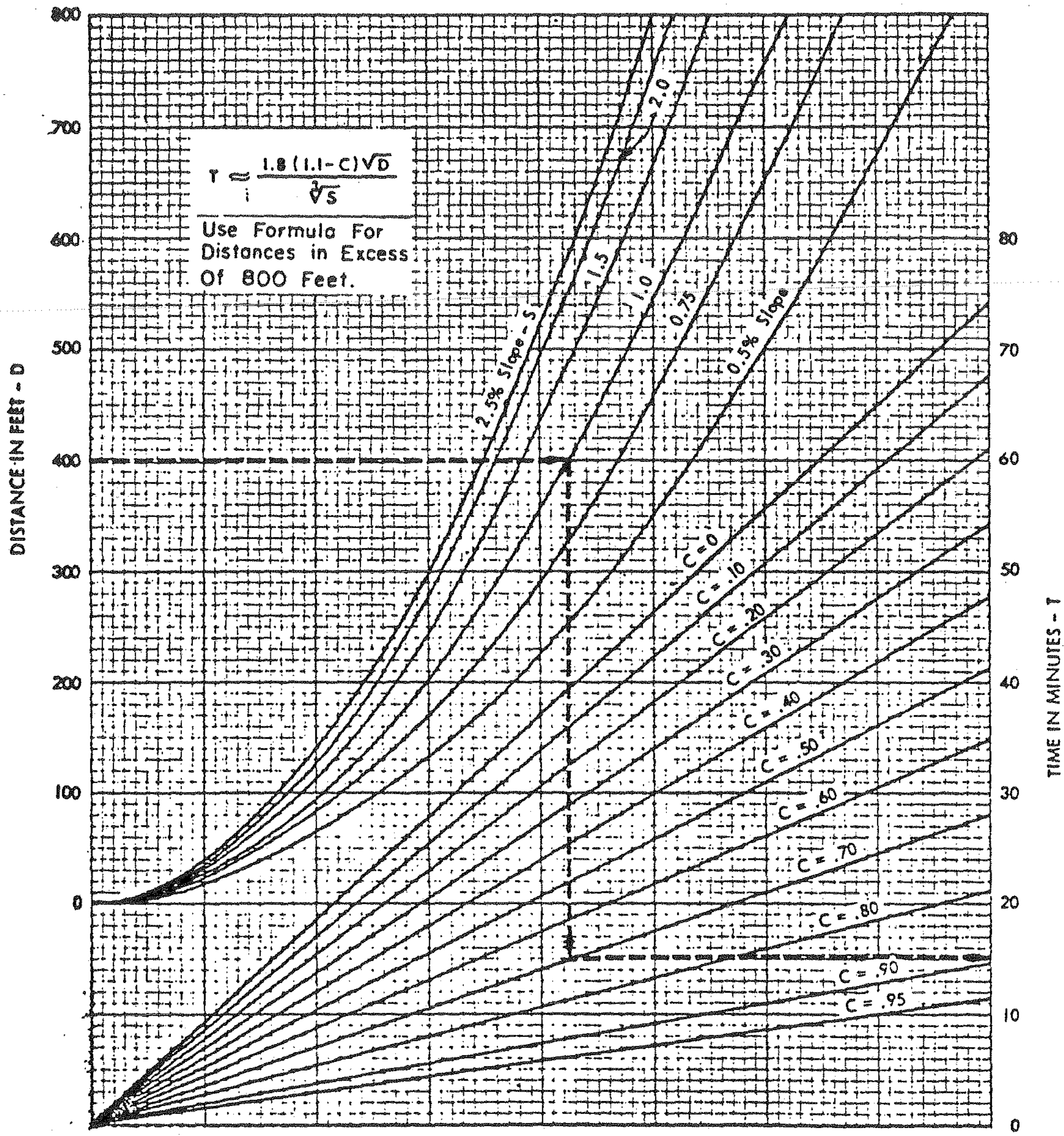
Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$



SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL	NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS	
APPROVED [illegible signature]	DATE ______	APPENDIX

URBAN AREAS OVERLAND TIME OF FLOW CURVES



Surface Flow Time Curves

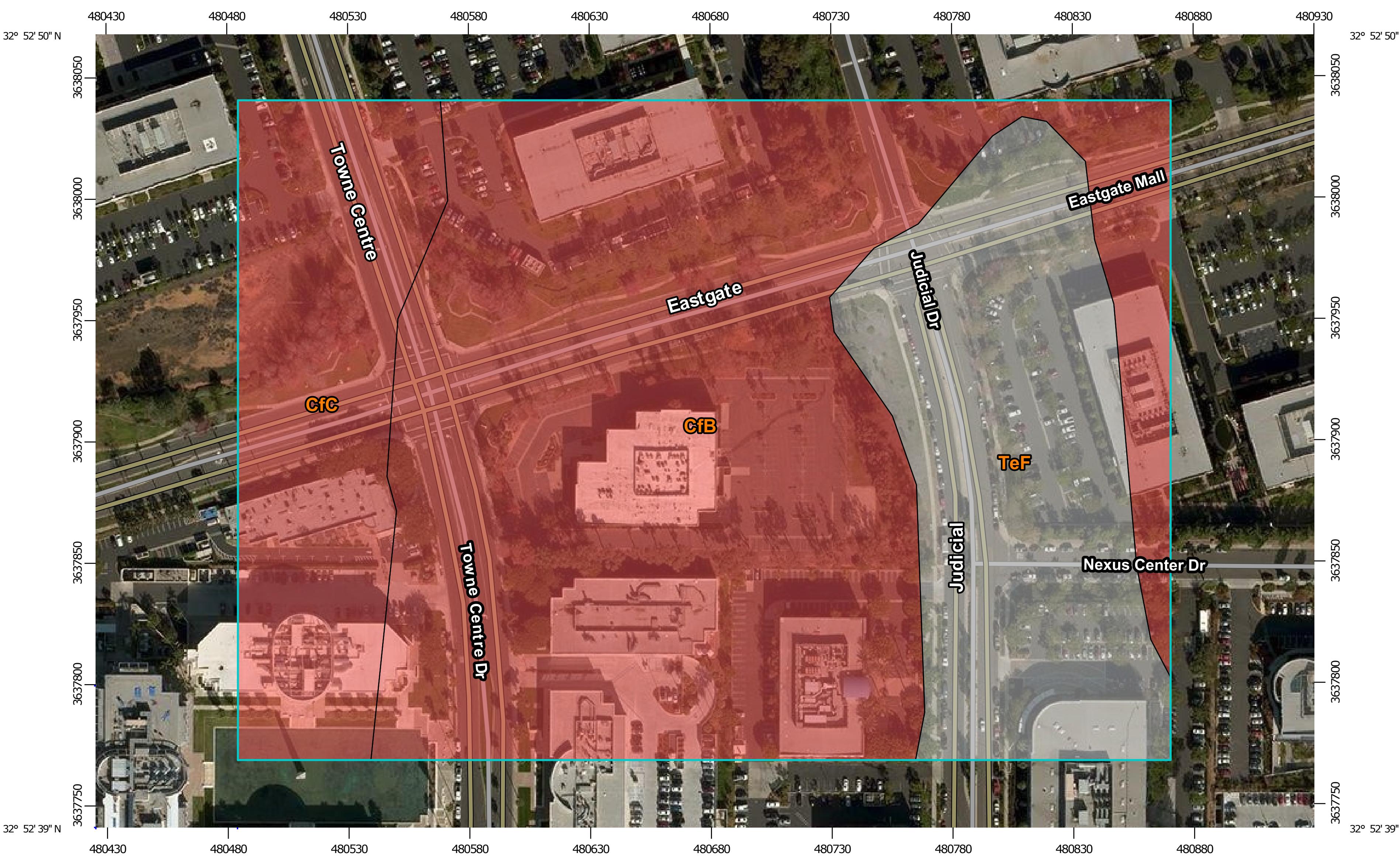
EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.

SLOPE = 1.0 %

COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES



Map Scale: 1:2,310 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CfB	Chesterton fine sandy loam, 2 to 5 percent slopes	D	15.6	59.7%
CfC	Chesterton fine sandy loam, 5 to 9 percent slopes	D	4.6	17.6%
TeF	Terrace escarpments		5.9	22.7%
Totals for Area of Interest			**26.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 03/17/16

9455 Towne Centre Drive
Office Building and Parking Structure
Existing Conditions
50-Year Storm Event

********* Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is 50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station 10.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.650 given for subarea
Initial subarea flow distance = 280.000(Ft.)
Highest elevation = 407.500(Ft.)
Lowest elevation = 403.200(Ft.)
Elevation difference = 4.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 11.75 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6500)*(280.000^.5)/(1.536^(1/3)]= 11.75
Rainfall intensity (I) = 2.991(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.650
Subarea runoff = 1.050(CFS)
Total initial stream area = 0.540(Ac.)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.570 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  407.000(Ft.)
Lowest elevation =  401.400(Ft.)
Elevation difference =    5.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    10.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5700)*( 215.000^.5)/( 2.605^(1/3)]=  10.17
Rainfall intensity (I) =      3.169(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.570
Subarea runoff =      1.662(CFS)
Total initial stream area =       0.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      30.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Initial subarea flow distance  =  476.000(Ft.)
Highest elevation =  406.200(Ft.)
Lowest elevation =  399.900(Ft.)
Elevation difference =    6.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8600)*( 476.000^.5)/( 1.324^(1/3)]=   8.58
Rainfall intensity (I) =      3.392(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff =      4.493(CFS)
Total initial stream area =       1.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      40.000 to Point/Station      42.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  218.000(Ft.)
Highest elevation =  402.300(Ft.)
```

```
Lowest elevation =  383.700(Ft.)
Elevation difference =   18.600(Ft.)
TC=[(11.9*0.0413^3)/( 18.60)]^.385=  1.27 + 10 min. =    11.27 min.
Rainfall intensity (I) =      3.041(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.972(CFS)
Total initial stream area =        0.710(Ac.)
End of computations, total study area =          3.710 (Ac.)
```

```
          San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
     Rational Hydrology Study        Date: 03/15/16
------------------------------------------------------------------------
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9455 Towne Centre Drive
Office Building and Parking Structure
Proposed Conditions
50-Year Storm Event

```
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.720 given for subarea
Initial subarea flow distance  =  136.000(Ft.)
Highest elevation =  425.000(Ft.)
Lowest elevation =  423.640(Ft.)
Elevation difference =    1.360(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     7.98 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7200)*( 136.000^.5)/( 1.000^(1/3)]=   7.98
Rainfall intensity (I) =      3.495(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.720
Subarea runoff =      1.007(CFS)
Total initial stream area =        0.400(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.720 given for subarea
Time of concentration =     7.98 min.
Rainfall intensity =      3.495(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.720
Subarea runoff =      0.101(CFS) for    0.040(Ac.)
Total runoff =      1.107(CFS)   Total area =        0.44(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   399.000(Ft.)
Downstream point/station elevation =   398.690(Ft.)
Pipe length  =    30.59(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.107(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.107(CFS)
Normal flow depth in pipe =    4.58(In.)
Flow top width inside pipe =   11.66(In.)
Critical Depth =    5.32(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     8.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.720 given for subarea
Time of concentration =     8.10 min.
Rainfall intensity =      3.473(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.720
Subarea runoff =      0.175(CFS) for    0.070(Ac.)
Total runoff =      1.282(CFS)   Total area =        0.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   398.690(Ft.)
Downstream point/station elevation =   398.110(Ft.)
Pipe length  =    58.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.282(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.282(CFS)
```

```
Normal flow depth in pipe =    4.99(In.)
Flow top width inside pipe =   11.83(In.)
Critical Depth =    5.74(In.)
Pipe flow velocity =      4.16(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     8.34 min.


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Process from Point/Station      106.000 to Point/Station      106.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.720 given for subarea
Time of concentration =     8.34 min.
Rainfall intensity =      3.433(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.720
Subarea runoff =      0.173(CFS) for    0.070(Ac.)
Total runoff =      1.455(CFS)   Total area =        0.58(Ac.)


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Process from Point/Station      106.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   398.110(Ft.)
Downstream point/station elevation =   397.650(Ft.)
Pipe length  =    45.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.455(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.455(CFS)
Normal flow depth in pipe =    5.33(In.)
Flow top width inside pipe =   11.92(In.)
Critical Depth =    6.13(In.)
Pipe flow velocity =      4.32(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     8.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.580 given for subarea
Time of concentration =     8.51 min.
Rainfall intensity =      3.404(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.580
Subarea runoff =      0.237(CFS) for    0.120(Ac.)
Total runoff =      1.692(CFS)   Total area =        0.70(Ac.)


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Process from Point/Station      108.000 to Point/Station      110.000
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**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   397.650(Ft.)
Downstream point/station elevation =   396.580(Ft.)
Pipe length  =    73.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.692(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.692(CFS)
Normal flow depth in pipe =    5.23(In.)
Flow top width inside pipe =   11.90(In.)
Critical Depth =    6.63(In.)
Pipe flow velocity =      5.15(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     8.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.670 given for subarea
Time of concentration =     8.75 min.
Rainfall intensity =      3.366(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.670
Subarea runoff =      0.135(CFS) for    0.060(Ac.)
Total runoff =      1.828(CFS)   Total area =        0.76(Ac.)


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Process from Point/Station      110.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   396.580(Ft.)
Downstream point/station elevation =   393.100(Ft.)
Pipe length  =   267.11(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.828(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.828(CFS)
Normal flow depth in pipe =    5.64(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    6.91(In.)
Pipe flow velocity =      5.04(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =     9.63 min.


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Process from Point/Station      110.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
```

```
Stream flow area =      0.760(Ac.)
Runoff from this stream =      1.828(CFS)
Time of concentration =    9.63 min.
Rainfall intensity =     3.238(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      120.000 to Point/Station      122.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Initial subarea flow distance  =  148.000(Ft.)
Highest elevation =  425.000(Ft.)
Lowest elevation =  423.520(Ft.)
Elevation difference =    1.480(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.57 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8000)*( 148.000^.5)/( 1.000^(1/3)]=   6.57
Rainfall intensity (I) =      3.788(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      1.091(CFS)
Total initial stream area =        0.360(Ac.)


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Process from Point/Station      122.000 to Point/Station      122.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Time of concentration =     6.57 min.
Rainfall intensity =      3.788(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.800
Subarea runoff =      0.333(CFS) for    0.110(Ac.)
Total runoff =      1.424(CFS)   Total area =        0.47(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   397.470(Ft.)
Downstream point/station elevation =   397.270(Ft.)
Pipe length  =    19.94(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.424(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.424(CFS)
Normal flow depth in pipe =    5.27(In.)
Flow top width inside pipe =   11.91(In.)
Critical Depth =    6.07(In.)
Pipe flow velocity =      4.29(Ft/s)
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Travel time through pipe =    0.08 min.
Time of concentration (TC) =     6.65 min.


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Time of concentration =     6.65 min.
Rainfall intensity =      3.770(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.800
Subarea runoff =      0.090(CFS) for    0.030(Ac.)
Total runoff =      1.515(CFS)   Total area =        0.50(Ac.)


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Process from Point/Station      124.000 to Point/Station      126.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   397.270(Ft.)
Downstream point/station elevation =   396.810(Ft.)
Pipe length  =    46.03(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.515(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.515(CFS)
Normal flow depth in pipe =    5.47(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    6.26(In.)
Pipe flow velocity =      4.35(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     6.82 min.


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Process from Point/Station      124.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.500(Ac.)
Runoff from this stream =      1.515(CFS)
Time of concentration =    6.82 min.
Rainfall intensity =     3.729(In/Hr)


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Process from Point/Station      128.000 to Point/Station      126.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Initial subarea flow distance  =  152.000(Ft.)
Highest elevation =  425.000(Ft.)
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Lowest elevation =  423.480(Ft.)
Elevation difference =    1.520(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.66 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8900)*( 152.000^.5)/(   1.000^(1/3)]=   4.66
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      1.291(CFS)
Total initial stream area =        0.340(Ac.)


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Process from Point/Station      128.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.340(Ac.)
Runoff from this stream =      1.291(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     4.265(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                   (In/Hr)


1        1.515      6.82             3.729
2        1.291      5.00             4.265
Qmax(1) =
        1.000 *    1.000 *     1.515) +
        0.874 *    1.000 *     1.291) + =       2.643
Qmax(2) =
        1.000 *    0.733 *     1.515) +
        1.000 *    1.000 *     1.291) + =       2.401

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.515       1.291
Maximum flow rates at confluence using above data:
        2.643        2.401
Area of streams before confluence:
        0.500        0.340
Results of confluence:
Total flow rate =      2.643(CFS)
Time of concentration =     6.823 min.
Effective stream area after confluence =      0.840(Ac.)


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Process from Point/Station      126.000 to Point/Station      126.000
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**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.82 min.
Rainfall intensity =      3.729(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.133(CFS) for    0.040(Ac.)
Total runoff =      2.776(CFS)   Total area =       0.88(Ac.)


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Process from Point/Station      126.000 to Point/Station      130.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   396.810(Ft.)
Downstream point/station elevation =   393.550(Ft.)
Pipe length  =    23.24(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.776(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.776(CFS)
Normal flow depth in pipe =    3.71(In.)
Flow top width inside pipe =   11.10(In.)
Critical Depth =    8.58(In.)
Pipe flow velocity =     13.41(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.85 min.


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Process from Point/Station      130.000 to Point/Station      130.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.85 min.
Rainfall intensity =      3.722(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.133(CFS) for    0.040(Ac.)
Total runoff =      2.908(CFS)   Total area =       0.92(Ac.)


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Process from Point/Station      130.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   393.550(Ft.)
Downstream point/station elevation =   393.100(Ft.)
Pipe length  =    12.06(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.908(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.908(CFS)
Normal flow depth in pipe =    5.44(In.)
Flow top width inside pipe =   11.95(In.)
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Critical Depth =    8.78(In.)
Pipe flow velocity =      8.39(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.88 min.


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Process from Point/Station      130.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.920(Ac.)
Runoff from this stream =      2.908(CFS)
Time of concentration =    6.88 min.
Rainfall intensity =     3.717(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                   (In/Hr)


1        1.828      9.63            3.238
2        2.908      6.88            3.717
Qmax(1) =
        1.000 *    1.000 *     1.828) +
        0.871 *    1.000 *     2.908) + =       4.362
Qmax(2) =
        1.000 *    0.714 *     1.828) +
        1.000 *    1.000 *     2.908) + =       4.213

Total of 2 main streams to confluence:
Flow rates before confluence point:
       1.828      2.908
Maximum flow rates at confluence using above data:
        4.362       4.213
Area of streams before confluence:
        0.760       0.920


Results of confluence:
Total flow rate =      4.362(CFS)
Time of concentration =     9.635 min.
Effective stream area after confluence  =      1.680(Ac.)


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Process from Point/Station      112.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   393.100(Ft.)
Downstream point/station elevation =   371.080(Ft.)
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```
Pipe length  =   187.40(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.362(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     4.362(CFS)
Normal flow depth in pipe =    4.96(In.)
Flow top width inside pipe =   11.82(In.)
Critical Depth =   10.52(In.)
Pipe flow velocity =     14.25(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     9.85 min.


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Process from Point/Station      132.000 to Point/Station      132.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.990 given for subarea
Time of concentration =     9.85 min.
Rainfall intensity =      3.209(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.990
Subarea runoff =      1.334(CFS) for    0.420(Ac.)
Total runoff =      5.696(CFS)   Total area =        2.10(Ac.)


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Process from Point/Station      132.000 to Point/Station      134.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   371.080(Ft.)
Downstream point/station elevation =   356.600(Ft.)
Pipe length  =   123.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.696(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     5.696(CFS)
Normal flow depth in pipe =    5.76(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =   11.35(In.)
Pipe flow velocity =     15.27(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     9.99 min.


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.830 given for subarea
Initial subarea flow distance  =  505.000(Ft.)
Highest elevation =  404.300(Ft.)
Lowest elevation =  379.500(Ft.)
Elevation difference =   24.800(Ft.)
Time of concentration calculated by the urban
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```
areas overland flow method (App X-C) =     6.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8300)*( 505.000^.5)/( 4.911^(1/3)]=   6.43
Rainfall intensity (I) =      3.824(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830
Subarea runoff =      1.301(CFS)
Total initial stream area =        0.410(Ac.)


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Process from Point/Station      202.000 to Point/Station      204.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   379.500(Ft.)
Downstream point elevation =   377.000(Ft.)
Channel length thru subarea  =   505.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      1.301(CFS)
Depth of flow =   0.165(Ft.), Average velocity =   0.765(Ft/s)
Channel flow top width =   10.659(Ft.)
Flow Velocity =    0.77(Ft/s)
Travel time  =   11.00 min.
Time of concentration =   17.42 min.
Critical depth =      0.080(Ft.)


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Process from Point/Station      202.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.410(Ac.)
Runoff from this stream =      1.301(CFS)
Time of concentration =   17.42 min.
Rainfall intensity =     2.539(In/Hr)


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Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.830 given for subarea
Initial subarea flow distance  =  189.000(Ft.)
Highest elevation =  425.000(Ft.)
Lowest elevation =  423.110(Ft.)
Elevation difference =    1.890(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.68 min.
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TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8300)*( 189.000^.5)/( 1.000^(1/3)]=   6.68
Rainfall intensity (I) =      3.762(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830
Subarea runoff =      1.124(CFS)
Total initial stream area =       0.360(Ac.)


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Process from Point/Station      212.000 to Point/Station      204.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   380.000(Ft.)
Downstream point elevation =   377.000(Ft.)
Channel length thru subarea  =   157.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      1.124(CFS)
Depth of flow =   0.101(Ft.), Average velocity =   1.094(Ft/s)
Channel flow top width =   10.403(Ft.)
Flow Velocity =    1.09(Ft/s)
Travel time  =    2.39 min.
Time of concentration =    9.07 min.
Critical depth =      0.073(Ft.)


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Process from Point/Station      212.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.360(Ac.)
Runoff from this stream =      1.124(CFS)
Time of concentration =    9.07 min.
Rainfall intensity =     3.317(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        1.301     17.42             2.539
2        1.124      9.07             3.317
Qmax(1) =
        1.000 *    1.000 *     1.301) +
        0.765 *    1.000 *     1.124) + =       2.161
Qmax(2) =
        1.000 *    0.521 *     1.301) +
        1.000 *    1.000 *     1.124) + =       1.802
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       1.301      1.124
Maximum flow rates at confluence using above data:
        2.161      1.802
Area of streams before confluence:
        0.410      0.360
Results of confluence:
Total flow rate =      2.161(CFS)
Time of concentration =    17.424 min.
Effective stream area after confluence =      0.770(Ac.)


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Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.830 given for subarea
Time of concentration =    17.42 min.
Rainfall intensity =      2.539(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.830
Subarea runoff =      0.358(CFS) for    0.170(Ac.)
Total runoff =      2.520(CFS)   Total area =        0.94(Ac.)


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Process from Point/Station      204.000 to Point/Station      214.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   374.000(Ft.)
Downstream point/station elevation =   361.200(Ft.)
Pipe length  =    89.18(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.520(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.520(CFS)
Normal flow depth in pipe =    3.51(In.)
Flow top width inside pipe =   10.92(In.)
Critical Depth =    8.17(In.)
Pipe flow velocity =     13.16(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    17.54 min.


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  395.000(Ft.)
Lowest elevation =  378.000(Ft.)
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Elevation difference =   17.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.27 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 147.000^.5)/(11.565^(1/3)]=   6.27
Rainfall intensity (I) =      3.863(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.261(CFS)
Total initial stream area =        0.150(Ac.)


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Process from Point/Station      302.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   375.000(Ft.)
Downstream point/station elevation =   371.200(Ft.)
Pipe length  =    97.03(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.261(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     0.261(CFS)
Normal flow depth in pipe =    1.58(In.)
Flow top width inside pipe =    8.10(In.)
Critical Depth =    2.51(In.)
Pipe flow velocity =      4.27(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     6.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance  =  114.000(Ft.)
Highest elevation =  404.800(Ft.)
Lowest elevation =  402.000(Ft.)
Elevation difference =    2.800(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.26 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 114.000^.5)/( 2.456^(1/3)]=   9.26
Rainfall intensity (I) =      3.290(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.192(CFS)
Total initial stream area =        0.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
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Upstream point/station elevation =   399.000(Ft.)
Downstream point/station elevation =   393.000(Ft.)
Pipe length  =   179.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.192(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     0.192(CFS)
Normal flow depth in pipe =    1.42(In.)
Flow top width inside pipe =    7.74(In.)
Critical depth could not be calculated.
Pipe flow velocity =      3.69(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =    10.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      404.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.520 given for subarea
Time of concentration =    10.07 min.
Rainfall intensity =      3.181(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.520
Subarea runoff =      0.513(CFS) for    0.310(Ac.)
Total runoff =      0.705(CFS)   Total area =        0.44(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   393.000(Ft.)
Downstream point/station elevation =   392.390(Ft.)
Pipe length  =    60.86(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.705(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     0.705(CFS)
Normal flow depth in pipe =    3.62(In.)
Flow top width inside pipe =   11.01(In.)
Critical Depth =    4.20(In.)
Pipe flow velocity =      3.53(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    10.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      406.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.720 given for subarea
Time of concentration =    10.36 min.
Rainfall intensity =      3.146(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.720
```

```
Subarea runoff =      0.181(CFS) for    0.080(Ac.)
Total runoff =      0.887(CFS)   Total area =       0.52(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   392.390(Ft.)
Downstream point/station elevation =   388.000(Ft.)
Pipe length  =    57.94(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.887(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     0.887(CFS)
Normal flow depth in pipe =    2.44(In.)
Flow top width inside pipe =    9.66(In.)
Critical Depth =    4.73(In.)
Pipe flow velocity =      7.75(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    10.48 min.
End of computations, total study area =          3.710 (Ac.)
```

POST CONSTRUCTION BMP SIZING CALCULATIONS

BMP1 DMA1

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA1	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	15409	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1079	898	647
PERVIOUS	2989	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	21	17	13
Total BMP Area	18398							Minimum BMP Size	1099.553	916	660
								Proposed BMP Size*	1100	1100	660
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	9.99	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP2 DMA2

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA2	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2210	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	155	129	93
PERVIOUS	1051	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	3261							Minimum BMP Size	162.057	135	97
								Proposed BMP Size*	750	750	450
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	2.16	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP3 DMA3

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA3	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	31679	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	2218	1847	1331
PERVIOUS	9050	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	63	53	38
Total BMP Area	40729							Minimum BMP Size	2280.88	1900	1369
								Proposed BMP Size*	2400	2400	1440
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	9.50	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP4 DMA4

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA4	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	1817	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	127	106	76
PERVIOUS	1059	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	2876							Minimum BMP Size	134.603	112	81
								Proposed BMP Size*	160	160	96
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	8.41	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP5 DMA5

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA5	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2853	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	200	166	120
PERVIOUS	2415	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	17	14	10
Total BMP Area	5268							Minimum BMP Size	216.615	180	130
								Proposed BMP Size*	520	520	312
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	4.16	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP6 DMA6

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA6	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	17562	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1229	1024	738
PERVIOUS	8353	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	58	49	35
Total BMP Area	25915							Minimum BMP Size	1287.811	1073	773
								Proposed BMP Size*	1320	1320	792
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	9.75	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP7 DMA7

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA7	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	1583	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	111	92	66
PERVIOUS	4014	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	28	23	17
Total BMP Area	5597							Minimum BMP Size	138.908	116	83
								Proposed BMP Size*	480	480	288
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	2.89	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP8 DMA8

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA8	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	6662	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	466	388	280
PERVIOUS	6975	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	49	41	29
Total BMP Area	13637							Minimum BMP Size	515.165	429	309
								Proposed BMP Size*	950	950	570
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	5.42	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP9 DMA9

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA9	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	16981	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1189	990	713
PERVIOUS	1290	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	9	8	5
Total BMP Area	18271							Minimum BMP Size	1197.7	998	719
								Proposed BMP Size*	1285	1285	771
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	9.32	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

BMP10 DMA10

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA10	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	16362	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1145	954	687
PERVIOUS	5442	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	38	32	23
Total BMP Area	21804							Minimum BMP Size	1183.434	986	710
								Proposed BMP Size*	1955	1955	1173
									Soil Matrix Depth	18.00	in
									Minimum Ponding Depth	6.05	in
									Maximum Ponding Depth		in
									Selected Ponding Depth	12.00	in

WATER QUALITY AND HYDROMODIFICATION

1. THE PROPOSED PROJECT RESULTS IN A REDUCTION IN PEAK STORM RUNOFF.
2. THIS PROJECT INCLUDES PROVISIONS FOR THE STATE'S HYDRO–MODIFICATION REQUIREMENTS.
3. THE PROPOSED GRADING AND DRAINAGE DESIGN INCLUDES DIRECTING RUNOFF TO NATURAL BMPS WHERE IT WILL BE TREATED BEFORE DISCHARGING OFFSITE.
4. THE PROPOSED BMPS FOR THE PROJECT INCLUDE LANDSCAPING, BIO–RETENTION, AND SELF–RETAINING AREAS.
5. THIS PLAN IS CONSISTENT WITH THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THE FOLLOWING REPORTS;

- FINAL WATER QUALITY TECHNICAL REPORT (WQTR) 9455 TOWNE CENTRE DRIVE DATED JANUARY 11, 2016
- FINAL DRAINAGE STUDY 9455 TOWNE CENTRE DRIVE DATED JANUARY 11, 2016.

