The City of San Diego

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

Chevron Fueling/Car Wash Facility - 2959 Midway Drive - San Diego, CA
Project Number 556729
C-CHV16014.1

ENGINEER OF WORK:

Kyle Flaming, PE RCE # CA 76432
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Chevron Corporation
145 South State College Blvd
Brea, CA 92821
(714) 671-3311

PREPARED BY:

PM DESIGN
Civil Engineering Solutions Group

PM Design Group, Inc.
38 Executive Park, Suite 310
Irvine, CA 92614
760.583.3388

DATE:
August 17, 2018

Approved by: City of San Diego Date

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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: Chevron F/CW Facility - 2959 Midway Drive, San Diego, CA
Permit Application Number: 556729

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.

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

Kyle Flaming
Print Name

PM Design Group, Inc.
Company

August 16, 2018
Date

Engineer's Stamp

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Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

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	6/5/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Initial Submittal
2	10/6/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Second Submittal
3	12/12/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Third Submittal
4	3/26/18	◉ Preliminary Design/Planning/CEQA ○ Final Design	Fourth Submittal
5	8/16/18	◉ Preliminary Design/Planning/CEQA ○ Final Design	Fifth Submittal

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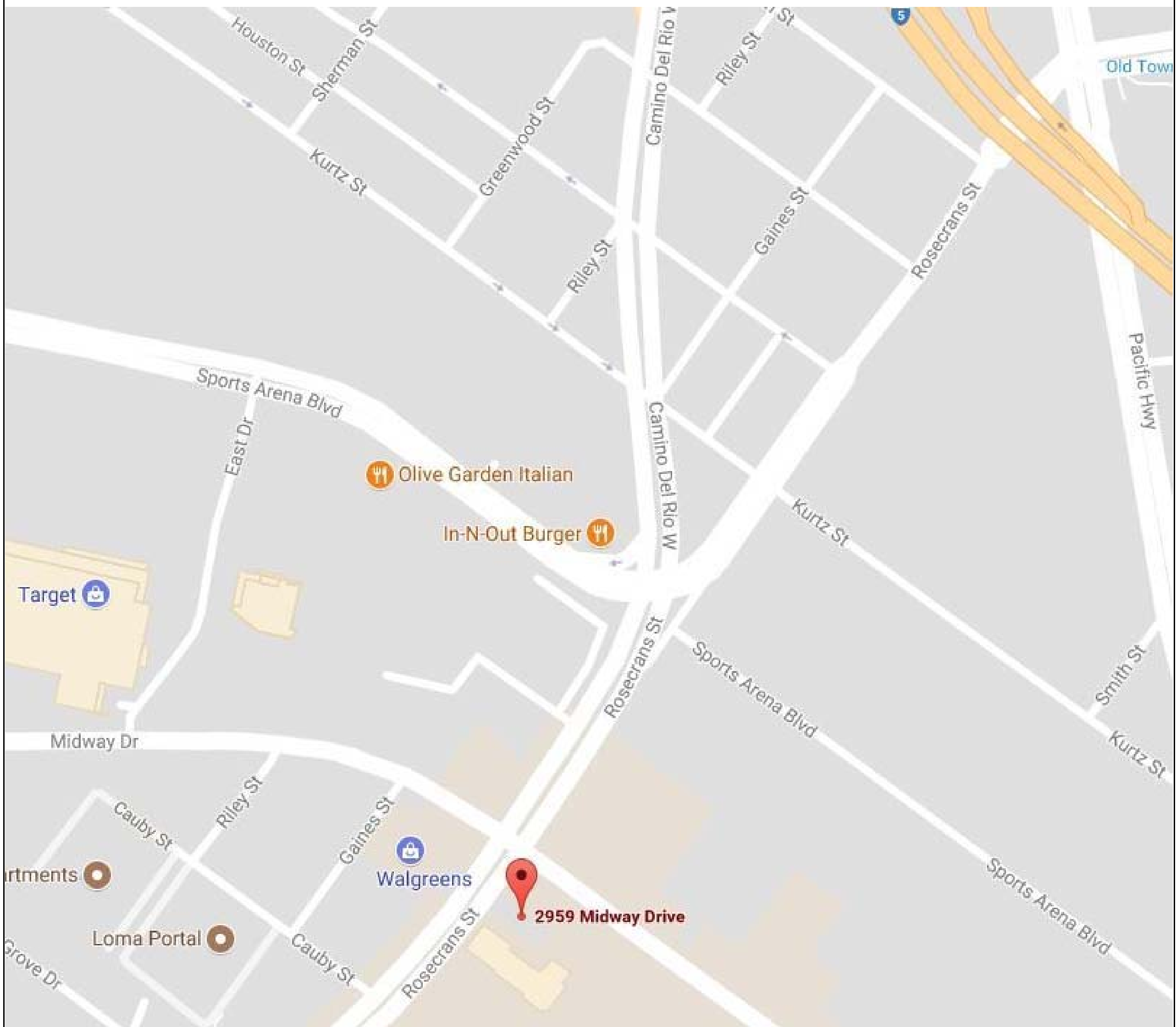
Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

PROJECT VICINITY MAP

Project Name: Chevron Fuel/Car Wash Facility - 2959 Midway Drive, San Diego
Permit Application Number: 556729



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City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
October 2016

Project Address: 2959 Midway Drive, San Diego, CA	Project Number *(for City Use Only)*:

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 administered 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 resulting in ground disturbance and contact with storm water runoff?

☒ Yes; WPCP required, skip 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 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 only ONE of the following activities: water service, sewer lateral, or 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, pot holing, curb and gutter replacement, and retaining wall encroachments.

○ Yes; no document required

Check one of the boxes below, 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 proposes 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 questions 1-3, and checked "Yes" for question 4
PART B does not apply and no document is required. Continue to Section 2.

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

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 requiring a Water Pollution Control Plan but 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; project not exempt.

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 Development 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
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 (RGO) that create 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 (ADT) 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 PERMANENT STORM WATER REQUIREMENTS.	☐
2.	The project is a STANDARD DEVELOPMENT 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 a hydromodification plan management	☒

Kyle Flaming, P.E.	Civil Engineer, Engineer of Record
Name of Owner or Agent *(Please Print)*	Title
Signature	Date

Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)	**Form I-1**

Project Identification	
Project Name: Chevron Fueling Facility - 2959 Midway Drive, San Diego, CA	
Permit Application Number: 556729	Date: 6/5/17

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

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.

Step	Answer	Progression
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.	◉ Yes	Go to Step 2.
	○ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.

Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):

Step	Answer	Progression
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.	○ Standard Project	Stop. Standard Project requirements apply.
	◉ PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	○ PDP Exempt	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below.

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

<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>):</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:
The site storm drain discharge will connect to the existing 18" City of San Diego concrete storm drain beneath Midway Drive. The hardened city storm drain continues uninterrupted and discharges to San Diego Bay.</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>
<tr><td colspan="3">Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply:
No proposed areas of on-site CCS. No upstream CCSYA's draining on-site. Project is to redevelopment an existing Chevron fueling facility and adjacent car wash property. Cover is asphalt paving, concrete paving, landscaped areas.</td></tr>
</table>

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Chevron Retail Fueling Facility
Project Address	2959 Midway Drive, San Diego, CA
Assessor's Parcel Number(s) (APN(s))	450-470-35-00 & 450-470-38-00
Permit Application Number	556729
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)	908.21
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	0.68 Acres ([SQFT] Square Feet)
Area to be disturbed by the project (Project Footprint)	0.68 Acres ([SQFT] Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	[AC] Acres (24,262 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	[AC] Acres (5,363 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.	-17 %

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

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: Existing Chevron fueling facility and adjacent private car wash facility to be redeveloped.
Existing Land Cover Includes (select all that apply): ☐ Vegetative Cover ☒ Non-Vegetated Pervious Areas ☒ Impervious Areas Description / Additional Information: Existing Chevron site: retail building, fueling canopy, asphalt/concrete paving, minor landscaped areas. Adjacent car wash property: retail building, asphalt/concrete paving, minor landscaped areas.
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:

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:

Existing drainage conveyance is urban. No off-site run-on. No existing storm drain, detention, water quality treatment or channels are located on-site.

Site runoff is conveyed by sheet flow and shallow concentrated flow from south to north and exits the drive entrance at the northeast site corner. Runoff travels as gutter flow to the existing storm drain inlet on Midway Drive. Runoff is then conveyed by the 1 concrete pipe connecting to the City of San Diego storm drain system. The hardened conveyance travels uninterrupted and discharges to the San Diego Bay.

Pre-project drainage areas consisted of 97.75% impervious area with flows of 1.11 cfs during a 2-year storm to 2.62 cfs in a 100-year storm.

The reduction in imperviousness in the redeveloped site causes lower flow and more retention; therefore, capacity required is reduced.

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: Redevelopment will include construction of a Chevron retail building, fueling facility, fueling canopy, car wash building, concrete paving/curb/gutter/sidewalks asphalt paving stormwater drainage structures and two (2) water-quality BMP (Type BF-1, Biofiltration with No Infiltration) structures. A hydromodification flow control structure is NOT REQUIRED. The revised drainage pattern will use a combination of sheet, shallow concentrated and pipe flow to convey ALL site runoff to two (2) new BMP structures. Treated runoff water quality design storm will be conveyed to the site storm drain by orifice overflow into BMP overflow structures (drop inlets). Control of off-site peak flow rates and duration by a hydromodification flow control structure is NOT REQUIRED.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Project impervious features will include the retail building roof, car wash roof, fuel canopy roof, concrete paving, curb, gutter, sidewalks and asphalt paving.
List/describe proposed pervious features of the project (e.g., landscape areas): Project pervious features will include the BMP and landscaped areas.
Does the project include grading and changes to site topography? ☒ Yes ☐ No Description / Additional Information: The existing site is mildly sloped. No site perimeter retaining walls are proposed for this project. Minor grade changes are proposed to induce sheet flow and shallow concentrated flow to the respective BMP structures.

Form I-3B Page 5 of 11

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

◉ Yes

○ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

Runon: the south and east property boundaries are protected from run-on by the adjacent private retaining wall and concrete curbs. The north and west boundaries will have raised drive entrances preventing site run-on of street gutter flow.

Runoff: Runoff from the impervious building and car wash roof surfaces will discharge to at-grade concrete splash blocks located in the landscaped area. All runoff from site pervious landscaped areas will sheet flow to site impervious paved areas. All sheet and shallow concentrated runoff from impervious paved areas will either flow directly to the respective BMP structure or to a drop inlet connected to the BMP structure by underground PVC piping. Runoff from the impervious fuel canopy roof will be conveyed to the BMP structure via a system of rainwater leaders and underground PVC piping.)

The BMP structures were sized using the SWQMP worksheets. BMP-1 and BMP-2 will treat 100% of the design DCV not realiably retained (NRR) and is sized for 0.75 of the DCV NRR in pores and ponding. The BMP-1 and BMP-2 footprint area meet the 3% runoff factor defined in the worksheets. DMA areas and the respective DCV are shown on the attached DMA Exhibit.

Treated runoff will be temporarily stored in the BMP structure; flow will infiltrate (5"/hr min) through the 18" biofiltration layer, filter course layer and gravel retention layer. Low flow discharge will enter 8" perforated PVC pipes connected to the respective BMP overflow structure. Low flow discharge will enter the underground PVC pipe and gravity flow to a drop inlet structure (DI-BMP-1) located adjacent to the north property boundary.

Excess runoff will be conveyed by orifice overflow to grated drop inlet structures (DI-BMP-1, DI-BMP-2). The inlets will discharge to underground PVC pipes connected to DI-BMP-2.

Control of off-site peak flow rates and duration by a hydromodification flow control structure is NOT REQUIRED. Although not quantified, by inspection the post-project impervious surface area decrease and the addition of BMP retention/storage structures will reduce peak flow rates and runoff quantity compared to the pre-project condition.

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:

All interior drains and car wash facilities will be connected to the sanitary sewer. Runoff from outside site pervious/impervious areas will be conveyed to the respective BMP structure.

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) Future road widening on Midway Drive proposes replacing the existing catchbasin with a new catchbasin and 18" dia. concrete pipe extension. Off-site discharge will occur when the storage capacity of BMP-1 is exceeded. Overflow of DI-BMP-1 will enter the underground storm drain system and gravity flow to DI-BMP-2. Flow will be conveyed off-site by a 12" PVC pipe to the proposed catch basin at Midway Drive. Off-site discharge will occur when the storage capacity of BMP-2 is exceeded. Overflow of DI-BMP-2 will flow to the proposed catch basin via the 12" PVC pipe. The off-site catch basin will discharge to the 18" hardened city storm drain which continues uninterrupted to San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. Beneficial Use Designations: REC-1, NAV, SAL, EST, MAR Includes recreation, aesthetic enjoyment, navigation, preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations. The project will not discharge to ASBS. The project will discharge to the City of San Diego storm drain system located beneath Midway Drive. This hardened conveyance discharges to San Diego Bay.
Provide distance from project outfall location to impaired or sensitive receiving waters. N/A
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The project site is located 1.2 miles from the Famosa Slough SMCA.

Form I-3B Page 8 of 11

Identification of Receiving Water Pollutants of Concern

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
San Diego Bay	Pesticides, Sediment, Trash	5A/ Indicator Bacteria;
San Diego Bay	Pesticides, Sediment, Trash	5A/ Dissolved Copper; Lead
San Diego Bay	Pesticides, Sediment, Trash	5A/ Zinc (wet weather)

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): The project will discharge to the City of San Diego storm drain. The hardened system continues uninterrupted to the San Diego Bay.
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 project does not contain a CCSYA area as defined on the the WMAA map, "Potential Critical Coarse Sediment Yield Area - Regional San Diego County Watersheds", dated 09/8/14.

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. Project discharges to a City of San Diego hardened conveyance system continuing uninterrupted to the San Diego Bay. Exempt from hydromodification management requirements.
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:
Discussion / Additional Information: (optional)

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. Future road widening of Midway Drive proposes new concrete curb, gutter, sidewalk and drainage improvements. Site constraints influencing stormwater design include: Provide required DCV Provide setback clearance for future sidewalks Provide connection to future drainage improvements on Midway Drive.
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.

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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:			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-3 not implemented: There will be no outdoor materials storage areas.			
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: There will be no outdoor work areas.			
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:			

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☒ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☒ N/A
Interior parking garages	☐ Yes	☐ No	☒ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☒ N/A
Landscape/Outdoor Pesticide Use	☒ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☒ N/A
Food service	☐ Yes	☐ No	☒ N/A
Refuse areas	☒ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☒ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☒ N/A
Fuel Dispensing Areas	☒ Yes	☐ No	☐ N/A
Loading Docks	☐ Yes	☐ No	☒ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☒ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☒ N/A
Plazas, sidewalks, and parking lots	☒ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☒ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☒ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☒ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

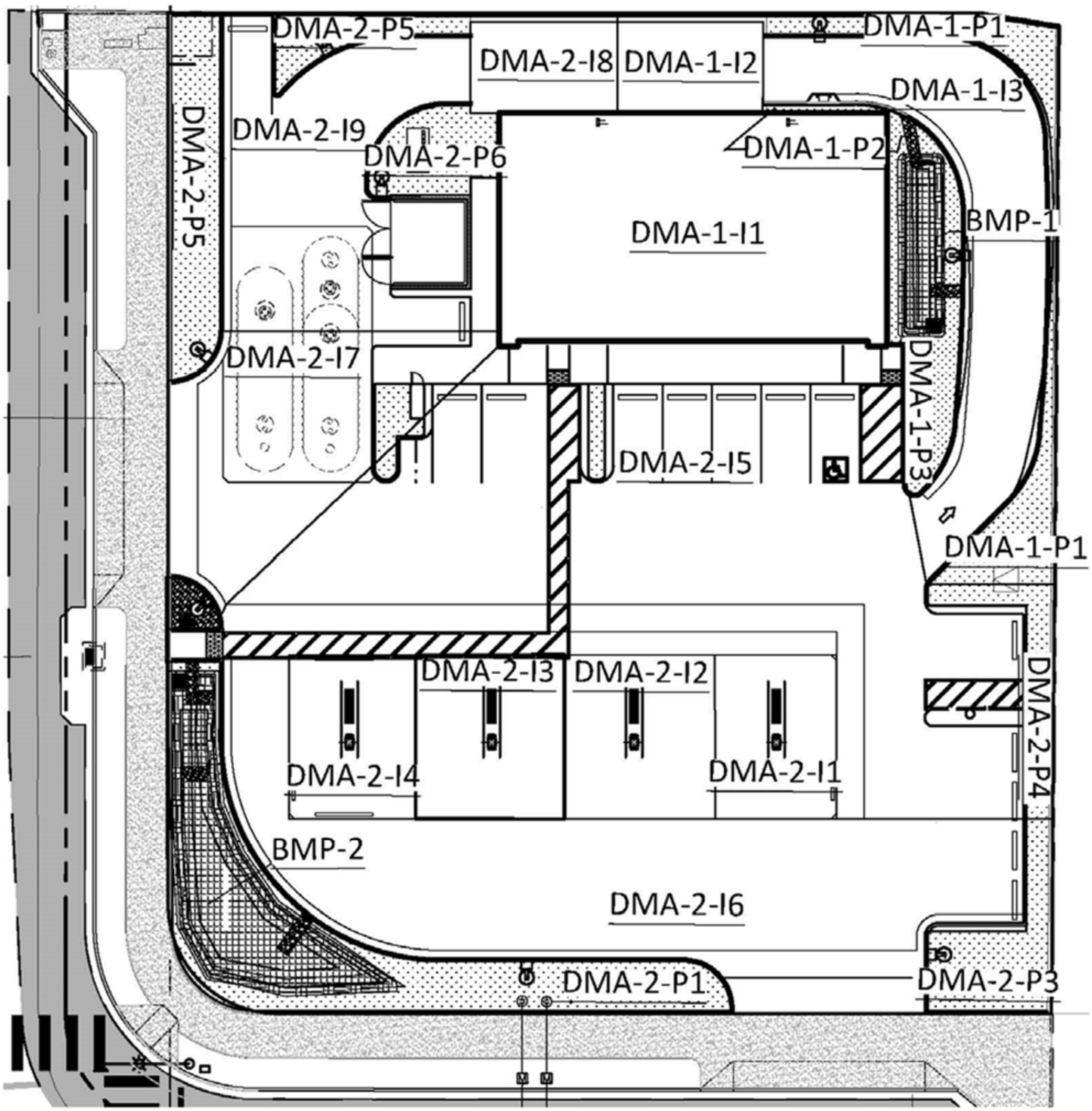
Site Design BMP Checklist for All Development Projects			Form I-5
Site Design BMPs			
All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement 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: Project located in urban area with no natural drainage pathways or features.			
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: The pre-development site has limited landscaping.			

Form I-5 Page 2 of 4			
Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-5 not implemented: Roof leaders discharge to pervious landscaped areas. However, site grading restrictions prevent adding the required 10' infiltration strip. All runoff from pervious and impervious surfaces will overland flow to BMP structures (Type BF-1).			
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	

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: All site runoff is collected by the BMP structures for filtration. No infiltration of runoff is proposed for this site.			
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:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-8 not implemented: The limited site area makes it impractical to implement a harvest/use system for non-potable water.			
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

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:



Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

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.

Since Harvest and Use is not feasible, infiltration was considered. However, due to the high groundwater table, infiltration is infeasible as documented in the Worksheet C.4-2: Form I-8B included as attachment 1-D. Therefore, Biofiltration (Type BF-1) was chosen as the appropriate site BMP. The sizing for the proposed facilities was determined by Appendix B.5, where two general options with an underlying minimum footprint size of 3 percent. The BMPs were sized the minimum footprint size of 3 percent (as this was the largest footprint when calculating the two options in Worksheet B.5-1). The BMP will not be outlet controlled, so Standard Biofiltration Sizing was used as described in Appendix B.5.1.2. Therefore the two BMPs were sized as follows:

DMA 1 consists of the Chevron Retail Building, half of the car was roof, paving, and landscaping as outlined on the Post-Development DMA Exhibit. Impervious area in this DMA is 5,335 square feet while pervious area consists of 1,490 square feet. As per the geotechnical report, the underlying soil belongs to Hydrologic Soil Group NRCS Type A. Therefore the calculated runoff factor for DMA 1 is (5,335*0.90 + 1,490*0.1)/(6,825) = 0.725

Required BMP Footprint = Area draining (6,825 sq ft) * adjusted runoff factor (0.725) * 0.03

=148.4 sq ft.

Proposed BMP Footprint = 159 sq. ft.

Documentation shows BMP meets requirements in BF-1 fact sheet.

DMA 2 consists of the fueling canopy, half of the car was roof, the trash enclosure roof, paving, and landscaping as outlined on the Post-Development DMA Exhibit. Impervious area in this DMA is

(Continue on page 2 as necessary.)

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) 18,927 square feet while pervious area consists of 3,873 square feet. As per the geotechnical report, the underlying soil belongs to Hydrologic Soil Group NRCS Type A. Therefore the calculated runoff factor for DMA 1 is (18,927*0.90 + 3,873*0.1)/(22,800) = 0.764 Required BMP Footprint = Area draining (22,800 sq ft) * adjusted runoff factor (0.764) * 0.03 =522.6 sq ft. Proposed BMP Footprint = 570 sq.ft. Documentation shows BMP meets requirements in BF-1 fact sheet Worksheet B.5-1 and Worksheet B.5-6 for each structure. The attached DMA exhibit and BMP Table detail the pervious and impervious shed areas draining to BMP-1 and BMP-2. The total DCV was calculated for each BMP using Worksheet B.2-1 and then the Simple Sizing Method for Biofiltration BMPs Worksheet B.5-1 was used for the Biofiltration footprint. The default minimum sizing was used for the BMP footprint to meet City of San Diego requirements. BMP-1: The site grading plan was used to determine BMP shape and location. Curb and gutter grades were analyzed to determine required BMP bottom elevations. The 2016 Stormwater Standards, Part 1 Appendix E.12 was used to determine BMP Type BF-1 specifications. A 1' deep rectangular basin, 3:1 side slopes, 10" live storage depth, 6" filter course, 6" gravel retention storage was initially assumed. Pond shapes were drawn in Autocad representing the rim, effective width and bottom elevations. Areas were determined and the average end area method was used to determine the retention storage volume provided. The BMP size and gravel retention dimensions were adjusted until there was adequate capacity to capture the entire DCV NRR to treat and to store 75% of the DCV NRR in pores and ponding. The DCV is 206 cubic feet, the minimum required BMP footprint is 148.4 square feet, and the provided footprint is 159 square feet. BMP-2: Site grading and hydraulic constraints limited BMP sizing options. The site grading plan was used to determine BMP shape, location and bottom elevations. The site perimeter match grades were analyzed to determine required on-site hydraulic constraints. The 2016 Stormwater Standards, Part 1 Appendix E.12 was used to determine BMP Type BF-1 specifications. A 1'2" deep irregular shaped basin, 3:1 side slopes, 12" live storage depth, 6" filter course, 12" gravel retention storage was initially assumed. Pond shapes were drawn in Autocad representing the rim, effective width and bottom elevations. Areas were determined and the average end area method was used to determine the retention storage volume provided. BMP-2 was sized to capture 100% of the DCV NRR and to store 75% of the DCV NRR in pores and ponding. The DCV is 726 cubic feet, the minimum required BMP footprint is 522.6 square feet, and the provided footprint is 570 square feet.

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No. C3.01	
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	Chevron Corporation 145 South State College Blvd Brea, CA 92821
Who will be the final owner of this BMP?	Chevron Corporation 145 South State College Blvd Brea, CA 92821
Who will maintain this BMP into perpetuity?	Chevron Corporation 145 South State College Blvd Brea, CA 92821
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of X (Copy as many as needed)
Structural BMP ID No. BMP-1
Construction Plan Sheet No. C3.01
Discussion (as needed): BMP-1 to meet City of San Diego Type BF-1 specifications. Basin has been sized by the minimum footprint requirement of 3%. See BMP plan and details for required area and depth dimensions.

Form I-6 Page 5 of 6	
Structural BMP Summary Information	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No. C3.01	
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	Chevron Corporation 145 South State College Blvd Brea, CA 92821
Who will be the final owner of this BMP?	Chevron Corporation 145 South State College Blvd Brea, CA 92821
Who will maintain this BMP into perpetuity?	Chevron Corporation 145 South State College Blvd Brea, CA 92821
What is the funding mechanism for maintenance?	Click or tap here to enter text.

Form I-6 Page 6 of 6
Structural BMP ID No. BMP-2
Construction Plan Sheet No. C3.01
Discussion (as needed): BMP-2 to meet City of San Diego Type BF-1 specifications. Basin has been sized to capture 100% of DCV. See BMP plan and details for required area and depth dimensions.

City of San Diego
Development Services
1222 First Ave., MS-501
San Diego, CA 92101

Permanent BMP Construction
Self Certification Form

FORM
DS-563
December 2016

Date Prepared: 7/19/2018	Project No./Drawing No.: C-CHV16014.1
Project Applicant: Chevron Corporation	Phone: (714) 671-3311
Project Address: 2959 Midway Drive, San Diego, CA	
Project Name: Chevron Fueling Station/Car Wash Facility - 2959 Midway Drive - San Diego, CA	

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 Standards Manual 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 Priority Development Projects in order to comply with the City's Storm Water ordinances and applicable San Diego Regional MS4 Permit. 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, hydromodification, and treatment control BMP's required per the Storm Water Standards Manual; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and San Diego Regional MS4 Permit.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: ____________________

Date of Signature: ____________________

Printed Name: Kyle Flaming

Title: Project Civil Engineer

Phone No. (469) 270-3758

Engineer's Stamp

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

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

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

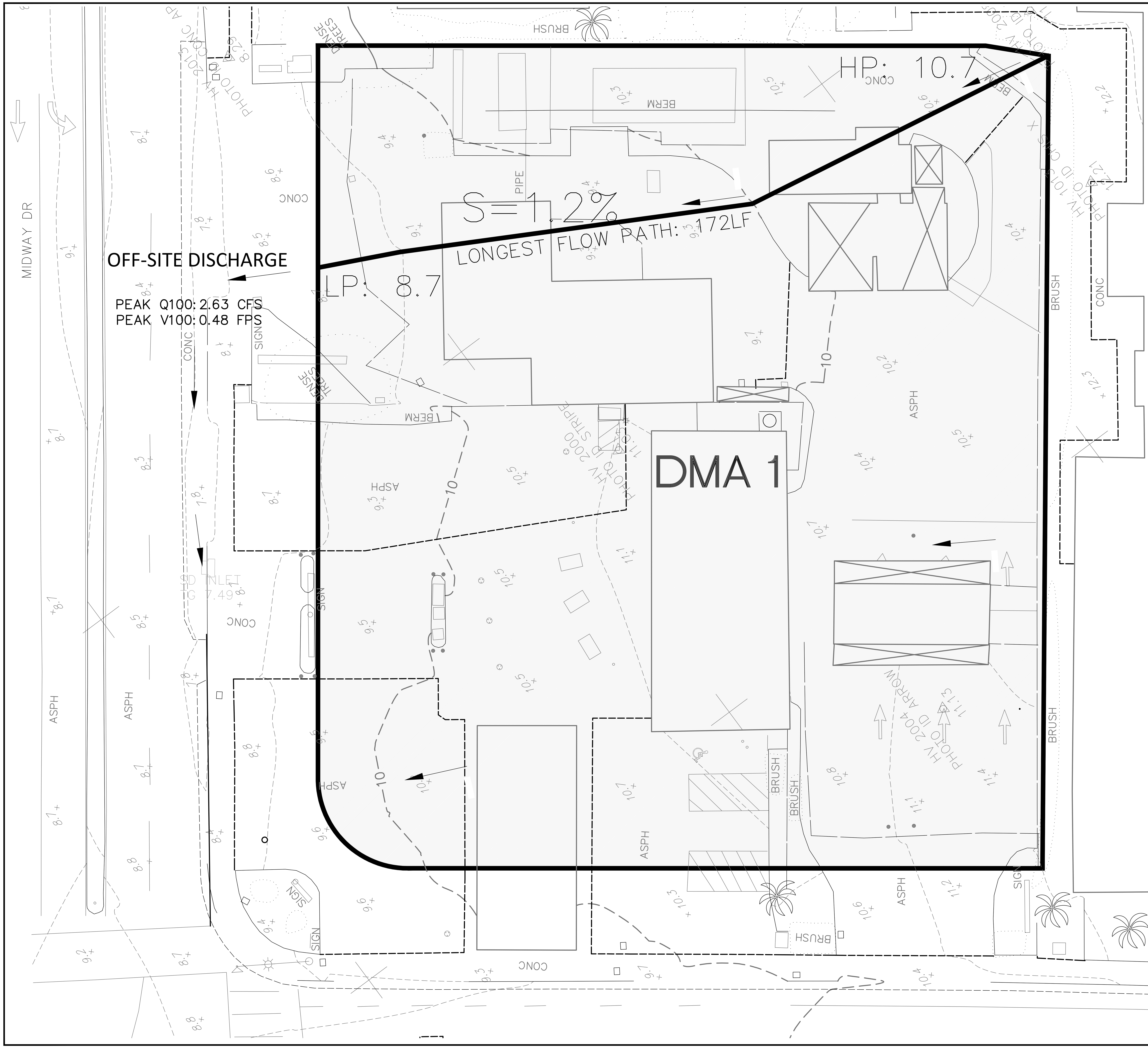
Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
☒ Structural BMPs (identify location, type of BMP, and size/detail)

ATTACHMENT 1-A

DMA EXHIBIT



PRE-DEVELOPMENT LEGEND

BASIN

FLOW PATH OF TRAVEL

CONTOUR

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE D
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.

PM DESIGN
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KYLE W. FLAMING
No. 76432
EXP. 12/31/18
CIVIL
STATE OF CALIFORNIA

8/16/18
Seal

MARK	DATE	REVISION

Chevron

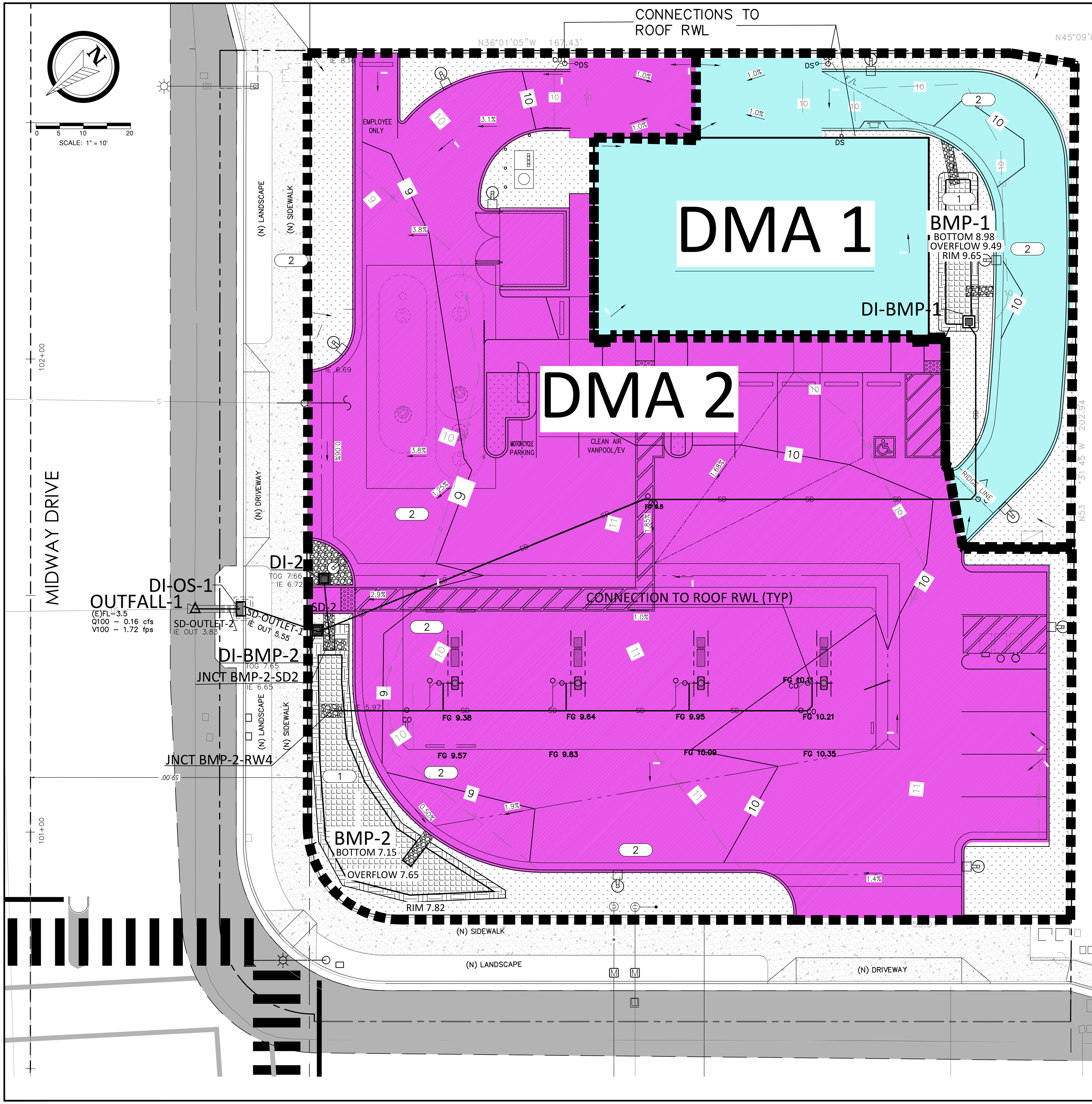
CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
PRE-DEVELOPMENT DRAINAGE EXHIBIT

Sheet Number

PLOT DATE: 8/16/2018

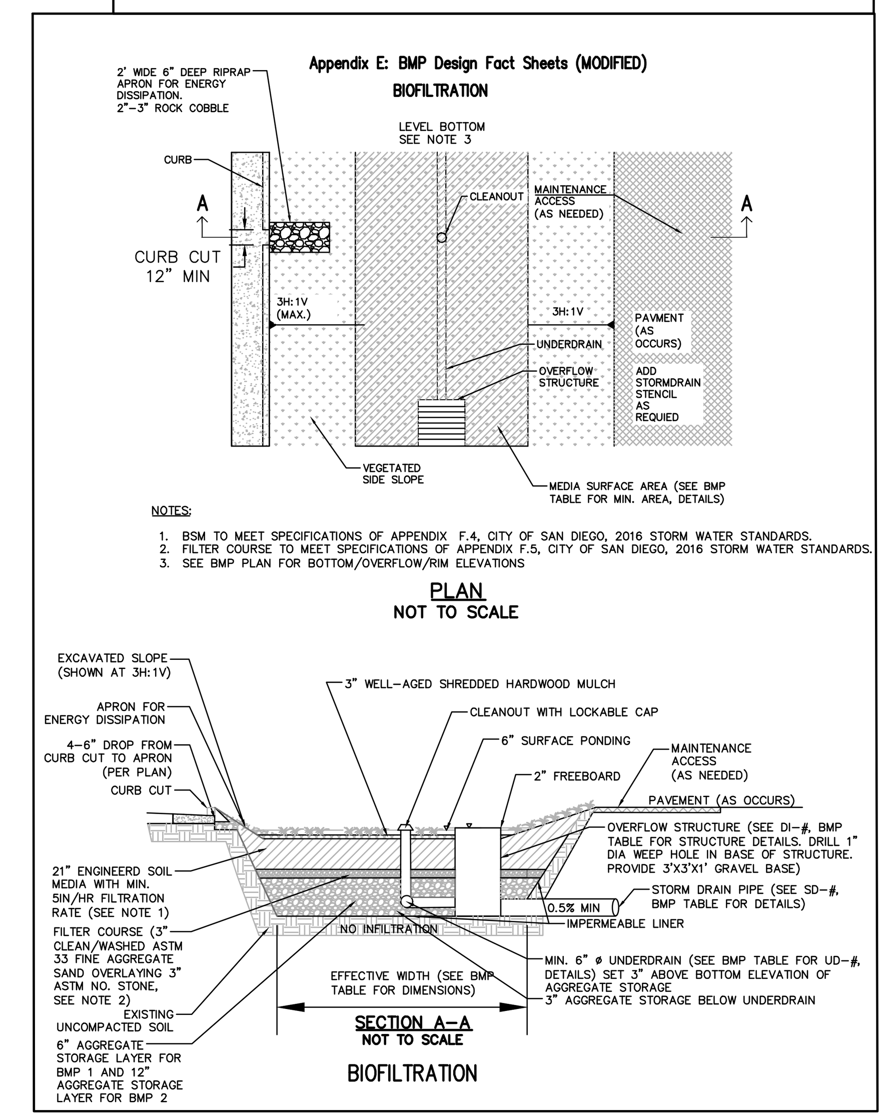


POST-DEVELOPMENT LEGEND

- DMA BOUNDARY
- IMPERVIOUS AREAS
- PERVIOUS AREA
- FLOW PATH OF TRAVEL
- CONTOUR
- BIOFILTRATION (BF–1) WITH NO INFILTRATION

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE A
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.
4. DMA AREAS ARE DIVIDED BY THE BOUNDARY LINE AND LABELED AS DMA–#; IMPERVIOUS AREA IS SHADED.
5. PROPOSED ON–SITE STORM DRAIN PIPES ARE LABELED AS SD–#, WHILE PROPOSED OFF–SITE STORM DRAIN PIPES ARE SD–OUTLET–#
5. PROPOSED BMP OVERFLOW STRUCTURES ARE LABELED AS DI–BMP–#, WHILE PROPOSED BMP STRUCTURES ARE BMP–#
6. FOR DMA/BMP OR STORM DRAIN NETWORK SPECS, SEE APPENDIX E: POST–DEVELOPMENT BMP TABLE AND SW NETWORK DATA TABLE, RESPECTIVELY.



KEY NOTES:

ITEM	DESCRIPTION
	BIOFILTRATION WITH NO INFILTRATION: SEE DETAIL ABOVE.
	STORMWATER STENCIL: MARK ALL CURB CUTS WITH "NO DUMPING - DRAINS TO THE BAY"

BMP NUMERIC SIZING CALCULATION

AREA ID	PERVIOUS AREA (S.F.)	IMPERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)	DMA TYPE	CALCULATED "C" FACTOR BASED ON 0.1, 0.9	Sizing Used	BMP SIZE REQUIRED (SQ FT)	BMP SIZE PROVIDED* (SQ FT)
DMA 1	1,490	5,335	6,825	BIOFILTRATION (DRAINS TO BMP–1)	0.725	0.03	148.4	159|229
DMA 2	3,873	18,927	22,800	BIOFILTRATION (DRAINS TO BMP–2)	0.764	0.03	522.6	570|829
Note: *EFFECTIVE SURFACE AREA|ENTIRE AREA		24,262	29,625				671.0	729|1,058

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8/17/2018
Seal

REVISION

DATE

MARK

Chevron

CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
DMA EXHIBIT

Sheet Number

PLOT DATE: 8/16/2018

ATTACHMENT 1-B

TABULAR SUMMARY OF DMA’S AND DESIGN CAPTURE VOLUME CALCULATIONS

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **BMP TABLE**

BMP TABLE

Project Input Data:		
Total Site Area:	29,581	SF
	0.679	AC
	0.5	d, 85th percentile, 24-hr rainfall depth (inches) per Figure B.1-1
	0.9	C, Roof/Paved Area Runoff Factor
	0.1	C, Landscaped/BMP Area Runoff Factor
In-Situ Infiltration Rate:	0.0	IN/HR
BioInfiltration Rate:	5.0	IN/HR
Bioretention Soil Mix (BSM) Depth:	18.0	IN, See BMP Plan Details
BMP-1: Gravel Storage Depth:	6.0	IN, See BMP Plan Details
BMP-2: Gravel Storage Depth:	12.0	IN, See BMP Plan Details
Filter-Course Depth:	6.0	IN, See BMP Plan Details
Gravel Porosity:	0.4	
BSM Porosity:	0.2	
Filter-Course Porosity:	0.2	Assumed equal to BSM (conservative)

BMP #		**DMA #**	**Structure #**	**Item**	**Shed Area, sf**	**Shed Area, ac**	**Overland Flow Outlet**	**C**	**DCV cf**
BMP-1		DMA-1			6,825	0.157		0.725	206
BMP Bottom/FG Elev, ft	8.98		DMA-1-I1	Chevron Retail Bldg Roof	2,960		BMP-1	0.90	111
BMP Rim Elev, ft	9.65		DMA-1-I2	Chevron Car Wash Roof 1	449		BMP-1	0.90	17
Sidewalls, H:V	3:1		DMA-1-I3	Paving	1,926		BMP-1	0.90	72
Effective Area, sf	159.0		BMP-1 (POND/PERVIOUS)	BMP-1 (Live Storage Area)	209		BMP-1	0.10	1
BMP Live Storage Area, sf	219.0		DMA-1-P1	Landscape	752		BMP-1	0.10	3
Rim Area, sf	279.0		DMA-1-P2	Landscape	294		BMP-1	0.10	1
Riser Height, in	8.0		DMA-1-P3	Landscape	235		BMP-1	0.10	1
Freeboard, in	2.0								
BMP Overflow Elev, ft	9.49		**BMP-1: TYPE BF-1 BIOFILTRATION, SEE BMP DETAIL SHEET FOR SPECIFICATIONS**						
BMP Live Storage Depth, ft	0.50								
Effective Storage Area, sf	159.0								
Detention Storage Effective Depth, ft	1.05								
Infiltration Storage Volume Provided, cf	0								
Live Storage, cf	196								
Net Volume Not Reliably Retained, cf	10								
BMP Drawdown Time, hr	15.6								
BMP-2		DMA-2			22,800	0.523		0.754	726
BMP Bottom/FG Elev, ft	7.15		DMA-2-I1	Fueling Canopy	675		BMP-2	0.90	25
BMP Rim Elev, ft	7.82		DMA-2-I2	Fueling Canopy	825		BMP-2	0.90	31
Sidewalls, H:V	3:1		DMA-2-I3	Fueling Canopy	825		BMP-2	0.90	31
Effective Area, sf	570.0		DMA-2-I4	Fueling Canopy	675		BMP-2	0.90	25
BMP Live Storage Area, sf	699.5		DMA-2-I5	Paving	7,281		BMP-2	0.90	273
Rim Area, sf	829.0		DMA-2-I6	Paving	4,088		BMP-2	0.90	153
Riser Height, in	8.0		DMA-2-I7	Paving	1,788		BMP-2	0.90	67
Freeboard, in	2.0		DMA-2-8	Chevron Car Wash Roof 2	449		BMP-2	0.90	17
BMP Overflow Elev, ft	7.65		DMA-2-I9	Paving/Trash Enclosure Roof	2,321		BMP-2	0.90	87
BMP Live Storage Depth, ft	0.50		BMP-2 (POND/PERVIOUS)	BMP-2 (Live Storage Area)	736		BMP-2	0.10	3
Effective Storage Area, sf	570.00		DMA-2-P1	Landscape	900		BMP-2	0.10	4
Detention Storage Effective Depth, ft	1.3		DMA-2-P2	Landscape	272		BMP-2	0.10	1
Infiltration Storage Volume Provided, cf	0		DMA-2-P3	Landscape	458		BMP-2	0.10	2
Live Storage, cf	780		DMA-2-P4	Landscape	284		BMP-2	0.10	1
Net Volume Not Reliably Retained, cf	-54		DMA-2-P5	Landscape	897		BMP-2	0.10	4
BMP Drawdown Time, hr	20		DMA-2-P6	Landscape	326		BMP-2	0.10	1
			BMP-2: TYPE BF-1 BIOFILTRATION, SEE BMP DETAIL SHEET FOR SPECIFICATIONS						

ATTACHMENT 1-C

FORM I-7: HARVEST AND USE FEASIBILITY SCREENING

<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]
Reclaimed water is not planned for use on the site and no infiltration is proposed on the site.</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.
DCV = 932 (cubic feet)</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>

ATTACHMENT 1-D

FORM I-8: CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION

Categorization of Infiltration Feasibility Condition			Form I-8
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: 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: Per Geotechnical Investigation Report (Attachment 6), groundwater exists at 7' BGS Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

City of San Diego TRANSPORTATION & STORM WATER

Form I-8 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: Per Geotechnical Investigation Report, groundwater exists at 7' BGS 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.		X
Provide basis: Per Geotechnical Investigation Report, groundwater exists at 7' BGS 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		

*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 the City Engineer to substantiate findings

Form I-8 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: Per Geo-technical Investigation Report, local soil is HSG Type A. Infiltration testing reported an infiltration rate of 8.6 - 8.7 in/hr. 2005 testing found GW at 17'. 2017 testing found GW at 7'. The high GW table precludes infiltration from being considered for BMP design. 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: Per Geotechnical Investigation Report, groundwater exists at 7' BGS 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.			

Form I-8 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: Per Geotechnical Investigation Report, groundwater exists at 7' BGS 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.	X	
Provide basis: 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.		

*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 the City Engineer to substantiate findings

ATTACHMENT 1-E

POLLUTANT CONTROL BMP DESIGN WORKSHEETS / CALCULATIONS

Worksheet B.2-1 DCV BMP-1

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=	0.157	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.725	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=	206	cubic-feet

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (BMP1)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	206	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]		inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]		inches
7	Assumed surface area of the biofiltration BMP		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		cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	206	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	21	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	6	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)]	12.6	inches
19	Total Depth Treated [Line 17 + Line 18]	42.6	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	309	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	87	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]	154.5	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	147.14	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	6,825	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.725	
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]	148.4	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	159	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]		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

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 AppendixF.

Worksheet B.2-1 DCV BMP-2

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=	0.523	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.764	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=	726	cubic-feet

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (BMP 2)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	726	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]		inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]		inches
7	Assumed surface area of the biofiltration BMP		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		cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	726	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	21	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)]	15	inches
19	Total Depth Treated [Line 17 + Line 18]	45	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (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]	1,089	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	290.4	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]	544.5	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	435.6	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	22,800	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.764	
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]	522.6	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	570	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]		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

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 AppendixF.

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☒ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

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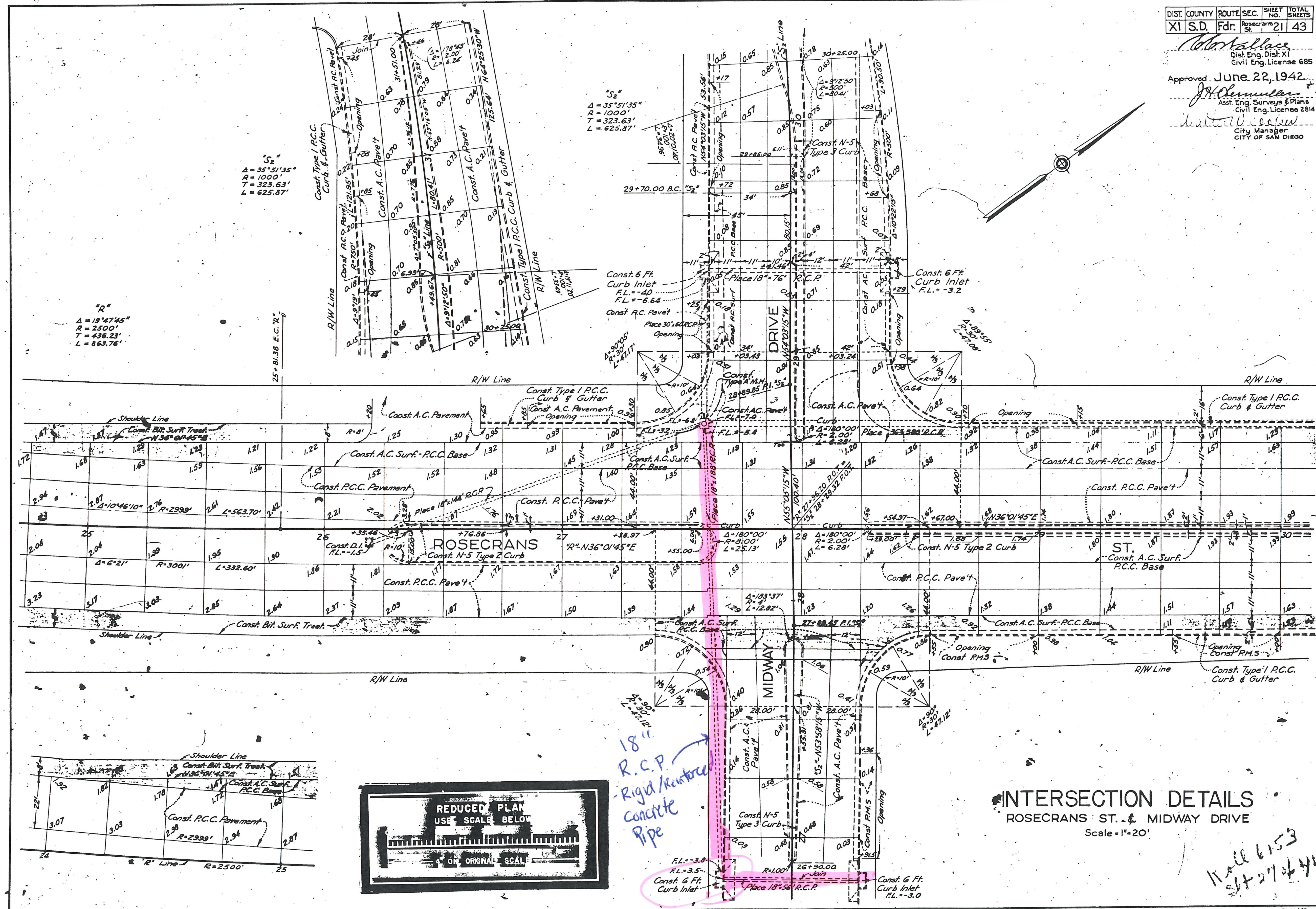
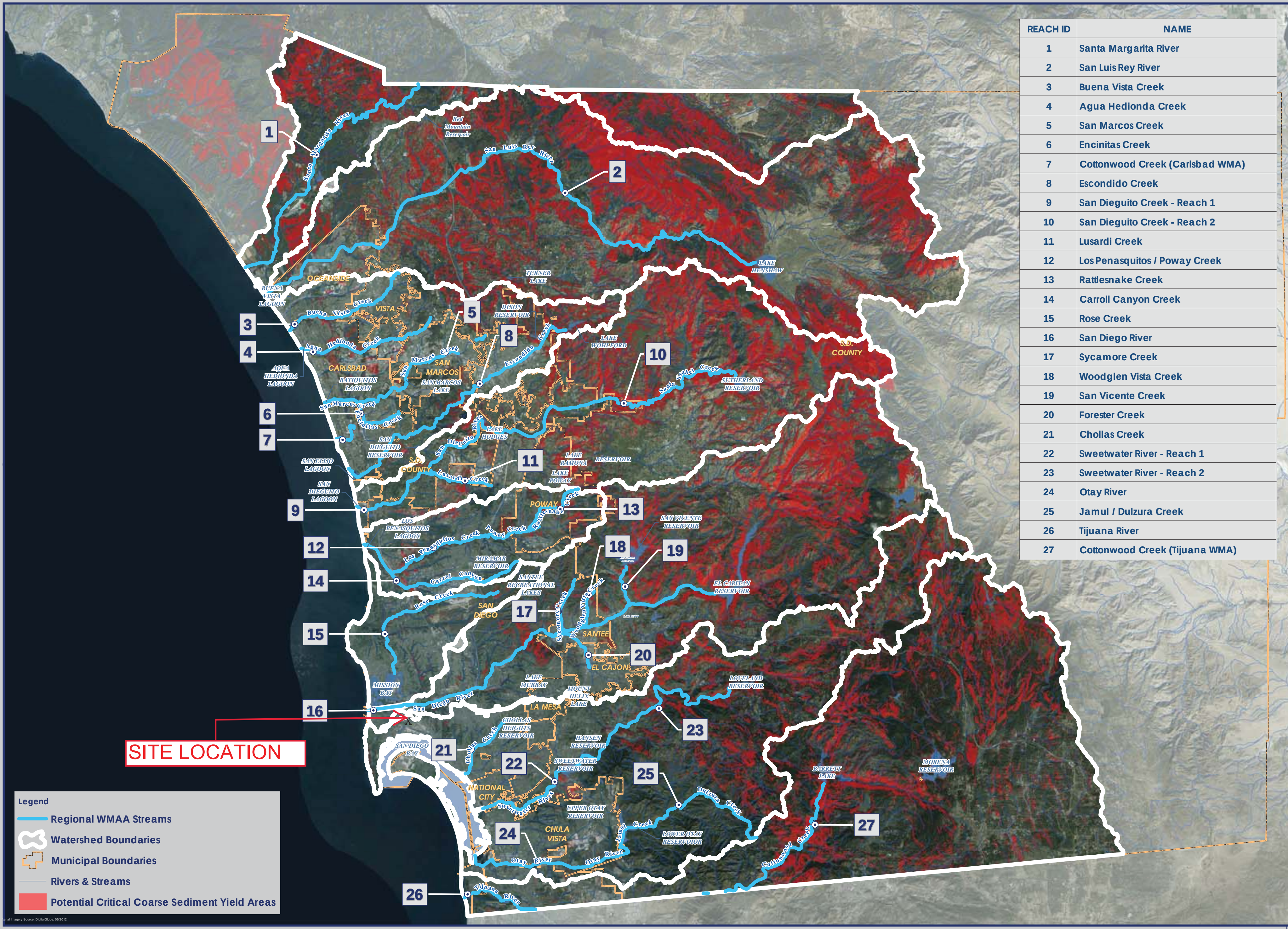
Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

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



DH NRT Q. 13
FED. ROAD DIST. NO. 2 | STATE CAL. | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. 21 | TOTAL SHEETS 43
DIST. XI | COUNTY S.D. | ROUTE Fdr. | SEC. Rosecrans St. | SHEET NO. 21 | TOTAL SHEETS 43
Dist. Eng. Dist. XI
Civil Eng. License 685
Approved June 22, 1942
Asst. Eng. Surveys & Plans
Civil Eng. License 2814
City Manager
CITY OF SAN DIEGO
ROSECRANS ST.
MIDWAY DRIVE
R/W Line
Shoulder Line
Const. Bit. Surf. Treat.
Const. A.C. Surf.-P.C.C. Base
Const. P.C.C. Pavement
Const. Type I P.C.C. Curb & Gutter
Const. N-5 Type 2 Curb
Const. N-5 Type 3 Curb
Const. 6 Ft. Curb Inlet
Place 18" x 76' R.C.P.
Place 18" x 188' R.C.P.
Place 18" x 144' R.C.P.
Place 18" x 56' R.C.P.
Place 30" x 60' R.C.P.
Const. Type "A" M.H.
Place 365.58' P.C.B.
Opening
Const. P.M.S.
REDUCED PLAN
USE SCALE BELOW
ON ORIGINAL SCALE
18" R.C.P. - Rigid Reinforced Concrete Pipe
INTERSECTION DETAILS
ROSECRANS ST. & MIDWAY DRIVE
Scale 1" = 20'
Roll 6153
St 27444
JAN. '42 M.W.



REACH ID	NAME
1	Santa Margarita River
2	San Luis Rey River
3	Buena Vista Creek
4	Agua Hedionda Creek
5	San Marcos Creek
6	Encinitas Creek
7	Cottonwood Creek (Carlsbad WMA)
8	Escondido Creek
9	San Dieguito Creek - Reach 1
10	San Dieguito Creek - Reach 2
11	Lusardi Creek
12	Los Penasquitos / Poway Creek
13	Rattlesnake Creek
14	Carroll Canyon Creek
15	Rose Creek
16	San Diego River
17	Sycamore Creek
18	Woodglen Vista Creek
19	San Vicente Creek
20	Forester Creek
21	Chollas Creek
22	Sweetwater River - Reach 1
23	Sweetwater River - Reach 2
24	Otay River
25	Jamul / Dulzura Creek
26	Tijuana River
27	Cottonwood Creek (Tijuana WMA)

Potential Critical Coarse Sediment Yield Areas

Regional San Diego County Watersheds

Exhibit Date: Sept. 8, 2014

Geosyntec consultants

RICK ENGINEERING COMPANY


San Dieg
SITE LOCATION
X
SAN DIEGO
BAY
21

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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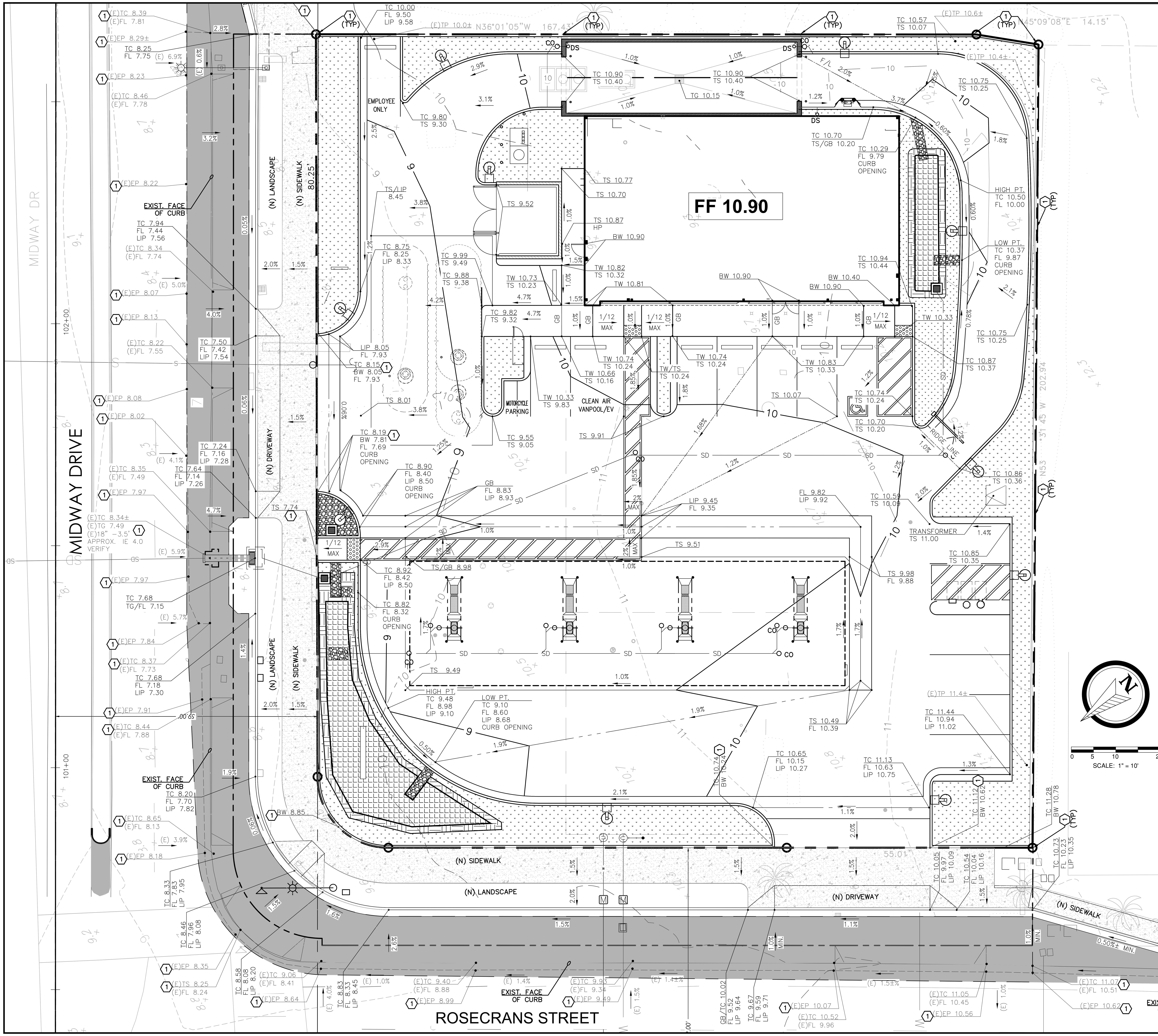

GRADING LEGEND:

0.00 (E) OR 0.00 (E)	EXISTING SPOT ELEVATION
0.00	PROPOSED ELEVATION
	DIRECTION OF DRAINAGE FLOW
	RIDGE LINE/ GRADE BREAK
	FLOW LINE

EP	EDGE OF PAVEMENT	LP	LOW POINT
BW	BACK OF WALK	TC	TOP OF CURB
FS	FACE OF SURFACE	FF	TOP OF FLOOR SLAB
FL	FLOW LINE	TP	TOP OF PAVEMENT
GB	GRADE BREAK	TS	TOP OF CONCRETE SLAB
LIP	EDGE OF SWALE OR GUTTER	TG	TOP OF GRATE
HP	HIGHT POINT	EG	EXISTING GRADE
TOW	TOP OF WALL	IE	INVERT ELEVATION
FG	FINISH GRADE	TW	TOP OF CONCRETE WALK

GRADING DATA TABLE

ALL EARTHWORK OPERATIONS SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATION IN THE PROJECT SPECIFIC SOILS REPORT PREPARED BY STANTEC CONSULTING SERVICES, INC., PROJECT NO. 185850087 AND DATED MAY 5, 2017.

SITE GRADING:

CUT– 266 CU.YD.
FILL: 205 CU.YD.

266 CU.YDS. (CUT) – 205 CU. YDS.(FILL) = 61 CU.YDS. CUT

EXCAVATION:

BUILDING AND CAR WASH:	(EXEMPT – not included in calculation)
UNDERGROUND STORAGE TANKS:	–2,331 CU.YDS.
CANOPY COLUMN FOOTINGS:	– 52 CU.YDS.
STORMWATER BASINS	+ –153 CU.YDS.
OVER–EXCAVATION:	–2,536 CU.YDS.
TOTAL OVER–EXCAVATION PLUS SITE GRADING:	–2,597 CU. YDS.
RE–USE OF OVER–EXCAVATED MATERIAL: (25%)	+ 650 CU. YDS.

TOTAL IMPORT/EXPORT: {[(–266)+(205)+(–2,331)+(–52)+(–153)+(650)]} = **1,947 CU.YD. EXPORT**

PER THE RECOMMENDATION IN THE PROJECT SOILS REPORT THESE SOILS ARE SUITABLE OR USE AS STRUCTURAL FILL IN BUILDING PAD AREAS WITH MOISTURE CONDITIONING AND RE–COMPACTION. (50% RE–USE)

MAXIMUM DEPTH OF EXCAVATION:

UNDERGROUND FUEL STORAGE TANKS:	18.5' BELOW GROUND SURFACE
CANOPY FOOTINGS:	7.0' BELOW GROUND SURFACE

MAXIMUM DEPTH OF FILL:

UNDERGROUND FUEL STORAGE TANKS:	17.5' BELOW GROUND SURFACE

(*) THE UPPER 12–INCHES BENEATH STRUCTURAL AREAS AND PAVEMENTS SHOULD BE SCARIFIED, MOISTURE CONDITIONED. AND COMPACTED TO 95%.

(*) STANTEC CONSULTING SERVICES, INC., PROJECT NO. 185850087 AND DATED MAY 5, 2017.

BENCHMARK

BENCHMARK
A BRASS PLUG LOCATED AT THE NORTHWEST CURB RETURN AT THE INTERSECTION OF ROSECRANS AVENUE AND HANCOCK STREET, PER THE CITY OF SAN DIEGO VERTICAL CONTROL RECORD.

ELEVATION = 8.878' DATUM: MEAN SEA LEVEL

BASED ON PROJECT ALTA SURVEY BY KIMBERLY HORN
PROJECT NO. 095801001 DATED 06–05–16
SAID SURVEY SHALL BE CONSIDERED A PART OF THESE PLANS

THIS PROJECT WILL GENERATE PEDESTRIAN ACTIVITY AND THEREFORE WILL BE SUBJECT TO HAVING ALL PUBLIC IMPROVEMENTS ADJACENT TO THE PROJECT SITE COMPLY TO STATE ACCESSIBILITY STANDARDS AND COMPLY TO CURRENT CITY STANDARDS.

DURING ANY CONSTRUCTION PHASE OF THE PROJECT, THE APPLICANT SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). SEE WPCP PLAN, SHEET C7.1 AND ACCOMPANYING REPORT.

NOTE:
ALL PROPOSED PUBLIC IMPROVEMENTS SHALL BE CONSTRUCTED PER CURRENT CITY OF SAN DIEGO STANDARDS.

KEY NOTES:

ITEM	DESCRIPTION
1	CONTRACTOR TO VERIFY ALL CONFORM GRADES PRIOR TO ANY NEW CONSTRUCTION ACTIVITIES.