POST CONSTRUCTION BMPS

1. THE PROJECT IS A PRIORITY DEVELOPMENT PROJECT PER THE CITY'S STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST (DS–560).
2. THE OWNER SHALL MAINTAIN THE LANDSCAPE AREAS.
3. SEE THIS SHEET 2 FOR POST CONSTRUCTION BMP (I.E. BIORETENTION) DETAILS.

LEGEND

- PROPERTY LINE
- DRAINAGE PATTERN/FLOW DIRECTION
- DAYLIGHT/LIMIT OF WORK
- 380 PROPOSED CONTOUR
- PROPOSED STORM DRAIN (PVT.)
- DRAINAGE MANAGEMENT AREA (DMA)
- BMP1 BEST MANAGEMENT PRACTICE
- DMA1 DRAINAGE MANAGEMENT AREA

STEVEN C. KETTLER R.C.E. NO. C48358 DATE
EXP. 6–30–2016

KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6–30–2016
CIVIL
STATE OF CALIFORNIA

PRIVATE CONTRACT

DRAINAGE MANAGEMENT AREA PLAN FOR:

9455 TOWNE CENTRE DRIVE

PARCEL 3 OF PARCEL MAP NO. 16265

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 8 OF 19 SHEETS

I.O. NO. 24006426
PROJECT NO. 465929

FOR CITY ENGINEER | DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KLE			
AS–BUILTS				

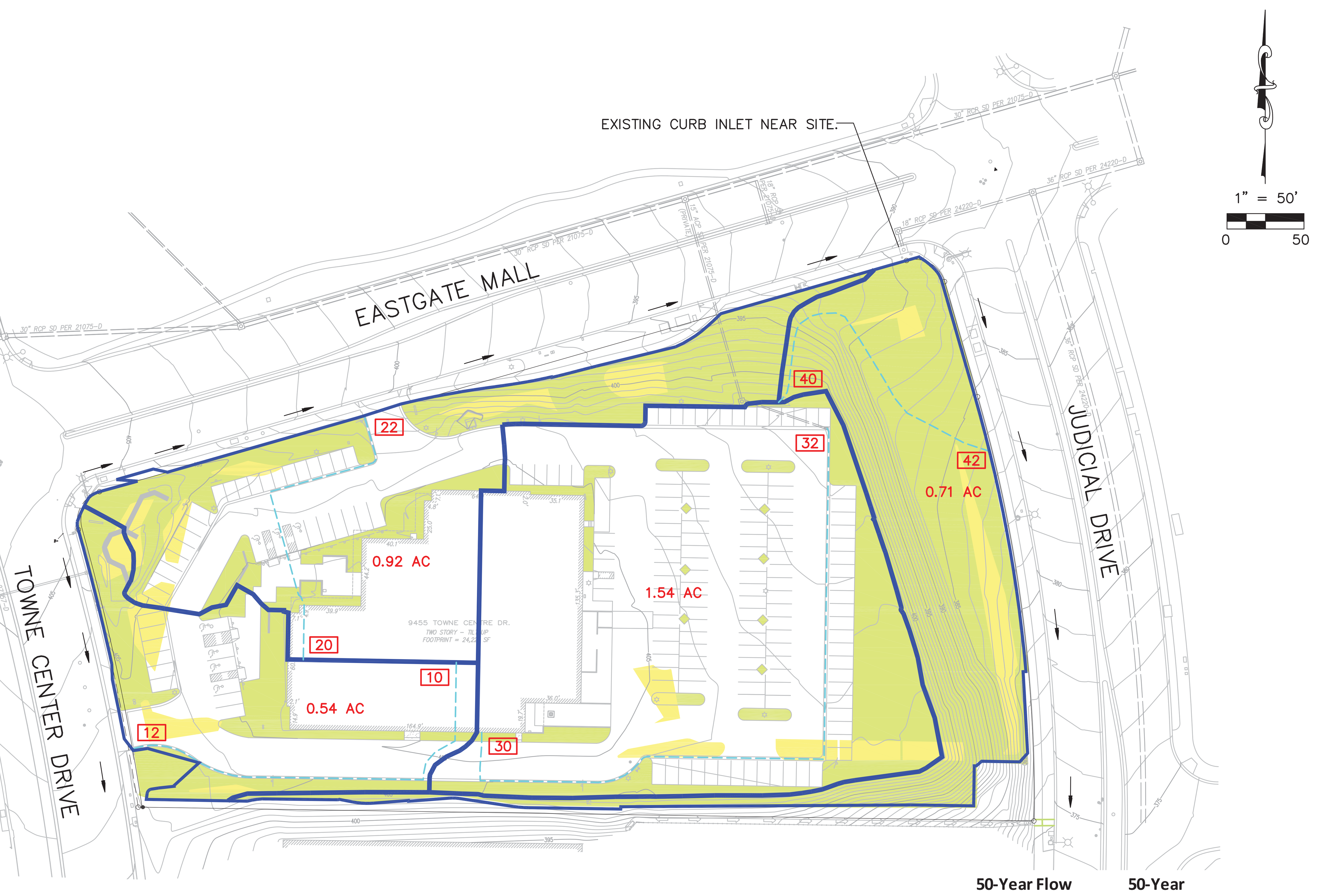
1900–6265
NAD83 COORDINATES

260–1705
LAMBERT COORDINATES

CONTRACTOR ________ DATE STARTED ________
INSPECTOR ________ DATE COMPLETED ________

39204-8 -D

DMA Plan used to determine proposed condition pervious and impervious areas



LEGEND:
DRAINAGE BASIN BOUNDARY
OVERLAND FLOW PATH
3.74 AC DRAINAGE BASIN AREA
10 RATIONAL METHOD NODE NUMBER
EXISTING PERVIOUS AREA
EXISTING IMPERVIOUS AREA

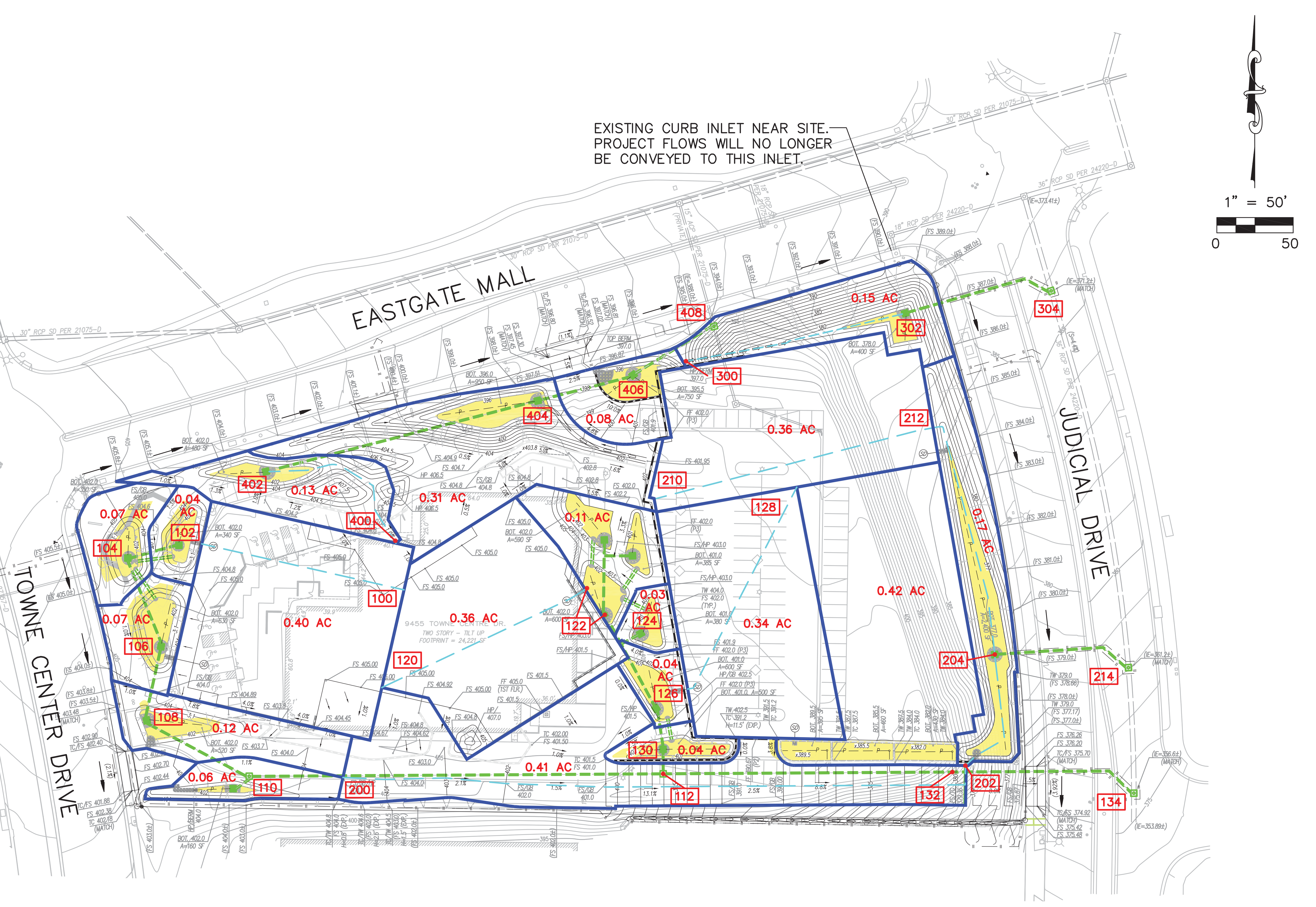
NOTES:
THE SOIL TYPE IS ALL "D". THE DEVELOPED PAD IS IN THE "FLAT" CATEGORY. THE OVERALL SITE IS 56 PERCENT IMPERVIOUS AND 44 PERCENT PERVIOUS.

THE FLOW VELOCITIES IN THE SUMMARY TABLE TO THE RIGHT WERE DETERMINED BY DIVIDING THE FLOW LENGTH BY THE TIME OF CONCENTRATION. THIS GIVES THE AVERAGE VELOCITY OF THE SURFACE FLOW.

Node	50-Year Flow Rate, cfs	50-Year Velocity, cfs
12	1.1	0.4
22	1.7	0.4
32	4.5	0.9
42	1.0	0.3

SUMMARY OF FLOWS

EXISTING CONDITION
RATIONAL METHOD WORK MAP



LEGEND:
DRAINAGE BASIN BOUNDARY
OVERLAND FLOW PATH
PROPOSED DRAINAGE FACILITY
3.74 AC DRAINAGE BASIN AREA
100 RATIONAL METHOD NODE NUMBER
PROPOSED BIOFILTRATION BASIN

NOTES:
THE SOIL TYPE IS ALL "D". THE SLOPES WILL BE IN THE "FLAT" CATEGORY. THE OVERALL SITE WILL BE 73 PERCENT IMPERVIOUS AND 32 PERCENT PERVIOUS.

ALL FLOWS IN SUMMARY TABLE TO RIGHT WILL ENTER AN EXISTING STORM DRAIN. THE "0.0" CFS AT NODE 214 REFLECTS THE DETAINED FLOW.

Node	50-Year Flow Rate, cfs	50-Year Velocity, cfs
134	5.7	15.3
214	0.0	0.0
304	0.3	4.3
408	0.9	7.8

SUMMARY OF FLOWS

PROPOSED CONDITION
RATIONAL METHOD WORK MAP

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.

15 August 2016

KILROY REALTY CORP.
3611 Valley Centre Drive, Suite 550
San Diego, CA 92130-3318
Attn: Ms. Kim Elliott

Job No. 15-10932

Subject: **Addendum Geotechnical Report Response to City Reviewer**
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Ms. Elliott:

In accordance with your request, ***Geotechnical Exploration, Inc***. herein responds to the City of San Diego LDR-Geology, Cycle 51, review comments in a Memo with completion date of August 11, 2016, with respect to the planned office building and parking structure project at the subject property in San Diego, California. The LDR-Geology reviewer has reviewed our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMPs," dated August 4, 2016.

Issue No. 9: *"Submit an addendum geotechnical report or update letter that specifically addresses the following".*

GEI Response: We submit this letter as our "Addendum Geotechnical Report" in response to the City reviewer's comments.

Issue No. 10: *"The project's geotechnical consultant should clarify if their site specific evaluation was conducted to attempt to achieve on-site storm water infiltration to the greatest extent feasible." (New Issue)*

GEI Response: Our site specific evaluation was conducted to attempt to achieve on-site storm water infiltration to the greatest extent possible. The results of our evaluation, however, indicated that any infiltration at the site would result in geotechnical hazards which cannot be reasonably mitigated.

Issue No. 11: *"The project's geotechnical consultant should clarify if in their professional opinion, potential impacts associated with potential on-site infiltration cannot be mitigated to a level of insignificance at any location on the proposed project site." (New Issue).*

GEI Response: In our *professional opinion, potential impacts associated with potential on-site infiltration cannot be mitigated to a level of insignificance at any location on the proposed project site.*

<u>Issue No. 12</u>: *"The project's geotechnical consultant should clarify if, in their professional opinion and based on their site specific investigation, there are no areas of the site where storm water infiltration is feasible." (New Issue).*

GEI Response: Based on our site specific investigation, it is our professional opinion that storm water infiltration is not feasible at any location on the site without resulting in geotechnical hazards which cannot be reasonably mitigated:

If you have further questions regarding this matter, please contact our office. Reference to our **Job No. 15-10932** will help expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING • GROUNDWATER • ENGINEERING GEOLOGY

04 August 2016

KILROY REALTY CORP.
3611 Valley Centre Drive, Suite 550
San Diego, CA 92130-3318
Attn: Mr. Bob Little

Job No. 15-10932

Subject: **Addendum Geotechnical Report Response to City Reviewer**
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Little:

In accordance with your request, ***Geotechnical Exploration, Inc***. herein responds to the City of San Diego LDR-Geology, Cycle 49, review comments dated June 9, 2016, with respect to the planned office building and parking structure project at the subject property in San Diego, California. We previously submitted our "Report of Preliminary Geotechnical Investigation" dated December 15, 2015, our "Response to City Plan Check-City Project No. Nbr 465929" dated February 8, 2016, and our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMPs," dated May 23, 2016.

Issue No. 2: *Submit an addendum geotechnical report or update letter that specifically addresses the following: (New Issue).*

GEI Response: We submit this letter as our "Addendum Geotechnical Report" in response to the City reviewer's comments.

Issue No. 3: *Provide the percolation data for tests INF-1 through INF-5. (New Issue).*

GEI Response: Attached with this addendum geotechnical report, we have included a site plan showing the test locations, percolation test data and calculations for the conversion of percolation test rates to infiltration rates for tests INF-1 through INF-5.

Issue No. 4: *The referenced limited geotechnical investigation and Form I-8 provide converted infiltration rates ranging from 0.007 to 0.102 inches per hour indicating the soil conditions allow for an appreciable amount of infiltration. Criteria 5 should be marked "yes."*

GEI Response: Please note, we are now using worksheet C.4-1 for the characterization of infiltration feasibility conditions on the site. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we have revised worksheet C.4-1 accordingly as directed by the reviewer. Our revised worksheet C.4-1 form is attached.

Issue No. 5: *For Criteria 6, provide the specific geologic and/or geotechnical hazard(s) that cannot be mitigated to an acceptable level for each location tested per Appendix C.2*

GEI Response: The specific geologic/geotechnical hazards for each infiltration test location, per Appendix C.2, are presented below based on the following detailed information regarding our evaluation of the anticipated groundwater seepage regimen at the site.

C.2.1 Soil and Geologic Conditions

1. Infiltration Testing and Subsurface Flow Findings and Discussion

As indicated in our reports dated December 15, 2015, and February 8, 2016, the site is underlain by a relatively thin layer of compacted fill soils overlying Very Old Paralic deposits consisting of dense to very dense sands. The contact between the fills and formational materials in general slopes down to the east.

Infiltration Tests 1, 2 and 5 indicated calculated infiltration rates of 0.0035, 0.0035 and 0.033 inches per hour, respectively, with a factor of safety of 2 applied. The water column for these tests was completely within the formational deposits. Infiltration Test 3 indicated a calculated infiltration rate of 0.044 inches per hour with a factor of safety of 2 applied. The water column for this test was half in fill soil and half within the formational deposits. Infiltration Test 4 indicated a calculated infiltration rate of 0.014 inches per hour with a factor of safety of 2 applied. The water column for this test was completely within fill soils with the exception of the bottom few inches which were formational. The infiltration rates were determined utilizing percolation test procedures which are corrected by the Porchet equation to determine the vertical infiltration rates. It should be noted that the Porchet equation assumes that the entire bottom and sidewall of the test hole exposed to the water column is the same material, which was not the case for Tests 3 and 4. Based on the preceding, it is our opinion that in general the infiltration rates for formational materials only would be less than 0.005 inches per hour with a minimum factor of safety of 2. The obvious conclusion from the preceding is that infiltration will result primarily in lateral spreading of a "perched" groundwater condition although long term infiltration will include vertical movement of the water into the underlying foundation soils for the proposed structures.

C.2.4 Utility Considerations

Due to the anticipated perched seepage condition as previously discussed, it is our opinion that the infiltration would result in water intrusion into new on-site utility trench lines as well as existing trench lines and vaults for City utilities along Judicial Drive, Eastgate Mall and Towne Centre Drive and the adjacent property to the south, which are both lower in elevation.

C.2.6 Retaining Walls and Foundations

1. <u>Infiltration Effects on the Proposed Structures</u>

The allowable bearing pressures for footings presented in our investigation report dated December 15, 2015, were governed by anticipated settlements. Utilizing Standard Penetration test results we recommended allowable dead plus live load bearing values to limit anticipated total settlements to a maximum of 1 inch. As indicated above, it is our opinion that over an extended period of time the formational soils below footings would become essentially saturated. For that condition our settlement calculations indicate an additional post construction settlement of 1 inch. Further, given the very high Standard Penetration test values measured during our field exploration, it is our opinion that the formational materials possess a carbonate type cementing and, as a result, the actual settlement of the proposed building footings may initially be negligible but then begin to occur as the materials become wetted. This would result in post construction settlements on the order of 2 inches that would occur randomly over an extended period of time as the wetting front progresses.

2. <u>Infiltration Effects on the Proposed Permanent Soil Nail and Tied-Back Shoring Walls</u>

Wetting of the soils behind these walls will result in an increased load on the walls due to an increase in soil weight. Of more concern, however, is that the soil anchors will be tensioned and locked off based on the resistance of the materials in their existing dry condition. As the soils surrounding the anchors become wetted, however, we anticipate yielding of the anchors that would at a minimum result in architectural damage to the walls. This would also apply to the existing lagging wall on the lower property to the south.

C.2.4 Utility Considerations and
C.2.6 Retaining Walls and Foundations

A discussion of the geotechnical hazards per Appendix C.2, specific to each infiltration test location, is presented below:

INF-1: Is proposed adjacent to Eastgate Mall with several existing utility lines and vaults. The infiltration rate with a minimum factor of safety of 2 is 0.0035 inches per hour which is less than required for partial infiltration. In addition, the proposed infiltration basin would be located within 20 feet of the proposed 5-story office building. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Eastgate Mall and detrimental post construction settlement of the proposed office building.

INF-2: Is proposed adjacent (within 7 feet) of the proposed 5-story office building. The infiltration rate with a minimum factor of safety of 2 is 0.0035 inches per hour which is less than required for partial infiltration. The geotechnical hazards associated with this infiltration basin include water intrusion into buried existing utility lines and/or vaults on the subject site and Towne Center Drive and detrimental post construction settlement of the proposed office building.

INF-3: Is proposed adjacent to Eastgate Mall with several existing utility lines and vaults. In addition, the proposed infiltration basin would be immediately adjacent to the proposed 6-story parking structure and permanent tied-back and soil nail site retaining walls. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Eastgate Mall, detrimental post construction settlement of the proposed parking structure and detrimental yielding of the permanent tied-back and soil nail site retaining walls.

INF-4: Is proposed adjacent to the proposed 6-story parking structure and permanent tied-back and soil nail site retaining walls as well as an existing permanent shoring wall on the adjacent property to the south. The geotechnical hazards associated with this infiltration basin include detrimental post construction settlement of the proposed parking structure and detrimental yielding of the proposed soil nail and tie-back retaining walls and adjacent off-site existing permanent shoring wall on the adjacent property to the south.

INF-5: Is proposed adjacent to Judicial Drive with several existing utility lines and vaults. In addition, the proposed infiltration basin would be immediately adjacent to the proposed 6-story parking structure. The geotechnical hazards associated with this infiltration basin include water intrusion into buried utility lines and/or vaults along Judicial Drive and detrimental post construction settlement of the proposed parking structure.

In summary, it is our opinion that infiltration at any location on the site would result in the geotechnical hazards previously discussed, such as damaging post-construction building settlement, yielding and damage to the proposed permanent tied-back and soil nail shoring walls, and intrusion into both on-site and adjacent off-site trenches and vaults. The geotechnical hazards associated with the proposed infiltration basin locations cannot be reasonable mitigated.

Issue No. 6: *Based on the answer provided in Criteria 7, provide specific geologic/geotechnical hazards associated to shallow perched seepage at the site.*

GEI Response: The specific geologic/geotechnical hazards associated with shallow perched seepage at the site include detrimental post construction settlements of the proposed 5-story office building and 6-story parking structure, yielding of the proposed permanent soil nail and tie-back retaining walls, water intrusion into proposed site underground utility lines and/or vaults as well as existing lines and vaults in the surrounding streets as well as on the lower adjacent existing development to the south.

Issue No. 7: *Provide a response to Criteria 8 based on Appendix C.3.*

GEI Response: In accordance with "*The City of San Diego, Storm Water Standards, BMP Design Manual*," Appendix C.4.4, the project design engineer has the responsibility to complete Criteria's 4 and 8 of worksheet C.4-1. The attached worksheet C.4-1 includes responses to Criteria's 4 and 8.

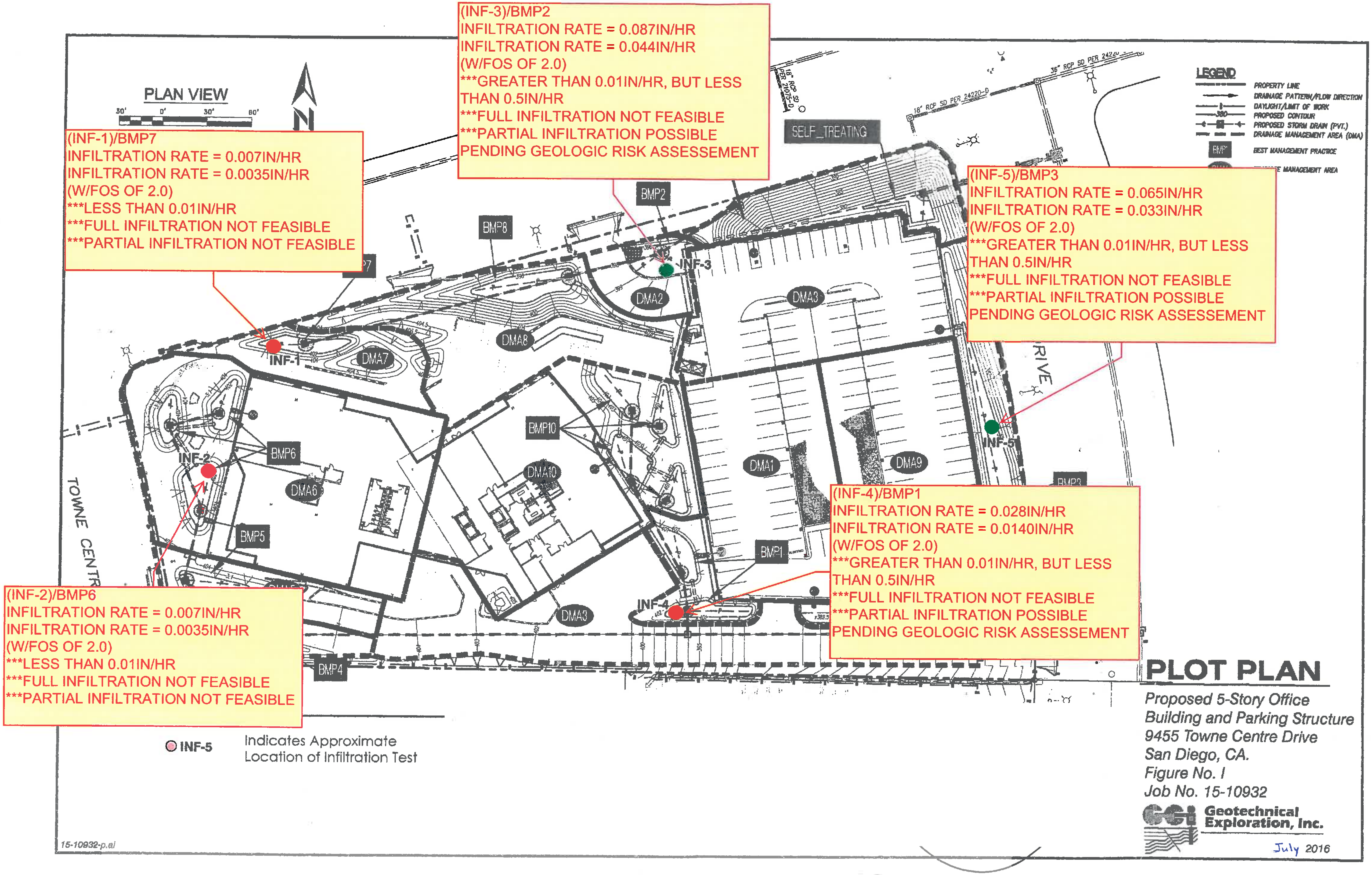
If you have further questions regarding this matter, please contact our office. Reference to our **Job No. 15-10932** will help expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA



PLAN VIEW
(INF-3)/BMP2
INFILTRATION RATE = 0.087IN/HR
INFILTRATION RATE = 0.044IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE PENDING GEOLOGIC RISK ASSESEMENT
(INF-1)/BMP7
INFILTRATION RATE = 0.007IN/HR
INFILTRATION RATE = 0.0035IN/HR
(W/FOS OF 2.0)
***LESS THAN 0.01IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION NOT FEASIBLE
(INF-5)/BMP3
INFILTRATION RATE = 0.065IN/HR
INFILTRATION RATE = 0.033IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE
PENDING GEOLOGIC RISK ASSESSEMENT
(INF-4)/BMP1
INFILTRATION RATE = 0.028IN/HR
INFILTRATION RATE = 0.0140IN/HR
(W/FOS OF 2.0)
***GREATER THAN 0.01IN/HR, BUT LESS THAN 0.5IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION POSSIBLE
PENDING GEOLOGIC RISK ASSESSEMENT
(INF-2)/BMP6
INFILTRATION RATE = 0.007IN/HR
INFILTRATION RATE = 0.0035IN/HR
(W/FOS OF 2.0)
***LESS THAN 0.01IN/HR
***FULL INFILTRATION NOT FEASIBLE
***PARTIAL INFILTRATION NOT FEASIBLE
SELF_TREATING
LEGEND
PROPERTY LINE
DRAINAGE PATTERN/FLOW DIRECTION
DAYLIGHT/LIMIT OF WORK
PROPOSED CONTOUR
PROPOSED STORM DRAIN (PVT.)
DRAINAGE MANAGEMENT AREA (DMA)
BEST MANAGEMENT PRACTICE
INF-1
INF-2
INF-3
INF-4
INF-5
BMP1
BMP2
BMP4
BMP5
BMP6
BMP8
BMP10
DMA1
DMA2
DMA3
DMA6
DMA7
DMA8
DMA9
DMA10
TOWNE CENTR
INF-5 Indicates Approximate Location of Infiltration Test
PLOT PLAN
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. I
Job No. 15-10932
Geotechnical Exploration, Inc.
July 2016
15-10932-p.ai

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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 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Borehole percolation testing was performed at 5 locations on the site within or adjacent to the proposed infiltration basins in accordance with Appendix D of the City of San Diego BMP design manual. In addition, a comprehensive evaluation of the site was conducted in accordance with Appendix C.2. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated geotechnical hazards that cannot be mitigated to an acceptable level is not applicable. 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.		X
Provide basis: The infiltration test results below the proposed facility locations range from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Based on the infiltration test rate findings across the site, infiltration rates greater than 0.5 inches per hour were not encountered, therefore, a narrative discussion of the associated risk of groundwater contamination that cannot be mitigated to an acceptable level is not applicable. 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: The response to Criteria #1 - #3 is No, therefore full infiltration is not feasible and Criteria #4 is "N/A" --- Kettler Leweck Engineering 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 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	No	

*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.	X	
Provide basis: The City of San Diego BMP Design Manual, Appendix C and Appendix D, do not provide values considered for appreciable rates. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we answered yes to this screening question as directed by the reviewer. Measured infiltration rates varied from 0.0035 to 0.044 inches per hour with a minimum factor of safety of 2 applied. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.		X
Provide basis: In our opinion, any long term infiltration at the site will result in geotechnical hazards which cannot be reasonable mitigated to an acceptable level. Based on our comprehensive evaluation in accordance with Appendix C.2, the anticipated geotechnical hazards are outlined below: C.2.6 Retaining Walls and Foundations 1. Damaging post construction differential settlements of up to 2 inches for the proposed office building and parking structure. 2. Damaging post construction yielding of the permanent tied-back and soil nail walls. 3. Increase in lateral pressures and reduction of soil strength of the permanent shoring wall and surfacing seepage in the slope that descends to the lower existing development to the south. C.2.4 Utility Considerations Water intrusion into existing utility lines and vaults both on-site and off-site including the adjacent public streets (Judicial Drive and Towne Centre Drive) and existing development which bounds the southern property boundary at a lower elevation. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.			

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	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.		X
Provide basis: In review of our "Report of Preliminary Geotechnical Investigation" dated December 15, 2015, groundwater was not encountered to a depth of 38.5 feet below existing ground surface. Although groundwater was not encountered to the aforementioned depth, the risk for groundwater related concerns include shallow perched seepage due to the practically impermeable dense to very dense nature of the formational soils across the site. Based on our comprehensive evaluation in accordance with Appendix C.3, the anticipated risk for groundwater related concerns are outlined below: C.3.7 Other Factors Inadequate infiltration treatment of shallow perched seepage surfacing on the adjacent slopes to the north and south potentially transporting storm water pollutants or other factors. Please refer to our "Addendum Geotechnical Report" dated August 4, 2016 for details of the comprehensive evaluation and investigation conducted, percolation rates and percolation rate to infiltration rate calculations and maps representative of the study. 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.			
8	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.		
Provide basis: The response to Criteria #6 and #7 is No, therefore partial infiltration is not feasible and Criteria #8 is "N/A" --- Kettler Leweck Engineering 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.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. 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.	No	

*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

Porchet Corrections

Infiltration rate=((delta h*60r)/(delta t*(r+2 h avg))

Test No.	Delta T (min)	h 1 (inches)	h 2 (inches)	delta h (inches)	h avg (inches)	r (radius) (inches)	delta h*60r	delta t*(r+2 h avg)	Infiltration rate (in/hr)
1	60	31.750	31.875	0.125	31.813	4	30	4057.5	0.007
2	60	32.250	32.375	0.125	32.313	4	30	4117.5	0.007
3	60	37.500	39.250	1.750	38.375	4	420	4845	0.087
4	60	33.375	33.875	0.500	33.625	4	120	4275	0.028
5	60	28.500	29.500	1.000	29.000	4	240	3720	0.065

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-1 TEST HOLE SIZE: 8"

SOIL CLASSIFICATION: SILTY SAND / CLAYEY SAND ~1.5' FILL

DEPTH OF TEST HOLE: 58" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 8:54 5/16/16 Stop 0638 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE W/ 11" STICK UP

TEST PERIOD

3" PEA GRAVEL

57" TOP OF GRAVEL TO TOP OF PVC

PRE-SOAK

Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
8:54		22.25			
0638					
0735	57	31.125	31.25	0.125	456
0735					
0832	57	31.25	31.375	0.125	456
0832					
0932	60	31.375	31.5	0.125	480
0932					
1032	60	31.5	31.625	0.125	480
1032					
1132	60	31.625	31.75	0.125	480
1132					
1232	60	31.75	31.875	0.125	480

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-2 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: SILTY SAND / CLAYEY SAND ~1.5' FILL

DEPTH OF TEST HOLE: 56" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 9:20 5-16-16 Stop 0630 5-17-16

AMOUNT OF WATER USED: ~ 10 GALLONS

4" PVC PERFORATED PIPE W/ 11" STICK UP

2" PEAGRAVEL

61 ½" FROM TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
	920					
PRE-SOAK			21.0			
	0630					
	0730	60	31.625	31.75	0.125	480
	0730					
	0830	60	31.75	31.875	0.125	480
	0830					
	0930	60	31.875	32.0	0.125	480
	0930					
	1030	60	32.0	32.125	0.125	480
	1030					
	1130	60	32.125	32.25	0.125	480
	1130					
	1230	60	32.25	32.375	0.125	480

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-3 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: SILTY SAND/CLAYEY SAND ~4' FILL

DEPTH OF TEST HOLE: 58" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 9:44 5-16-16 Stop 0642 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE w/ 6" STICK UP 60" TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD 2" PEAGRAVEL

Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
944					
PRE-SOAK		15.75			
0642	56	28.25	30.5	2.25	24.9
0738					
0738	56	30.5	32.25	1.75	32
0834					
0834	60	32.25	34.0	1.75	34.3
0934					
0934	60	34.0	35.75	1.75	34.3
1034					
1034	60	35.75	37.5	1.75	34.3
1134					
1134	60	37.5	39.25	1.75	34.3
1234					

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-4　　　TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: CLAYEY SAND (FILL)

DEPTH OF TEST HOLE: 58"　　　DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 10:08 5-16-16　　　Stop 0645 5-17-16

AMOUNT OF WATER USED: ~ 10 GALLONS

4" PVC PERFORATED PIPE W/ 9" STICK UP　　　59 3/4 TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD　　　1 3/4" PEA GRAVEL

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRE-SOAK	1008		18.5			
	0645 / 0741	56	31.0	31.25	0.25	224
	0741 / 0836	55	31.25	31.875	0.625 ~~0.75~~	88 ~~73.3~~
	0836 / 0936	60	31.875	32.375	0.5	120
	0936 / 1036	60	32.375	32.875	0.5	120
	1036 / 1136	60	32.875	33.375	0.5	120
	1136 / 1236	60	33.375	33.875	0.5	120

LEACHLINE PERCOLATION DATA SHEET/CONTINUOUS PRE-SOAK

JOB NO. 15-10932

TEST HOLE NO.: INF-5 TEST HOLE SIZE: 8" DIA

SOIL CLASSIFICATION: CLAYEY SAND (SC) ~2' FILL

DEPTH OF TEST HOLE: 60" DATE EXCAVATED: 5-16-16

PRESOAK PERIOD

TIME INTERVAL: Start 10:42 5-16-16 Stop 0650 5-17-16

AMOUNT OF WATER USED: ~10 GALLONS

4" PVC PERFORATED PIPE W/ 2" STICK UP

2" PEA GRAVEL

58" FROM TOP OF GRAVEL TO TOP OF PVC

TEST PERIOD

	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min/inch)
PRESOAK	1042		12,25			
	0650 0745	55	22.625	23.5	0.825	~~66.6~~ ok
	0745 0840	55	23.5	24.5	1.0	55
	0840 0940	60	24.5	26,125	1,625	36,9
	0940 1050	60	26,125	27.5	1, 375	43.6
	1050 1150	60	27.5	28.5	1.0	60
	1150 1250	60	28.5	29.5	1.0	60

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING • GROUNDWATER • ENGINEERING GEOLOGY

23 May 2016

KILROY REALTY CORP. **Job No. 15-10932**
3611 Valley Centre Drive, Suite 550
San Diego, CA 92130-3318
Attn: Mr. Bob Little

Subject: **Report of Limited Geotechnical Investigation**
Proposed Storm Water Infiltration BMP's
Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, California

Dear Mr. Little:

In accordance with your request, and our proposal dated April 21, 2016, we herein provide this limited geotechnical investigation to allow evaluation of the feasibility of utilizing storm water infiltration BMPs at the location of the proposed 5-Story Office Building and Parking Structure site. On May 16, 2016, we placed five borings on the site for evaluation of storm water infiltration BMPs, per the requirements of the City of San Diego's Storm Water Standards, BMP Design Manual in accordance with the Guidelines for Geotechnical Reports (Appendix C), and Approved Infiltration Rate Assessment Methods (Appendix D).

I. PROJECT SUMMARY AND SCOPE OF SERVICES

It is our understanding that the project will consist of an on-grade five-story, steel-frame office building and six-level concrete parking structure with two levels below grade on the north, south and west sides and associated improvements. We have reviewed the preliminary site plan of the property prepared by Kettler Leweck Engineering.

7420 TRADE STREET • SAN DIEGO, CA. 92121 • (858) 549-7222 • FAX: (858) 549-1604 • EMAIL: geotech@gei-sd.com

The scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, percolation testing within the location of the proposed infiltration basins, and the preparation of this report. The data obtained and the analyses performed were to allow evaluation of the feasibility of the proposed storm water infiltration BMPs.

II. SITE DESCRIPTION

The site of the proposed office building and parking structure is currently developed with a two-story office building and parking lot on a previously graded, relatively level building pad located southeast of the intersection of Towne Centre Drive and Eastgate Mall in San Diego, California (see Vicinity Map, Figure No. I).

The rectangular-shaped property is bounded to the north by Eastgate Mall approximately 0 to 10 feet lower in elevation; to the south by two existing office buildings approximately 5 to 20 feet lower in elevation; to the east by Judicial Drive approximately 12 to 25 feet lower in elevation; and to the west by Towne Centre Drive at approximately the same elevation.

III. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program utilizing a truck-mounted, continuous-flight auger drill rig to investigate, sample and perform infiltration testing of the subsurface soils. Five exploratory borings were drilled to a maximum depth of 5 feet within the area of the proposed infiltration basins on May 16, 2016. Infiltration testing was conducted from approximately 3 to 5 feet in depth in the bottom of our borings. In addition, based on our *"Report of Preliminary Geotechnical Investigation,"* dated December

15, 2015, groundwater was not encountered below the subject site to a depth of 37½ feet. The soils encountered in the exploratory borings were continuously logged in the field by our certified engineering geologist and described in accordance with the Unified Soil Classification System. The approximate locations of the exploratory borings and percolation testing are shown on the Plot Plan, Figure No. II.

Representative samples were obtained from the exploratory excavations at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing.

IV. <u>SOIL DESCRIPTION</u>

Our subsurface exploration program revealed that the areas of the proposed storm water infiltration basins is underlain by approximately 1½ to 4½ feet of existing fill soils, consisting of medium dense to dense clayey and silty sands. Quaternary-Age Very Old Paralic Deposit (Qvop9a) formational materials, consisting of very dense clayey and silty sands, were encountered beneath the fill soils.

The exploratory borings and related information depict subsurface conditions only at the specific locations shown on the site plan and on the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes.

IV. <u>LABORATORY TESTS AND SOIL INFORMATION</u>

The following test was conducted on the sampled soils:

1. Determination of Percentage of Particles Passing #200 Sieve (ASTM D1140-14)

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength. Based on our laboratory test results, 25 to 41% of the soils tested passed the #200 sieve.

V. GROUNDWATER

Free groundwater was not encountered in the exploratory excavations at the time of excavation. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification, rainfall, and other possible factors that may not have been evident at the time of our field investigation.

VI. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the field investigation conducted by our firm, our laboratory test results, infiltration test results, and our experience with similar soils and formational materials.

We performed percolation testing at five locations at a depth between 36 and 60 inches per the requirements of the City of San Diego's Storm Water Standards, BMP Design Manual, in accordance with Appendix D. The infiltration basins have been proposed predominately to the west of the proposed office structure, in between the proposed office structure and proposed parking structure and to the east and southeast of the proposed parking structure. Testing at the five locations, (INF-1 through INF-5), revealed percolation rates of 0.125- to 1.75-inch/hour. The percolation test rate results have been converted to infiltration rates, using the Porchet Method and are presented in the table below. The infiltration rates presented in the table below do not include an applied factor of safety.

Proposed Infiltration Basin ID	**Borehole Percolation Test ID**	**Percolation Rates (inches/hour)**	**Converted Infiltration Rates (inches/hour)**
BMP 1	(INF-4)	0.5	0.029
BMP 2	(INF-3)	1.75	0.102
BMP 3	(INF-5)	1.0	0.073
BMP 6	(INF-2)	0.125	0.007
BMP 7	(INF-1)	0.125	0.007

Based on the results of our percolation testing and review of USDA soil maps, the site has been assigned to hydrologic soil group (HSG) D. As part of our geologic/geotechnical site evaluation, we considered the following issues:

1. The site is ***not*** subject to high groundwater conditions (within 10 feet of the base of the infiltration facility.

2. The site is ***not*** in close proximity to a known contaminated soil site.

3. The site ***is*** underlain by artificial fill over very dense formational clayey and silty sand soils, but ***not*** subject to hydroconsolidation.

4. The site ***has*** infiltration rates between 0.007 to 0.102-inch/hour without applying a factor of safety.

5. The site ***does not*** have a silt plus clay percentage of greater than 50.

6. The site ***is*** underlain by practically impermeable formational soils encountered below 1½ to 4½ feet in depth.

7. The site is ***not*** located within 100 feet from a drinking water well.

8. The site is ***not*** located within 100 feet from an on-site septic system or designated expansion area.

9. The site ***is*** located adjacent to a slope steeper than 25 percent.

Based on the results of our percolation testing and evaluation of the infiltration rates, it is our professional opinion that this site does not have favorable soil conditions and appreciable infiltration rates for the design of full or partial infiltration BMPs. Further, any long term infiltration could result in unmitigatable geotechnical hazards such as post construction building settlement and yielding of soil nail and tie-back retaining walls. Accordingly, we recommend that all storm water BMPs be lined with impermeable liners and drained with perforated subdrain pipes.

LIMITATIONS

The findings, opinions, and conclusions presented herein have been made in accordance with generally accepted principles and practice in the field of geotechnical engineering within the County of San Diego. No warranty, either expressed or implied, is made.

If you have any questions regarding this letter, please contact our office. Reference to our **Job No. 15-10932** will help expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

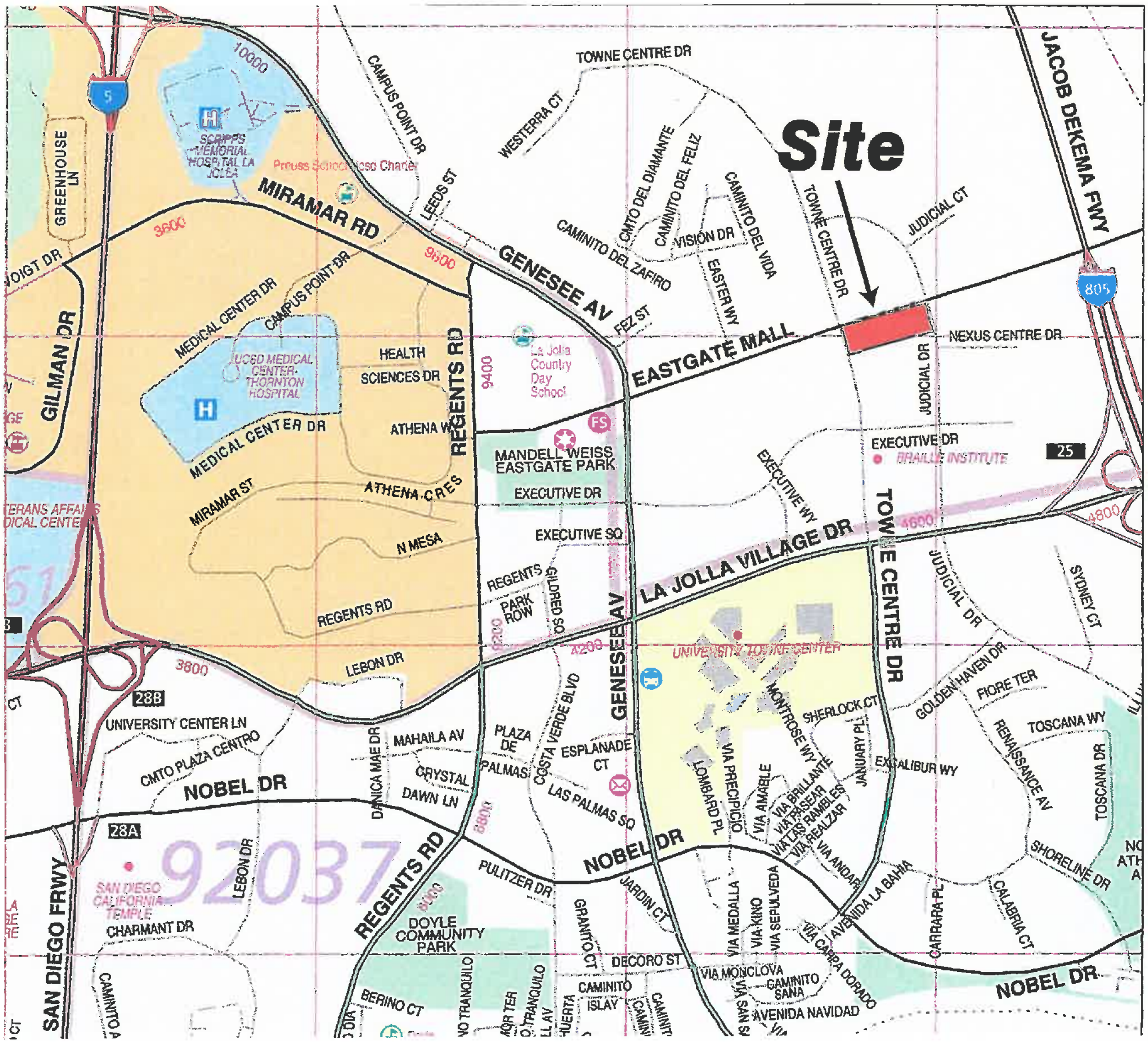
Jonathan A. Browning
P.G. 9012/C.E.G. 2615
Senior Project Geologist

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

PROFESSIONAL GEOLOGIST
JONATHAN A. BROWNING
No. 2615
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

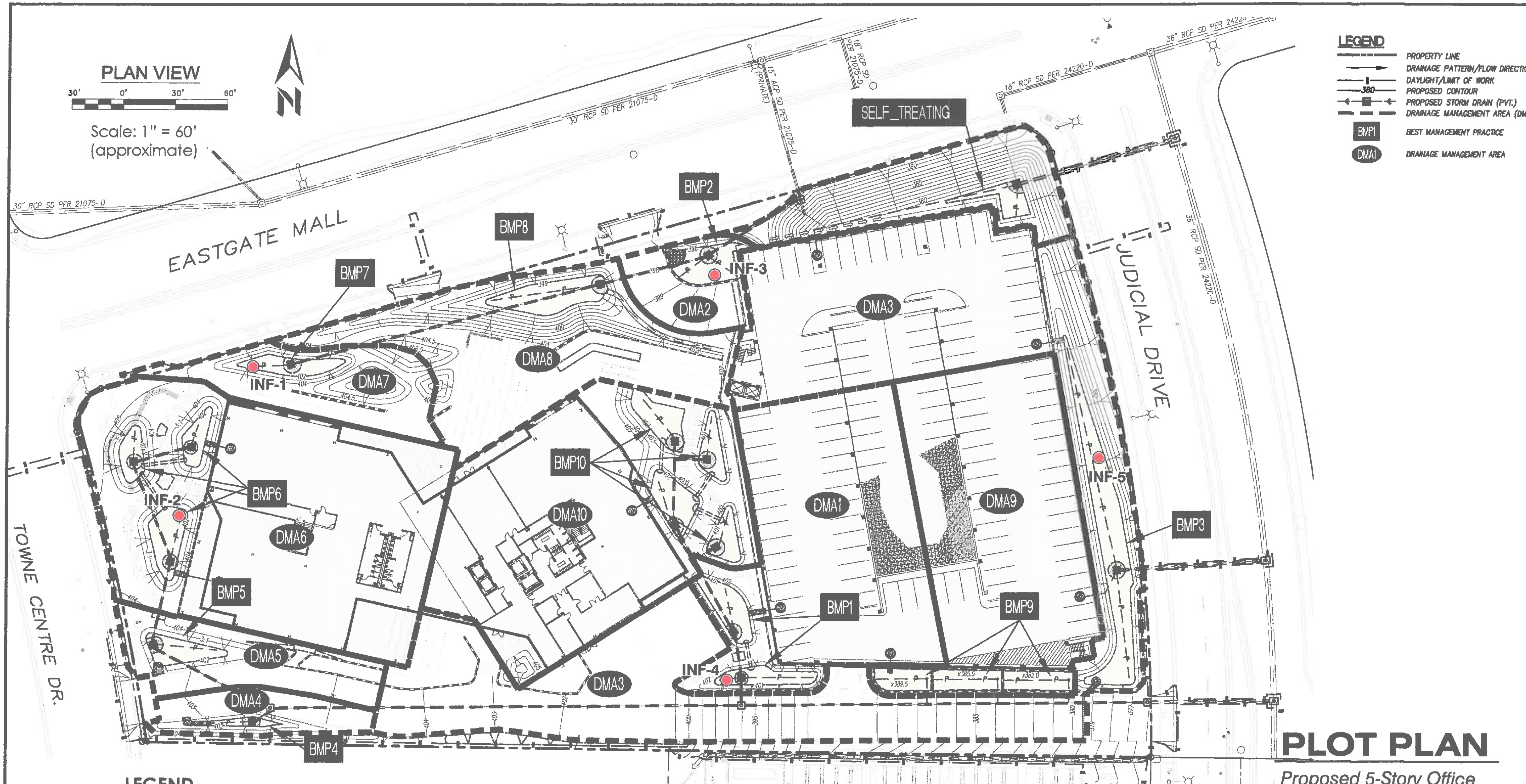
VICINITY MAP



Thomas Bros Guide San Diego County pg 1228-D2

Proposed 5-Story Office Building
and Parking Structure
9455 Towne Centre Drive
San Diego, CA.

Figure No. I
Job No. 15-10932



LEGEND

INF-5 Indicates Approximate Location of Infiltration Test

STEVEN C. KETTLER R.C.E. NO. C48358 EXP. 6-30-2016

KETTLER LEWECK ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER STEVEN C. KETTLER No. C48358 Exp. 6-30-2016 CIVIL STATE OF CALIFORNIA

REFERENCE: This Plot Plan was prepared from an existing undated Drainage Management Area Plan & Private Storm Drain Profile plan by KETTLER LEWECK ENGINEERING and from on-site field reconnaissance performed by GEI.

PLOT PLAN

Proposed 5-Story Office Building and Parking Structure
9455 Towne Centre Drive
San Diego, CA.
Figure No. II
Job No. 15-10932

Geotechnical Exploration, Inc.

May 2016

15-10932-p.ai

PRELIMINARY DRAINAGE REPORT

FOR
9455 TOWNE CENTRE DRIVE
OFFICE BUILDING & PARKING STRUCTURE
SAN DIEGO, CALIFORNIA

PTS NO. 291342

September 4, 2015

Prepared For:

Kilroy Realty Corporation
3611 Valley Centre Drive, Suite 550
San Diego, CA 92101
(858) 523-0300

Prepared By:

KETTLER LEWECK
ENGINEERING
303 A Street, Suite 302
San Diego, California 92101
(619) 269-3444

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

Steven C. Kettler RCE 48358
Registration Expires 6-30-2016

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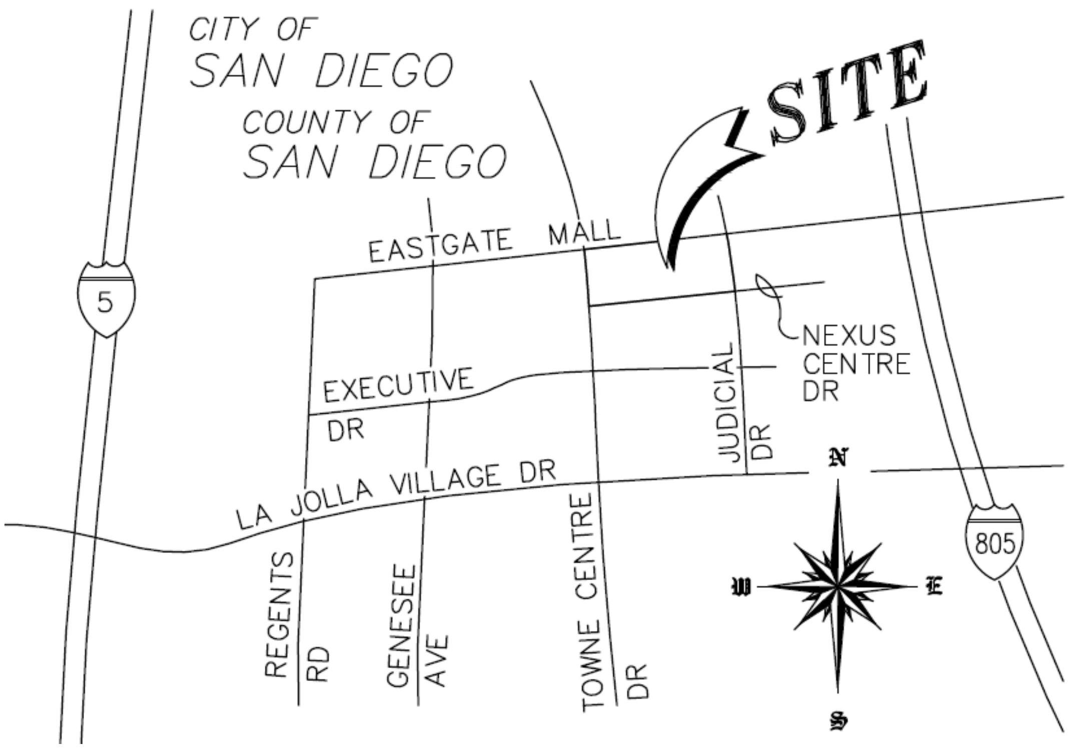
APPENDIX

INTRODUCTION

Kilroy Realty Corporation is proposing to redevelop an existing 3.91 acre office building site located at 9455 Towne Centre Drive in the city of San Diego (see Vicinity Map). The site is bounded by Towne Centre Drive to the west, Eastgate Mall to the north, Judicial Drive to the east, and existing office buildings to the south. The site currently contains a two-story 45,000 square foot office building with surface parking. The existing building and parking will be demolished prior to construction of the proposed 150,000 square foot, 5-story office building and 5-level parking structure.



Vicinity Map

Under existing conditions, storm runoff from the site is conveyed as follows (see the Existing Condition Rational Method Work Map in Appendix A). Runoff from the southwesterly portion sheet flows onto Towne Centre Drive primarily from the site's westerly driveway entrance. A small portion of runoff from this area sheet flows directly onto the adjacent Towne Centre Drive. Runoff from the northwesterly/northerly portion sheet flows onto Eastgate Mall either directly or from the site's northerly driveway entrance. Runoff from the rear of the site flows into a catch basin at the northeasterly corner of the main parking lot. A storm drain lateral conveys runoff from the catch basin north to an existing public storm drain system in Eastgate Mall. This storm drain continues east in Eastgate Mall, then south in Judicial Drive. Finally, runoff from the slope along the southerly and easterly site perimeters flows to Judicial Drive either directly or via the property to the south. The site runoff to Eastgate Mall and Judicial Drive is ultimately collected by the Judicial Drive storm drain system, i.e., the majority of the site runoff will enter the Judicial Drive storm drain. The only site runoff not collected by the Judicial Drive storm drain is the small area of runoff onto Towne Centre Drive.

After development, storm runoff from the majority of the project will be conveyed by proposed private on-site storm drain systems directly to the Judicial Drive storm drain system (see the Proposed Condition Rational Method Work Map in Appendix A). The on-site storm drains will connect to the Judicial Drive storm drain at three locations east of the site. A reduced amount of site runoff will continue to be conveyed to the existing storm drain lateral in Eastgate Mall. This runoff will also reach the Judicial Drive storm drain. Storm runoff will no longer be directed onto Towne Centre Drive or onto Eastgate Mall. The project includes a series of bioretention basins at various locations throughout the site to meet treatment control and hydromodification requirements.

The proposed storm drain and water quality design provides the following benefits. First, the current and upcoming (after December 24, 2015) treatment control and hydromodification criteria will be met by the bioretention basins (see the associated *Water Quality Technical Report*). Second, the pre-project runoff onto Towne Centre Drive, Eastgate Mall, and to the existing lateral in Eastgate Mall will be eliminated or reduced, which provides increased flow capacity for these areas. Third, bioretention basins will provide detention benefits so that the future site runoff to the Judicial Drive storm drain will not increase over existing conditions. Since the post-project runoff will primarily enter the Judicial Drive storm drain further downstream in this system than under existing conditions, the project will provide increased flow capacity in a portion of the existing Judicial Drive and Eastgate Mall public storm drains. In summary, the project will provide flow capacity benefits to some surrounding areas, and will not increase the flow in the existing Judicial Drive storm drain.

This preliminary drainage report has been prepared in support of Kettler Leweck Engineering's plans for the project entitlement. This report provides hydrologic analyses in order to provide preliminary flow rates and demonstrate feasibility as well as compliance with drainage regulations.

HYDROLOGIC RESULTS

The overall drainage basin covers nearly 3.74 acres so the City of San Diego's 1984 *Drainage Design Manual's* rational method procedure was the basis for the existing and proposed condition hydrologic analyses. The *Manual* states that "the underground storm drain system shall be based upon a 50-year frequency storm." Since the post-project runoff will connect directly to existing public underground storm drain systems, 50-year analyses have been performed. The CivilDesign Rational Method Hydrology Program is based on the City criteria and was used for the analyses. The rational method input parameters are summarized below and the supporting data is included in Appendix A:

- Intensity-Duration-Frequency: The City's 50-year Intensity-Duration-Frequency curve from the *Drainage Design Manual* was used.

- Drainage area: The existing condition drainage basins were delineated from the base topographic mapping prepared for the project, and the proposed condition drainage basins were delineated using Kettler Leweck Engineering's entitlement grading plan. The overall existing condition drainage basin boundary was set equal to the overall proposed condition boundary to allow a comparison of results. The drainage basin boundaries and grading are shown on the Rational Method Work Maps in Appendix A.