PM DESIGN
Architectural Solutions Group

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Roy W. Pedro, Architect

REGISTERED PROFESSIONAL ENGINEER
KYLE W. FLAMING
No. 76432
EXP. 12/31/18
CIVIL
STATE OF CALIFORNIA

Seal 8/16/2018

MARK	DATE	REVISION

Chevron

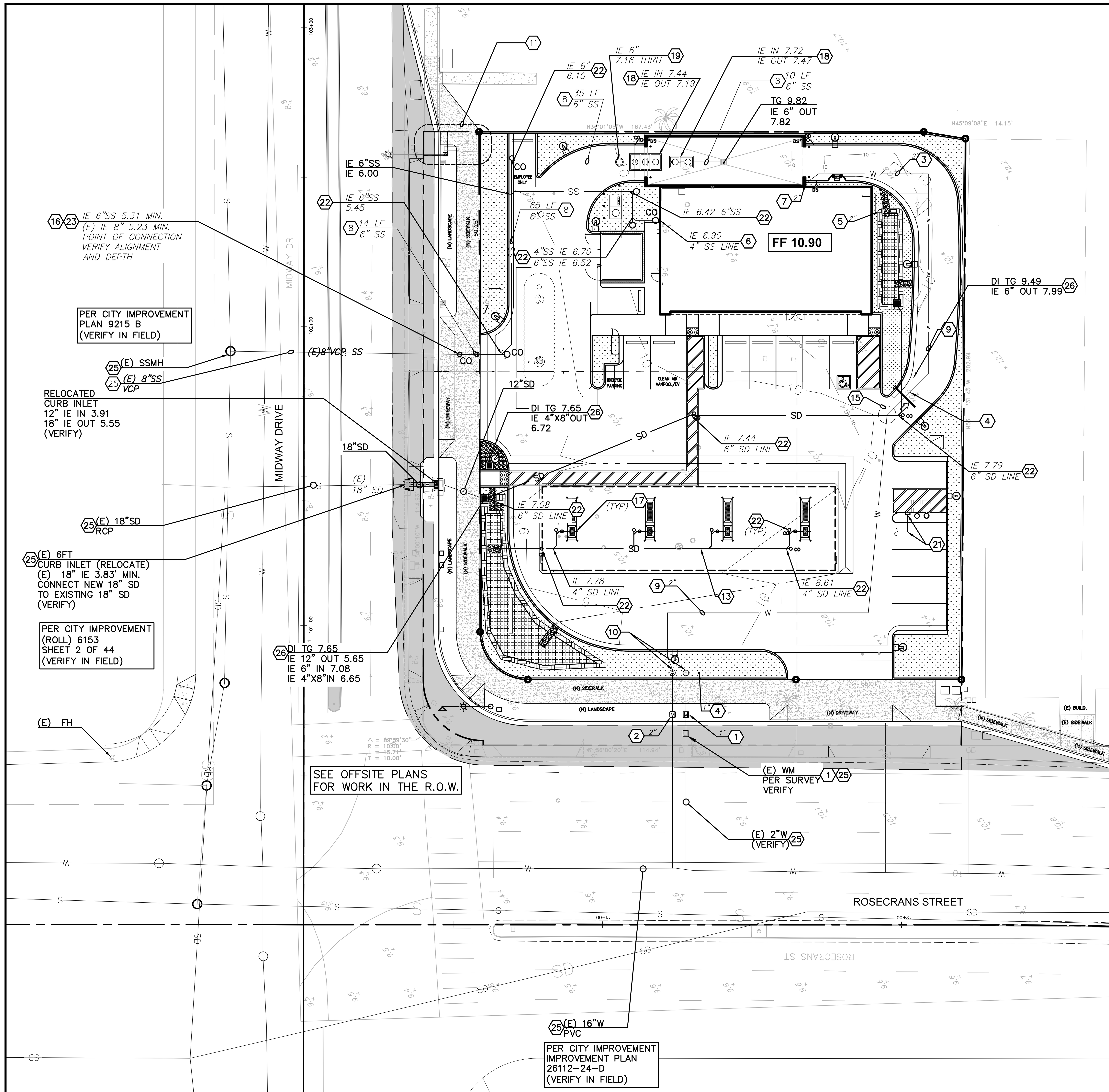
CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
GRADING AND DRAINAGE PLAN

Sheet Number
C2.1

PLOT DATE: 8/16/2018



KEY NOTES:

ITEM	DESCRIPTION
1	EXTEND EXISTING 2" WATER SERVICE TO THE NEW NEW FRONTAGE ALIGNMENT SIMILAR TO CITY OF SAN DIEGO STANDARD DRAWING SDW-150. SET NEW METER BOX AND 1" METER PER CITY OF SAN DIEGO STANDARD DRAWING SDW-134. DEDICATE SERVICE FOR LANDSCAPE IRRIGATION.
2	INSTALL NEW 2" WATER SERVICE PER CITY STANDARD DETAIL SDW-149. INSTALL NEW METER BOX AND 2" METER PER CITY OF SAN DIEGO STANDARD DRAWING SDW-135.
3	2" WATER LINE TO CARWASH
4	P.O.C. FOR LANDSCAPE IRRIGATION. REFER TO LANDSCAPING PLAN FOR ADDITIONAL INFORMATION.
5	P.O.C. DOMESTIC WATER TO BUILDING: REFER TO PLUMBING PLAN FOR LOCATION AT BUILDING. INSTALL GATE VALVE.
6	P.O.C. SANITARY SEWER LINE TO BUILDING: REFER TO PLUMBING PLAN FOR MORE DETAILS.
7	P.O.C. CARWASH WATER TO BUILDING: REFER TO CARWASH PLAN FOR LOCATION AT BUILDING. INSTALL GATE VALVE. (VERIFY LOCATION AND SIZE)
8	6" SDR-35 PVC - SANITARY SEWER: SLOPE AT 1% MINIMUM
9	NEW 2" DOMESTIC WATER LINE: TYPE "K" COPPER LINE.
10	BACKFLOW PREVENTER (MATCH LINE SIZE). PER CITY OF SAN DIEGO STANDARD DRAWING SDW-155.
11	EXISTING TRANSFORMER, EASEMENT AND RELATED ELECTRICAL EQUIPMENT TO BE REMOVED AND ABANDONED.
12	NOT USED.
13	SDR-35 PVC STORMDRAIN: CONNECT CANOPY DRAINS TO BIO-FILTRATION AREA. SEE GRADING AND DRAINAGE PLAN FOR ADDITIONAL INFORMAITON
14	NOT USED
15	UTILITY CROSSING: PROVIDE MINIMUM 1' CLEARANCE BETWEEN PIPE. CONTACT ENGINEER IF THERE IS A CONFLICT.
16	POINT OF CONNECTION TO (E) 8" SS LATERAL: VERIFY DEPTH AND ALIGNMENT IN FIELD PRIOR TO ANY NEW CONSTRUCTION ACTIVITIES.
17	CANOPY RAINWATER LEADER: CONNECT TO STORM DRAIN SYSTEM. DIRECT TO BIO-FILTRATION AREA. SEE CANOPY FABRICATION PLANS FOR RAINWATER LEADER CONNECTION DETAILS AND SPECIFICATIONS. SEE GRADING AND DRAINAGE PLAN.
18	CARWASH RECLAIM SYSTEM: SEE CARWASH PLANS FOR DETAILS AND SPECIFICATIONS.
19	CARWASH SAMPLE BOX: SEE CARWASH PLANS FOR DETAILS AND SPECIFICATIONS.
20	SEWER LATTERAL (PROPERTY LINE) CLEAN OUT: PER CITY STANDARDS DETAIL SS-04.
21	AIR WATER STATION: CONNECT 3/4" TYKE 'K' COPPER LINE TO CARWASH WATER SUPPLY LINE.: SEE ARCHITECTURAL PLANS FOR DETAILS.
22	CLEANOUT TO GRADE: SEE DETAIL 11 ON SHEET C6.1. (NOTE: USE 2-WAY CLEANOUTS @ CANOPY COLUMNS).
23	SEWER LATERAL (PROPERTY LINE) CLEAN OUT: PER CITY STANDARDS DETAIL SS-04.
24	INSTALL 6"X6"X4" TEE ON THE END OF THE 4"Ø PIPE. ENTEND RIPRAP 2.0' MIN. BEYOND TEE.:
25	EXISTING RECORD UTILITY: PER RECORD CITY IMPROVEMENT PLANS AND SURVEY INFORMATION. ALL EXISTING UTILITIES MUST BE INDEPENDENTLY CONFIRMED BY CONTRACTOR PRIOR TO ANY NEW CONSTRUCTION.
26	BASIN AREA OVERFLOW DRAIN: SEE BMP PLAN FOR ADDITIONAL AND GRADING PLAN FOR ADDITIONAL INFORMATION.

DIAL 811

0 10 20 40
SCALE: 1" = 20'

UTILITY LEGEND:

- 0.00 (E) OR 0.00 (E) — EXISTING SPOT ELEVATION
- 0.00 — PROPOSED ELEVATION
- DIRECTION OF DRAINAGE FLOW
- N 0° 0' 00" W — PROPERTY LINE
- CO — CLEAN-OUT TO GRADE
- P.O.C. — POINT OF CONNECTION
- WATER METER
- REDUCED PRESSURE BACKFLOW DEVICE
- CO — CLEANOUT TO GRADE
- EXISTING CONCRETE CURB TO REMAIN
- W — WATER LINE
- SS — SANITARY SEWER LINE
- SD OR — STORM DRAIN LINE

UTILITY VERIFICATION:

PRIOR TO START OF ANY WORK, THE CONTRACTOR SHALL VERIFY THE LOCATION, ELEVATION AND MATERIAL TYPE FOR ALL EXISTING UNDERGROUND UTILITIES THROUGHOUT THE SITE AND AT THE POINTS OF CONNECTION. THE CONTRACTOR SHALL VERIFY THAT THE PROPOSED UTILITY SERVICE WILL MEET THE INDICATED PIPE SLOPES AND IMMEDIATELY NOTIFY THE CLIENT REPRESENTATIVE AND PM DESIGN GROUP OF ANY CONDITION(S) THAT WILL PREVENT CONSTRUCTION OF NEW UTILITY SERVICES AS INDICATED ON THE PLANS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ALL ADDITIONAL COST INCLUDING BUT NOT LIMITED TO REDESIGN, CONSTRUCTION, INSPECTION, AND LIQUIDATED DAMAGES RESULTING FROM THE CONTRACTOR'S FAILURE TO PERFORM UTILITY VERIFICATION.

UTILITY NOTES:

1. SEE ELECTRICAL DRAWINGS FOR ELECTRICAL RUNS.
2. INSTALL IRRIGATION SLEEVES MIN. 12" FROM BACK OF CURB AND MINIMUM 18" DEEP, CAP ENDS.
3. PLUMBING DESIGN BASED ON ASSUMED MINIMUM PSI OF 65 PSI AT BACK OF EACH METER. IF PRESSURE TESTED AT THE BACK OF METER IS LESS THAN THE MINIMUM DESIGN VALUE NOTED, CONTRACTOR SHALL IMMEDIATELY NOTIFY CLIENT REPRESENTATIVE AND CONSULTANT.
4. THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE AN APPROXIMATION OF THEIR ACTUAL LOCATION AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY OCCUR DUE TO THE CONTRACTOR'S FAILURE TO PHYSICALLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
5. THE CONTRACTOR SHALL SECURE ALL ENCROACHMENT PERMITS FROM ALL APPLICABLE AGENCIES BEFORE THE COMMENCEMENT OF WORK.
6. USE SDR-26 FOR ALL DRAIN, WASTE & VENT PIPING. ABS & PVC PIPING IS PROHIBITED.

PM DESIGN
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Roy W. Pedro, Architect

REGISTERED PROFESSIONAL ENGINEER
KYLE W. FLAMING
No. 76432
EXP. 12/31/18
CIVIL
STATE OF CALIFORNIA

Seal 8/16/18

MARK	DATE	REVISION

Chevron
CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

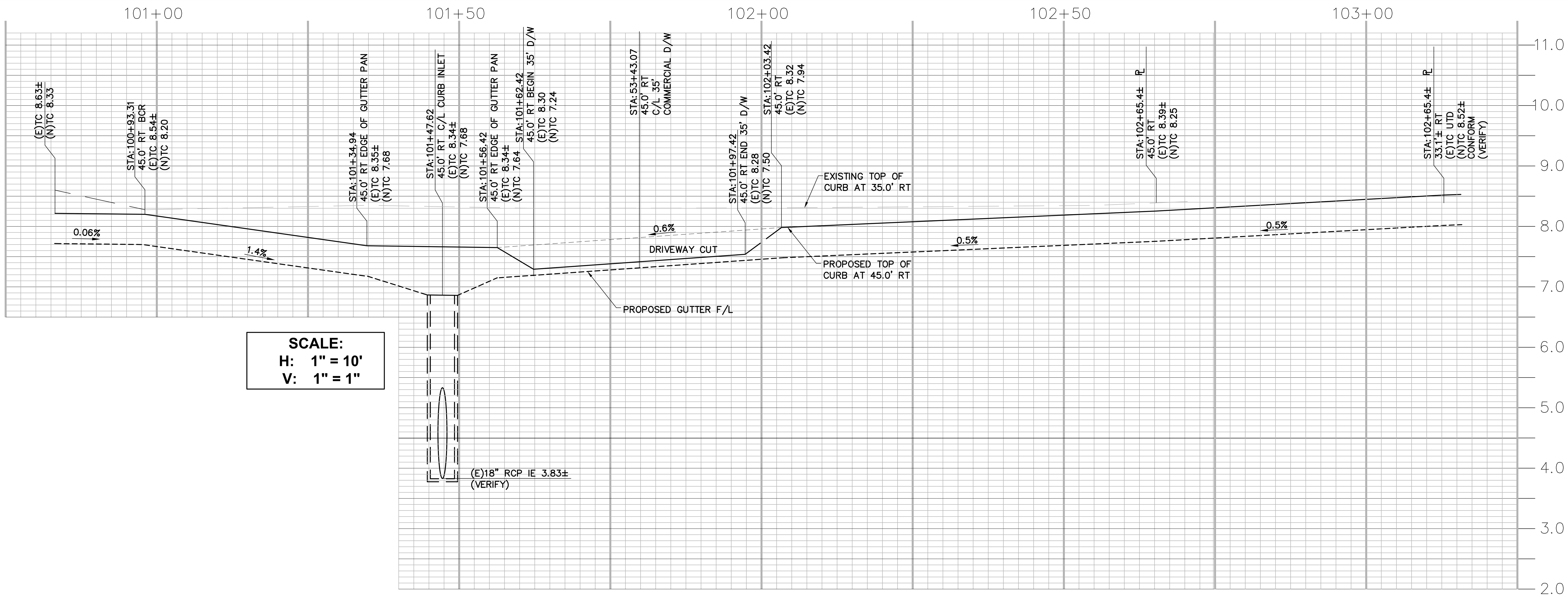
Sheet Name
UTILITY PLAN

Sheet Number
C4.1

PLOT DATE: 8/16/2018

KEY NOTES:

ITEM	DESCRIPTION
1	REMOVE EXISTING CURB, GUTTER, SIDEWALK, DRIVEWAYS AND CURB RAMP: AS REQUIRED BY NEW WORK.
2	REMOVE EXISTING CURB DRAIN AND PRESERVE FOR RELOCATION TO NEW CURB ALIGNMENT.
3	SAWCUT AND REMOVE APPROXIMATELY 2.0' OF EXISTING AC PAVMENT: CREATE A CLEAN CONFORM LINE FOR NEW AC PAVEMENT.
4	CONSTRUCT NEW CURB AND GUTTER PER CITY OF SAN DIEGO STANDARD DRAWING SDG-151.
5	CONSTRUCT NEW 35' WIDE COMMERCIAL DRIVEWAY: PER CITY OF SAN DIEGO STANDARD DRAWING SDG-163. SEE DETAIL ON SHEET OS5.
6	INSTALL (E) CURB INLET INTO NEW CURB ALIGNMENT: EXTENDED 18" RCP FROM EXISTING CB LOCATION TO THE NEW LOCATION AT 0.01 SLOPE.
7	CONSTRUCT NEW CURB RAMP SIMILAR TO CITY OF SAN DIEGO STANDARD DRAWING SDG-137 TYPE D: CENTER IN NEW 30' CURB RADIUS.
8	CONSTUCT NEW 8' WIDE CONCRETE SIDEWALK PER CITY OF SAN DIEGO STANDARD DETAIL SDG-155: SIDEWALK IS 8' WIDE FOR USE AS A FUTURE TYPE-I BIKE (TWO-WAY) BIKE PATH.
9	CONNECT ONSITE STORMRAIN SYSTEM TO THE BACK OF THE RELOCATED CURB INLET
10	CONNECT NEW SECTION OF 18" RCP TO THE EXISTING 18" RCP WITH AN 12" THICK CONCRETE COLLAR. MATCH SLOPE OF (E) RCP (0.01 PER RECORDS). CONTRACTOR TO VERIFY DEPTH PRIOR TO ANY NEW CONSTRUCTION.
11	(E) 8" SANITARY SEWER LATERAL: CONSTUCT SANITARY SEWER CLEAN-OUT PER CITY OF SAN DIEGO STANDARD DRAWING SDS-102. CONTACTOR TO VERIFY DEPTH PRIOR TO ANY NEW CONSTRUCTION. SEE ONSITE UTILITY PLANS FOR ONSITE SEWER DETAILS.
12	CUT AND REMOVE SECTION OF EXISING MEDIAN CURB. CONSTRUCT NEW MEDIAN CURB TO ALIGN WITH NEW CROSSWALK STRIPING / STOP BAR: SEE STRIPING PLAN FOR ADDITIONAL INFORMATION.
13	CONSTRUCT NEW AC PAVEMENT TO MATCH EXISTING PAVEMENT SECTION.
14	RELOCATE EXISTING TRAFFIC SIGNAL (WITH STREETLIGHT) AND RE-INSTALL IN NEW LOCATION.



CONSTRUCTION RECORD	DATE	BY	REVISIONS	ACC'D	DATE
Contractor					
Inspector					
Date Completed					

BENCHMARK
VERTICAL DATUM: PER ALTA SURVEY BY KIMBERLY HORN PROJECT NO 095801001; DATED 6/5/16
BASIS OF BEARING: PER ALTA SURVEY BY KIMBERLY HORN PROJECT NO 095801001; DATED 6/5/16

SCALE: Horizontal / Vertical

REGISTERED PROFESSIONAL ENGINEER KYLE W. FLAMING No. 76432 EXP. 12/31/18 CIVIL STATE OF CALIFORNIA
SEAL: 8/16/2018

Designed By | Drawn By | Checked By
Plans Prepared Under Supervision Of
MICHAEL L. BURGESS Date
R.C.E. No. 41852

RECOMMENDED BY: DATE:
ACCEPTED BY: DATE:
DIRECTOR OF PUBLIC WORKS / CITY ENGINEER R.C.E. No.

CITY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS

MIDWAY DR. IMPROVEMENT PLAN
2959 MIDWAY DRIVE
SAN DIEGO, CA

PLOT DATE: 8/16/2018

Drawing No. OS4
Sheet 4 of 9

Project Name: **Chevron Retail Fueling Facility – 2959 Midway Drive, San Diego, CA**

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

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

<u>Preliminary Design / Planning / CEQA level submittal:</u>

- Attachment 3a must identify:
  - ☐ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

<u>Final Design level submittal:</u>

Attachment 3a must identify:

☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
☐ How to access the structural BMP(s) to inspect and perform maintenance
☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐ When applicable, frequency of bioretention soil media replacement
☐ Recommended equipment to perform maintenance
☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

☐ Vicinity map
☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
☒ BMP and HMP location and dimensions
☐ BMP and HMP specifications/cross section/model
☐ Maintenance recommendations and frequency
☐ LID features such as (permeable paver and LS location, dim, SF).

Table 7-2. Maintenance Indicators and Actions for Vegetated BMPs

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Actions
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in vegetated swales	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event*	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

Biofiltration Basin Maintenance Plan for

Chevron Fueling/Car Wash Facility
2959 Midway Drive, San Diego, Ca

Project Address and Cross Streets: 2959 Midway Drive at Rosecrans St

BMP Owner:_______________________________________ **Phone No.:**_________________
Designated Contact:_________________________________ **Phone No.:**_________________

Mailing Address:____

The property contains two Biofiltration Basins, located as shown as shown in the attached site plan. Biofiltration Basin No. BMP-1 is located in the south portion of the project site, and BMP-2 is located in the north portion of the project site.

I. Routine Maintenance Activities

The principal maintenance objectives are to ensure that water flows unimpeded into the Biofiltration Basin and landscaping remains attractive in appearance. Table 1 shows the routine maintenance activities, and the frequency at which they will be conducted.

Table 1
Routine Maintenance Activities for Biofiltration Basins

No	Maintenance Task	Frequency of Task
1	Evaluate health of vegetation. Remove and replace all dead and diseased vegetation. Treat vegetation using preventative and low-toxic methods.	Twice a year
2	Maintain the vegetation and irrigation system. Prune and weed to keep flow-through basin neat and orderly in appearance	As Needed
3	Check that there is sufficient biotreatment soil media (depth as shown on plan). Check that soil is at the appropriate level to allow water to temporarily pond above soil surface (depth as shown on plan).	Before wet season and as necessary
4	Remove accumulated sediment, litter and debris from Biofiltration Basin and !dispose of properly. Replenish mulch as needed.	Before wet season and as necessary
5	Inspect Biofiltration Basin to ensure that there are no clogs.	Monthly during the wet season, and as needed after storm vents
6	Inspect downspouts from rooftops and sheet flow from paved areas to ensure flow to basin is unimpeded. Remove debris and repair damaged pipes. Check splash blocks or rocks and repair, replace and replenish as necessary.	Monthly during the wet season, and as needed after storm vents
7	Inspect overflow pipe to ensure that it will safely convey excess flows to storm drain. Repair or replace any damaged or disconnected piping.	Monthly during the wet season, and as needed
8	Inspect Biofiltration Basin to ensure that it is structurally sound (no cracks or leaks). Repair as necessary.	Monthly during the wet season, and as needed after storm vents
9	Inspect Biofiltration Basin using the attached inspection checklist.	Monthly, or after large storm vents, and after removal of accumulated debris or material

II. Use of Pesticides

The use of pesticides and quick release fertilizers shall be minimized, and the principles of integrated pest management (1PM) followed:

1. Employ non-chemical controls (biological, physical and cultural controls) before using chemicals to treat a pest problem.
2. Prune plants properly and at the appropriate time of year.
3. Provide adequate irrigation for landscape plants. Do not over water.
4. Limit fertilizer use unless soil testing indicates a deficiency. Slow-release or organic fertilizer is preferable. Check with municipality for specific requirements.
5. Pest control should avoid harming non-target organisms, or negatively affecting air and water quality and public health. Apply chemical controls only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, apply the least toxic and the least persistent pesticide that will provide adequate pest control. Do not apply pesticides on a prescheduled basis.
6. Sweep up spilled fertilizer and pesticides. Do not wash away or bury such spills.
7. Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
8. Only licensed, trained pesticide applicators shall apply pesticides.
9. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.
10. Unwanted/un-used pesticides shall be disposed as hazardous waste.

III. Vector Control

Standing water shall not remain in the treatment measures for more than four days, to prevent mosquito generation. Should any mosquito issues arise, contact San Diego County Vector Control. Mosquito larvicides shall be applied only when absolutely necessary, as indicated by the District, and then only by a licensed professional or contractor.

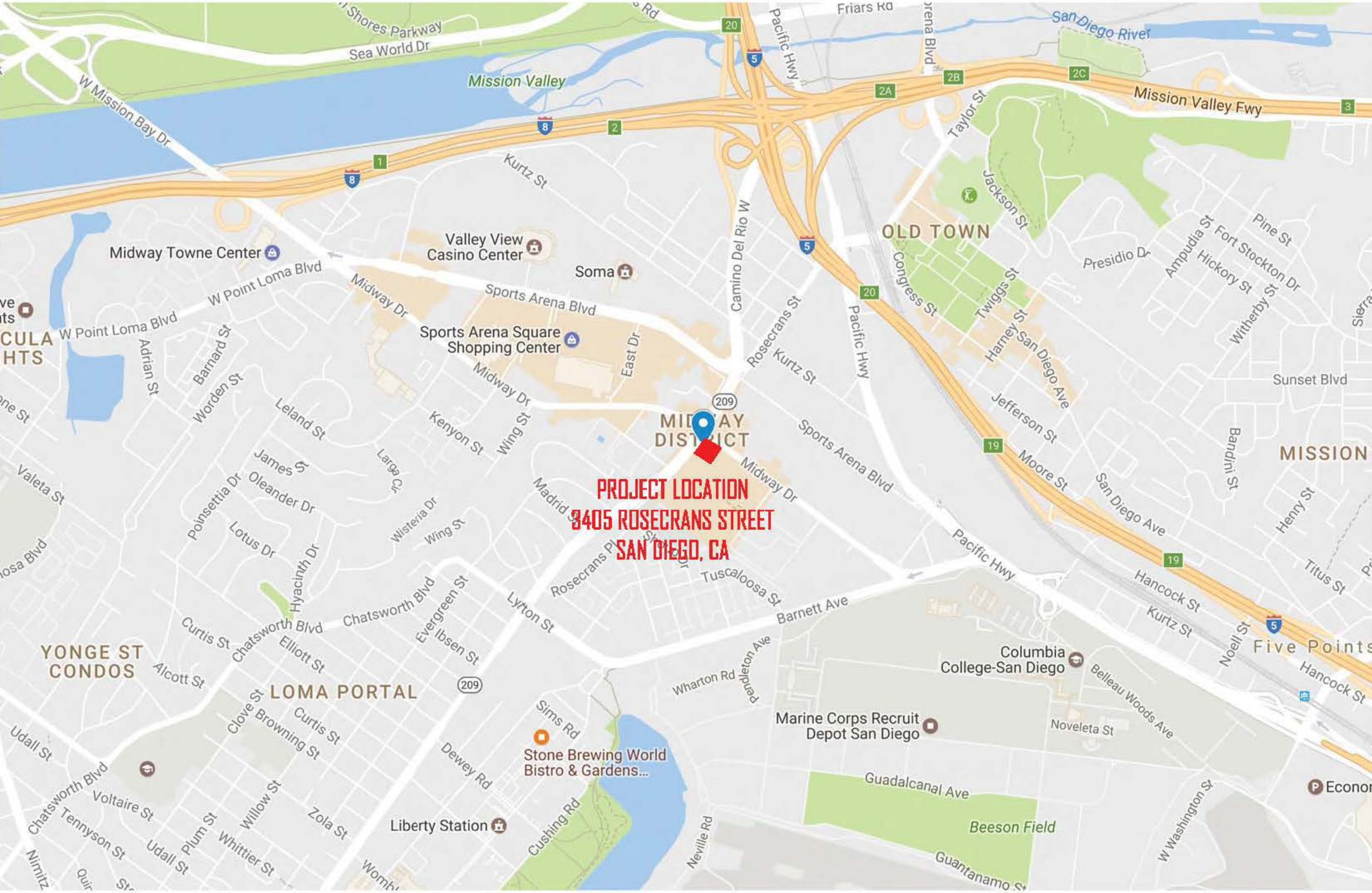
IV. Inspections

The attached Biofiltration Basin Inspection and Maintenance Checklist shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

V. Access, Observation and Soil Media Replacement

The Basins can be accessed by either the driveway on Rosecrans Street or from the driveway on Midway Drive.
There are separate grated overflow structures to drain each basin used to drain ponding areas.
Soil media is to be assessed every five years for possible replacement. Soil not replaced at five years should be reassessed every year thereafter. Should soil need to be replaced it should be removed and replaced using hand tools or small excavators. A firm specializing in BMP construction/ maintenance shall be employed to maintain the basin.

Defect	Conditions When Maintenance is needed	Maintenance Needed? (Y/N)	Comments: (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected when Maintenance is Performed
1. Vegetation	Vegetation is dead, diseased and/or vegetation is healthy and attractive overgrown.			Vegetation is healthy and attractive in appearance
2. Soil	Soil too deep or too shallow.			Soil is at proper depth (per soil specifications) for optimum filtration and flow
3. Mulch	Mulch is missing or patchy in appearance			Mulch is even in appearance.
4. Sediment, Trash, and Debris Accumulation	Sediment, trash and debris accumulated in the Biofiltration Basin. Basin does not drain in 3-4 hours.			Sediment, trash and debris removed from Biofiltration Basin and disposed of properly. Basin drains within 24-hrs.
5. Clogs/Drainage	Clogs/Drainage. Drains within 24 hours after end of rainfall.			Basin does drain within 24-hrs
6. Downspouts & Sheetflow	Flow to basin is impeded. Downspouts area clogged or pipes are damaged. Splash blocks or rocks in need of repair or replenishment.			Flows to basin is un-impeded. Downspouts are not clogged. Rocks replaced or repaired and functioning as designed.
7. Overflow Pipe	Does not safely convey excess flows to storm drain. Pipe damaged or disconnected.			Piping convey's excess flows to storm drain as designed.
8. Structural Soundness	Basin is damaged, leaking or falling apart.			Repaired Basin, not leaking. Functioning as designed.
9. Miscellaneous	Any condition not covered above that needs attention in order for the flow through the basin to function as designed.			Miscellaneous repairs made and Biofiltration system functioning as designed.


PROJECT LOCATION
3405 ROSECRANS STREET
SAN DIEGO, CA
MIDWAY DISTRICT
OLD TOWN
LOMA PORTAL
YONGE ST CONDOS
MISSION
Five Points
Mission Valley
Mission Valley Fwy
San Diego River
Sea World Dr
Friars Rd
W Mission Bay Dr
Midway Towne Center
Valley View Casino Center
Soma
Sports Arena Square Shopping Center
Sports Arena Blvd
Midway Dr
W Point Loma Blvd
Camino Del Rio W
Rosecrans St
Pacific Hwy
Kurtz St
Taylor St
Jackson St
Congress St
Twiggs St
Harney St
San Diego Ave
Jefferson St
Moore St
Hancock St
Presidio Dr
Sunset Blvd
Bandini St
Barnett Ave
Tuscaloosa St
Lytton St
Chatsworth Blvd
Columbia College-San Diego
Marine Corps Recruit Depot San Diego
Stone Brewing World Bistro & Gardens...
Liberty Station
Beeson Field
Guadalcanal Ave
Noveleta St
Belleau Woods Ave
Wharton Rd
Pendleton Ave
Dewey Rd
Sims Rd
Cushing Rd
Neville Rd
W Washington St

THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:

THE CITY OF SAN DIEGO

AND WHEN RECORDED MAIL TO:

(THIS SPACE IS FOR THE RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:

This agreement is made by and between the City of San Diego, a municipal corporation [City] and

the owner or duly authorized representative of the owner [Property Owner] of property located at:

(PROPERTY ADDRESS)

and more particularly described as:

(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 Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): ____________________

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):

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):____________________

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), orBuilding Plan Project No(s)____________________.

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 Exhibits(s):

____
(Owner Signature)

____
(Print Name and Title)

____
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control engineer Signature

____
(Print Name)

____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDMENTS PER CIVIL CODE SEC. 1180 ET.SEQ

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
☐ Details and specifications for construction of structural BMP(s)
☐ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
☐ How to access the structural BMP(s) to inspect and perform maintenance
☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐ Recommended equipment to perform maintenance
☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
☐ All BMPs must be fully dimensioned on the plans
☐ When propritery BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

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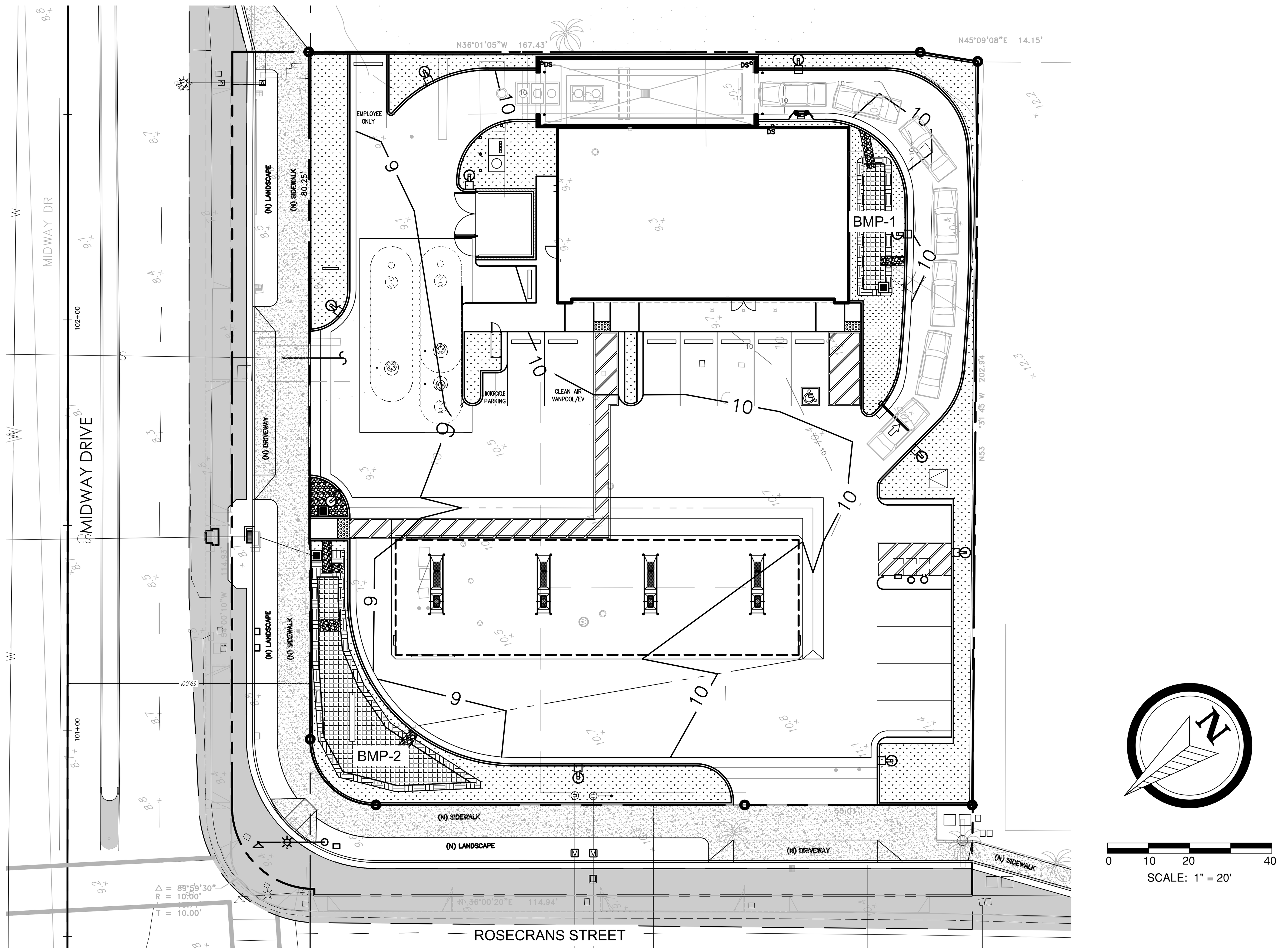


Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP TABLE

BMP TABLE

Project Input Data:

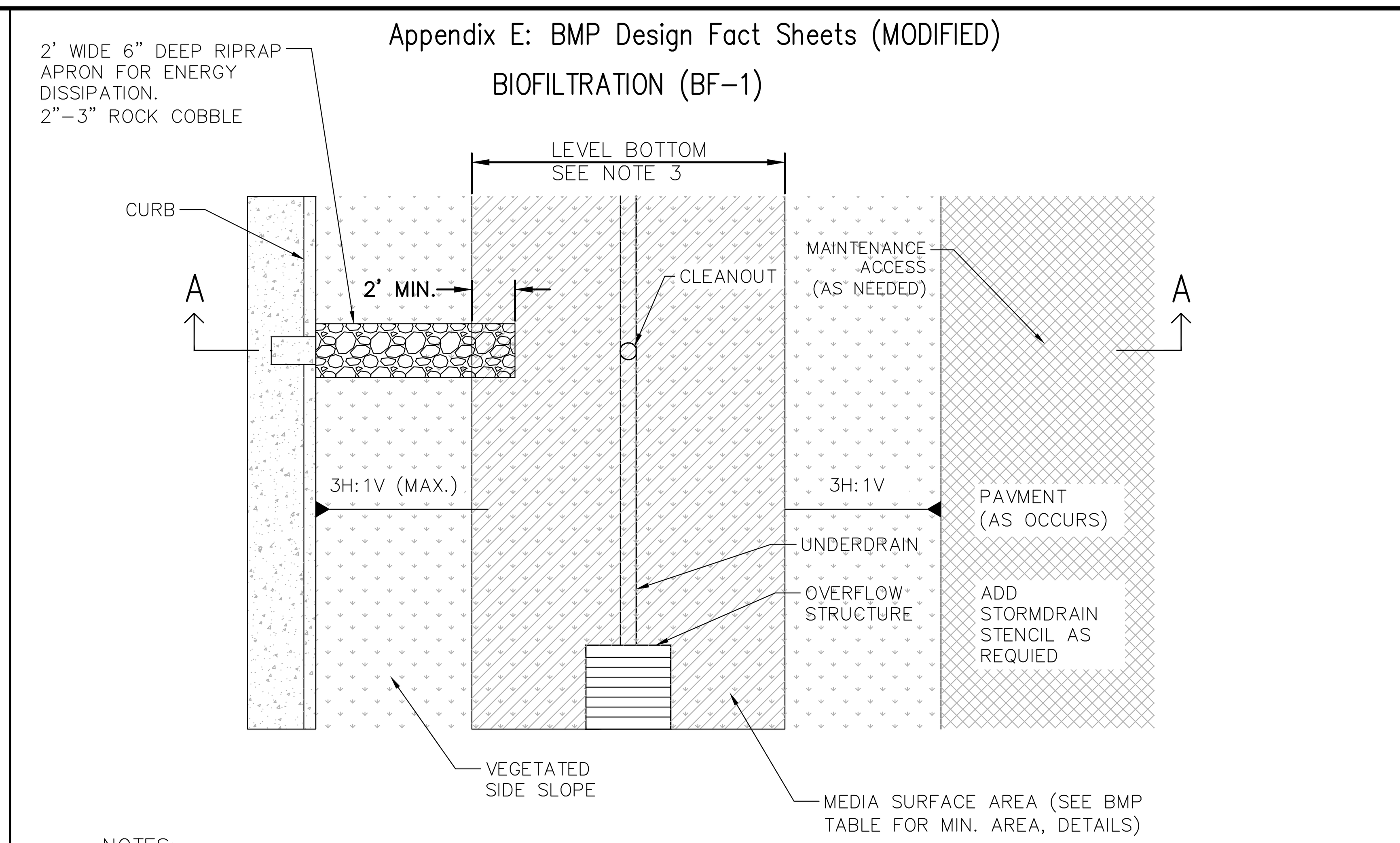
Total Site Area:	29,581	SF
	0.679	AC
	0.5	d, 85th percentile, 24-hr rainfall depth (inches) per Figure B.1-1
	0.9	C, Roof/Paved Area Runoff Factor
	0.5	C, Landscaped/BMP Area Runoff Factor

BMP #		DMA #	Structure #	Item	Shed Area, sf	Shed Area, ac	Coefficient C	Flow Length D,	Slope %	Tc min	Peak V2[1,2] fps	Peak V100[1,2] fps	Peak Q2 cfs	Peak Q10 cfs	Peak Q50 cfs	Peak Q100 cfs
BMP-1		DMA-1			6,825	0.157	0.724						0.240	0.380	0.520	0.580
BMP Bottom/FG Elev, ft	8.98		DMA-1-I1	Chevron Retail Bldg Roof	2,960	0.0680	0.95	130	0.5	3.88	0.25	0.60				
BMP Rim Elev, ft	9.65		DMA-1-I2	Chevron Car Wash Roof 1	449	0.0103	0.95	95	0.5	3.31						
Sidewalls, H:V	3:1		DMA-1-I3	Paving	1,926	0.0442	0.95	68	7.0	2.51						
Effective Area, sf	159.0		BMP-1 (POND/PERVIOUS)	BMP-1 (Live Storage Area)	209	0.0048	0.50	30	5.0	7.45	0.04	0.09				
BMP Live Storage Area, sf	219.0		DMA-1-P1	Landscape	752	0.0173	0.50	80	1.9	7.80						
Rim Area, sf	279.0		DMA-1-P2	Landscape	294	0.0067	0.50	40	0.5	8.60						
Riser Height, in	8.0		DMA-1-P3	Landscape	235	0.01	0.50	32.00	3.6	3.99						
Freeboard, in	2.0															
BMP Overflow Elev, ft	9.49															
BMP Live Storage Depth, ft	0.50															
Effective Storage Area, sf	159.0															
Infiltration Storage Volume Provided, cf	0															
Detention Storage Effective Depth, ft	1															
Live Storage, cf	196															
Net Volume Not Reliably Retained, cf	10															
BMP Drawdown Time, hr	15.6															
BMP-2		DMA-2			22,800	0.523	0.754						0.830	1.210	1.610	1.750
BMP Bottom/FG Elev, ft	7.15		DMA-2-I1	Fueling Canopy	675	0.0155	0.95	31	0.5	1.89	1.25	2.64				
BMP Rim Elev, ft	7.82		DMA-2-I2	Fueling Canopy	825	0.0189	0.95	33	0.5	1.95						
Sidewalls, H:V	3:1		DMA-2-I3	Fueling Canopy	825	0.0189	0.95	33	0.5	1.95						
Effective Area, sf	570.0		DMA-2-I4	Fueling Canopy	675	0.0155	0.95	31	0.5	1.89						
BMP Live Storage Area, sf	699.5		DMA-2-I5[3]	Paving	7,281	0.1671	0.95	170	1.6	1.40	0.35	0.75				
Rim Area, sf	829.0		DMA-2-I6	Paving	4,088	0.0938	0.95	190	1.5	1.20	0.20	0.42				
Riser Height, in	8.0		DMA-2-I7[3]	Paving	1,788	0.0410	0.95	100	2.6	0.94						
Freeboard, in	2.0		DMA-2-I8[3]	Chevron Car Wash Roof 2	449	0.0103	0.95	170	1.6	3.01						
BMP Overflow Elev, ft	7.65		DMA-2-I9[3]	Paving/Trash Enclosure Roof	2,321	0.0533	0.95	132	1.7	2.60	0.22	0.47				
BMP Live Storage Depth, ft	0.50		BMP-2 (POND/PERVIOUS)	BMP-2 (Live Storage Area)	736	0.0169	0.50	74	0.5	4.30						
Effective Storage Area, sf	570		DMA-2-P1	Landscape	900	0.0207	0.50	60	2.1	3.27						
Infiltration Storage Volume Provided, cf	0		DMA-2-P2[3]	Landscape	272	0.0062	0.50	39	0.5	8.50						
Detention Storage Effective Depth, ft	1.25		DMA-2-P3	Landscape	458	0.0105	0.50	24	1.0	4.71	0.02	0.05				
Live Storage, cf	780		DMA-2-P4[3]	Landscape	284	0.0065	0.50	41	1.0	6.92	0.01	0.03				
Net Volume Not Reliably Retained, cf	-54		DMA-2-P5[3]	Landscape	897	0.0206	0.50	30	0.5	7.45	0.04	0.09				
BMP Drawdown Time, hr	20		DMA-2-P6[3]	Landscape	326	0.0075	0.50	16	0.5	5.44	0.02	0.03				

Note:
[1] The Peak Velocities correspond to an entrance point into the BMP.
[2] The Peak Velocities for pervious areas that enter the BMP through specified entrance points were calculated seperately from the impervious area flow due to time of concentration
[3] The flow from these areas contribute to DI-2 which exits the system through pipe system, SD-2. SD-2 directly to BMP-2. The peak velocity is 1.1 fps for V2 and 2.4 fps for V100.

Appendix E: BMP Design Fact Sheets (MODIFIED)

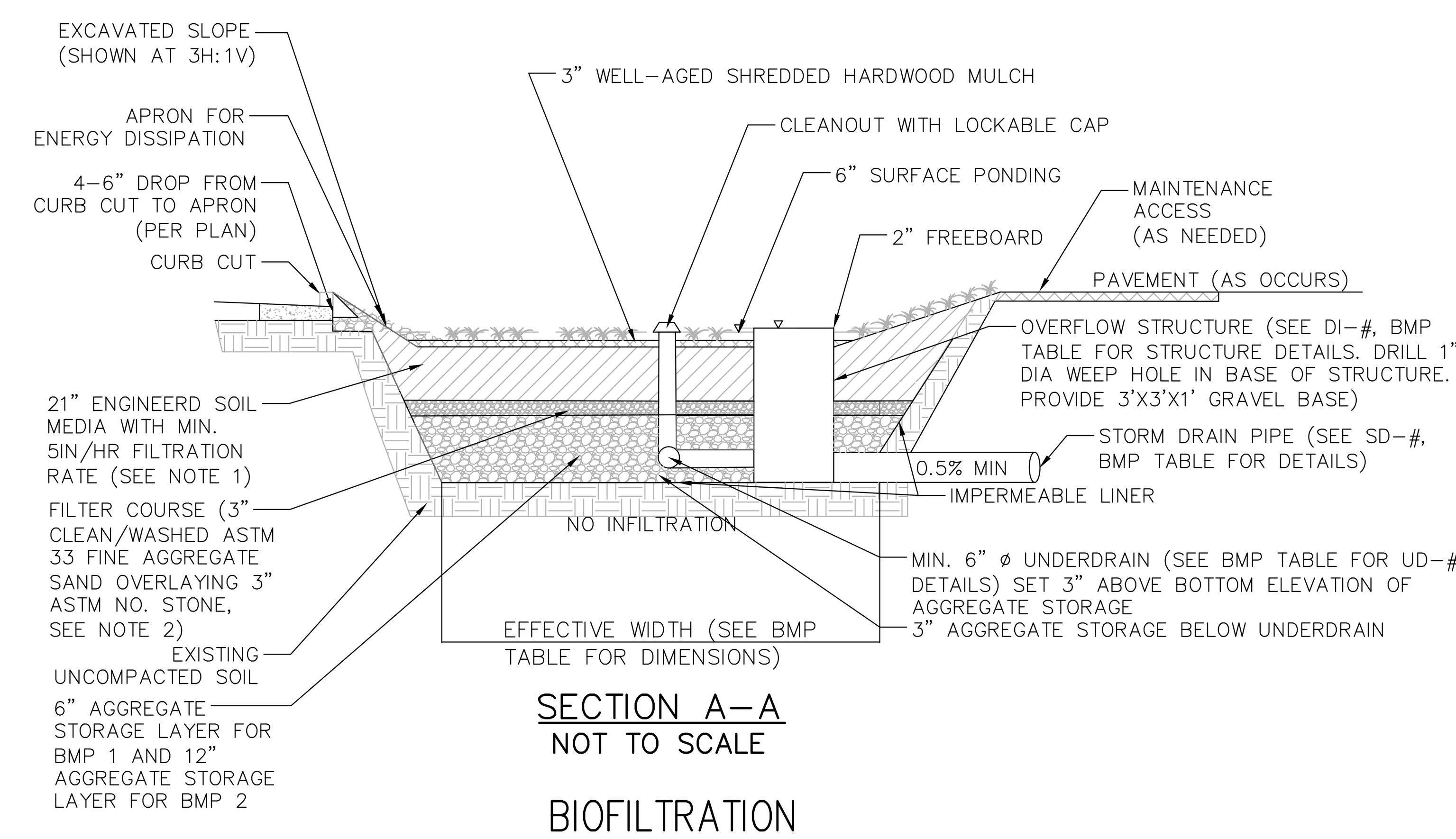
BIOFILTRATION (BF-1)



NOTES:

1. BSM TO MEET SPECIFICATIONS OF APPENDIX F.4, CITY OF SAN DIEGO, 2016 STORM WATER STANDARDS.
2. FILTER COURSE TO MEET SPECIFICATIONS OF APPENDIX F.5, CITY OF SAN DIEGO, 2016 STORM WATER STANDARDS.
3. SEE BMP PLAN FOR BOTTOM/OVERFLOW/RIM ELEVATIONS

PLAN
NOT TO SCALE



SECTION A–A
NOT TO SCALE

BIOFILTRATION

1	BIOFILTRATION

BMP NOTE:

PERMANENT POST-CONSTRUCTION BMP DEVICES (BIORETENTION BASINS) SHALL NOT BE REMOVED OR MODIFIED WITHOUT THE APPROVAL FROM THE CITY OF SAN DIEGO.

BMP LEGEND

- WATERSHED BOUNDARY
- IMPERVIOUS AREA
- PERVIOUS AREA
- BIORETENTION AREA

PM DESIGN
Architectural Solutions Group

2455 Bennett Valley Rd. Suite A-102
Santa Rosa, CA. 95404
Ph. (707) 703-5618
Roy W. Pedro, Architect

REGISTERED PROFESSIONAL ENGINEER
KYLE W. FLAMING
No. 76432
EXP. 12/31/18
CIVIL
STATE OF CALIFORNIA

Seal 8/16/18

REVISION

MARK | DATE

Chevron

CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
BMP
BEST
MANAGEMENT
PLAN

Sheet Number
C3.0

PLOT DATE: 8/16/2018

ATTACHMENT 5
DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

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PROJECT DRAINAGE REPORT

Chevron

Chevron Fueling/ Car Wash Facility
2959 Midway Drive, San Diego, CA

Prepared For: Chevron Corporation
145 South State Street
Brea, CA 92821

Prepared By: Kyle Flaming, P.E.
KFlaming@jmcivileng.com
5900 S. Lake Forest Drive
Suite 380
McKinney, TX
75070

JM CIVIL
Engineering Solutions Group

June 5, 2017
REV. Aug. 2018

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B. Pre-Development Drainage Plan
C. Post-Development Drainage Plan
D. Calculation Results – Pre-Development
- Pre-Development Data Table
- Pre-Development Q2, Q10, Q50 and Q100 Hydrographs

E. Calculation Results – Post-Development
- Post-Development BMP Data Table
- Post-Development Stormwater Network Data Table
- BMP-1 – Q2, Q10, Q50 and Q100 Hydrographs
- BMP-2 – Q2, Q10, Q50 and Q100 Hydrographs
- Offsite Flow – Q2, Q10, Q50 and Q100 Hydrographs

F. Additional Backup
- FEMA FIRM Map
- NOAA IDF Curve Data
- Program Output Report – Post-Development, Q100

1. PROJECT DESCRIPTION

CHEVRON, Corp. proposes to redevelop a 0.68 ac lot located at 2959 Midway Drive in the City of San Diego, CA. See **Appendix A** for Project Location Map.

Pre-Development Conditions (See **Appendix B** for Pre-Development Drainage Plan):

- Existing Chevron fueling facility
- Adjacent car wash facility to be included in re-development
- 98.5% impervious building roofs, fuel canopy, paving, sidewalk, curb/gutter (29,171 sf)
- 1.5% pervious landscaping (410 sf)
- No on-site drainage features, surface runoff only.

Post-Development improvements (See **Appendix C** for Post-Development Drainage Plan):

- New Chevron Retail Building
- New Car Wash Building
- New Fueling Canopy
- New concrete paving, sidewalks, curb/gutter, asphalt paving.
- New landscaped areas
- New site drainage facilities (surface drain inlets, PVC storm drain piping, PVC perforated underdrain piping,)
- 82% total impervious site area = 24,262 sf
- 18% total pervious site area = 5,363 sf

This project is not subject to Section 404 of the Clean Water Act as the redevelopment will not discharge dredged or fill material into waters of the United States. The project complies with state water quality standards and meets the requirements of the Clean Water Act Section 401, see separate Storm Water Quality Management Plan.

2. HYDROLOGY

Design Criteria

This report will meet the following requirements of the 2017 City of San Diego Drainage Design Manual:

- Hydrologic Method: Rational (projects less than 0.5 sq. mi)
- Type D soil
- Runoff Coefficients
    - Impervious: 0.95 (Roof, Canopy, Paving, Sidewalk, Curb & Gutter)
    - Pervious: 0.5 (Landscaping, BMP areas)
- Rainfall Intensity: NOAA IDF Curve for project location (see **Appendix F**)

Hydrology Methodology

Pre-Development: The topographic site survey was used to define existing impervious and pervious areas within the basin. Overland flow length, land slope and runoff coefficients were determined. Time of concentration (Tc) was computed as six and a half minutes. Pre-Development site conditions were modeled using the Rational Method to estimate the Q50 and Q100 flowrates using the sub-basin area, runoff coefficients, and rainfall data as follows:
Q=CiA; where:
C = [0.95*(0.67)+0.5*(0.01)]/0.68 = 0.94
i50=3.69in/hr ; i100=4.1 in/hr
Q50 = 2.36 cfs and Q100=2.62 cfs

Post-Development: The topographic site survey and preliminary grading plan were used to define proposed basins. Overland flow length, slope and runoff coefficients were determined. Time of concentration (Tc) for each basin was then estimated using "Urban Areas Overland Time of Flow Curves" (see worksheet **Appendix F**). The Post-Development site conditions were modeled using AutoDesk SSA software by developing a sub-basin link-node model. The Rational method was used to estimate design storm runoff quantities. Hydrodynamic flow routing (based on Saint Venant equations) analysis was performed using sub-basin, pipe network and stage/storage input parameters to estimate Q2, Q10, Q50, and Q100 flowrates.

Geotechnical Investigation

Stantec Consulting Services, Inc. prepared a geotechnical investigation report for the subject site on 05/05/17 (see **SWQMP, Attachment 6**). A subcontractor drilled soil borings to a depth of approximately 71.5 ft below ground surface (bgs). The results of the testing are as follows:

- "The property is underlain by artificial fill, alluvium, and Very Old Paralic Deposits. The artificial fill and alluvium are relatively similar, consisting of interbedded layers of very loose to medium dense sand with variable amounts of silt and clay (SW-SM, SP-SM, SM, and SC USCS soil types) and soft to stiff clay (CL and CH USCS soil types) and silt (ML USCS soil type) to an approximate depth of 60 to 75 feet bgs. Old Paralic Deposits consisting of medium dense to dense sands (SP-SM, SC, and SM USCS soil type) and very stiff clay (CL USCS soil type) were encountered to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively."
- Observed in-situ infiltration rate: 8.6-8.7 in/hr; after reduction and safety factor: 1.4-1.5 in/hr;
- Observed GW level < 10' BGS

Land Use

The existing site is zoned CC-1-3.

FEMA Floodplain Mapping

The project location is mapped on FEMA Flood Insurance Rate Map (FIRM) Map Number: 06073C1880G. The site is location in Flood Zone X, areas determined to be outside the 0.2% annual chance floodplain per the FEMA National Flood Insurance Program. The FIRM MAP for the project area is included in **Appendix F.**

Ground Water (GW) Table

The April 2017 geotechnical investigation encountered GW at approximately 7' below ground surface. 2015 Stantec testing encountered GW at 17'. High GW tables excludes infiltration as an option so biofiltration ponds, BMP-1 and BMP-2, were designed for water quality treatment. These ponds provide temporary runoff storage and are further described and detailed in the Storm Water Quality Management Plan.

3. HYDRAULICS

Pre-Development Drainage Conditions

Existing drainage conveyance is urban. No off-site run-on. No existing storm drain, detention, water quality treatment or channels are located on-site.

Site runoff is conveyed by sheet flow and shallow concentrated flow from south to north and exits the drive entrance at the northeast site corner. Runoff travels as gutter flow to the existing storm drain inlet on Midway Drive. Runoff is then conveyed by City of San Diego storm drain ID # 23305 (Ref. Dwg # 6153-27-R) and eventually discharges to the San Diego Bay.

Post-Development Drainage Conditions

The revised drainage pattern will use a combination of sheet, shallow concentrated, and pipe flow to convey all site runoff to two (2) new BMP biofiltration ponds. Runoff from the impervious building and car wash roof surfaces will discharge through roof drains to grade onto the impervious pavement to dissipate and disperse. The runoff will then be directed through curb cuts into riprap in the landscape prior to entering the biofiltration pond. All runoff from site pervious landscaped areas will sheet flow to site impervious paved areas. All sheet and shallow concentrated runoff from impervious paved areas will either flow directly to the respective BMP structure or to a drop inlet connected to the BMP structure by underground PVC piping. Runoff from the impervious fuel canopy roof will be conveyed to BMP-2 via a system of rainwater leaders and underground PVC piping. All runoff will flow through riprap prior to entering the biofiltration ponds. The velocity entering the biofiltration ponds at various points will be less than 3 feet per second (see Appendix E).

Runoff less than the live storage volume (see BMP Table) will be stored in the BMP structure where flow will infiltrate (5"/hr min) through the 21" BSM layer, 6" filter course layer and gravel retention layer. Low flow discharge will enter 6" perforated PVC underdrains connected to the respective BMP overflow structure. Discharge will gravity flow to DI-BMP-2 and then off-site to the proposed catch basin on Midway Drive.

Runoff exceeding the total BMP capacity will be conveyed by orifice overflow to grated drop inlet structures located within the BMP (DI-BMP-1, DI-BMP-2). The inlets will discharge to the underground PVC storm drain system. All site runoff will pass through DI-BMP-2. Flow exiting DI-BMP-2 will be conveyed off-site to a new proposed catch basin on Midway Drive. The new catch basin will connected to the City of San Diego 36" storm drain beneath Midway Drive and eventually discharge to the San Diego Bay.

Design Methodology

As the tributary areas are under one square mile and the site is not within a floodplain or floodplain fringe area as defined by FEMA, the stormwater conveyance system has been designed for a combination of capacity and overflow for the 100-year storm without damage and the runoff criteria based on a 50-year storm.

Pre-Development: The Pre-Development Q2, Q10, Q50 and Q100 peak discharge flowrates were estimated using Rational method of analysis as presented in the Hydrology method above.

Post-Development: The Pre-Development site conditions were modeled using AutoDesk Storm and Sanitary Analysis (SSA) software. A node-link model of the DMA sub-basins was developed and the Rational method of analysis was applied to estimate the Q2, Q10, Q50 and Q100 peak discharge flowrates. Hydrodynamic flow routing (based on Saint Venant equations) principles were used to develop the Q100 hydraulic grade line (HGL) to assess the long term hydraulic performance of the on-site storm drain network.

4. Calculation Results

The results of the AutoDesk SSA software are provided in the program output report for the post-development 100-year storm simulation. The results show that the last pipe (SD-OUTLET-2) in the system connecting to the public storm drain system is at 55% capacity during a 100-year storm event. The HGL for the 100-year storm is 4.62 feet, which is slightly above half full for the pipe at its connection to OUTFALL-1. SD-OUTLET-2 pipe is not surcharged in the 100-year storm; therefore, it is assumed to not be surcharged in the 50-year storm.

	Q2 cfs	Q10 cfs	Q50 cfs	Q100 cfs
Pre-Development Total Offsite Q	1.11	1.73	2.36	2.62
Post-Development Total Offsite Q	1.07	1.59	2.13	2.33
Post-Development Inflow Q To BMP-1	0.24	0.38	0.52	0.58
Post-Development Inflow Q To BMP-2	0.83	1.21	1.61	1.75

5. Summary

Chevron Corporation proposes redevelopment of the existing fueling station and adjacent car wash property at 2959 Midway Drive in San Diego, CA. The project will add a new retail building, car wash building, fuel canopy, and landscaping.

The Pre-Development project site is 98.5% paved. Storm runoff currently overland flows to the City of San Diego storm drain system on Midway Drive. The Rational method estimates Q100 = 2.63 cfs.

The Post-Development project will be 82% paved. The addition of new landscaping and BMP water-quality structures increases the pervious area by 16.5%. The BMP water quality structures add peak flow attenuation and live storage capacity. The Rational method estimates offsite discharge Q100 = 2.33 cfs.

APPENDICES

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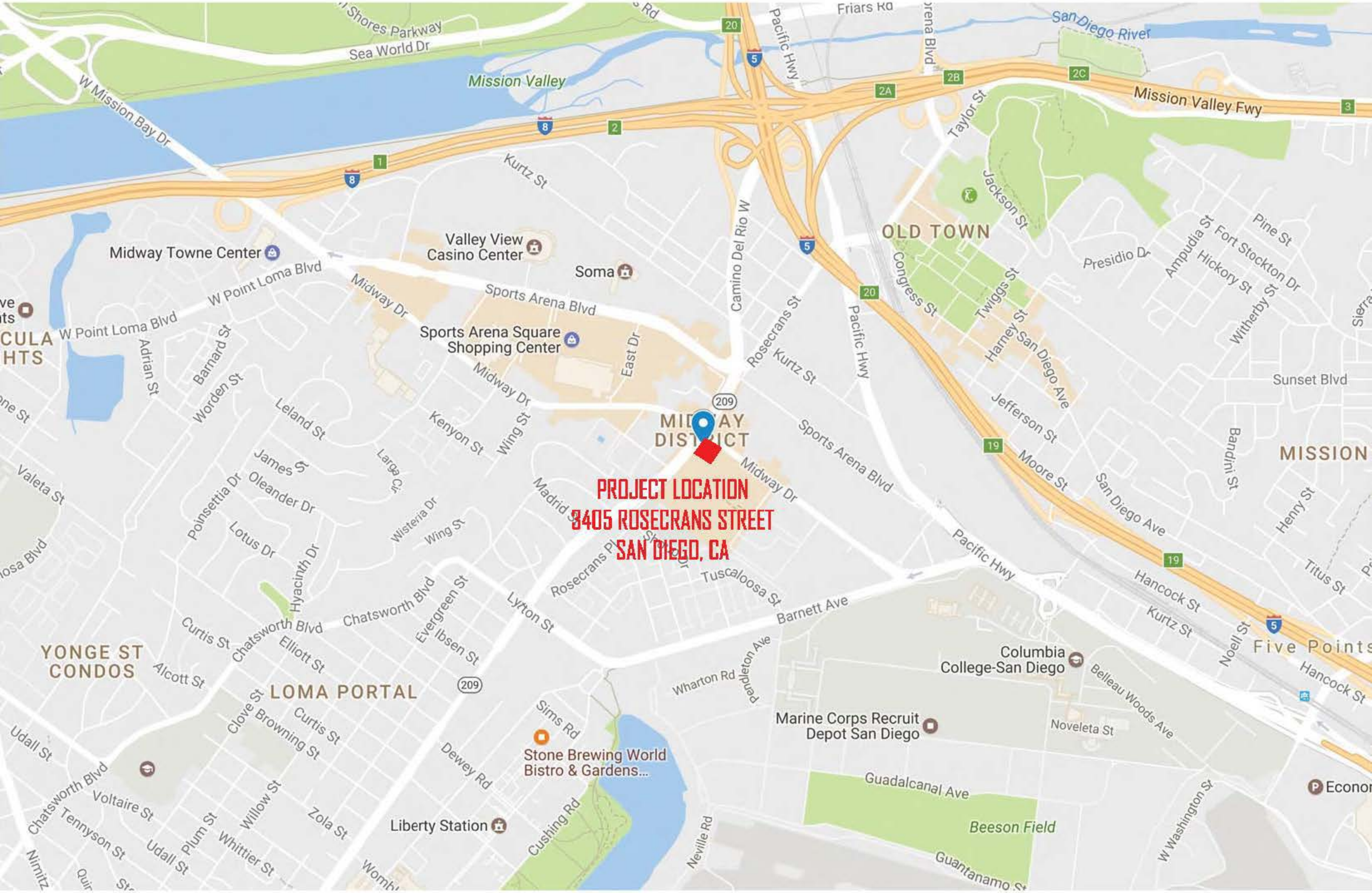
E. Calculation Results – Post-Development
    - Post-Development Data Table
    - BMP-1 – Q2, Q10, Q50 and Q100 Hydrographs
    - BMP-2 – Q2, Q10, Q50 and Q100 Hydrographs
    - Offsite Flow – Q2, Q10, Q50 and Q100 Hydrographs
F. Additional Backup

APPENDIX A

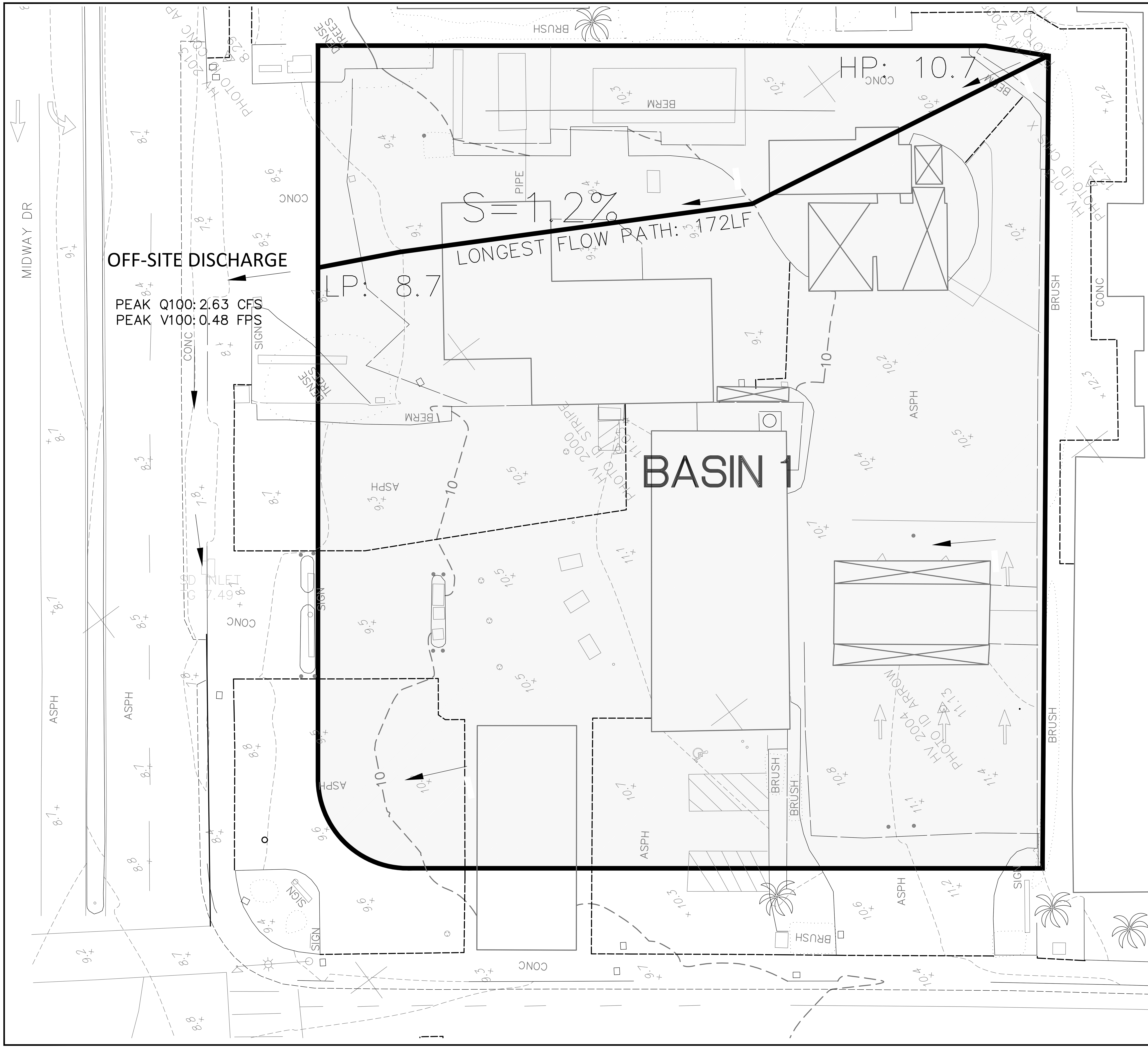
PROJECT LOCATION MAP



PROJECT LOCATION
3405 ROSECRANS STREET
SAN DIEGO, CA
MIDWAY DISTRICT
OLD TOWN
LOMA PORTAL
Mission Valley
Mission Valley Fwy
Sea World Dr
Midway Towne Center
Valley View Casino Center
Soma
Sports Arena Square Shopping Center
Sports Arena Blvd
Midway Dr
Rosecrans St
Pacific Hwy
Camino Del Rio W
Barnett Ave
Columbia College-San Diego
Marine Corps Recruit Depot San Diego
Stone Brewing World Bistro & Gardens...
Liberty Station
Beeson Field
San Diego River
Five Points

APPENDIX B

PRE-DEVELOPMENT DRAINAGE PLAN



PRE-DEVELOPMENT LEGEND

BASIN	BASIN
FLOW PATH OF TRAVEL	FLOW PATH OF TRAVEL
10	CONTOUR

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE D
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.