- Hydrologic soil groups: The soil group within the site is entirely 'D' according to the City criteria.

- Runoff coefficients: The existing and proposed condition runoff coefficients were determined by first delineating the existing and proposed pervious/impervious areas within each drainage subarea. The existing condition pervious/impervious areas are included on the Existing Condition Rational Method Work Map in Appendix A and the proposed condition pervious/impervious areas were obtained from Kettler Leweck Engineering's DMA exhibit, which is included in Appendix A. The existing and proposed pervious and impervious areas are summarized in Table 1 below. The existing and proposed condition drainage subareas from Node 40 to 42 are both entirely pervious, so a C value of 0.45 was used for these two subareas in accordance with the rural category in Table 2 from the *Manual.* For all other drainage subareas, the formula given in Note 2 of Table 2 was used along with a minimum C value of 0.50 and maximum value of 0.99.

Condition	**Node**	**Impervious Area, sf**	**Pervious Area, sf**	**Total Area, sf**	**Total Area, ac**	**Percent Impervious**	**C Value**
Existing	10-12	15,890	9,075	24,965	0.57	63.65	0.68
Existing	20-22	21,486	18,471	39,957	0.92	53.77	0.57
Existing	30-32	54,226	12,747	66,973	1.54	80.97	0.86
Existing	40-42	0	31,210	31,210	0.71	0.00	0.45
Proposed	10-12	34,067	7,156	41,223	0.95	82.64	0.88
Proposed	14	2,116	3,889	6,005	0.14	35.24	0.50
Proposed	16	1,902	1,113	3,015	0.07	63.08	0.67
Proposed	18	15,675	6,325	22,000	0.51	71.25	0.76
Proposed	20	18,500	10	18,510	0.42	99.95	0.99
Proposed	30-32	1,401	1,429	2,830	0.06	49.51	0.53
Proposed	34	9,565	9,756	19,321	0.44	49.51	0.53
Proposed	36	2,179	1,049	3,228	0.07	67.50	0.72
Proposed	40-42	0	6,641	6,641	0.15	0.00	0.45
Proposed	50-52	31,310	8,812	40,122	0.92	78.04	0.83

Table 1. Summary of Impervious and Pervious Area within Each Rational Method Drainage Subarea for Computing C Value

- Flow lengths and elevations: The flow lengths and elevations were obtained from the topographic mapping and grading plan.

The rational method results are included in Appendix A and summarized in Table 2. The table provides the existing and proposed condition flow to various receiving locations. The existing flow onto Towne Centre Drive is 1.2 cfs, which will be eliminated under proposed conditions. Similarly, the existing flow of 1.7 cfs onto the surface of Eastgate Mall will be eliminated. The existing flow into the Eastgate Mall lateral pipe will be reduced from 4.5 to 1.2 cfs by the project.

Discharge Location	Existing Condition 50-Year Flow Rate, cfs	Proposed Condition 50-Year Flow Rate, cfs	Mitigated Prop. Cond. 50-Year Flow Rate, cfs
Towne Centre Drive	1.2 (Node 12)	0	0
Eastgate Mall	1.7 (Node 22)	0	0
Eastgate Mall Storm Drain Lateral	4.5 (Node 32)	1.2 (Node 38)	1.2
Judicial Drive	1.0 (Node 42)	10.2 (Node 22, 44, and 54)	5.3
Total Flow Rate	8.4	11.4	6.5

Table 2. Comparison of Rational Method Results

The project will increase the unmitigated 50-year flow rate to Judicial Drive. Under existing conditions, runoff onto the surface of Judicial Drive will be 1.0 cfs from Table 2. This runoff along with the 1.7 and 4.5 cfs from Eastgate Mall will ultimately enter the Judicial Drive storm drain, i.e., the total existing condition runoff into the Judicial Drive storm drain will be 7.2 cfs (1.0+4.5+1.7 = 7.2). Under proposed conditions, site runoff will not flow onto the surface of Judicial Drive, but will be conveyed to its storm drain. Therefore, the project will reduce the surface flow on Judicial Drive. Table 2 shows that the proposed condition flow rate from the direct connections to the Judicial Drive storm drain is 10.2 cfs. An additional 1.2 cfs is added from the East Gate Mall lateral, for a total flow rate of 11.4 cfs. Therefore, the unmitigated runoff associated with the project will increase the 50-year flow rate towards the Judicial Drive storm drain from 7.2 to 11.4 cfs

The proposed condition 50-year flow rate can be mitigated by the proposed bioretention basins. Conceptual detention analyses were performed modeling the storage available from the bioretention basins at proposed condition rational method nodes 12 and 52. These basins provide 2,500 and 2,260 cubic feet of storage for hydromodification, respectively (0.0574 and 0.0519 acre-feet, respectively). The rational method results at these nodes were converted to hydrographs using the County of San Diego's rational method to hydrograph procedure. Each hydrograph was then entered into HEC-1 along with the available storage volume. The results are included in Appendix B and show that the 50-year flow rate at node 12 can be reduced from 3.3 to 0.9 cfs, and at node 52 from 3.3 to 0.8 cfs for a total reduction of 4.9 cfs. Therefore, the proposed condition flow rate entering the Judicial Drive storm drain is reduced from 10.2 to 5.3 cfs (see last column in Table 2), and the overall flow rate from the proposed project is lower than existing conditions. The actual reduction will vary during final engineering, but the conceptual detention analyses demonstrate that the project can be designed to mitigate for its flow increases.

CONCLUSION

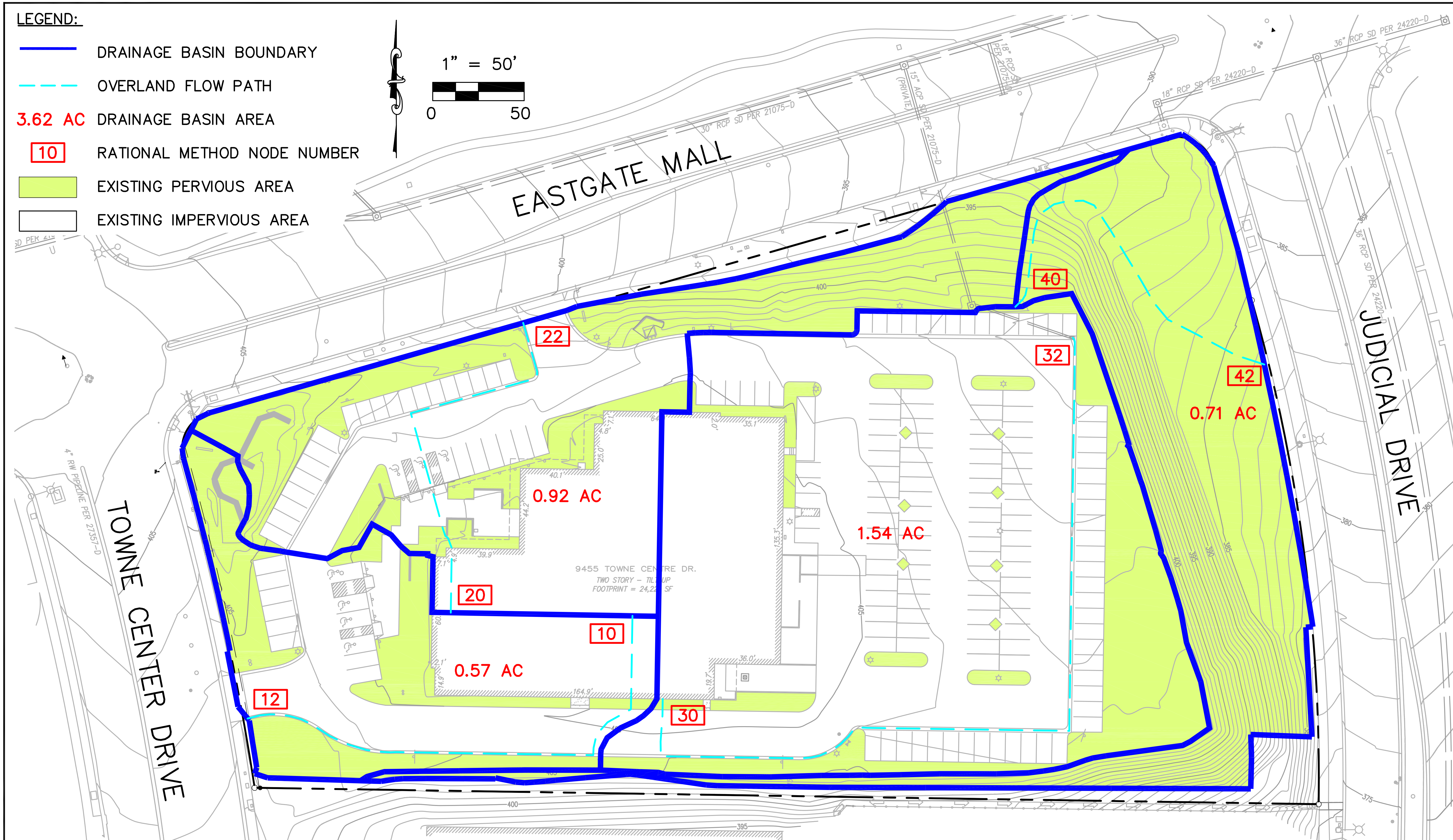
The analyses in this preliminary drainage report show that the project will reduce the 50-year flow rate from the site onto the surface of Towne Centre Drive, Eastgate Mall, and Judicial Drive. The project will also reduce the flow rate to the Eastgate Mall storm drain lateral. On the other hand, the unmitigated flow to the Judicial Drive storm drain will increase by 4.2 cfs. This increase is not excessive and it is possible the existing storm drain infrastructure can convey the increase. Nonetheless, if needed during final engineering, this increase can be mitigated by the proposed bioretention basins. The conceptual detention analyses contained in this report only considered two of the bioretention basins. The site has eight bioretention areas, so the detention can be accomplished by using other bioretention basins as well during final engineering.

The bioretention basins will delay (lengthen) the time of concentration, which will further reduce intensity and flow rate. This delay was not assessed for the preliminary analyses in this report, but can be assessed in final engineering.

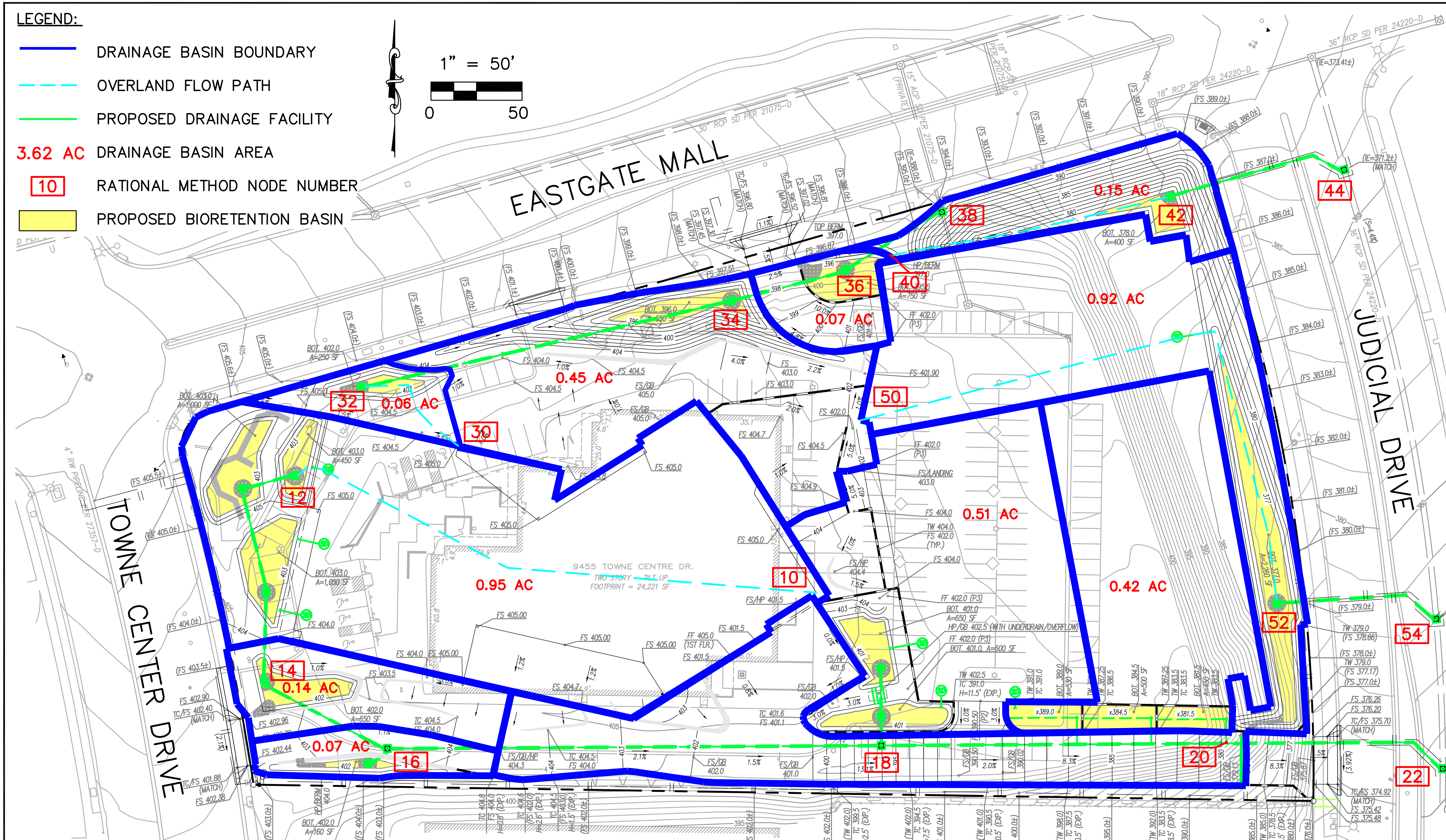
In summary, the analyses have demonstrated that the design flow rates are a relatively minor portion of the surrounding drainage area (as-built drawing 24220-4-D shows that the receiving storm drain in Judicial Drive was designed for nearly 90 cfs). The project will benefit the off-site flood carrying capacity in several adjacent street areas and storm drain segments. The project will increase the 50-year flow rate towards the Judicial Drive storm drain, but this can be mitigated for during final engineering given the current site concept containing multiple bioretention basins. Therefore, the project is feasible from a drainage standpoint.

APPENDIX A

RATIONAL METHOD RESULTS



EXISTING CONDITION
RATIONAL METHOD WORK MAP



PROPOSED CONDITION
RATIONAL METHOD WORK MAP

POST CONSTRUCTION BMP SIZING CALCULATIONS

BMP1 DMA1

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA1	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	15675	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1097	914	658
PERVIOUS	6325	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	44	37	27
Total BMP Area	22000							Minimum BMP Size	1141.525	951	685
								Proposed BMP Size*	1250	1250	750
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		9.13	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP2 DMA2

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA2	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2179	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	153	127	92
PERVIOUS	1049	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	7	6	4
Total BMP Area	3228							Minimum BMP Size	159.873	133	96
								Proposed BMP Size*	750	750	450
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		2.13	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP3 DMA3

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA3	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	31310	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	2192	1825	1315
PERVIOUS	8812	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	62	51	37
Total BMP Area	40122							Minimum BMP Size	2253.384	1877	1352
								Proposed BMP Size*	2260	2260	1356
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		9.97	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP4 DMA4

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA4	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	1902	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	133	111	80
PERVIOUS	1113	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	8	6	5
Total BMP Area	3015							Minimum BMP Size	140.931	117	85
								Proposed BMP Size*	160	160	96
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		8.80	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP5 DMA5

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA5	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	2116	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	148	123	89
PERVIOUS	3889	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	27	23	16
Total BMP Area	6005							Minimum BMP Size	175.343	146	105
								Proposed BMP Size*	650	650	390
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		2.70	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP6 DMA6

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA6	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	34067	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	2385	1986	1431
PERVIOUS	7156	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	50	42	30
Total BMP Area	41223							Minimum BMP Size	2434.782	2028	1461
								Proposed BMP Size*	2500	2500	1500
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		9.73	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

BMP7 DMA7

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA7	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	10966	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	768	639	461
PERVIOUS	11185	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	78	65	47
Total BMP Area	22151							Minimum BMP Size	845.915	705	508
								Proposed BMP Size*	900	900	540
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		9.39	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

LEGEND

WATER QUALITY AND HYDROMODIFICATION

1. THE PROPOSED PROJECT RESULTS IN A REDUCTION IN PEAK STORM RUNOFF.
2. THIS PROJECT INCLUDES PROVISIONS FOR THE STATE'S HYDRO-MODIFICATION REQUIREMENTS.
3. THE PROPOSED GRADING AND DRAINAGE DESIGN INCLUDES DIRECTING RUNOFF TO NATURAL BMPS WHERE IT WILL BE TREATED BEFORE DISCHARGING OFFSITE.
4. THE PROPOSED BMPS FOR THE PROJECT INCLUDE LANDSCAPING, BIO-RETENTION, AND SELF-RETAINING AREAS.
5. THIS PLAN IS CONSISTENT WITH THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THE FOLLOWING REPORTS;

- PRELIMINARY WATER QUALITY TECHNICAL REPORT (WQTR) 9455 TOWNE CENTRE DRIVE DATED AUGUST 2015.
- PRELIMINARY DRAINAGE STUDY 9455 TOWNE CENTRE DRIVE DATED AUGUST 2015..

POST CONSTRUCTION BMPS

1. THE PROJECT IS A PRIORITY DEVELOPMENT PROJECT PER THE CITY'S STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST (DS-560).
2. THE OWNER SHALL MAINTAIN THE LANDSCAPE AREAS.
3. SEE THIS SHT. FOR POST CONSTRUCTION BMP (I.E. BIORETENTION) DETAILS.

BMP8 DMA8

BMP Sizing Spreadsheet V1.04			
Project Name:	Towne Centre Drive OB/PS	Hydrologic Unit:	
Project Applicant:		Rain Gauge:	Oceanside
Jurisdiction:		Total Project Area:	
Parcel (APN):		Low Flow Threshold:	0.5Q2
BMP Name:	DMA8	BMP Type:	Flow-Through Planter
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.024

Areas Draining to BMP						HMP Sizing Factors			Minimum BMP Size		
DMA Name	Area (sf)	Soil Type	Slope	Post Project Surface Type	Runoff Factor (Table 4-2)	Surface Area	Surface Volume	Subsurface Volume	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
IMPERVIOUS	18500	D	Flat	IMPERVIOUS	1.0	0.07	0.0583	0.042	1295	1079	777
PERVIOUS	10	D	Flat	PERVIOUS	0.1	0.07	0.0583	0.042	0	0	0
Total BMP Area	18510							Minimum BMP Size	1295.07	1079	777
								Proposed BMP Size*	1480	1480	888
								Soil Matrix Depth		18.00	in
								Minimum Ponding Depth		8.75	in
								Maximum Ponding Depth			in
								Selected Ponding Depth		12.00	in

STORM WATER PROTECTION NOTES

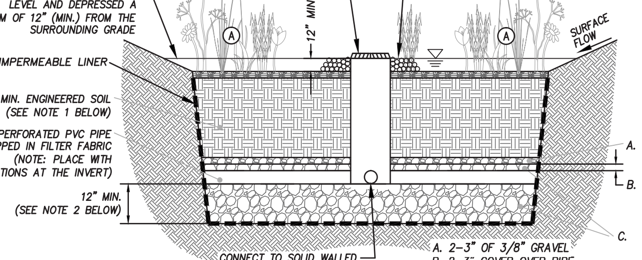
1. THIS PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT ORDER NO.______________________; AND RISK LEVEL/TYPE:
   - ☐ CGP RISK LEVEL 1 ☐ CGP LUP TYPE 1
   - ☐ CGP RISK LEVEL 2 ☐ CGP LUP TYPE 2
   - ☐ CGP RISK LEVEL 3 ☐ CGP LUP TYPE 3
2. CHECK ONE
   - ☐ THIS PROJECT WILL EXCEED THE MAXIMUM DISTURBED AREA LIMIT, THEREFORE A WEATHER TRIGGERED ACTION PLAN (WTAP) IS REQUIRED.
   - ☐ THIS PROJECT WILL FOLLOW PHASED GRADING NOT TO EXCEED FIVE (5) ACRES PER PHASE.
   - ▨ NOT APPLICABLE
3. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF SWPPP AS APPLICABLE.

(A) DEEP ROOTED, DENSE, DROUGHT TOLERANT PLANTING SUITABLE FOR WELL DRAINED SOIL; PLANTING SCHEDULE AS FOLLOWS (PER LANDSCAPE PLANS);

SCIENTIFIC NAME	COMMON NAME
CHONDROPTAELUM TECTORUM	SMALL CAPE RUSH
JUNCUS PATENS	CALIFORNIA GRAY RUSH
LEYMUS CONDENSATUS "CANYON PRINCE"	CANYON PRINCE WILD RYE

BIORETENTION DETAIL

NOT TO SCALE



BIORETENTION NOTES

1. BIORETENTION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.

PREPARED BY:

NAME:	FLAD ARCHITECTS
ADDRESS:	650 CALIFORNIA STREET 8TH FLOOR SAN FRANCISCO, CA 94108
PHONE:	415-398-1600
FAX:	415-398-1606
REVISION 8:	
REVISION 7:	
REVISION 6:	
REVISION 5:	
REVISION 4:	9-4-15
REVISION 3:	10-3-13
REVISION 2:	7-10-13
REVISION 1:	12-14-12
ORIGINAL DATE:	8-2-12

SHEET TITLE:
DRAINAGE MANAGEMENT AREA PLAN

SHEET NO. 4 OF 24

PTS# 291342

PROJECT# KLE 0082

Flad Architects
650 CALIFORNIA STREET
8TH FLOOR
SAN FRANCISCO, CA 94108
P: 415-398-1600
F: 415-398-1606

RIOS CLEMENTI HALE STUDIOS
639 NORTH LARCHMONT BOULEVARD
SUITE 100
LOS ANGELES, CA 90004
P: 323-785-1800

DMA EXHIBIT USED FOR PROPOSED CONDITION PERVIOUS AND IMPERVIOUS AREAS

KETTLER LEWECK
ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
t: 619 269-3444 | f: 619 269-3459
www.kettlerleweck.com

REGISTERED PROFESSIONAL ENGINEER
STEVEN C. KETTLER
No. C48358
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

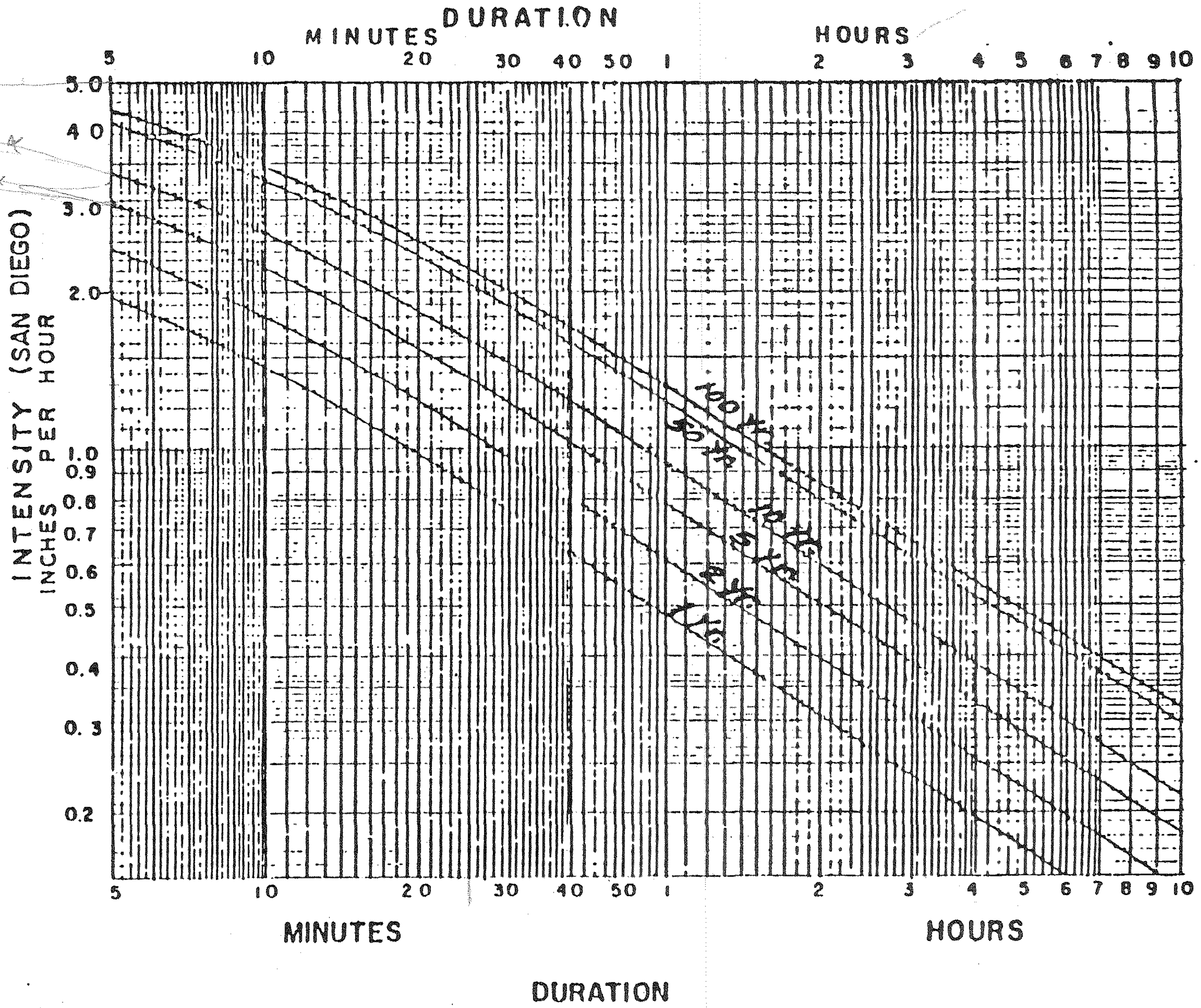
KILROY REALTY CORPORATION

KILROY REALTY CORPORATION
OFFICE BUILDING
9455 TOWNE CENTRE DRIVE
SAN DIEGO, CALIFORNIA

X:\PROJECTS\0082 - TCD OFFICE AND PARKING STRUCTURE\ENGR\PLANS\PDP PID PLANS\0082 TCD_SHEET 4.DWG (08-28-15 9:46:27AM) Plotted by: Mike

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 - FREQUENC
CURVES
for
COUNTY OF SAN DIEGO

APPENDIX I

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
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%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

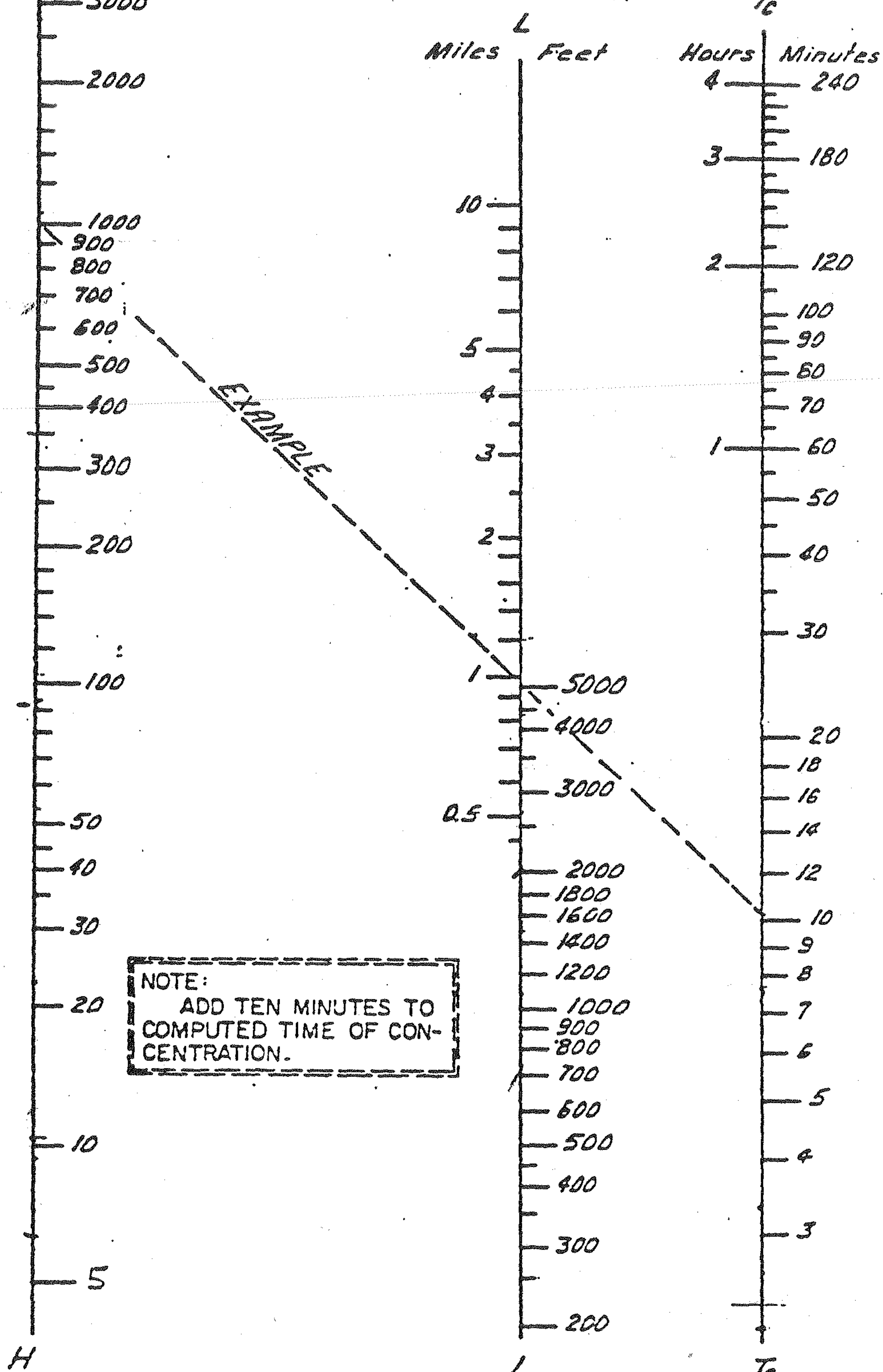
EQUATION

$$T_c = \left(\frac{11.9L^3}{H}\right)^{.385}$$

T_c = Time of concentration (in hours)

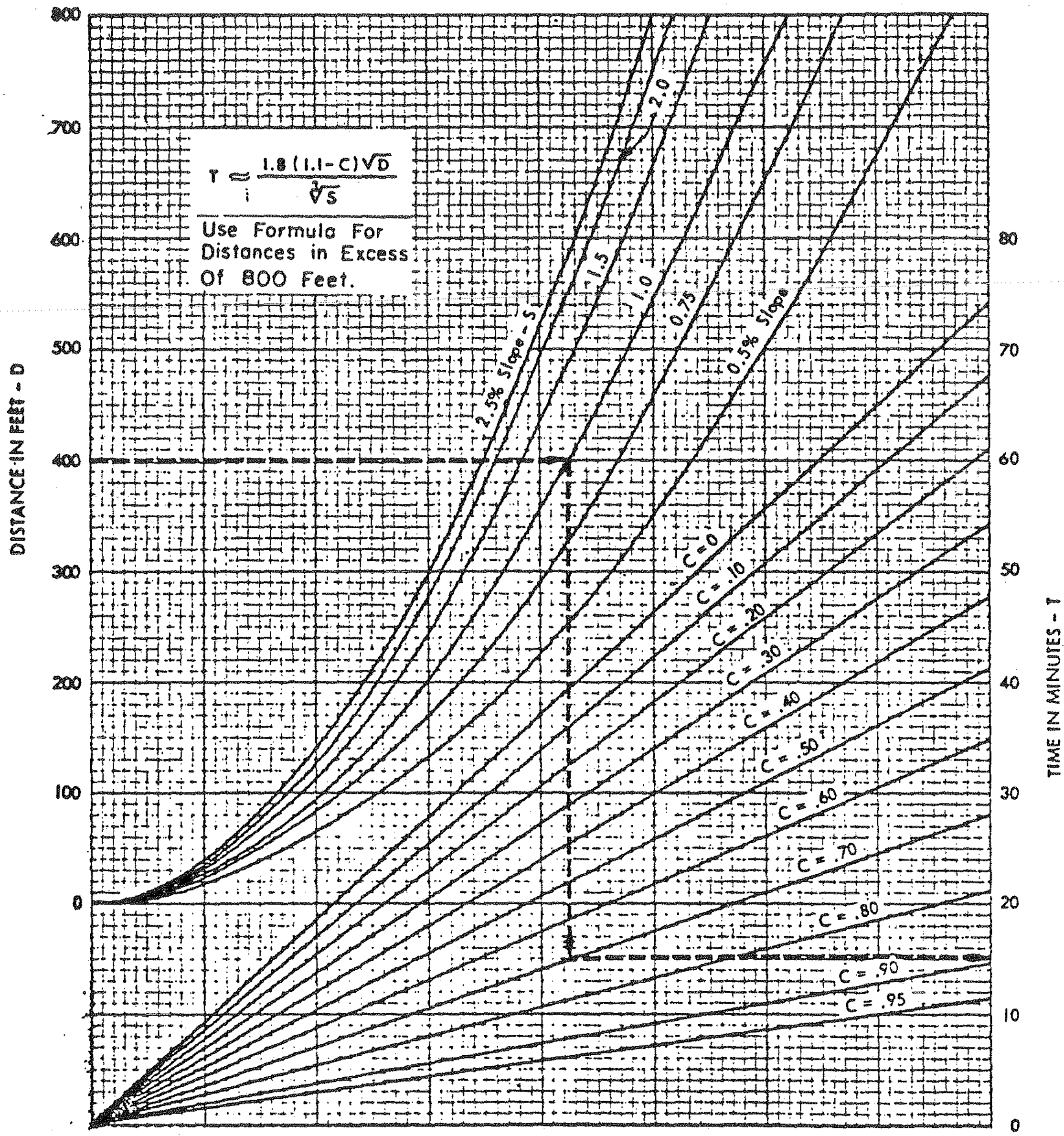
L = Length of watershed (in miles)

H = Difference in elevation along effective slope line (See Appendix X-B) (in feet)



SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL	NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS
APPROVED [illegible signature]	DATE ______ 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

```
          San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
     Rational Hydrology Study        Date: 08/28/15
------------------------------------------------------------------------
```

9455 Towne Centre Drive
Office Building and Parking Structure
Existing Conditions for Entitlements
50-Year Storm Event

```
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.680 given for subarea
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  407.500(Ft.)
Lowest elevation =  403.200(Ft.)
Elevation difference =    4.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    10.96 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6800)*( 280.000^.5)/( 1.536^(1/3)]=  10.96
Rainfall intensity (I) =      3.075(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.680
Subarea runoff =      1.192(CFS)
Total initial stream area =       0.570(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.570 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  407.000(Ft.)
Lowest elevation =  401.400(Ft.)
Elevation difference =    5.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    10.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5700)*( 215.000^.5)/( 2.605^(1/3)]=  10.17
Rainfall intensity (I) =      3.169(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.570
Subarea runoff =      1.662(CFS)
Total initial stream area =        0.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      30.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Initial subarea flow distance  =  476.000(Ft.)
Highest elevation =  406.200(Ft.)
Lowest elevation =  399.900(Ft.)
Elevation difference =    6.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8600)*( 476.000^.5)/( 1.324^(1/3)]=   8.58
Rainfall intensity (I) =      3.392(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff =      4.493(CFS)
Total initial stream area =        1.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      40.000 to Point/Station      42.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  218.000(Ft.)
Highest elevation =  402.300(Ft.)
```

```
Lowest elevation =  383.700(Ft.)
Elevation difference =   18.600(Ft.)
TC=[(11.9*0.0413^3)/( 18.60)]^.385=  1.27 + 10 min. =    11.27 min.
Rainfall intensity (I) =      3.041(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.972(CFS)
Total initial stream area =        0.710(Ac.)
End of computations, total study area =          3.740 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study   Date: 08/28/15

9455 Towne Centre Drive
Office Building and Parking Structure
Proposed Conditions for Entitlements
50-Year Storm Event

********* Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is   50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   10.000 to Point/Station   12.000
**** INITIAL AREA EVALUATION ****

____

User specified 'C' value of 0.880 given for subarea
Initial subarea flow distance = 301.000(Ft.)
Highest elevation = 408.000(Ft.)
Lowest elevation = 403.000(Ft.)
Elevation difference =   5.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   5.80 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8800)*(301.000^.5)/(1.661^(1/3)]=   5.80
Rainfall intensity (I) =   3.995(In/Hr) for a   50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =   3.340(CFS)
Total initial stream area =   0.950(Ac.)

++

```
Process from Point/Station       12.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   399.000(Ft.)
Downstream point/station elevation =   397.670(Ft.)
Pipe length  =   133.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.340(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.340(CFS)
Normal flow depth in pipe =    9.22(In.)
Flow top width inside pipe =   10.12(In.)
Critical Depth =    9.38(In.)
Pipe flow velocity =      5.16(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =     6.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.23 min.
Rainfall intensity =      3.874(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.271(CFS) for    0.140(Ac.)
Total runoff =      3.611(CFS)   Total area =       1.09(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   397.670(Ft.)
Downstream point/station elevation =   396.930(Ft.)
Pipe length  =    74.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.611(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.611(CFS)
Normal flow depth in pipe =    8.02(In.)
Flow top width inside pipe =   14.96(In.)
Critical Depth =    9.20(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     6.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.670 given for subarea
```

```
Time of concentration =     6.46 min.
Rainfall intensity =      3.816(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.670
Subarea runoff =      0.179(CFS) for    0.070(Ac.)
Total runoff =      3.790(CFS)   Total area =        1.16(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   396.930(Ft.)
Downstream point/station elevation =   394.260(Ft.)
Pipe length  =   267.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.790(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.790(CFS)
Normal flow depth in pipe =    8.26(In.)
Flow top width inside pipe =   14.92(In.)
Critical Depth =    9.43(In.)
Pipe flow velocity =      5.47(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =     7.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       18.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.760 given for subarea
Time of concentration =     7.27 min.
Rainfall intensity =      3.631(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.760
Subarea runoff =      1.407(CFS) for    0.510(Ac.)
Total runoff =      5.198(CFS)   Total area =        1.67(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       20.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   394.260(Ft.)
Downstream point/station elevation =   392.390(Ft.)
Pipe length  =   187.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.198(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.198(CFS)
Normal flow depth in pipe =   10.20(In.)
Flow top width inside pipe =   14.00(In.)
Critical Depth =   11.10(In.)
Pipe flow velocity =      5.85(Ft/s)
Travel time through pipe =    0.53 min.
```

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Time of concentration (TC) =     7.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       20.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.990 given for subarea
Time of concentration =     7.80 min.
Rainfall intensity =      3.527(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.990
Subarea runoff =      1.466(CFS) for    0.420(Ac.)
Total runoff =      6.664(CFS)   Total area =        2.09(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   392.390(Ft.)
Downstream point/station elevation =   391.160(Ft.)
Pipe length  =   123.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.664(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.664(CFS)
Normal flow depth in pipe =   10.41(In.)
Flow top width inside pipe =   17.78(In.)
Critical Depth =   12.00(In.)
Pipe flow velocity =      6.29(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     8.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.530 given for subarea
Initial subarea flow distance  =   68.000(Ft.)
Highest elevation =  405.000(Ft.)
Lowest elevation =  402.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5300)*(  68.000^.5)/( 4.412^(1/3)]=   5.16
Rainfall intensity (I) =      4.206(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.530
Subarea runoff =      0.134(CFS)
Total initial stream area =       0.060(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   398.000(Ft.)
Downstream point/station elevation =   395.950(Ft.)
Pipe length  =   205.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.134(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.134(CFS)
Normal flow depth in pipe =    2.00(In.)
Flow top width inside pipe =    5.65(In.)
Critical Depth =    2.18(In.)
Pipe flow velocity =      2.35(Ft/s)
Travel time through pipe =    1.46 min.
Time of concentration (TC) =     6.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.530 given for subarea
Time of concentration =     6.62 min.
Rainfall intensity =      3.777(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.530
Subarea runoff =      0.901(CFS) for    0.450(Ac.)
Total runoff =      1.035(CFS)   Total area =        0.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   395.950(Ft.)
Downstream point/station elevation =   395.330(Ft.)
Pipe length  =    62.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.035(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.035(CFS)
Normal flow depth in pipe =    5.16(In.)
Flow top width inside pipe =    8.90(In.)
Critical Depth =    5.60(In.)
Pipe flow velocity =      3.95(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =     6.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       36.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
```

```
User specified 'C' value of 0.720 given for subarea
Time of concentration =     6.88 min.
Rainfall intensity =      3.716(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.720
Subarea runoff =      0.187(CFS) for    0.070(Ac.)
Total runoff =      1.222(CFS)   Total area =       0.58(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   395.330(Ft.)
Downstream point/station elevation =   394.750(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.222(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.222(CFS)
Normal flow depth in pipe =    5.75(In.)
Flow top width inside pipe =    8.64(In.)
Critical Depth =    6.11(In.)
Pipe flow velocity =      4.10(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     7.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  155.000(Ft.)
Highest elevation =  397.000(Ft.)
Lowest elevation =  377.800(Ft.)
Elevation difference =   19.200(Ft.)
TC=[(11.9*0.0294^3)/( 19.20)]^.385=  0.85 + 10 min. =    10.85 min.
Rainfall intensity (I) =      3.088(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.208(CFS)
Total initial stream area =       0.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
________________________________________________________________________
Upstream point/station elevation =   374.000(Ft.)
Downstream point/station elevation =   371.200(Ft.)
Pipe length  =    97.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.208(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.208(CFS)
Normal flow depth in pipe =    1.90(In.)
Flow top width inside pipe =    5.58(In.)
Critical Depth =    2.74(In.)
Pipe flow velocity =      3.88(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    11.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       52.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.830 given for subarea
Initial subarea flow distance  =  351.000(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  377.000(Ft.)
Elevation difference =   25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.73 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8300)*( 351.000^.5)/(   7.123^(1/3)]=   4.73
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830
Subarea runoff =      3.257(CFS)
Total initial stream area =        0.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       54.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   361.200(Ft.)
Pipe length  =    89.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.257(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.257(CFS)
Normal flow depth in pipe =    4.72(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.90(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     5.11 min.
End of computations, total study area =           3.740 (Ac.)
```

APPENDIX B

DETENTION RESULTS

```
*****************************************                          ***************************************
*                                       *                          *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                          *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998                *                          *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                 *                          *         609 SECOND STREET           *
*                                       *                          *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE   31AUG15  TIME  15:14:38   *                          *          (916) 756-1104             *
*                                       *                          *                                     *
*****************************************                          ***************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X       XXXXX   X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                      *DIAGRAM
*** FREE ***
          1           ID   KILROY REALTY OFFICE BUILDING & PARKING STRUCTURE
          2           ID   50-YEAR DETENTION ANALYSIS
          3           ID   BASED ON PROPOSED CONDITION RATIONAL METHOD RESULTS NODE 10 TO 12
          4           IT       2 01JAN90    1200     200

          5           KK   BASIN
          6           KM   RATIONAL METHOD HYDROGRAPH PROGRAM
          7           KM   50-YEAR, 6-HOUR RAINFALL IS 2.1 INCHES
          8           KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.88
          9           KM   RATIONAL METHOD TIME OF CONCENTRATION IS 5.8 MINUTES
         10           BA  0.0015
         11           IN       6 01JAN90    1157
         12           QI       0     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
         13           QI     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.2
         14           QI     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
         15           QI     0.2     0.3     0.3     0.3     0.3     0.4     0.4     0.5     0.6     0.8
         16           QI     1.9    3.34     0.7     0.4     0.3     0.3     0.2     0.2     0.2     0.2
         17           QI     0.2     0.2     0.2     0.1     0.1     0.1     0.1     0.1     0.1     0.1
         18           QI     0.1       0       0       0       0       0       0       0       0       0
         19           QI       0       0

         20           KK  DETAIN
         21           RS       1    STOR      -1
         22           SV       0  0.0574
         23           SQ       0     .87
         24           SE     100     101
         25           ZZ
```

```
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    5       BASIN
                V
                V
   20      DETAIN

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
****************************************                                                      ***************************************
*                                      *                                                      *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                      *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998               *                                                      *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1               *                                                      *         609 SECOND STREET           *
*                                      *                                                      *      DAVIS, CALIFORNIA 95616        *
* RUN DATE   31AUG15  TIME  15:14:38   *                                                      *          (916) 756-1104             *
*                                      *                                                      *                                     *
****************************************                                                      ***************************************



                          KILROY REALTY OFFICE BUILDING & PARKING STRUCTURE
                          50-YEAR DETENTION ANALYSIS
                          BASED ON PROPOSED CONDITION RATIONAL METHOD RESULTS NODE 10 TO 12

    IT         HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1JAN90  STARTING DATE
                    ITIME       1200  STARTING TIME
                       NQ        200  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      1JAN90  ENDING DATE
                   NDTIME       1838  ENDING TIME
                   ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE    6.63 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
   5 KK    *    BASIN   *
           *            *
           **************
                          RATIONAL METHOD HYDROGRAPH PROGRAM
                          50-YEAR, 6-HOUR RAINFALL IS 2.1 INCHES
                          RATIONAL METHOD RUNOFF COEFFICIENT IS 0.88
                          RATIONAL METHOD TIME OF CONCENTRATION IS 5.8 MINUTES

  11 IN        TIME DATA FOR INPUT TIME SERIES
                    JXMIN          6  TIME INTERVAL IN MINUTES
                   JXDATE      1JAN90  STARTING DATE
                   JXTIME       1157  STARTING TIME

              SUBBASIN RUNOFF DATA

  10 BA        SUBBASIN CHARACTERISTICS
                    TAREA        .00  SUBBASIN AREA

                                                                  ***

*************************************************************************************************************************************

                                                     HYDROGRAPH AT STATION    BASIN

*************************************************************************************************************************************
```

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 1200	1	0.	*	1 JAN 1340	51	0.	*	1 JAN 1520	101	0.	*	1 JAN 1700	151	0.
1 JAN 1202	2	0.	*	1 JAN 1342	52	0.	*	1 JAN 1522	102	0.	*	1 JAN 1702	152	0.
1 JAN 1204	3	0.	*	1 JAN 1344	53	0.	*	1 JAN 1524	103	0.	*	1 JAN 1704	153	0.
1 JAN 1206	4	0.	*	1 JAN 1346	54	0.	*	1 JAN 1526	104	0.	*	1 JAN 1706	154	0.
1 JAN 1208	5	0.	*	1 JAN 1348	55	0.	*	1 JAN 1528	105	0.	*	1 JAN 1708	155	0.
1 JAN 1210	6	0.	*	1 JAN 1350	56	0.	*	1 JAN 1530	106	0.	*	1 JAN 1710	156	0.
1 JAN 1212	7	0.	*	1 JAN 1352	57	0.	*	1 JAN 1532	107	0.	*	1 JAN 1712	157	0.
1 JAN 1214	8	0.	*	1 JAN 1354	58	0.	*	1 JAN 1534	108	0.	*	1 JAN 1714	158	0.
1 JAN 1216	9	0.	*	1 JAN 1356	59	0.	*	1 JAN 1536	109	0.	*	1 JAN 1716	159	0.
1 JAN 1218	10	0.	*	1 JAN 1358	60	0.	*	1 JAN 1538	110	0.	*	1 JAN 1718	160	0.
1 JAN 1220	11	0.	*	1 JAN 1400	61	0.	*	1 JAN 1540	111	1.	*	1 JAN 1720	161	0.
1 JAN 1222	12	0.	*	1 JAN 1402	62	0.	*	1 JAN 1542	112	1.	*	1 JAN 1722	162	0.
1 JAN 1224	13	0.	*	1 JAN 1404	63	0.	*	1 JAN 1544	113	1.	*	1 JAN 1724	163	0.
1 JAN 1226	14	0.	*	1 JAN 1406	64	0.	*	1 JAN 1546	114	1.	*	1 JAN 1726	164	0.
1 JAN 1228	15	0.	*	1 JAN 1408	65	0.	*	1 JAN 1548	115	1.	*	1 JAN 1728	165	0.
1 JAN 1230	16	0.	*	1 JAN 1410	66	0.	*	1 JAN 1550	116	1.	*	1 JAN 1730	166	0.
1 JAN 1232	17	0.	*	1 JAN 1412	67	0.	*	1 JAN 1552	117	1.	*	1 JAN 1732	167	0.
1 JAN 1234	18	0.	*	1 JAN 1414	68	0.	*	1 JAN 1554	118	1.	*	1 JAN 1734	168	0.
1 JAN 1236	19	0.	*	1 JAN 1416	69	0.	*	1 JAN 1556	119	2.	*	1 JAN 1736	169	0.
1 JAN 1238	20	0.	*	1 JAN 1418	70	0.	*	1 JAN 1558	120	2.	*	1 JAN 1738	170	0.
1 JAN 1240	21	0.	*	1 JAN 1420	71	0.	*	1 JAN 1600	121	3.	*	1 JAN 1740	171	0.
1 JAN 1242	22	0.	*	1 JAN 1422	72	0.	*	1 JAN 1602	122	3.	*	1 JAN 1742	172	0.
1 JAN 1244	23	0.	*	1 JAN 1424	73	0.	*	1 JAN 1604	123	3.	*	1 JAN 1744	173	0.
1 JAN 1246	24	0.	*	1 JAN 1426	74	0.	*	1 JAN 1606	124	2.	*	1 JAN 1746	174	0.
1 JAN 1248	25	0.	*	1 JAN 1428	75	0.	*	1 JAN 1608	125	1.	*	1 JAN 1748	175	0.
1 JAN 1250	26	0.	*	1 JAN 1430	76	0.	*	1 JAN 1610	126	1.	*	1 JAN 1750	176	0.
1 JAN 1252	27	0.	*	1 JAN 1432	77	0.	*	1 JAN 1612	127	1.	*	1 JAN 1752	177	0.
1 JAN 1254	28	0.	*	1 JAN 1434	78	0.	*	1 JAN 1614	128	0.	*	1 JAN 1754	178	0.
1 JAN 1256	29	0.	*	1 JAN 1436	79	0.	*	1 JAN 1616	129	0.	*	1 JAN 1756	179	0.
1 JAN 1258	30	0.	*	1 JAN 1438	80	0.	*	1 JAN 1618	130	0.	*	1 JAN 1758	180	0.
1 JAN 1300	31	0.	*	1 JAN 1440	81	0.	*	1 JAN 1620	131	0.	*	1 JAN 1800	181	0.
1 JAN 1302	32	0.	*	1 JAN 1442	82	0.	*	1 JAN 1622	132	0.	*	1 JAN 1802	182	0.
1 JAN 1304	33	0.	*	1 JAN 1444	83	0.	*	1 JAN 1624	133	0.	*	1 JAN 1804	183	0.
1 JAN 1306	34	0.	*	1 JAN 1446	84	0.	*	1 JAN 1626	134	0.	*	1 JAN 1806	184	0.
1 JAN 1308	35	0.	*	1 JAN 1448	85	0.	*	1 JAN 1628	135	0.	*	1 JAN 1808	185	0.
1 JAN 1310	36	0.	*	1 JAN 1450	86	0.	*	1 JAN 1630	136	0.	*	1 JAN 1810	186	0.
1 JAN 1312	37	0.	*	1 JAN 1452	87	0.	*	1 JAN 1632	137	0.	*	1 JAN 1812	187	0.
1 JAN 1314	38	0.	*	1 JAN 1454	88	0.	*	1 JAN 1634	138	0.	*	1 JAN 1814	188	0.
1 JAN 1316	39	0.	*	1 JAN 1456	89	0.	*	1 JAN 1636	139	0.	*	1 JAN 1816	189	0.
1 JAN 1318	40	0.	*	1 JAN 1458	90	0.	*	1 JAN 1638	140	0.	*	1 JAN 1818	190	0.
1 JAN 1320	41	0.	*	1 JAN 1500	91	0.	*	1 JAN 1640	141	0.	*	1 JAN 1820	191	0.
1 JAN 1322	42	0.	*	1 JAN 1502	92	0.	*	1 JAN 1642	142	0.	*	1 JAN 1822	192	0.
1 JAN 1324	43	0.	*	1 JAN 1504	93	0.	*	1 JAN 1644	143	0.	*	1 JAN 1824	193	0.
1 JAN 1326	44	0.	*	1 JAN 1506	94	0.	*	1 JAN 1646	144	0.	*	1 JAN 1826	194	0.
1 JAN 1328	45	0.	*	1 JAN 1508	95	0.	*	1 JAN 1648	145	0.	*	1 JAN 1828	195	0.
1 JAN 1330	46	0.	*	1 JAN 1510	96	0.	*	1 JAN 1650	146	0.	*	1 JAN 1830	196	0.
1 JAN 1332	47	0.	*	1 JAN 1512	97	0.	*	1 JAN 1652	147	0.	*	1 JAN 1832	197	0.
1 JAN 1334	48	0.	*	1 JAN 1514	98	0.	*	1 JAN 1654	148	0.	*	1 JAN 1834	198	0.
1 JAN 1336	49	0.	*	1 JAN 1516	99	0.	*	1 JAN 1656	149	0.	*	1 JAN 1836	199	0.
1 JAN 1338	50	0.	*	1 JAN 1518	100	0.	*	1 JAN 1658	150	0.	*	1 JAN 1838	200	0.

****

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	6.63-HR
+	(CFS)	(HR)					
			(CFS)				
+	3.	4.03		0.	0.	0.	0.
			(INCHES)	1.778	1.780	1.780	1.780
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

*** ***

```
              **************
              *            *
  20 KK       *   DETAIN   *
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

  21 RS           STORAGE ROUTING
                        NSTPS           1  NUMBER OF SUBREACHES
                         ITYP        STOR  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

  22 SV             STORAGE          .0        .1

  23 SQ           DISCHARGE          0.        1.

  24 SE           ELEVATION      100.00    101.00

                                                                               ***

WARNING --- ROUTED OUTFLOW (      1.) IS GREATER THAN MAXIMUM OUTFLOW (      1.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (      1.) IS GREATER THAN MAXIMUM OUTFLOW (      1.) IN STORAGE-OUTFLOW TABLE

*****************************************************************************************************************************

                                                              HYDROGRAPH AT STATION   DETAIN

*****************************************************************************************************************************
```

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	100.1	1	JAN	1414	68	0.	.0	100.2	1	JAN	1628	135	1.	.0	100.8
1	JAN	1202	2	0.	.0	100.1	1	JAN	1416	69	0.	.0	100.2	1	JAN	1630	136	1.	.0	100.8
1	JAN	1204	3	0.	.0	100.1	1	JAN	1418	70	0.	.0	100.2	1	JAN	1632	137	1.	.0	100.8
1	JAN	1206	4	0.	.0	100.1	1	JAN	1420	71	0.	.0	100.2	1	JAN	1634	138	1.	.0	100.8
1	JAN	1208	5	0.	.0	100.1	1	JAN	1422	72	0.	.0	100.2	1	JAN	1636	139	1.	.0	100.7
1	JAN	1210	6	0.	.0	100.1	1	JAN	1424	73	0.	.0	100.2	1	JAN	1638	140	1.	.0	100.7
1	JAN	1212	7	0.	.0	100.1	1	JAN	1426	74	0.	.0	100.2	1	JAN	1640	141	1.	.0	100.7
1	JAN	1214	8	0.	.0	100.1	1	JAN	1428	75	0.	.0	100.2	1	JAN	1642	142	1.	.0	100.7
1	JAN	1216	9	0.	.0	100.1	1	JAN	1430	76	0.	.0	100.2	1	JAN	1644	143	1.	.0	100.7
1	JAN	1218	10	0.	.0	100.1	1	JAN	1432	77	0.	.0	100.2	1	JAN	1646	144	1.	.0	100.6
1	JAN	1220	11	0.	.0	100.1	1	JAN	1434	78	0.	.0	100.2	1	JAN	1648	145	1.	.0	100.6
1	JAN	1222	12	0.	.0	100.1	1	JAN	1436	79	0.	.0	100.2	1	JAN	1650	146	1.	.0	100.6
1	JAN	1224	13	0.	.0	100.1	1	JAN	1438	80	0.	.0	100.2	1	JAN	1652	147	1.	.0	100.6
1	JAN	1226	14	0.	.0	100.1	1	JAN	1440	81	0.	.0	100.2	1	JAN	1654	148	1.	.0	100.6
1	JAN	1228	15	0.	.0	100.1	1	JAN	1442	82	0.	.0	100.2	1	JAN	1656	149	0.	.0	100.6
1	JAN	1230	16	0.	.0	100.1	1	JAN	1444	83	0.	.0	100.2	1	JAN	1658	150	0.	.0	100.5
1	JAN	1232	17	0.	.0	100.1	1	JAN	1446	84	0.	.0	100.2	1	JAN	1700	151	0.	.0	100.5
1	JAN	1234	18	0.	.0	100.1	1	JAN	1448	85	0.	.0	100.2	1	JAN	1702	152	0.	.0	100.5
1	JAN	1236	19	0.	.0	100.1	1	JAN	1450	86	0.	.0	100.2	1	JAN	1704	153	0.	.0	100.5
1	JAN	1238	20	0.	.0	100.1	1	JAN	1452	87	0.	.0	100.2	1	JAN	1706	154	0.	.0	100.5
1	JAN	1240	21	0.	.0	100.1	1	JAN	1454	88	0.	.0	100.2	1	JAN	1708	155	0.	.0	100.5
1	JAN	1242	22	0.	.0	100.1	1	JAN	1456	89	0.	.0	100.2	1	JAN	1710	156	0.	.0	100.5
1	JAN	1244	23	0.	.0	100.1	1	JAN	1458	90	0.	.0	100.2	1	JAN	1712	157	0.	.0	100.5
1	JAN	1246	24	0.	.0	100.1	1	JAN	1500	91	0.	.0	100.2	1	JAN	1714	158	0.	.0	100.5
1	JAN	1248	25	0.	.0	100.1	1	JAN	1502	92	0.	.0	100.2	1	JAN	1716	159	0.	.0	100.4
1	JAN	1250	26	0.	.0	100.1	1	JAN	1504	93	0.	.0	100.2	1	JAN	1718	160	0.	.0	100.4
1	JAN	1252	27	0.	.0	100.1	1	JAN	1506	94	0.	.0	100.2	1	JAN	1720	161	0.	.0	100.4
1	JAN	1254	28	0.	.0	100.1	1	JAN	1508	95	0.	.0	100.2	1	JAN	1722	162	0.	.0	100.4
1	JAN	1256	29	0.	.0	100.1	1	JAN	1510	96	0.	.0	100.2	1	JAN	1724	163	0.	.0	100.4
1	JAN	1258	30	0.	.0	100.1	1	JAN	1512	97	0.	.0	100.2	1	JAN	1726	164	0.	.0	100.4
1	JAN	1300	31	0.	.0	100.1	1	JAN	1514	98	0.	.0	100.2	1	JAN	1728	165	0.	.0	100.4
1	JAN	1302	32	0.	.0	100.1	1	JAN	1516	99	0.	.0	100.2	1	JAN	1730	166	0.	.0	100.4
1	JAN	1304	33	0.	.0	100.1	1	JAN	1518	100	0.	.0	100.2	1	JAN	1732	167	0.	.0	100.3
1	JAN	1306	34	0.	.0	100.1	1	JAN	1520	101	0.	.0	100.3	1	JAN	1734	168	0.	.0	100.3
1	JAN	1308	35	0.	.0	100.1	1	JAN	1522	102	0.	.0	100.3	1	JAN	1736	169	0.	.0	100.3
1	JAN	1310	36	0.	.0	100.1	1	JAN	1524	103	0.	.0	100.3	1	JAN	1738	170	0.	.0	100.3