0 5 10 20
SCALE: 1" = 10'

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CIVIL
STATE OF CALIFORNIA
Seal 8/16/18

MARK	DATE	REVISION

Chevron
CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

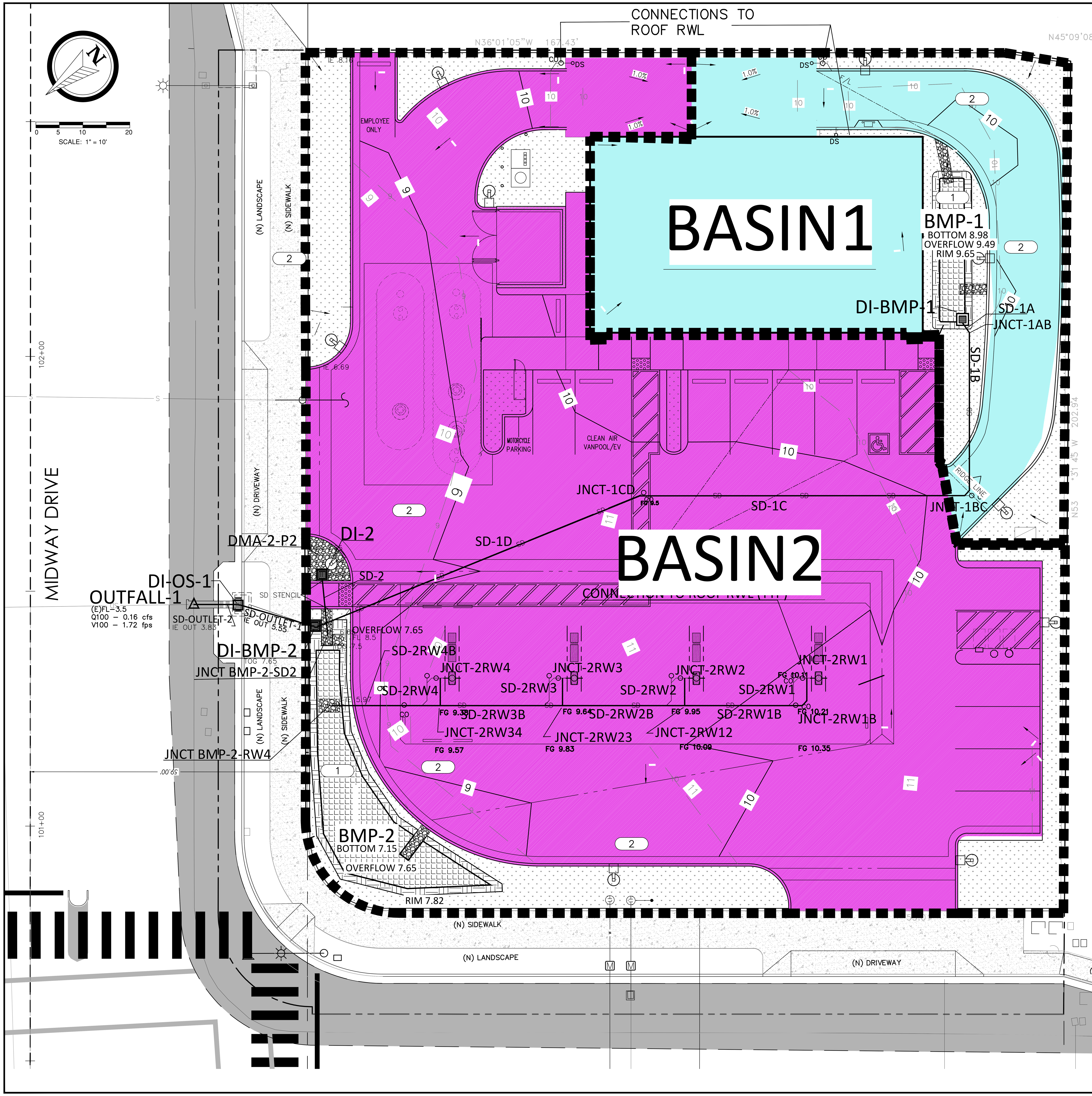
Sheet Name
PRE-DEVELOPMENT DRAINAGE EXHIBIT

Sheet Number

PLOT DATE: 8/16/2018

APPENDIX C

POST-DEVELOPMENT DRAINAGE PLAN



POST-DEVELOPMENT LEGEND

(dashed line)	BASIN BOUNDARY
(shaded box)	IMPERVIOUS AREA
(dotted box)	PERVIOUS AREA
(arrow)	FLOW PATH OF TRAVEL
—10—	CONTOUR
(hatched box)	BIOFILTRATION (BF-1)

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE D
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.
4. BASIN AREAS ARE DIVIDED BY THE BOUNDARY LINE AND IMPERVIOUS AREA IS SHADED.
5. PROPOSED ON-SITE STORM DRAIN PIPES ARE LABELED AS SD-#, WHILE PROPOSED OFF-SITE STORM DRAIN PIPES ARE SD-OUTLET-#
5. PROPOSED BMP OVERFLOW STRUCTURES ARE LABELED AS DI-BMP-#, WHILE PROPOSED BMP STRUCTURES ARE BMP-#
6. FOR BASIN OR STORM DRAIN NETWORK SPECS, SEE APPENDIX E: POST-DEVELOPMENT BMP TABLE AND SW NETWORK DATA TABLE, RESPECTIVELY.

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8/16/18
Seal

REVISION
DATE
MARK

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CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
POST DEVELOPMENT DRAINAGE EXHIBIT

Sheet Number

PLOT DATE: 8/16/2018

APPENDIX D

CALCULATION RESULTS

PRE-DEVELOPMENT

PRE-DEVELOPMENT DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **Pre-Development Drainage Condiiton**

Pre-Existing Drainage Conditions

Total Site Area: 0.679 ac
29,581.00 ft^2

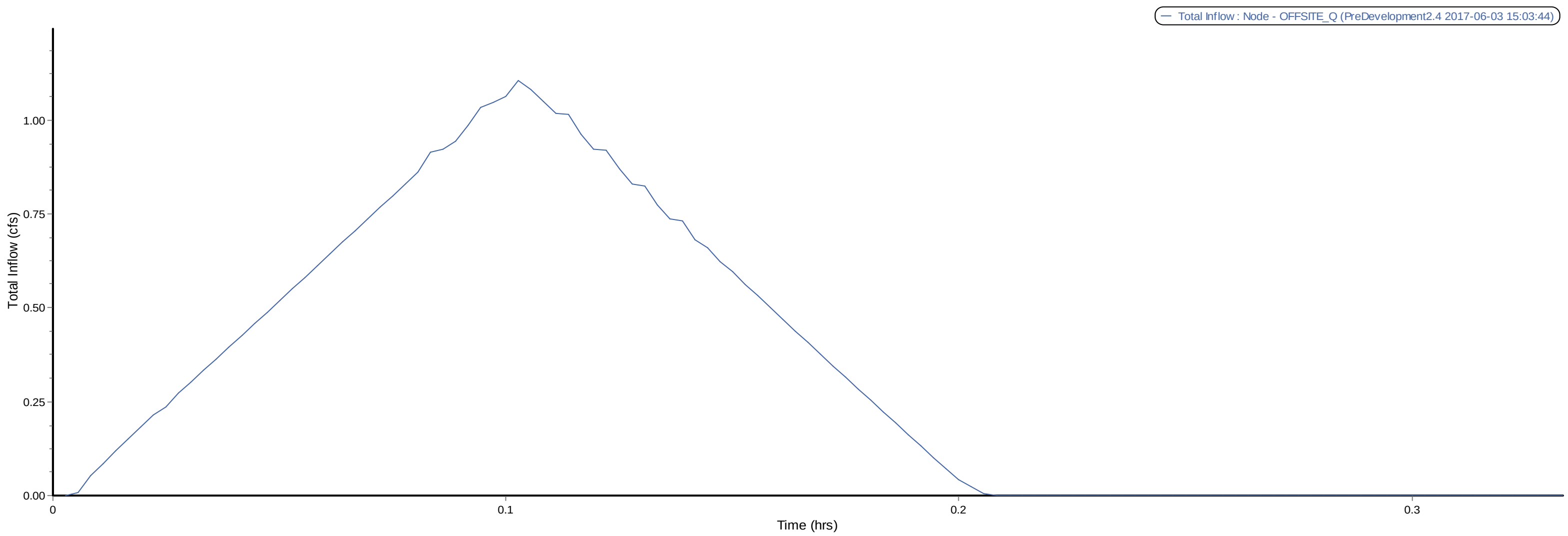
DMA #	Shed Area, ft^2	Shed Area, AC	% IMP	Flow Length D, ft	Slope %	Tc min	Runoff Coefficient C*	Peak Q2 cfs	Peak Q10 cfs	Peak Q50 cfs	Peak Q100 cfs
Basin 1	29,581	0.67909	97.7	141	1.20	5.50	0.94	1.11	1.73	2.36	2.62

PRE-DEVELOPMENT Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q2

RESULTS:

Runoff Peak Q:	1.11	CFS
Runoff Volume:	401	ft^3

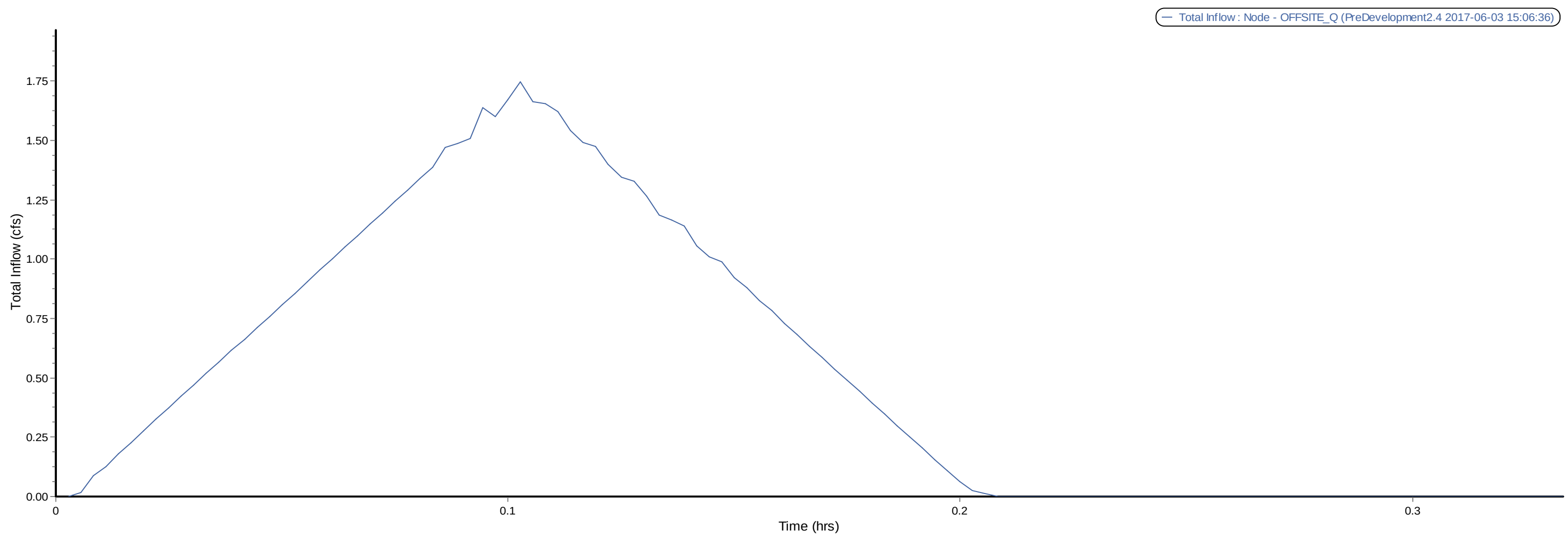


Element ID	OFFSITE_Q
Maximum Total Inflow (cfs)	1.11
Minimum Total Inflow (cfs)	0
Event Mean Total Inflow (cfs)	0.34
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft^3)	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume (ft^3)	401.12
Detention Storage (ft^3)	N/A
Exceedance	0
Deficit	0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q10

RESULTS:

Runoff Peak Q: $\boxed{1.74}$ CFS
Runoff Volume: $\boxed{625}$ ft^3

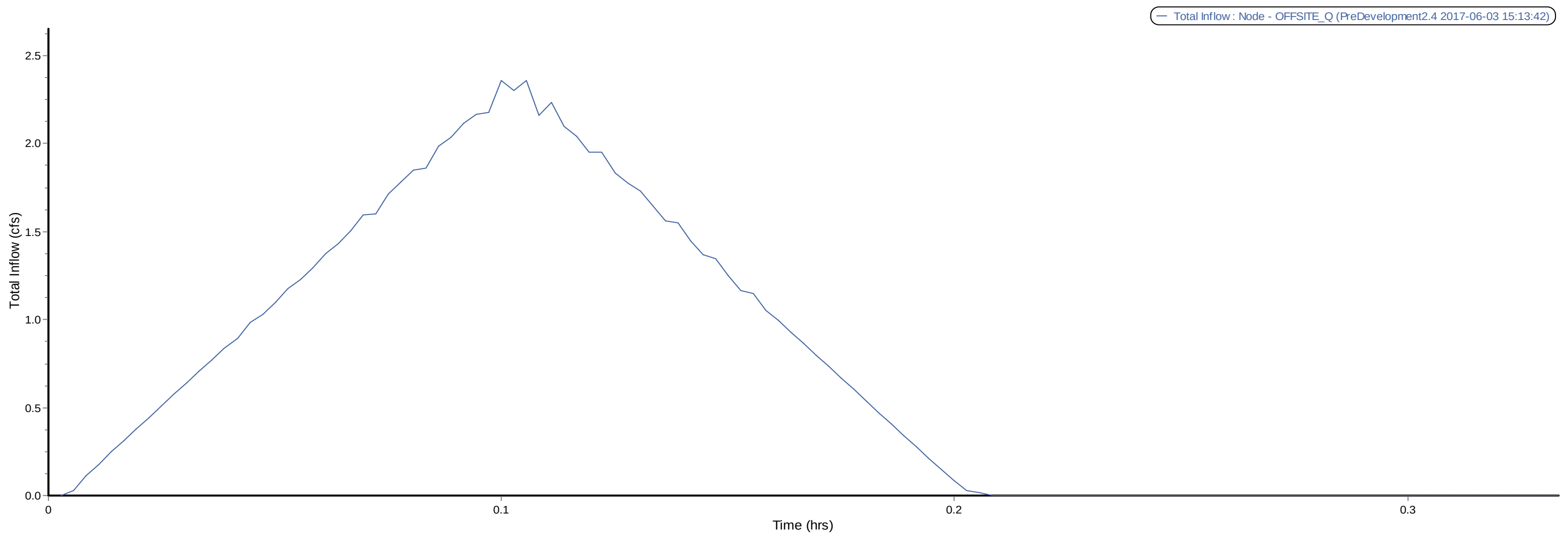


Element ID	OFFSITE Q
Maximum Total Inflow	1.74
Minimum Total Inflow	0.00
Event Mean Total	0.52
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	624.67
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q50

RESULTS:

Runoff Peak Q:	2.37	CFS
Runoff Volume:	851	ft^3

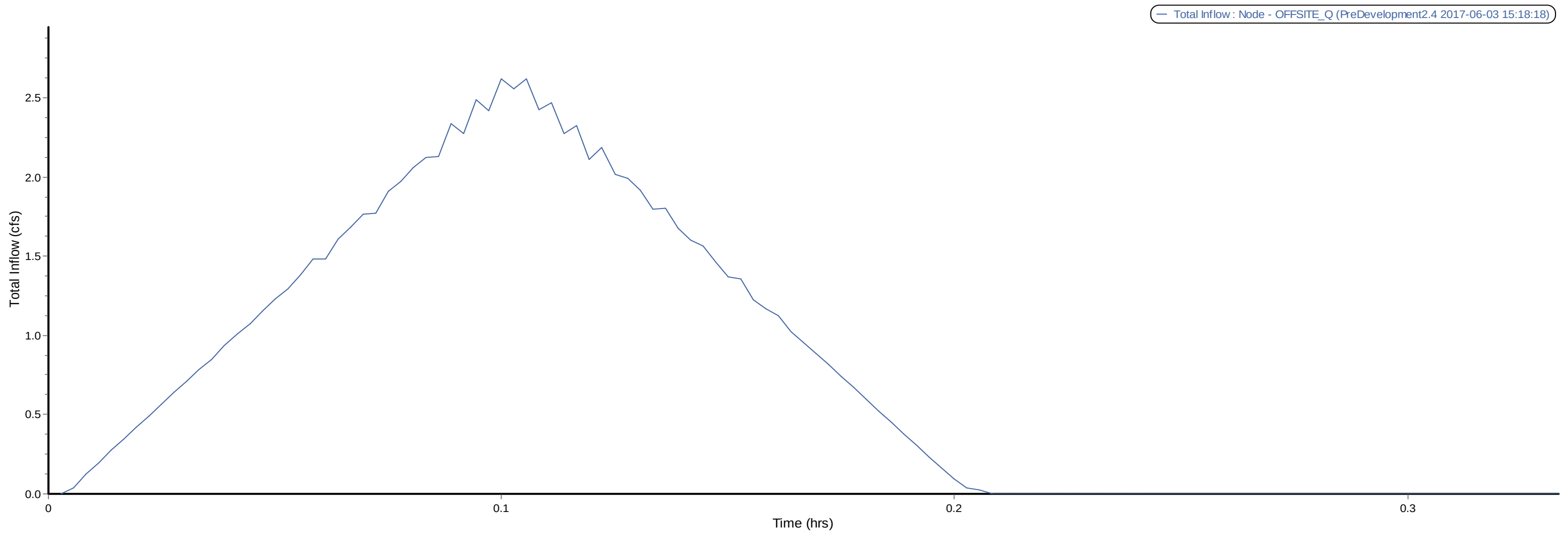


Element ID	OFFSITE_Q
Maximum Total Inflow	2.37
Minimum Total Inflow	0.00
Event Mean Total	0.72
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	851.13
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q100

RESULTS:

Runoff Peak Q:	**2.63**	**CFS**
Runoff Volume:	**946**	**ft³**



Element ID	OFFSITE_Q
Maximum Total Inflow	2.63
Minimum Total Inflow	0.00
Event Mean Total	0.80
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume	946.27
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

APPENDIX E

CALCULATION RESULTS

POST-DEVELOPMENT

POST-DEVELOPMENT DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **BMP TABLE**

BMP TABLE

Project Input Data:

Total Site Area:	29,581	SF
	0.679	AC
	0.5	d, 85th percentile, 24-hr rainfall depth (inches) per Figure B.1-1
	0.9	C, Roof/Paved Area Runoff Factor
	0.5	C, Landscaped/BMP Area Runoff Factor

BMP #		DMA #	Shed Area, sf	Shed Area, ac	Coefficient C	Flow Length D,	Slope %	Tc min	Peak V2[1,2] fps	Peak V50[1,2] fps	Peak V100[1,2] fps	Peak Q2 cfs	Peak Q10 cfs	Peak Q50 cfs	Peak Q100 cfs
BMP-1		Basin1	6,825	0.157	0.724	67.9	2.4	4.0	0.25	0.54	0.60	0.240	0.380	0.520	0.580
BMP Bottom/FG Elev, ft	8.98														
BMP Rim Elev, ft	9.65														
Sidewalls, H:V	3:1														
Effective Area, sf	159.0														
BMP Live Storage Area, sf	219.0														
Rim Area, sf	279.0														
Riser Height, in	8.0														
Freeboard, in	2.0														
BMP Overflow Elev, ft	9.49														
BMP Live Storage Depth, ft	0.50														
Effective Storage Area, sf	159.0														
Infiltration Storage Volume Provided, cf	0														
Detention Storage Effective Depth, ft	1														
Live Storage, cf	196														
Net Volume Not Reliably Retained, cf	10														
BMP Drawdown Time, hr	15.6														
BMP-2		Basin2	22,800	0.523	0.754	73	1.1	3.6	0.257	0.500	0.547	0.830	1.210	1.610	1.750
BMP Bottom/FG Elev, ft	7.15														
BMP Rim Elev, ft	7.82														
Sidewalls, H:V	3:1														
Effective Area, sf	570.0														
BMP Live Storage Area, sf	699.5														
Rim Area, sf	829.0														
Riser Height, in	8.0														
Freeboard, in	2.0														
BMP Overflow Elev, ft	7.65														
BMP Live Storage Depth, ft	0.50														
Effective Storage Area, sf	570														
Infiltration Storage Volume Provided, cf	0														
Detention Storage Effective Depth, ft	1.25														
Live Storage, cf	780														
Net Volume Not Reliably Retained, cf	-54														
BMP Drawdown Time, hr	20														

Note:

[1]The Peak Velocities correspond to an entrance point into the BMP.

[2]The Peak Velocity for pervious areas that enter the BMP through specified entrance points were not included in the velocity calculations, but were all less than 0.1 fps in all storms. Basin 2 included the fueling canopy and the velocity was not considered for these due to differences in conveyance systems, but the pipes exiting the fueling canopy had velocity for the 2 year, 50 year, and 100 year of 1.25 fps, 2.42 fps, and 2.64 fps, respectively.

POST-DEVELOPMENT

STORMWATER NETWORK DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **DRAINAGE STRUCTURES TABLE**

DRAINAGE STRUCTURES

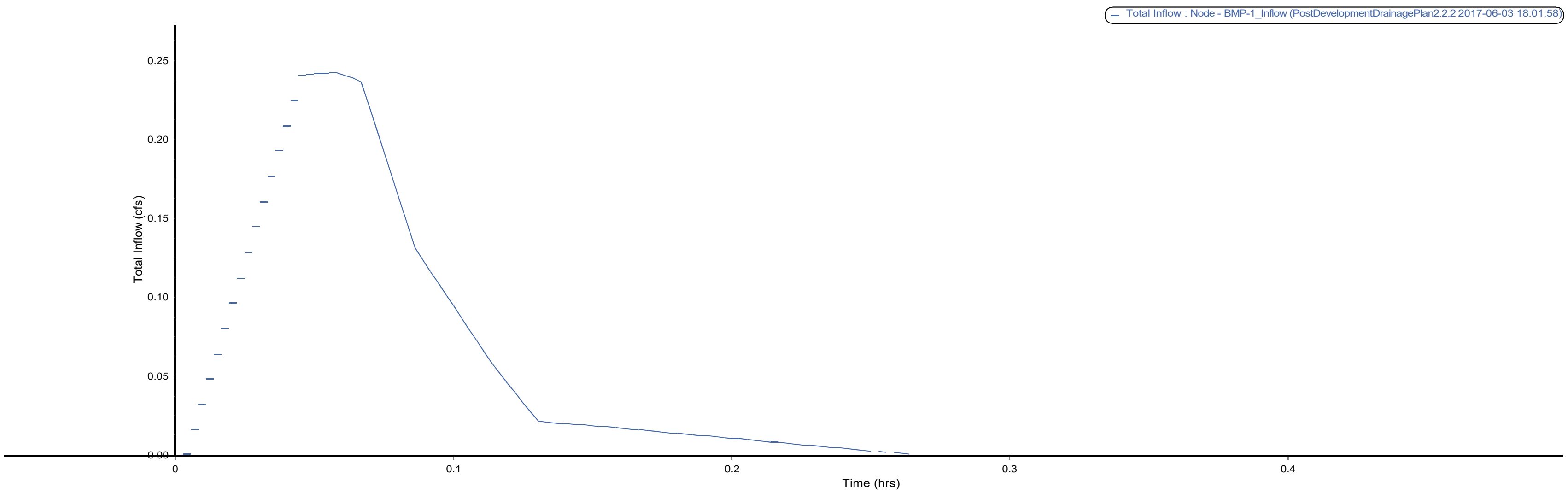
BMP #	DMA #	Structure #	Item	DIA/SIZE in	Quantity #	L, ft	S, ft/ft	IE In, ft	IE Out	TOG, ft	Sump Elev., ft
				0	0	0	0.000	0.00	0.00	0.00	0.00
BMP-1	DMA-1										
	INLETS	DI-BMP-1	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					9.49	5.65
	PIPES	SD-1A	PVC Pipe	6		4	0.005	7.99	7.97		
		SD-1B	PVC Pipe	6		35	0.005	7.97	7.79		
		SD-1C	PVC Pipe	6		70	0.005	7.79	7.44		
		SD-1D	PVC Pipe	6		72	0.005	7.44	7.08		
		UD-1	Slotted PVC, ASTM D 3034 or AE	4		26	0.000	6.65	6.65		
	JUNCTIONS	JNCT-1AB	PVC 90 DEG	6"x 6"	1				7.97		
		JNCT-1BC	PVC 90 DEG	6"x 6"	1				7.79		
		JNCT-1CD	PVC 22.5 DEG	6"x 6"	1				7.44		
BMP-2	DMA-2										
	INLETS	DI-2	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					7.66	5.72
		DI-BMP-2	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					7.65	3.65
	PIPES	SD-2RW1	PVC Pipe	4		26	0.010	8.61	8.35		
		SD-2RW2	PVC Pipe	4		26	0.012	8.35	8.04		
		SD-2RW3	PVC Pipe	4		26	0.010	8.04	7.78		
		SD-2RW4	PVC Pipe	4		23	0.049	7.78	6.65		
		SD-2	STEEL TUBE	4X8X0.25	2	13	0.005	6.72	6.65		
		UD-2	Slotted PVC, ASTM D 3034 or eq.	4		68	0.000	4.65	4.65		
	JUNCTIONS	JNCT-2RW1	Connect RWL to JNCT-2RW1	VERIFY 4"x4"Connector	1				8.61		
		JNCT-2RW2	Connect RWL to JNCT-2RW2	VERIFY 4"x4"Connector	1				8.35		
		JNCT-2RW3	Connect RWL to JNCT-2RW3	VERIFY 4"x4"Connector	1				8.04		
		JNCT-2RW4	Connect RWL to JNCT-2RW4	VERIFY 4"x4"Connector	1				7.78		
		JNCT- BMP-2-SD2	Energy Dissipator Outlet Structure	See Plan - Details	1			0.00	6.65		
		JNCT- BMP-2-RW4	Energy Dissipator Outlet Structure	See Plan - Details	1			0.00	6.65		
OFFSITE											
		SD-OUTLET-1	PVC Pipe	12		20	0.005	5.65	5.55		
		DI-OS-1	FUTURE OFF-SITE CURB INLET	CONNECT SD-OUTLET-1 TO FUTURE INLE	1						
		SD-OUTLET-2	FUTURE OFF-SITE CONCRETE PIPE	18		9	0.009	3.91	3.83		
		OUTFALL-1	OUTFALL TO CITY OF SAN DIEGO 36" CONC. PIPE	CONNECT SD-OUTLET-2 TO EX. SD	1						

POST DEVELOPMENT
BMP-1 – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: acility - 3405 Rosecrans Street, San Diego, CA
Feature: gy/Hydraulic Calculations
Item: : Post-Development Q2

RESULTS:

Runoff Peak Q:	**0.24**	**CFS**
Runoff Volume:	**67**	**FT**

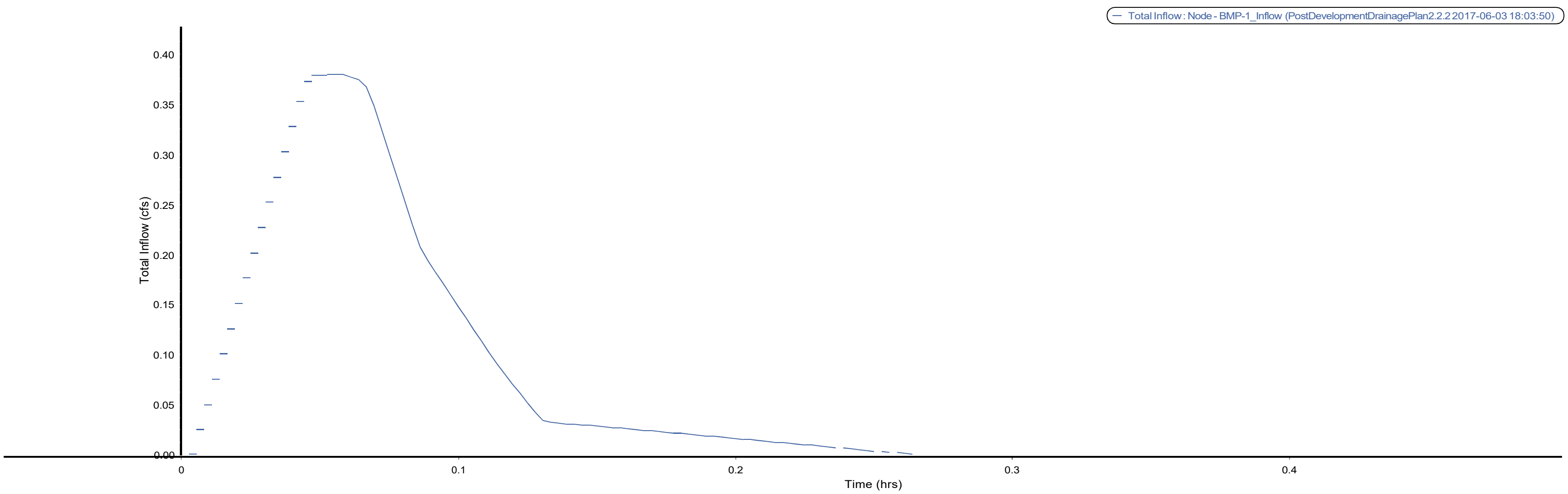


Element ID	BMP-1_Inflow
Maximum Total Inflow (cfs)	0.24
Minimum Total Inflow (cfs)	0
Event Mean Total Inflow (cfs)	0.02
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	67.39
Detention Storage (ft³)	N/A
Exceedance	0
Deficit	0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-1: Post-Development Q10

RESULTS:

Runoff Peak Q:	0.38	CFS
Runoff Volume:	106	FT

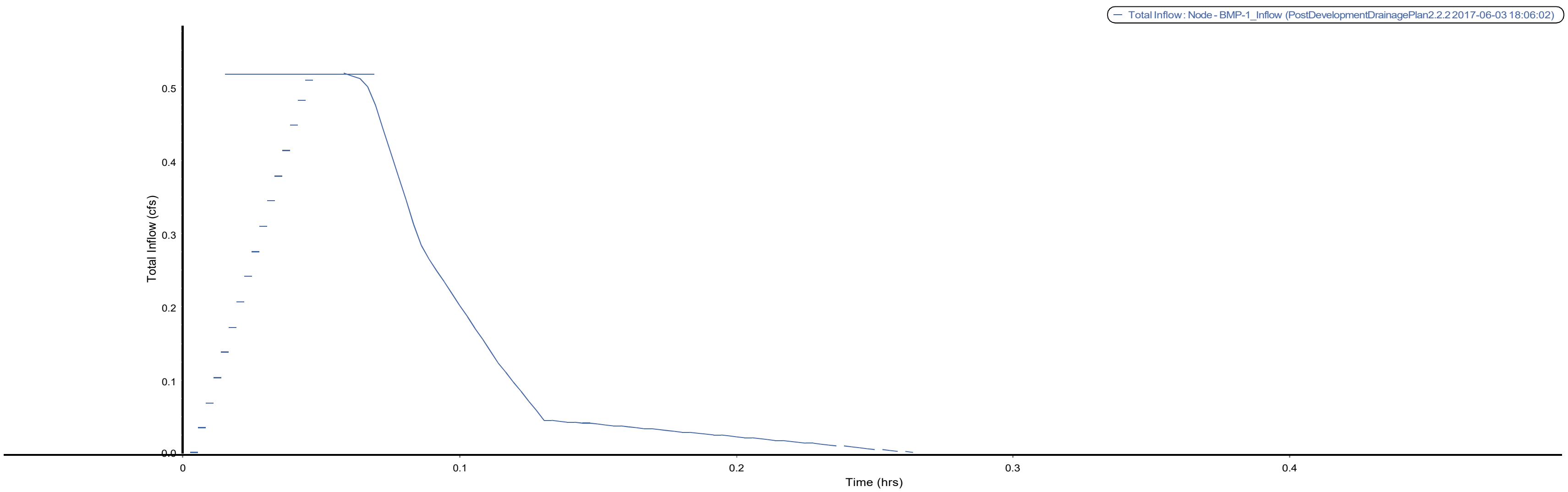


Element ID	BMP-1 Inflow
Maximum Total Inflow	0.38
Minimum Total Inflow	0.00
Event Mean Total	0.06
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	105.65
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-1: Post-Development Q50

RESULTS:

Runoff Peak Q:	**0.52**	**CFS**
Runoff Volume:	**144**	**FT**

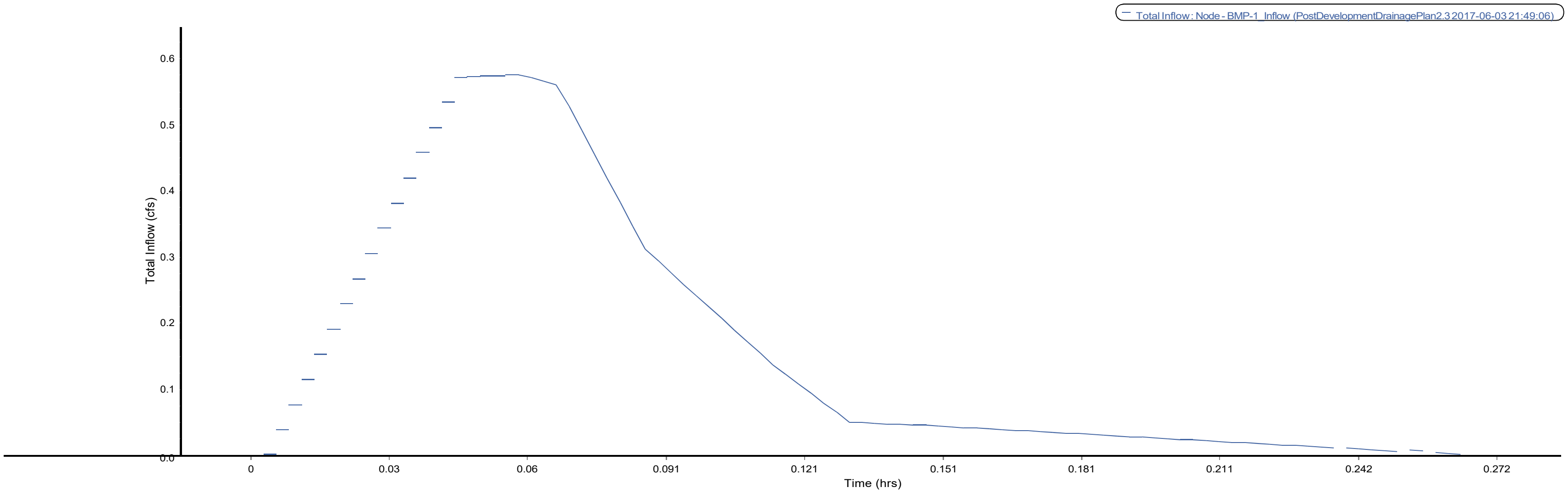


Element ID	BMP-1 Inflow
Maximum Total Inflow	0.52
Minimum Total Inflow	0.00
Event Mean Total	0.08
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	144.14
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project:	Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature:	Hydrology/Hydraulic Calculations
Item:	BMP-1: Post-Development Q100

RESULTS:

Runoff Peak Q:	0.58	**CFS**
Runoff Volume:	160	**FT**



Element ID	BMP-1 Inflow
Maximum Total Inflow	0.58
Minimum Total Inflow	0.00
Event Mean Total	0.04
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	159.93
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

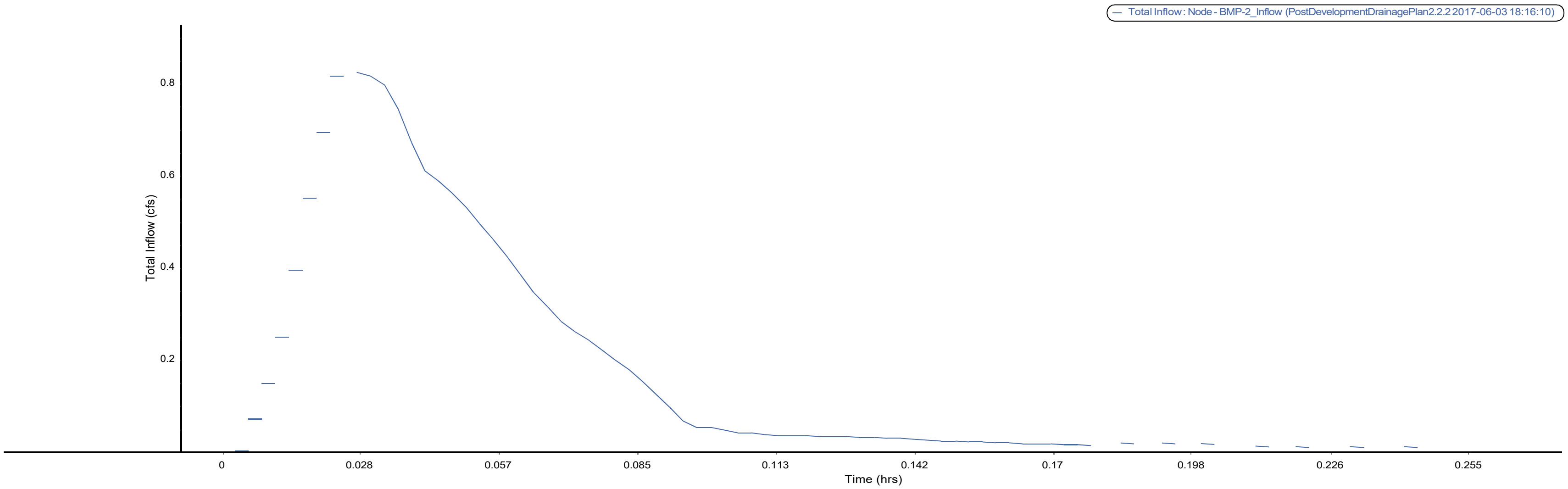
POST DEVELOPMENT

BMP-2 – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q2

RESULTS:

Runoff Peak Q:	0.83	CFS
Runoff Volume:	155	FT

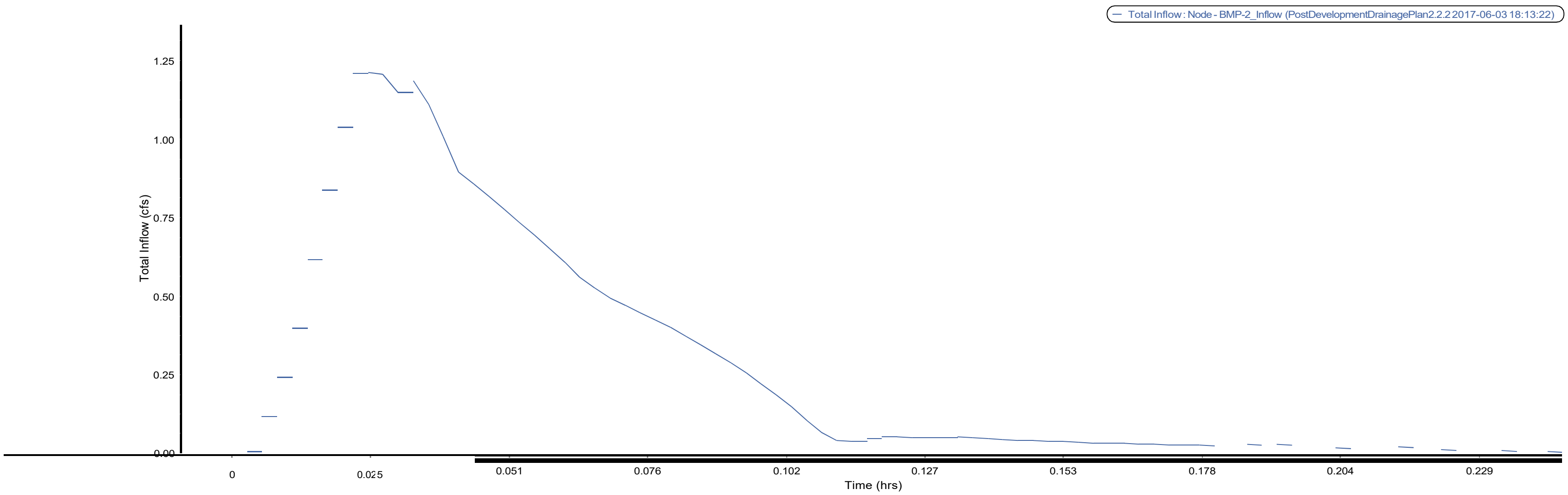


Element ID	BMP-2 Inflow
Maximum Total Inflow	0.83
Minimum Total Inflow	0.00
Event Mean Total	0.09
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume	154.64
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q10

RESULTS:

Runoff Peak Q:	1.21	CFS
Runoff Volume:	243	FT

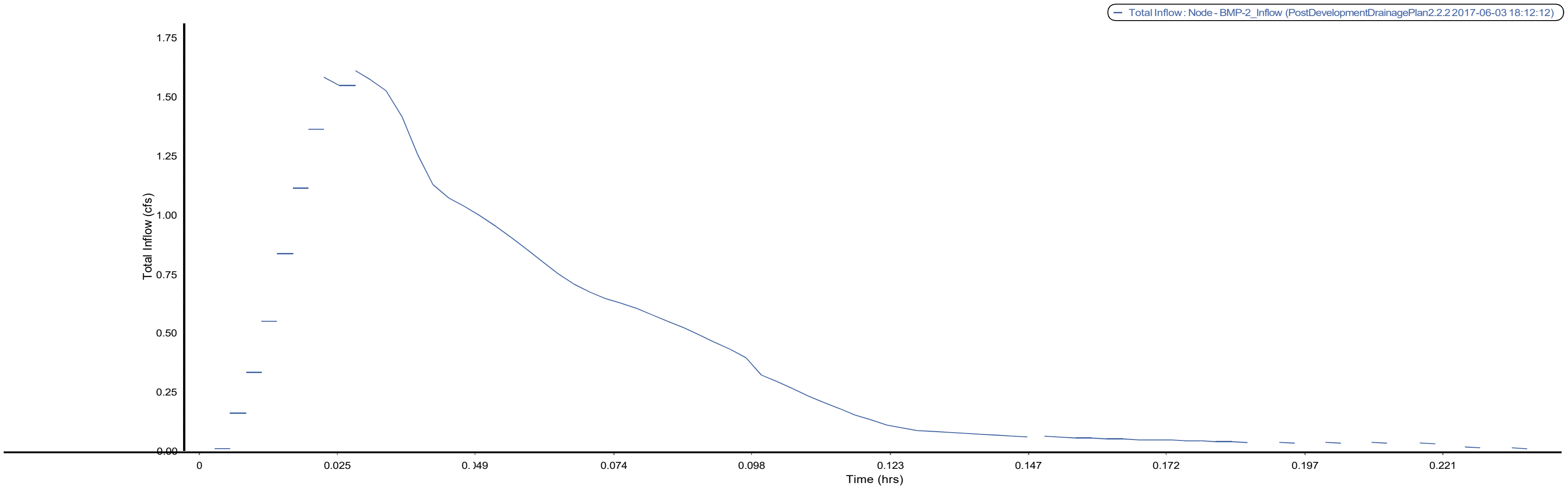


Element ID	BMP-2 Inflow
Maximum Total Inflow	1.21
Minimum Total Inflow	0.00
Event Mean Total	0.14
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	243.45
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q50

RESULTS:

Runoff Peak Q:	1.61	CFS
Runoff Volume:	335	FT

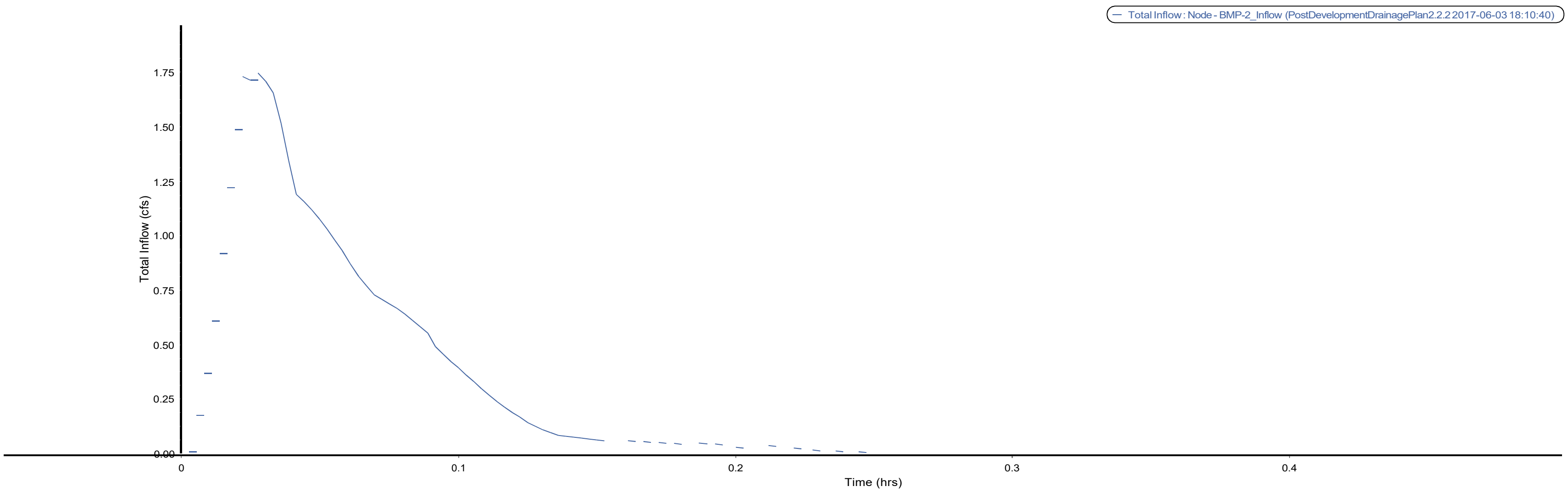


Element ID	BMP-2 Inflow
Maximum Total Inflow	1.61
Minimum Total Inflow	0.00
Event Mean Total	0.19
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	335.45
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q100

RESULTS:

Runoff Peak Q:	**1.75**	**CFS**
Runoff Volume:	**371**	**FT**



Element ID	BMP-2 Inflow
Maximum Total Inflow	1.75
Minimum Total Inflow	0.00
Event Mean Total	0.21
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	371.31
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

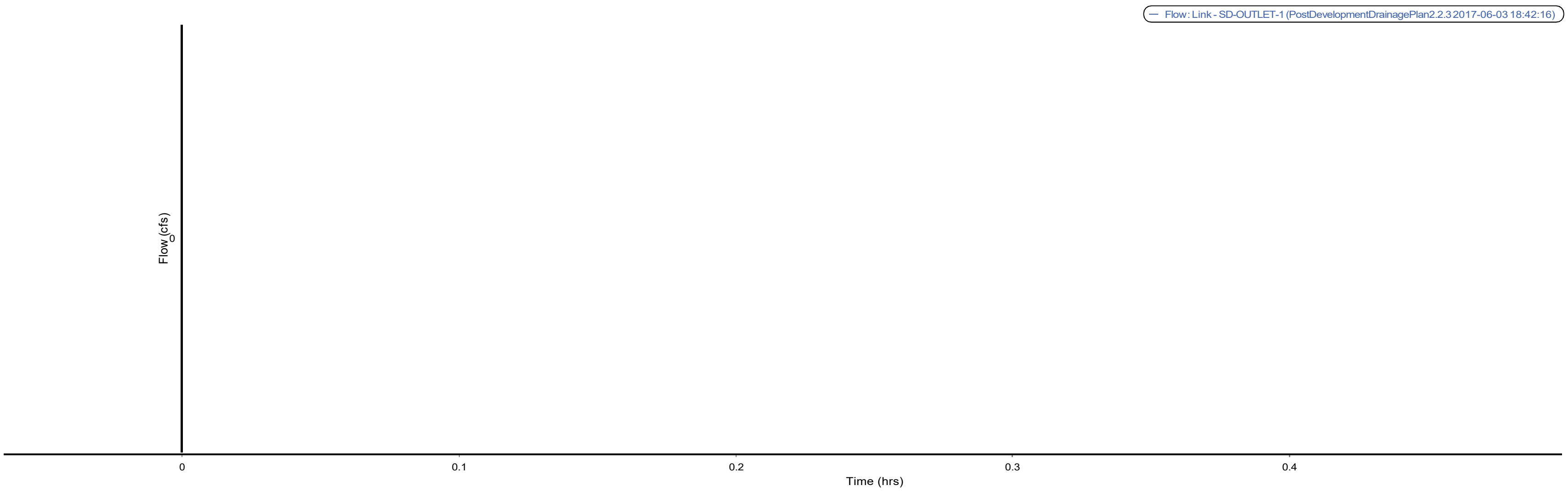
POST DEVELOPMENT

OFFSITE FLOW – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite Flow: Post-Development Q2

RESULTS:

Runoff Peak Q: 0.00 CFS
Runoff Volume: 0 FT

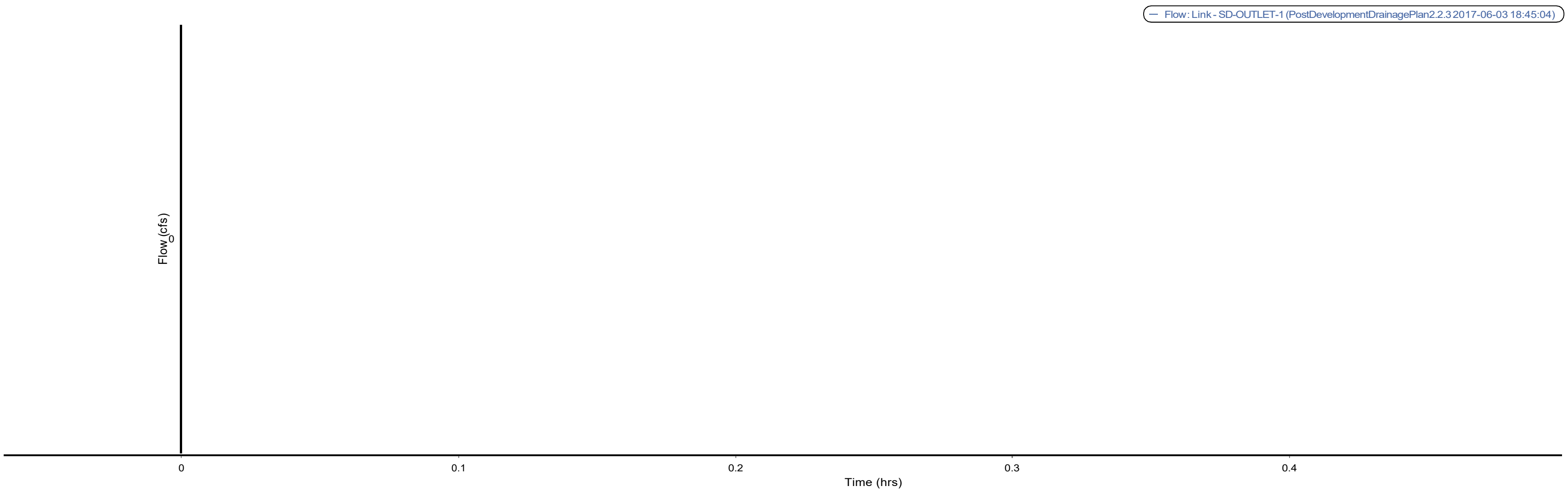


Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0
Minimum Flow (cfs)	0
Event Mean Flow (cfs)	0
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Flow (ft³)	0
Detention Storage (ft³)	N/A
Exceedance	0
Deficit	0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q10

RESULTS:

Runoff Peak Q:	0.00	**CFS**
Runoff Volume:	0	**FT**

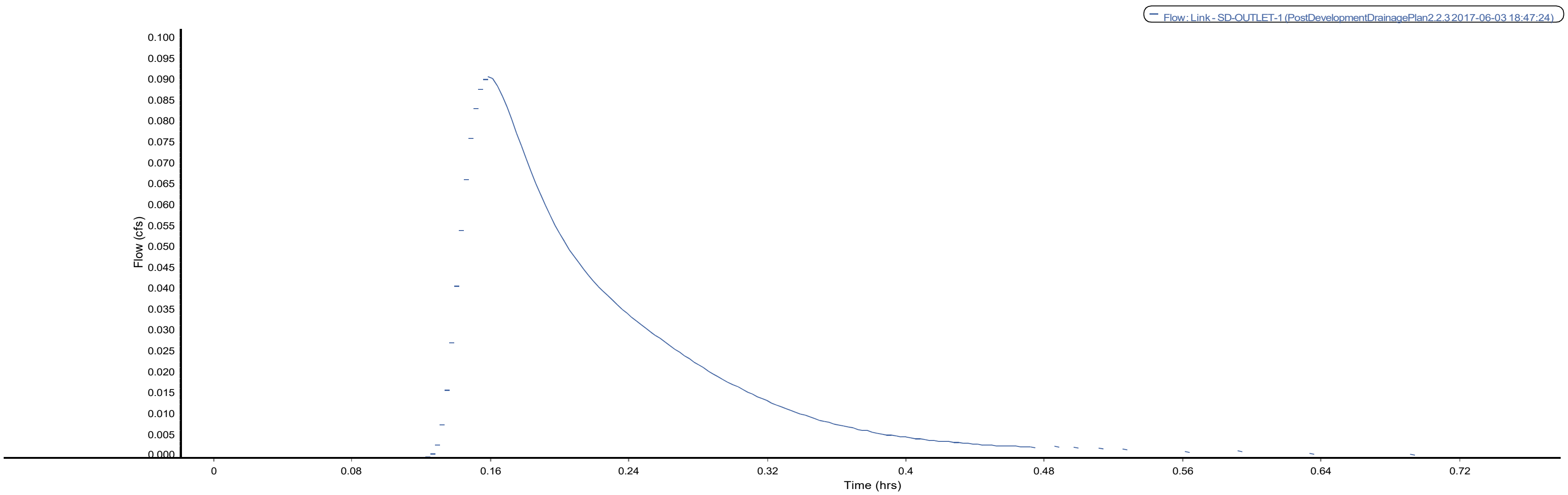


Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.00
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.00
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Flow (ft^3)	0.00
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q50

RESULTS:

Runoff Peak Q:	0.09	CFS
Runoff Volume:	34	FT

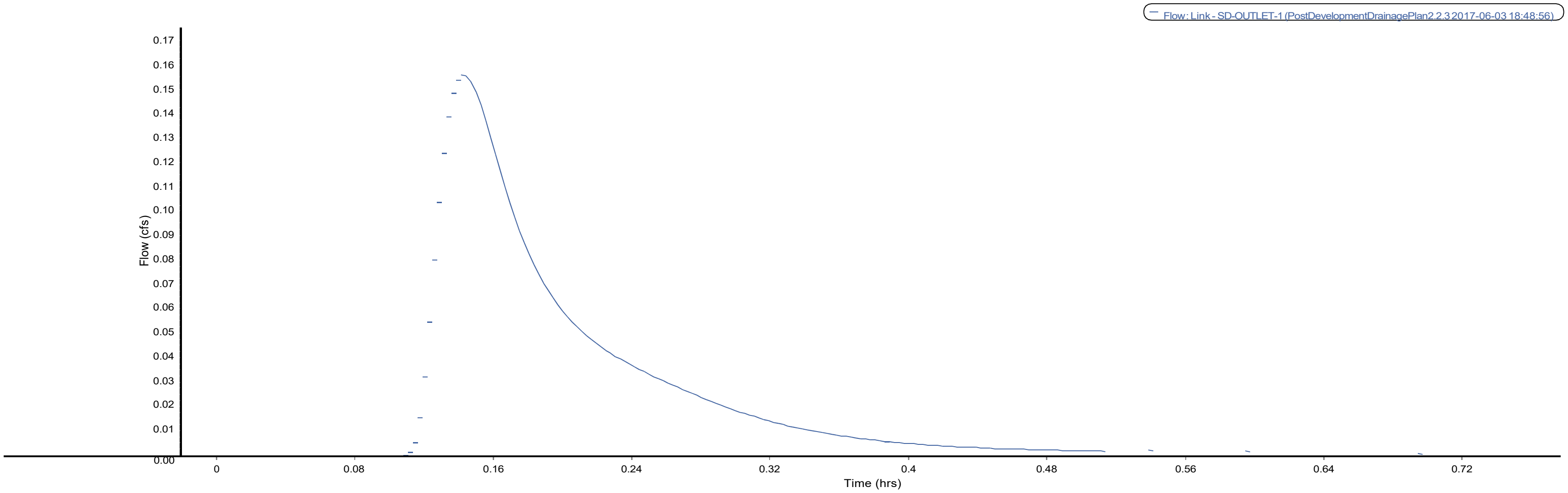


Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.09
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.01
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Flow (ft³)	33.91
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q100

RESULTS:

Runoff Peak Q: 0.16 **CFS**
Runoff Volume: 50 **FT**



Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.16
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.01
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Flow (ft³)	49.66
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

APPENDIX F

ADDITONAL BACKUP

FEMA FIRM MAP

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1880G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1880 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

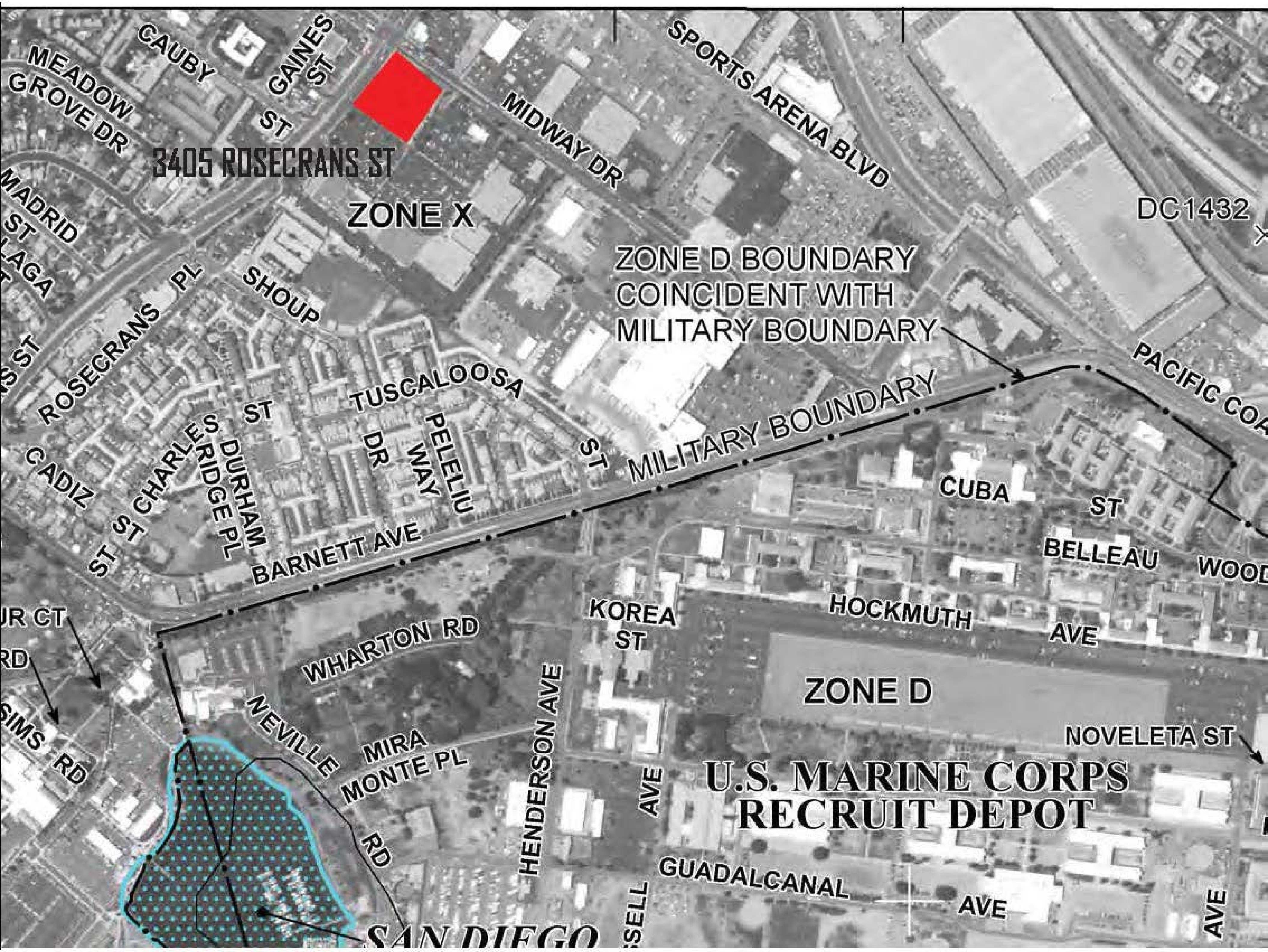
COMMUNITY	NUMBER	PANEL	SUFFIX
CORONADO, CITY OF	060287	1880	G
SAN DIEGO, CITY OF	060295	1880	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C1880G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency


3405 ROSECRANS ST
ZONE X
ZONE D BOUNDARY COINCIDENT WITH MILITARY BOUNDARY
MILITARY BOUNDARY
ZONE D
DC1432
U.S. MARINE CORPS RECRUIT DEPOT
SAN DIEGO
CAUBY
GAINES ST
MEADOW GROVE DR
ST
MIDWAY DR
SPORTS ARENA BLVD
PACIFIC COA
MADRID ST
ROSECRANS PL
ROSECRANS ST
SHOUP
TUSCALOOSA ST
ST CHARLES ST
CADIZ ST
DURHAM ST
RIDGE PL
DR
PELELIU WAY
BARNETT AVE
CUBA ST
BELLEAU
WOOD
HOCKMUTH AVE
KOREA ST
WHARTON RD
NEVILLE RD
MIRA MONTE PL
HENDERSON AVE
NOVELETA ST
GUADALCANAL AVE
AVE
SIMS RD

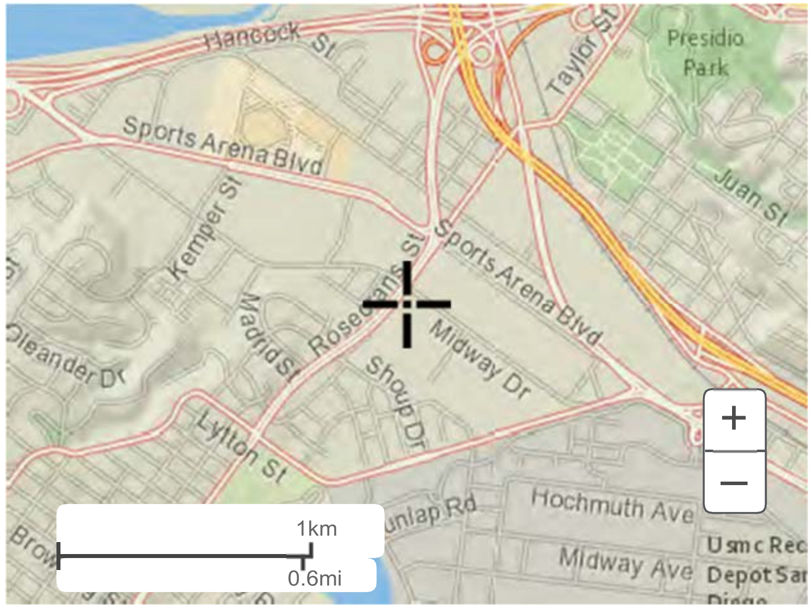
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

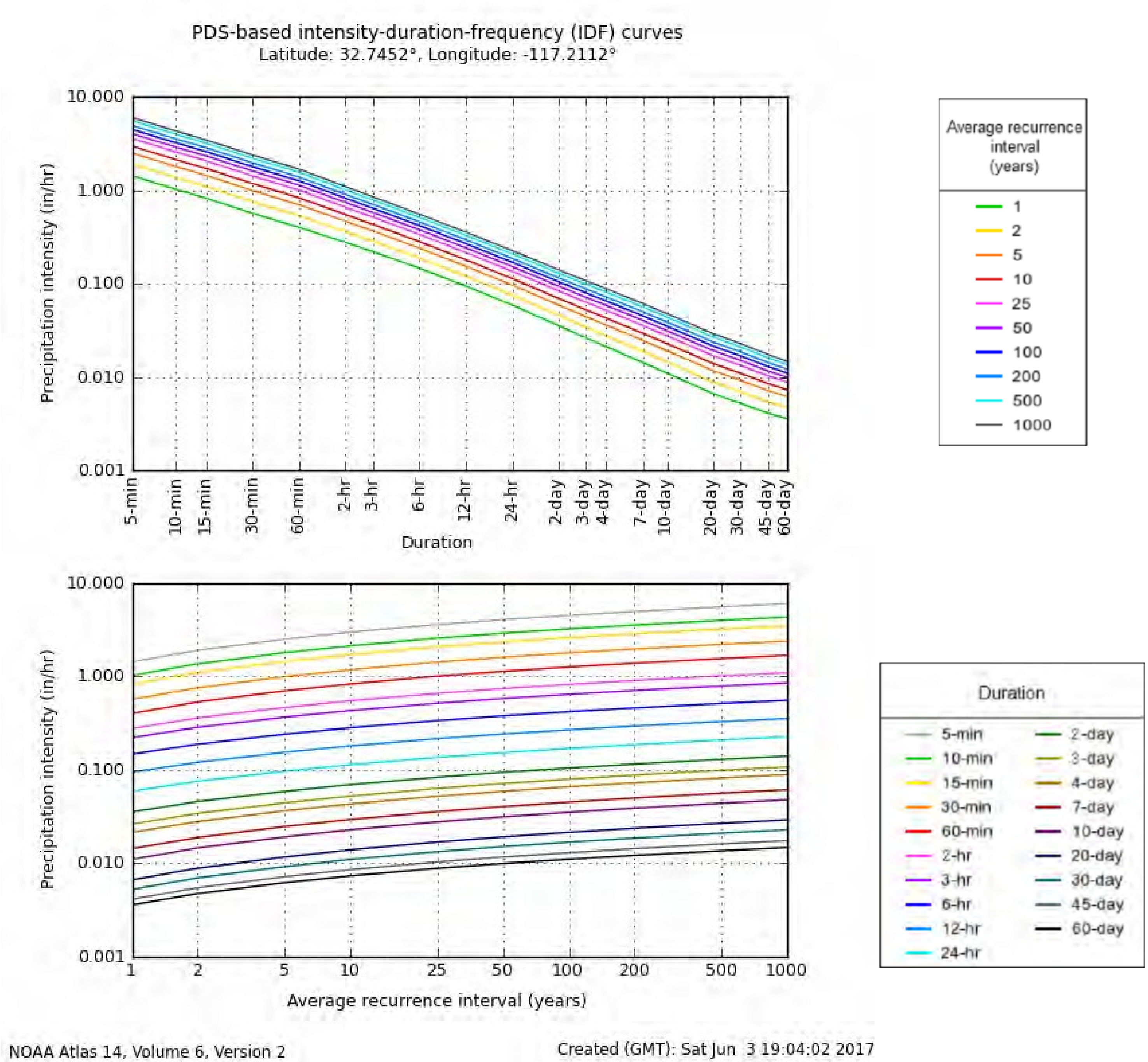
NOAA IDF CURVE DATA



Large scale terrain

Large scale map

PF graphical



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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 6, Version 2 Location name: San Diego, California, USA* Latitude: 32.7452°, Longitude: -117.2112°
Elevation: 29.76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.43 (1.19-1.73)	1.90 (1.58-2.29)	2.50 (2.08-3.02)	2.96 (2.45-3.62)	3.58 (2.84-4.52)	4.03 (3.14-5.21)	4.48 (3.41-5.94)	4.93 (3.65-6.74)	5.53 (3.91-7.88)	5.99 (4.09-8.84)
10-min	1.02 (0.852-1.24)	1.36 (1.13-1.64)	1.79 (1.49-2.17)	2.12 (1.75-2.59)	2.56 (2.04-3.24)	2.89 (2.26-3.74)	3.21 (2.44-4.26)	3.53 (2.61-4.83)	3.97 (2.81-5.65)	4.29 (2.93-6.34)
15-min	0.824 (0.688-0.996)	1.10 (0.916-1.33)	1.44 (1.20-1.74)	1.71 (1.41-2.09)	2.06 (1.65-2.61)	2.33 (1.82-3.01)	2.59 (1.97-3.44)	2.85 (2.11-3.90)	3.20 (2.26-4.56)	3.46 (2.36-5.11)
30-min	0.566 (0.474-0.684)	0.754 (0.630-0.912)	0.990 (0.826-1.20)	1.18 (0.972-1.44)	1.42 (1.13-1.80)	1.60 (1.25-2.07)	1.78 (1.35-2.36)	1.96 (1.45-2.68)	2.20 (1.56-3.14)	2.38 (1.62-3.52)
60-min	0.400 (0.335-0.483)	0.533 (0.445-0.644)	0.699 (0.583-0.848)	0.830 (0.686-1.02)	1.00 (0.800-1.27)	1.13 (0.882-1.46)	1.26 (0.956-1.67)	1.38 (1.02-1.89)	1.55 (1.10-2.21)	1.68 (1.15-2.48)
2-hr	0.276 (0.231-0.334)	0.360 (0.300-0.434)	0.465 (0.388-0.564)	0.548 (0.453-0.670)	0.658 (0.525-0.833)	0.740 (0.577-0.957)	0.820 (0.624-1.09)	0.902 (0.666-1.23)	1.01 (0.714-1.44)	1.09 (0.745-1.61)
3-hr	0.220 (0.184-0.266)	0.285 (0.238-0.344)	0.366 (0.305-0.444)	0.431 (0.356-0.527)	0.516 (0.412-0.653)	0.579 (0.452-0.749)	0.642 (0.489-0.852)	0.705 (0.521-0.964)	0.789 (0.558-1.13)	0.852 (0.582-1.26)
6-hr	0.147 (0.123-0.177)	0.188 (0.157-0.227)	0.240 (0.200-0.291)	0.282 (0.233-0.345)	0.337 (0.269-0.426)	0.378 (0.295-0.489)	0.418 (0.318-0.555)	0.459 (0.340-0.628)	0.514 (0.364-0.732)	0.554 (0.379-0.820)
12-hr	0.094 (0.079-0.114)	0.120 (0.101-0.146)	0.154 (0.128-0.186)	0.180 (0.149-0.220)	0.215 (0.172-0.273)	0.242 (0.189-0.313)	0.268 (0.204-0.355)	0.294 (0.217-0.402)	0.329 (0.233-0.469)	0.355 (0.243-0.525)
24-hr	0.059 (0.052-0.069)	0.075 (0.066-0.088)	0.097 (0.084-0.113)	0.113 (0.098-0.133)	0.136 (0.114-0.165)	0.152 (0.126-0.188)	0.169 (0.137-0.214)	0.186 (0.146-0.241)	0.208 (0.158-0.281)	0.225 (0.166-0.313)
2-day	0.035 (0.031-0.041)	0.046 (0.040-0.053)	0.059 (0.051-0.069)	0.069 (0.060-0.082)	0.083 (0.070-0.101)	0.094 (0.078-0.116)	0.104 (0.084-0.132)	0.115 (0.091-0.149)	0.129 (0.098-0.174)	0.140 (0.103-0.195)
3-day	0.026 (0.023-0.031)	0.034 (0.030-0.040)	0.044 (0.039-0.052)	0.052 (0.045-0.062)	0.063 (0.053-0.077)	0.071 (0.059-0.088)	0.080 (0.064-0.101)	0.088 (0.069-0.114)	0.099 (0.075-0.133)	0.107 (0.079-0.149)
4-day	0.021 (0.019-0.025)	0.028 (0.024-0.033)	0.036 (0.032-0.042)	0.043 (0.037-0.051)	0.052 (0.044-0.063)	0.059 (0.049-0.073)	0.066 (0.053-0.083)	0.073 (0.057-0.094)	0.082 (0.062-0.110)	0.089 (0.065-0.124)
7-day	0.014 (0.013-0.017)	0.019 (0.017-0.022)	0.025 (0.022-0.029)	0.029 (0.025-0.035)	0.036 (0.030-0.043)	0.040 (0.033-0.050)	0.045 (0.036-0.057)	0.050 (0.039-0.065)	0.056 (0.043-0.076)	0.061 (0.045-0.085)
10-day	0.011 (0.010-0.013)	0.015 (0.013-0.017)	0.019 (0.017-0.022)	0.023 (0.020-0.027)	0.028 (0.023-0.034)	0.031 (0.026-0.039)	0.035 (0.028-0.044)	0.039 (0.031-0.050)	0.044 (0.033-0.059)	0.048 (0.035-0.066)
20-day	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.012 (0.010-0.014)	0.014 (0.012-0.016)	0.017 (0.014-0.021)	0.019 (0.016-0.024)	0.021 (0.017-0.027)	0.024 (0.019-0.031)	0.027 (0.020-0.036)	0.029 (0.021-0.040)
30-day	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.008-0.011)	0.011 (0.010-0.013)	0.013 (0.011-0.016)	0.015 (0.012-0.019)	0.017 (0.014-0.021)	0.019 (0.015-0.024)	0.021 (0.016-0.028)	0.023 (0.017-0.032)
45-day	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.007-0.010)	0.010 (0.009-0.013)	0.012 (0.010-0.014)	0.013 (0.010-0.016)	0.014 (0.011-0.019)	0.016 (0.012-0.022)	0.018 (0.013-0.024)
60-day	0.004 (0.003-0.004)	0.005 (0.004-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.009)	0.009 (0.007-0.011)	0.010 (0.008-0.012)	0.011 (0.009-0.014)	0.012 (0.010-0.016)	0.014 (0.010-0.018)	0.015 (0.011-0.020)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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PROGRAM OUTPUT REPORT