1 JAN 1312	37	0.	.0	100.1 *	1 JAN 1526	104	0.	.0	100.3 *	1 JAN 1740	171	0.	.0	100.3
1 JAN 1314	38	0.	.0	100.1 *	1 JAN 1528	105	0.	.0	100.3 *	1 JAN 1742	172	0.	.0	100.3
1 JAN 1316	39	0.	.0	100.1 *	1 JAN 1530	106	0.	.0	100.3 *	1 JAN 1744	173	0.	.0	100.3
1 JAN 1318	40	0.	.0	100.1 *	1 JAN 1532	107	0.	.0	100.3 *	1 JAN 1746	174	0.	.0	100.3
1 JAN 1320	41	0.	.0	100.1 *	1 JAN 1534	108	0.	.0	100.3 *	1 JAN 1748	175	0.	.0	100.3
1 JAN 1322	42	0.	.0	100.1 *	1 JAN 1536	109	0.	.0	100.3 *	1 JAN 1750	176	0.	.0	100.3
1 JAN 1324	43	0.	.0	100.1 *	1 JAN 1538	110	0.	.0	100.3 *	1 JAN 1752	177	0.	.0	100.3
1 JAN 1326	44	0.	.0	100.1 *	1 JAN 1540	111	0.	.0	100.3 *	1 JAN 1754	178	0.	.0	100.3
1 JAN 1328	45	0.	.0	100.1 *	1 JAN 1542	112	0.	.0	100.3 *	1 JAN 1756	179	0.	.0	100.3
1 JAN 1330	46	0.	.0	100.1 *	1 JAN 1544	113	0.	.0	100.3 *	1 JAN 1758	180	0.	.0	100.2
1 JAN 1332	47	0.	.0	100.1 *	1 JAN 1546	114	0.	.0	100.4 *	1 JAN 1800	181	0.	.0	100.2
1 JAN 1334	48	0.	.0	100.1 *	1 JAN 1548	115	0.	.0	100.4 *	1 JAN 1802	182	0.	.0	100.2
1 JAN 1336	49	0.	.0	100.1 *	1 JAN 1550	116	0.	.0	100.4 *	1 JAN 1804	183	0.	.0	100.2
1 JAN 1338	50	0.	.0	100.1 *	1 JAN 1552	117	0.	.0	100.4 *	1 JAN 1806	184	0.	.0	100.2
1 JAN 1340	51	0.	.0	100.1 *	1 JAN 1554	118	0.	.0	100.5 *	1 JAN 1808	185	0.	.0	100.2
1 JAN 1342	52	0.	.0	100.1 *	1 JAN 1556	119	0.	.0	100.5 *	1 JAN 1810	186	0.	.0	100.2
1 JAN 1344	53	0.	.0	100.1 *	1 JAN 1558	120	1.	.0	100.6 *	1 JAN 1812	187	0.	.0	100.2
1 JAN 1346	54	0.	.0	100.1 *	1 JAN 1600	121	1.	.0	100.7 *	1 JAN 1814	188	0.	.0	100.2
1 JAN 1348	55	0.	.0	100.1 *	1 JAN 1602	122	1.	.0	100.8 *	1 JAN 1816	189	0.	.0	100.2
1 JAN 1350	56	0.	.0	100.1 *	1 JAN 1604	123	1.	.1	100.9 *	1 JAN 1818	190	0.	.0	100.2
1 JAN 1352	57	0.	.0	100.1 *	1 JAN 1606	124	1.	.1	101.0 *	1 JAN 1820	191	0.	.0	100.2
1 JAN 1354	58	0.	.0	100.1 *	1 JAN 1608	125	1.	.1	101.0 *	1 JAN 1822	192	0.	.0	100.2
1 JAN 1356	59	0.	.0	100.1 *	1 JAN 1610	126	1.	.1	101.0 *	1 JAN 1824	193	0.	.0	100.1
1 JAN 1358	60	0.	.0	100.1 *	1 JAN 1612	127	1.	.1	101.0 *	1 JAN 1826	194	0.	.0	100.1
1 JAN 1400	61	0.	.0	100.1 *	1 JAN 1614	128	1.	.1	101.0 *	1 JAN 1828	195	0.	.0	100.1
1 JAN 1402	62	0.	.0	100.1 *	1 JAN 1616	129	1.	.1	101.0 *	1 JAN 1830	196	0.	.0	100.1
1 JAN 1404	63	0.	.0	100.1 *	1 JAN 1618	130	1.	.1	100.9 *	1 JAN 1832	197	0.	.0	100.1
1 JAN 1406	64	0.	.0	100.1 *	1 JAN 1620	131	1.	.1	100.9 *	1 JAN 1834	198	0.	.0	100.1
1 JAN 1408	65	0.	.0	100.1 *	1 JAN 1622	132	1.	.1	100.9 *	1 JAN 1836	199	0.	.0	100.1
1 JAN 1410	66	0.	.0	100.2 *	1 JAN 1624	133	1.	.0	100.9 *	1 JAN 1838	200	0.	.0	100.1
1 JAN 1412	67	0.	.0	100.2 *	1 JAN 1626	134	1.	.0	100.8 *					
				*					*					

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	6.63-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1.	4.13		0.	0.	0.	0.
		(INCHES)	1.699	1.741	1.741	1.741
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	6.63-HR
+ (AC-FT)	(HR)					
0.	4.13		0.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	6.63-HR
+ (FEET)	(HR)					
101.00	4.17		100.32	100.29	100.29	100.29

CUMULATIVE AREA = .00 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+										
	HYDROGRAPH AT									
+		BASIN	3.34	4.03	0.	0.	0.	.00		
	ROUTED TO									
+		DETAIN	0.87	4.13	0.	0.	0.	.00		
+									101.00	4.17

*** NORMAL END OF HEC-1 ***

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****************************************                                       ***************************************
*                                      *                                       *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                       *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998               *                                       *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                *                                       *         609 SECOND STREET           *
*                                      *                                       *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE   31AUG15  TIME  16:19:28  *                                       *          (916) 756-1104             *
*                                      *                                       *                                     *
****************************************                                       ***************************************




                                        X     X  XXXXXXX   XXXXX         X
                                        X     X  X        X     X       XX
                                        X     X  X        X              X
                                        XXXXXXX  XXXX     X       XXXXX  X
                                        X     X  X        X              X
                                        X     X  X        X     X        X
                                        X     X  XXXXXXX   XXXXX        XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                      *DIAGRAM
*** FREE ***
           1          ID   KILROY REALTY OFFICE BUILDING & PARKING STRUCTURE
           2          ID   50-YEAR DETENTION ANALYSIS
           3          ID   BASED ON PROPOSED CONDITION RATIONAL METHOD RESULTS NODE 50 TO 52
           4          IT       2 01JAN90    1200     200

           5          KK   BASIN
           6          KM   RATIONAL METHOD HYDROGRAPH PROGRAM
           7          KM   50-YEAR, 6-HOUR RAINFALL IS 2.1 INCHES
           8          KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.83
           9          KM   RATIONAL METHOD TIME OF CONCENTRATION IS 5.0 MINUTES
          10          BA  0.0014
          11          IN       5 01JAN90    1158
          12          QI       0     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
          13          QI     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
          14          QI     0.1     0.1     0.1     0.1     0.1     0.2     0.2     0.2     0.2     0.2
          15          QI     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.3
          16          QI     0.3     0.3     0.3     0.4     0.4     0.5     0.6     0.8     2.1     3.3
          17          QI     0.7     0.4     0.4     0.3     0.3     0.2     0.2     0.2     0.2     0.2
          18          QI     0.2     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1     0.1
          19          QI     0.1     0.1     0.1       0       0       0       0       0       0       0
          20          QI       0       0       0       0

          21          KK  DETAIN
          22          RS       1    STOR      -1
          23          SV       0  0.0519
          24          SQ       0     .80
          25          SE     100     101
          26          ZZ
```

```
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    5       BASIN
                V
                V
   21      DETAIN

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

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****************************************                                          ***************************************
*                                      *                                          *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                          *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998               *                                          *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                *                                          *         609 SECOND STREET           *
*                                      *                                          *      DAVIS, CALIFORNIA 95616        *
* RUN DATE   31AUG15  TIME  16:19:28   *                                          *          (916) 756-1104             *
*                                      *                                          *                                     *
****************************************                                          ***************************************



                     KILROY REALTY OFFICE BUILDING & PARKING STRUCTURE
                     50-YEAR DETENTION ANALYSIS
                     BASED ON PROPOSED CONDITION RATIONAL METHOD RESULTS NODE 50 TO 52

     IT         HYDROGRAPH TIME DATA
                      NMIN           2  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1JAN90  STARTING DATE
                     ITIME        1200  STARTING TIME
                        NQ         200  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1JAN90  ENDING DATE
                    NDTIME        1838  ENDING TIME
                    ICENT           19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE    6.63 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   5 KK     *     BASIN  *
            *            *
            **************
                     RATIONAL METHOD HYDROGRAPH PROGRAM
                     50-YEAR, 6-HOUR RAINFALL IS 2.1 INCHES
                     RATIONAL METHOD RUNOFF COEFFICIENT IS 0.83
                     RATIONAL METHOD TIME OF CONCENTRATION IS 5.0 MINUTES

  11 IN         TIME DATA FOR INPUT TIME SERIES
                     JXMIN           5  TIME INTERVAL IN MINUTES
                    JXDATE      1JAN90  STARTING DATE
                    JXTIME        1158  STARTING TIME

               SUBBASIN RUNOFF DATA

  10 BA         SUBBASIN CHARACTERISTICS
                     TAREA         .00  SUBBASIN AREA

                                                                   ***

*****************************************************************************************************************************

                                                   HYDROGRAPH AT STATION    BASIN

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```

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
1 JAN 1200	1	0.	*	1 JAN 1340	51	0.	*	1 JAN 1520	101	0.	*	1 JAN 1700	151	0.
1 JAN 1202	2	0.	*	1 JAN 1342	52	0.	*	1 JAN 1522	102	0.	*	1 JAN 1702	152	0.
1 JAN 1204	3	0.	*	1 JAN 1344	53	0.	*	1 JAN 1524	103	0.	*	1 JAN 1704	153	0.
1 JAN 1206	4	0.	*	1 JAN 1346	54	0.	*	1 JAN 1526	104	0.	*	1 JAN 1706	154	0.
1 JAN 1208	5	0.	*	1 JAN 1348	55	0.	*	1 JAN 1528	105	0.	*	1 JAN 1708	155	0.
1 JAN 1210	6	0.	*	1 JAN 1350	56	0.	*	1 JAN 1530	106	0.	*	1 JAN 1710	156	0.
1 JAN 1212	7	0.	*	1 JAN 1352	57	0.	*	1 JAN 1532	107	0.	*	1 JAN 1712	157	0.
1 JAN 1214	8	0.	*	1 JAN 1354	58	0.	*	1 JAN 1534	108	0.	*	1 JAN 1714	158	0.
1 JAN 1216	9	0.	*	1 JAN 1356	59	0.	*	1 JAN 1536	109	0.	*	1 JAN 1716	159	0.
1 JAN 1218	10	0.	*	1 JAN 1358	60	0.	*	1 JAN 1538	110	0.	*	1 JAN 1718	160	0.
1 JAN 1220	11	0.	*	1 JAN 1400	61	0.	*	1 JAN 1540	111	0.	*	1 JAN 1720	161	0.
1 JAN 1222	12	0.	*	1 JAN 1402	62	0.	*	1 JAN 1542	112	0.	*	1 JAN 1722	162	0.
1 JAN 1224	13	0.	*	1 JAN 1404	63	0.	*	1 JAN 1544	113	1.	*	1 JAN 1724	163	0.
1 JAN 1226	14	0.	*	1 JAN 1406	64	0.	*	1 JAN 1546	114	1.	*	1 JAN 1726	164	0.
1 JAN 1228	15	0.	*	1 JAN 1408	65	0.	*	1 JAN 1548	115	1.	*	1 JAN 1728	165	0.
1 JAN 1230	16	0.	*	1 JAN 1410	66	0.	*	1 JAN 1550	116	1.	*	1 JAN 1730	166	0.
1 JAN 1232	17	0.	*	1 JAN 1412	67	0.	*	1 JAN 1552	117	1.	*	1 JAN 1732	167	0.
1 JAN 1234	18	0.	*	1 JAN 1414	68	0.	*	1 JAN 1554	118	1.	*	1 JAN 1734	168	0.
1 JAN 1236	19	0.	*	1 JAN 1416	69	0.	*	1 JAN 1556	119	2.	*	1 JAN 1736	169	0.
1 JAN 1238	20	0.	*	1 JAN 1418	70	0.	*	1 JAN 1558	120	2.	*	1 JAN 1738	170	0.
1 JAN 1240	21	0.	*	1 JAN 1420	71	0.	*	1 JAN 1600	121	3.	*	1 JAN 1740	171	0.
1 JAN 1242	22	0.	*	1 JAN 1422	72	0.	*	1 JAN 1602	122	3.	*	1 JAN 1742	172	0.
1 JAN 1244	23	0.	*	1 JAN 1424	73	0.	*	1 JAN 1604	123	3.	*	1 JAN 1744	173	0.
1 JAN 1246	24	0.	*	1 JAN 1426	74	0.	*	1 JAN 1606	124	2.	*	1 JAN 1746	174	0.
1 JAN 1248	25	0.	*	1 JAN 1428	75	0.	*	1 JAN 1608	125	1.	*	1 JAN 1748	175	0.
1 JAN 1250	26	0.	*	1 JAN 1430	76	0.	*	1 JAN 1610	126	1.	*	1 JAN 1750	176	0.
1 JAN 1252	27	0.	*	1 JAN 1432	77	0.	*	1 JAN 1612	127	0.	*	1 JAN 1752	177	0.
1 JAN 1254	28	0.	*	1 JAN 1434	78	0.	*	1 JAN 1614	128	0.	*	1 JAN 1754	178	0.
1 JAN 1256	29	0.	*	1 JAN 1436	79	0.	*	1 JAN 1616	129	0.	*	1 JAN 1756	179	0.
1 JAN 1258	30	0.	*	1 JAN 1438	80	0.	*	1 JAN 1618	130	0.	*	1 JAN 1758	180	0.
1 JAN 1300	31	0.	*	1 JAN 1440	81	0.	*	1 JAN 1620	131	0.	*	1 JAN 1800	181	0.
1 JAN 1302	32	0.	*	1 JAN 1442	82	0.	*	1 JAN 1622	132	0.	*	1 JAN 1802	182	0.
1 JAN 1304	33	0.	*	1 JAN 1444	83	0.	*	1 JAN 1624	133	0.	*	1 JAN 1804	183	0.
1 JAN 1306	34	0.	*	1 JAN 1446	84	0.	*	1 JAN 1626	134	0.	*	1 JAN 1806	184	0.
1 JAN 1308	35	0.	*	1 JAN 1448	85	0.	*	1 JAN 1628	135	0.	*	1 JAN 1808	185	0.
1 JAN 1310	36	0.	*	1 JAN 1450	86	0.	*	1 JAN 1630	136	0.	*	1 JAN 1810	186	0.
1 JAN 1312	37	0.	*	1 JAN 1452	87	0.	*	1 JAN 1632	137	0.	*	1 JAN 1812	187	0.
1 JAN 1314	38	0.	*	1 JAN 1454	88	0.	*	1 JAN 1634	138	0.	*	1 JAN 1814	188	0.
1 JAN 1316	39	0.	*	1 JAN 1456	89	0.	*	1 JAN 1636	139	0.	*	1 JAN 1816	189	0.
1 JAN 1318	40	0.	*	1 JAN 1458	90	0.	*	1 JAN 1638	140	0.	*	1 JAN 1818	190	0.
1 JAN 1320	41	0.	*	1 JAN 1500	91	0.	*	1 JAN 1640	141	0.	*	1 JAN 1820	191	0.
1 JAN 1322	42	0.	*	1 JAN 1502	92	0.	*	1 JAN 1642	142	0.	*	1 JAN 1822	192	0.
1 JAN 1324	43	0.	*	1 JAN 1504	93	0.	*	1 JAN 1644	143	0.	*	1 JAN 1824	193	0.
1 JAN 1326	44	0.	*	1 JAN 1506	94	0.	*	1 JAN 1646	144	0.	*	1 JAN 1826	194	0.
1 JAN 1328	45	0.	*	1 JAN 1508	95	0.	*	1 JAN 1648	145	0.	*	1 JAN 1828	195	0.
1 JAN 1330	46	0.	*	1 JAN 1510	96	0.	*	1 JAN 1650	146	0.	*	1 JAN 1830	196	0.
1 JAN 1332	47	0.	*	1 JAN 1512	97	0.	*	1 JAN 1652	147	0.	*	1 JAN 1832	197	0.
1 JAN 1334	48	0.	*	1 JAN 1514	98	0.	*	1 JAN 1654	148	0.	*	1 JAN 1834	198	0.
1 JAN 1336	49	0.	*	1 JAN 1516	99	0.	*	1 JAN 1656	149	0.	*	1 JAN 1836	199	0.
1 JAN 1338	50	0.	*	1 JAN 1518	100	0.	*	1 JAN 1658	150	0.	*	1 JAN 1838	200	0.

****

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	6.63-HR
+	(CFS)	(HR)					
			(CFS)				
+	3.	4.03		0.	0.	0.	0.
			(INCHES)	1.745	1.747	1.747	1.747
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

*** ***

```
          **************
          *            *
 21 KK    *   DETAIN   *
          *            *
          **************

             HYDROGRAPH ROUTING DATA

 22 RS           STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

 23 SV             STORAGE          .0        .1

 24 SQ           DISCHARGE          0.        1.

 25 SE           ELEVATION      100.00    101.00

                                                                ***

WARNING --- ROUTED OUTFLOW (      1.) IS GREATER THAN MAXIMUM OUTFLOW (      1.) IN STORAGE-OUTFLOW TABLE

*******************************************************************************************************************************

                                                    HYDROGRAPH AT STATION   DETAIN

*******************************************************************************************************************************
```

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	100.1	1	JAN	1414	68	0.	.0	100.2	1	JAN	1628	135	1.	.0	100.8
1	JAN	1202	2	0.	.0	100.1	1	JAN	1416	69	0.	.0	100.2	1	JAN	1630	136	1.	.0	100.8
1	JAN	1204	3	0.	.0	100.1	1	JAN	1418	70	0.	.0	100.2	1	JAN	1632	137	1.	.0	100.8
1	JAN	1206	4	0.	.0	100.1	1	JAN	1420	71	0.	.0	100.2	1	JAN	1634	138	1.	.0	100.8
1	JAN	1208	5	0.	.0	100.1	1	JAN	1422	72	0.	.0	100.2	1	JAN	1636	139	1.	.0	100.7
1	JAN	1210	6	0.	.0	100.1	1	JAN	1424	73	0.	.0	100.2	1	JAN	1638	140	1.	.0	100.7
1	JAN	1212	7	0.	.0	100.1	1	JAN	1426	74	0.	.0	100.2	1	JAN	1640	141	1.	.0	100.7
1	JAN	1214	8	0.	.0	100.1	1	JAN	1428	75	0.	.0	100.2	1	JAN	1642	142	1.	.0	100.7
1	JAN	1216	9	0.	.0	100.1	1	JAN	1430	76	0.	.0	100.2	1	JAN	1644	143	1.	.0	100.7
1	JAN	1218	10	0.	.0	100.1	1	JAN	1432	77	0.	.0	100.2	1	JAN	1646	144	1.	.0	100.6
1	JAN	1220	11	0.	.0	100.1	1	JAN	1434	78	0.	.0	100.2	1	JAN	1648	145	1.	.0	100.6
1	JAN	1222	12	0.	.0	100.1	1	JAN	1436	79	0.	.0	100.2	1	JAN	1650	146	0.	.0	100.6
1	JAN	1224	13	0.	.0	100.1	1	JAN	1438	80	0.	.0	100.2	1	JAN	1652	147	0.	.0	100.6
1	JAN	1226	14	0.	.0	100.1	1	JAN	1440	81	0.	.0	100.2	1	JAN	1654	148	0.	.0	100.6
1	JAN	1228	15	0.	.0	100.1	1	JAN	1442	82	0.	.0	100.2	1	JAN	1656	149	0.	.0	100.6
1	JAN	1230	16	0.	.0	100.1	1	JAN	1444	83	0.	.0	100.2	1	JAN	1658	150	0.	.0	100.6
1	JAN	1232	17	0.	.0	100.1	1	JAN	1446	84	0.	.0	100.2	1	JAN	1700	151	0.	.0	100.5
1	JAN	1234	18	0.	.0	100.1	1	JAN	1448	85	0.	.0	100.2	1	JAN	1702	152	0.	.0	100.5
1	JAN	1236	19	0.	.0	100.1	1	JAN	1450	86	0.	.0	100.2	1	JAN	1704	153	0.	.0	100.5
1	JAN	1238	20	0.	.0	100.1	1	JAN	1452	87	0.	.0	100.2	1	JAN	1706	154	0.	.0	100.5
1	JAN	1240	21	0.	.0	100.1	1	JAN	1454	88	0.	.0	100.2	1	JAN	1708	155	0.	.0	100.5
1	JAN	1242	22	0.	.0	100.1	1	JAN	1456	89	0.	.0	100.2	1	JAN	1710	156	0.	.0	100.5
1	JAN	1244	23	0.	.0	100.1	1	JAN	1458	90	0.	.0	100.2	1	JAN	1712	157	0.	.0	100.5
1	JAN	1246	24	0.	.0	100.1	1	JAN	1500	91	0.	.0	100.2	1	JAN	1714	158	0.	.0	100.4
1	JAN	1248	25	0.	.0	100.1	1	JAN	1502	92	0.	.0	100.2	1	JAN	1716	159	0.	.0	100.4
1	JAN	1250	26	0.	.0	100.1	1	JAN	1504	93	0.	.0	100.2	1	JAN	1718	160	0.	.0	100.4
1	JAN	1252	27	0.	.0	100.1	1	JAN	1506	94	0.	.0	100.2	1	JAN	1720	161	0.	.0	100.4
1	JAN	1254	28	0.	.0	100.1	1	JAN	1508	95	0.	.0	100.2	1	JAN	1722	162	0.	.0	100.4
1	JAN	1256	29	0.	.0	100.1	1	JAN	1510	96	0.	.0	100.2	1	JAN	1724	163	0.	.0	100.4
1	JAN	1258	30	0.	.0	100.1	1	JAN	1512	97	0.	.0	100.2	1	JAN	1726	164	0.	.0	100.4
1	JAN	1300	31	0.	.0	100.1	1	JAN	1514	98	0.	.0	100.2	1	JAN	1728	165	0.	.0	100.4
1	JAN	1302	32	0.	.0	100.1	1	JAN	1516	99	0.	.0	100.2	1	JAN	1730	166	0.	.0	100.3
1	JAN	1304	33	0.	.0	100.1	1	JAN	1518	100	0.	.0	100.2	1	JAN	1732	167	0.	.0	100.3
1	JAN	1306	34	0.	.0	100.1	1	JAN	1520	101	0.	.0	100.2	1	JAN	1734	168	0.	.0	100.3
1	JAN	1308	35	0.	.0	100.1	1	JAN	1522	102	0.	.0	100.3	1	JAN	1736	169	0.	.0	100.3
1	JAN	1310	36	0.	.0	100.1	1	JAN	1524	103	0.	.0	100.3	1	JAN	1738	170	0.	.0	100.3
1	JAN	1312	37	0.	.0	100.1	1	JAN	1526	104	0.	.0	100.3	1	JAN	1740	171	0.	.0	100.3
1	JAN	1314	38	0.	.0	100.1	1	JAN	1528	105	0.	.0	100.3	1	JAN	1742	172	0.	.0	100.3

1 JAN 1316	39	0.	.0	100.1	*	1 JAN 1530	106	0.	.0	100.3	*	1 JAN 1744	173	0.	.0	100.3
1 JAN 1318	40	0.	.0	100.1	*	1 JAN 1532	107	0.	.0	100.3	*	1 JAN 1746	174	0.	.0	100.3
1 JAN 1320	41	0.	.0	100.1	*	1 JAN 1534	108	0.	.0	100.3	*	1 JAN 1748	175	0.	.0	100.3
1 JAN 1322	42	0.	.0	100.1	*	1 JAN 1536	109	0.	.0	100.3	*	1 JAN 1750	176	0.	.0	100.3
1 JAN 1324	43	0.	.0	100.1	*	1 JAN 1538	110	0.	.0	100.3	*	1 JAN 1752	177	0.	.0	100.3
1 JAN 1326	44	0.	.0	100.1	*	1 JAN 1540	111	0.	.0	100.3	*	1 JAN 1754	178	0.	.0	100.3
1 JAN 1328	45	0.	.0	100.1	*	1 JAN 1542	112	0.	.0	100.3	*	1 JAN 1756	179	0.	.0	100.3
1 JAN 1330	46	0.	.0	100.1	*	1 JAN 1544	113	0.	.0	100.3	*	1 JAN 1758	180	0.	.0	100.2
1 JAN 1332	47	0.	.0	100.1	*	1 JAN 1546	114	0.	.0	100.4	*	1 JAN 1800	181	0.	.0	100.2
1 JAN 1334	48	0.	.0	100.1	*	1 JAN 1548	115	0.	.0	100.4	*	1 JAN 1802	182	0.	.0	100.2
1 JAN 1336	49	0.	.0	100.1	*	1 JAN 1550	116	0.	.0	100.4	*	1 JAN 1804	183	0.	.0	100.2
1 JAN 1338	50	0.	.0	100.1	*	1 JAN 1552	117	0.	.0	100.4	*	1 JAN 1806	184	0.	.0	100.2
1 JAN 1340	51	0.	.0	100.1	*	1 JAN 1554	118	0.	.0	100.4	*	1 JAN 1808	185	0.	.0	100.2
1 JAN 1342	52	0.	.0	100.1	*	1 JAN 1556	119	0.	.0	100.5	*	1 JAN 1810	186	0.	.0	100.2
1 JAN 1344	53	0.	.0	100.1	*	1 JAN 1558	120	0.	.0	100.6	*	1 JAN 1812	187	0.	.0	100.2
1 JAN 1346	54	0.	.0	100.1	*	1 JAN 1600	121	1.	.0	100.7	*	1 JAN 1814	188	0.	.0	100.2
1 JAN 1348	55	0.	.0	100.1	*	1 JAN 1602	122	1.	.0	100.8	*	1 JAN 1816	189	0.	.0	100.2
1 JAN 1350	56	0.	.0	100.1	*	1 JAN 1604	123	1.	.0	100.9	*	1 JAN 1818	190	0.	.0	100.2
1 JAN 1352	57	0.	.0	100.1	*	1 JAN 1606	124	1.	.1	101.0	*	1 JAN 1820	191	0.	.0	100.2
1 JAN 1354	58	0.	.0	100.1	*	1 JAN 1608	125	1.	.1	101.0	*	1 JAN 1822	192	0.	.0	100.2
1 JAN 1356	59	0.	.0	100.1	*	1 JAN 1610	126	1.	.1	101.0	*	1 JAN 1824	193	0.	.0	100.1
1 JAN 1358	60	0.	.0	100.1	*	1 JAN 1612	127	1.	.1	101.0	*	1 JAN 1826	194	0.	.0	100.1
1 JAN 1400	61	0.	.0	100.1	*	1 JAN 1614	128	1.	.0	101.0	*	1 JAN 1828	195	0.	.0	100.1
1 JAN 1402	62	0.	.0	100.1	*	1 JAN 1616	129	1.	.0	100.9	*	1 JAN 1830	196	0.	.0	100.1
1 JAN 1404	63	0.	.0	100.1	*	1 JAN 1618	130	1.	.0	100.9	*	1 JAN 1832	197	0.	.0	100.1
1 JAN 1406	64	0.	.0	100.1	*	1 JAN 1620	131	1.	.0	100.9	*	1 JAN 1834	198	0.	.0	100.1
1 JAN 1408	65	0.	.0	100.1	*	1 JAN 1622	132	1.	.0	100.9	*	1 JAN 1836	199	0.	.0	100.1
1 JAN 1410	66	0.	.0	100.1	*	1 JAN 1624	133	1.	.0	100.9	*	1 JAN 1838	200	0.	.0	100.1
1 JAN 1412	67	0.	.0	100.1	*	1 JAN 1626	134	1.	.0	100.8	*					
					*						*					

****

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	6.63-HR
+	(CFS)	(HR)					
			(CFS)				
+	1.	4.13		0.	0.	0.	0.
			(INCHES)	1.666	1.706	1.706	1.706
			(AC-FT)	0.	0.	0.	0.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	6.63-HR
+	(AC-FT)	(HR)				
	0.	4.13	0.	0.	0.	0.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	6.63-HR
+	(FEET)	(HR)				
	101.00	4.13	100.31	100.29	100.29	100.29

CUMULATIVE AREA = .00 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	BASIN	3.3	4.03	0.	0.	0.	.00		
+	ROUTED TO	DETAIN	0.8	4.13	0.	0.	0.	.00		
+									101.00	4.13

*** NORMAL END OF HEC-1 ***

EXTERIOR NOISE ANALYSIS REPORT

9455 TOWNE CENTRE DRIVE REDEVELOPMENT

San Diego, CA

March 11, 2016

Prepared for:
KLR Planning
P.O. Box 882676
San Diego, CA 92168

Prepared by:

dBF Associates, Inc.
3129 Tiger Run Court, Suite 202
Carlsbad, CA 92010

Tables

Figures

Appendices

1.0 INTRODUCTION AND SUMMARY

This report evaluates noise associated with the proposed "9455 Towne Centre Drive Redevelopment" project in the University City community of the City of San Diego, California (Figure 1). The project consists of the demolition of an existing 47,091-square-foot office building and construction of an 150,000-square-foot research / office building and parking structure along the south side of Eastgate Mall between Towne Centre Drive and Judicial Drive. Surrounding land uses include scientific research and office in all directions. The primary noise sources affecting the project site are vehicular traffic on Towne Centre Drive, Eastgate Mall, and Judicial Drive, and aircraft operations associated with Marine Corps Air Station (MCAS) Miramar.