POST-DEVELOPMENT Q100

Autodesk® Storm and Sanitary Analysis 2014 - Version 8.1.46 (Build 1)

****
Project Description
****
File Name PostDevelopmentDrainagePlan2.4.SPF

****
Analysis Options
****
Flow Units .... cfs
Subbasin Hydrograph Method. Rational
Time of Concentration...... FAA
Return Period............. 100 years
Link Routing Method .... Hydrodynamic
Storage Node Exfiltration.. Constant rate, free surface area
Starting Date JUN-03-2017 00:00:00
Ending Date JUN-03-2017 01:00:00
Report Time Step 00:00:10

****
Element Count
****
Number of subbasins 23
Number of nodes 15
Number of links............ 13

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %
BMP-1	0.01	30.00	0.5000
BMP-2	0.01	10.00	0.5000
DMA-1_I1	0.07	130.00	0.5000
DMA-1_I2	0.01	95.00	0.5000
DMA-1_I3	0.04	68.00	0.7000
DMA-1_P1	0.02	80.00	1.9000
DMA-1_P2	0.01	40.00	0.5000
DMA-1_P3	0.01	40.00	0.5000
DMA-2_I1	0.02	31.00	0.5000
DMA-2_I2	0.02	33.00	0.5000
DMA-2_I3	0.02	33.00	0.5000
DMA-2_I4	0.02	31.00	0.5000
DMA-2_I5	0.17	170.00	1.6000
DMA-2_I6	0.09	190.00	1.5000

DMA-2_I7	0.04	100.00	2.6000
DMA-2_I8	0.01	170.00	1.6000
DMA-2_I9	0.05	132.00	1.7000
DMA-2_P1	0.02	60.00	0.5000
DMA-2_P2	0.01	39.00	0.5000
DMA-2_P3	0.01	39.00	1.0000
DMA-2_P4	0.01	41.00	1.0000
DMA-2_P5	0.02	30.00	0.5000
DMA-2_P6	0.01	16.00	0.5000

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
JNCT-1AB	JUNCTION	7.97	9.83	0.00	
JNCT-1BC	JUNCTION	7.79	10.15	0.00	
JNCT-1CD	JUNCTION	7.44	9.50	0.00	
JNCT-2RW1	JUNCTION	8.58	10.21	0.00	
JNCT-2RW2	JUNCTION	8.32	9.95	0.00	
JNCT-2RW3	JUNCTION	8.01	9.64	0.00	
JNCT-2RW4	JUNCTION	7.75	9.38	0.00	
JNCT-2RW4C	JUNCTION	6.65	8.00	0.00	
OUTFALL-1	OUTFALL	3.83	5.33	0.00	
BMP-1_Inflow	STORAGE	8.65	9.65	242.00	
BMP-2_Inflow	STORAGE	6.65	8.00	915.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
DI-2	NEENAH FOUNDRY	R-1792-AG	On Sag	1	6.72	7.75	35.00	6.72	50.00
DI-BMP-1	NEENAH FOUNDRY	R-1792-AG	On Sag	1	7.99	9.49	204.00	7.99	50.00
DI-BMP-2	NEENAH FOUNDRY	R-1792-AG	On Sag	1	5.65	7.65	683.60	5.65	50.00
DI-OS1	NEENAH FOUNDRY	R-1792-AG	On Sag	1	3.91	8.50	10.00	5.41	0.00

****
Roadway and Gutter Summary

****

Inlet ID	Roadway Longitudinal Slope ft/ft	Roadway Cross Slope ft/ft	Roadway Manning's Roughness	Gutter Cross Slope ft/ft	Gutter Width ft	Gutter Depression in
DI-2	-	0.0200	0.0160	0.0620	2.00	2.00
DI-BMP-1	-	0.0200	0.0160	0.0620	2.00	2.00
DI-BMP-2	-	0.0200	0.0160	0.0620	2.00	2.00
DI-OS1	-	0.0200	0.0160	0.0620	2.00	2.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
SD-1C	DI-BMP-1	JNCT-1AB	CONDUIT	4.0	0.5000	0.0120
SD-1D	JNCT-1AB	JNCT-1BC	CONDUIT	35.0	0.5143	0.0120
SD-1E	JNCT-1BC	JNCT-1CD	CONDUIT	70.0	0.5000	0.0120
SD-1F	JNCT-1CD	DI-BMP-2	CONDUIT	72.0	0.5000	0.0120
SD-2	DI-2	BMP-2_Inflow	CONDUIT	13.0	0.5385	0.0120
SD-2RW1	JNCT-2RW1	JNCT-2RW2	CONDUIT	26.0	1.0000	0.0120
SD-2RW2	JNCT-2RW2	JNCT-2RW3	CONDUIT	26.0	1.1923	0.0120
SD-2RW3	JNCT-2RW3	JNCT-2RW4	CONDUIT	26.0	1.0000	0.0120
SD-2RW4	JNCT-2RW4	JNCT-2RW4C	CONDUIT	23.0	4.7826	0.0120
SD-OUTLET-1	DI-BMP-2	DI-OS1	CONDUIT	20.0	0.5000	0.0120
SD-OUTLET-2	DI-OS1	OUTFALL-1	CONDUIT	9.0	0.8889	0.0150
DI-BMP-1-INFLOW	BMP-1_Inflow	DI-BMP-1	WEIR			
DI-BMP-2-iNFLOW	BMP-2_Inflow	DI-BMP-2	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
SD-1C	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-1D	CIRCULAR	0.50	0.50	1	0.20	0.13	0.44
SD-1E	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-1F	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-2	RECT_CLOSED	0.33	0.67	1	0.22	0.11	0.47
SD-2RW1	CIRCULAR	0.33	0.33	1	0.09	0.08	0.21
SD-2RW2	CIRCULAR	0.33	0.33	1	0.09	0.08	0.23
SD-2RW3	CIRCULAR	0.33	0.33	1	0.09	0.08	0.21
SD-2RW4	CIRCULAR	0.33	0.33	1	0.09	0.08	0.45
SD-OUTLET-1	CIRCULAR	1.00	1.00	1	0.79	0.25	2.73
SD-OUTLET-2	CIRCULAR	1.50	1.50	1	1.77	0.38	8.58

```
**************************        Volume        Depth
Runoff Quantity Continuity       acre-ft        inches
**************************     ---------       -------
Total Precipitation ......        0.018         0.327
Continuity Error (%) .....         0.168


**************************        Volume        Volume
Flow Routing Continuity          acre-ft      Mgallons
**************************     ---------     ---------
External Inflow ..........        0.000         0.000
External Outflow .........        0.002         0.001
Initial Stored Volume ....        0.000         0.000
Final Stored Volume ......        0.014         0.004
Continuity Error (%) .....       -0.004


*************************************
Runoff Coefficient Computations Report
*************************************

-----------------
Subbasin BMP-1
-----------------
                                        Area       Soil      Runoff
Soil/Surface Description              (acres)      Group      Coeff.
------------------------------------------------------------------------------------
-                                       0.01         -        0.50
Composite Area & Weighted Runoff Coeff.              0.01                0.50

-----------------
Subbasin BMP-2
-----------------
                                        Area       Soil      Runoff
Soil/Surface Description              (acres)      Group      Coeff.
------------------------------------------------------------------------------------
-                                       0.01         -        0.50
Composite Area & Weighted Runoff Coeff.              0.01                0.50

--------------------
Subbasin DMA-1_I1
--------------------
                                        Area       Soil      Runoff
Soil/Surface Description              (acres)      Group      Coeff.
------------------------------------------------------------------------------------
-                                       0.07         -        0.95
Composite Area & Weighted Runoff Coeff.              0.07                0.95

--------------------
Subbasin DMA-1_I2
--------------------
                                        Area       Soil      Runoff
Soil/Surface Description              (acres)      Group      Coeff.
------------------------------------------------------------------------------------
```

-	0.01	-	0.95	
Composite Area & Weighted Runoff Coeff.			0.01	0.95

Subbasin DMA-1_I3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.04	-	0.95	
Composite Area & Weighted Runoff Coeff.			0.04	0.95

Subbasin DMA-1_P1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.			0.02	0.50

Subbasin DMA-1_P2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.			0.01	0.50

Subbasin DMA-1_P3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.			0.01	0.50

Subbasin DMA-2_I1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.03	-	0.95	
Composite Area & Weighted Runoff Coeff.			0.03	0.95

Subbasin DMA-2_I2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.

-	0.03	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.03		0.95

Subbasin DMA-2_I3

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.
-	0.03	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.03		0.95

Subbasin DMA-2_I4

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.
-	0.03	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.03		0.95

Subbasin DMA-2_I5

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.
-	0.17	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.17		0.95

Subbasin DMA-2_I6

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.
-	0.09	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.09		0.95

Subbasin DMA-2_I7

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.
-	0.04	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.04		0.95

Subbasin DMA-2_I8

	Area	Soil	Runoff	
Soil/Surface Description		(acres)	Group	Coeff.

-	0.01	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.01		0.95

Subbasin DMA-2_I9

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.05	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.05		0.95

Subbasin DMA-2_P1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.02		0.50

Subbasin DMA-2_P2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P4

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P5

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.

-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.02		0.50

Subbasin DMA-2_P6

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.01	-	0.50
Composite Area & Weighted Runoff Coeff.	0.01		0.50

****
FAA (Federal Aviation Agency) Time of Concentration Computations Report
****

Tc = (1.8 * (1.1 - C) * (L^0.5) * (S^-0.333))

Where:

Tc = Time of Concentration (min)
C = Runoff Coefficient
L = Flow Length (ft)
S = Slope (%)

Subbasin BMP-1

Runoff Coefficient: 0.50
Flow Length (ft): 30.00
Slope (%): 0.50
Computed TOC (minutes): 7.45

Subbasin BMP-2

Runoff Coefficient: 0.50
Flow Length (ft): 10.00
Slope (%): 0.50
Computed TOC (minutes): 4.30

Subbasin DMA-1_I1

Runoff Coefficient: 0.95
Flow Length (ft): 130.00
Slope (%): 0.50
Computed TOC (minutes): 3.88

Subbasin DMA-1_I2

Runoff Coefficient: 0.95
Flow Length (ft): 95.00
Slope (%): 0.50
Computed TOC (minutes): 3.31

Subbasin DMA-1_I3

Runoff Coefficient: 0.95
Flow Length (ft): 68.00
Slope (%): 0.70
Computed TOC (minutes): 2.51

Subbasin DMA-1_P1

Runoff Coefficient: 0.50
Flow Length (ft): 80.00
Slope (%): 1.90
Computed TOC (minutes): 7.80

Subbasin DMA-1_P2

Runoff Coefficient: 0.50
Flow Length (ft): 40.00
Slope (%): 0.50
Computed TOC (minutes): 8.60

Subbasin DMA-1_P3

Runoff Coefficient: 0.50
Flow Length (ft): 40.00
Slope (%): 0.50
Computed TOC (minutes): 8.60

Subbasin DMA-2_I1

Runoff Coefficient: 0.95
Flow Length (ft): 31.00
Slope (%): 0.50
Computed TOC (minutes): 1.89

Subbasin DMA-2_I2

Runoff Coefficient: 0.95
Flow Length (ft): 33.00
Slope (%): 0.50
Computed TOC (minutes): 1.95

Subbasin DMA-2_I3

Runoff Coefficient: 0.95
Flow Length (ft): 33.00
Slope (%): 0.50
Computed TOC (minutes): 1.95

Subbasin DMA-2_I4

Runoff Coefficient: 0.95
Flow Length (ft): 31.00
Slope (%): 0.50
Computed TOC (minutes): 1.89

Subbasin DMA-2_I5

Runoff Coefficient: 0.95
Flow Length (ft): 170.00
Slope (%): 1.60
Computed TOC (minutes): 3.01

Subbasin DMA-2_I6

Runoff Coefficient: 0.95
Flow Length (ft): 190.00
Slope (%): 1.50
Computed TOC (minutes): 3.25

Subbasin DMA-2_I7

Runoff Coefficient: 0.95
Flow Length (ft): 100.00
Slope (%): 2.60
Computed TOC (minutes): 1.96

Subbasin DMA-2_I8

Runoff Coefficient: 0.95
Flow Length (ft): 170.00
Slope (%): 1.60
Computed TOC (minutes): 3.01

Subbasin DMA-2_I9

Runoff Coefficient: 0.95
Flow Length (ft): 132.00
Slope (%): 1.70
Computed TOC (minutes): 2.60

Subbasin DMA-2_P1

Runoff Coefficient: 0.50
Flow Length (ft): 60.00
Slope (%): 0.50
Computed TOC (minutes): 10.54

Subbasin DMA-2_P2

Runoff Coefficient: 0.50
Flow Length (ft): 39.00
Slope (%): 0.50
Computed TOC (minutes): 8.50

Subbasin DMA-2_P3

Runoff Coefficient: 0.50
Flow Length (ft): 39.00
Slope (%): 1.00
Computed TOC (minutes): 6.74

Subbasin DMA-2_P4

Runoff Coefficient: 0.50
Flow Length (ft): 41.00
Slope (%): 1.00
Computed TOC (minutes): 6.92

Subbasin DMA-2_P5

Runoff Coefficient: 0.50
Flow Length (ft): 30.00
Slope (%): 0.50
Computed TOC (minutes): 7.45

Subbasin DMA-2_P6

Runoff Coefficient: 0.50
Flow Length (ft): 16.00
Slope (%): 0.50
Computed TOC (minutes): 5.44

****
Subbasin Runoff Summary
****

Subbasin ID	Accumulated Precip in	Rainfall Intensity in/hr	Total Runoff in	Peak Runoff cfs	Weighted Runoff Coeff	Time of Concentration days hh:mm:ss
BMP-1	0.46	3.70	0.23	0.01	0.500	0 00:07:27
BMP-2	0.36	5.02	0.18	0.02	0.500	0 00:04:18
DMA-1_I1	0.34	5.30	0.32	0.34	0.950	0 00:03:52
DMA-1_I2	0.32	5.76	0.30	0.06	0.950	0 00:03:18
DMA-1_I3	0.28	6.67	0.26	0.28	0.950	0 00:02:30
DMA-1_P1	0.47	3.62	0.24	0.03	0.500	0 00:07:48
DMA-1_P2	0.50	3.45	0.25	0.01	0.500	0 00:08:36
DMA-1_P3	0.50	3.45	0.25	0.01	0.500	0 00:08:36
DMA-2_I1	0.24	7.75	0.23	0.11	0.950	0 00:01:53
DMA-2_I2	0.25	7.63	0.24	0.14	0.950	0 00:01:57
DMA-2_I3	0.25	7.63	0.24	0.14	0.950	0 00:01:57
DMA-2_I4	0.24	7.75	0.23	0.11	0.950	0 00:01:53
DMA-2_I5	0.30	6.06	0.29	0.96	0.950	0 00:03:00
DMA-2_I6	0.32	5.82	0.31	0.52	0.950	0 00:03:15
DMA-2_I7	0.25	7.61	0.24	0.30	0.950	0 00:01:57
DMA-2_I8	0.30	6.06	0.29	0.06	0.950	0 00:03:00
DMA-2_I9	0.29	6.55	0.28	0.33	0.950	0 00:02:36
DMA-2_P1	0.55	3.12	0.27	0.03	0.500	0 00:10:32
DMA-2_P2	0.49	3.47	0.25	0.01	0.500	0 00:08:30
DMA-2_P3	0.43	3.88	0.22	0.02	0.500	0 00:06:44
DMA-2_P4	0.45	3.83	0.22	0.01	0.500	0 00:06:55
DMA-2_P5	0.46	3.70	0.23	0.04	0.500	0 00:07:27
DMA-2_P6	0.39	4.30	0.20	0.02	0.500	0 00:05:26

****
Node Depth Summary

****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
JNCT-1AB	0.11	0.29	8.26	0 00:06	0	0	0:00:00
JNCT-1BC	0.10	0.27	8.06	0 00:06	0	0	0:00:00
JNCT-1CD	0.09	0.22	7.66	0 00:08	0	0	0:00:00
JNCT-2RW1	0.00	0.00	8.58	0 00:00	0	0	0:00:00
JNCT-2RW2	0.00	0.00	8.32	0 00:00	0	0	0:00:00
JNCT-2RW3	0.00	0.00	8.01	0 00:00	0	0	0:00:00
JNCT-2RW4	0.00	0.00	7.75	0 00:00	0	0	0:00:00
JNCT-2RW4C	0.00	0.00	6.65	0 00:00	0	0	0:00:00
OUTFALL-1	0.06	0.79	4.62	0 00:00	0	0	0:00:00
BMP-1_Inflow	0.80	0.88	9.53	0 00:05	0	0	0:00:00
BMP-2_Inflow	0.84	0.96	7.61	0 00:30	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days hh:mm
JNCT-1AB	JUNCTION	0.00	0.28	0 00:05	0.00	
JNCT-1BC	JUNCTION	0.00	0.24	0 00:06	0.00	
JNCT-1CD	JUNCTION	0.00	0.21	0 00:07	0.00	
JNCT-2RW1	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW2	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW3	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW4	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW4C	JUNCTION	0.00	0.00	0 00:00	0.00	
OUTFALL-1	OUTFALL	0.00	4.69	0 00:00	0.00	
BMP-1_Inflow	STORAGE	0.57	0.57	0 00:03	0.00	
BMP-2_Inflow	STORAGE	0.82	1.43	0 00:02	0.00	

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days hh:mm

DI-2	425.16	10.93	3.18	0 00:04
DI-BMP-1	0.00	9.49	0.00	0 00:06
DI-BMP-2	0.00	7.65	0.00	0 00:08
DI-OS1	0.00	8.50	0.00	0 00:00

****
Inlet Flow Summary
****

Inlet ID	Peak Flow cfs	Peak Lateral Flow cfs	Peak Flow Intercepted by Inlet cfs	Peak Flow Bypassing Inlet cfs	Inlet Efficiency during Peak Flow %	Total Flooding acre-in	Total Time Flooded minutes
DI-2	1.48	1.48	-	-	-	0.000	1
DI-BMP-1	0.00	0.00	-	-	-	0.000	0
DI-BMP-2	0.00	0.00	-	-	-	0.000	0
DI-OS1	0.00	0.00	-	-	-	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
BMP-1_Inflow	0.118	81	0 00:05	0.104	72	0.26	0.00	0:00:00	0.000
BMP-2_Inflow	0.484	58	0 00:30	0.414	50	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
OUTFALL-1	60.84	0.11	4.69
System	60.84	0.11	4.69

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
SD-1C	CONDUIT	0 00:05	3.48	1.00	0.28	0.43	0.65	0.63	0	Calculated
SD-1D	CONDUIT	0 00:06	3.04	1.00	0.24	0.44	0.56	0.53	0	Calculated
SD-1E	CONDUIT	0 00:07	2.88	1.00	0.21	0.43	0.48	0.44	0	Calculated
SD-1F	CONDUIT	0 00:08	1.99	1.00	0.15	0.43	0.35	0.41	0	Calculated
SD-2	CONDUIT	0 00:04	3.69	1.00	0.82	0.47	1.76	1.00	57	SURCHARGED
SD-2RW1	CONDUIT	0 00:00	0.00	1.00	0.00	0.21	0.00	0.00	0	Calculated
SD-2RW2	CONDUIT	0 00:00	0.00	1.00	0.00	0.23	0.00	0.00	0	Calculated
SD-2RW3	CONDUIT	0 00:00	0.00	1.00	0.00	0.21	0.00	0.00	0	Calculated
SD-2RW4	CONDUIT	0 00:00	0.00	1.00	0.00	0.45	0.00	0.00	0	Calculated
SD-OUTLET-1	CONDUIT	0 00:08	1.72	1.00	0.15	2.73	0.05	0.17	0	Calculated
SD-OUTLET-2	CONDUIT	0 00:00	4.56	1.00	4.69	8.58	0.55	0.71	0	Calculated
DI-BMP-1-INFLOW	WEIR	0 00:05			0.26		0.04			
DI-BMP-2-iNFLOW	WEIR	0 00:00			0.00		0.00			

****
Highest Flow Instability Indexes
****
Link SD-2 (2)

Analysis began on: Fri Jun 09 10:31:50 2017
Analysis ended on: Fri Jun 09 10:31:50 2017
Total elapsed time: < 1 sec

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.

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Geotechnical Investigation Report

Chevron Facility No. 9-2239
2959 Midway Drive
San Diego, California 92110

Prepared for:
Chevron Products Company
145 South State College Boulevard, Suite 400
Brea, California 92821

Prepared by:
Stantec Consulting Services Inc.
25864 Business Center Drive, Suite F
Redlands, California 92374

Project No: 185850087

May 5, 2017

Stantec Consulting Services Inc.
25864 Business Center Drive, Suite F
Redlands, California 92374

May 5, 2017

Mr. Sergio Linares
Chevron Products Company
145 South State College Boulevard, Suite 400
Brea, California 92821

SUBJECT: GEOTECHNICAL INVESTIGATION REPORT
Chevron 9-2239
2959 Midway Drive
San Diego, California 92110

Dear Mr. Linares:

This letter transmits Stantec Consulting Services Inc.'s (Stantec) geotechnical investigation report for the proposed rebuild of Chevron Facility No. 9-2239 retail gasoline station located in San Diego, California.

The purpose of this report is to evaluate the subsurface conditions and provide geotechnical recommendations for design and construction of the project.

We appreciate the opportunity to work with you on this project. If you have any questions, please call us at the number below.

Respectfully submitted,

STANTEC CONSULTING SERVICES INC.

LICENSED PROFESSIONAL ENGINEER
JARET FISCHER
C 80383
EXP. 3/31/19
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STATE OF CALIFORNIA

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1.0 INTRODUCTION

This report presents the results of Stantec's geotechnical investigation for the proposed rebuild of Chevron Facility No. 9-2239 retail gasoline station located in San Diego, California. The project location is shown on the Site Vicinity Map, Figure 1.

1.1 PROPOSED CONSTRUCTION

Chevron proposes to build a new 2,918 square feet (sf) convenience store building with an attached 867 sf carwash, a new 2,744 sf fueling canopy, install two new 20,000-gallon double wall fiberglass underground storage tanks (USTs) with four dispensers, and install associated pavement and landscaping located at 2959 Midway Drive, in the City of San Diego, California. The new USTs will be installed at an approximate depth of 17 feet below the ground surface (bgs) and are approximately 28 feet northeast of the proposed convenience store building. The area of the proposed site improvements are shown on the Site Plan, Figure 2. The existing Chevron retail gasoline facility and carwash facility improvements will be razed.

1.2 PURPOSE AND SCOPE OF WORK

1.2.1 Purpose

The purpose of this report is to evaluate the subsurface conditions and provide geotechnical recommendations for design and construction of the new facilities. This report has been conducted in general accordance with accepted geotechnical engineering principles and in general conformance with the approved proposal and cost estimate for the project by Stantec, dated November 11, 2016.

1.2.2 Scope of Work

Our scope of work consisted of the following:

- Review available subsurface information for the site and nearby locations,
- Perform a site reconnaissance to evaluate general geotechnical and site conditions,
- Perform a field subsurface exploration program consisting of four hollow stem auger borings and two cone penetrometer (CPT) soundings,
- Perform percolation testing,
- Perform geotechnical laboratory tests on selected samples,
- Perform geotechnical engineering analyses, and
- Preparation of this geotechnical investigation report for the proposed project.

2.0 FIELD INVESTIGATION

2.1 PRE-DRILLING PROCEDURES

Underground Service Alert (USA) was notified before commencing drilling activities to identify underground utilities that could conflict with the proposed borings. In addition, a private utility locator was retained to clear each of the boring and CPT locations for potential conflicts with underground utilities. Prior to drilling, each boring and CPT location was investigated in the field for potential conflicts with marked or observed utility lines and other obstructions.

2.2 HOLLOW STEM AUGER DRILLING

Two test borings were drilled using a truck mounted drill rig equipped with a hollow-stem auger on April 3, 2017 and April 7, 2017, by ABC Liovin Drilling (ABC) to a maximum depth of 71.5 feet at the locations shown on Figure 2. The borings were logged by a Stantec field engineer who also collected samples of the materials encountered for examination and laboratory testing.

2.3 SAMPLING

Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. CAL sampling followed ASTM D3550 (Standard Practice for Ring-Lined Barrel Sampling of Soils) procedures. Disturbed samples were obtained using a Standard Penetration Test (SPT) sampler, which is a split tube sampler with a 2-inch outer diameter and 1⅜-inch inner diameter. SPTs were performed in accordance with ASTM D1586 (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils), and D6066 (Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential). Disturbed bulk samples were also obtained from the drill cuttings.

The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the samplers the final 12 inches of an 18-inch drive is noted on the borings logs as "Driving Resistance (blows/foot of drive)." A recent email provided to us by ABC Drilling indicates the drill rig used on this project has an average hammer efficiency of 83%.

Samples were classified in the field using the Unified Soil Classification System (USCS), in accordance with ASTM D2488 (Standard Practice for Description and Identification of Soils [Visual-Manual Method]) procedures. The laboratory testing confirmed or modified field classifications as necessary for presentation on the boring logs. Soil samples were removed from the samplers, placed in appropriate containers, and transported in accordance with ASTM D4220 (Standard Practice for Preserving and Transporting Soil Samples).

The test boring logs are located in Appendix A. Soils are classified in accordance with the USCS, which is explained in "Symbols and Terms Used on Borehole and Test Pit Records" in Appendix A.

2.4 CONE PENETRATION TESTS

Two CPTs were completed on April 7, 2017, by Gregg Drilling and Testing, Inc. (Gregg) under a Stantec engineer's direction. CPT soundings were performed in accordance with ASTM D6441 (Standard Test Method for Mechanical Cone Penetration Tests of Soils).

The CPTs were advanced using a truck mounted CPT rig to a maximum depth of approximately 75 feet below the ground surface at the locations shown on Figure 2. Piezo-cone penetrometers were advanced using a push rod equipped with an instrumented penetrometer tip. Continuous tip, side friction, and dynamic pore pressure data were collected for each sounding. Once the CPTs were completed, the holes were grouted. CPT data are included in Appendix B.

2.5 LABORATORY TESTING

The following laboratory tests were performed in general accordance with ASTM and California Test procedures:

- <u>In-Situ Moisture and Density (ASTM D2216)</u>: In-situ moisture and density are calculated by weighing and measuring the drive samples obtained from the borings.
- <u>Sieve Analysis (ASTM D422 and ASTM C136):</u> This test is used to evaluate the distribution of soil grain sizes, which constitute the soil fabric and is used in soil classification and assessment of soil engineering behavior.
- <u>No. 200 Sieve Wash (ASTM D1140)</u>: This test is used to evaluate the amount of soil grain sizes finer than the 0.075 mm (No. 200 sieve) and is used in soil classification and assessment of soil engineering behavior.
- <u>Direct Shear Test (ASTM D3080)</u>: Direct shear tests were performed to obtain shear strength parameters that can be used to estimate bearing capacity, lateral earth pressures, resistance to sliding, and other engineering characteristics.
- <u>Atterberg Limits (ASTM D 4318)</u>: The Atterberg Limits are utilized to classify fine-grained soils and correlate them to specific engineering properties. The Atterberg limits are composed of the liquid limit, and the plastic limit. The liquid limit is the moisture where the soil changes from a plastic to a liquid state and the plastic limit is the moisture content where the soil changes from a semi-solid state to a plastic state.
- <u>Maximum Dry Density and Optimum Moisture Content (ASTM D1557)</u>: The maximum dry density and optimum moisture content are used to determine the relative compaction of existing soils and to evaluate the level of compaction achieved during earthwork.
- <u>Chemical Tests for Corrosion Potential (Applicable EPA, ASTM or local test methods)</u>: The pH, resistivity, soluble sulfate content and chloride ion content useful in the assessment of corrosion potential were evaluated in a near surface soil sample.

The laboratory test results are presented in Appendix C.

2.6 PERCOLATION WELL INSTALLATION

Two soil borings were converted into percolation wells on April 3, 2017, by 2R Drilling under a Stantec engineer's direction at locations shown on Figure 2. The three-inch diameter percolation wells were screened between 2 and 5 feet bgs. A traffic rated well-box was installed at the surface to protect the percolation well. Percolation well details are included in the boring logs in Appendix A and percolation data are included in Appendix D.

3.0 GEOLOGIC SETTING AND SITE CONDITIONS

3.1 REGIONAL GEOLOGY

The regional geology as shown on the geologic map by Kennedy and Tan, (California Geological Survey, 2008) indicates the site is overlain by artificial fill (af), young alluvial floodplain deposits (Qya), and very old paralic deposits (Qvop).

3.2 SURFACE CONDITIONS

The existing retail gasoline facility and adjacent carwash are located at 2959 Midway Drive and 3405 Rosecrans Street, in San Diego, California. The retail gasoline facility consists of a convenience store, two fueling islands, one fueling island canopy, three USTs, and associated paved driveway and parking areas, and landscape areas. The eastern fueling canopy was removed several years ago. The former carwash facility includes four abandoned buildings, associated paved parking and driveway areas, and landscape areas. A retaining wall approximately five to six feet tall is located along the southeastern and southwestern property lines.

The existing ground surface in the immediate vicinity of the proposed addition lies predominantly between elevations of 8 and 11 feet (1988, NAVD). The site is relatively flat and the surrounding ground surface slopes gently from west to east toward Midway Drive.

3.3 SUBSURFACE CONDITIONS

The materials encountered in the borings consist of artificial fill, Bay Deposits, and Old Paralic Deposit formational material. Descriptions of the materials are presented below.

<u>Artificial Fill Deposits (af)</u> – The artificial fill (late Holocene) consists of interbedded layers of very loose to loose sand (SP-SM and SM USCS soil types), and soft silt (ML USCS soil type). The artificial fill encountered in the borings extends to a depth of approximately 4 to 7 feet below ground surface.

<u>Young Alluvium (Qya)</u> – Alluvium encountered in the borings at the site generally consist of loose to medium dense, gray, silty sand (SP-SM, SM, and SC USCS soil types) with occasional shell fragments and gravels, and soft to stiff silt and clay (CL, CH, and ML USCS soil types). The alluvium extends to depths of approximately 65 to 75 feet bgs.

<u>Very Old Paralic Deposits (Qvop)</u> - Very Old Paralic Deposits encountered in the borings at the site generally consist of very dark grayish brown to dark olive brown medium dense to dense sand (SP-SM and SM USCS soil types) and very stiff clay (CL USCS soil type). The Very Old Paralic Deposits extend to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively.

Groundwater - Groundwater was encountered in borings B-1 and B-2 at a depth of approximately 7 feet below the existing ground surface (bgs) during this investigation. Previous onsite investigations indicate groundwater was encountered at a depth of approximately 17 feet bgs (Stantec, 2015). Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

4.0 GEOLOGIC HAZARDS

4.1 FAULTING AND SURFACE RUPTURE

The site is located in a seismically active area. The estimated distance from the site to nearby mapped active faults is presented in the table below.

Table 1 – Faults in Site Vicinity

Fault	Distance (miles) (1)	Maximum Moment Magnitude (1)
Newport Inglewood (onshore)	0.8	7.5
Rose Canyon	0.8	6.9
Coronado Bank	11.8	7.4
Palos Verdes	11.8	7.7
Newport Inglewood (offshore)	30.9	7.0
Elsinore	41.9	7.9

1. Measured from 2008 National Seismic Hazard Maps - USGS (USGS, 2008).

As noted above, the closest known active fault is the Newport Inglewood (onshore) Fault, located approximately 0.8 miles northeast of the Site. The Site is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults are known to underlie or project toward the site. Therefore, the probability of fault rupture is considered low.

4.2 CALIFORNIA BUILDING CODE SEISMIC CRITERIA

A geologic hazard likely to affect the project is ground shaking as a result of movement along an active fault zone in the vicinity of the subject site. The seismic parameters in accordance with the 2016 California Building Code (CBC) are presented below:

Table 2 – 2016 CBC Seismic Parameters and Peak Ground Acceleration

2016 CBC Seismic Parameters and Peak Ground Acceleration	
Parameter	**Value**
Site Coordinates	Latitude : 32.749211° Longitude : -117.205963°
Mapped Spectral Acceleration Value at Short Period: S_s	1.275g
Mapped Spectral Acceleration Value at 1-Second Period: S_1	0.492g
Site Classification	E

2016 CBC Seismic Parameters and Peak Ground Acceleration	
Short Period Site Coefficient: F_a	0.900
1-Second Period Site Coefficient: F_v	2.400
Design Spectral Response Acceleration at Short Periods: S_{DS}	0.765g
Design Spectral Response Acceleration at 1-Second Period: S_{D1}	0.787g
Peak Ground Acceleration adjusted for Site Class Effects: PGA_M	0.577g

4.3 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction is the transformation of a deposit of soil from a solid state to a liquefied state as a consequence of increased pore pressure and reduced effective stress. Often, this transformation results from the cyclic loading of an earthquake and the soil acquires "mobility" sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, saturated (below groundwater), and uniformly graded fine-grained sands. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity. Cohesive soils are generally not considered susceptible to soil liquefaction.

Stantec reviewed readily available and relevant maps and publications regarding liquefaction potential at the subject property. According to the City of San Diego Seismic Safety Study Map (CSD, 2008), the property is located within a liquefaction hazard zone.

The liquefaction potential was evaluated with the CLiq v2.1.6.7 computer program (Geologismiki, 2017) using the CPT data. Liquefaction triggering methods developed by Idriss and Boulanger (2014) were used in our liquefaction evaluation. Our evaluation was based on the site class adjusted peak ground acceleration of 0.58g, as presented in Table 2, and an earthquake magnitude of 7.5. The in-situ groundwater depth of approximately 7 feet was used to evaluate the cyclic resistance ratio of the on-site soils. The historic high groundwater depth of 5.5 feet was used to evaluate the cyclic stress ratio for the design earthquake.

Our evaluation indicates that relatively significant portions of the sandy alluvium between depths of approximately 11 to 60 feet is potentially liquefiable.

We estimate the total and differential seismically-induced settlement may be on the order of 5 to 9-inches and 4 to 7-inches, respectively, across a 40-foot span. A discussion of options for mitigation of seismically-induced settlement are provided in this report. The results of the liquefaction analysis are provided in Appendix C.

4.4 LIQUEFACTION INDUCED LATERAL SPREADING

Lateral spreading of sloping ground, or towards the free face of stream bank, is often associated with liquefaction. The site is nearly flat and there are no free faces in the vicinity of the project. On that basis, there appears to be low risk for significant horizontal displacements due to lateral spreading.

4.5 CITY OF SAN DIEGO SEISMIC SAFETY STUDY

Figure 3 shows the approximate site location on the City of San Diego Seismic Safety Study map. The site is located in Geologic Hazard Category 31, which is defined as high liquefaction potential with shallow groundwater, major drainages, or hydraulic fills. As discussed above, our liquefaction analysis also indicates that there is a liquefaction potential at the Site.

4.6 LANDSLIDES AND SLOPE STABILITY

Evidence of landslides or slope instabilities was not observed. The potential for landslides or slope instabilities to occur at the site is considered negligible.

4.7 FLOODING, TSUNAMIS AND SEICHES

The site is not located within a flood zone or dam inundation area. The site is not located within a mapped area on the State of California Tsunami Inundation Maps (Cal EMA, 2009); therefore, damage due to flooding or tsunamis is considered low. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located immediately adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is considered low.

4.8 INFILTRATION RATE

Following the San Diego County Best Management Practice (BMP) Design Manual (SDCBMPDM, 2016) procedure for determining the infiltration rate, the field test results in Appendix D indicate the average of the final three percolation rates ranged between 8.6 and 8.7 inches per hour. After applying a reduction factor and a safety factor, the adjusted infiltration rate ranged between 1.4 and 1.5 inches per hour. However, a separation of at least 10 feet is required from the bottom of the infiltration facility to the high groundwater level. Since the historic high groundwater level is approximately 5.5 feet, and the groundwater level at the time of our investigation was approximately 7 feet, it is our opinion that infiltration is not feasible at this site.

4.9 EXPANSIVE SOILS

The near-surface soils consist of clayey sand and silty sand. Based on the plasticity index testing results, near surface soils are considered non-expansive, as defined by the 2016 California Building Code. Mitigation for expansive soils is not anticipated, based on samples tested.

If imported soils are used for earthwork, Stantec recommends that the proposed soils be tested for expansion potential prior to import. Imported soils should be approved by the Project Soils Engineer before being placed.

5.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed retail gasoline facility development from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that will warrant mitigation and/or consideration during planning stages. The main geotechnical conclusions for the project are presented in the following sections.

- The property is underlain by artificial fill, alluvium, and Very Old Paralic Deposits. The artificial fill and alluvium are relatively similar, consisting of interbedded layers of very loose to medium dense sand with variable amounts of silt and clay (SW-SM, SP-SM, SM, and SC USCS soil types) and soft to stiff clay (CL and CH USCS soil types) and silt (ML USCS soil type) to an approximate depth of 60 to 75 feet bgs. Old Paralic Deposits consisting of medium dense to dense sands (SP-SM, SC, and SM USCS soil type) and very stiff clay (CL USCS soil type) were encountered to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively.

- Groundwater was encountered at a depth of approximately seven feet bgs in borings B-1 and B-2 during our geotechnical evaluation. Groundwater was previously encountered at a depth of 17 to 20 feet bgs in soil borings GT-1 and GT-2 (Stantec, 2015). Shallow groundwater will be an issue for the design and construction of the proposed UST's.

- The artificial fill and alluvium at the site are considered susceptible to liquefaction and seismically induced settlement. The estimated total and differential seismically settlements exceed building and canopy tolerances. Accordingly, mitigation will be necessary to reduce settlement to acceptable levels. Either ground improvement or structural mitigation consisting of deep foundations can be used to mitigate the seismic settlement hazard. We consider that vibro-stone columns would be a viable ground improvement option at this site. A shallow foundation system could be used in conjunction with ground improvement. A structural mitigation option consisting of deep foundations would also be a suitable option for the site. Deep foundations such as augercast pressure grouted (APG) piles or Augercast pressure-grouted displacement (APGD) piles may be considered. A cost comparison between the ground improvement and deep foundation systems should be completed to determine the most cost effective approach. Specialty ground improvement contractors can provide significant input to the selection of appropriate methods, given the site-specific soil conditions and project requirements.

- Areas where ground improvement is not implemented or where support is not provided through deep foundations will be subject to seismic settlement as described above.

- Based on recent developments, the ground improvement option may be a more cost-effective foundation solution as compared with the deep foundation option.
- Some ground improvement methods such as vibro compaction in stone columns cause vibration and ground settlement. Accordingly, these ground improvement options may not be suitable in areas close to existing off-site structures, since these activities could cause damage to these existing off-site structures.

6.0 RECOMMENDATIONS

6.1 EARTHWORK

6.1.1 Site Preparation

The extent of site preparation will depend on whether the liquefaction hazard is mitigated through the use of deep foundations or with ground improvement. In general site preparation should begin with the removal of existing improvements, vegetation and debris. Grading should conform to the guidelines presented in the 2016 California Building Code (CBC, 2016), as well as the requirements of the City of San Diego.

6.1.2 Remedial Grading

Building Foundation Areas:

The extent of remedial grading below building foundations will depend on whether the liquefaction hazard is mitigated through deep foundations, or with ground improvement. In general, for ground improvement options, remedial grading should be performed to provide an approximate three-foot thick re-compacted fill layer between the top of ground improvement and the underside of shallow foundation. For the deep foundation option, remedial grading should be performed to reinstate disturbed material from the installation of the deep foundations. Removal, replacement, and compaction should be completed laterally at least five feet beyond the outside edge of the footings unless constrained by existing structures.

The bottom of the remedial grading excavations should be scarified to a depth of 8-inches, moisture conditioned to within 2 percentage points of the optimum moisture content and compacted to 95% relative compaction based on the ASTM D1557 laboratory test procedure. All references to optimum moisture content and relative compaction in this report are based on this test method.

Concrete Pavement and Hardscape:

Beneath paved driveway and parking areas, the existing soils should be excavated to a depth of at least one foot below the existing ground surface or final subgrade elevation, whichever is lower. Scarification and compaction for driveway areas should extend horizontally at least 2 feet beyond the outside edge of the areas to be paved or as property line or structure constraints dictate.

The surface exposed by excavation should be scarified to a depth of 6 inches, moisture conditioned to within 2 percentage points of the optimum moisture content, and compacted to 90% relative compaction.

Field Observations:

The Project Soils Engineer should check the bottom of excavations. If soft, loose, or otherwise unsuitable soils are encountered, the depth of removal may be extended.

6.1.3 Engineered Fill Placement and Compaction

Excavated materials determined by the geotechnical engineer to be satisfactory can be replaced as compacted fill. It is anticipated the majority of the excavated materials can be used as compacted fill soils. The geotechnical engineer should approve the fill material before placement.

Fill should be placed in 6- to 8-inch thick loose lifts, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557. Utility trench backfill beneath structures, pavements and hardscape should be compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavements should be compacted to at least 95% relative compaction.

6.1.4 Expansive Soil

The onsite materials appear to have a very low expansion potential. Design for expansive soils is not considered necessary.

6.1.5 Imported Material

Imported materials, if used for fill, should be predominately granular, contain no rocks or lumps greater than 3 inches in maximum dimension, and have an Expansion Index of less than 20 or a Plasticity Index less than 15. Imported materials should be reviewed and approved by the project Soils Engineer before being brought to the site.

Soft or saturated soils may be encountered during removal of soils below the proposed building extensions. The excavation bottom and backfill soil should be inspected and approved by a representative of the Soils Engineer prior to use as backfill.

6.1.6 Site Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order. Difficult excavation and gravel and cobbles should not be anticipated within the artificial fill and recent bay deposits.

6.1.7 Oversized Material

Excavations are not likely to generate oversized material.

6.1.8 Temporary Excavations

Temporary excavations to depths up to approximately 20 feet bgs are anticipated for construction of the UST's. The existing fill and alluvial soils can be considered Type C for excavation in accordance with OSHA and Cal-OSHA requirements. Temporary excavations should be shored or excavated with a slope not steeper than 1½:1 (horizontal to vertical) in accordance with OSHA and Cal-OSHA requirements. Temporary excavations 3 feet deep or less can be made vertically.

The excavations should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation.

Stantec should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces. Slopes steeper than those described above will require shoring.

6.1.9 Temporary Cantilever Shoring

Temporary excavations to depths up to approximately 20 feet bgs are anticipated for construction of the UST's. Where cantilevered shoring is used in lieu of sloping the temporary excavation sidewalls, the shoring design may be tentatively based upon an active earth pressure equal to a fluid weighing 43 pounds per cubic foot (pcf) above the groundwater level. Below the groundwater level, a buoyant active earth pressure equal to a fluid weighing 22 pcf can be used in combination with hydrostatic water pressure. These pressures do not include a safety factor and are based on level backfill conditions.

Allowable passive pressures above the groundwater level may be based on a fluid weighing 260 pcf. Below the groundwater level, a buoyant passive pressure equal to a fluid weighing 130 pcf can be used in combination with hydrostatic water pressure. These pressures are based on level ground conditions in front of the wall.

6.1.10 Braced Shoring System

For braced shoring above the groundwater level, a uniform rectangular pressure distribution should be used from top to bottom of the shoring equivalent to the following,

Bracing: 30H psf/ft

where H is the depth of the excavation, in feet. Hydrostatic pressure should be added for bracing below the groundwater level.

The earth pressures indicated above do not include a safety factor; therefore, the shoring design should include an appropriate safety factor for the overall performance of the system.

6.1.11 Dewatering

Dewatering will likely be required for construction of the UST's. Dewatering may be facilitated with the use of well points. Lowering the groundwater can cause increased internal stresses and consolidation. Compressible soils may be present beneath the streets and private properties beyond the site boundaries. Conventional dewatering would require that perimeter wells lower the groundwater to a level at least several feet below the bottom of the planned excavations to achieve a stable surface for construction and excavations. This may cause increased internal stress, and subsequent compression of soils in the surrounding area and consideration should be given to effect of dewatering system on the surrounding properties.

6.1.12 Slopes

Although grading information is currently unavailable, no permanent slopes on the Site are anticipated for the project. The stability of slopes, if any, should be evaluated when design-grading information becomes available.

6.1.13 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures. Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

6.1.14 Grading Plan Review

Stantec should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

6.2 STRUCTURAL SUPPORT

The potential for settlement in the event of a major earthquake must be considered in selecting the retail gasoline facility's foundation systems. Methods for reducing the potential for damage to the new facilities will depend on the structure type and its location within the overall proposed development. Two alternative approaches should be considered for specific structures:

1. Deep Foundations: The foundation layout for the new structures are not known. Deep foundations that develop support in the dense Very Old Paralic Deposits below the liquefiable materials would be a suitable foundation option. Deep foundation depth would likely be on the order of 75 to 80 feet in order to obtain sufficient capacity below the deepest liquefiable depth. However, settlement of the ground surface around the foundation elements would still be expected in the event of a major seismic event.

2. Ground Improvement: The liquefaction potential can be substantially reduced by improving the ground in place. If ground improvements are used to successfully mitigate the liquefaction hazards, then shallow foundations may be suitable for supporting various project structures. Ground improvement methods that might be considered for this site include:

    - Vibro-compaction uses a vibratory probe to densify the soils at depth.
    - Vibro-replacement (stone columns) densifies the in-situ soils, while also installing a stronger stone column that improves drainage during seismic loading.
    - Rammed aggregate piers (RAP) provide similar benefits as stone columns, but usually for shallower depths of treatment.
    - Various types of grouting (jet grouting, compaction grouting, etc.) can be used to treat smaller, isolated areas.

    Some ground improvement methods such as vibro compaction in stone columns cause vibration and ground settlement. Accordingly, these ground improvement options may not be suitable in areas close to existing off-site structures, since these activities could cause damage to these existing off-site structures. This condition may be present on the South and East sides of the property where existing off-site structures are located. In areas where ground improvement is required close to existing off-site structures, compaction grouting should be considered as an alternative ground improvement method.

    Ground improvement should be designed such that static and dynamic settlements are within the structures tolerable limits. In general, maximum total liquefaction induced settlement should be less than 2 inches, and liquefaction induced differential settlement should be less than 1 inch. The project structural engineer should review these estimates to determine if they are adequate for the proposed structure. We anticipate ground improvement will likely be required to a depth of at least 40 feet. A specialty ground improvement contractor should be consulted to provide cost information and other ground improvement details.

6.3 FOUNDATIONS

6.3.1 Shallow Foundations

Shallow foundations constructed over one of the ground improvement methods described above are expected to provide adequate support for the proposed convenience store and carwash buildings provided they are founded in properly compacted fill prepared in accordance with the recommendations of Section 6.1.2. For isolated or continuous footings bearing entirely in compacted fill soils, an allowable bearing pressure of 2,500 pounds per square foot (psf) may be incorporated in the design. The bearing capacity can be increased by one third for transient loading conditions such as earthquake and wind. The following recommendations should be incorporated into the foundation design:

- Minimum foundation embedment depth of 18 inches, measured from the bottom of the footing to the lowest adjacent soil subgrade.
- Minimum foundation width of 24 inches,
- Minimum Footing Longitudinal Reinforcement: Two #4 bars, top and bottom
- Horizontal bearing surfaces with steps at changes in bearing elevation.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using an allowable lateral pressure of 260 psf per foot of depth below the ground surface for level ground conditions. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

6.3.2 Canopy Foundations

Typical shallow drilled pier footings for the canopy columns in conjunction with one of the ground improvement methods described above are expected to provide adequate support for the proposed structures provided that the recommendations provided herein are incorporated in the design. We understand that typical canopy column footings consist of reinforced concrete drilled piers having a minimum diameter or width of 4.0 feet and embedded a minimum depth of 7 feet bgs. Based on these assumptions and the anticipated subsurface conditions, an allowable bearing pressure of 4,000 psf may be used in the design. For resistance to transient lateral loads, such as earthquake and wind loads, the aforementioned allowable bearing capacity may be increased by one-third.

6.3.3 Deep Structural Foundations

Numerous proprietary and non-proprietary deep foundation systems may be considered for support of the proposed convenience store building, carwash building, and fueling canopy. Two types are described below:

- Augercast pressure-grouted displacement (APGD) piles
- Augercast pressure-grouted (APG) piles

APGD piles use a hollow-stem auger that is plugged at the bit to displace the soil as it is drilled into the ground. When the design tip elevation is reached, the plug is removed and high-strength grout is pumped into the hole as the auger is withdrawn. This pile type can minimize cuttings returned to the surface, although difficult drilling conditions could be encountered in deeper layers of dense sand.

APG piles utilize a hollow stem auger with a plugged bit to drill to the design tip elevation, where the plug is removed and high-pressure grout is pumped into the hole as the auger is withdrawn. This is similar to APGD piles, except that as the APG auger is withdrawn, the soil removed with the auger is approximately the same volume as the drilled hole. The removed soil is replaced in the ground with the high-pressure grout. APG piles are widely used, and may be more economical than APGD piles, despite the increased spoil disposal requirements.

We performed analyses to provide preliminary estimates of axial capacity for the deep foundation option. We evaluated the axial capacity for an 18 inch diameter Pressure Grouted Auger Cast Displacement Pile. The minimum pile depth was determined based on the required capacity during the design seismic event where liquefaction extends to a depth of approximately 60 feet. For this load condition, down drag on the pile occurs as a result of liquefaction induced settlement. The minimum pile depth needed to resist the down drag forces is estimated to be 75 feet below ground surface.

The allowable static, axial capacity for an 18 inch diameter Pressure Grouted Auger Cast Displacement Pile with the pile tip at a depth of 75 feet is estimated at 105 tons. Deep foundations should have a center to center spacing of at least three pile diameters. A group capacity reduction is not required provided this spacing is used.

Lateral pile capacity will be affected by liquefaction and pile group spacing. A lateral pile analysis using L-Pile or similar software programs should be completed if deep foundations are used for the project. We can perform these analyses if needed. To account for reductions in capacity due to liquefaction, we recommend using a P-Multiplier equal to 0.1 within the zones susceptible to liquefaction.

For pile group effects, we recommend using P-Multiplier's for center to center spacings less than six pile diameters. The P-Multiplier varies depending on the actual spacing and the position of the pile within the group. We can also perform these analyses if needed.

The floor slabs should also be supported on deep foundations, otherwise significant floor slab damage will occur in the event of seismically induced liquefaction.If a deep foundation option is selected, the ground surface below the floor slab and adjacent to the pile supported structure will still settle.

Recommendations for pile installation will be specific for the type of pile selected. We can provide these recommendations after the pile type has been determined.

Significant ground surface settlements could occur during an earthquake as a result of liquefaction in subsurface soils. Total seismic induced settlements, in the event of the design earthquake, are expected to be on the order of 5 to 9 inches with approximately 4 to 7 inches of differential settlement. Mitigation measures including deep foundations or ground improvement with shallow foundations should be incorporated into the design to minimize permanent deformations in these structures.

6.3.4 Foundation Plan Review

Stantec should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

6.3.5 Foundation Excavation Observations

A representative from Stantec should observe deep foundation or ground improvement installation, and all foundation excavations prior to forming or placing reinforcing steel.

6.4 SLABS-ON-GRADE

6.4.1 Interior Slabs on Grade

If a ground improvement technique is incorporated into the design, slabs-on-grade may be utilized. The top 24 inches of material below interior concrete slabs-on-grade should have an expansion index of 20 or less. The project structural engineer should design the interior concrete slabs-on-grade floor. However, we recommend a minimum thickness of 5 inches.

A vapor barrier should be placed beneath slabs where moisture sensitive floor coverings will be installed. If plastic is used, a minimum 10-mil is recommended. The plastic should comply with ASTM E1745. Installation should comply with ASTM E1643. Current construction practice typically includes placement of a 2-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture to the underside of the slab that can increase the time required to reduce vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The slab can be placed directly on the vapor retarder/barrier. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed. The project team should determine the appropriate treatment for the specific application.

In addition to the moisture vapor barrier, a capillary moisture break can be constructed below the slab to further reduce moisture transmission from the subgrade soil, if desired. The capillary moisture break should consist of at least 4-inches of clean, free-draining gravel or crushed rock placed below the moisture vapor retarder/barrier. The components of the capillary moisture break should meet the particle-size gradation presented in Table 3.

Table 3 – Gradation for Capillary Moisture Break

Gradation for Capillary Moisture Break	
Sieve Size	**Percentage Passing Sieve**
1 inch	100
3/4 inch	30-75
1/2 inch	5–10
3/8 inch	0-2

6.4.2 Exterior Slabs on Grade

The top 24 inches of material below exterior concrete slabs-on-grade should have an expansion index of 20 or less determined in accordance with ASTM D4829 or a Plasticity Index less than 15. Exterior slabs should have a minimum thickness of 4 inches and be reinforced with at least No. 4 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns.

6.5 UNDERGROUND STORAGE TANK BACKFILL

Dead man anchors may be used to resist buoyant forces on UST's. The anchors should be designed to resist buoyant forces based on a groundwater level at the ground surface for static conditions. For liquefaction conditions, the unit weight of the groundwater should be taken as 110 pcf.

Backfilling adjacent to and over the top of the underground storage tanks should be performed in accordance with the tank manufacturer's specifications. Pea gravel used for tank backfill should be encapsulated ("burrito wrapped") in a geotextile fabric to prevent migration of fines into the voids in the pea gravel, which could cause ground settlement. The pea gravel backfill should be covered with a structural concrete slab designed to bridge over localized settlement of the gravel backfill.

Depending on the actual quality and composition of the gravel utilized to backfill the USTs, little or no mechanical compactive effort is generally necessary to place the gravel in a dense manner. However, to increase the density of the gravel backfill and to mitigate future settlement of the gravel backfill the following methods should be utilized. The gravel shall be compacted with a concrete vibrator or mechanical compaction equipment, at approximate two to three foot intervals. Backfilling adjacent to and over the top of the underground storage tanks should be performed in accordance with the tank manufacturer's specifications.

6.6 PRELIMINARY PAVEMENT SECTION RECOMMENDATIONS

Tentative pavement structural sections were developed based on the AASHTO design method in accordance with Chevron's preferences, visual onsite soil classifications, laboratory resistance R-Value of 40 and traffic index (TI) values below. The design below applies to pavement sections supported on compacted existing onsite soils.

Table 4 - Flexible Pavement Sections

Traffic Type	Traffic Index	Asphalt Concrete (inches)	Aggregate Base* (inches)
Vehicle Traffic	4.5	4	4
Truck Traffic	6.5	4	5

***Aggregate Base should conform to Class 2 Aggregate Base in accordance with the Caltrans Standard Specifications or Crushed Miscellaneous Base in accordance with the Standard Specifications for Public Works Construction.**

Table 5 - Portland Cement Concrete Pavement Sections

Traffic Type	Traffic Index	JPCP* (inches)	Aggregate Base* (inches)
Vehicle Traffic	4.5	6	6
Truck Traffic	6.5	8	6

***Jointed Plain Concrete Pavement**

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be removed and replaced with compacted fill. The aggregate base and asphalt concrete should be compacted to at least 95% relative compaction. All materials and methods of construction should conform to good engineering practices and the minimum standards of the City of San Diego.

The concrete should exhibit a minimum 28-day compressive strength of 4,500 psi. Minimum reinforcement for concrete pavement in vehicle traffic areas should include #4 bars on 18-inch centers. Additional reinforcement and/or slab thickness may be appropriate as structural conditions dictate, as determined by the project structural or civil engineer. Other design and construction criteria for concrete pavements, such as mix design, strength, durability, reinforcement, joint spacing, thickened edges, etc., should conform to current specifications recommended by the American Concrete Institute (ACI).

6.7 CORROSIVITY

Four samples of the onsite soils were tested to provide a preliminary indication of the corrosion potential of the onsite soils. The test results are presented in Appendix C. A brief discussion of the corrosion test results is provided in the following text.

- The sample tested had a soluble sulfate concentration of 0.019 percent, which indicates the sample has a negligible sulfate corrosion potential relative to concrete. It should be noted that soluble sulfate in the irrigation water supply, and/or the use of fertilizer may cause the sulfate content in the surficial soils to increase with time. This may result in a higher sulfate exposure than that indicated by the test results reported herein. Studies have shown that the use of improved cements in the concrete, and a low water-cement ratio will improve the resistance of the concrete to sulfate exposure.

- The shallow samples tested had a chloride concentration of 255 to 450 parts per million (ppm), which indicates the sample has a negligible chloride corrosion potential relative to metal.

- The deep samples tested had a chloride concentration of 6,360 parts per million (ppm), which indicates the sample has a very severe chloride corrosion potential relative to metal.

- The samples tested had a minimum resistivity of 130 to 1,600 ohm-cm, which indicates the samples are corrosive to severely corrosive to ferrous metals.

- The sample tested had a pH of 7.8 to 8.39, which indicates the sample is moderately alkaline.

Based on the test results, the near surface soils are expected to have a corrosion potential for concrete ranging from low to very severe (Caltrans, 2014) and a high corrosion potential for steel (Romanoff, 1989). As such, special design considerations for steel in direct contact with soil and deep concrete may be required. The project structural engineer should evaluate the requirements of ACI 318-14 and determine their applicability to the site.

Additional testing should be performed after grading to evaluate the as-graded corrosion potential of the onsite soils. Stantec are not corrosion engineers. A corrosion consultant should be retained to provide corrosion control recommendations if deemed necessary.

6.8 POST INVESTIGATION SERVICES

Post investigation services are an important and necessary continuation of this investigation, and it is recommended that Stantec be retained as the Project Soils Engineer to perform such services. Final project grading and foundation plans, foundation details and specifications should be reviewed by Stantec prior to construction to check that the intent of the recommendations presented herein have been applied to the design. Following review of plans and specifications, observation during construction should be performed to correlate the findings of this exploration with the actual subsurface conditions exposed.

7.0 CLOSURE

Our conclusions, recommendations, and discussions presented herein are based upon an evaluation and interpretation of the findings from the field and laboratory programs, with interpolation and extrapolation of subsurface conditions between and beyond the exploration locations. This report contains information that is valid as of the report's date and to the extent directly known to Stantec. However, conditions can change with the passage of time or construction subsequent to this report's preparation that may invalidate, either partially or wholly, the conclusions and recommendations presented herein.

Inherent in most projects performed in the heterogeneous subsurface environment, continuing subsurface explorations and analyses may reveal conditions that are different than those described in this report. The findings and recommendations contained in this report were developed in accordance with generally accepted, current professional principles and practice ordinarily exercised, under similar circumstances, by geotechnical engineers and geologists practicing in this locality. No other warranty, express or implied, is made.

8.0 REFERENCES

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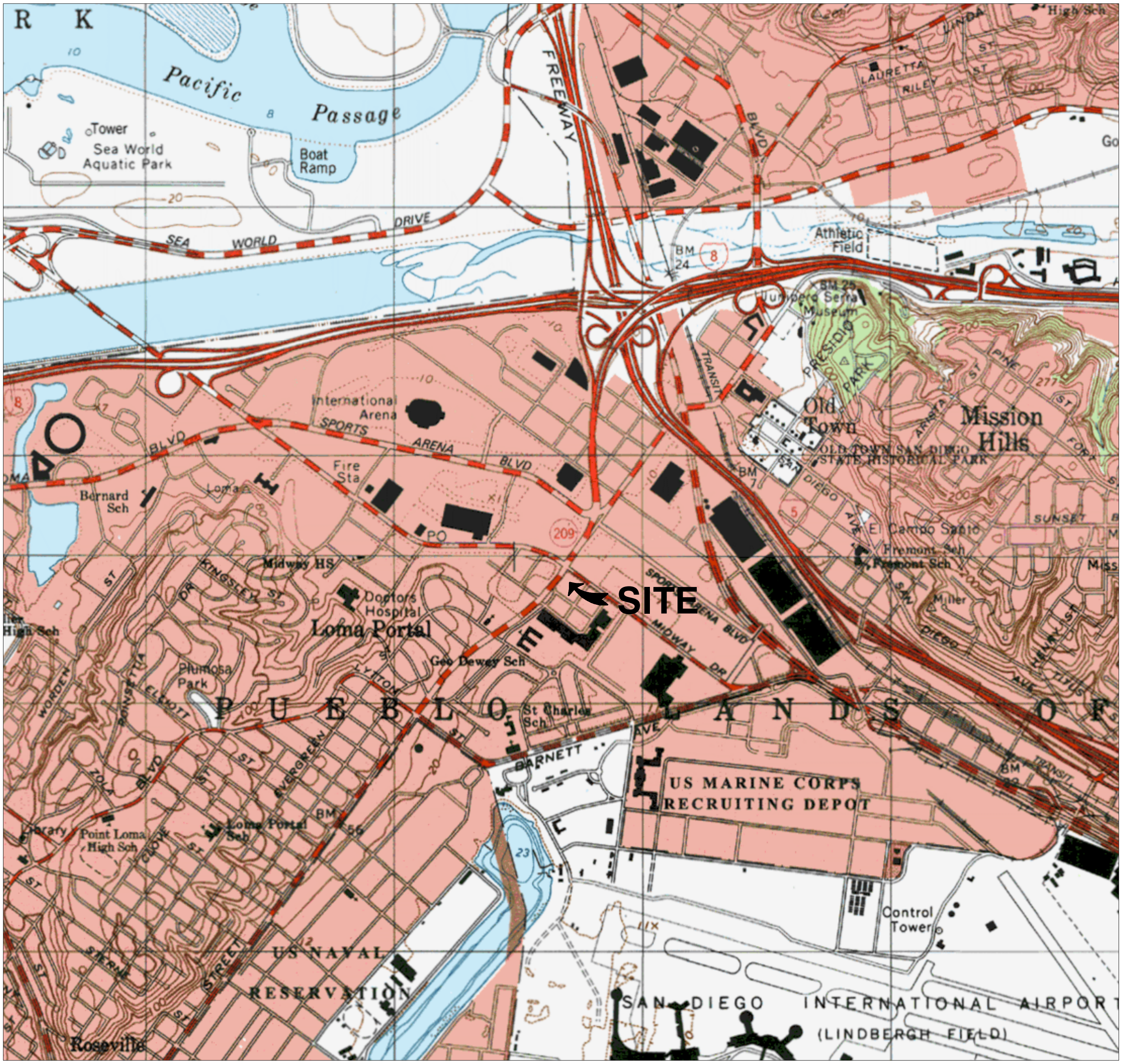
FIGURES



N

1	1/2	0	1

SCALE IN MILE

1000	0	1000	2000	3000	4000	5000	6000	7000

SCALE IN FEET

REFERENCE: USGS 7.5 X 15 MINUTE QUADRANGLE; LA JOLLA, CA 1996

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25864-F BUSINESS CENTER DRIVE
REDLANDS, CA 92374

FOR:

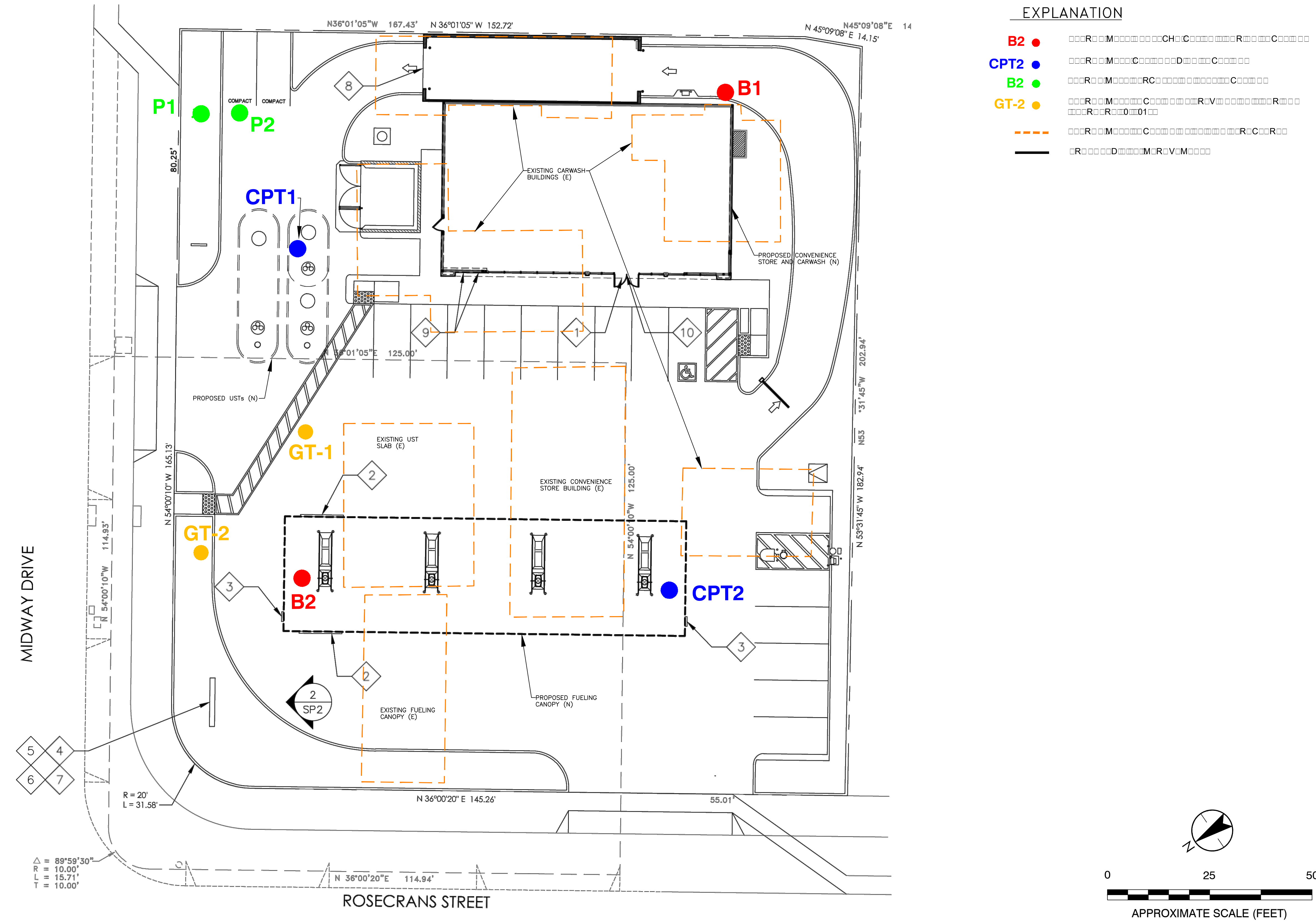
CHEVRON FACILITY NO. 9-2239
2959 MIDWAY DRIVE
SAN DIEGO, CALIFORNIA 92110

SITE LOCATION MAP

FIGURE:

1

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:



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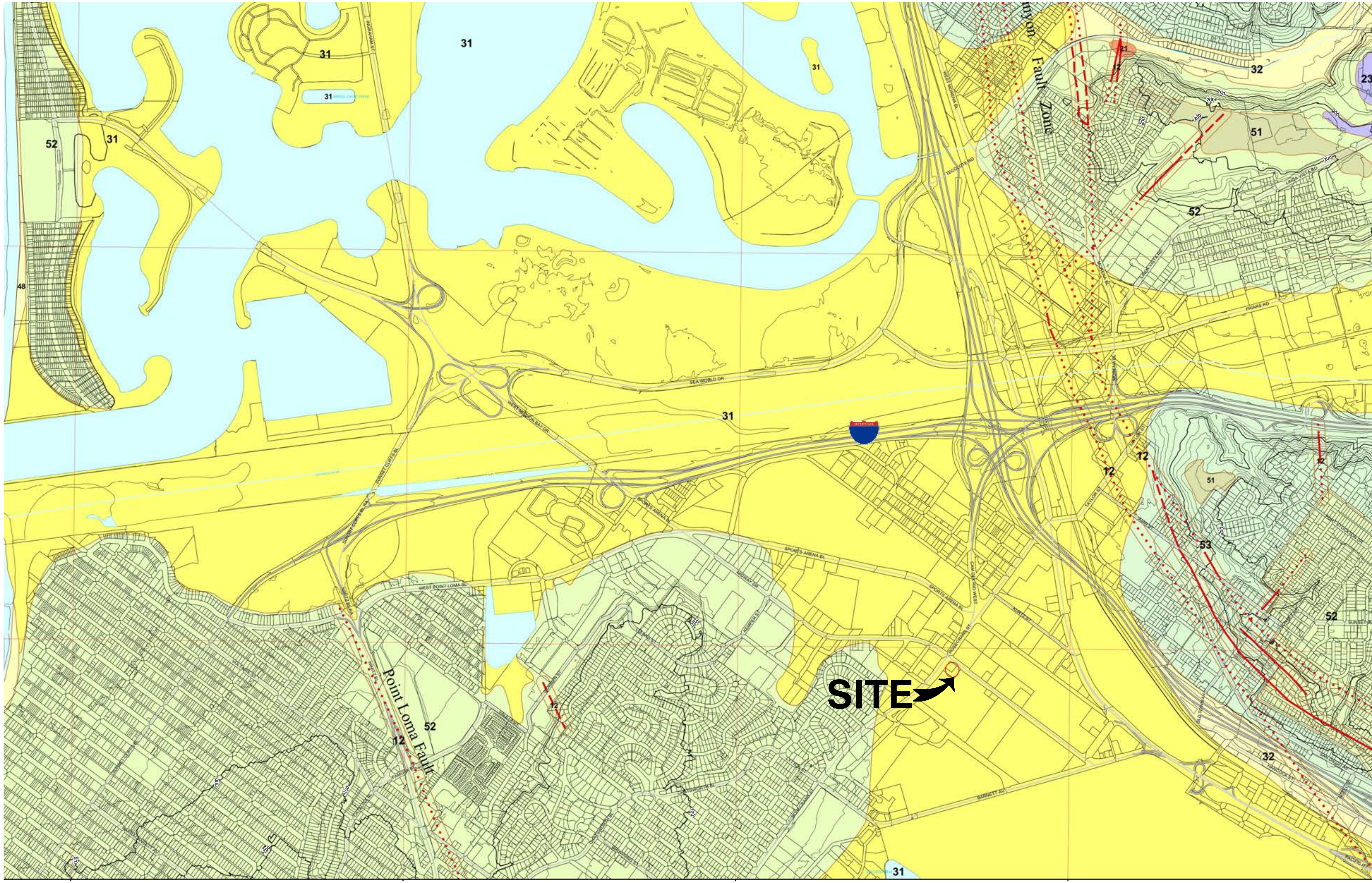


21 Confirmed, known, or highly suspected
22 Possible or conjectured

SLIDE-PRONE FORMATIONS

23 Friars: neutral or favorable geologic structure
24 Friars: unfavorable geologic structure
25 Ardath: neutral or favorable geologic structure
26 Ardath: unfavorable geologic structure
27 Otay, Sweetwater, and others

LIQUEFACTION

31 High Potential -- shallow groundwater major drainages, hydraulic fills
32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
42 Generally unstable Unfavorable bedding plains, high erosion
43 Generally unstable Unfavorable jointing, local high erosion
44 Moderately stable Mostly stable formations, local high erosion
45 Moderately stable Some minor landslides, minor erosion
46 Moderately stable Some unfavorable geologic structure, minor or no erosi
47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

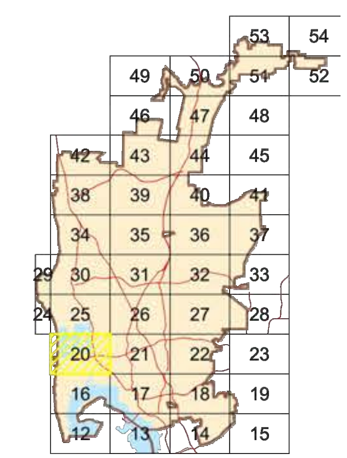
51 Level mesas -- underlain by terrace deposits and bedroc nominal risk
52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

Fault
Inferred Fault
Concealed Fault
Shear Zone

Index Map



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NOT TO SCALE

Stantec

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APPENDIX A
BORING LOGS

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PROJECT: **Geotechnical Legend**
LOCATION: **123 Main St. Anywhere USA**
PROJECT NUMBER: **00AB.12345.00**

WELL / PROBEHOLE / BOREHOLE NO: **Legend** PAGE 1 OF 1

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DRILLING: STARTED **1/1/06** COMPLETED: **1/1/06**	NORTHING (ft):
INSTALLATION: STARTED **1/1/06** COMPLETED: **1/1/06**	EASTING (ft):
DRILLING COMPANY: **Driling Sub-contractor**	LATITUDE:
DRILLING EQUIPMENT: **Drilling Equipment**	LONGITUDE:
DRILLING METHOD: **Drilling Method**	GROUND ELEV (ft):
SAMPLING EQUIPMENT: **Sampling Equipment**	TOC ELEV (ft):
	INITIAL DTW (ft): **NE**
	BOREHOLE DEPTH (ft): **25.0**
	STATIC DTW (ft): **NE**
	WELL DEPTH (ft): **25.0**
	WELL CASING DIAMETER (in): **NA**
	BOREHOLE DIAMETER (in):
	LOGGED BY: **Onsite Technician**
	CHECKED BY: **Project Eng.**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Geotechnical Lab Testing	Environmental Lab Testing	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			<u>Geotechnical Lab Testing</u>							Surface Completion
			CNSL - Consolidation		CNSL					
			CRSN - Corrosion		CRSN					
			EI - Expansion Index		EI					
			HA - Hydrometer Analysis		HA					
5			MD - Moisture Density		MD				5	
			M - Moisture		M					
			R-Val - R-Value		R-Val			As Shown		
			SA - Sieve Analysis		SA					
			DS - Direct Shear		DS					
			UC - Unconfined Compression		UC					
			AL - Atterberg Limits		AL					
			#200 - #200 Sieve Wash		#200					
10			MP - Modified Proctor		MP				10	
			<u>Environmental Lab Testing</u>							
			8015M - Volatile and/or Extractable Petroleum Hydrocarbons			8015M				Backfill Description
			8260 - Halogenated Volatile Organic Compounds with Oxygenates			8260				
15			8270 - Semi-Volatile Organic Compounds			8270			15	
			8081 - Organochlorine Pesticides			8081				
			Hand Auger Sample							
20			Driven Sample, Blows Per 6 Inches, 2.5 Inch ID California Modified Sample Interval				10 11 15		20	
			Driven Sample, Blows Per 6 Inches, 1.5 Inch ID SPT Sample Interval				20 22 23			
25			Hole terminated at 25 feet.						25	
30									30	
35									35	

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488). The classification excludes particles larger than 76 mm (3 inches). The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test N-Value (also known as N-Index). A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests.

Consistency	Undrained Shear Strength	
	kips/sq.ft.	kPa
Very Soft	<0.25	<12.5
Soft	0.25 - 0.5	12.5 - 25
Firm	0.5 - 1.0	25 - 50
Stiff	1.0 - 2.0	50 – 100
Very Stiff	2.0 - 4.0	100 - 200
Hard	>4.0	>200

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ROCK DESCRIPTION

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor*
25-50	*Poor*
50-75	*Fair*
75-90	*Good*
90-100	*Excellent*

Rock quality classification is based on a modified core recovery percentage (RQD) in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on NW core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures. The terminology describing rock mass quality based on RQD is subjective and is underlain by the presumption that sound strong rock is of higher engineering value than fractured weak rock.

Terminology describing rock mass:

Spacing (mm)	Joint Classification	Bedding, Laminations, Bands
> 6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

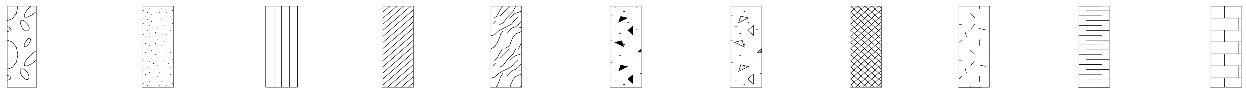
Strength Classification	Unconfined Compressive Strength (MPa)
Extremely Weak	< 1
Very Weak	1 – 5
Weak	5 – 25
Medium Strong	25 – 50
Strong	50 – 100
Very Strong	100 – 250
Extremely Strong	> 250

Terminology describing rock weathering:

Term	Description
Fresh	No visible signs of rock weathering. Slight discolouration along major discontinuities
Slightly Weathered	Discolouration indicates weathering of rock on discontinuity surfaces. All the rock material may be discoloured.
Moderately Weathered	Less than half the rock is decomposed and/or disintegrated into soil.
Highly Weathered	More than half the rock is decomposed and/or disintegrated into soil.
Completely Weathered	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



Boulders Cobbles Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Metamorphic Bedrock | Sedimentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
WS	Wash sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

▼ measured in standpipe, piezometer, or well

▽ inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and N-values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N value corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to A size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (305 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

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PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-1** PAGE 1 OF 4

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NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **7**	BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Borehole Backfill
		4" Asphalt					
		7" Aggregate Base (AB)					
	ML	ARTIFICIAL FILL: **SANDY SILT** ; ML; 2.5Y 3/1 very dark gray; 4.3% fine gravel; 43.8% very fine to coarse grained sand; 51.9% non-plastic fines; moist; hydrocarbon odor present; staining present (FILL)	B1-BULK	MDD			3 Feet Concrete Cap
			0938 B1-2	SA			
5	SM	YOUNG ALLUVIUM (Qya): **SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 85% very fine to medium grained sand; 15% non-plastic fines; moist; hydrocarbon odor present; staining present (NATIVE)	0945 B1-5		6 6 5		
7 ∇		80% very fine to medium grained sand; 20% non-plastic fines; wet; loose below 7 feet.	0947 B1-7		0 1 1		
10			0951 B1-10	MD	1 1 2		Backfilled With Cement/ Bentonite Grout
15		10YR 3/4 dark yellowish brown; 85% very fine to fine grained sand; 15% non-plastic fines below 15 feet.	0955 B1-15		0 1 2		
	CH	**FAT CLAY** ; CH; 2.5Y 3/1 very dark gray; 5% very fine grained sand; 95% high plasticity fines; wet; soft; no odor; no staining					
20	SM	**SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 74.5% very fine to fine grained sand; 25.5% non-plastic fines; wet; very loose.	1000 B1-20	SA, MD	1 2 4		

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-1**

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7**
BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CONT'D):							
25			2.5Y 3/2 very dark grayish brown; 86.3 percent fine to medium grained sand; 13.7% fines; medium dense below 25 feet.	X	1004 B1-25	SA	4 4 7		25	
30			80% very fine to fine grained sand; 20% non-plastic fines; loose below 30 feet.	X	1010 B1-30		3 4 4		30	
35				X	1017 B1-35		3 4 6		35	Backfilled With Cement/ Bentonite Grout
40		SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; loose; no odors; no staining	X	1024 B1-40		2 3 3		40	
		CH	**FAT CLAY** ; CH; 2.5Y 3/1 very dark gray; 5% very fine grained sand; 95% high plasticity fines; moist; firm; no odor; no staining							
		SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; loose; no odors; no staining							

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

B-1

Stantec

NORTHING (ft): | EASTING (ft):
LATITUDE: | LONGITUDE:
GROUND ELEV (ft): | TOC ELEV (ft):
INITIAL DTW (ft): **7** | BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55** | WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** | BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** | CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
		YOUNG ALLUVIUM (Qya) (CONT'D):	1032 B1-45		1 3 3			
	CH	**FAT CLAY** ; CH; 2.5Y 3/2 very dark grayish brown; 10% very fine grained sand; 90% high plasticity fines; moist; firm; no odors; no staining						
50	SM	**SILTY SAND** ; SM; 2.5Y 3/2 very dark grayish brown; 85% very fine to fine grained sand; 15% non-plastic fines; moist; loose; no staining; no odor.	1038 B1-50		2 4 5		50	
55		Wet/ saturated; very loose below 55 feet.	1045 B1-55		0 1 1		55	Backfilled With Cement/ Bentonite Grout
60		Medium dense below 60 feet.	1057 B1-60		1 5 14		60	
	SC	**CLAYEY SAND** ; SC; 2.5Y 3/2 very dark grayish brown; 80% very fine to medium grained sand; 20% medium plasticity fines; very stiff; no staining; no odor						
65	SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; wet; medium dense; no odors; no staining.	1104 B1-65		5 8 13		65	
	CL	VERY OLD PARALIC DEPOSITS (Qvop): **SANDY LEAN CLAY** ; CL; 10YR 3/2 very dark grayish brown; 35% very fine to fine grained sand; 65% medium plasticity fines;						

PROJECT: **Chevron 9-2239**	WELL / PROBEHOLE / BOREHOLE NO:
LOCATION: **2959 Midway Ave. San Diego, CA**	**B-1** PAGE 4 OF 4
PROJECT NUMBER: **185850087**	
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**	NORTHING (ft): / EASTING (ft):
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**	LATITUDE: / LONGITUDE:
DRILLING COMPANY: **ABC Liovin Drilling**	GROUND ELEV (ft): / TOC ELEV (ft):
DRILLING EQUIPMENT: **CME 75**	INITIAL DTW (ft): **7** / BOREHOLE DEPTH (ft): **71.5**
DRILLING METHOD: **Hollow Stem Auger**	STATIC DTW (ft): **55** / WELL DEPTH (ft): **---**
SAMPLING EQUIPMENT: **Split Spoon**	WELL CASING DIAMETER (in): **---** / BOREHOLE DIAMETER (in): **8**
	LOGGED BY: **M. Sapp** / CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			very stiff; dry; no staining; no odor							
70		SM	**SILTY SAND** ; SM; 2.5Y 3/2 very dark grayish brown; 83.4% very fine to fine grained sand; 16.3% non-plastic fines; wet; dense; no odors; no staining.	X	1119 B1-70	SA	2 17 29		70	Backfilled With Cement/ Bentonite Grout
		SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 15% coarse gravel; 70% very fine to fine grained sand; 15% non-plastic fines; wet; medium dense; no odors; no staining.							
			Hole terminated at 71.5 feet.							
75									75	
80									80	
85									85	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
B-2 PAGE 1 OF 4

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7**
BOREHOLE DEPTH (ft): **81.5**
STATIC DTW (ft): **41**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			4" Asphalt							
		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to medium grained sand; 15% non-plastic fines; moist; medium dense; hydrocarbon odor present; staining present		B2-BULK 0917 B2-2	MD	6 7 9			3 Feet Concrete Cap
5		SP-SM	YOUNG ALLUVIUM (Qya): **POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 dark olive brown; 90% very fine to fine grained sand; 10% non-plastic fines; moist; loose; no odor; no staining		0921 B2-5	#200, AL	1 2 2		5	
		ML	**SANDY SILT** ; ML; 10YR 3/4 dark yellowish brown; 23% very fine grained sand; 77% non-plastic fines; wet; soft; no staining; no odor		0928 B2-7		1 2 2		∇	
10		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 75% very fine to fine grained sand; 25% non-plastic fines; wet; very loose; no odor; no staining		0939 B2-10		1 1 2		10	Backfilled With Cement/ Bentonite Grout
15		CH	**FAT CLAY** ; CH; 10YR 3/1 very dark gray; 98% very fine grained sand; 2% high plasticity fines; wet; soft; no odor; no staining		0944 B2-15	MD, #200, AL	1 1 2		15	
20		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to medium grained sand; 15% non-plastic fines; wet; very loose; hydrocarbon odor present; staining present		0948 B2-20		0 1 2		20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

B-2

Stantec

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7**
STATIC DTW (ft): **41**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **M. Sapp**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **81.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CONT'D):							
25			Very loose, shells present below 25 feet.		0953 B2-25		2 1 3		25	
30			80% very fine to medium grained sand; 20% non-plastic fines; loose below 30 feet.		0959 B2-30		1 3 7		30	
35		CH	**FAT CLAY WITH SAND** ; CH; 2.5Y 3/3 dark olive brown; 25% very fine to coarse grained sand; 75% high plasticity fines; wet; soft; no odors; no staining		1004 B2-35		2 2 2		35	Backfilled With Cement/ Bentonite Grout
		ML	**SILT WITH SAND** ; ML; 2.5Y 3/3 dark olive brown; 25% very fine grained sand; 75% non-plastic fines; wet; soft; no odors; no staining							
40		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 70% very fine to fine grained sand; 30% non-plastic fines; wet; medium dense; no odor; no staining		1015 B2-40		2 5 8		40	

PROJECT: **Chevron 9-2239**	WELL / PROBEHOLE / BOREHOLE NO: **B-2** PAGE 3 OF 4
LOCATION: **2959 Midway Ave. San Diego, CA**	NORTHING (ft):
PROJECT NUMBER: **185850087**	EASTING (ft):
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**	LATITUDE:
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**	LONGITUDE:
DRILLING COMPANY: **ABC Liovin Drilling**	GROUND ELEV (ft):
DRILLING EQUIPMENT: **CME 75**	TOC ELEV (ft):
DRILLING METHOD: **Hollow Stem Auger**	INITIAL DTW (ft): **7**
SAMPLING EQUIPMENT: **Split Spoon**	BOREHOLE DEPTH (ft): **81.5**
	STATIC DTW (ft): **41**
	WELL DEPTH (ft): **---**
	WELL CASING DIAMETER (in): **---**
	BOREHOLE DIAMETER (in): **8**
	LOGGED BY: **M. Sapp**
	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
		SW-SM	YOUNG ALLUVIUM (Qya) (CONT'D): **WELL GRADED SAND WITH SILT** ; SW-SM; 2.5Y 3/3 dark olive brown; 90% fine to coarse grained sand; 10% non-plastic fines; wet; medium dense; no odors; no staining	X	1022 B2-45		2 4 6			
50		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 60% very fine to fine grained sand; 40% non-plastic fines; wet; very loose; no staining; no odor; shells present.	X	1148 B2-50		1 1 3		50	
55			80% fine to coarse grained sand; 20% non-plastic fines; loose below 55 feet.	X	1155 B2-55		1 3 5		55	Backfilled With Cement/ Bentonite Grout
60		SP	**POORLY GRADED SAND** ; SP; 2.5Y 3/3 dark olive brown; 98% very fine to medium grained sand; 2% non-plastic fines; wet; medium dense.	X	1204 B2-60	SA	4 5 5		60	
			VERY OLD PARALIC DEPOSITS:							
65				X	1211 B2-65		3 11 13		65	

PROJECT: **Chevron 9-2239**		WELL / PROBEHOLE / BOREHOLE NO:	
LOCATION: **2959 Midway Ave. San Diego, CA**		**B-2** PAGE 4 OF 4	
PROJECT NUMBER: **185850087**		NORTHING (ft):	EASTING (ft):
DRILLING: STARTED **4/7/17**	COMPLETED: **4/7/17**	LATITUDE:	LONGITUDE:
INSTALLATION: STARTED **4/7/17**	COMPLETED: **4/7/17**	GROUND ELEV (ft):	TOC ELEV (ft):
DRILLING COMPANY: **ABC Liovin Drilling**		INITIAL DTW (ft): **7**	BOREHOLE DEPTH (ft): **81.5**
DRILLING EQUIPMENT: **CME 75**		STATIC DTW (ft): **41**	WELL DEPTH (ft): **---**
DRILLING METHOD: **Hollow Stem Auger**		WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **8**
SAMPLING EQUIPMENT: **Split Spoon**		LOGGED BY: **M. Sapp**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
70				X	1222 B2-70		0 7 12		70	
75			95% very fine to medium grained sand; 5% non-plastic fines; medium dense below 75 feet.	X	1244 B2-75	SA	7 8 18		75	Backfilled With Cement/ Bentonite Grout
80			Dense below 80 feet.	X	1307 B2-80		7 18 21		80	
			Hole terminated at 81.5 feet.							
85									85	

PROJECT: **Chevron 9-2239**		WELL / PROBEHOLE / BOREHOLE NO: **P-1**	PAGE 1 OF 1
LOCATION: **2959 Midway Ave. San Diego, CA**		NORTHING (ft):	EASTING (ft):
PROJECT NUMBER: **185850087**		LATITUDE:	LONGITUDE:
DRILLING: STARTED **4/3/17**	COMPLETED: **4/3/17**	GROUND ELEV (ft):	TOC ELEV (ft):
INSTALLATION: STARTED **4/3/17**	COMPLETED: **4/3/17**	INITIAL DTW (ft): **NE**	BOREHOLE DEPTH (ft): **6.5**
DRILLING COMPANY: **ABC Liovin Drilling**		STATIC DTW (ft): **NE**	WELL DEPTH (ft): **---**
DRILLING EQUIPMENT: **CME 75**		WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **8**
DRILLING METHOD: **Hollow Stem Auger**		LOGGED BY: **M. Sapp**	CHECKED BY: **J. Fischer**
SAMPLING EQUIPMENT: **Split Spoon**			

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			4" Asphalt							
			7" AB							Backfilled with bentonite.
		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 10YR 3/3 dark brown; 85% very fine to medium grained sand; 20% non-plastic fines; moist; medium dense; no odor; no staining		1358 P1-2	SA	4 8 8			Backfilled with gravel pack.
5			85% very fine to fine grained sand; 15% non-plastic fines; moist; very loose below 5 feet.		1406 P1-5		1 1 1		5	Backfilled with bentonite.
			Hole terminated at 6.5 feet.							
10									10	
15									15	
20									20	

PROJECT: **Chevron 9-2239**	WELL / PROBEHOLE / BOREHOLE NO: **P-2** PAGE 1 OF 1
LOCATION: **2959 Midway Ave. San Diego, CA**	
PROJECT NUMBER: **185850087**	
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**	NORTHING (ft): / EASTING (ft):
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**	LATITUDE: / LONGITUDE:
DRILLING COMPANY: **ABC Liovin Drilling**	GROUND ELEV (ft): / TOC ELEV (ft):
DRILLING EQUIPMENT: **CME 75**	INITIAL DTW (ft): **NE** / BOREHOLE DEPTH (ft): **6.5**
DRILLING METHOD: **Hollow Stem Auger**	STATIC DTW (ft): **NE** / WELL DEPTH (ft): **---**
SAMPLING EQUIPMENT: **Split Spoon**	WELL CASING DIAMETER (in): **---** / BOREHOLE DIAMETER (in): **8**
	LOGGED BY: **M. Sapp** / CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			7" Asphalt							
		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to fine grained sand; 15% non-plastic fines; moist; loose; no odor; no staining (FILL)		0742 P2-2		3 3 2			Backfilled with bentonite. Backfilled with gravel pack.
5			No recovery, very loose.				1 2 2		5	Backfilled with bentonite.
			Hole terminated at 6.5 feet.							
10									10	
15									15	
20									20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

GT-1

Stantec

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **17** BOREHOLE DEPTH (ft): **61.5**
STATIC DTW (ft): **15.5** WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC** CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			4" Asphalt							3' Concrete Cap
1320		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 10YR 3/3 dark brown; 60% fine grained sand; 40% fines; moist; no odors; no staining		1320 GT1-2		--	--		
1335 5			...same as above ; 2.5Y 3/3 dark olive brown; 55.4% fine grained sand; 44.4% fines; 0.1% fine gravel; loose		1335 GT1-5	SA	2 2 2	--	5	
1338		SC	YOUNG ALLUVIUM (Qya): **CLAYEY SAND** ; SC; 2.5Y 3/3 dark olive brown; 58.4% fine grained sand; 41.6% fines; moist; very loose; no odors; no staining		1338 GT1-7	DS	0 0 6	--		
1342 10		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 80% fine grained sand; 20% fines; wet; very loose; no odors; no staining		1342 GT1-10	SA	0 1 2	--	10	
1350 15		CH	**CLAY** ; CH; 2.5Y 2.5/1 black; high plasticity; 96.3% fines; 3.7% fine grained sand; wet; soft; moderate odor; no staining		1350 GT1-15	HA, AL, DS, M	1 2 2	--	15	
1355 20		SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 55% fine grained sand; 45% fines; wet; loose; slight odor; no staining		1355 GT1-20		2 4 5	--	20	Backfilled With Cement/ Bentonite Grout
1400 25		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; poorly graded; 87.9% fine grained sand; 12.9% fines; wet; loose to medium dense; no odors; no staining		1400 GT1-25	HA, AL, M	4 5 5	--	25	
1406 30			...same as above ; loose		1406 GT1-30		2 3 3	--	30	
1412 35		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 54.4% fine grained sand; 45.6% fines; wet; loose; no odors; no staining		1412 GT1-35	HA, AL, M	0 2 2	--	35	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **GT-1**

Stantec

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **17**	BOREHOLE DEPTH (ft): **61.5**
STATIC DTW (ft): **15.5**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CNT'D):							
1417 40		CH	**CLAY** ; CH; 2.5Y 2.5/1 black; high plasticity; 90% fines; 10% fine grained sand; wet; soft; no odors; no staining		1417 GT1-40		0 1 1	--	40	
1425 45			...same as above ; 85.1% fines; 14.9% fines grained sand; very soft		1425 GT1-45	HA, AL, M	0 0 1	--	45	
1433 50			...same as above ; high plasticity; 95% fines; 5% fine grained sand; firm		1433 GT1-50		2 3 4	--	50	Backfilled With Cement/ Bentonite Grout
1441 55		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; poorly graded; 85.7% fine grained sand; 14.3% fines; wet; loose; no odors; no staining		1441 GT1-55	HA, AL, M	0 3 6	--	55	
1451 60		SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; wet; medium dense; no odors; no staining		1451 GT1-60		3 5 8	--	60	
			VERY OLD PARALIC DEPOSITS (Qvop):							
1505 65			...same as above; 2.5Y 3/3 dark olive brown; 53.7% fine grained sand; 46.3% fines; medium dense		1505 GT1-65	HA, AL, M	8 10 19	--	65	
1520 70		SM	**SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 80% fine grained sand; 20% fines; wet; very dense; no odors; no staining		1520 GT1-70		33 50-4"	--	70	
75			Groundwater encountered @ ~17' BGS. Static depth to water ~15.5' BGS. Hole terminated at 71.5 feet.						75	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

GT-2

Stantec

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **20**	BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **25**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			4" Asphalt							3' Concrete Cap
0850		SC	ARTIFICIAL FILL: **CLAYEY SAND** ; SC; 10YR 3/1 very dark gray; low plasticity; 53.2% fines; 46.8% fine grained sand; moist; slight odor; no staining		0850 GT2-2	#200	--	--		
0903 5		SM	**SILTY SAND** ; SM; 10YR 2/2 very dark brown; 65% fine grained sand; 35% fines; moist; very loose; slight odor; no staining		0903 GT2-5	MD	2 2 3	--	5	
0907		CL	YOUNG ALLUVIUM (Qya): **CLAY** ; CL; 2.5Y 3/3 very dark grayish brown; medium plasticity; 80.8% fines; 19.2% fine grained sand; wet; soft; strong petroleum hydrocarbon odor; no staining		0907 GT2-7	#200	0 1 1	--		
0910 10		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 60% fine grained sand; 40% fines; wet; very loose; strong petroleum hydrocarbon odor; no staining		0910 GT2-10	DS	2 2 3	--	10	
0919 15		CL	**CLAY** ; CL; 2.5Y 2.5/1 black; high plasticity; 95% fines; 5% fine grained sand; wet; soft; slight petroleum hydrocarbon odor; no staining		0919 GT2-15		0 1 1	--	15	
0924 20		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; wet; medium dense; no odors; no staining		0924 GT2-20	MD	3 6 11	--	20	Backfilled With Cement/ Bentonite Grout
0929 25			...same as above ; loose		0929 GT2-25		3 3 3	--	25	
0934 30		SP	**SAND** ; SP; 2.5Y 2.5/1 black; 95% fine grained sand; 5% fines; trace shell fragments; wet; very loose; no odors; no staining		0934 GT2-30		1 1 1	--	30	
0940 35		CL	**CLAY** ; CL; 2.5Y 2.5/1 black; low plasticity; 95% fines; 5% fine grained sand; wet; firm; no odors; no staining		0940 GT2-35		3 3 3	--	35	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

GT-2

Stantec

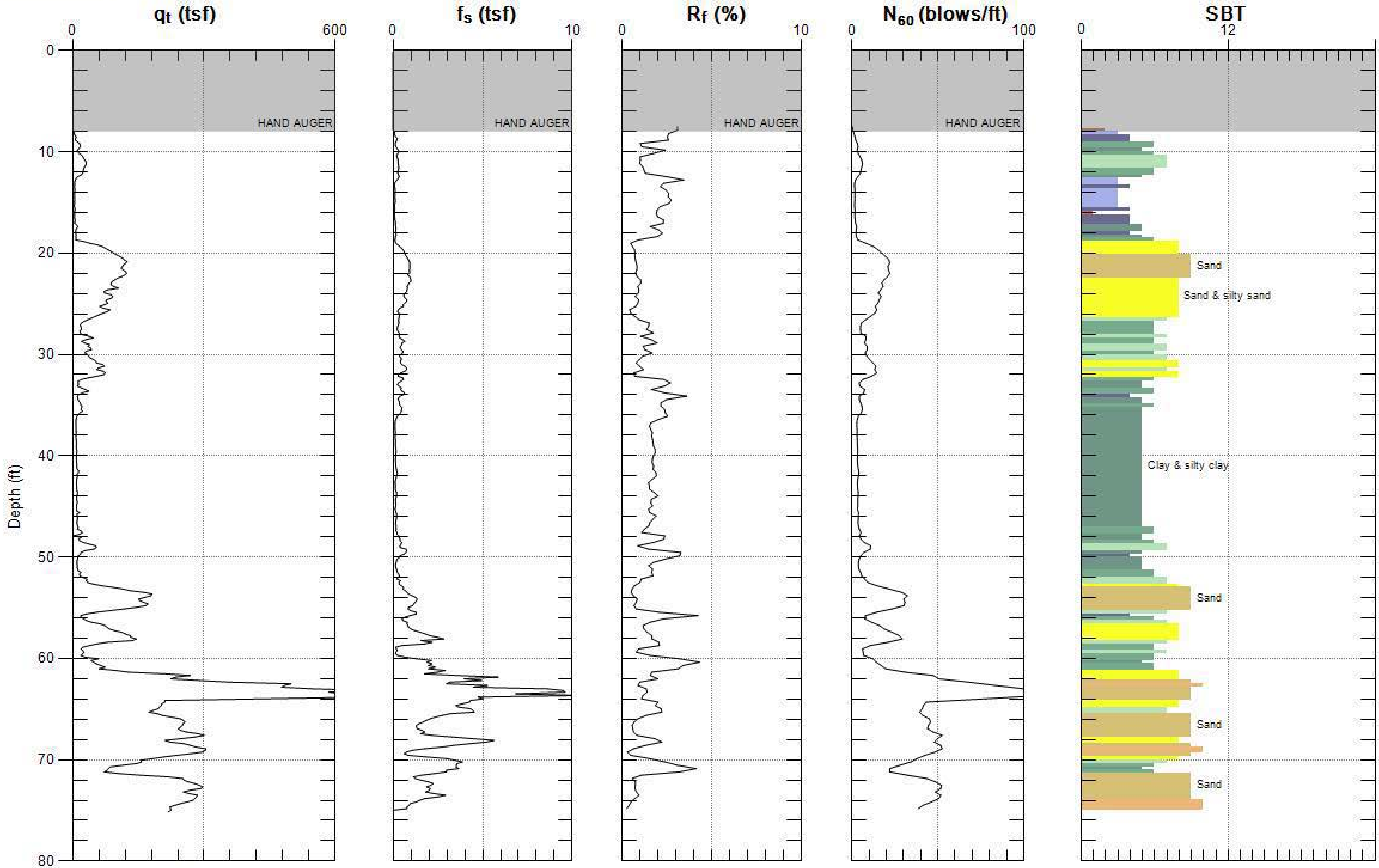
NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **20** BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **25** WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC** CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CNT'D):							
0946 40		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 80% fine grained sand; 20% fines; trace shell fragments; wet; very loose; no odors; no staining		0946 GT2-40		1 1 1	--	40	
0958 45		CL	**CLAY** ; CL; 2.5Y 2.5/1 black; high plasticity; 95% fines; 5% fine grained sand; moist; soft; no odors; no staining		0958 GT2-45		1 1 2	--	45	
1007 50			...same as above ; 90% fines; 10% fine grained sand; trace shell fragments; wet; stiff		1007 GT2-50		3 5 6	--	50	Backfilled With Cement/ Bentonite Grout
1029 55		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; trace shell fragments; wet; very loose; no odors; no staining		1029 GT2-55		0 0 1	--	55	
1040 60		SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 60% fine grained sand; 40% fines; wet; medium dense; no odors; no staining		1040 GT2-60		4 6 6	--	60	
			Groundwater encountered @ ~ 20' BGS. Static depth to water ~ 25'.							
65									65	
70									70	
			Hole terminated at 71.5 feet.							
75									75	

APPENDIX B
CONE PENETROMETER SOUNDINGS

STANTEC CONSULTING

Site: CHEVRON 9-2239
Sounding: CPT-1
Engineer: M.SAPP
Date: 4/7/17 11:20



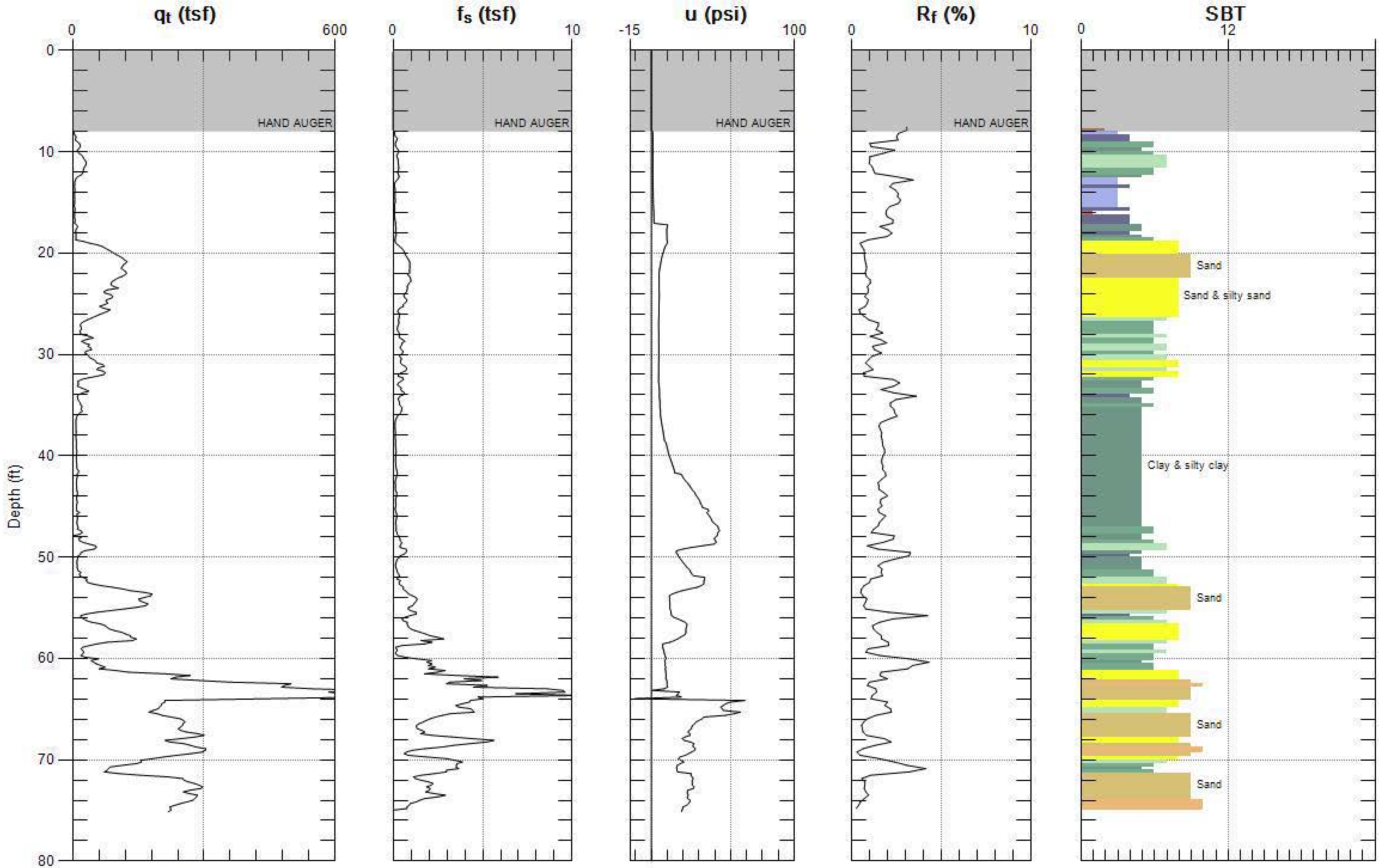
Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

STANTEC CONSULTING

Site: CHEVRON 9-2239
Sounding: CPT-1
Engineer: M.SAPP
Date: 4/7/17 11:20

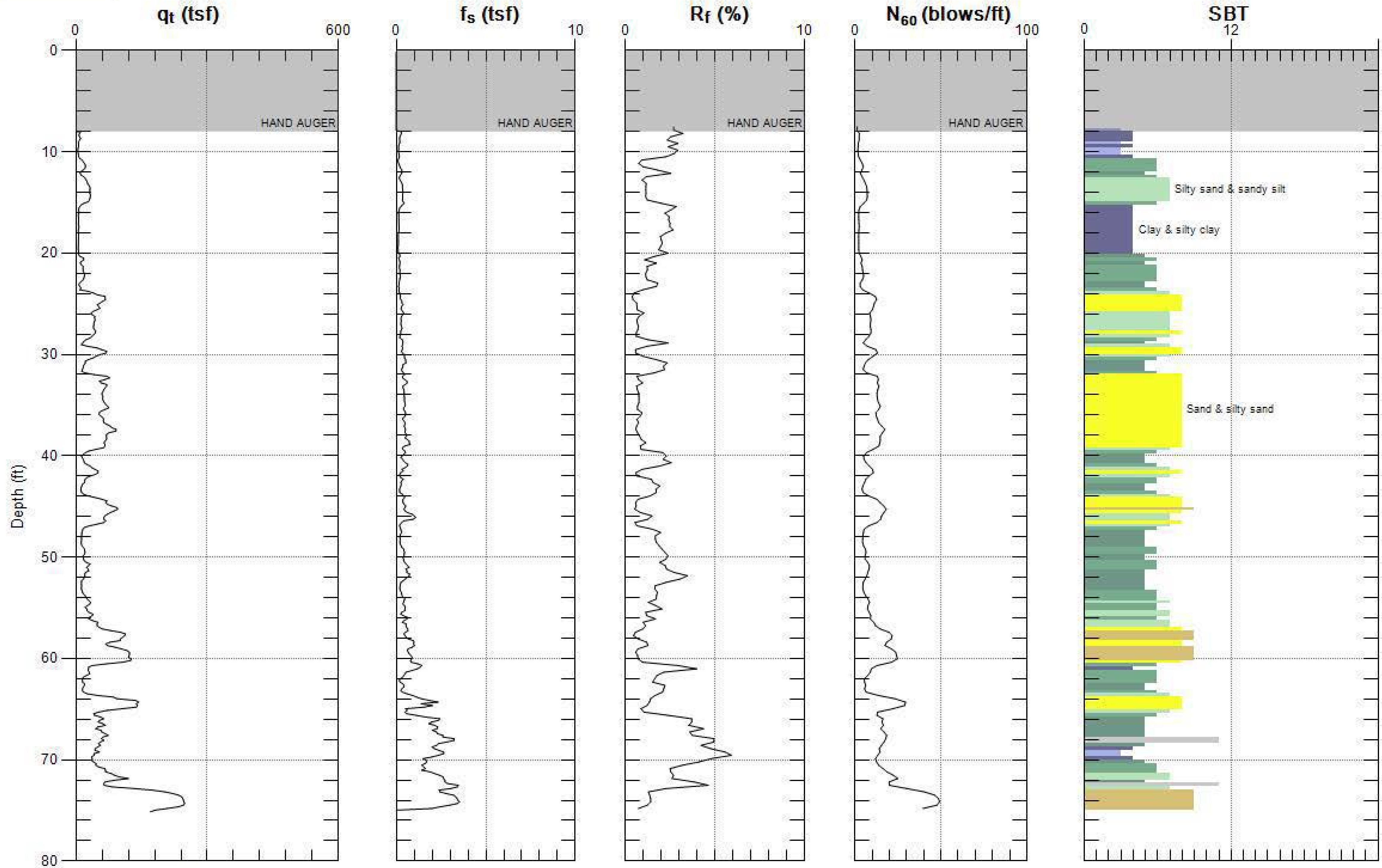


Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

STANTEC CONSULTING

Site: CHEVRON 9-2239
Sounding: CPT-3
Engineer: M.SAPP
Date: 4/7/17 07:12

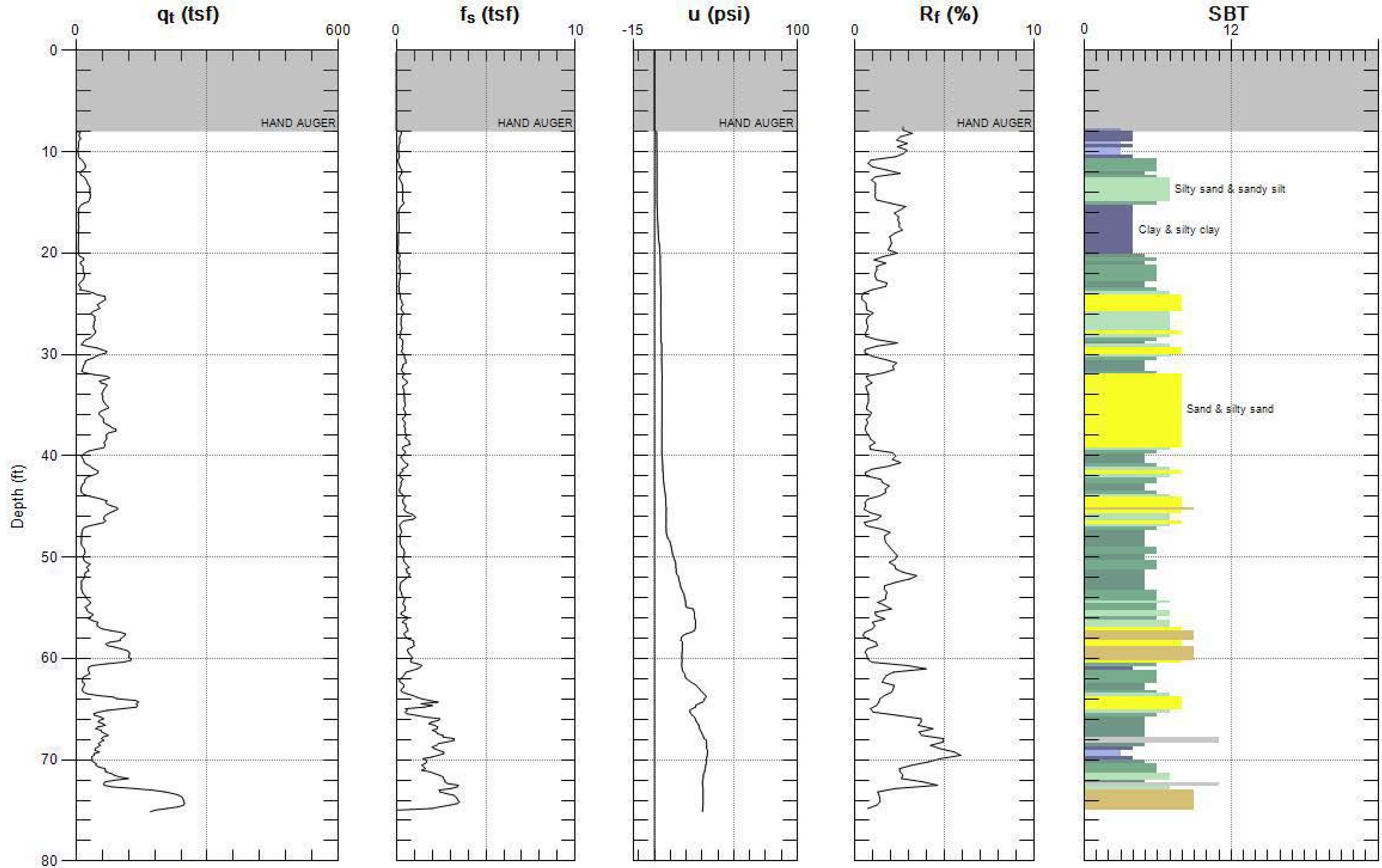


Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

STANTEC CONSULTING

Site: CHEVRON 9-2239
Sounding: CPT-3
Engineer: M.SAPP
Date: 4/7/17 07:12



Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

APPENDIX C
LABORATORY TEST RESULTS

Stantec

SUMMARY OF SOIL DENSITY TEST RESULTS

ASTM D 2216

Boring Location	Sample Depth (ft)	Wet Density (lb/ft^3)	Dry Density (lb/ft^3)	Moisture Content (percent)
B1-10	10	117.7	90.0	30.9
B1-20	20	119.3	88.1	35.4
B2-2	2	142.2	128.8	10.4
B2-15	15	109.2	69.7	56.7
GT2-5	5	106.0	86.3	22.5
GT2-20	20	124.3	99.5	25.0

Gradation Analysis
ASTM D 422

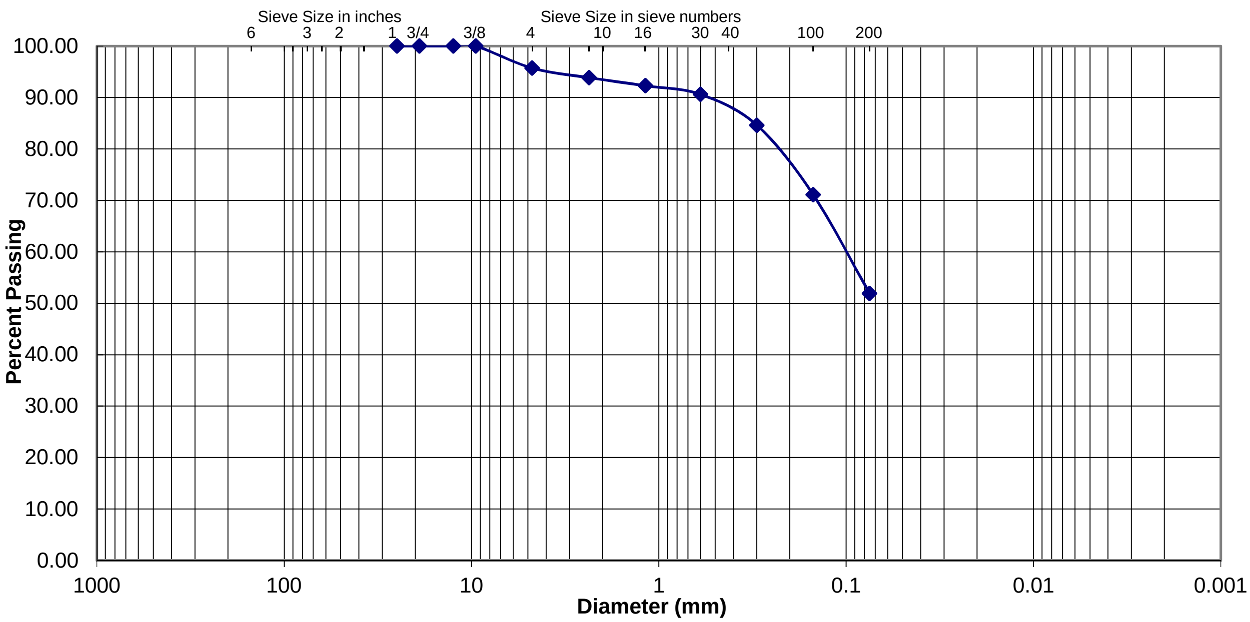
Project Name	Chevron 9-2239	Project Number	185850087
Source	B1-2'	Lab ID	B1-2
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	Angular	Test Date	04-18-2017
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	277.80		
Moisture Content (%)	16.8		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	11.90	4.3	95.7
No. 8	5.20	1.9	93.8
No. 16	4.30	1.5	92.3
No. 30	4.70	1.7	90.6
No. 50	16.60	6.0	84.6
No. 100	37.50	13.5	71.1
No. 200	53.40	19.2	51.9
Pan	144.20	51.9	---

% Gravel	4.3
% Sand	43.8
% Fines	51.9
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name	Chevron 9-2239	Project Number	185850087
Source	B1-20'	Lab ID	B1-20
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	N/A	Test Date	04-18-2017
Particle Hardness	N/A		
Sample Dry Mass (g)	286.00		
Moisture Content (%)	35.4		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.00	0.0	100.0
No. 16	0.00	0.0	100.0
No. 30	0.60	0.2	99.8
No. 50	21.80	7.6	92.2
No. 100	72.90	25.5	66.7
No. 200	117.70	41.2	25.5
Pan	73.00	25.5	---

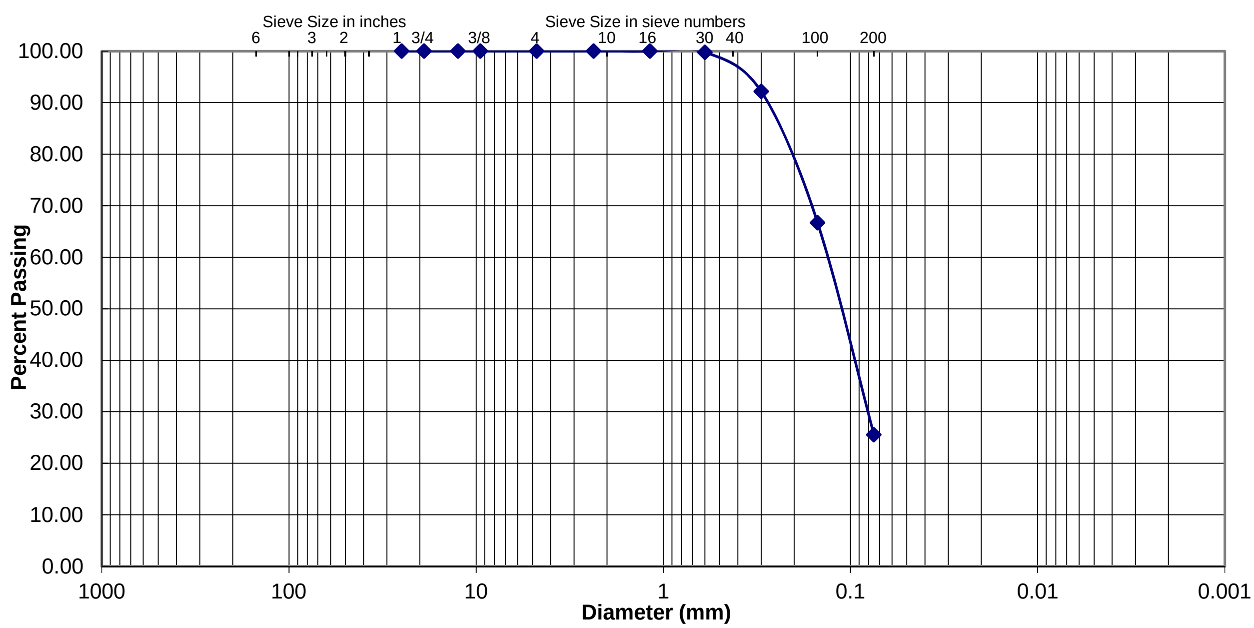
% Gravel	0.0
% Sand	74.5
% Fines	25.5
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source B1-25'

Project Number 185850087
Lab ID B1-25
Date Received 04-17-2017
Preparation Date 04-17-2017
Test Date 04-18-2017

Preparation Method ASTM D 1140 Method A
Particle Shape N/A
Particle Hardness N/A
Sample Dry Mass (g) 294.00
Moisture Content (%) 28.2

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.00	0.0	100.0
No. 16	0.00	0.0	100.0
No. 30	0.20	0.1	99.9
No. 50	26.60	9.0	90.9
No. 100	163.00	55.4	35.4
No. 200	63.80	21.7	13.7
Pan	40.40	13.7	---

% Gravel 0.0
% Sand 86.3
% Fines 13.7
Fines Classification ML

D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

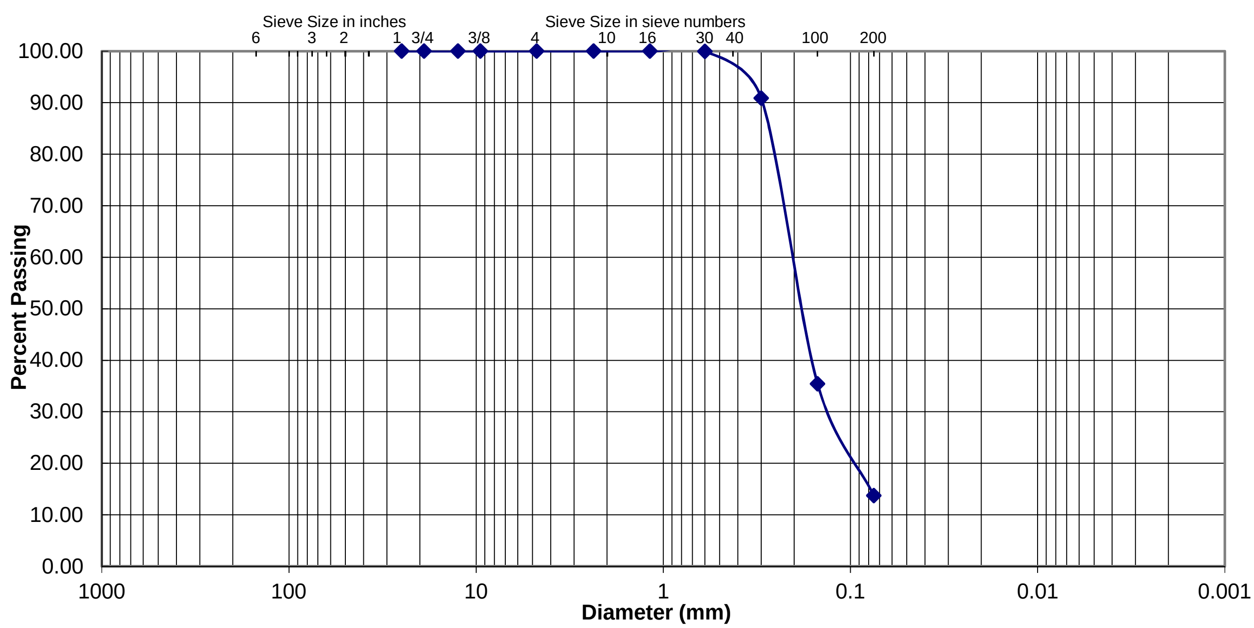
Cu N/A
Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source B1-70'

Project Number 185850087
Lab ID B1-70
Date Received 04-17-2017
Preparation Date 04-17-2017
Test Date 04-18-2017

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 301.70
Moisture Content (%) 25.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.90	0.3	99.7
No. 8	0.70	0.2	99.5
No. 16	1.10	0.4	99.1
No. 30	2.40	0.8	98.3
No. 50	26.40	8.8	89.6
No. 100	155.80	51.6	37.9
No. 200	65.20	21.6	16.3
Pan	49.20	16.3	---

% Gravel 0.3
% Sand 83.4
% Fines 16.3
Fines Classification ML

D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

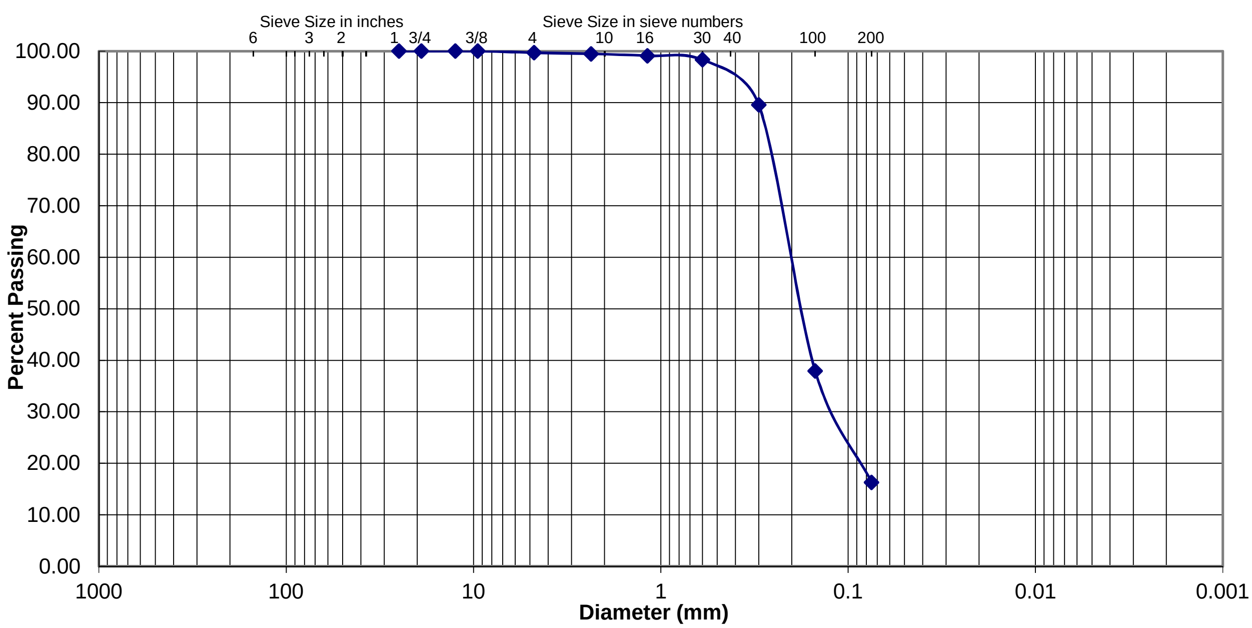
Cu N/A
Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Compaction Characteristics of Soil Using Modified Effort

ASTM D 1557 - Method A

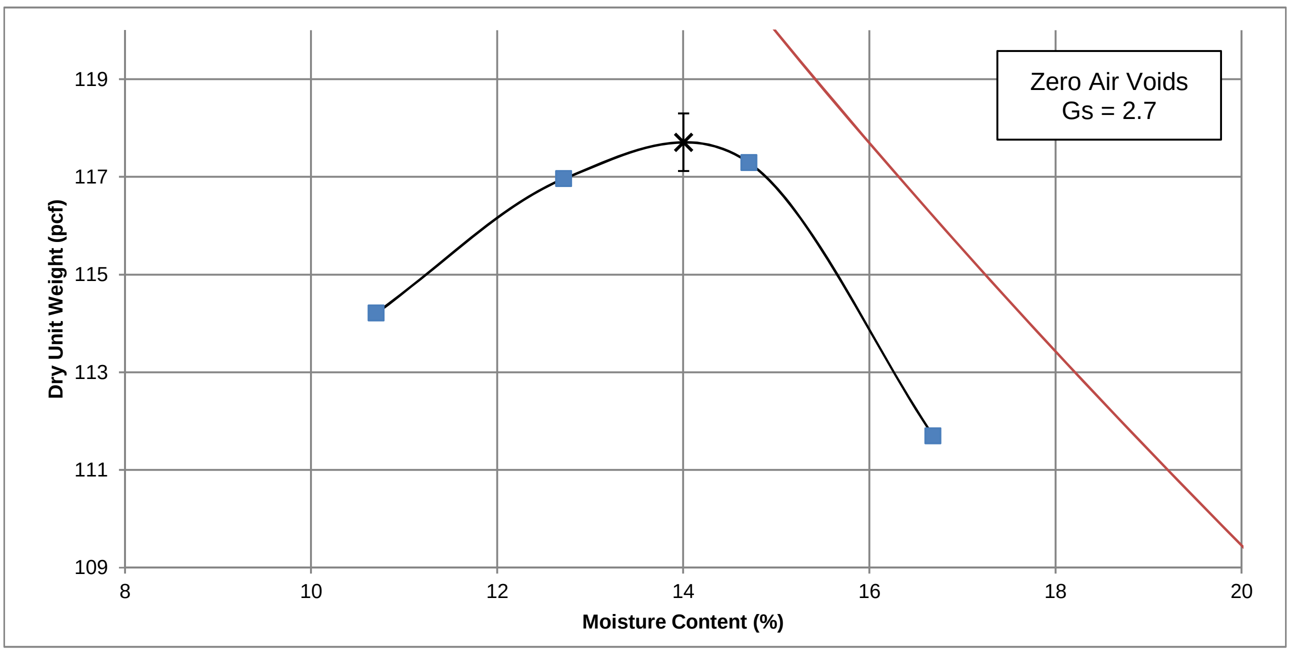
Stantec

Project	Chevron 9-2239	Project No.	185850087
Source	B1 - 1 to 5 feet	Sample ID	Bulk 1
Description	Silty Sand (SM) Dark Brown	Date Received	04/14/2017
Visual Notes		Date Tested	04/19/2017

Test Fraction (%)			Oversized Fraction (%)		
Gs of Test Fraction	2.7	Estimated	Gs of Oversized Fraction	2.7	ASTM C 127
Oversized Fraction Sieve	3/4"		MC of Oversized Fraction (%)	11.1	

Mold Weight (g) 4218.48 Preparation Method Moist Rammer Type Manual

Wet Soil & Mold Weight (g)	Wet Soil Weight (g)	Moisture Content Determination: Wet Soil & Tare (g)	Dry Soil & Tare (g)	Tare (g)	Water Content (%)	Dry Unit Weight (pcf)
6128	1910	311.40	281.30	0.00	10.7	114.2
6210	1991	286.30	254.00	0.00	12.7	117.0
6251	2032	330.70	288.30	0.00	14.7	117.3
6187	1969	280.40	240.30	0.00	16.7	111.7



Maximun Dry Unit Weight (pcf) **117.7**
Optimum Moisture Content (%) **14.0**

Corrected Maximun Dry Unit Weight (pcf) **N/A**
Corrected Optimum Moisture Content (%) **N/A**

Comments

Stantec

Materials Finer Than 75μm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	B2-7'	Lab ID	B2-7
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Test Date	04-18-2017

Initial Sample Wet Mass (g)	125.50	Moisture Content (%)	41.8
Initial Oven Dry Sample Mass (g)	88.50		
Final Oven Dry Sample Mass (g)	20.70		
Materials Finer Than 75μm (No. 200) Sieve (g)	67.80		
Percent Finer Than 75μm (No. 200) Sieve (%)	76.6		

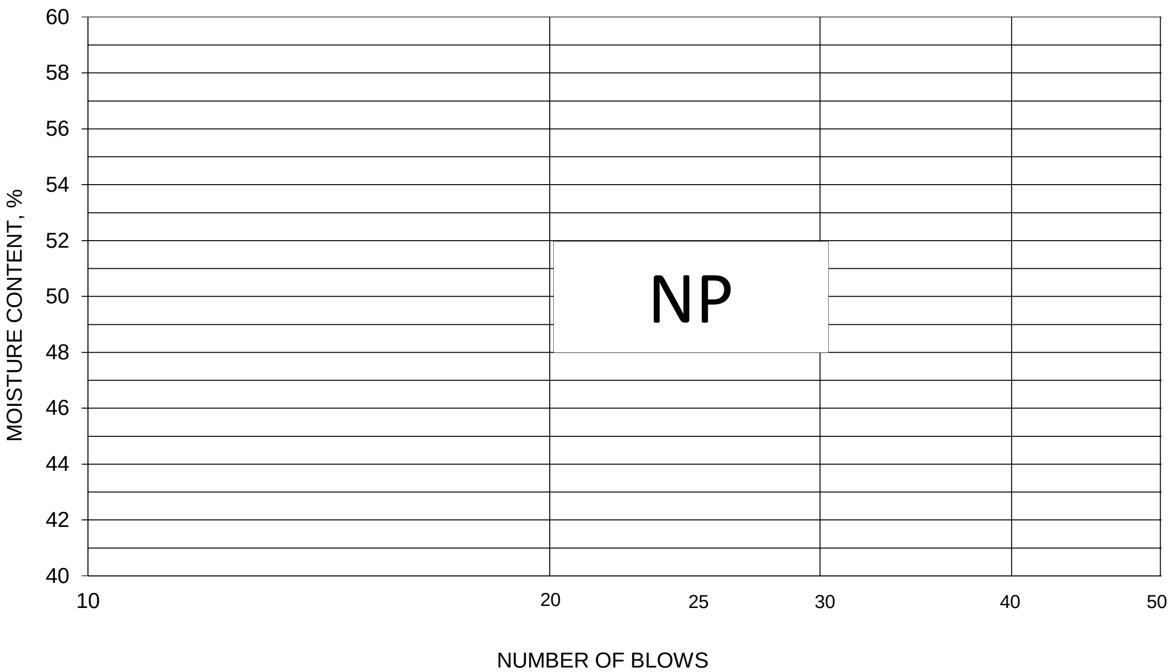
Comments

Reviewed By

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	B2-7'	Lab ID	B2-7
Tested By	JP	Test Method	ASTM D 4318
% + No. 40	0		
Test Date	04-20-2017	Prepared	Dry
Date Received	04-17-2017		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
					0