The project as designed complies with the City of San Diego traffic noise significance threshold of 70 dBA CNEL for offices. As a condition of project approval, an interior noise analysis would be required to ensure that interior noise levels in offices meet the City of San Diego General Plan Noise Compatibility requirement of 50 dBA CNEL or less.

Mechanical equipment on the project site would comply with the City of San Diego municipal code operational noise limits (65 /60 dBA Leq during daytime / evening & nighttime hours) at project property lines.

Construction of the project would comply with the City of San Diego 75 dBA Leq (12 hour) municipal code construction noise limit at residential zones.

Project-generated traffic noise would not exceed the City of San Diego traffic noise significance threshold of a 3-dB increase.

No noise impacts were identified. No mitigation is necessary.

dBF Associates, Inc.

FIGURE 1
Vicinity Map

1.1 NOISE BACKGROUND

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

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

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

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

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

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

Source: Compiled by dBF Associates, Inc.

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

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

1.2 PROJECT DESCRIPTION

The 9455 Towne Centre Drive Redevelopment project proposes the redevelopment of an existing office building with a new office building and parking structure. The 3.9-acre project site is located at 9455 Towne Centre Drive, San Diego, California 92121. The site is situated in the southeast quadrant of the Eastgate Mall and Towne Centre Drive Intersection in the University Community Plan Area of the City of San Diego and is within the Marine Corps Air Station (MCAS) Miramar Airport Influence Area.

The project proposes the demolition of the existing 47,091-square foot two-story building and surface parking and construction of a five-story, 150,000-square-foot scientific research/office building that would complement existing industrial uses in the University community and in adjacent communities. Outdoor employee amenity space would be provided in the north-central portion of the project site, in the northwest corner of the project site, and in the south-central portion of the project site. Parking would be accommodated within a five-story parking garage. The project would provide 600 parking spaces, to include 12 accessible spaces, seven motorcycle spaces, and 48 carpool/zero emission vehicle spaces. Additionally, the project would include 30 short-term bicycle parking spaces and 30 long-term bicycle parking spaces. Project access is currently provided from driveways on Towne Centre Drive and Eastgate Mall. The entry off Towne Centre Drive would be retained in its current location with the proposed project, providing access to the project site and parking garage. The access from Eastgate Mall would be shifted further to the east and would provide direct access to the parking garage. An additional driveway with direct parking garage access and access to the parking garage would be added off Judicial Drive in the southeast corner of the project site. The project would increase the existing landscaping on the property and would provide a variety of trees, shrubs, and groundcover around the perimeter of the site and along the interior drive-court.

The proposed project includes an Amendment to the University Community Plan to increase the Development Intensity allocated to the project site in the Community Plan, a Site Development Permit, and a Planned Development Permit (PDP).

2.0 APPLICABLE NOISE STANDARDS

2.1 CITY OF SAN DIEGO

2.1.1 General Plan

The City of San Diego requires new projects to meet exterior noise level standards as established in the Noise Element of the General Plan [City of San Diego 2015: Policy NE-A.2]. The Land Use – Noise Compatibility Guidelines are presented in Table 2.

Sound levels up to 65 dBA CNEL are considered Compatible with outdoor areas of frequent use (patios, etc.) in the Offices land use category; sound levels up to 75 dBA CNEL are considered Conditionally Compatible. The building structure must attenuate exterior noise in occupied areas (offices) to 50 dBA CNEL or below.

Table 2. Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA 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 & Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables					
Residential					
Single Dwelling Units; Mobile Homes		45			
Multiple Dwelling Units **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 12Educational 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, Beverages & Groceries; Pets & Pet Supplies; Sundries Pharmaceutical, & Convenience Sales; Wearing Apparel & Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50	
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries					
Research & Development				50	

	Compatible	**Indoor Uses**	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		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 (45 or 50) for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated t make the outdoor activities acceptable. Refer to Section I.
	Incompatible	**Indoor Uses**	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

2.1.2 CEQA Significance Thresholds

2.1.2.1 Traffic Noise

The Development Services Department's California Environmental Quality Act (CEQA) Significance Determination Thresholds [City of San Diego 2011] addresses traffic noise, as specified in Table K-2: Traffic Noise Significance Thresholds (dB(A) CNEL). Relevant portions are reproduced in Table 3.

Table 3. City of San Diego Traffic Noise Significance Thresholds (dBA CNEL)

Structure or Proposed Use that would be impacted by Traffic Noise	Interior Space	Exterior Useable Space†
Single-family detached	45 dB	65 dB
Multi-family, schools, libraries, hospitals, day care, hotels, motels, parks, convalescent homes	Development Services Department (DSD) ensures 45 dB pursuant to Title 24	65 dB
Offices, Churches, Business, Professional Uses	n/a	70 dB
Commercial, Retail, Industrial, Outdoor Spectator Sports Uses	n/a	75 dB

† 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.

2.1.2.2 Airport Noise

The DSD's CEQA Significance Determination Thresholds addresses airport noise, as specified in Table K-3: Impacts from Airport Noise, reproduced as Table 4.

Table 4. City of San Diego Airport Noise Impact Thresholds

Structure or Proposed Use that would be impacted by Airport Noise	Regulation
Structure within an AEOZ	Exterior noise is one factor in determining land use compatibility. See Table K-4 and the applicable Comprehensive Land Use Plan (CLUP).
New Single Family and Multi-family	Building Development Review Division (BDR) of Development Services Department (DSD) ensures 45 dB interior noise levels. Discuss Airport noise impact & BDR requirements (insulation and upgraded building materials to ensure 45 dB(A) CNEL) in environmental document See also **§ 132.0309 Requirement for Avigation Easement.**
Remodels and additions to existing single and multi-family	Noise study & mitigation **not required** for airport noise > 65 dB(A) CNEL. See also **§ 132.0309 Requirement for Avigation Easement**. For development within the 60 dB CNEL contour of Lindbergh Field the applicant must demonstrate that indoor noise levels that are attributable to airport operations shall not exceed 45 dB. Refer to § 132.0306 of the Municipal Code.
New construction of hospitals, schools, day care centers or other sensitive uses	Noise study and mitigation **required** for airport noise > 65 dB(A) CNEL. See also § **132.0309 Requirement for Avigation Easement.**

2.1.3 Noise Ordinance

City of San Diego Municipal Code Section 59.5.401: Sound Level Limits [City of San Diego 2010] states:

> It shall be unlawful for any person to cause noise by any means to the extent that the one-hour average sound level exceeds the applicable limit given in the following table, at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is that part of the total noise at the specified location that is due solely to the action of said person.

TABLE OF APPLICABLE LIMITS

Land Use	Time of Day	One-Hour Average Sound Level (decibels)
1. Single Family Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45 40
2. Multi-Family Residential (up to a maximum density of 1/2000)	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50 45
3. All other Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55 50
4. Commercial	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	65 60 60
5. Industrial or Agricultural	any time	75

(Amended 9-11-1989 by O-17337 N.S.)
(Amended 11-28-2005 by O-19446 N.S.; effective 2-9-2006.)

City of San Diego Municipal Code Section 59.5.0404: Construction Noise [City of San Diego 2010] states:

(b) … it shall be unlawful for any person… 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. (Amended 1-3-1984 by O-16100 N.S.)

3.0 EXISTING NOISE ENVIRONMENT

The noise environment at the project site is dominated by vehicular traffic on Towne Centre Drive, Eastgate Mall, and Judicial Drive, and aircraft operations associated with MCAS Miramar.

Towne Centre Drive has an existing (year 2015) Average Daily Traffic (ADT) volume of 14,630 vehicles between Eastgate Mall and Executive Drive [USAI 2016]. The posted speed limit on Towne Centre Drive is 40 miles per hour (mph). Towne Centre Drive is classified as a four-lane Major Arterial roadway. Towne Centre Drive has a raised landscaped median and a two-lane left-turn pocket at the stoplight intersection with Eastgate Mall. Towne Centre Drive has a grade of approximately +1-2% northbound.

Eastgate Mall has an existing (year 2015) ADT volume of 11,257 vehicles between Towne Centre Drive and Judicial Drive [USAI 2016]. The posted speed limit on Eastgate Mall is 45 mph. Eastgate Mall is classified as a four-lane Collector roadway. Eastgate Mall has a raised median and single-lane left-turn pockets at the intersections with Towne Centre Drive and Judicial Drive. Eastgate Mall has a grade of approximately +2-3% westbound.

Judicial Drive has an existing (year 2015) ADT volume of 6,000 vehicles between Eastgate Mall and Executive Drive [USAI 2016]. The speed limit on Judicial Drive is unposted; traffic was generally observed to travel at approximately 35-40 mph. Judicial Drive is classified as a four-lane Major Arterial roadway. Judicial Drive has a raised median, a two-lane left-turn pocket at Eastgate Mall, and a dedicated right-turn lane at Eastgate Mall. Judicial Drive has a grade of approximately +3-4% northbound.

The project site is exposed to an existing (year 2004) MCAS Miramar noise level of approximately 62-63 dBA CNEL [MCAS, Miramar 2005].

3.1 SOUND LEVEL MEASUREMENTS

Three short-term (20-minute) sound level measurements were conducted during the afternoon peak traffic period of Tuesday, February 9, 2016 to quantify the existing onsite acoustical environment due to vehicle traffic and to calibrate the noise model. Agencies such as the U.S. Department of Housing and Urban Development (HUD) and the City of San Diego consider the peak hour sound level reasonably equivalent to the CNEL for vehicular traffic.

A RION Model NA-28 American National Standards Institute Type 1 Integrating Sound Level Meter was used as the data-collection device. The meter was mounted to a tripod, roughly 5 feet above ground, to simulate the average height of the human ear. The sound level meter was calibrated before and after the measurement period.

The measurement results are summarized in Table 5 and correspond to the locations depicted on Figure 2. A review of the table shows that the measured sound level ranged from approximately 59 dBA Leq at Measurement Location 1 (ML1) and ML3 to approximately 63 dBA at ML2. Other noise sources observed during the site visit include HVAC units on nearby buildings, birds calling, and wind in trees. The meter was occasionally paused briefly during aircraft overflights, to isolate the measurements to traffic noise.

Table 5. Sound Level Measurements (dBA)

Measurement Location		Time	Leq	Lmin	Lmax	L10	L50	L90	Traffic
ML1	~90 feet east of Towne Centre Drive CL, ~220 feet south of Eastgate Mall CL, on grade with Towne Centre Drive	15:45 – 16:05	58.6	61.3	69.9	61.3	57.2	53.4	Towne Centre Drive: NB: 54 cars SB: 261 cars & 4 buses
ML2	~65 feet south of Eastgate Mall CL, ~320 feet east of Towne Centre Drive CL, ~6 feet above Eastgate Mall grade	16:10 – 16:30	63.3	53.3	71.5	67.0	61.3	56.2	Eastgate Mall: EB: 215 cars, 2 medium trucks, 4 heavy trucks, 5 buses, & 2 motorcycles WB: 141 cars, 4 medium trucks, 2 heavy trucks, & 1 motorcycle
ML3	~120 feet west of Judicial Drive CL, ~375 feet south of Eastgate Mall CL, ~40 feet above Judicial Drive grade	16:35 – 16:55	59.2	52.9	73.2	61.7	57.7	54.3	Judicial Drive: NB: 71 cars, 2 medium trucks, & 1 motorcycle SB: 62 cars & 2 motorcycles

Notes:

All measurements conducted on Tuesday, February 9, 2016.
CL = centerline.
Traffic reported in terms of cars / medium trucks / heavy trucks / buses / motorcycles.

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FIGURE 2
Sound Level Measurements

4.0 FUTURE ONSITE NOISE ENVIRONMENT

The future onsite noise environment would also be a result of vehicular traffic on Towne Centre Drive, Eastgate Mall, and Judicial Drive, and aircraft operations associated with MCAS Miramar.

4.1 VEHICULAR TRAFFIC

Towne Centre Drive has a projected (year 2035 + project) ADT volume of 17,600 vehicles between Eastgate Mall and Executive Drive. Eastgate Mall has a projected (year 2035 + project) ADT volume of 14,700 vehicles between Towne Centre Drive and Judicial Drive. Judicial Drive has a projected (year 2035 + project) ADT volume of 8,400 vehicles [USAI 2016].

The Federal Highway Administration's (FHWA) Traffic Noise Model (TNM) version 2.5 was used to calculate traffic noise levels. The modeling effort considered offsite buildings, intervening topography, project buildings, roadway alignments, estimated average vehicle speed, peak-hour traffic volume, and vehicle mix. The model was calibrated using actual traffic counts and sound level measurements. Measured sound levels varied from modeled sound levels by less than 3 dBA. Future vehicular traffic calculations are summarized in Appendix A.

All current roadway parameters were assumed to remain constant in the future, and were modeled accordingly. The peak-hour traffic volume was assumed to be 10% of the ADT volume on each roadway. A traffic mix of 99% cars and 1% buses was used on Towne Centre Drive. A traffic mix of 94.5% cars, 1.5% medium trucks, 1.5% heavy trucks, 1.5% buses, and 1% motorcycles was used on Eastgate Mall. A traffic mix of 96.5% cars, 1.5% medium trucks, and 2% motorcycles was used on Judicial Drive. A default ground type of "hard soil" was used in the model.

Future exterior traffic noise levels on the project site are predicted to range from approximately 56 dBA CNEL at the south project building facade to approximately 68 dBA CNEL at the north project deck area. The predicted future exterior traffic noise levels are shown on Figure 3.

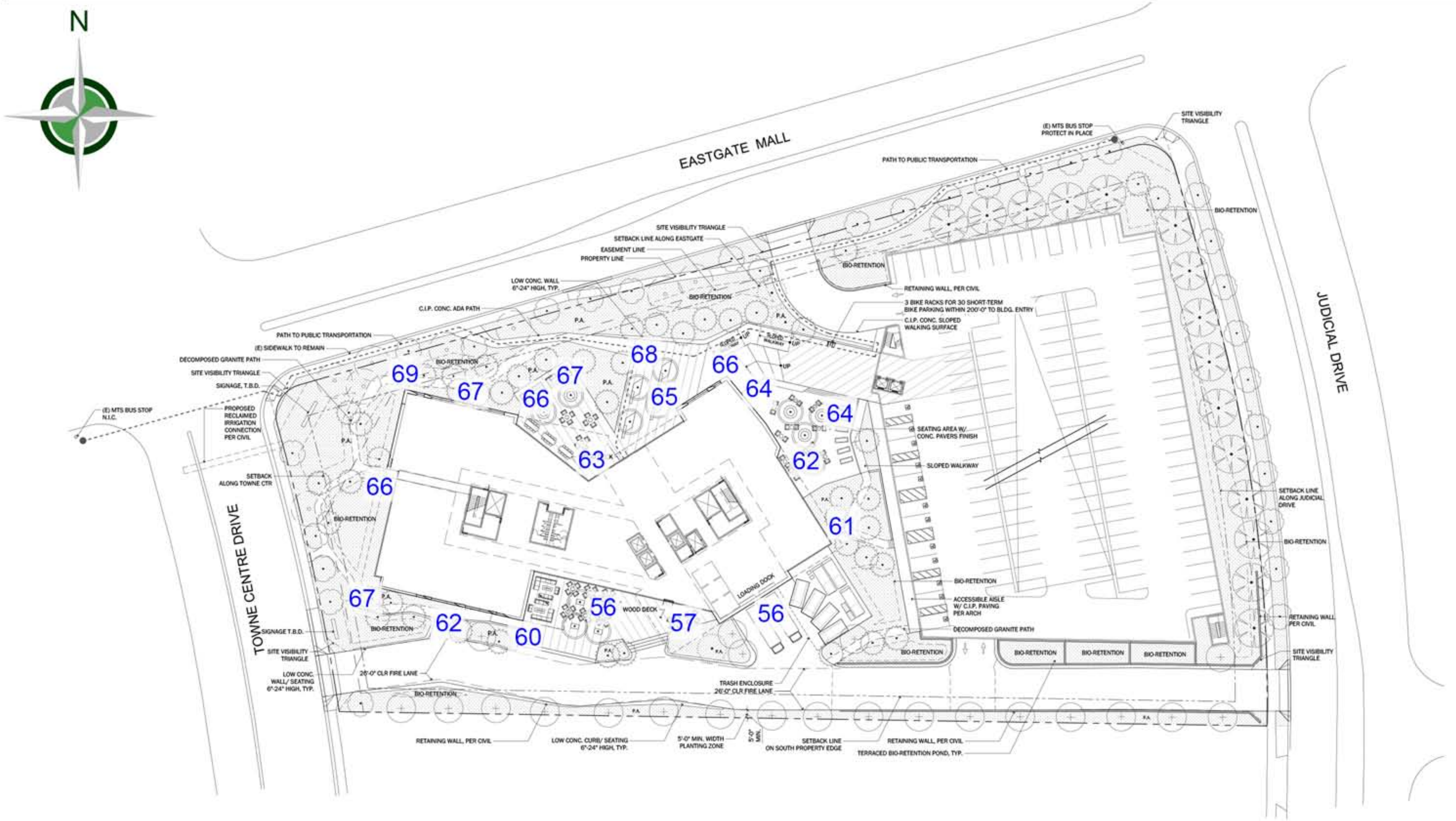


FIGURE 3

Future Exterior Traffic Noise Levels (CNEL)

4.2 AIRCRAFT OPERATIONS

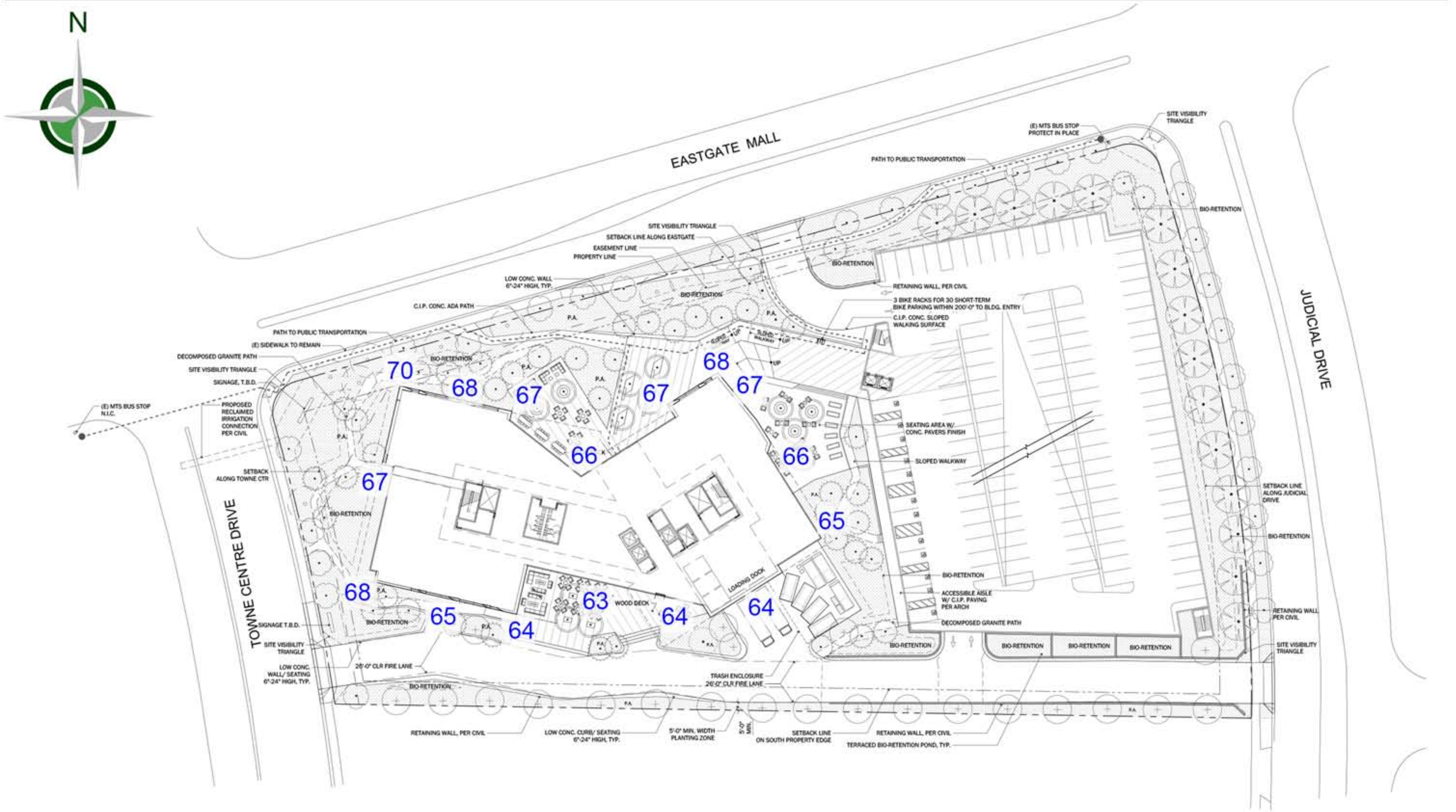
The project site is projected to be exposed to a future MCAS Miramar noise level of 62-63 dBA CNEL [SDCALUC 2011].

4.3 COMPOSITE TRANSPORTATION NOISE LEVELS

The predicted future exterior traffic noise levels were added to the projected future exterior airport noise levels. The resultant future composite exterior transportation noise levels at the proposed building façades would range from approximately 63 dBA CNEL at the south project building façade to approximately 70 dBA CNEL at the northwest project building façade corner. The predicted future composite exterior transportation noise levels are shown on Figure 4.

Exterior traffic noise levels at the project outdoor usable spaces would not exceed the City of San Diego traffic noise significance threshold of 70 dBA CNEL for offices. The project would result in no exterior noise impact.

Because future composite exterior transportation noise levels would exceed 65 dBA CNEL at the northwest project building façade, interior noise levels in offices could exceed the City of San Diego General Plan Noise Compatibility Guidelines requirement of 50 dBA CNEL. To avoid a potential land use impact, as a condition of project approval, an interior noise analysis would be required to be approved by the City's Building Inspection Department upon application for a building permit. This interior noise analysis must identify the sound transmission loss requirements for building façade elements (windows, walls, doors, and exterior wall assemblies) necessary to limit interior noise in offices to 50 dBA CNEL or below. Upgraded windows and/or doors with Sound Transmission Class (STC) ratings of 30 or higher may be necessary. If the interior noise limit can be achieved only with the windows closed, the building design must include mechanical ventilation that meets California Building Code (CBC) requirements. Worst-case noise levels, either existing or future, must be used. With the implementation of the findings of the interior noise analysis, interior noise levels in offices would be 50 dBA CNEL or below and comply with the City of San Diego General Plan Noise Compatibility Guidelines requirement. The project would result in a less than significant interior noise impact with project features incorporated in accordance with the interior noise analysis.



dBF Associates, Inc.

FIGURE 4
Future Exterior Composite Transportation Noise Levels (CNEL)

5.0 PROJECT-GENERATED NOISE

5.1 MECHANICAL EQUIPMENT

The project building would be initially constructed as a "cold shell" with minimal mechanical equipment. Depending on the tenant, the building would be fully developed as an office or a laboratory facility. The laboratory option, which would require more mechanical equipment, is evaluated herein.

The project building is planned to have up to four air handler / chilled water units, three chiller units, two chilled water pumps, two heating hot water boilers, two heating hot water pumps, and one heat recovery unit on the rooftop. The project is planned to have one ground-mounted emergency generator on the south side of the building. The rooftop level is approximately 80 feet above local ground. All rooftop mechanical equipment would be inside a screen wall 16 feet in height above rooftop level. The generator would be behind a screen wall 8 feet in height above ground level.

One air handler is expected to be a 100-ton unit or similar, producing sound power levels of approximately 83 dBA (casing radiated), 106 dBA (supply air discharge), and 111 dBA (outside air). Three air handlers are expected to be 150-ton units or similar, each producing sound power levels of approximately 89 dBA, (casing radiated), 111 dBA (supply air discharge), and 113 dBA (outside air). Each chiller is expected to be a 250-ton unit or similar, producing a sound power level of approximately 99 dBA at 100% load. Each pump and boiler, and the heat recovery unit, are expected to produce sound power levels of approximately 84 – 89 dBA.

The generator is expected to produce a sound power level of approximately 103 dBA. The routine testing of the generator would be on a monthly basis, for a period of 30 minutes, during daytime hours (between 7 a.m. to 7 p.m.).

The project would be a commercial land use. All adjacent properties are office (commercial) land uses. HVAC equipment would operate at any time of the day or night, for any duration. Operational noise at commercial property exceeding 65 dBA Leq between 7 a.m. to 7 p.m. or exceeding 60 dBA Leq between 7 p.m. to 7 a.m. would be a significant impact.

The Datakustik Cadna/A industrial noise prediction model was used to estimate noise levels from operational noise sources on the project site. The locations of the project building and mechanical equipment were imported from the site plan [Flad Architects 2015]. No noise reduction related to ground effects, atmospheric absorption, or intervening topography was included in the model. The assumptions made for source input into the noise model are detailed below.

As designed, onsite project mechanical equipment would generate noise levels at the south project property line as high as approximately 65 dBA Leq between 7 a.m. to 7 p.m. and as high as 51 dBA Leq between 7 p.m. to 7 a.m. Project operation would comply with City of San Diego Municipal Code noise limits. The project would result in no operational noise impact. No operational noise mitigation is necessary.

5.2 TRAFFIC

The proposed project would generate additional traffic along existing roads in the project area. An analysis was conducted of the project's effect on traffic noise conditions. Existing-without-project traffic noise levels were compared to existing-with-project traffic noise levels. The existing and project-generated ADT volumes on project roadway segments were obtained from the TIA [USAI 2016]. It was assumed that the existing roadway parameters would be unchanged. Table 6 shows the noise level increases along project roadways as a result of project traffic. The addition of project traffic would increase existing noise levels by less than 3 dBA CNEL along all assessed roadway segments. The project would result in no traffic noise impact.

Table 6. Off-Site Traffic Noise Levels

Roadway Segment	Existing ADT	Existing + Project ADT	Project-Generated Noise Level Increase
Genesee Avenue			
Eastgate Mall to Executive Drive	24,078	24,198	+ 0 dBA CNEL
Eastgate Mall			
Genesee Avenue to Easter Way	12,932	13,427	+ 0.2 dBA CNEL
Easter Way to Towne Centre Drive	11,682	12,207	+ 0.2 dBA CNEL
Towne Centre Drive to Judicial Drive	11,257	11,602	+ 0.1 dBA CNEL
East of Judicial Drive	10,356	10,506	+ 0.1 dBA CNEL
Towne Centre Drive			
Eastgate Mall to Executive Drive	14,630	15,148	+ 0.2 dBA CNEL
Executive Drive to La Jolla Village Drive	19,049	19,739	+ 0.2 dBA CNEL
Judicial Drive			
Eastgate Mall to Executive Drive	6,000	6,638	+ 0.4 dBA CNEL
Executive Drive to Golden Haven Drive	6,920	7,115	+ 0.1 dBA CNEL

5.3 CONSTRUCTION

Construction of the project would generate a temporary increase in noise in the project area. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, and distance between the noise source and receiver.