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: ______________________

Reviewed By ______________________

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	B2-15'	Lab ID	B2-15
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Test Date	04-18-2017

Initial Sample Wet Mass (g)	223.60	Moisture Content (%)	56.6
Initial Oven Dry Sample Mass (g)	142.80		
Final Oven Dry Sample Mass (g)	3.00		
Materials Finer Than 75µm (No. 200) Sieve (g)	139.80		
Percent Finer Than 75µm (No. 200) Sieve (%)	97.9		

Comments

Reviewed By

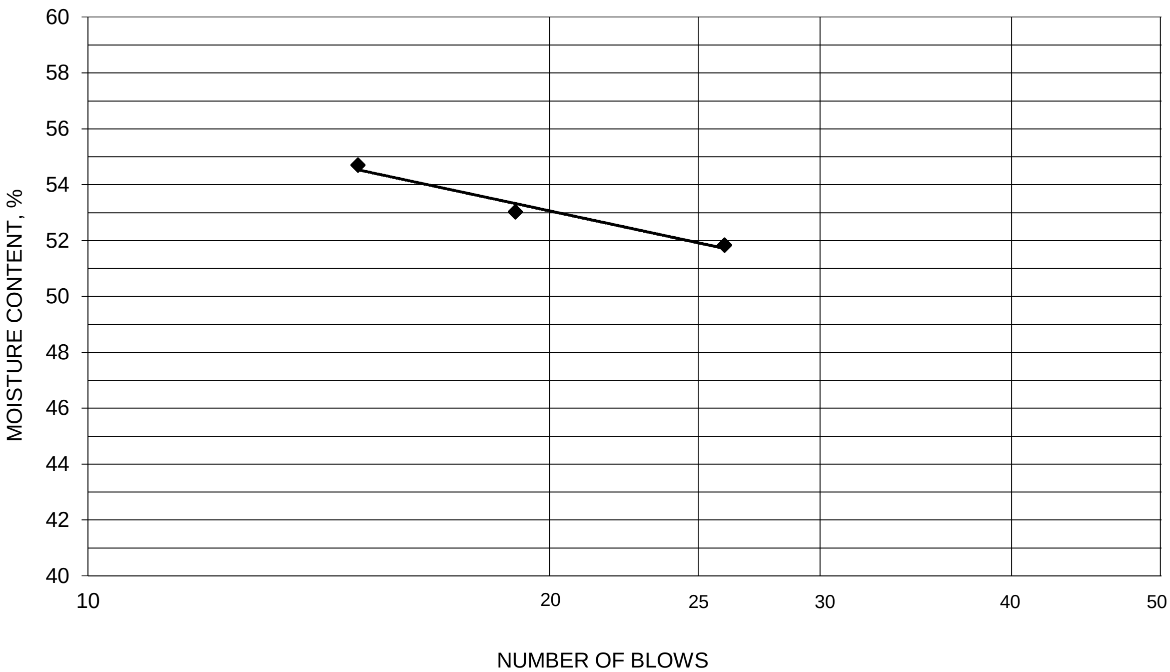
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239			Project No.	185850087
Source	B2-15'			Lab ID	B2-15
Tested By	JP	Test Method	ASTM D 4318	% + No. 40	0
Test Date	04-20-2017	Prepared	Dry	Date Received	04-17-2017

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
19.65	17.54	13.47	26	51.8	
20.96	18.60	14.15	19	53.0	
20.82	18.20	13.41	15	54.7	52

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
20.56	18.66	13.44	36.4	36	16

Remarks: __________

Reviewed By __________

Gradation Analysis
ASTM D 422

Stantec

Project Name	Chevron 9-2239	Project Number	185850087
Source	B2-60'	Lab ID	B2-60
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	Angular	Test Date	04-18-2017
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	294.00		
Moisture Content (%)	31.2		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.50	0.2	99.8
No. 16	2.40	0.8	99.0
No. 30	17.50	6.0	93.1
No. 50	86.00	29.3	63.8
No. 100	143.10	48.7	15.1
No. 200	38.90	13.2	1.9
Pan	5.60	1.9	---

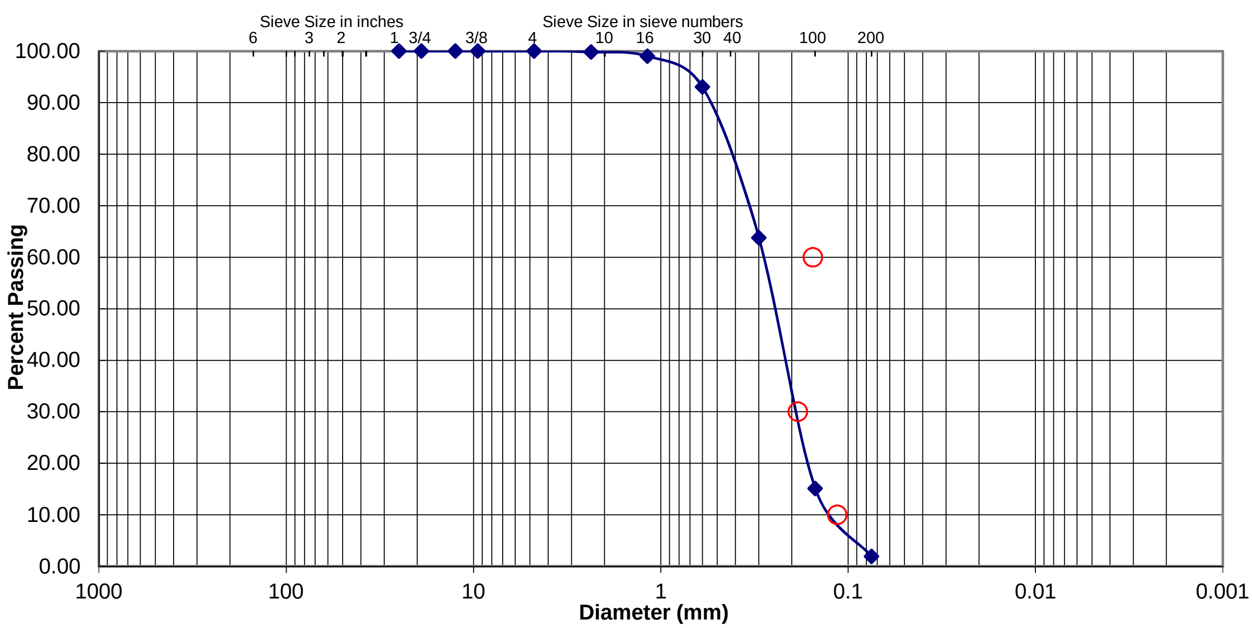
% Gravel	0.0
% Sand	98.1
% Fines	1.9
Fines Classification	ML
D_{10} (mm)	0.1146
D_{30} (mm)	0.1854
D_{60} (mm)	0.1542
Cu	1.35
Cc	1.94

Classification

Poorly Graded Sand (SP)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name	Chevron 9-2239
Source	B2-75'
Preparation Method	ASTM D 1140 Method A
Particle Shape	Angular
Particle Hardness	Hard and Durable
Sample Dry Mass (g)	306.30
Moisture Content (%)	18.8

Project Number	185850087
Lab ID	B2-75
Date Received	04-17-2017
Preparation Date	04-17-2017
Test Date	04-18-2017

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.40	0.1	99.9
No. 8	0.50	0.2	99.7
No. 16	5.90	1.9	97.8
No. 30	29.40	9.6	88.2
No. 50	126.60	41.3	46.8
No. 100	105.50	34.4	12.4
No. 200	23.60	7.7	4.7
Pan	14.40	4.7	---

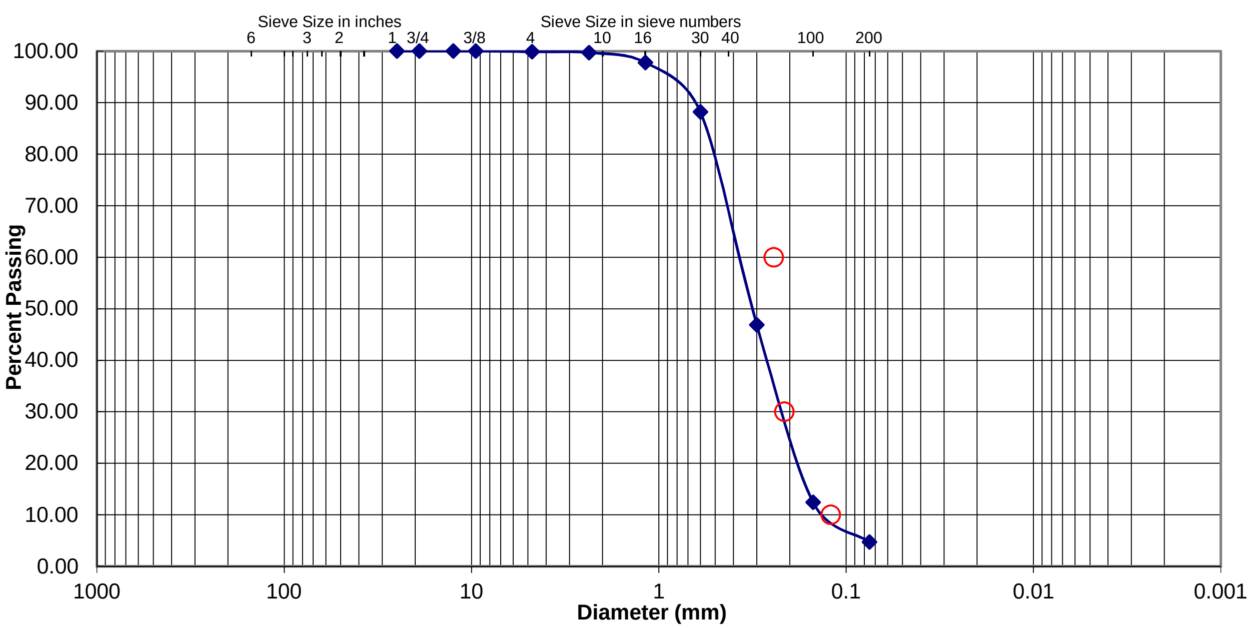
% Gravel	0.1
% Sand	95.2
% Fines	4.7
Fines Classification	ML
D_{10} (mm)	0.1208
D_{30} (mm)	0.2137
D_{60} (mm)	0.2440
Cu	2.02
Cc	1.55

Classification

Poorly Graded Sand (SP)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name	Chevron 9-2239
Source	P1-5'
Project Number	185850087
Lab ID	P1-5
Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A
Preparation Date	04-17-2017
Particle Shape	Angular
Test Date	04-18-2017
Particle Hardness	Hard and Durable
Sample Dry Mass (g)	300.10
Moisture Content (%)	17.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.10	0.0	100.0
No. 8	0.20	0.1	99.9
No. 16	0.20	0.1	99.8
No. 30	1.60	0.5	99.3
No. 50	31.50	10.5	88.8
No. 100	89.20	29.7	59.1
No. 200	73.70	24.6	34.5
Pan	103.60	34.5	---

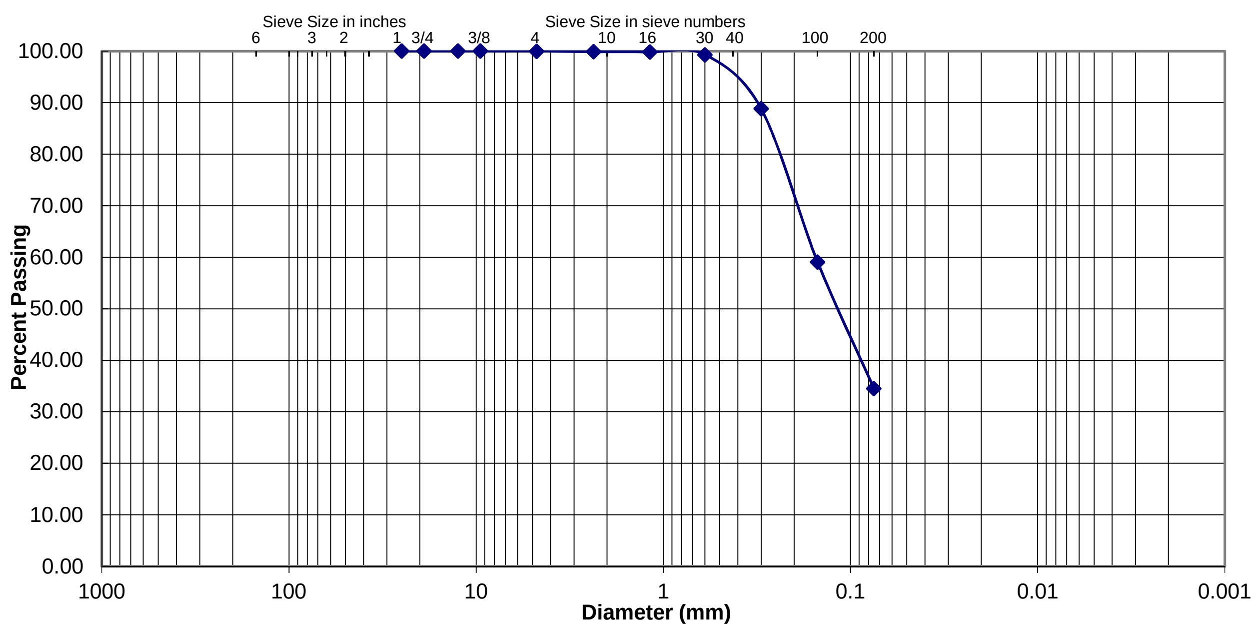
% Gravel	0.0
% Sand	65.4
% Fines	34.5
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	GT2-2	Lab ID	GT2-2
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Test Date	03-23-2015

Initial Sample Wet Mass (g)	492.10	Moisture Content (%)	15.3
Initial Oven Dry Sample Mass (g)	426.70		
Final Oven Dry Sample Mass (g)	199.70		
Materials Finer Than 75µm (No. 200) Sieve (g)	227.00		
Percent Finer Than 75µm (No. 200) Sieve (%)	53.2		

Comments

Reviewed By

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	GT2-7	Lab ID	GT2-7
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Test Date	03-23-2015

Initial Sample Wet Mass (g)	458.90	Moisture Content (%)	38.9
Initial Oven Dry Sample Mass (g)	330.30		
Final Oven Dry Sample Mass (g)	63.40		
Materials Finer Than 75µm (No. 200) Sieve (g)	266.90		
Percent Finer Than 75µm (No. 200) Sieve (%)	80.8		

Comments ______________________

Reviewed By ______________________

Stantec

Gradation Analysis
ASTM D 422

Project Name	Chevron 9-2239	Project Number	185850087
Source	GT1-5	Lab ID	GT1-5
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Preparation Date	03-23-2015
Particle Shape	Angular	Test Date	02-24-2015
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	375.60		
Moisture Content (%)	23.5		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.51	0.1	99.9
No. 8	0.20	0.1	99.8
No. 10	0.01	0.0	99.8
No. 20	0.45	0.1	99.7
No. 40	3.20	0.9	98.8
No. 50	10.28	2.7	96.1
No. 80	61.16	16.3	79.8
No. 100	34.15	9.1	70.7
No. 200	98.71	26.3	44.4
Pan	166.93	44.4	---

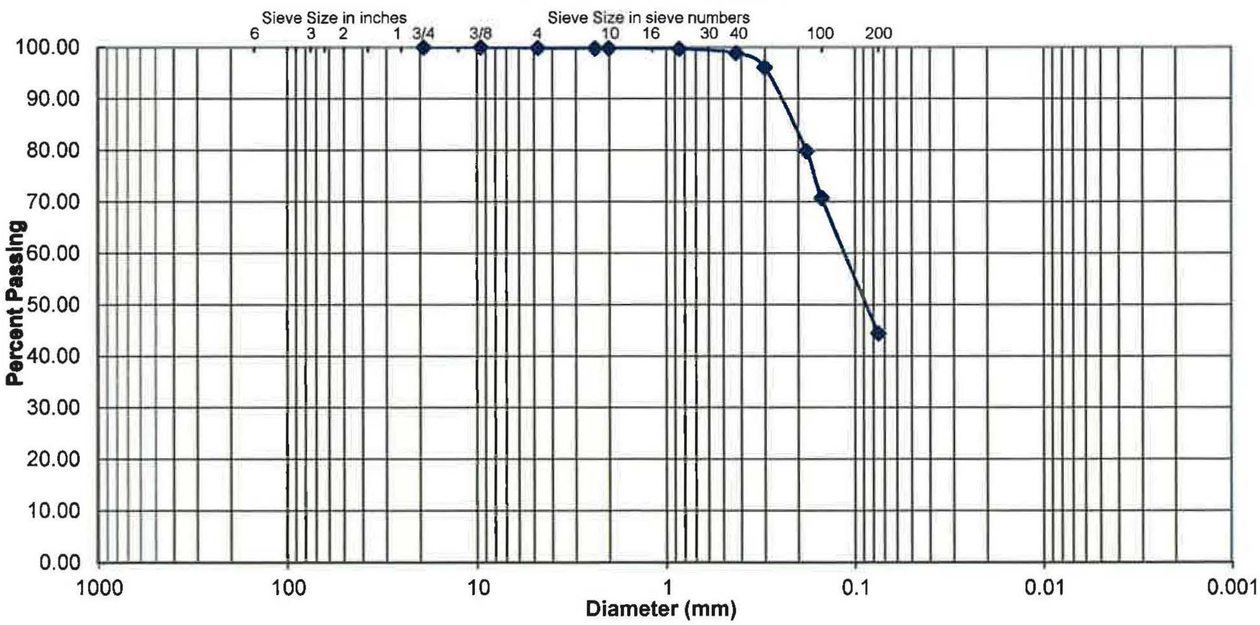
% Gravel	0.1
% Sand	55.4
% Fines	44.4
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source GT1-10

Project Number 185850087
Lab ID GT1-10
Date Received 03-23-2015
Preparation Date 03-23-2015
Test Date 02-24-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 346.10
Moisture Content (%) 35.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.22	0.1	99.9
No. 10	0.01	0.0	99.9
No. 20	0.11	0.0	99.9
No. 40	0.52	0.2	99.8
No. 50	2.77	0.8	99.0
No. 80	29.67	8.6	90.4
No. 100	55.78	16.1	74.3
No. 200	113.02	32.7	41.6
Pan	144.00	41.6	---

% Gravel 0.0
% Sand 58.4
% Fines 41.6
Fines Classification CL

D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

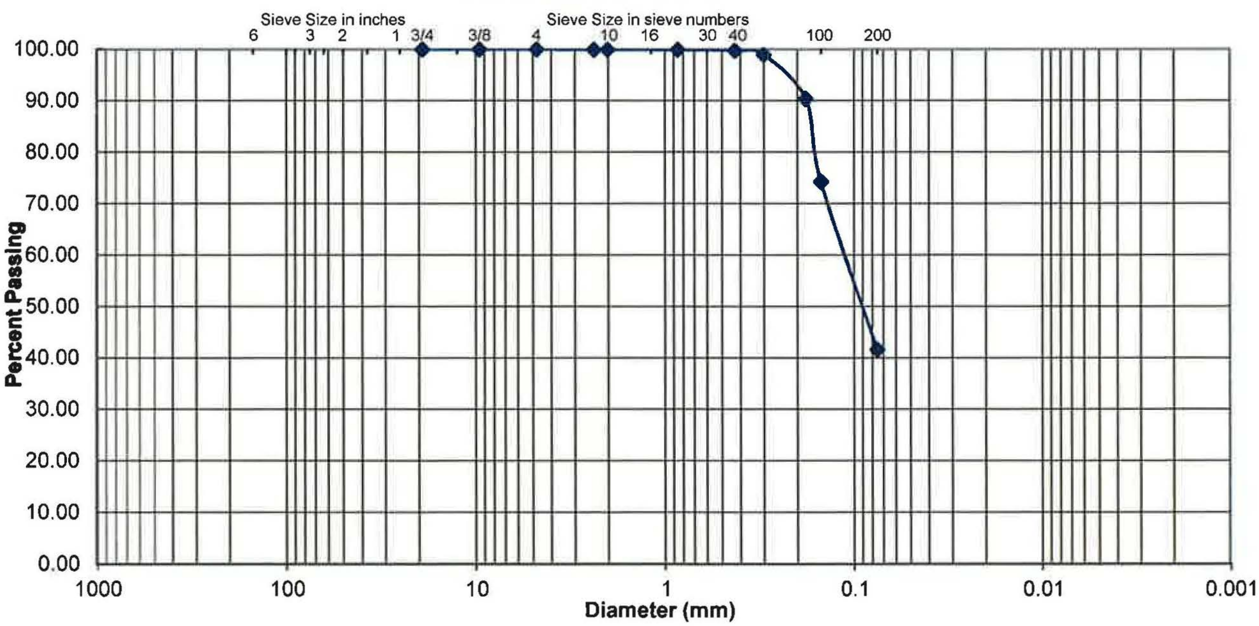
Cu N/A
Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

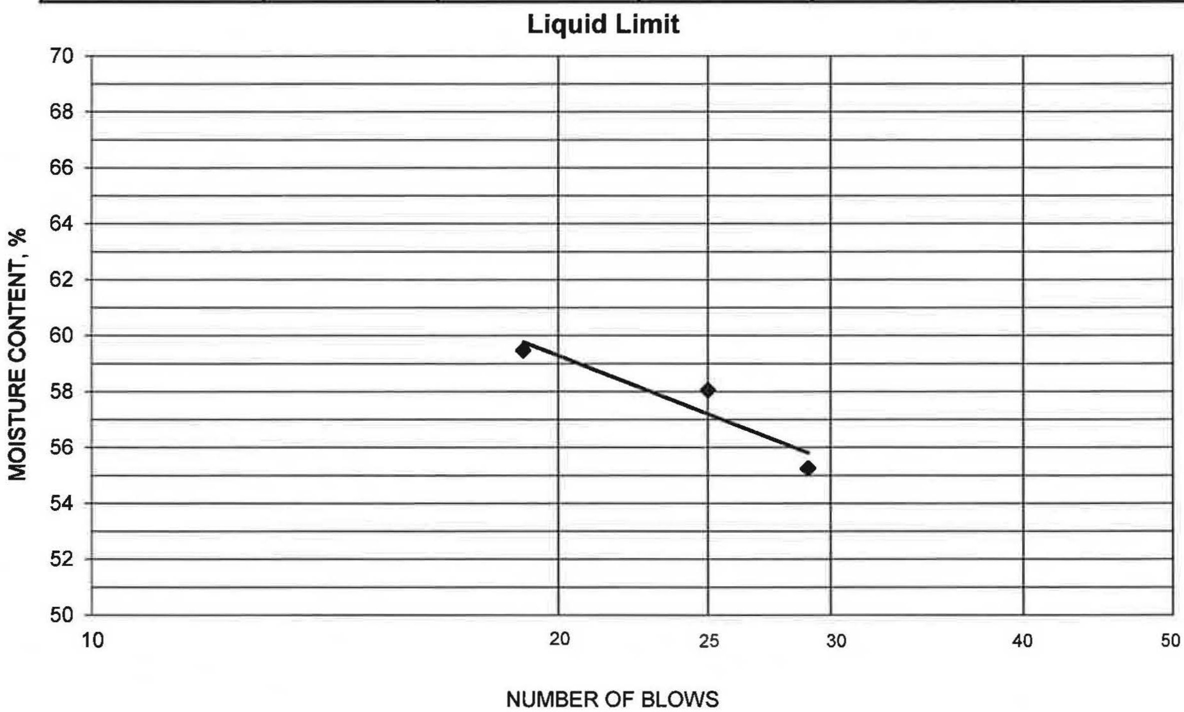
Reviewed By

Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-15	Lab ID	GT1-15
Tested By	MAC Test Method ASTM D 4318	% + No. 40	97
Test Date	02-24-2015 Prepared Dry	Date Received	02-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
49.33	44.70	36.32	29	55.3	
47.12	43.12	36.23	25	58.1	
47.78	43.51	36.33	19	59.5	57



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.07	19.56	12.06	33.5	33	24

Remarks:

Reviewed By

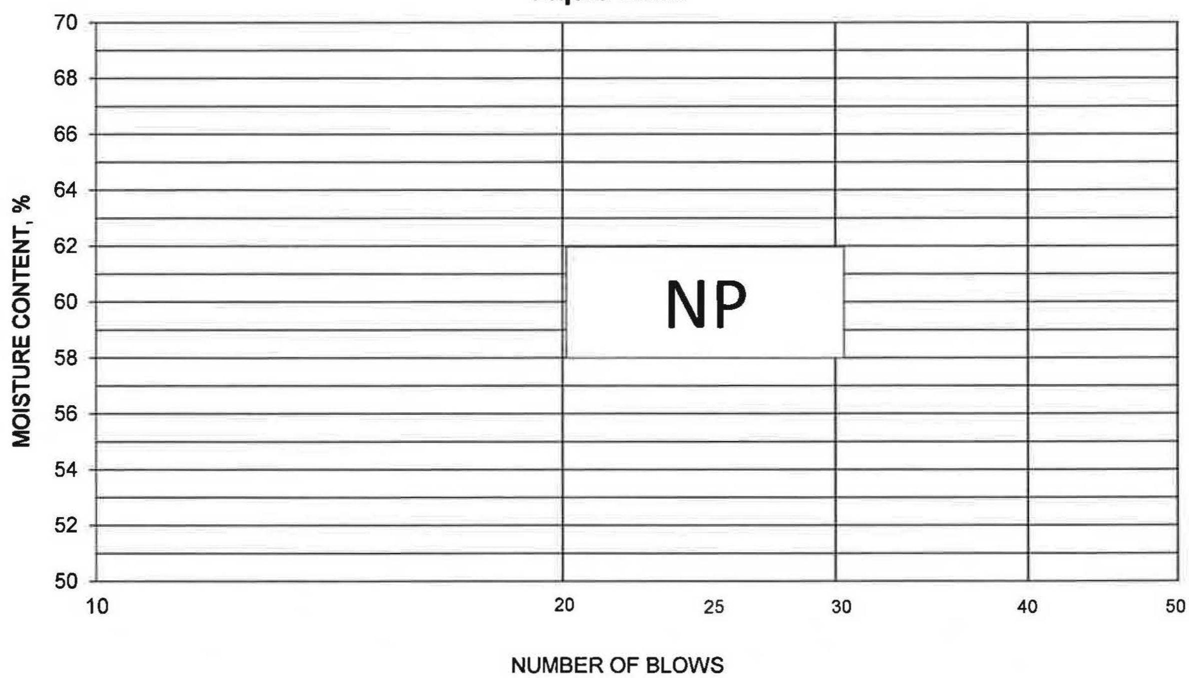
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-35	Lab ID	GT1-35
Tested By	MAC	Test Method	ASTM D 4318
% + No. 40	80		
Test Date	02-24-2015	Prepared	Dry
Date Received	02-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
27.17	24.01	10.91	35	24.1	26
24.76	21.23	8.30	21	27.3	
25.92	21.99	8.84	15	29.9	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: ______________________

Reviewed By ______________________

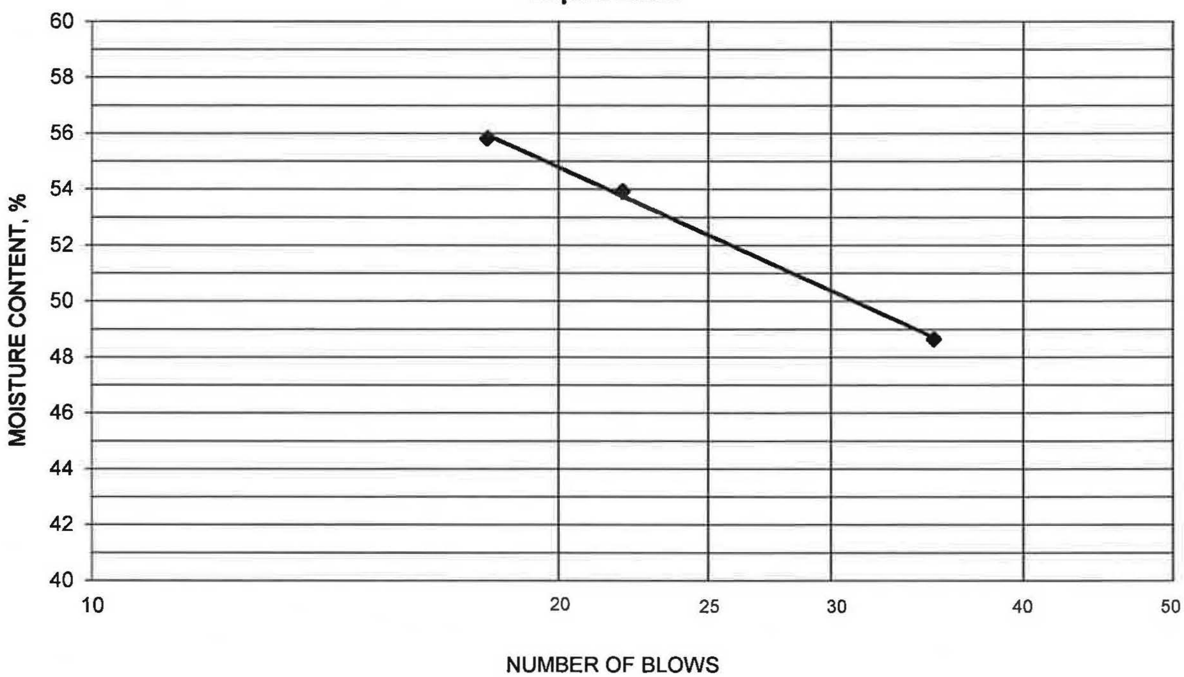
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-45	Lab ID	GT1-45
Tested By	MAC	Test Method	ASTM D 4318
% + No. 40	95		
Test Date	02-24-2015	Prepared	Dry
Date Received	02-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
25.92	21.05	11.04	35	48.7	52
23.65	18.50	8.95	22	53.9	
25.51	20.33	11.05	18	55.8	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.27	19.77	12.10	32.6	33	19

Remarks: ______________________

Reviewed By ______________

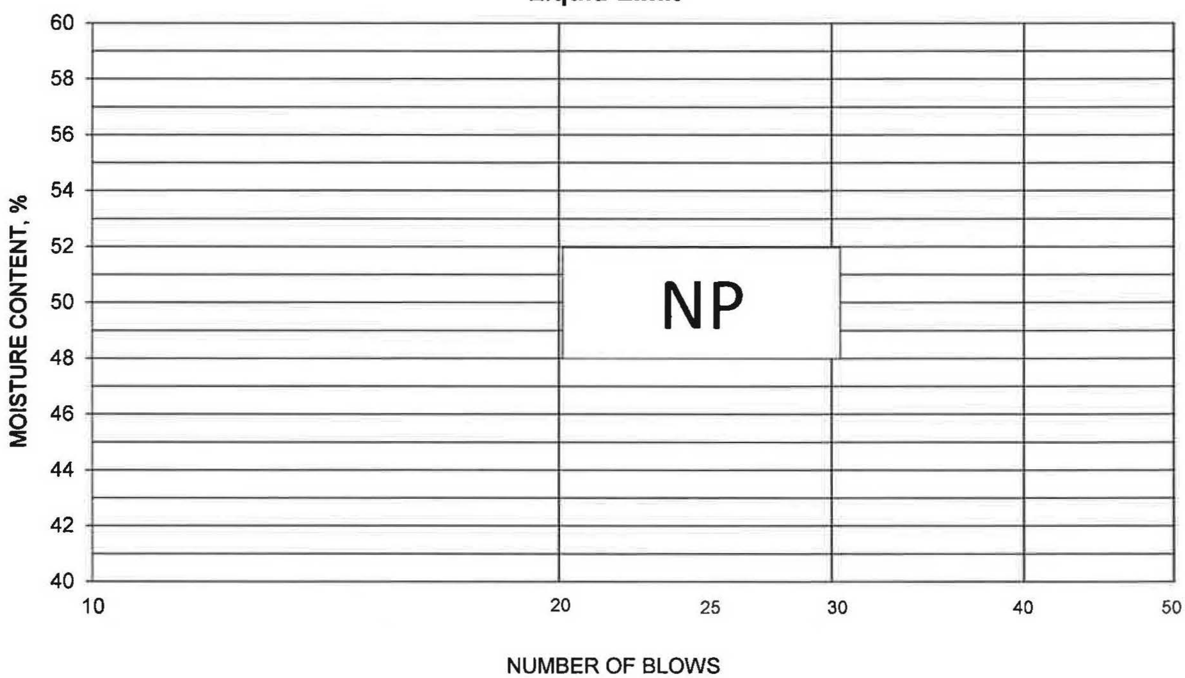
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239			Project No.	185850087
Source	GT1-55			Lab ID	GT1-55
Tested By	MAC	Test Method	ASTM D 4318	% + No. 40	80
Test Date	02-24-2015	Prepared	Dry	Date Received	02-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
30.06	26.81	11.04	26	20.6	21
26.39	23.40	10.65	21	23.5	
29.81	26.21	10.91	15	23.5	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: ______________________

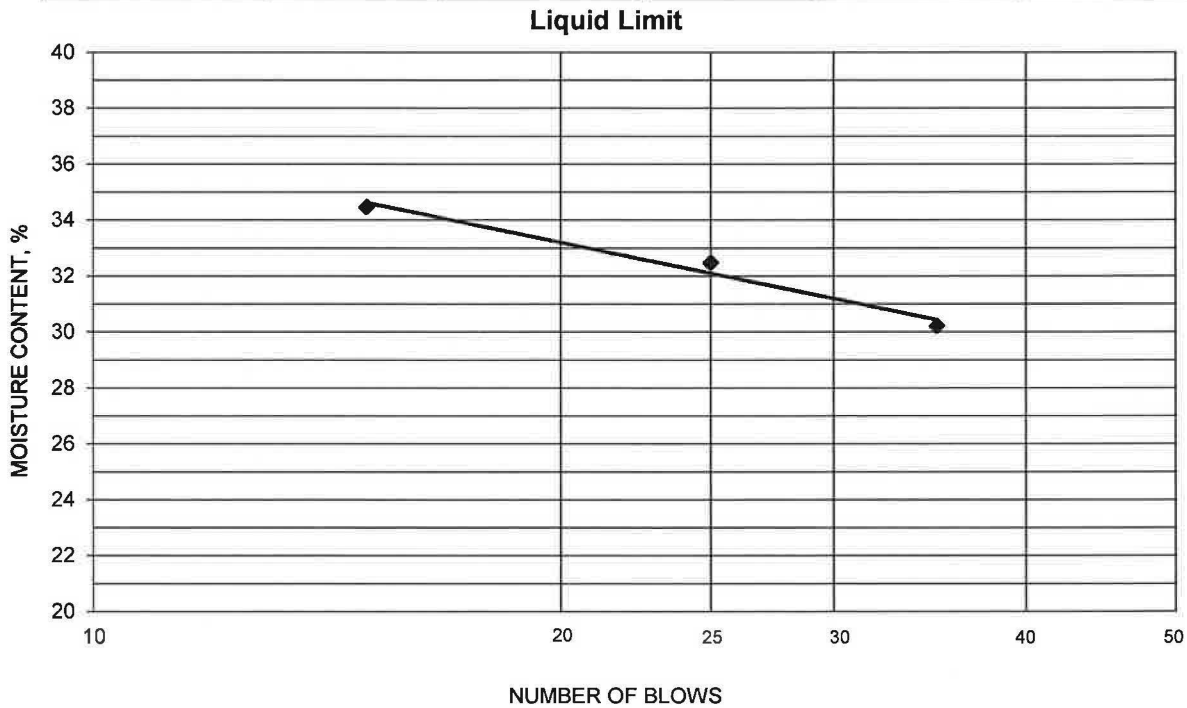
Reviewed By ______________

Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-65	Lab ID	GT1-65
Tested By	MAC	Test Method	ASTM D 4318
% + No. 40	70		
Test Date	02-24-2015	Prepared	Dry
Date Received	02-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
29.17	24.88	10.68	35	30.2	32
28.98	24.58	11.03	25	32.5	
28.98	24.34	10.88	15	34.5	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.26	20.80	12.08	16.7	17	15

Remarks: __________

Reviewed By __________

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 1, 2017
Revised May 4, 2017

Mr. Jaret Fischer
Stantec Consulting, Inc.
25864-F Business Center Drive
Redlands, CA 92374

Subject: **LABORATORY TEST RESULTS**
Chevron # 185850087
Converse Project No. 17-81-108-08

Dear Mr. Fischer:

Enclosed are the results of the laboratory tests that you requested for the above-referenced project. We received the samples from you on April 3, 2017. The following tests were performed in accordance with the relevant standard.

- Two (2) Direct Shear Tests (ASTM D3080)
- Three (3) Soil Corrosion Tests (California Tests 417, 422, 643) performed by EGLab, Inc.
- One (1) R-Value Test (Caltrans 301)

We appreciate the opportunity to be of continued service to Stantec Consulting, Inc. If you should have any questions or need additional information, please feel free to contact us at 909-796-0544.

CONVERSE CONSULTANTS

Jordan Roper
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
JORDAN GREGORY ROPER
C 84175
CIVIL
STATE OF CALIFORNIA

KVG/JR

Encl: Table No. 1, *Direct Shear Test Results*
Table No. 2, *Summary of Soil Corrosivity Test Result*
Table No. 3, *R-Value Test Results*
Drawing No. 1 - 2, *Direct Shear Test Results*

Table No. 1, Direct Shear Test Results

Sample/Depth (ft.)	Soil Description	Cohesion (psf)	Friction Angle (degree)
B-1 / 5.0	Sandy Silt (ML), Fine Grained, Dark-Brown	240	26
B-2 / 7.0	Sandy Silt (ML), Fine Grained, Dark-Brown	210	26

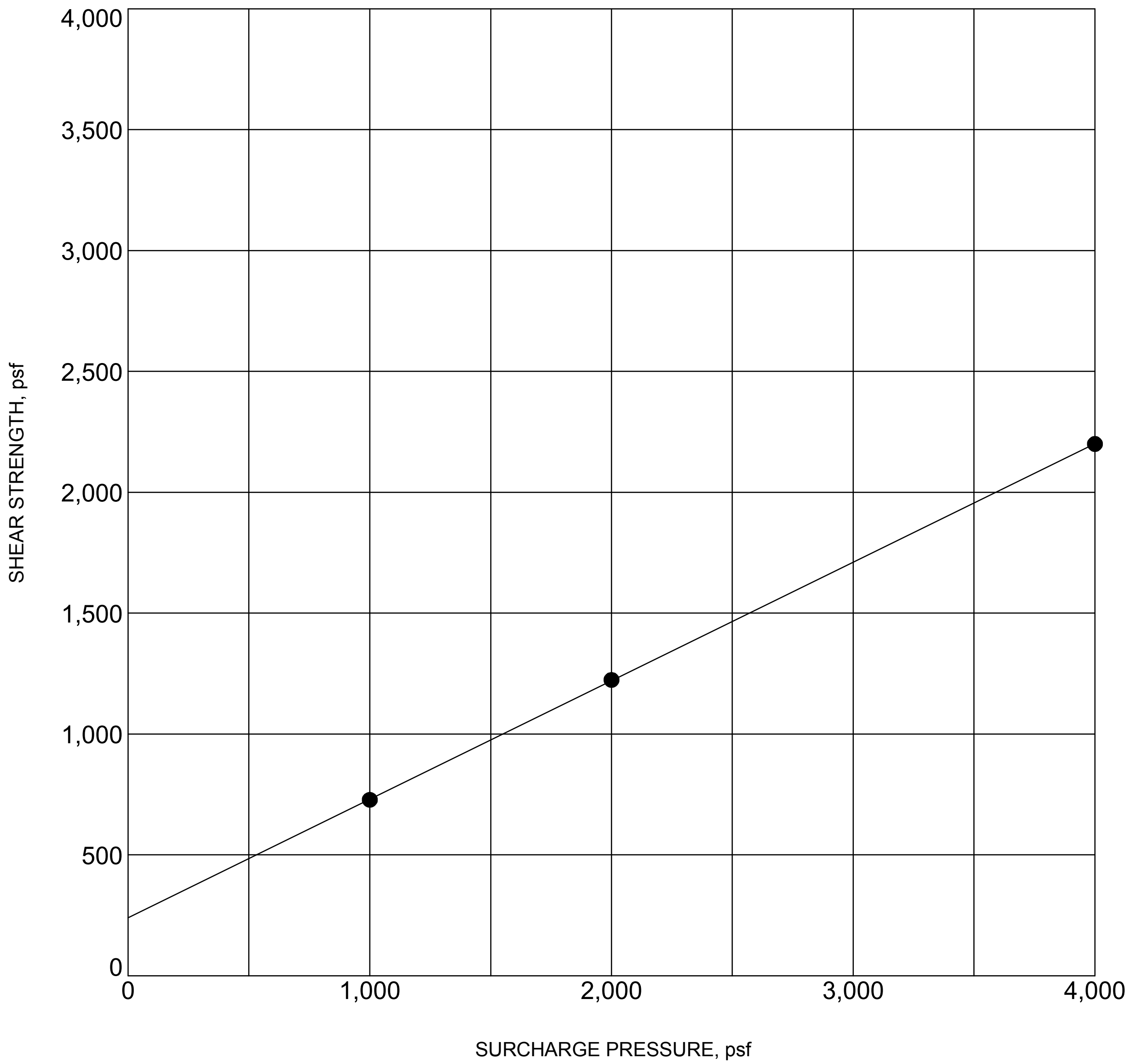
Table No. 2, Summary of Corrosion Test Results

Sample/Type/ Depth (ft)	pH	Soluble Sulfates (CA 417) (% by weight)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
B-1 / Bulk / NA	8.22	0.117	450	1030
B-2 / Bulk / NA	8.29	0.019	255	1600
B-2 / Bulk / 80	8.39	0.039	6360	130

*Tests performed by EGLab, Inc.

Table No. 3, R-value Test Results

Boring No.	Sample Type	Soil Description	R-value
B2	BULK	Silty Sand (SM), Fine to Coarse Grained, Brown	46



BORING NO. :	**BH-1**	DEPTH (ft) :	**5.0**
DESCRIPTION :	**Sandy Silt (ML), Fine Grained, Dark-Brown**		
COHESION (psf) :	**240**	FRICTION ANGLE (degrees):	**26**
MOISTURE CONTENT (%) :	**16.4**	DRY DENSITY (pcf) :	**107.5**

NOTE: Ultimate Strength.

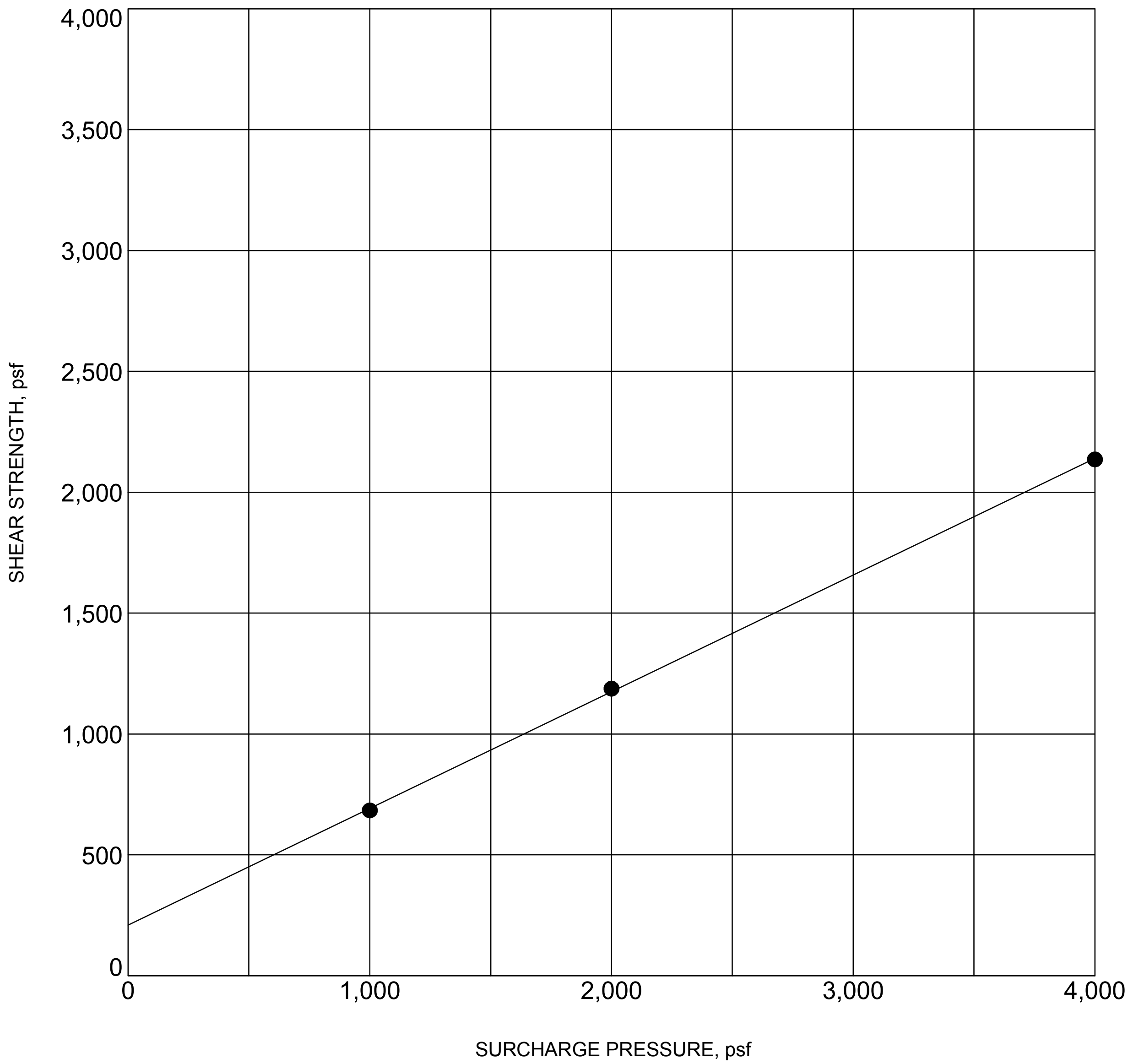
DIRECT SHEAR TEST RESULTS

Converse Consultants

Stantec Consulting, Inc.
Chevron #185850087

Project No. **17-81-108-08**

Drawing No. **1**



BORING NO. :	**BH-2**	DEPTH (ft) :	**7.0**
DESCRIPTION :	**Sandy Silt (ML), Fine Grained, Dark-Brown**		
COHESION (psf) :	**210**	FRICTION ANGLE (degrees):	**26**
MOISTURE CONTENT (%) :	**14.2**	DRY DENSITY (pcf) :	**90.0**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Stantec Consulting, Inc.
Chevron #185850087

Project No. **17-81-108-08**

Drawing No. **2**

Converse Consultants
Geotechnical Engineering, Environmental and Groundwater Science, Inspection and Testing Services

March 9, 2015

Mr. Jaret Fischer
Stantec Consulting Inc.
25864-F Business Center Drive
Redlands, CA 92374

Subject: **LABORATORY TEST RESULTS**
185850087 – Chevron 9-2239
Converse Project No. 15-81-104-05

Dear Mr. Fischer:

Presented below are the results of the laboratory tests that you requested for the above-referenced project. We received the samples from your office on February 20, 2015. The following tests were performed in accordance with the relevant standard:

- One (1) Maximum Dry Density and Optimum Moisture Content Tests (ASTM D1557)
- Three (3) Direct Shear Tests (ASTM D3080)
- Six (6) Hydrometer Tests (ASTM D422)
- One (1) Soil Corrosivity Test (Caltrans 643, 422, 417, and 532)

We appreciate the opportunity to be of continued service to Stantec Consulting Inc. If you should have any questions or need additional information, please feel free to contact us at (909) 796-0544.

CONVERSE CONSULTANTS

Scot Mathis, PG, CEG
Senior Geologist

SM/kvg

Encl: Table No. 1, *Moisture – Density Relationship Test Results*
Table No. 2, *Direct Shear Test Results*
Table No. 3, *Hydrometer Test Results*
Table No. 4, *Corrosivity Test Results*
Drawing No. 1, *Moisture – Density Relationship Test Results*
Drawing No. 2 - 4, *Direct Shear Test Results*
Drawing No. 5 - 6, *Grain Sized Distribution Results*

Table No. 1, Moisture - Density Relationship Test Results

Sample ID	Soil Classification	Maximum Dry Density (pcf)	Optimum Water Content (%)
GT-2	Silty Sand with Trace Clay (SM), Fine to Medium Grained, Olive-Gray	120.0	12.5

Table No. 2, Direct Shear Test Results

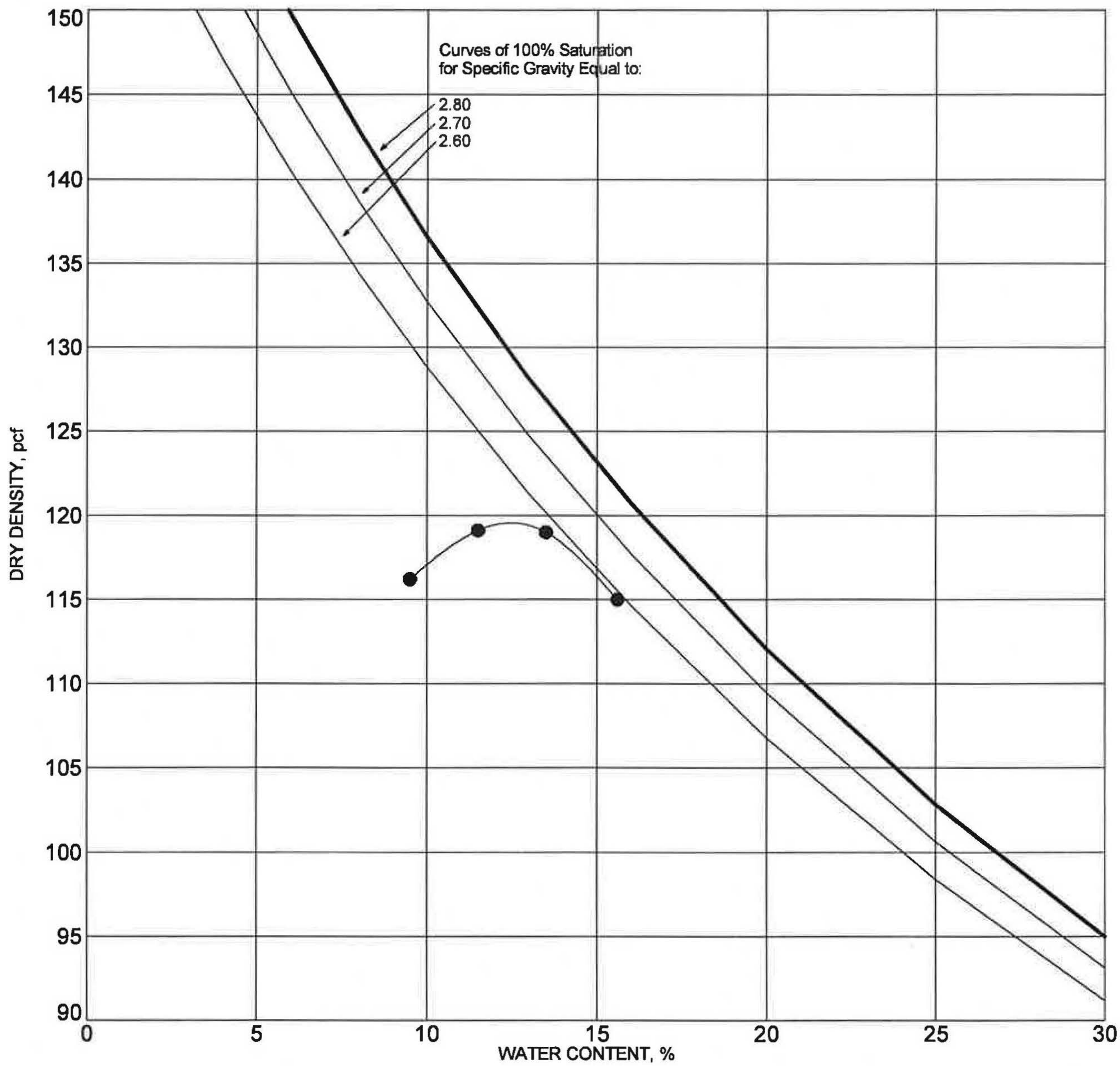
Sample ID	Depth (feet)	Soil Description	Cohesion	Friction Angle
GT-1 @ 7'	7.0	Clay (CL), Olive-Brown	105	29
GT-1 @ 15'	15.0	Silty Clay (CL-ML), Dark Gray	120	21
GT-2 @ 10'	10.0	Sandy Silt (ML), Gray	135	31

Table No. 3, Hydrometer Test Results

Sample ID	Depth (feet)	Percent Finer (%)			Silt (%)	Clay (%)
		#10	#50	#200		
GT-1 @ 15'	15	100.0	98.60	96.29	54.9	41.4
GT-1 @ 25'	25	100.0	94.24	12.90	9.2	3.7
GT-1 @ 35'	35	100.0	97.95	45.57	31.8	13.8
GT-1 @ 45'	45	98.78	98.95	85.13	50.9	34.2
GT-1 @ 55'	55	100.0	93.92	14.32	7.9	6.4
GT-1 @ 65'	65	96.60	86.82	46.32	28.7	17.6

Table No. 4, Corrosivity Test Results

Sample ID	pH	Soluble Sulfate (CA 417) (ppm)	Soluble Chlorides (CA 422) (ppm)	Saturated Resistivity (CA 643) Ohm-cm
GT-1	7.8	953	333	600



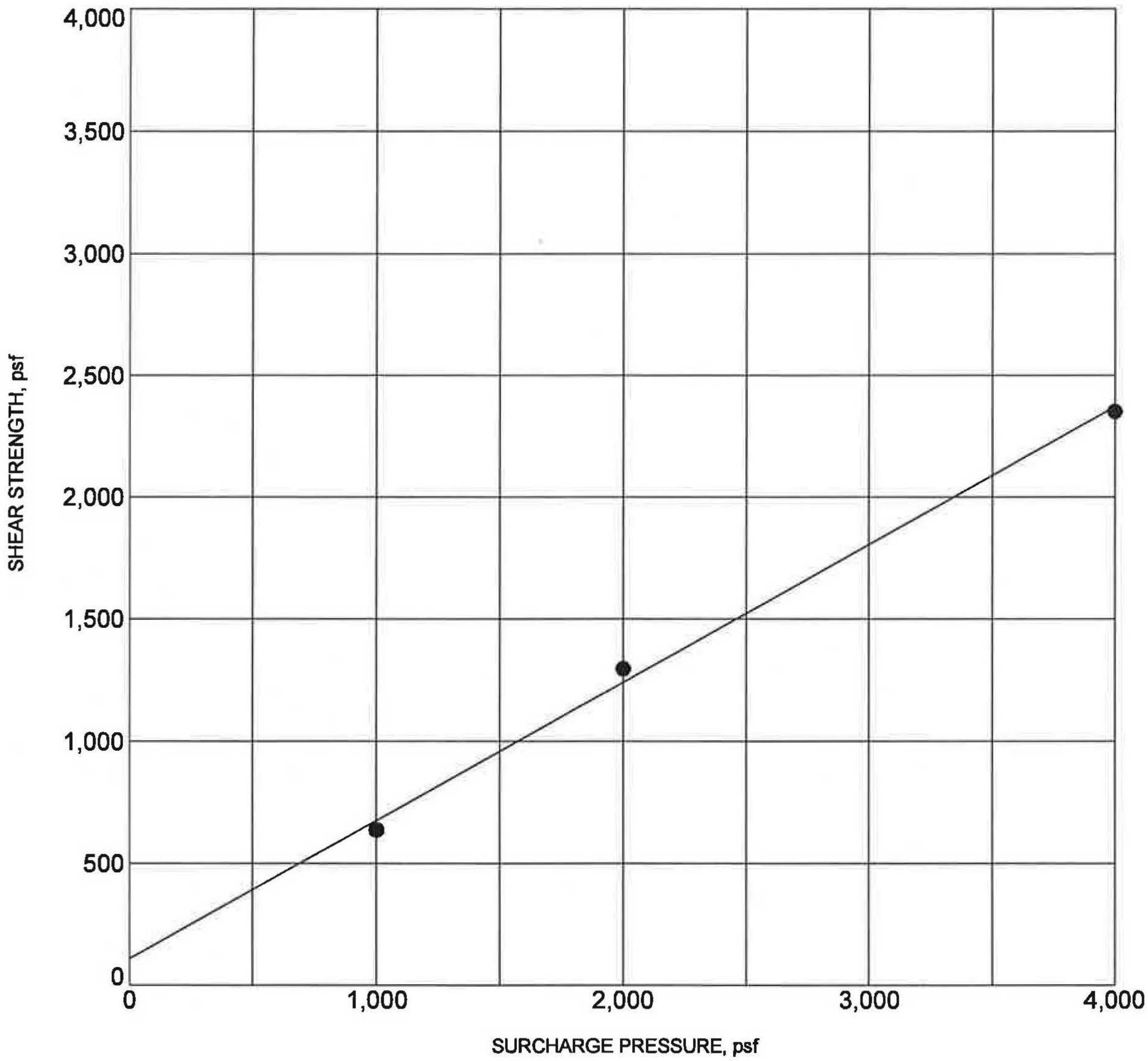
SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	GT-2	Not Reported	Silty Sand with Trace Clay (SM), Fine to Medium Grained, Olive-Gray	D1557 - A	12.5	120.0

NOTE:

MOISTURE-DENSITY RELATIONSHIP RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 **Job No: 185850087** **For: Stantec**	**15-81-104-05**	**1**



BORING NO. :	GT-1 @ 7'	DEPTH (ft) :	7
DESCRIPTION :	Clay (CL), Olive-Brown		
COHESION (psf) :	105	FRICTION ANGLE (degrees) :	29
MOISTURE CONTENT (%) :	40.2	DRY DENSITY (pcf) :	80.0

NOTE: Ultimate Strength.

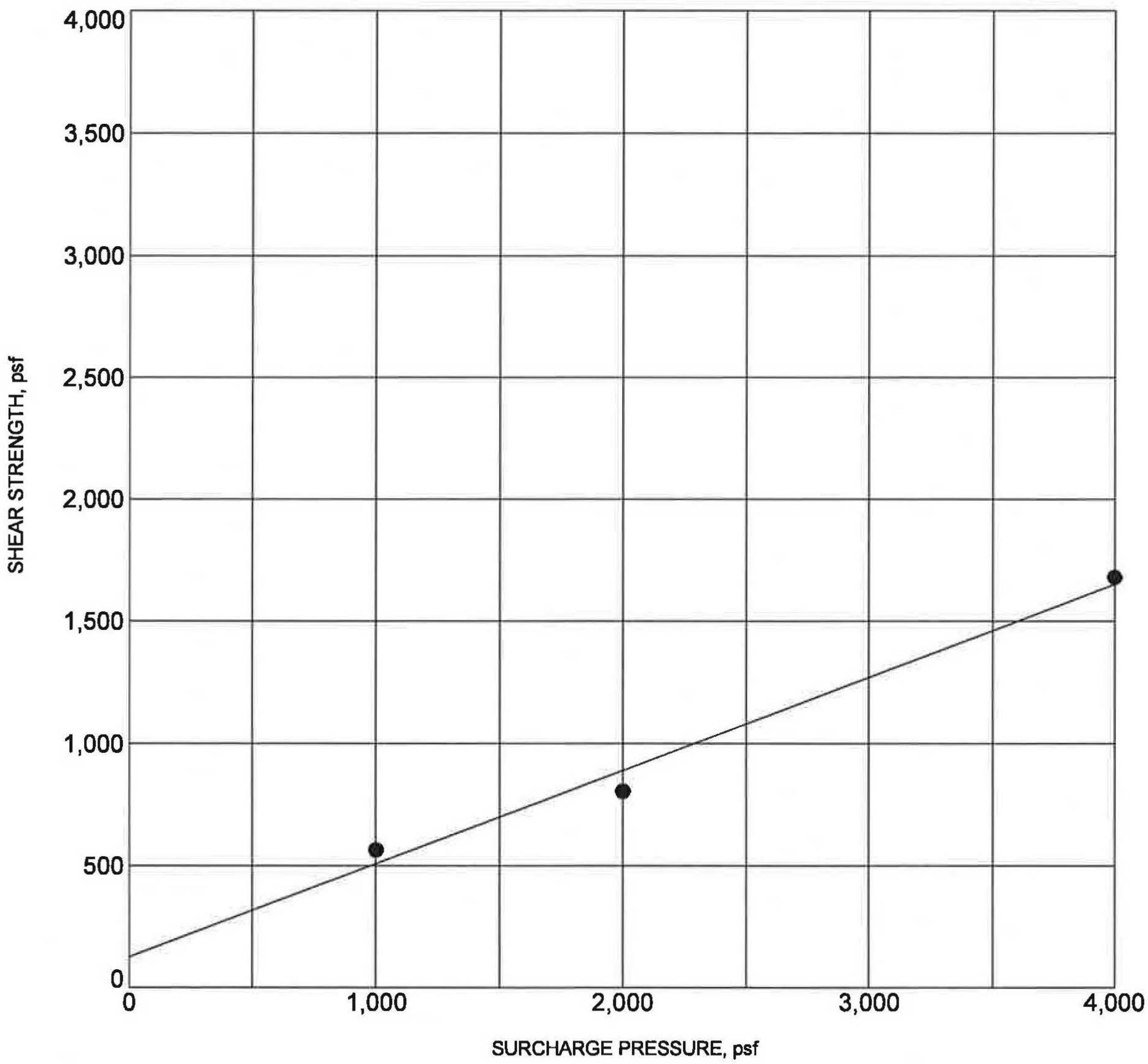
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
Chevron 9-2239
Job No: 185850087
For: Stantec

Project No. 15-81-104-05

Drawing No. 2



BORING NO.	:	GT-1 @ 15'	DEPTH (ft)	:	15
DESCRIPTION	:	Silty Clay (CL-ML), Dark Gray			
COHESION (psf)	:	120	FRICTION ANGLE (degrees)	:	21
MOISTURE CONTENT (%)	:	81.6	DRY DENSITY (pcf)	:	53.3

NOTE: Ultimate Strength.

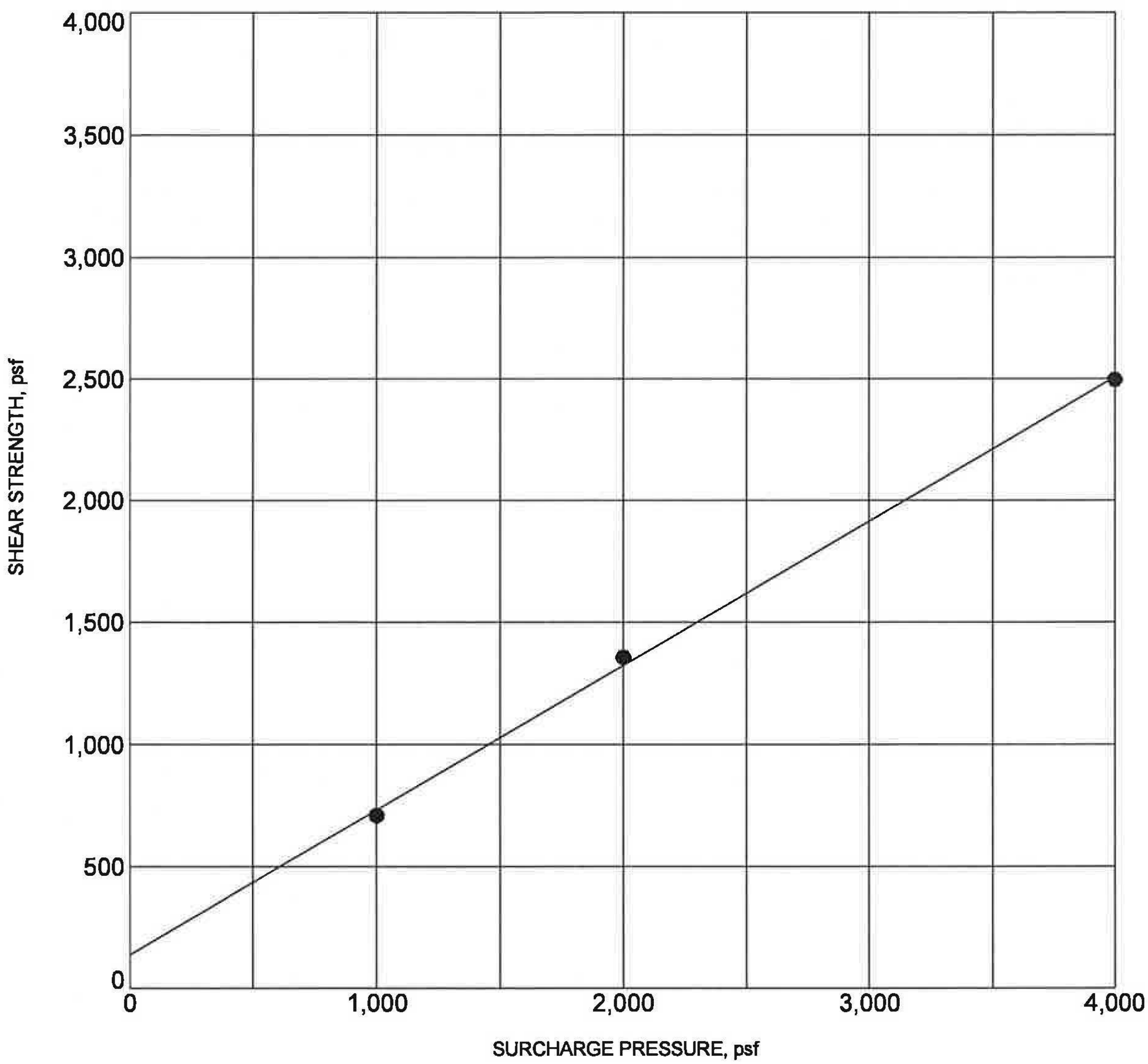
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
Chevron 9-2239
Job No: 185850087
For: Stantec

Project No. **15-81-104-05**

Drawing No. **3**



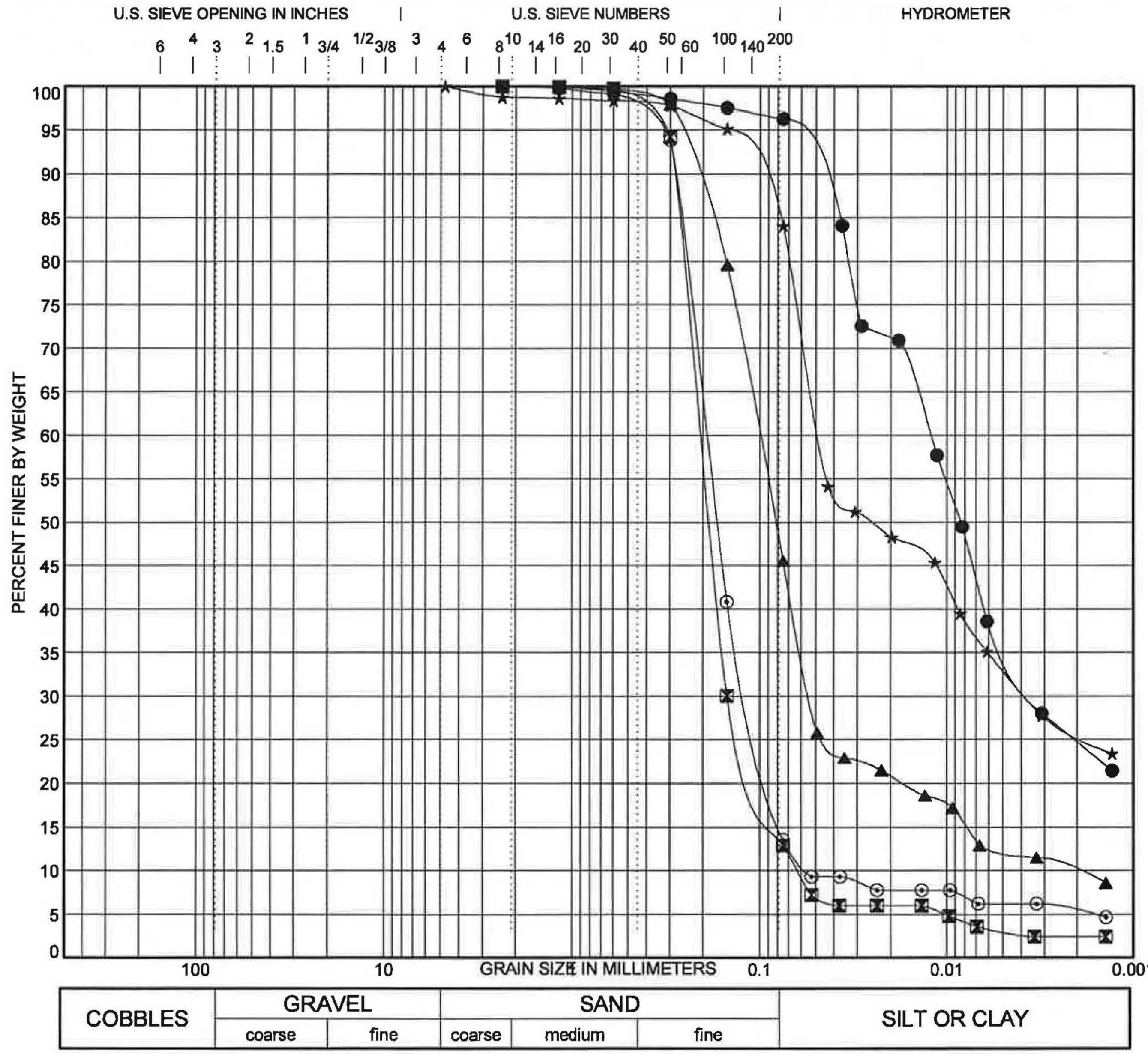
BORING NO.	:	GT-2 @ 10'	DEPTH (ft)	:	10
DESCRIPTION	:	Sandy Silt (ML), Gray			
COHESION (psf)	:	135	FRICTION ANGLE (degrees)	:	31
MOISTURE CONTENT (%)	:	41.1	DRY DENSITY (pcf)	:	82.1

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 Job No: 185850087 For: Stantec	15-81-104-05	4



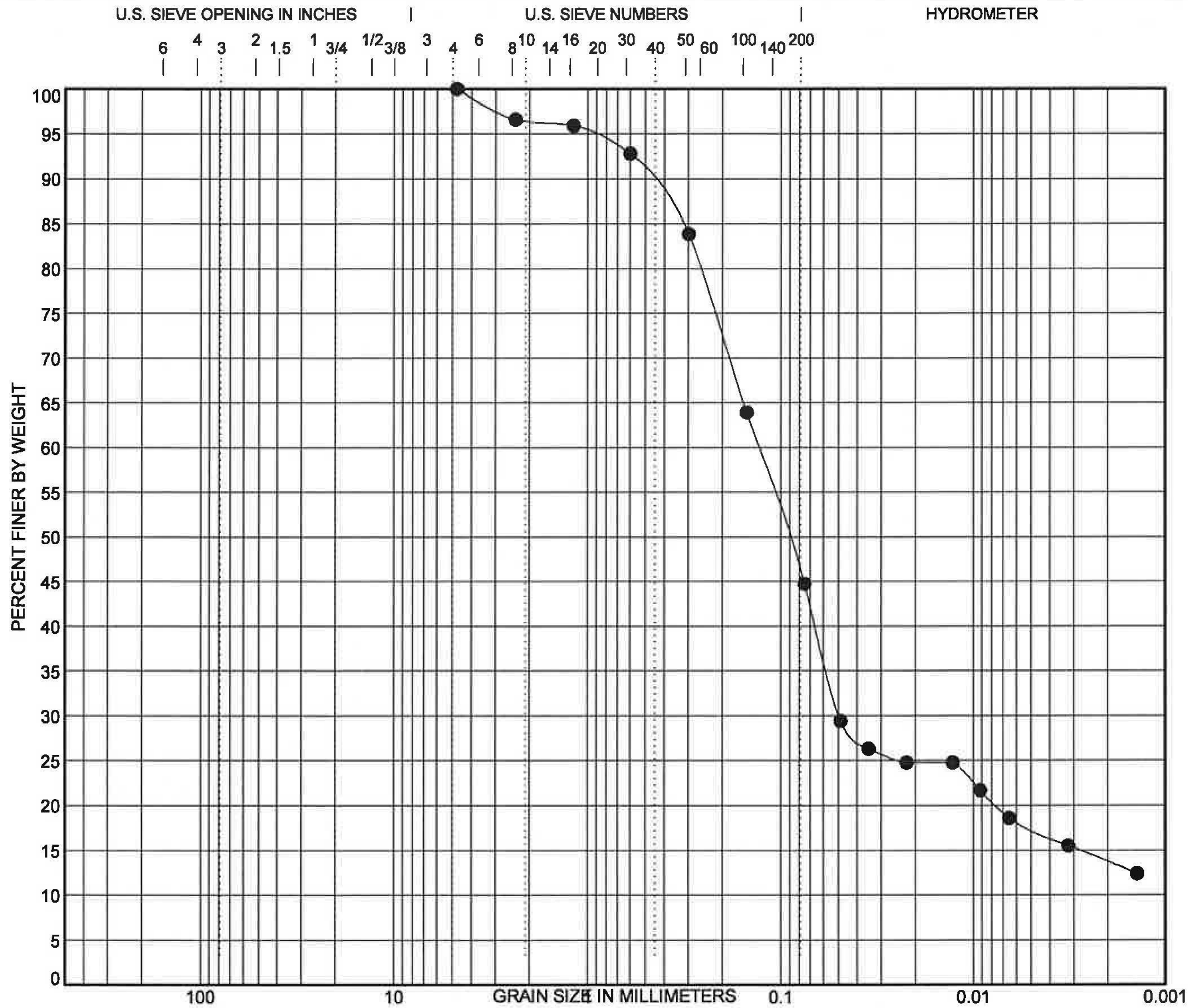
Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
● GT-1 @ 15'	15	Silty Clay (CL-ML)					
⊠ GT-1 @ 25'	25	Silty Sand (SM)				1.73	3.31
▲ GT-1 @ 35'	35	Silty, Clayey Sand (SC-SM)				13.36	47.11
★ GT-1 @ 45'	45	Clayey Silt with Sand (ML-CL)					
⊙ GT-1 @ 55'	55	Silty, Clayey Sand (SC-SM)				1.21	3.46

Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● GT-1 @ 15'	15	2.36	0.012	0.004		0.0	3.7	96.3	
⊠ GT-1 @ 25'	25	2.36	0.207	0.15	0.063	0.0	87.1	12.9	
▲ GT-1 @ 35'	35	2.36	0.101	0.054	0.002	0.0	54.4	45.6	
★ GT-1 @ 45'	45	4.75	0.048	0.004		0.0	15.9	84.1	
⊙ GT-1 @ 55'	55	2.36	0.193	0.114	0.056	0.0	86.5	13.5	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 Job No: 185850087 For: Stantec	15-81-104-05	5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
● **GT-1 @ 65'**	**65**	**Silty, Clayey Sand (SC-SM)**					

Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **GT-1 @ 65'**	**65**	**4.75**	**0.13**	**0.05**		**0.0**	**55.3**	**44.8**	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Project Name
Chevron 9-2239
Job No: 185850087
For: Stantec

Project No.
15-81-104-05

Drawing No.
6

HDR

Table 1 - Laboratory Tests on Soil Samples

Converse Consultants
Stantec Chevron 9-2239
Your #15-81-104-05, HDR Lab #15-0176LAB
26-Mar-15

Sample ID			
			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	1,440
saturated		ohm-cm	600
pH			7.8
Electrical Conductivity		mS/cm	0.81
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	80
magnesium	Mg^{2+}	mg/kg	22
sodium	Na^{1+}	mg/kg	715
potassium	K^{1+}	mg/kg	39
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	201
fluoride	F^{1-}	mg/kg	2.8
chloride	Cl^{1-}	mg/kg	333
sulfate	SO_4^{2-}	mg/kg	953
phosphate	PO_4^{3-}	mg/kg	8.3
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	63
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

APPENDIX D
PERCOLATION TEST RESULTS

PERCOLATION TEST DATA SHEET							
Project:	Chevron 9-2239		Project No.	185850087		Date:	4/7/2017
Test Hole No.	P1		Tested By:	M. Sapp			
Depth of Test Hole, D_T:		5' 0"	USCS Soil Classification		SM		
Test Hole Dimensions (inches)				Length	Width		
Diameter (if round)	8"	Sides (if rectangular)					
Sandy Soil Test Criteria*							
Trial No.	Start Time	Stop Time	Time Interval, (min)	Initial Depth of Water (in)	Final Depth of Water (in)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	3:00pm	3:30pm	30.0	24.25	30.0	5.75	n
2	3:30pm	4:00pm	30.0	23.75	29.25	5.5	n

*This test is generally implemented similarly to the USBR Well Permeameter Method. Per the Riverside County Borehole Percolation method, a hole is bored to a depth at least 5 times the borehole radius. The hole is presoaked for 24 hours (or at least 2 hours if sandy soils with no clay). The hole is filled to approximately the anticipated top of the proposed infiltration basin. Rates of fall are measured for six hours, refilling each half hour (or 10 minutes for sand). Tests are generally repeated until consistent results are obtained.

Trial No.	Start Time	Stop Time	Δt, Time Interval, (min)	D_o, Initial Depth of Water (in)	D_f, Final Depth of Water (in)	ΔD, Change in Water Level (in.)	Percolation Rate (in/hr)
1	8:05am	8:35am	30	24.0	18.25	5.75	11.5
2	8:35am	9:05am	30	24.25	19.0	5.25	10.5
3	9:05am	9:35am	30	24.75	19.75	5.0	10.0
4	9:35am	10:05am	30	24.25	19.50	4.75	9.5
5	10:05am	10:35am	30	24.0	19.8	4.25	8.5
6	10:35am	11:05am	30	24.0	19.50	4.5	9.0
7	11:05am	11:35am	30	24.25	19.75	4.5	9.0
8	11:35am	12:05pm	30	23.75	19.50	4.25	8.5
9	12:05pm	12:35pm	30	23.75	19.5	4.25	8.5
10	12:35pm	1:05pm	30	24.0	19.5	4.5	9.0
11							
12							
13							
14							
15							

Comments:

Factor of Safety and Design Infiltration Rate Worksheet		Worksheet D.5-1 from Appendix D San Diego County BMP Design Manual			
Factor Category		**Factor Description**	**Assigned Weight (w)**	**Factor Value (v)**	**Product (p) p = w x v**
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	2	0.5
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	3	0.75
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2
B	Design	Level of pretreatment/ expected sediment loads	0.5	3	1.5
		Redundancy/resiliency	0.25	3	0.75
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			3
Combined Safety Factor, $S_{total} = S_A \times S_B$				6	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				8.7	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				1.45	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

PERCOLATION TEST DATA SHEET

Project:	Chevron 9-2239		Project No.	185850087		Date:	4/7/2017
Test Hole No.	P2		Tested By:	M. Sapp			
Depth of Test Hole, D_T:		5' 0"	USCS Soil Classification		SM		
Test Hole Dimensions (inches)				Length	Width		
Diameter (if round)	8"	Sides (if rectangular)					

Sandy Soil Test Criteria*

Trial No.	Start Time	Stop Time	Time Interval, (min)	Initial Depth of Water (in)	Final Depth of Water (in)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:00am	8:30am	30.0	42.25	47.75	5.5	n
2	8:30am	9:00am	30.0	42.0	47.25	5.25	n

*This test is generally implemented similarly to the USBR Well Permeameter Method. Per the Riverside County Borehole Percolation method, a hole is bored to a depth at least 5 times the borehole radius. The hole is presoaked for 24 hours (or at least 2 hours if sandy soils with no clay). The hole is filled to approximately the anticipated top of the proposed infiltration basin. Rates of fall are measured for six hours, refilling each half hour (or 10 minutes for sand). Tests are generally repeated until consistent results are obtained.

Trial No.	Start Time	Stop Time	Δt, Time Interval, (min)	D_o, Initial Depth of Water (in)	D_f, Final Depth of Water (in)	ΔD, Change in Water Level (in.)	Percolation Rate (in/hr)
1	8:35am	9:05am	30	24.0	18.0	6.0	12.0
2	9:05am	9:35am	30	24.0	18.75	5.25	10.5
3	9:35am	10:05am	30	24.25	19.5	4.75	9.5
4	10:05am	10:35am	30	23.75	18.75	5.00	10.0
5	10:35am	11:05am	30	24.25	19.75	4.50	9.0
6	11:05am	11:35am	30	24.0	19.75	4.25	8.5
7	11:35am	12:05pm	30	24.0	19.5	4.5	9.0
8	12:05pm	12:35pm	30	24.25	20.25	4.0	8.0
9	12:35pm	1:05pm	30	23.75	19.5	4.25	8.5
10							
11							
12							
13							
14							
15							

Comments:

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1 from Appendix D San Diego County BMP Design Manual		
Factor Category		**Factor Description**	**Assigned Weight (w)**	**Factor Value (v)**	**Product (p) p = w x v**
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	2	0.5
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	3	0.75
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2
B	Design	Level of pretreatment/ expected sediment loads	0.5	3	1.5
		Redundancy/resiliency	0.25	3	0.75
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			3
Combined Safety Factor, $S_{total} = S_A \times S_B$				6	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				8.5	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				1.42	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

APPENDIX E
LIQUEFACTION ANALYSIS RESULTS

Stantec Consulting Services Inc.
25864-F Business Center Drive
Redlands, California 92374
http://www.stantec.com

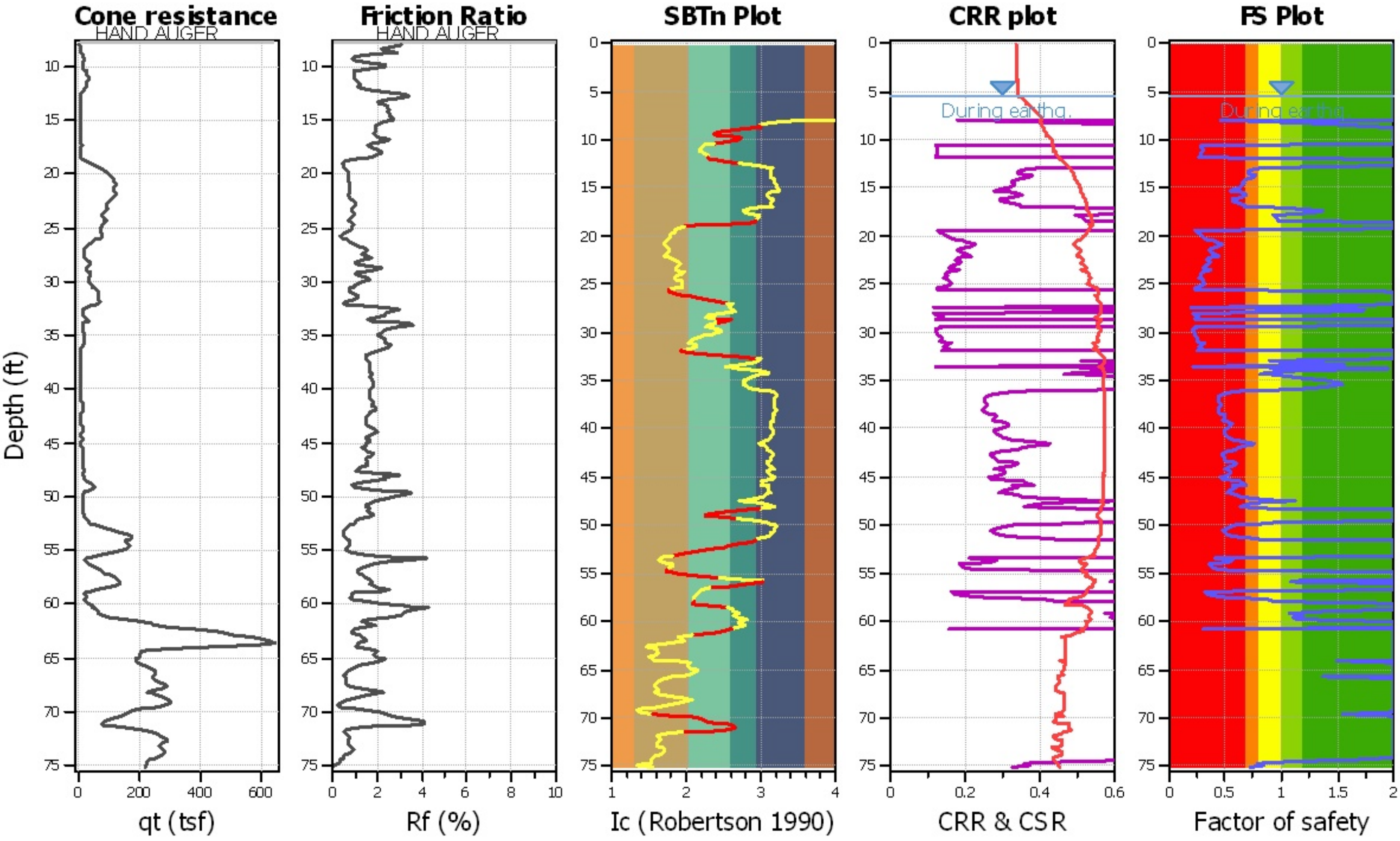
LIQUEFACTION ANALYSIS REPORT

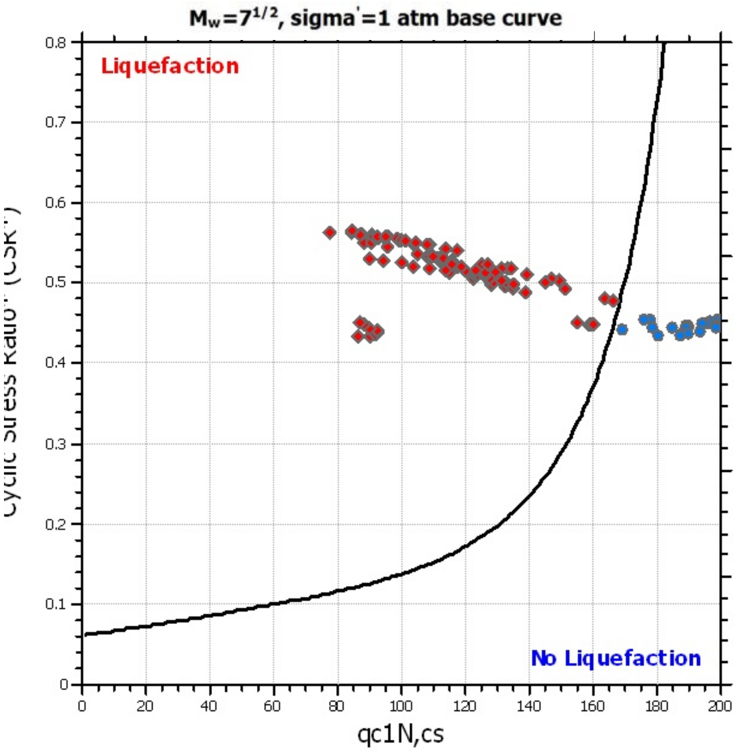
Project title : Chevron 9-2239 **Location : 2959 Midway Drive, San Diego, California**

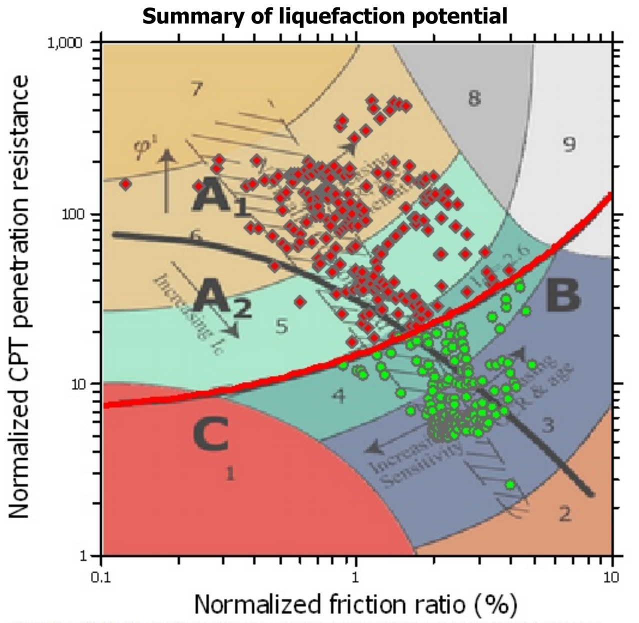
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	7.00 ft	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

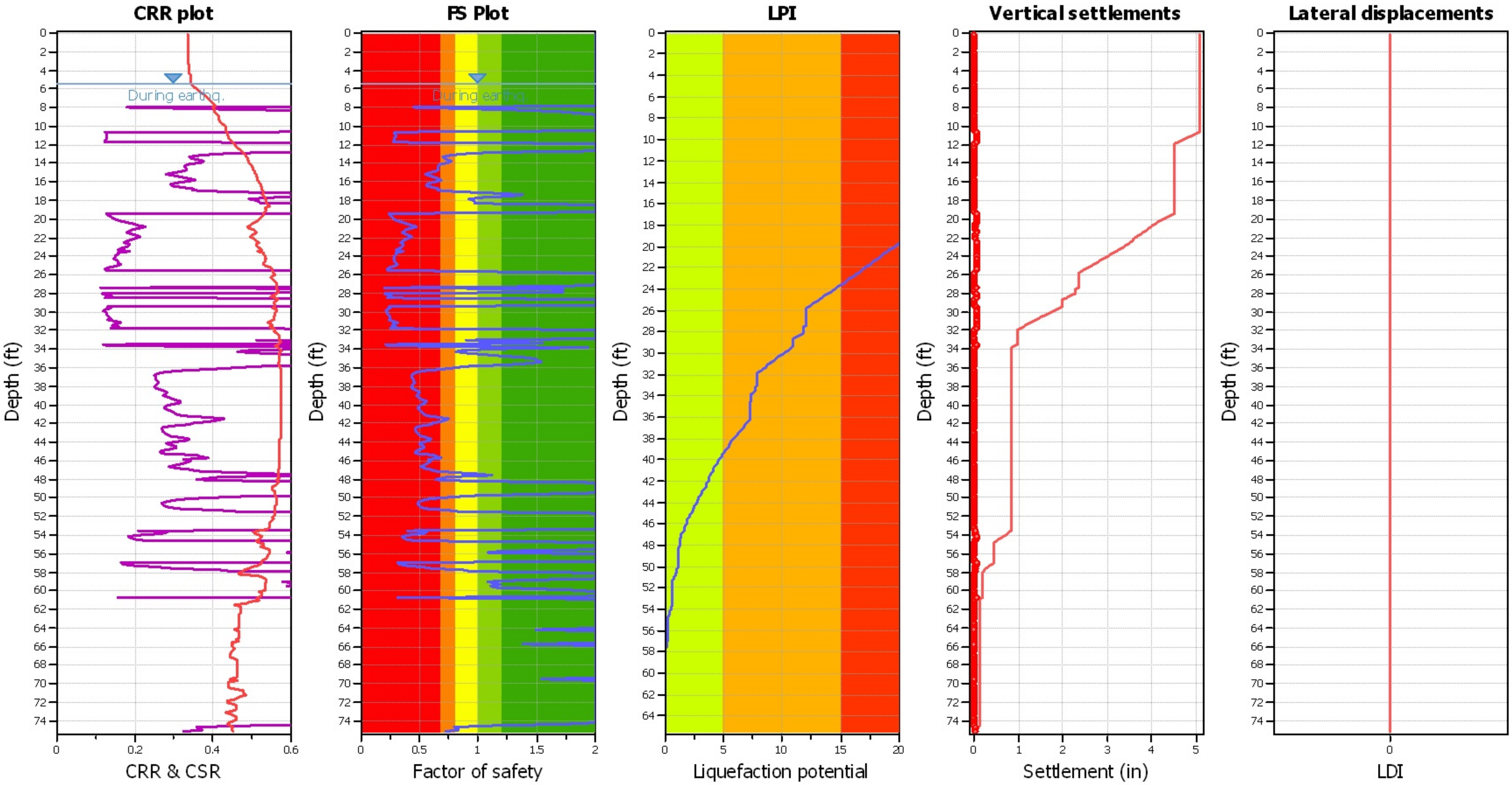






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.58	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	7.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Stantec Consulting Services Inc.
25864-F Business Center Drive
Redlands, California 92374
http://www.stantec.com

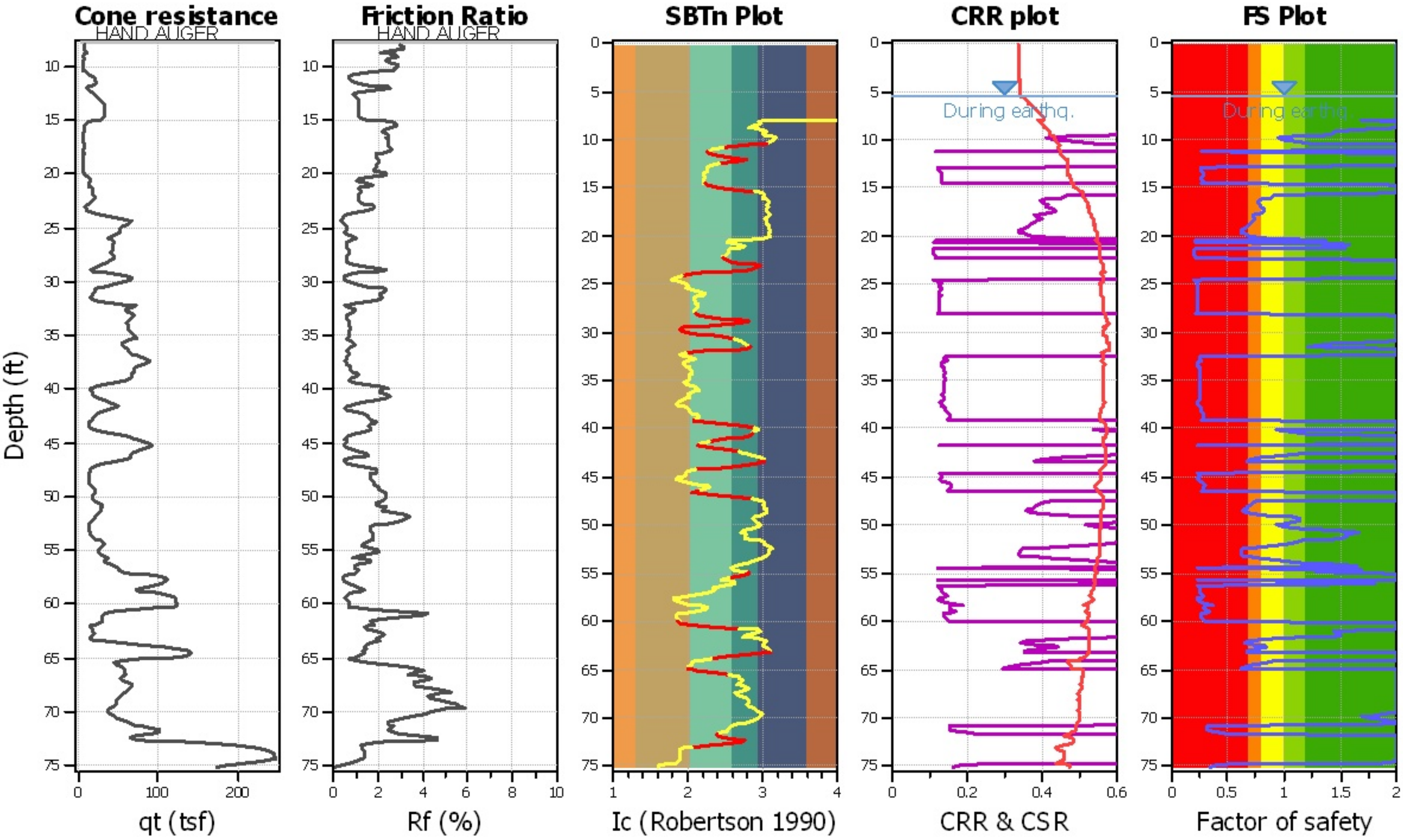
LIQUEFACTION ANALYSIS REPORT

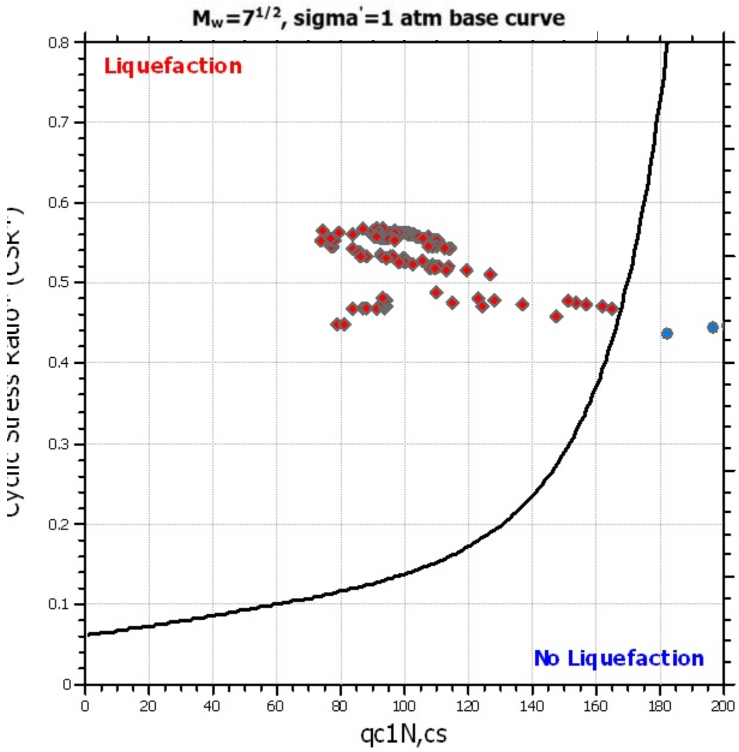
Project title : Chevron 9-2239 **Location : 2959 Midway Drive, San Diego, California**

CPT file : CPT-2

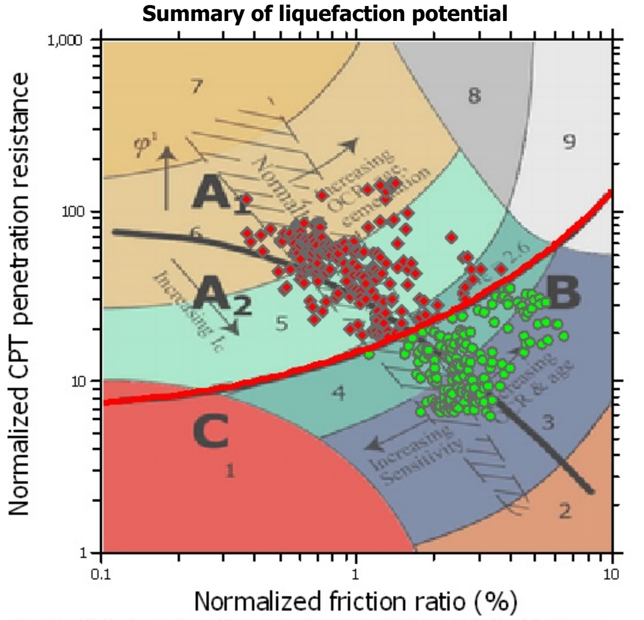
Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	7.00 ft	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 ft	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method



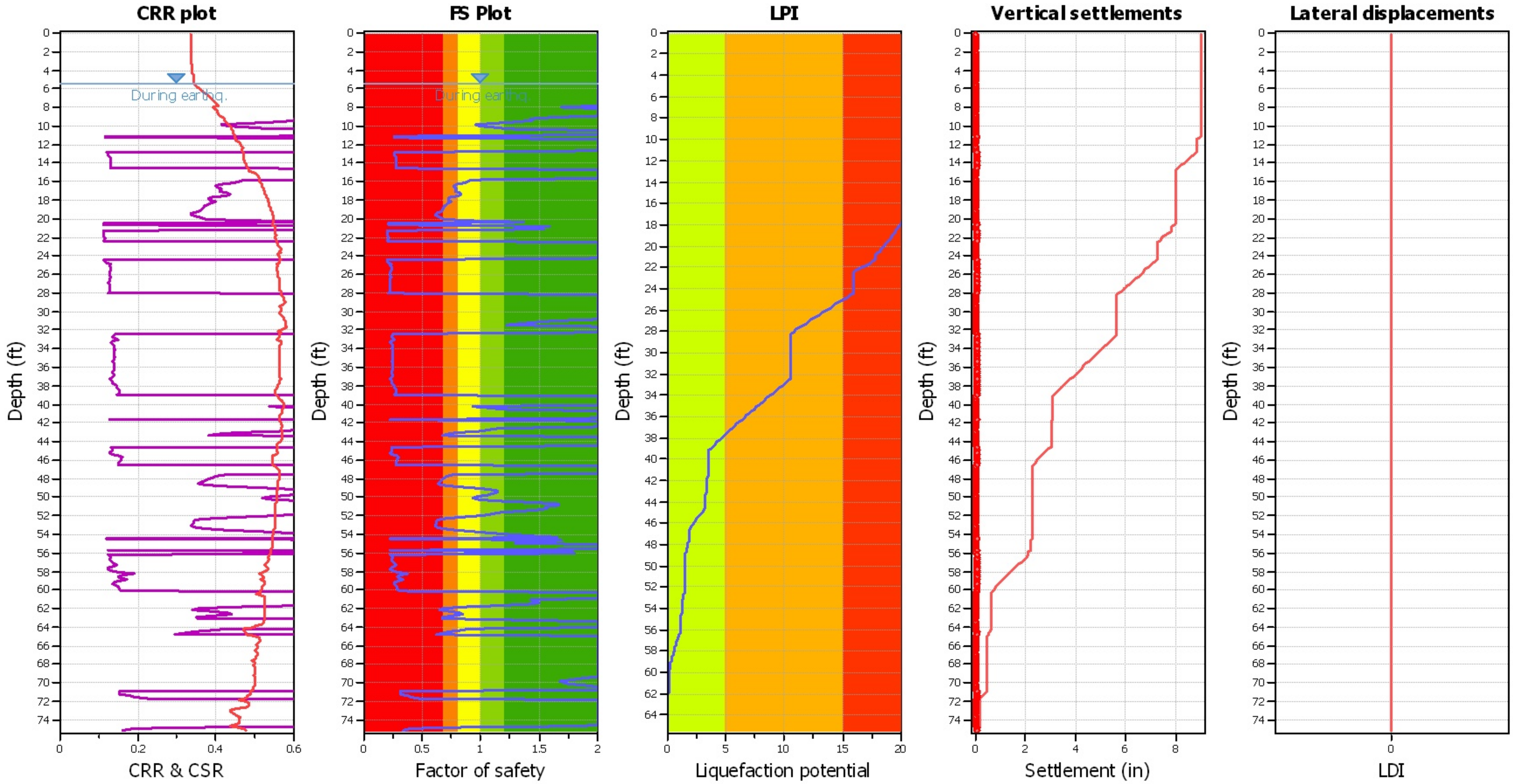


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.58	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	7.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

PROJECT DRAINAGE REPORT

Chevron

Chevron Fueling/ Car Wash Facility
2959 Midway Drive, San Diego, CA

Prepared For:

Chevron Corporation
145 South State Street
Brea, CA 92821

Prepared By:

Kyle Flaming, P.E.
KFlaming@jmcivileng.com
5900 S. Lake Forest Drive
Suite 380
McKinney, TX
75070

JM CIVIL Engineering Solutions Group

June 5, 2017
REV. Aug. 2018

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   - Land Use 2
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F. Additional Backup
   - FEMA FIRM Map
   - NOAA IDF Curve Data
   - Program Output Report – Post-Development, Q100

1. PROJECT DESCRIPTION

CHEVRON, Corp. proposes to redevelop a 0.68 ac lot located at 2959 Midway Drive in the City of San Diego, CA. See **Appendix A** for Project Location Map.

Pre-Development Conditions (See **Appendix B** for Pre-Development Drainage Plan):

- Existing Chevron fueling facility
- Adjacent car wash facility to be included in re-development
- 98.5% impervious building roofs, fuel canopy, paving, sidewalk, curb/gutter (29,171 sf)
- 1.5% pervious landscaping (410 sf)
- No on-site drainage features, surface runoff only.

Post-Development improvements (See **Appendix C** for Post-Development Drainage Plan):

- New Chevron Retail Building
- New Car Wash Building
- New Fueling Canopy
- New concrete paving, sidewalks, curb/gutter, asphalt paving.
- New landscaped areas
- New site drainage facilities (surface drain inlets, PVC storm drain piping, PVC perforated underdrain piping,)
- 82% total impervious site area = 24,262 sf
- 18% total pervious site area = 5,363 sf

This project is not subject to Section 404 of the Clean Water Act as the redevelopment will not discharge dredged or fill material into waters of the United States. The project complies with state water quality standards and meets the requirements of the Clean Water Act Section 401, see separate Storm Water Quality Management Plan.

2. HYDROLOGY

Design Criteria

This report will meet the following requirements of the 2017 City of San Diego Drainage Design Manual:

- Hydrologic Method: Rational (projects less than 0.5 sq. mi)
- Type D soil
- Runoff Coefficients
    - Impervious: 0.95 (Roof, Canopy, Paving, Sidewalk, Curb & Gutter)
    - Pervious: 0.5 (Landscaping, BMP areas)
- Rainfall Intensity: NOAA IDF Curve for project location (see **Appendix F**)

Hydrology Methodology

Pre-Development: The topographic site survey was used to define existing impervious and pervious areas within the basin. Overland flow length, land slope and runoff coefficients were determined. Time of concentration (Tc) was computed as six and a half minutes. Pre-Development site conditions were modeled using the Rational Method to estimate the Q50 and Q100 flowrates using the sub-basin area, runoff coefficients, and rainfall data as follows:
Q=CiA; where:
C = [0.95*(0.67)+0.5*(0.01)]/0.68 = 0.94
i50=3.69in/hr ; i100=4.1 in/hr
Q50 = 2.36 cfs and Q100=2.62 cfs

Post-Development: The topographic site survey and preliminary grading plan were used to define proposed basins. Overland flow length, slope and runoff coefficients were determined. Time of concentration (Tc) for each basin was then estimated using "Urban Areas Overland Time of Flow Curves" (see worksheet **Appendix F**). The Post-Development site conditions were modeled using AutoDesk SSA software by developing a sub-basin link-node model. The Rational method was used to estimate design storm runoff quantities. Hydrodynamic flow routing (based on Saint Venant equations) analysis was performed using sub-basin, pipe network and stage/storage input parameters to estimate Q2, Q10, Q50, and Q100 flowrates.

Geotechnical Investigation

Stantec Consulting Services, Inc. prepared a geotechnical investigation report for the subject site on 05/05/17 (see **SWQMP, Attachment 6**). A subcontractor drilled soil borings to a depth of approximately 71.5 ft below ground surface (bgs). The results of the testing are as follows:

- "The property is underlain by artificial fill, alluvium, and Very Old Paralic Deposits. The artificial fill and alluvium are relatively similar, consisting of interbedded layers of very loose to medium dense sand with variable amounts of silt and clay (SW-SM, SP-SM, SM, and SC USCS soil types) and soft to stiff clay (CL and CH USCS soil types) and silt (ML USCS soil type) to an approximate depth of 60 to 75 feet bgs. Old Paralic Deposits consisting of medium dense to dense sands (SP-SM, SC, and SM USCS soil type) and very stiff clay (CL USCS soil type) were encountered to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively."
- Observed in-situ infiltration rate: 8.6-8.7 in/hr; after reduction and safety factor: 1.4-1.5 in/hr;
- Observed GW level < 10' BGS

Land Use

The existing site is zoned CC-1-3.

FEMA Floodplain Mapping

The project location is mapped on FEMA Flood Insurance Rate Map (FIRM) Map Number: 06073C1880G. The site is location in Flood Zone X, areas determined to be outside the 0.2% annual chance floodplain per the FEMA National Flood Insurance Program. The FIRM MAP for the project area is included in **Appendix F.**

Ground Water (GW) Table

The April 2017 geotechnical investigation encountered GW at approximately 7' below ground surface. 2015 Stantec testing encountered GW at 17'. High GW tables excludes infiltration as an option so biofiltration ponds, BMP-1 and BMP-2, were designed for water quality treatment. These ponds provide temporary runoff storage and are further described and detailed in the Storm Water Quality Management Plan.

3. HYDRAULICS

Pre-Development Drainage Conditions

Existing drainage conveyance is urban. No off-site run-on. No existing storm drain, detention, water quality treatment or channels are located on-site.

Site runoff is conveyed by sheet flow and shallow concentrated flow from south to north and exits the drive entrance at the northeast site corner. Runoff travels as gutter flow to the existing storm drain inlet on Midway Drive. Runoff is then conveyed by City of San Diego storm drain ID # 23305 (Ref. Dwg # 6153-27-R) and eventually discharges to the San Diego Bay.

Post-Development Drainage Conditions

The revised drainage pattern will use a combination of sheet, shallow concentrated, and pipe flow to convey all site runoff to two (2) new BMP biofiltration ponds. Runoff from the impervious building and car wash roof surfaces will discharge through roof drains to grade onto the impervious pavement to dissipate and disperse. The runoff will then be directed through curb cuts into riprap in the landscape prior to entering the biofiltration pond. All runoff from site pervious landscaped areas will sheet flow to site impervious paved areas. All sheet and shallow concentrated runoff from impervious paved areas will either flow directly to the respective BMP structure or to a drop inlet connected to the BMP structure by underground PVC piping. Runoff from the impervious fuel canopy roof will be conveyed to BMP-2 via a system of rainwater leaders and underground PVC piping. All runoff will flow through riprap prior to entering the biofiltration ponds. The velocity entering the biofiltration ponds at various points will be less than 3 feet per second (see Appendix E).

Runoff less than the live storage volume (see BMP Table) will be stored in the BMP structure where flow will infiltrate (5"/hr min) through the 21" BSM layer, 6" filter course layer and gravel retention layer. Low flow discharge will enter 6" perforated PVC underdrains connected to the respective BMP overflow structure. Discharge will gravity flow to DI-BMP-2 and then off-site to the proposed catch basin on Midway Drive.

Runoff exceeding the total BMP capacity will be conveyed by orifice overflow to grated drop inlet structures located within the BMP (DI-BMP-1, DI-BMP-2). The inlets will discharge to the underground PVC storm drain system. All site runoff will pass through DI-BMP-2. Flow exiting DI-BMP-2 will be conveyed off-site to a new proposed catch basin on Midway Drive. The new catch basin will connected to the City of San Diego 36" storm drain beneath Midway Drive and eventually discharge to the San Diego Bay.

Design Methodology

As the tributary areas are under one square mile and the site is not within a floodplain or floodplain fringe area as defined by FEMA, the stormwater conveyance system has been designed for a combination of capacity and overflow for the 100-year storm without damage and the runoff criteria based on a 50-year storm.

Pre-Development: The Pre-Development Q2, Q10, Q50 and Q100 peak discharge flowrates were estimated using Rational method of analysis as presented in the Hydrology method above.

Post-Development: The Pre-Development site conditions were modeled using AutoDesk Storm and Sanitary Analysis (SSA) software. A node-link model of the DMA sub-basins was developed and the Rational method of analysis was applied to estimate the Q2, Q10, Q50 and Q100 peak discharge flowrates. Hydrodynamic flow routing (based on Saint Venant equations) principles were used to develop the Q100 hydraulic grade line (HGL) to assess the long term hydraulic performance of the on-site storm drain network.

4. Calculation Results

The results of the AutoDesk SSA software are provided in the program output report for the post-development 100-year storm simulation. The results show that the last pipe (SD-OUTLET-2) in the system connecting to the public storm drain system is at 55% capacity during a 100-year storm event. The HGL for the 100-year storm is 4.62 feet, which is slightly above half full for the pipe at its connection to OUTFALL-1. SD-OUTLET-2 pipe is not surcharged in the 100-year storm; therefore, it is assumed to not be surcharged in the 50-year storm.

	Q2 cfs	Q10 cfs	Q50 cfs	Q100 cfs
Pre-Development Total Offsite Q	1.11	1.73	2.36	2.62
Post-Development Total Offsite Q	1.07	1.59	2.13	2.33
Post-Development Inflow Q To BMP-1	0.24	0.38	0.52	0.58
Post-Development Inflow Q To BMP-2	0.83	1.21	1.61	1.75

5. Summary

Chevron Corporation proposes redevelopment of the existing fueling station and adjacent car wash property at 2959 Midway Drive in San Diego, CA. The project will add a new retail building, car wash building, fuel canopy, and landscaping.

The Pre-Development project site is 98.5% paved. Storm runoff currently overland flows to the City of San Diego storm drain system on Midway Drive. The Rational method estimates Q100 = 2.63 cfs.

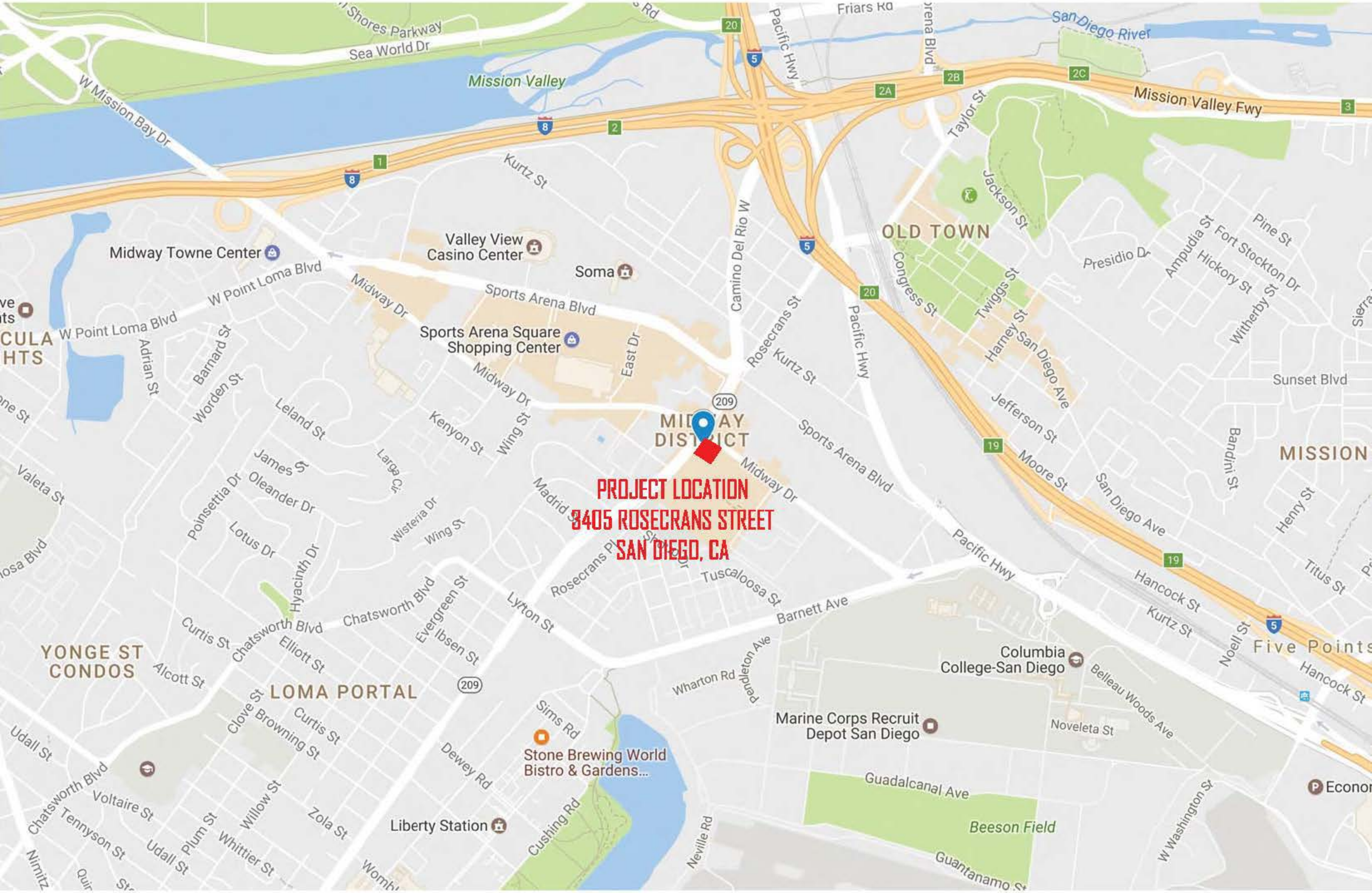
The Post-Development project will be 82% paved. The addition of new landscaping and BMP water-quality structures increases the pervious area by 16.5%. The BMP water quality structures add peak flow attenuation and live storage capacity. The Rational method estimates offsite discharge Q100 = 2.33 cfs.

APPENDICES

A. Project Location Map
B. Pre-Development Drainage Plan
C. Post-Development Drainage Plan
D. Calculation Results – Pre-Development
    - Pre-Development Data Table
    - Pre-Development Q2, Q10, Q50 and Q100 Hydrographs
E. Calculation Results – Post-Development
    - Post-Development Data Table
    - BMP-1 – Q2, Q10, Q50 and Q100 Hydrographs
    - BMP-2 – Q2, Q10, Q50 and Q100 Hydrographs
    - Offsite Flow – Q2, Q10, Q50 and Q100 Hydrographs
F. Additional Backup

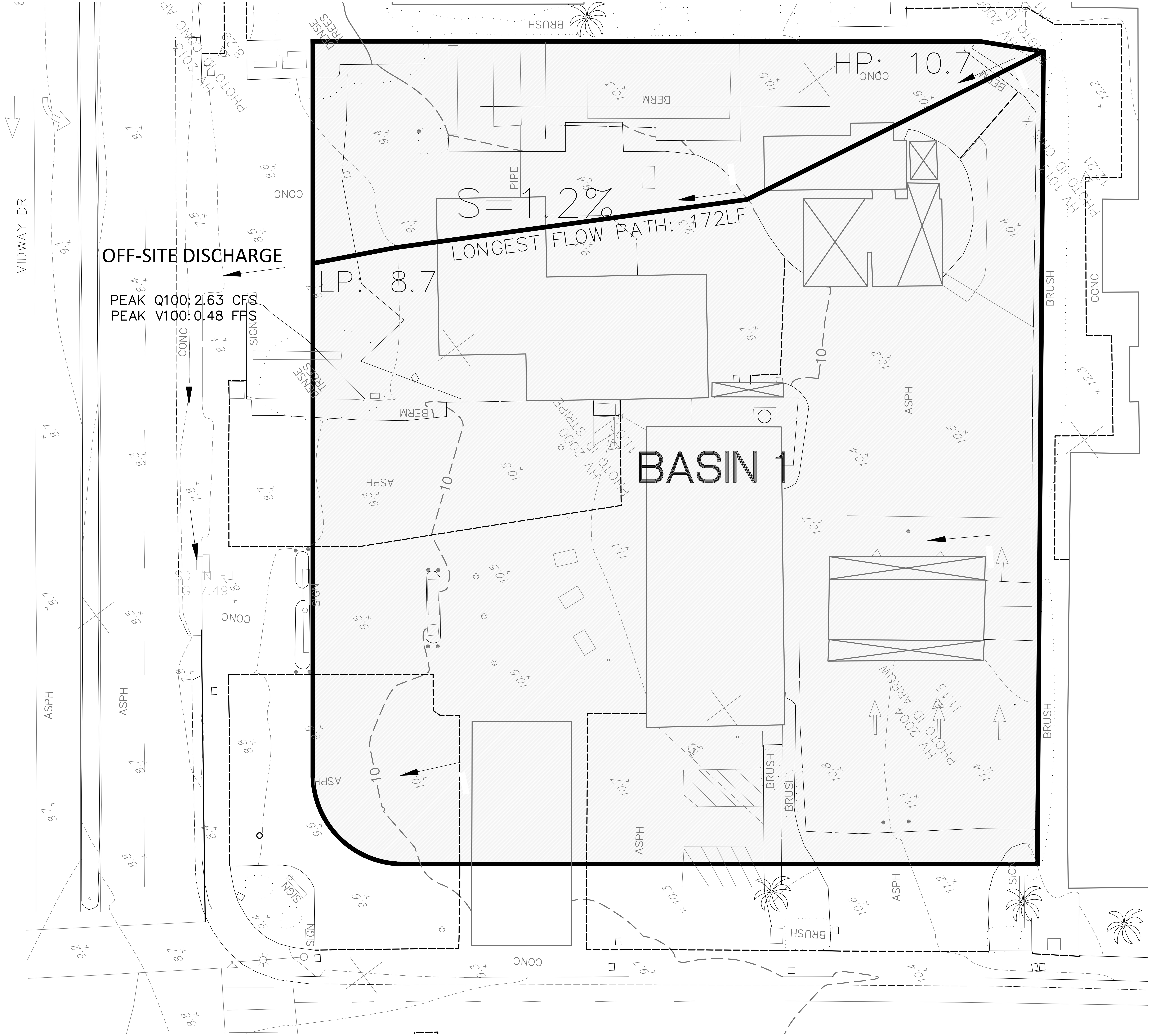
APPENDIX A

PROJECT LOCATION MAP


PROJECT LOCATION
3405 ROSECRANS STREET
SAN DIEGO, CA
MIDWAY DISTRICT
OLD TOWN
LOMA PORTAL
YONGE ST CONDOS
MISSION
Five Points
Mission Valley
Mission Valley Fwy
San Diego River
Sea World Dr
Friars Rd
W Mission Bay Dr
Midway Towne Center
Valley View Casino Center
Soma
Sports Arena Square Shopping Center
Sports Arena Blvd
W Point Loma Blvd
Midway Dr
Rosecrans St
Camino Del Rio W
Pacific Hwy
Kurtz St
Barnett Ave
Chatsworth Blvd
Columbia College-San Diego
Marine Corps Recruit Depot San Diego
Stone Brewing World Bistro & Gardens...
Liberty Station
Beeson Field
Guadalcanal Ave
Taylor St
Jackson St
Presidio Dr
Sunset Blvd
Hancock St

APPENDIX B

PRE-DEVELOPMENT DRAINAGE PLAN

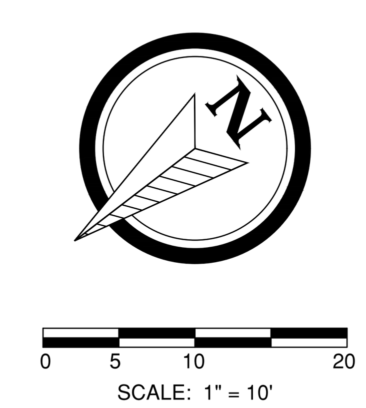


PRE-DEVELOPMENT LEGEND

(box symbol)	BASIN
(arrow symbol)	FLOW PATH OF TRAVEL
10 (line symbol)	CONTOUR

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE D
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.



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5/23/18
Seal

REVISION
DATE
MARK

Chevron
CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

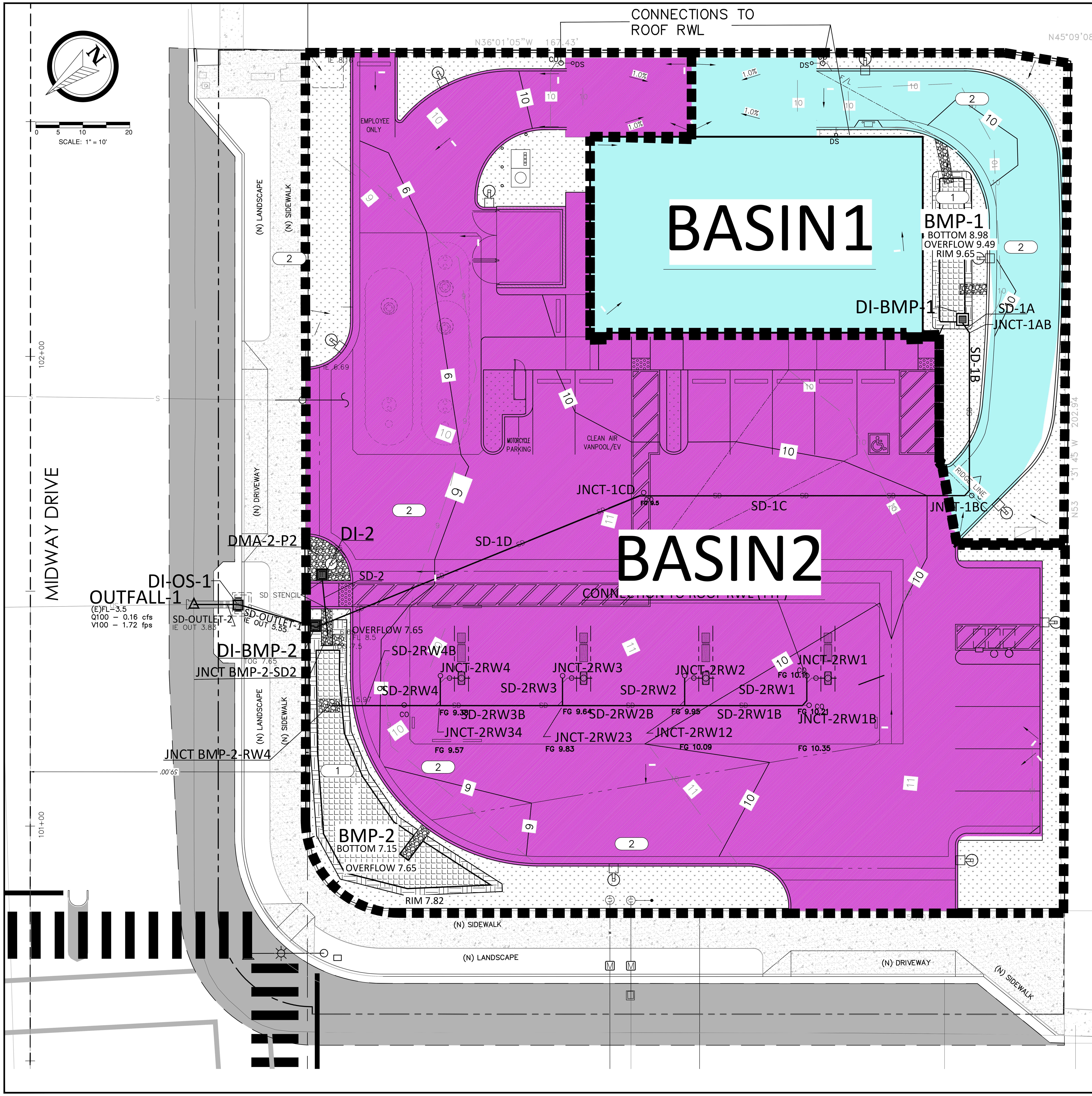
Project Number
CHV16014.1

Sheet Name
PRE-DEVELOPMENT DRAINAGE EXHIBIT

Sheet Number

APPENDIX C

POST-DEVELOPMENT DRAINAGE PLAN



POST-DEVELOPMENT LEGEND

- BASIN BOUNDARY
- IMPERVIOUS AREA
- PERVIOUS AREA
- FLOW PATH OF TRAVEL
- 10 CONTOUR
- BIOFILTRATION (BF-1)

NOTES:

1. HYDROLOGIC SOIL GROUP TYPE D
2. DEPTH TO GROUNDWATER 7FT
3. THERE ARE NO EXISTING HYDROLOGIC FEATURES, OR DRAINAGE NETWORKS, OR CCSY AREAS TO BE PROTECTED.
4. BASIN AREAS ARE DIVIDED BY THE BOUNDARY LINE AND IMPERVIOUS AREA IS SHADED.
5. PROPOSED ON-SITE STORM DRAIN PIPES ARE LABELED AS SD-#, WHILE PROPOSED OFF-SITE STORM DRAIN PIPES ARE SD-OUTLET-#
5. PROPOSED BMP OVERFLOW STRUCTURES ARE LABELED AS DI-BMP-#, WHILE PROPOSED BMP STRUCTURES ARE BMP-#
6. FOR BASIN OR STORM DRAIN NETWORK SPECS, SEE APPENDIX E: POST-DEVELOPMENT BMP TABLE AND SW NETWORK DATA TABLE, RESPECTIVELY.