Construction activity and delivery of construction materials and equipment would be limited to between 7:00 a.m. and 7:00 p.m. This project would implement conventional construction techniques and equipment. Standard equipment such as scrapers, graders, backhoes, rollers, loaders, tractors, cranes, and miscellaneous trucks would be used for construction of most project facilities. Sound levels of typical construction equipment range from approximately 65 dBA to 95 dBA at 50 feet from the source (U.S. Environmental Protection Agency [U.S. EPA] 1971).

Worst-case noise levels are typically associated with grading. Noise sources associated with grading of the proposed project, and associated noise levels, are shown in Table 7.

Table 7. Grading Noise Source Levels

Noise Source	Noise Level	Quantity
Bulldozer	85 dBA at 50 feet	1
Scraper	85 dBA at 50 feet	1
Backhoe	85 dBA at 50 feet	1
Water Truck	85 dBA at 50 feet	1
Roller	75 dBA at 50 feet	1

Acoustical calculations were performed to estimate noise from construction activity. The calculations assumed point source acoustical characteristics. A point source decays from a source to receiver at a rate of 6.0 dB per doubling of distance from the source. This is a logarithmic relationship describing the acoustical spreading of a pure undisturbed spherical wave in the air.

It was assumed that the equipment in Table 7 would operate continuously throughout the site. No correction was applied for downtime associated with equipment maintenance, breaks, or similar situations. The closest residences (La Jolla Mesa Estates; 9535 – 9595 Easter Way) are located approximately 1,000 feet west of the centroid of construction activity on the project site. Using standard point source calculations, the combined noise level from project grading – 91 dBA at 50 feet – would attenuate to approximately 65 dBA at the closest residences.

Construction activity would occur during allowable times, and would generate sound levels below 75 dBA Leq (12 hours), in compliance with Section 59.5.404 of the City of San Diego Municipal Code. Regardless of the development option, construction of the project is expected to comply with the City of San Diego 75 dBA Leq (12 hour) municipal code noise limit at residential zones. The project would result in no construction noise impact.

6.0 MITIGATION

6.1 NOISE AFFECTING THE PROJECT

No impacts were identified. No mitigation is necessary.

6.2 PROJECT-GENERATED NOISE

6.2.1 Mechanical Equipment

No impacts were identified. No mitigation is necessary.

6.2.2 Traffic

No impacts were identified. No mitigation is necessary.

6.2.3 Construction

No impacts were identified. No mitigation is necessary.

7.0 REFERENCES

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APPENDIX A

ROADWAY NOISE CALCULATIONS

dBF Associates, Inc.				**19 February 2016**							
SPF				**TNM 2.5**							
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**9455 Towne Centre Drive**						**a State highway agency substantiates the use**				
RUN:	**Measured**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Towne Centre Drive SB2	12.0	point56	56	1,901,036.5	6,267,550.5	0.00				Average	
		point55	55	1,901,056.6	6,267,475.5	0.00				Average	
		point54	54	1,901,068.9	6,267,416.5	0.00				Average	
		point53	53	1,901,076.4	6,267,372.5	0.00				Average	
		point117	117	1,901,082.1	6,267,330.5	0.00				Average	
		point118	118	1,901,117.9	6,266,970.5	0.00					
Towne Centre Drive SB1	12.0	point57	57	1,901,048.0	6,267,554.0	0.00				Average	
		point58	58	1,901,065.6	6,267,488.5	0.00				Average	
		point59	59	1,901,074.6	6,267,448.5	0.00				Average	
		point60	60	1,901,082.0	6,267,411.5	0.00				Average	
		point61	61	1,901,088.1	6,267,374.5	0.00				Average	
		point115	115	1,901,094.1	6,267,332.0	0.00				Average	
		point116	116	1,901,131.1	6,266,975.0	0.00					
Towne Centre Drive NB1	12.0	point114	114	1,901,165.1	6,266,977.5	0.00				Average	
		point113	113	1,901,128.9	6,267,326.5	0.00				Average	
		point64	64	1,901,123.4	6,267,369.5	0.00				Average	
		point65	65	1,901,116.4	6,267,412.5	0.00				Average	
		point66	66	1,901,106.6	6,267,461.5	0.00				Average	
		point67	67	1,901,094.1	6,267,512.5	0.00				Average	
		point68	68	1,901,082.9	6,267,554.0	0.00					
Towne Centre Drive NB2	12.0	point112	112	1,901,180.0	6,266,975.0	0.00				Average	
		point74	74	1,901,140.9	6,267,328.0	0.00				Average	
		point73	73	1,901,133.6	6,267,381.5	0.00				Average	
		point72	72	1,901,125.9	6,267,426.5	0.00				Average	
		point71	71	1,901,117.6	6,267,466.0	0.00				Average	

		point70	70	1,901,109.9	6,267,500.0	0.00				Average	
		point69	69	1,901,094.4	6,267,557.5	0.00					
Eastgate Mall EB2	12.0	point104	104	1,900,599.1	6,267,461.0	0.00				Average	
		point75	75	1,901,118.4	6,267,605.5	0.00				Average	
		point119	119	1,901,645.5	6,267,756.0	0.00				Average	
		point120	120	1,902,329.1	6,267,944.5	0.00					
Eastgate Mall EB1	12.0	point106	106	1,900,596.1	6,267,473.0	0.00				Average	
		point78	78	1,901,115.1	6,267,616.5	0.00				Average	
		point122	122	1,901,642.4	6,267,767.5	0.00				Average	
		point121	121	1,902,318.8	6,267,958.0	0.00					
Eastgate Mall WB1	12.0	point124	124	1,902,308.4	6,267,983.0	0.00				Average	
		point80	80	1,901,650.6	6,267,800.0	0.00				Average	
		point107	107	1,901,121.6	6,267,650.0	0.00				Average	
		point108	108	1,900,590.2	6,267,505.5	0.00					
Eastgate Mall WB2	12.0	point127	127	1,902,305.5	6,267,997.5	0.00				Average	
		point81	81	1,901,647.4	6,267,811.5	0.00				Average	
		point109	109	1,901,118.5	6,267,662.0	0.00				Average	
		point110	110	1,900,585.8	6,267,517.5	0.00					
Judicial Drive NB	12.0	point131	131	1,901,798.5	6,266,973.5	0.00				Average	
		point96	96	1,901,806.1	6,267,322.5	0.00				Average	
		point97	97	1,901,805.0	6,267,406.0	0.00				Average	
		point98	98	1,901,800.9	6,267,454.0	0.00				Average	
		point99	99	1,901,794.4	6,267,503.5	0.00				Average	
		point100	100	1,901,785.1	6,267,566.0	0.00				Average	
		point101	101	1,901,768.9	6,267,640.5	0.00				Average	
		point102	102	1,901,739.5	6,267,744.5	0.00					
Judicial Drive SB1	12.0	point95	95	1,901,708.9	6,267,733.5	0.00				Average	
		point94	94	1,901,736.6	6,267,635.5	0.00				Average	
		point93	93	1,901,750.1	6,267,575.5	0.00				Average	
		point92	92	1,901,759.9	6,267,516.0	0.00				Average	
		point91	91	1,901,766.1	6,267,452.5	0.00				Average	
		point90	90	1,901,768.4	6,267,406.5	0.00				Average	
		point132	132	1,901,768.0	6,267,357.5	0.00				Average	
		point133	133	1,901,760.0	6,266,992.5	0.00					
Judicial Drive SB2	12.0	point88	88	1,901,697.4	6,267,730.0	0.00				Average	
		point87	87	1,901,718.9	6,267,655.5	0.00				Average	
		point86	86	1,901,735.6	6,267,586.5	0.00				Average	
		point85	85	1,901,747.1	6,267,521.5	0.00				Average	
		point84	84	1,901,754.5	6,267,447.5	0.00				Average	

		point128	128	1,901,756.0	6,267,357.5	0.00				Average	
		point129	129	1,901,748.2	6,267,007.5	0.00					

dBF Associates, Inc. 19 February 2016
SPF TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 9455 Towne Centre Drive
RUN: Measured

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Towne Centre Drive SB2	point56	56	392	35	0	0	0	0	6	35	0	0
	point55	55	392	35	0	0	0	0	6	35	0	0
	point54	54	392	35	0	0	0	0	6	35	0	0
	point53	53	392	35	0	0	0	0	6	35	0	0
	point117	117	392	35	0	0	0	0	6	35	0	0
	point118	118										
Towne Centre Drive SB1	point57	57	392	35	0	0	0	0	6	35	0	0
	point58	58	392	35	0	0	0	0	6	35	0	0
	point59	59	392	35	0	0	0	0	6	35	0	0
	point60	60	392	35	0	0	0	0	6	35	0	0
	point61	61	392	35	0	0	0	0	6	35	0	0
	point115	115	392	35	0	0	0	0	6	35	0	0
	point116	116										
Towne Centre Drive NB1	point114	114	81	35	0	0	0	0	0	0	0	0
	point113	113	81	35	0	0	0	0	0	0	0	0
	point64	64	81	35	0	0	0	0	0	0	0	0
	point65	65	81	35	0	0	0	0	0	0	0	0
	point66	66	81	35	0	0	0	0	0	0	0	0
	point67	67	81	35	0	0	0	0	0	0	0	0
	point68	68										
Towne Centre Drive NB2	point112	112	81	35	0	0	0	0	0	0	0	0
	point74	74	81	35	0	0	0	0	0	0	0	0
	point73	73	81	35	0	0	0	0	0	0	0	0

	point72	72	81	35	0	0	0	0	0	0	0	0
	point71	71	81	35	0	0	0	0	0	0	0	0
	point70	70	81	35	0	0	0	0	0	0	0	0
	point69	69										
Eastgate Mall EB2	point104	104	323	35	3	35	6	35	8	35	3	35
	point75	75	323	35	3	35	6	35	8	35	3	35
	point119	119	323	35	3	35	6	35	8	35	3	35
	point120	120										
Eastgate Mall EB1	point106	106	323	35	3	35	6	35	8	35	3	35
	point78	78	323	35	3	35	6	35	8	35	3	35
	point122	122	323	35	3	35	6	35	8	35	3	35
	point121	121										
Eastgate Mall WB1	point124	124	212	35	6	35	3	35	0	0	2	35
	point80	80	212	35	6	35	3	35	0	0	2	35
	point107	107	212	35	6	35	3	35	0	0	2	35
	point108	108										
Eastgate Mall WB2	point127	127	212	35	6	35	3	35	0	0	2	35
	point81	81	212	35	6	35	3	35	0	0	2	35
	point109	109	212	35	6	35	3	35	0	0	2	35
	point110	110										
Judicial Drive NB	point131	131	213	35	6	35	0	0	0	0	3	35
	point96	96	213	35	6	35	0	0	0	0	3	35
	point97	97	213	35	6	35	0	0	0	0	3	35
	point98	98	213	35	6	35	0	0	0	0	3	35
	point99	99	213	35	6	35	0	0	0	0	3	35
	point100	100	213	35	6	35	0	0	0	0	3	35
	point101	101	213	35	6	35	0	0	0	0	3	35
	point102	102										
Judicial Drive SB1	point95	95	93	35	0	0	0	0	0	0	3	35
	point94	94	93	35	0	0	0	0	0	0	3	35
	point93	93	93	35	0	0	0	0	0	0	3	35
	point92	92	93	35	0	0	0	0	0	0	3	35
	point91	91	93	35	0	0	0	0	0	0	3	35
	point90	90	93	35	0	0	0	0	0	0	3	35
	point132	132	93	35	0	0	0	0	0	0	3	35
	point133	133										

INPUT: TRAFFIC FOR LAeq1h Volumes **9455 Towne Centre Drive**

Judicial Drive SB2	point88	88	93	35	0	0	0	0	0	0	3	35
	point87	87	93	35	0	0	0	0	0	0	3	35
	point86	86	93	35	0	0	0	0	0	0	3	35
	point85	85	93	35	0	0	0	0	0	0	3	35
	point84	84	93	35	0	0	0	0	0	0	3	35
	point128	128	93	35	0	0	0	0	0	0	3	35
	point129	129										

dBF Associates, Inc. **19 February 2016**
SPF **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **9455 Towne Centre Drive**
RUN: **Measured**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ML1	18	1	1,901,187.9	6,267,423.5	0.00	5.00	58.60	65	10.0	8.0	Y
ML2	19	1	1,901,373.6	6,267,638.0	0.00	5.00	63.30	65	10.0	8.0	Y
ML3	20	1	1,901,663.9	6,267,398.5	0.00	5.00	59.20	65	10.0	8.0	Y

dBF Associates, Inc.							**19 February 2016**					
SPF							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		**9455 Towne Centre Drive**										
RUN:		**Measured**										
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless**				
								a State highway agency substantiates the use				
ATMOSPHERICS:		**68 deg F, 50% RH**						**of a different type with approval of FHWA.**				

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated**
							Sub'l Inc					**minus**
												Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML1	18	1	58.6	61.7	65	3.1	10	----	61.7	0.0	8	-8.0
ML2	19	1	63.3	65.5	65	2.2	10	Snd Lvl	65.5	0.0	8	-8.0
ML3	20	1	59.2	58.6	65	-0.6	10	----	58.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	3	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

dBF Associates, Inc.					19 February 2016						
SPF					TNM 2.5						
INPUT: ROADWAYS							Average pavement type shall be used unless				
PROJECT/CONTRACT:	9455 Towne Centre Drive						a State highway agency substantiates the use				
RUN:	Future						of a different type with the approval of FHWA				
Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Towne Centre Drive SB2	12.0	point56	56	1,901,036.5	6,267,550.5	0.00				Average	
		point55	55	1,901,056.6	6,267,475.5	0.00				Average	
		point54	54	1,901,068.9	6,267,416.5	0.00				Average	
		point53	53	1,901,076.4	6,267,372.5	0.00				Average	
		point117	117	1,901,082.1	6,267,330.5	0.00				Average	
		point118	118	1,901,117.9	6,266,970.5	0.00					
Towne Centre Drive SB1	12.0	point57	57	1,901,048.0	6,267,554.0	0.00				Average	
		point58	58	1,901,065.6	6,267,488.5	0.00				Average	
		point59	59	1,901,074.6	6,267,448.5	0.00				Average	
		point60	60	1,901,082.0	6,267,411.5	0.00				Average	
		point61	61	1,901,088.1	6,267,374.5	0.00				Average	
		point115	115	1,901,094.1	6,267,332.0	0.00				Average	
		point116	116	1,901,131.1	6,266,975.0	0.00					
Towne Centre Drive NB1	12.0	point114	114	1,901,165.1	6,266,977.5	0.00				Average	
		point113	113	1,901,128.9	6,267,326.5	0.00				Average	
		point64	64	1,901,123.4	6,267,369.5	0.00				Average	
		point65	65	1,901,116.4	6,267,412.5	0.00				Average	
		point66	66	1,901,106.6	6,267,461.5	0.00				Average	
		point67	67	1,901,094.1	6,267,512.5	0.00				Average	
		point68	68	1,901,082.9	6,267,554.0	0.00					
Towne Centre Drive NB2	12.0	point112	112	1,901,180.0	6,266,975.0	0.00				Average	
		point74	74	1,901,140.9	6,267,328.0	0.00				Average	
		point73	73	1,901,133.6	6,267,381.5	0.00				Average	
		point72	72	1,901,125.9	6,267,426.5	0.00				Average	
		point71	71	1,901,117.6	6,267,466.0	0.00				Average	

		point70	70	1,901,109.9	6,267,500.0	0.00				Average	
		point69	69	1,901,094.4	6,267,557.5	0.00					
Eastgate Mall EB2	12.0	point104	104	1,900,599.1	6,267,461.0	0.00				Average	
		point75	75	1,901,118.4	6,267,605.5	0.00				Average	
		point119	119	1,901,645.5	6,267,756.0	0.00				Average	
		point120	120	1,902,329.1	6,267,944.5	0.00					
Eastgate Mall EB1	12.0	point106	106	1,900,596.1	6,267,473.0	0.00				Average	
		point78	78	1,901,115.1	6,267,616.5	0.00				Average	
		point122	122	1,901,642.4	6,267,767.5	0.00				Average	
		point121	121	1,902,318.8	6,267,958.0	0.00					
Eastgate Mall WB1	12.0	point124	124	1,902,308.4	6,267,983.0	0.00				Average	
		point80	80	1,901,650.6	6,267,800.0	0.00				Average	
		point107	107	1,901,121.6	6,267,650.0	0.00				Average	
		point108	108	1,900,590.2	6,267,505.5	0.00					
Eastgate Mall WB2	12.0	point127	127	1,902,305.5	6,267,997.5	0.00				Average	
		point81	81	1,901,647.4	6,267,811.5	0.00				Average	
		point109	109	1,901,118.5	6,267,662.0	0.00				Average	
		point110	110	1,900,585.8	6,267,517.5	0.00					
Judicial Drive NB	12.0	point131	131	1,901,798.5	6,266,973.5	0.00				Average	
		point96	96	1,901,806.1	6,267,322.5	0.00				Average	
		point97	97	1,901,805.0	6,267,406.0	0.00				Average	
		point98	98	1,901,800.9	6,267,454.0	0.00				Average	
		point99	99	1,901,794.4	6,267,503.5	0.00				Average	
		point100	100	1,901,785.1	6,267,566.0	0.00				Average	
		point101	101	1,901,768.9	6,267,640.5	0.00				Average	
		point102	102	1,901,739.5	6,267,744.5	0.00					
Judicial Drive SB1	12.0	point95	95	1,901,708.9	6,267,733.5	0.00				Average	
		point94	94	1,901,736.6	6,267,635.5	0.00				Average	
		point93	93	1,901,750.1	6,267,575.5	0.00				Average	
		point92	92	1,901,759.9	6,267,516.0	0.00				Average	
		point91	91	1,901,766.1	6,267,452.5	0.00				Average	
		point90	90	1,901,768.4	6,267,406.5	0.00				Average	
		point132	132	1,901,768.0	6,267,357.5	0.00				Average	
		point133	133	1,901,760.0	6,266,992.5	0.00					
Judicial Drive SB2	12.0	point88	88	1,901,697.4	6,267,730.0	0.00				Average	
		point87	87	1,901,718.9	6,267,655.5	0.00				Average	
		point86	86	1,901,735.6	6,267,586.5	0.00				Average	
		point85	85	1,901,747.1	6,267,521.5	0.00				Average	
		point84	84	1,901,754.5	6,267,447.5	0.00				Average	

		point128	128	1,901,756.0	6,267,357.5	0.00				Average	
		point129	129	1,901,748.2	6,267,007.5	0.00					

dBF Associates, Inc.			**19 February 2016**										
SPF			**TNM 2.5**										
INPUT: TRAFFIC FOR LAeq1h Volumes													
PROJECT/CONTRACT:	**9455 Towne Centre Drive**												
RUN:	**Future**												
Roadway	**Points**												
Name	**Name**	**No.**	**Segment**										
			Autos		**MTrucks**		**HTrucks**		**Buses**		**Motorcycles**		
			V	**S**	**V**	**S**	**V**	**S**	**V**	**S**	**V**	**S**	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Towne Centre Drive SB2	point56	56	436	40	0	0	0	0	4	40	0	0	
	point55	55	436	40	0	0	0	0	4	40	0	0	
	point54	54	436	40	0	0	0	0	4	40	0	0	
	point53	53	436	40	0	0	0	0	4	40	0	0	
	point117	117	436	40	0	0	0	0	4	40	0	0	
	point118	118											
Towne Centre Drive SB1	point57	57	436	40	0	0	0	0	4	40	0	0	
	point58	58	436	40	0	0	0	0	4	40	0	0	
	point59	59	436	40	0	0	0	0	4	40	0	0	
	point60	60	436	40	0	0	0	0	4	40	0	0	
	point61	61	436	40	0	0	0	0	4	40	0	0	
	point115	115	436	40	0	0	0	0	4	40	0	0	
	point116	116											
Towne Centre Drive NB1	point114	114	436	40	0	0	0	0	4	40	0	0	
	point113	113	436	40	0	0	0	0	4	40	0	0	
	point64	64	436	40	0	0	0	0	4	40	0	0	
	point65	65	436	40	0	0	0	0	4	40	0	0	
	point66	66	436	40	0	0	0	0	4	40	0	0	
	point67	67	436	40	0	0	0	0	4	40	0	0	
	point68	68											
Towne Centre Drive NB2	point112	112	436	40	0	0	0	0	4	40	0	0	
	point74	74	436	40	0	0	0	0	4	40	0	0	
	point73	73	436	40	0	0	0	0	4	40	0	0	

	point72	72	436	40	0	0	0	0	4	40	0	0
	point71	71	436	40	0	0	0	0	4	40	0	0
	point70	70	436	40	0	0	0	0	4	40	0	0
	point69	69										
Eastgate Mall EB2	point104	104	347	45	6	45	6	45	6	45	4	45
	point75	75	347	45	6	45	6	45	6	45	4	45
	point119	119	347	45	6	45	6	45	6	45	4	45
	point120	120										
Eastgate Mall EB1	point106	106	347	45	6	45	6	45	6	45	4	45
	point78	78	347	45	6	45	6	45	6	45	4	45
	point122	122	347	45	6	45	6	45	6	45	4	45
	point121	121										
Eastgate Mall WB1	point124	124	347	45	6	45	6	45	6	45	4	45
	point80	80	347	45	6	45	6	45	6	45	4	45
	point107	107	347	45	6	45	6	45	6	45	4	45
	point108	108										
Eastgate Mall WB2	point127	127	347	45	6	45	6	45	6	45	4	45
	point81	81	347	45	6	45	6	45	6	45	4	45
	point109	109	347	45	6	45	6	45	6	45	4	45
	point110	110										
Judicial Drive NB	point131	131	406	35	6	35	0	0	0	0	8	35
	point96	96	406	35	6	35	0	0	0	0	8	35
	point97	97	406	35	6	35	0	0	0	0	8	35
	point98	98	406	35	6	35	0	0	0	0	8	35
	point99	99	406	35	6	35	0	0	0	0	8	35
	point100	100	406	35	6	35	0	0	0	0	8	35
	point101	101	406	35	6	35	0	0	0	0	8	35
	point102	102										
Judicial Drive SB1	point95	95	203	35	3	35	0	0	0	0	4	35
	point94	94	203	35	3	35	0	0	0	0	4	35
	point93	93	203	35	3	35	0	0	0	0	4	35
	point92	92	203	35	3	35	0	0	0	0	4	35
	point91	91	203	35	3	35	0	0	0	0	4	35
	point90	90	203	35	3	35	0	0	0	0	4	35
	point132	132	203	35	3	35	0	0	0	0	4	35
	point133	133										

INPUT: TRAFFIC FOR LAeq1h Volumes **9455 Towne Centre Drive**

Judicial Drive SB2		point88	88	203	35	3	35	0	0	0	0	4	35
		point87	87	203	35	3	35	0	0	0	0	4	35
		point86	86	203	35	3	35	0	0	0	0	4	35
		point85	85	203	35	3	35	0	0	0	0	4	35
		point84	84	203	35	3	35	0	0	0	0	4	35
		point128	128	203	35	3	35	0	0	0	0	4	35
		point129	129										

dBF Associates, Inc.						**19 February 2016**					
SPF						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**9455 Towne Centre Drive**										
RUN:	**Future**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
South deck west	5	1	1,901,274.9	6,267,431.5	0.00	5.00	0.00	65	10.0	8.0	Y
South facade center	6	1	1,901,328.1	6,267,458.0	0.00	5.00	0.00	65	10.0	8.0	Y
South deck east	7	1	1,901,352.9	6,267,429.5	0.00	5.00	0.00	65	10.0	8.0	Y
Southeast facade	8	1	1,901,426.1	6,267,456.5	0.00	5.00	0.00	65	10.0	8.0	Y
East seating area south	9	1	1,901,446.5	6,267,521.5	0.00	5.00	0.00	65	10.0	8.0	Y
East seating area west	10	1	1,901,430.4	6,267,546.0	0.00	5.00	0.00	65	10.0	8.0	Y
East seating area northwest	11	1	1,901,409.6	6,267,573.0	0.00	5.00	0.00	65	10.0	8.0	Y
East seating area east	12	1	1,901,465.6	6,267,570.5	0.00	5.00	0.00	65	10.0	8.0	Y
Northeast facade corner	13	1	1,901,398.0	6,267,591.0	0.00	5.00	0.00	65	10.0	8.0	Y
East / northeast facade	14	1	1,901,363.6	6,267,566.5	0.00	5.00	0.00	65	10.0	8.0	Y
North facade center	22	1	1,901,308.1	6,267,526.5	0.00	5.00	0.00	65	10.0	8.0	Y
North deck north	23	1	1,901,337.4	6,267,617.5	0.00	5.00	0.00	65	10.0	8.0	Y
North deck northwest	24	1	1,901,303.6	6,267,580.5	0.00	5.00	0.00	65	10.0	8.0	Y
North deck west	25	1	1,901,276.5	6,267,564.5	0.00	5.00	0.00	65	10.0	8.0	Y
North / northwest façade	26	1	1,901,233.9	6,267,570.5	0.00	5.00	0.00	65	10.0	8.0	Y
Northwest facade corner	27	1	1,901,189.0	6,267,580.5	0.00	5.00	0.00	65	10.0	8.0	Y
West facade	28	1	1,901,178.4	6,267,523.5	0.00	5.00	0.00	65	10.0	8.0	Y
Southwest facade corner	30	1	1,901,166.6	6,267,462.0	0.00	5.00	0.00	65	10.0	8.0	Y
South / southwest facade	31	1	1,901,219.9	6,267,444.0	0.00	5.00	0.00	65	10.0	8.0	Y

dBF Associates, Inc.					**19 February 2016**																
SPF					**TNM 2.5**																
INPUT: BARRIERS																					
PROJECT/CONTRACT:	**9455 Towne Centre Drive**																				
RUN:	**Future**																				
Barrier									**Points**												
Name	**Type**	**Height**		**If Wall**	**If Berm**			**Add'tnl**	**Name**	**No.**	**Coordinates (bottom)**			**Height**	**Segment**						
		Min	**Max**	**$ per Unit Area**	**$ per Unit Vol.**	**Top Width**	**Run:Rise**	**$ per Unit Length**			**X**	**Y**	**Z**	**at Point**	**Seg Ht Perturbs Incre-ment**	**#Up**	**#Dn**	**On Struct?**	**Important Reflec-tions?**		
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft						
Project Building	W	0.00	99.99	0.00				0.00	point24	24	1,901,191.1	6,267,576.0	0.00	80.00	0.00	0	0				
									point27	27	1,901,169.0	6,267,467.5	0.00	80.00	0.00	0	0				
									point29	29	1,901,176.4	6,267,460.0	0.00	80.00	0.00	0	0				
									point30	30	1,901,272.5	6,267,437.5	0.00	80.00	0.00	0	0				
									point31	31	1,901,280.4	6,267,472.0	0.00	80.00	0.00	0	0				
									point32	32	1,901,381.9	6,267,448.5	0.00	80.00	0.00	0	0				
									point33	33	1,901,387.9	6,267,438.5	0.00	80.00	0.00	0	0				
									point36	36	1,901,454.4	6,267,488.5	0.00	80.00	0.00	0	0				
									point39	39	1,901,396.6	6,267,583.5	0.00	80.00	0.00	0	0				
									point42	42	1,901,307.6	6,267,521.5	0.00	80.00	0.00	0	0				
									point43	43	1,901,258.5	6,267,561.5	0.00	80.00	0.00	0	0				
									point44	44	1,901,191.1	6,267,576.0	0.00	80.00							

dBF Associates, Inc. 19 February 2016

SPF TNM 2.5

Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: 9455 Towne Centre Drive

RUN: Future

BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
South deck west	5	1	0.0	59.9	65	59.9	10	----	59.9	0.0	8	-8.0
South facade center	6	1	0.0	55.5	65	55.5	10	----	55.5	0.0	8	-8.0
South deck east	7	1	0.0	57.0	65	57.0	10	----	57.0	0.0	8	-8.0
Southeast facade	8	1	0.0	56.2	65	56.2	10	----	56.2	0.0	8	-8.0
East seating area south	9	1	0.0	61.3	65	61.3	10	----	61.3	0.0	8	-8.0
East seating area west	10	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
East seating area northwest	11	1	0.0	63.6	65	63.6	10	----	63.6	0.0	8	-8.0
East seating area east	12	1	0.0	63.9	65	63.9	10	----	63.9	0.0	8	-8.0
Northeast facade corner	13	1	0.0	65.7	65	65.7	10	Snd Lvl	65.7	0.0	8	-8.0
East / northeast facade	14	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
North facade center	22	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
North deck north	23	1	0.0	68.4	65	68.4	10	Snd Lvl	68.4	0.0	8	-8.0
North deck northwest	24	1	0.0	66.5	65	66.5	10	Snd Lvl	66.5	0.0	8	-8.0
North deck west	25	1	0.0	65.8	65	65.8	10	Snd Lvl	65.8	0.0	8	-8.0
North / northwest façade	26	1	0.0	66.8	65	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
Northwest facade corner	27	1	0.0	69.1	65	69.1	10	Snd Lvl	69.1	0.0	8	-8.0
West facade	28	1	0.0	66.2	65	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
Southwest facade corner	30	1	0.0	67.0	65	67.0	10	Snd Lvl	67.0	0.0	8	-8.0
South / southwest facade	31	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	19	0.0	0.0	0.0

All Impacted		8	0.0	0.0	0.0							
All that meet NR Goal		0	0.0	0.0	0.0							