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REVISION	DATE	MARK

Chevron

CHEVRON STATION
2959 MIDWAY DRIVE
SAN DIEGO, CA 92110

Project Number
CHV16014.1

Sheet Name
POST DEVELOPMENT DRAINAGE EXHIBIT

Sheet Number

APPENDIX D

CALCULATION RESULTS

PRE-DEVELOPMENT

PRE-DEVELOPMENT DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **Pre-Development Drainage Condiiton**

Pre-Existing Drainage Conditions

Total Site Area: 0.679 ac
29,581.00 ft^2

DMA #	Shed Area, ft^2	Shed Area, AC	% IMP	Flow Length D, ft	Slope %	Tc min	Runoff Coefficient C*	Peak Q2 cfs	Peak Q10 cfs	Peak Q50 cfs	Peak Q100 cfs
Basin 1	29,581	0.67909	98.6	141	1.20	5.50	0.94	1.11	1.74	2.37	2.63

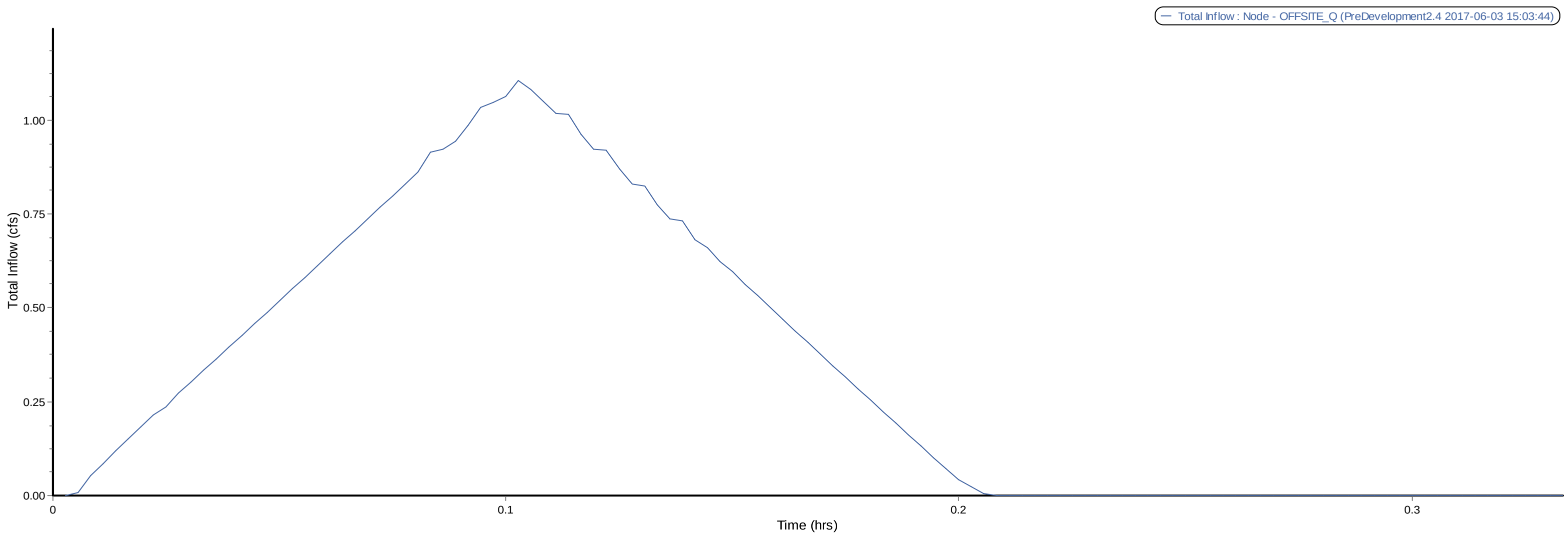
*C values were calculated based on values of 0.95 for Impervious Asphalt/Concrete and 0.5 for Landscaping

PRE-DEVELOPMENT Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q2

RESULTS:

Runoff Peak Q:	1.11	CFS
Runoff Volume:	401	ft^3

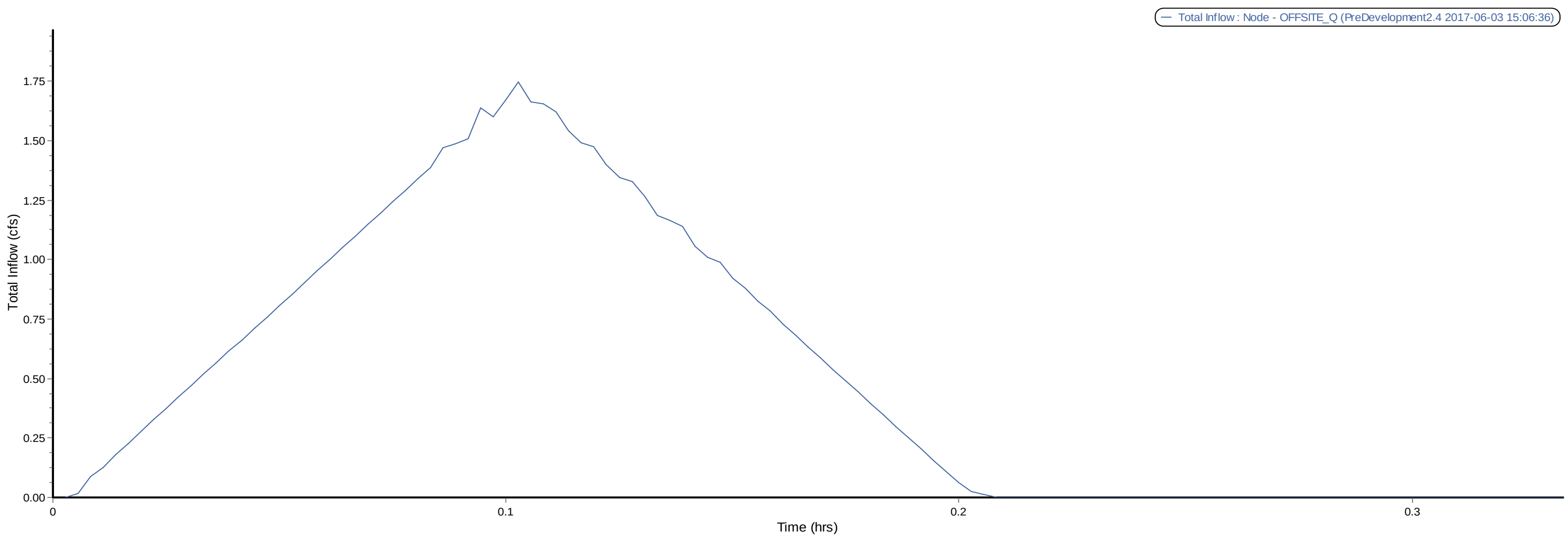


Element ID	OFFSITE_Q
Maximum Total Inflow (cfs)	1.11
Minimum Total Inflow (cfs)	0
Event Mean Total Inflow (cfs)	0.34
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft^3)	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume (ft^3)	401.12
Detention Storage (ft^3)	N/A
Exceedance	0
Deficit	0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q10

RESULTS:

Runoff Peak Q:	**1.74**	**CFS**
Runoff Volume:	**625**	**ft^3**

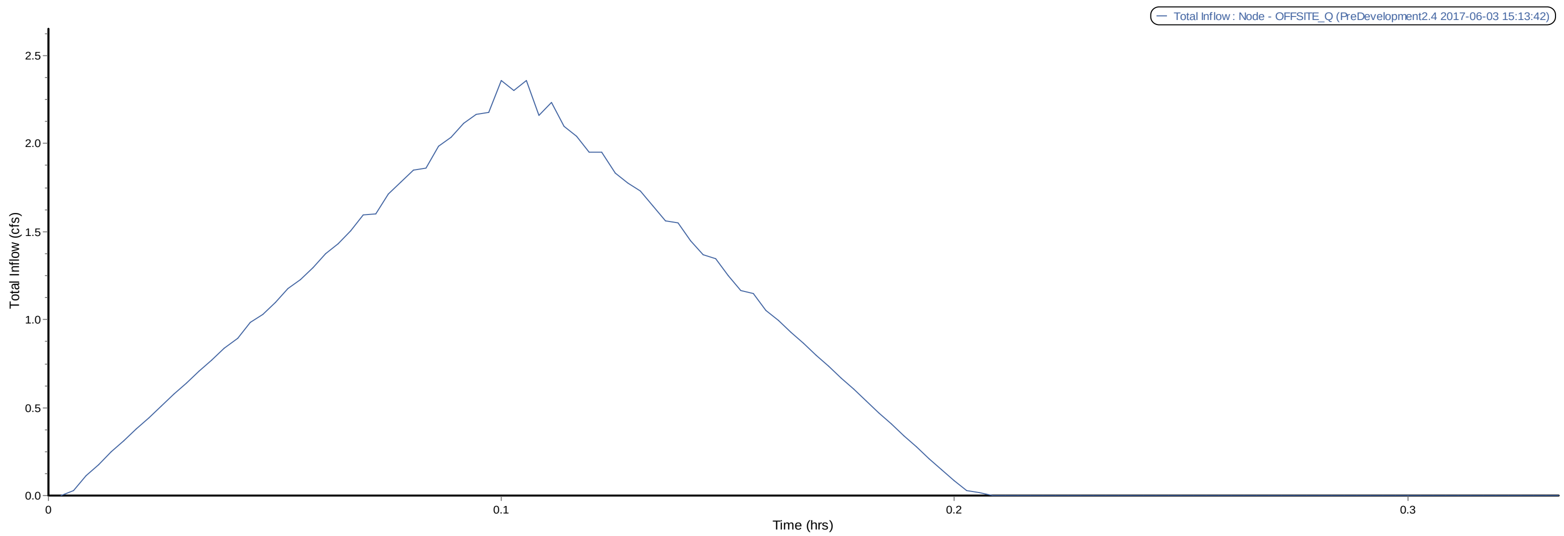


Element ID	OFFSITE Q
Maximum Total Inflow	1.74
Minimum Total Inflow	0.00
Event Mean Total	0.52
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	624.67
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q50

RESULTS:

Runoff Peak Q:	2.37	CFS
Runoff Volume:	851	FT^3

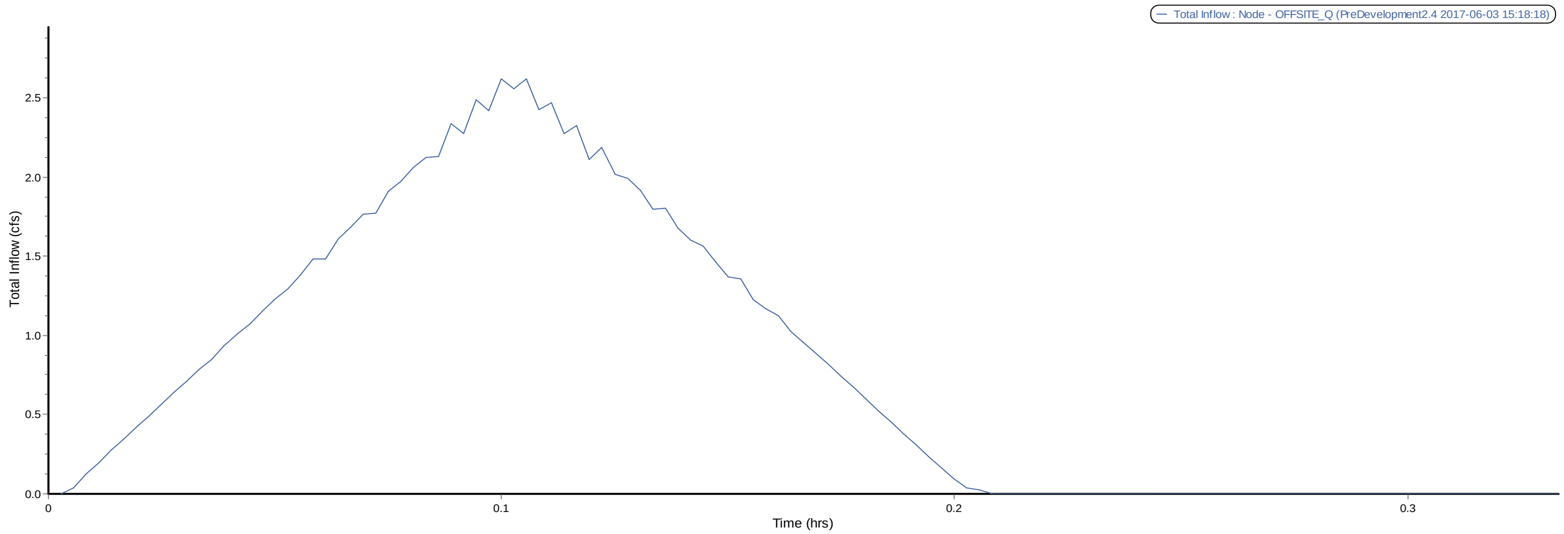


Element ID	OFFSITE Q
Maximum Total Inflow	2.37
Minimum Total Inflow	0.00
Event Mean Total	0.72
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	851.13
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Pre-Development Q100

RESULTS:

Runoff Peak Q: 2.63 CFS
Runoff Volume: 946 ft^3



Element ID	OFFSITE_Q
Maximum Total Inflow	2.63
Minimum Total Inflow	0.00
Event Mean Total	0.80
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	946.27
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

APPENDIX E

CALCULATION RESULTS

POST-DEVELOPMENT

POST-DEVELOPMENT DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **BMP TABLE**

BMP TABLE

Project Input Data:		
Total Site Area:	29,581	SF
	0.679	AC
	0.5	d, 85th percentile, 24-hr rainfall depth (inches) per Figure B.1-1
	0.9	C, Roof/Paved Area Runoff Factor
	0.5	C, Landscaped/BMP Area Runoff Factor

BMP #		DMA #	Shed Area, sf	Shed Area, ac	Coefficient C	Flow Length D,	Slope %	Tc min	Peak V2[1,2] fps	Peak V50[1,2] fps	Peak V100[1,2] fps	Peak Q2 cfs	Peak Q10 cfs	Peak Q50 cfs	Peak Q100 cfs
BMP-1		Basin1	6,825	0.157	0.724	67.9	2.4	4.0	0.25	0.54	0.60	0.240	0.380	0.520	0.580
BMP Bottom/FG Elev, ft	8.98														
BMP Rim Elev, ft	9.65														
Sidewalls, H:V	3:1														
Effective Area, sf	159.0														
BMP Live Storage Area, sf	219.0														
Rim Area, sf	279.0														
Riser Height, in	8.0														
Freeboard, in	2.0														
BMP Overflow Elev, ft	9.49														
BMP Live Storage Depth, ft	0.50														
Effective Storage Area, sf	159.0														
Infiltration Storage Volume Provided, cf	0														
Detention Storage Effective Depth, ft	1														
Live Storage, cf	196														
Net Volume Not Reliably Retained, cf	10														
BMP Drawdown Time, hr	15.6														
BMP-2		Basin2	22,800	0.523	0.754	73	1.1	3.6	0.257	0.500	0.547	0.830	1.210	1.610	1.750
BMP Bottom/FG Elev, ft	7.15														
BMP Rim Elev, ft	7.82														
Sidewalls, H:V	3:1														
Effective Area, sf	570.0														
BMP Live Storage Area, sf	699.5														
Rim Area, sf	829.0														
Riser Height, in	8.0														
Freeboard, in	2.0														
BMP Overflow Elev, ft	7.65														
BMP Live Storage Depth, ft	0.50														
Effective Storage Area, sf	570														
Infiltration Storage Volume Provided, cf	0														
Detention Storage Effective Depth, ft	1.25														
Live Storage, cf	780														
Net Volume Not Reliably Retained, cf	-54														
BMP Drawdown Time, hr	20														

Note:
[1]The Peak Velocities correspond to an entrance point into the BMP.

[2]The Peak Velocity for pervious areas that enter the BMP through specified entrance points were not included in the velocity calculations, but were all less than 0.1 fps in all storms. Basin 2 included the fueling canopy and the velocity was not considered for these due to differences in conveyance systems, but the pipes exiting the fueling canopy had velocity for the 2 year, 50 year, and 100 year of 1.25 fps, 2.42 fps, and 2.64 fps, respectively.

POST-DEVELOPMENT

STORMWATER NETWORK DATA TABLE

Project: Chevron Fueling/Car Wash Facility - 2959 Midway Drive, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: **DRAINAGE STRUCTURES TABLE**

DRAINAGE STRUCTURES

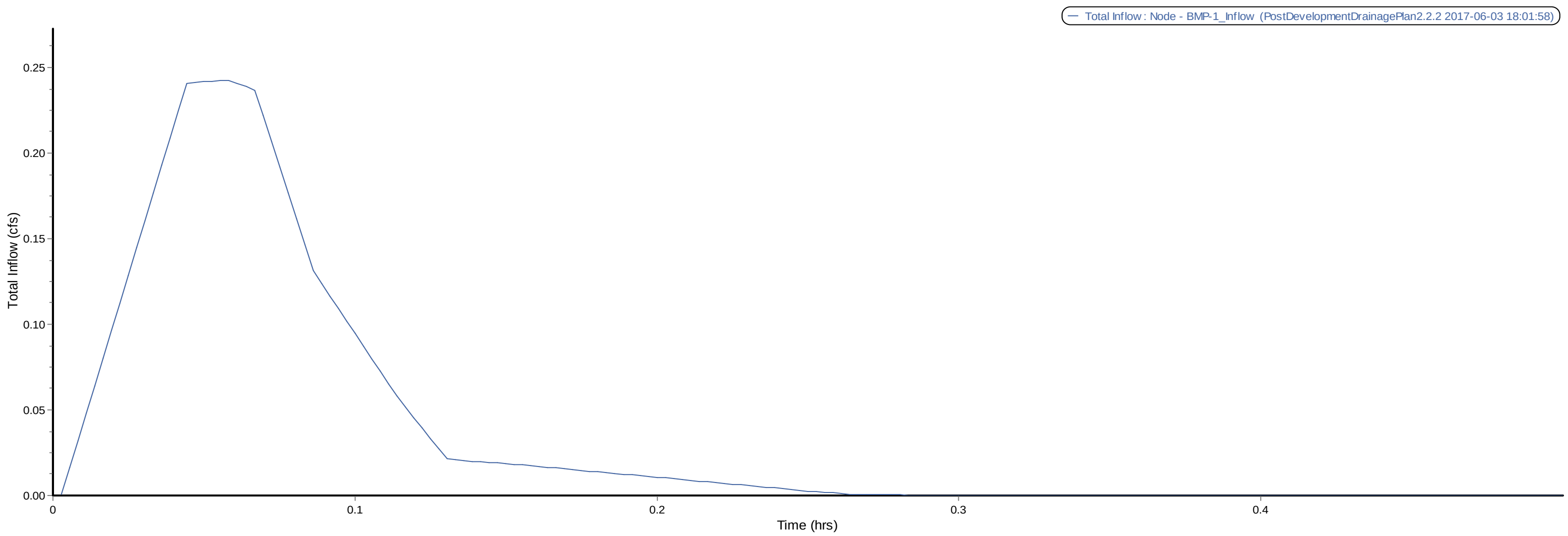
BMP #	DMA #	Structure #	Item	DIA/SIZE in	Quantity #	L, ft	S, ft/ft	IE In, ft	IE Out	TOG, ft	Sump Elev., ft
				0	0	0	0.000	0.00	0.00	0.00	0.00
BMP-1	DMA-1										
	INLETS	DI-BMP-1	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					9.49	5.65
	PIPES	SD-1A	PVC Pipe	6		4	0.005	7.99	7.97		
		SD-1B	PVC Pipe	6		35	0.005	7.97	7.79		
		SD-1C	PVC Pipe	6		70	0.005	7.79	7.44		
		SD-1D	PVC Pipe	6		72	0.005	7.44	7.08		
		UD-1	Slotted PVC, ASTM D 3034 or AE	4		26	0.000	6.65	6.65		
	JUNCTIONS	JNCT-1AB	PVC 90 DEG	6"x 6"	1				7.97		
		JNCT-1BC	PVC 90 DEG	6"x 6"	1				7.79		
		JNCT-1CD	PVC 22.5 DEG	6"x 6"	1				7.44		
BMP-2	DMA-2										
	INLETS	DI-2	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					7.66	5.72
		DI-BMP-2	Old Castle Grate Inlet Model # G1515 or AE	1'-6"X1'-6"X2'-0"	1					7.65	3.65
	PIPES	SD-2RW1	PVC Pipe	4		26	0.010	8.61	8.35		
		SD-2RW2	PVC Pipe	4		26	0.012	8.35	8.04		
		SD-2RW3	PVC Pipe	4		26	0.010	8.04	7.78		
		SD-2RW4	PVC Pipe	4		23	0.049	7.78	6.65		
		SD-2	STEEL TUBE	4X8X0.25	2	13	0.005	6.72	6.65		
		UD-2	Slotted PVC, ASTM D 3034 or eq.	4		68	0.000	4.65	4.65		
	JUNCTIONS	JNCT-2RW1	Connect RWL to JNCT-2RW1	VERIFY 4"x4"Connector	1				8.61		
		JNCT-2RW2	Connect RWL to JNCT-2RW2	VERIFY 4"x4"Connector	1				8.35		
		JNCT-2RW3	Connect RWL to JNCT-2RW3	VERIFY 4"x4"Connector	1				8.04		
		JNCT-2RW4	Connect RWL to JNCT-2RW4	VERIFY 4"x4"Connector	1				7.78		
		JNCT- BMP-2-SD2	Energy Dissipator Outlet Structure	See Plan - Details	1			0.00	6.65		
		JNCT- BMP-2-RW4	Energy Dissipator Outlet Structure	See Plan - Details	1			0.00	6.65		
OFFSITE											
		SD-OUTLET-1	PVC Pipe	12		20	0.005	5.65	5.55		
		DI-OS-1	FUTURE OFF-SITE CURB INLET	CONNECT SD-OUTLET-1 TO FUTURE INLE	1						
		SD-OUTLET-2	FUTURE OFF-SITE CONCRETE PIPE	18		9	0.009	3.91	3.83		
		OUTFALL-1	OUTFALL TO CITY OF SAN DIEGO 36" CONC. PIPE	CONNECT SD-OUTLET-2 TO EX. SD	1						

POST DEVELOPMENT
BMP-1 – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: acility - 3405 Rosecrans Street, San Diego, CA
Feature: gy/Hydraulic Calculations
Item: l: Post-Development Q2

RESULTS:

Runoff Peak Q:	0.24	CFS
Runoff Volume:	67	FT³

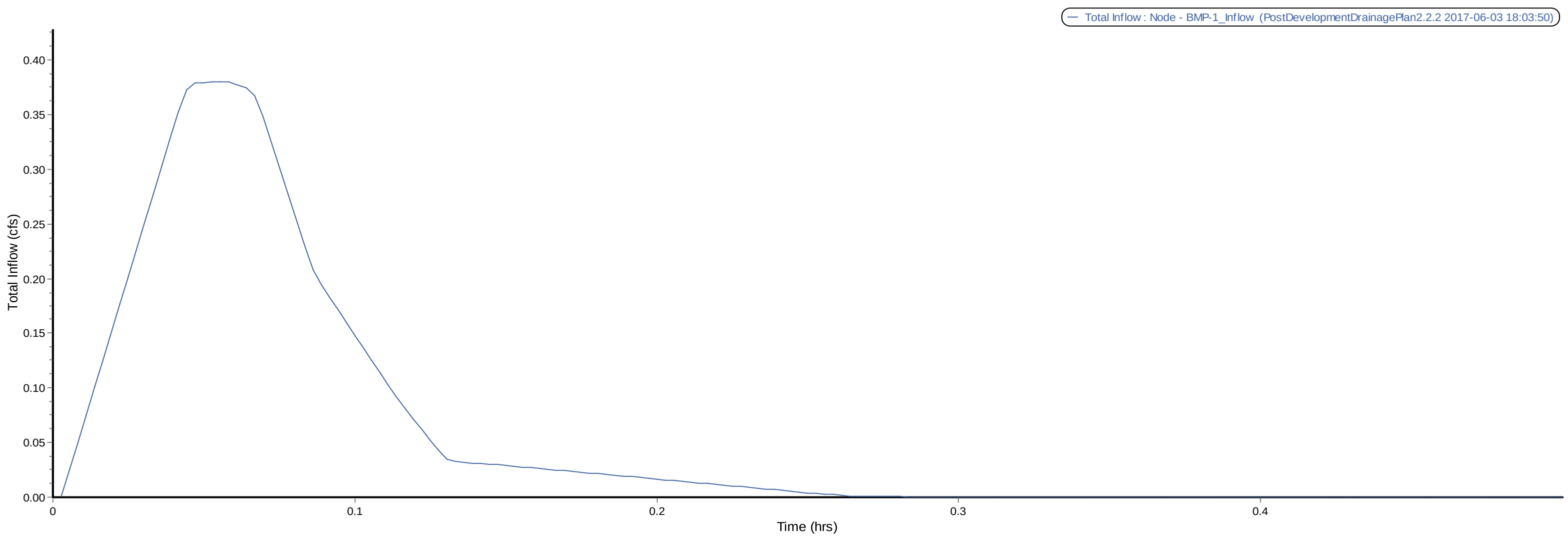


Element ID	BMP-1_Inflow
Maximum Total Inflow (cfs)	0.24
Minimum Total Inflow (cfs)	0
Event Mean Total Inflow (cfs)	0.02
Duration of Exceedances (hrs)	N/A
Duration of Deficits (hrs)	N/A
Number of Exceedances	N/A
Number of Deficits	N/A
Volume of Exceedance (ft³)	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume (ft³)	67.39
Detention Storage (ft³)	N/A
Exceedance	0
Deficit	0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-1: Post-Development Q10

RESULTS:

Runoff Peak Q:	**0.38**	**CFS**
Runoff Volume:	**106**	**ft^3**

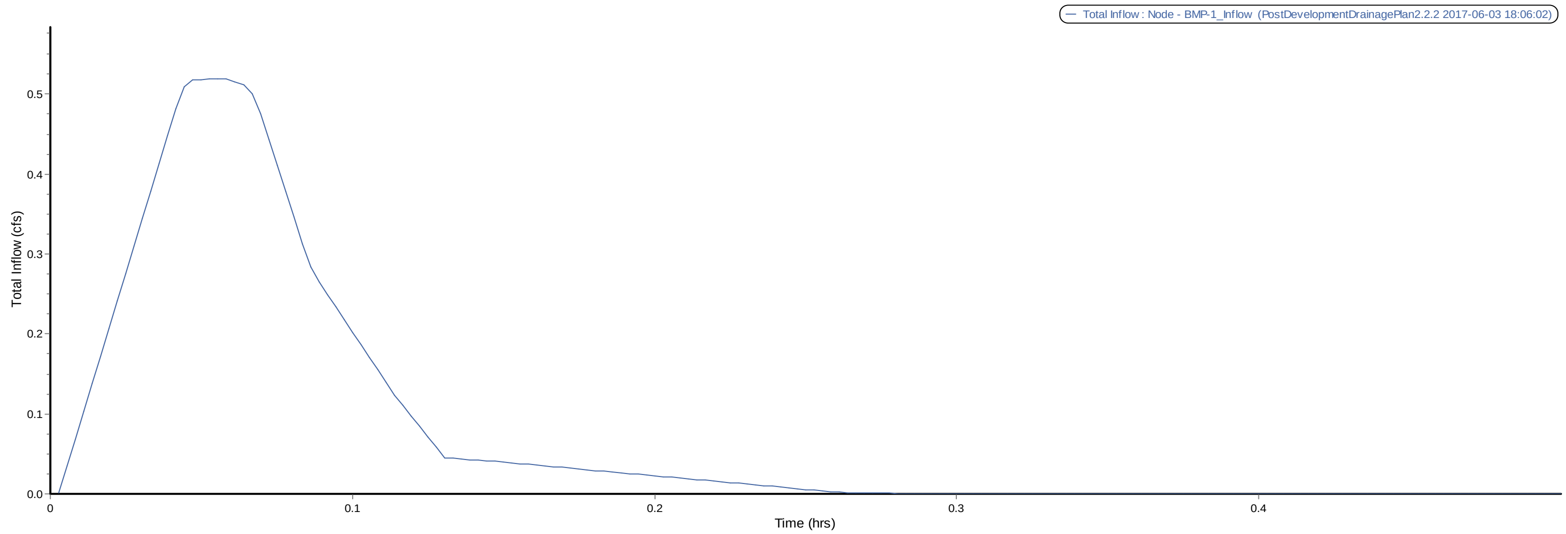


Element ID	BMP-1 Inflow
Maximum Total Inflow	0.38
Minimum Total Inflow	0.00
Event Mean Total	0.06
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	105.65
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-1: Post-Development Q50

RESULTS:

Runoff Peak Q:	**0.52**	**CFS**
Runoff Volume:	**144**	**ft^3**

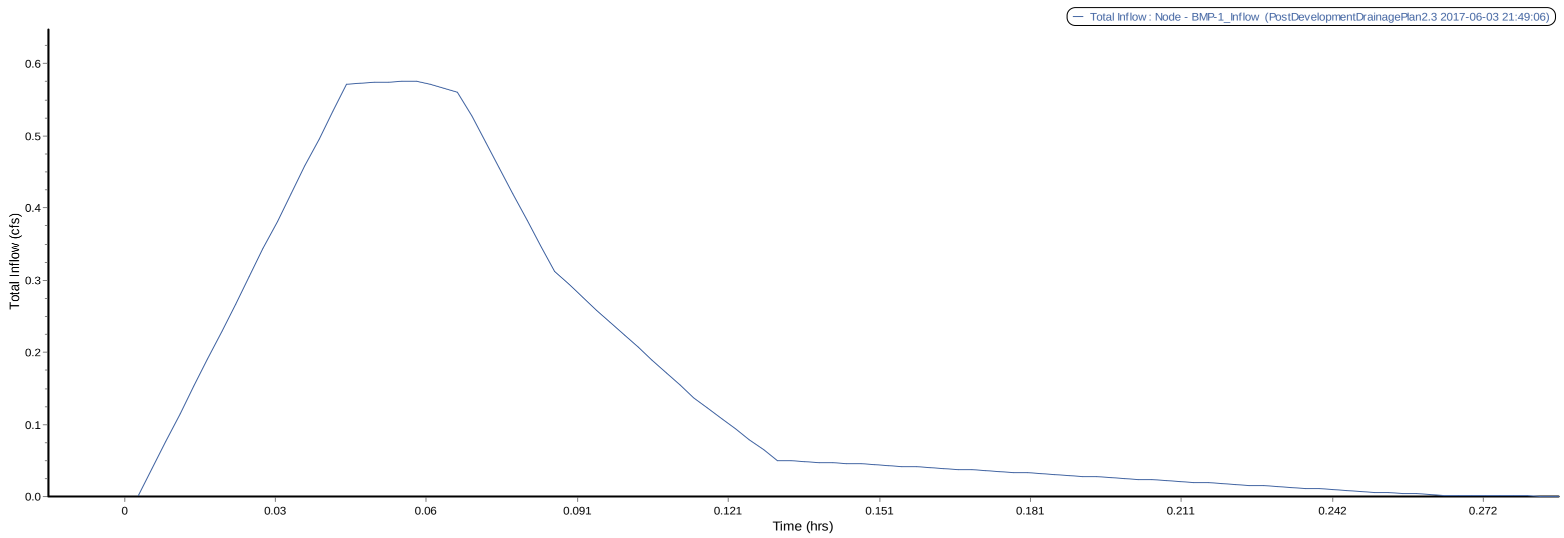


Element ID	BMP-1 Inflow
Maximum Total Inflow	0.52
Minimum Total Inflow	0.00
Event Mean Total	0.08
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	144.14
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-1: Post-Development Q100

RESULTS:

Runoff Peak Q:	0.58	CFS
Runoff Volume:	160	ft³



Element ID	BMP-1 Inflow
Maximum Total Inflow	0.58
Minimum Total Inflow	0.00
Event Mean Total	0.04
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume	159.93
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

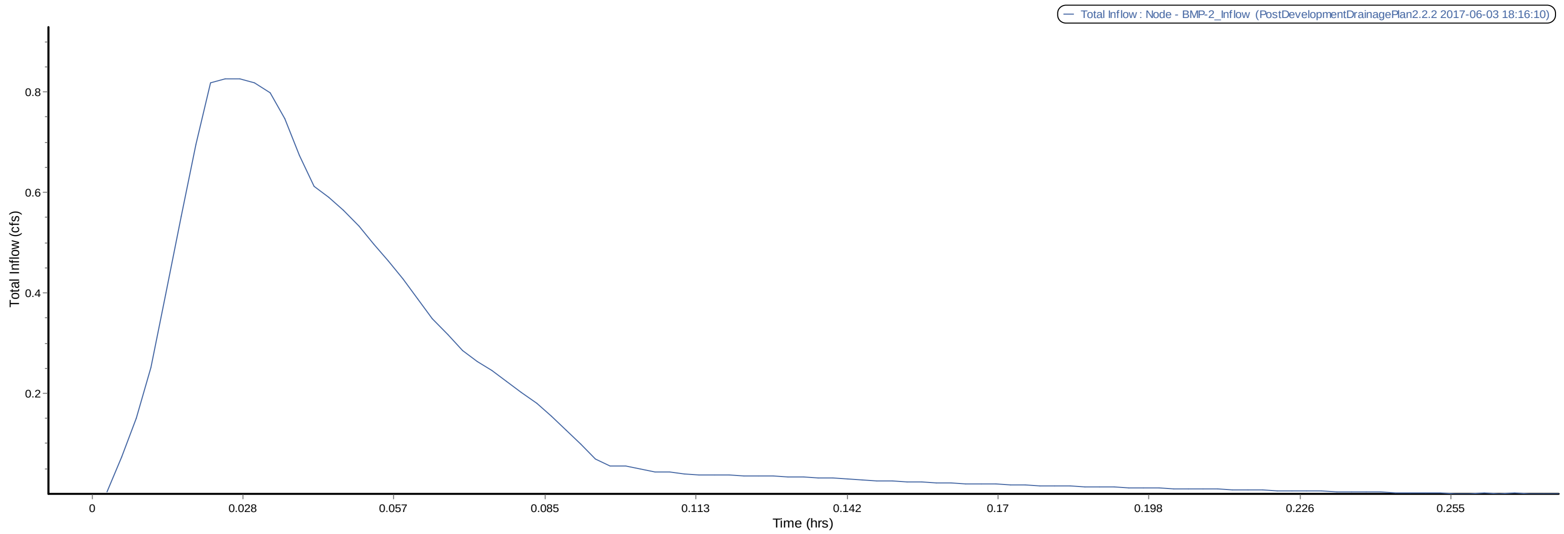
POST DEVELOPMENT

BMP-2 – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q2

RESULTS:

Runoff Peak Q:	0.83	CFS
Runoff Volume:	155	ft³

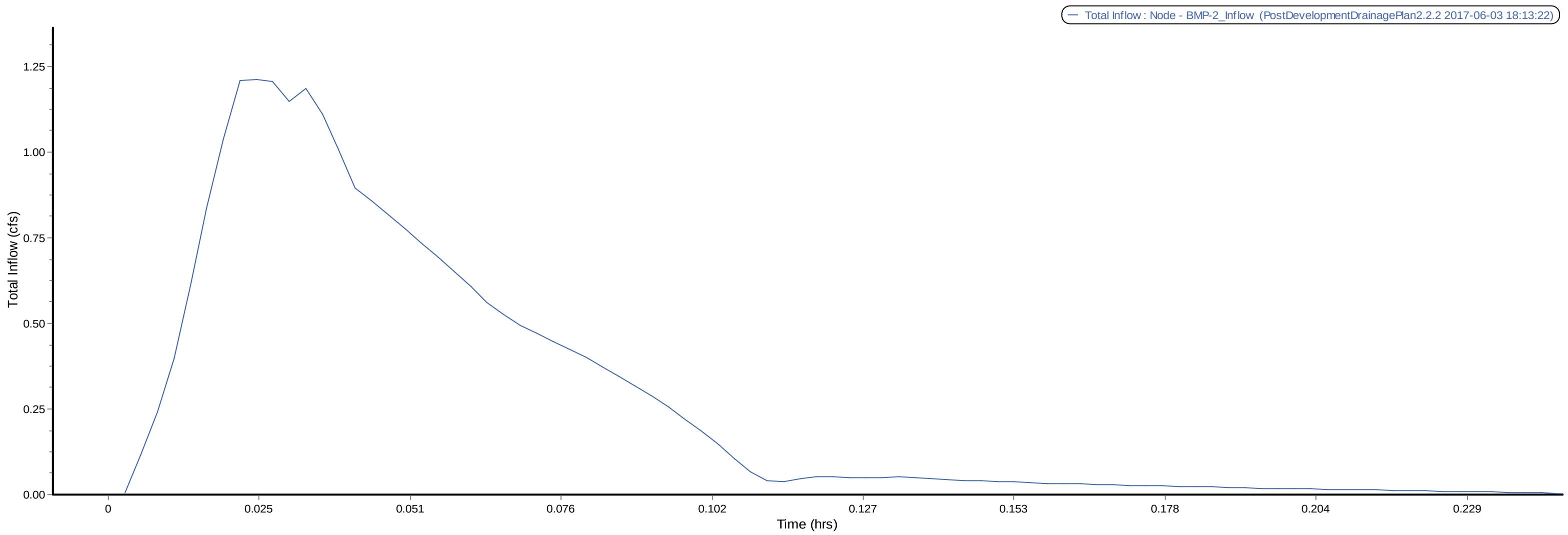


Element ID	BMP-2 Inflow
Maximum Total Inflow	0.83
Minimum Total Inflow	0.00
Event Mean Total	0.09
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	154.64
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q10

RESULTS:

Runoff Peak Q:	1.21	CFS
Runoff Volume:	243	FT³

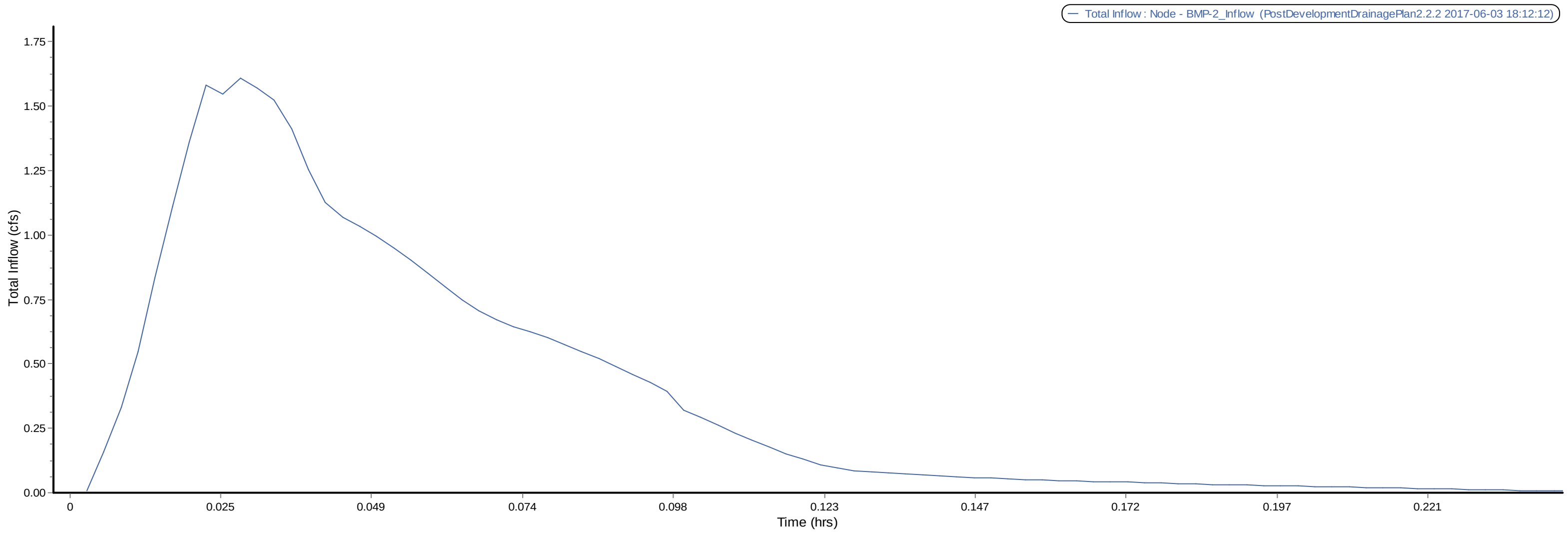


Element ID	BMP-2 Inflow
Maximum Total Inflow	1.21
Minimum Total Inflow	0.00
Event Mean Total	0.14
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume	243.45
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q50

RESULTS:

Runoff Peak Q:	**1.61**	**CFS**
Runoff Volume:	**335**	**ft³**

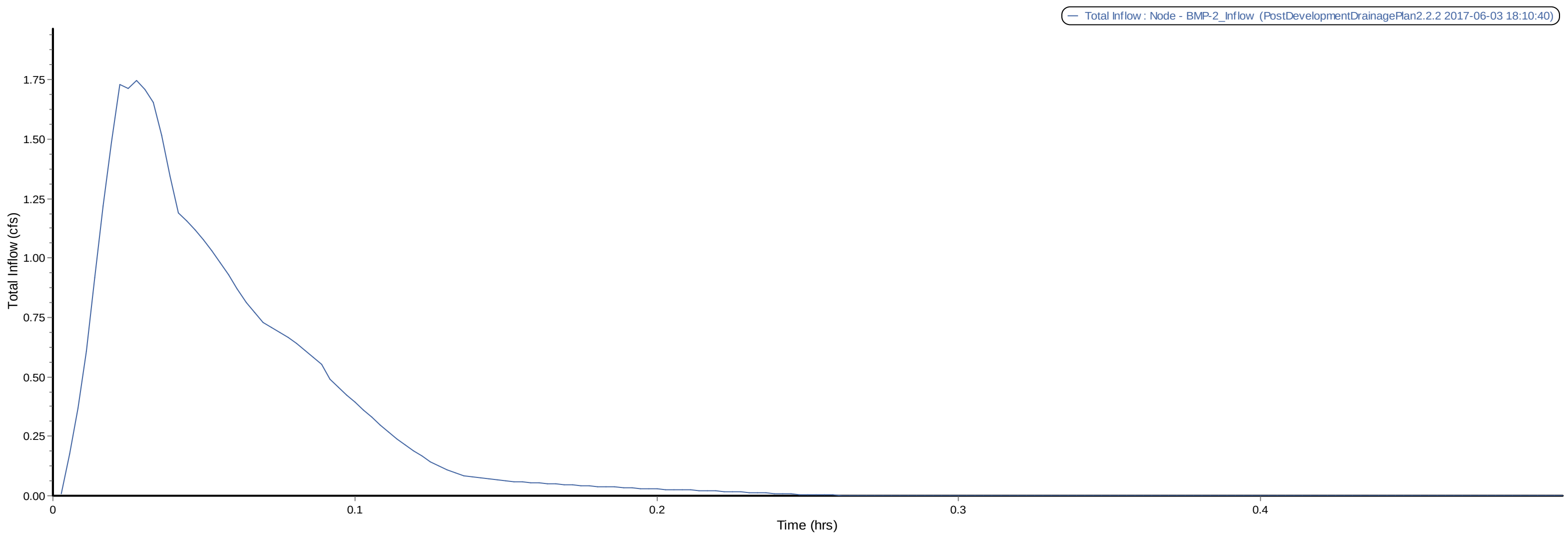


Element ID	BMP-2 Inflow
Maximum Total Inflow	1.61
Minimum Total Inflow	0.00
Event Mean Total	0.19
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Inflow Volume	335.45
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: BMP-2: Post-Development Q100

RESULTS:

Runoff Peak Q:	**1.75**	**CFS**
Runoff Volume:	**371**	**FT^3**



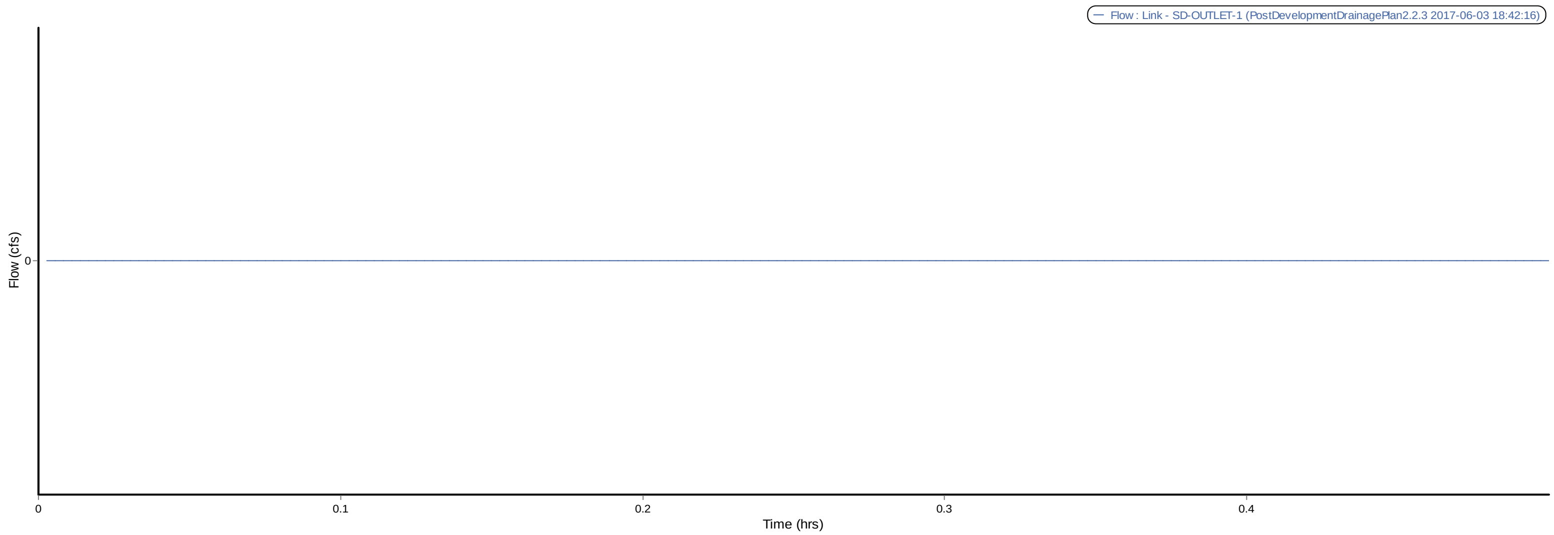
Element ID	BMP-2 Inflow
Maximum Total Inflow	1.75
Minimum Total Inflow	0.00
Event Mean Total	0.21
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Inflow Volume	371.31
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

POST DEVELOPMENT
OFFSITE FLOW – Q2, Q10, Q50 and Q100 HYDROGRAPHS

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite Flow: Post-Development Q2

RESULTS:

Runoff Peak Q:	0.00	CFS
Runoff Volume:	0	FT^3

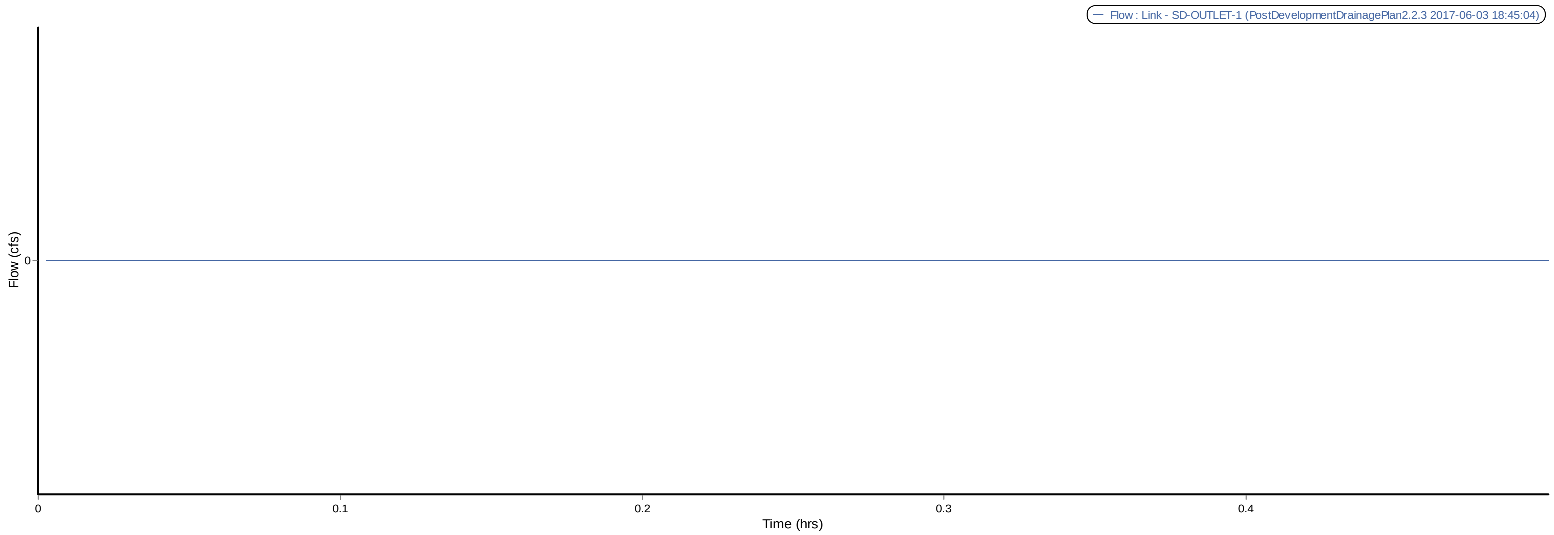


Element ID	SD-OUTLET-1	
Maximum Flow (cfs)		0
Minimum Flow (cfs)		0
Event Mean Flow (cfs)		0
Duration of Exceedances (hrs)	N/A	
Duration of Deficits (hrs)	N/A	
Number of Exceedances	N/A	
Number of Deficits	N/A	
Volume of Exceedance (ft³)	N/A	
Volume of Deficit (ft³)	N/A	
Total Flow (ft³)		0
Detention Storage (ft³)	N/A	
Exceedance		0
Deficit		0

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q10

RESULTS:

Runoff Peak Q:	0.00	CFS
Runoff Volume:	0	ft^3

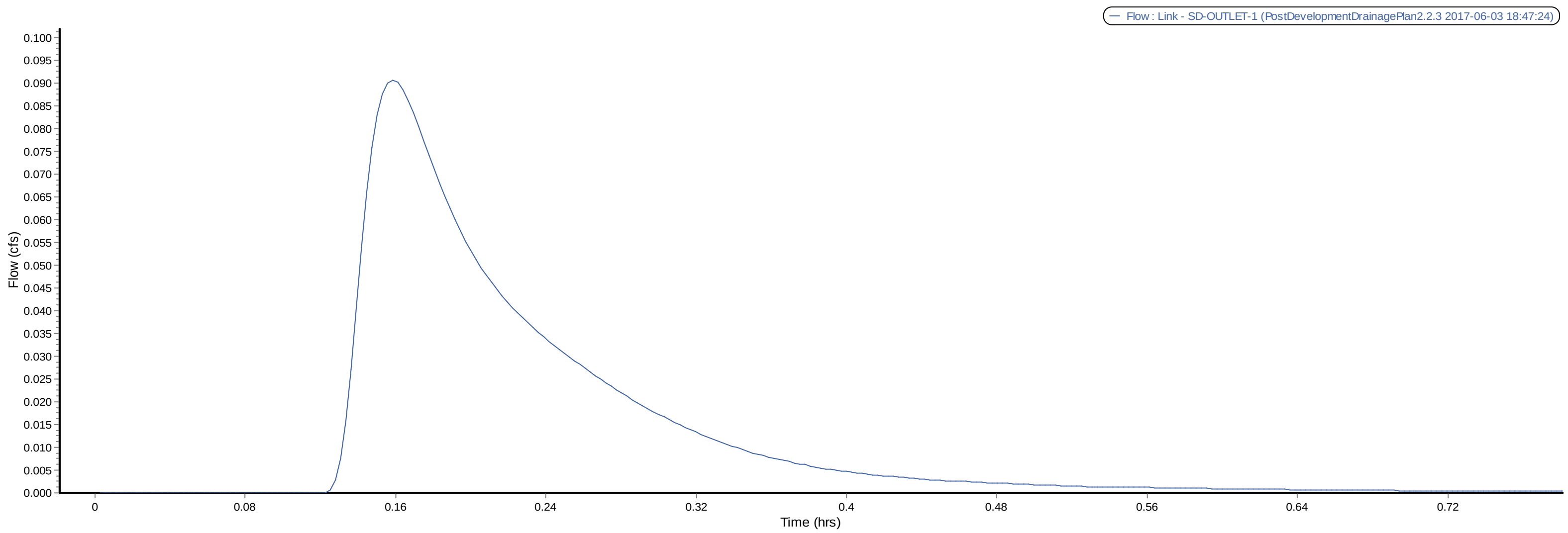


Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.00
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.00
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Flow (ft^3)	0.00
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q50

RESULTS:

Runoff Peak Q:	0.09	CFS
Runoff Volume:	34	FT³

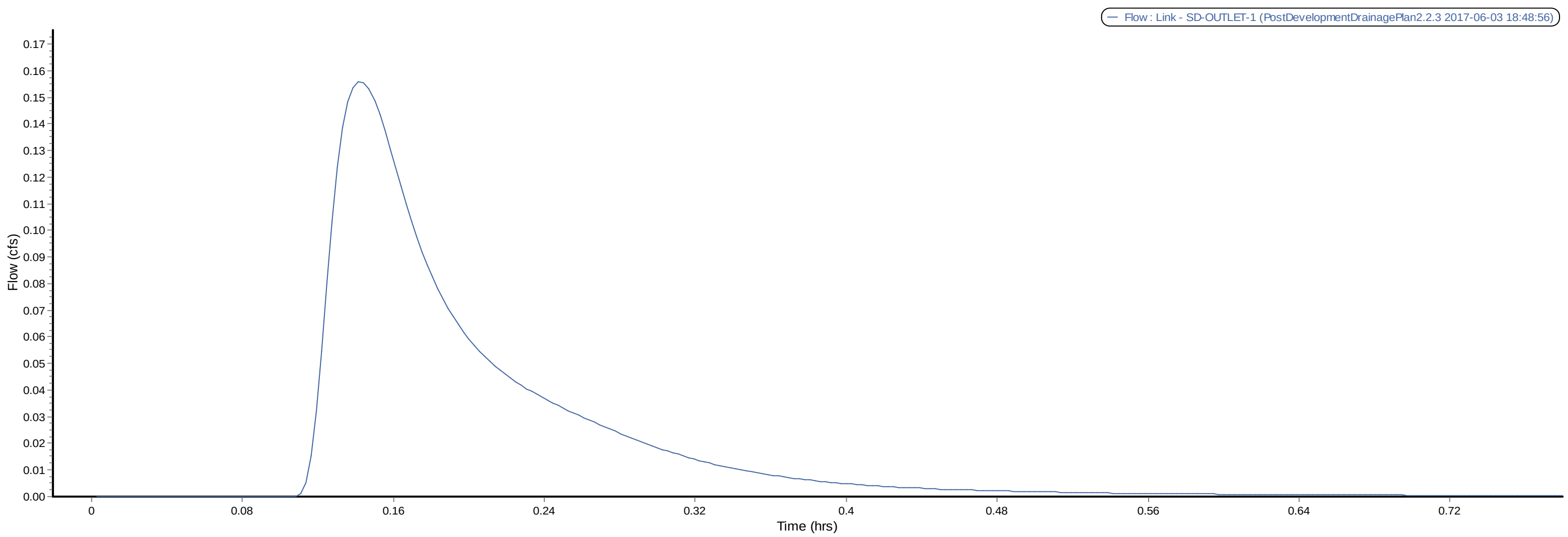


Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.09
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.01
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft³)	N/A
Total Flow (ft³)	33.91
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

Project: Chevron Fueling/Car Wash Facility - 3405 Rosecrans Street, San Diego, CA
Feature: Hydrology/Hydraulic Calculations
Item: Offsite: Post-Development Q100

RESULTS:

Runoff Peak Q:	**0.16**	**CFS**
Runoff Volume:	**50**	**FT^3**



Element ID	SD-OUTLET-1
Maximum Flow (cfs)	0.16
Minimum Flow (cfs)	0.00
Event Mean Flow (cfs)	0.01
Duration of	N/A
Duration of Deficits	N/A
Number of	N/A
Number of Deficits	N/A
Volume of Exceedance	N/A
Volume of Deficit (ft^3)	N/A
Total Flow (ft^3)	49.66
Detention Storage	N/A
Exceedance	0.00
Deficit	0.00

APPENDIX F

ADDITONAL BACKUP

FEMA FIRM MAP

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1880G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1880 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CORONADO, CITY OF	060287	1880	G
SAN DIEGO, CITY OF	060295	1880	G

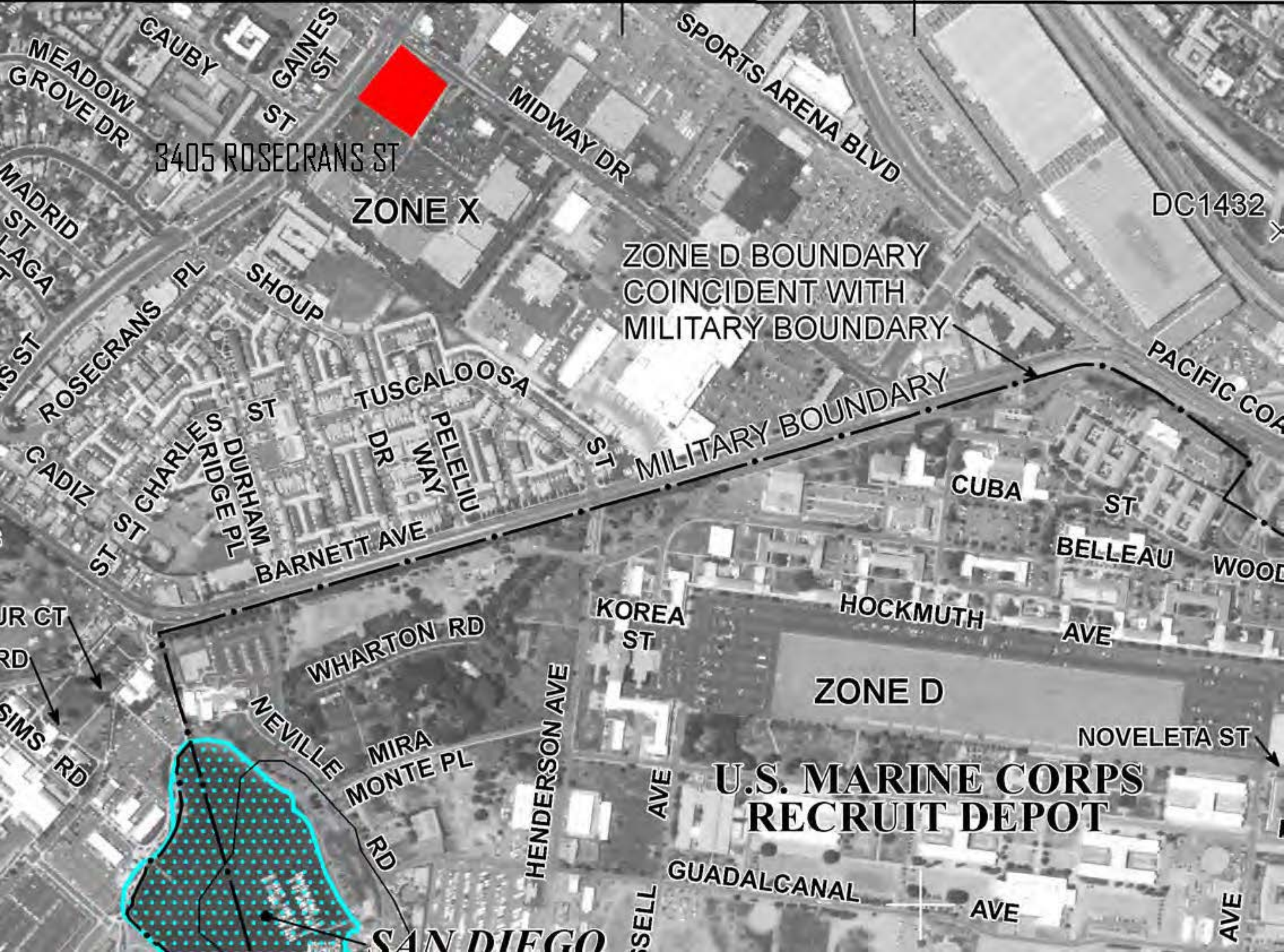
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

U.S. DEPARTMENT OF HOMELAND SECURITY

MAP NUMBER
06073C1880G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency


3405 ROSECRANS ST
ZONE X
ZONE D BOUNDARY COINCIDENT WITH MILITARY BOUNDARY
MILITARY BOUNDARY
ZONE D
U.S. MARINE CORPS RECRUIT DEPOT
SAN DIEGO
DC1432
CAUBY
GAINES ST
MEADOW GROVE DR
ST
MIDWAY DR
SPORTS ARENA BLVD
MADRID ST
ROSECRANS PL
SHOUP
ROSECRANS
TUSCALOOSA
ST
CHARLES
DURHAM RIDGE PL
DR
PELELIU WAY
ST
CADIZ ST
BARNETT AVE
PACIFIC COR
CUBA
ST
BELLEAU
WOOD
KOREA ST
HOCKMUTH
AVE
WHARTON RD
HENDERSON AVE
NEVILLE
RD
MIRA MONTE PL
NOVELETA ST
AVE
GUADALCANAL
AVE
SIMS
RD
UR CT
RD

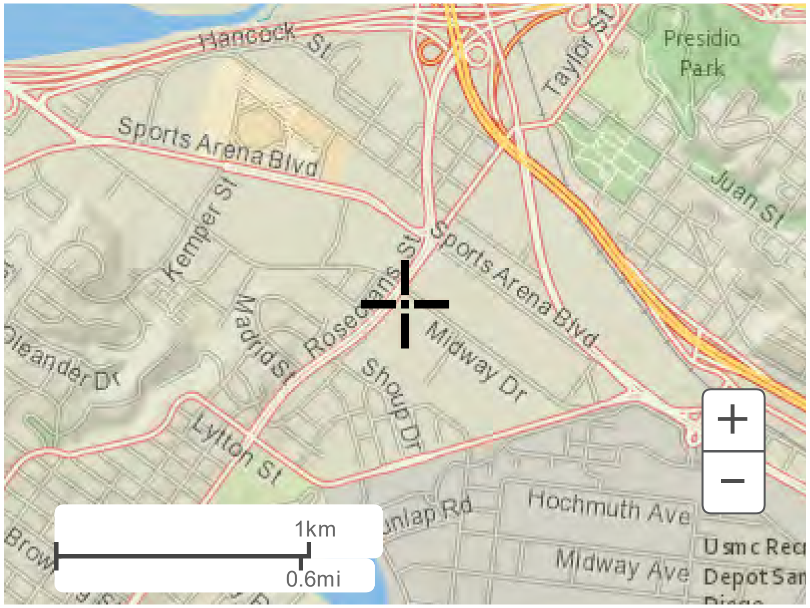
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

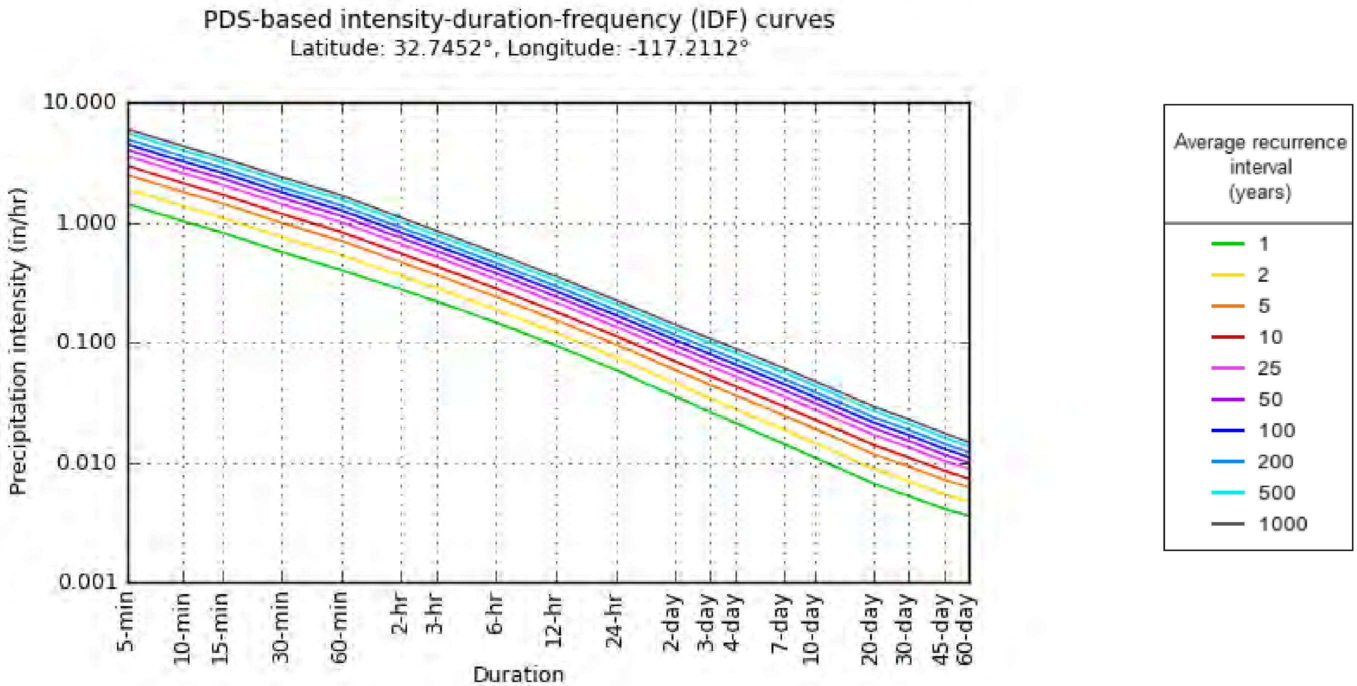
NOAA IDF CURVE DATA

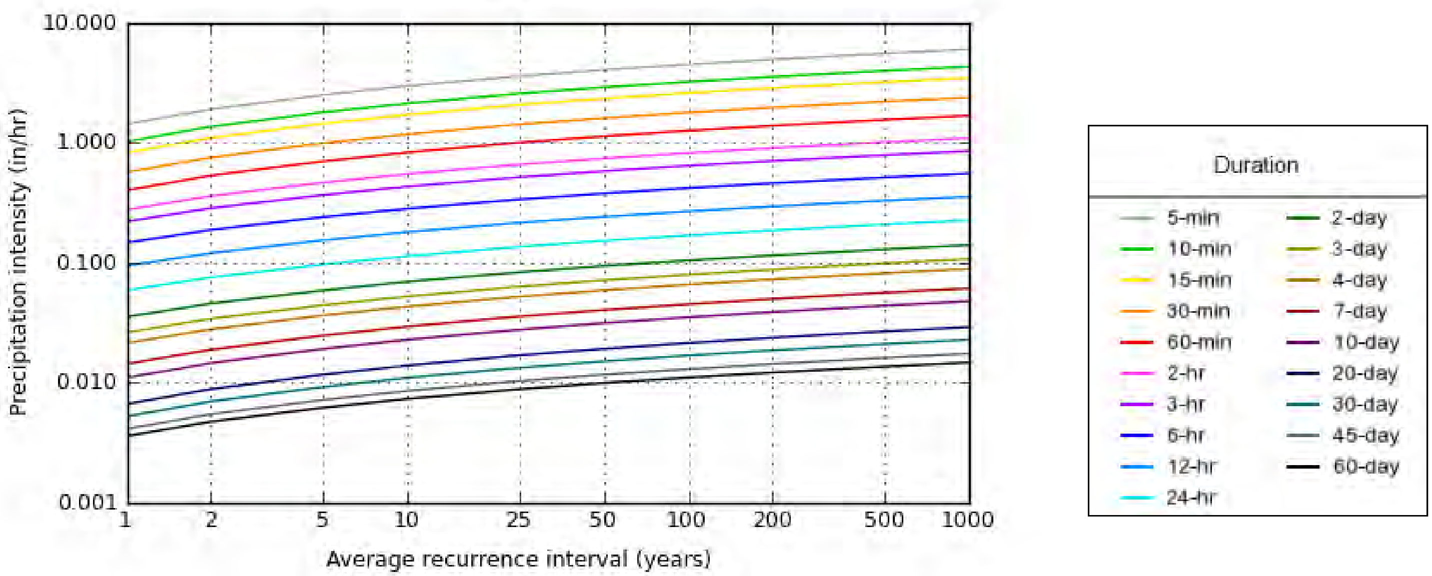


Large scale terrain

Large scale map

PF graphical





NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Sat Jun 3 19:04:02 2017

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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 6, Version 2
Location name: San Diego, California, USA*
Latitude: 32.7452°, Longitude: -117.2112°
Elevation: 29.76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.43 (1.19-1.73)	1.90 (1.58-2.29)	2.50 (2.08-3.02)	2.96 (2.45-3.62)	3.58 (2.84-4.52)	4.03 (3.14-5.21)	4.48 (3.41-5.94)	4.93 (3.65-6.74)	5.53 (3.91-7.88)	5.99 (4.09-8.84)
10-min	1.02 (0.852-1.24)	1.36 (1.13-1.64)	1.79 (1.49-2.17)	2.12 (1.75-2.59)	2.56 (2.04-3.24)	2.89 (2.26-3.74)	3.21 (2.44-4.26)	3.53 (2.61-4.83)	3.97 (2.81-5.65)	4.29 (2.93-6.34)
15-min	0.824 (0.688-0.996)	1.10 (0.916-1.33)	1.44 (1.20-1.74)	1.71 (1.41-2.09)	2.06 (1.65-2.61)	2.33 (1.82-3.01)	2.59 (1.97-3.44)	2.85 (2.11-3.90)	3.20 (2.26-4.56)	3.46 (2.36-5.11)
30-min	0.566 (0.474-0.684)	0.754 (0.630-0.912)	0.990 (0.826-1.20)	1.18 (0.972-1.44)	1.42 (1.13-1.80)	1.60 (1.25-2.07)	1.78 (1.35-2.36)	1.96 (1.45-2.68)	2.20 (1.56-3.14)	2.38 (1.62-3.52)
60-min	0.400 (0.335-0.483)	0.533 (0.445-0.644)	0.699 (0.583-0.848)	0.830 (0.686-1.02)	1.00 (0.800-1.27)	1.13 (0.882-1.46)	1.26 (0.956-1.67)	1.38 (1.02-1.89)	1.55 (1.10-2.21)	1.68 (1.15-2.48)
2-hr	0.276 (0.231-0.334)	0.360 (0.300-0.434)	0.465 (0.388-0.564)	0.548 (0.453-0.670)	0.658 (0.525-0.833)	0.740 (0.577-0.957)	0.820 (0.624-1.09)	0.902 (0.666-1.23)	1.01 (0.714-1.44)	1.09 (0.745-1.61)
3-hr	0.220 (0.184-0.266)	0.285 (0.238-0.344)	0.366 (0.305-0.444)	0.431 (0.356-0.527)	0.516 (0.412-0.653)	0.579 (0.452-0.749)	0.642 (0.489-0.852)	0.705 (0.521-0.964)	0.789 (0.558-1.13)	0.852 (0.582-1.26)
6-hr	0.147 (0.123-0.177)	0.188 (0.157-0.227)	0.240 (0.200-0.291)	0.282 (0.233-0.345)	0.337 (0.269-0.426)	0.378 (0.295-0.489)	0.418 (0.318-0.555)	0.459 (0.340-0.628)	0.514 (0.364-0.732)	0.554 (0.379-0.820)
12-hr	0.094 (0.079-0.114)	0.120 (0.101-0.146)	0.154 (0.128-0.186)	0.180 (0.149-0.220)	0.215 (0.172-0.273)	0.242 (0.189-0.313)	0.268 (0.204-0.355)	0.294 (0.217-0.402)	0.329 (0.233-0.469)	0.355 (0.243-0.525)
24-hr	0.059 (0.052-0.069)	0.075 (0.066-0.088)	0.097 (0.084-0.113)	0.113 (0.098-0.133)	0.136 (0.114-0.165)	0.152 (0.126-0.188)	0.169 (0.137-0.214)	0.186 (0.146-0.241)	0.208 (0.158-0.281)	0.225 (0.166-0.313)
2-day	0.035 (0.031-0.041)	0.046 (0.040-0.053)	0.059 (0.051-0.069)	0.069 (0.060-0.082)	0.083 (0.070-0.101)	0.094 (0.078-0.116)	0.104 (0.084-0.132)	0.115 (0.091-0.149)	0.129 (0.098-0.174)	0.140 (0.103-0.195)
3-day	0.026 (0.023-0.031)	0.034 (0.030-0.040)	0.044 (0.039-0.052)	0.052 (0.045-0.062)	0.063 (0.053-0.077)	0.071 (0.059-0.088)	0.080 (0.064-0.101)	0.088 (0.069-0.114)	0.099 (0.075-0.133)	0.107 (0.079-0.149)
4-day	0.021 (0.019-0.025)	0.028 (0.024-0.033)	0.036 (0.032-0.042)	0.043 (0.037-0.051)	0.052 (0.044-0.063)	0.059 (0.049-0.073)	0.066 (0.053-0.083)	0.073 (0.057-0.094)	0.082 (0.062-0.110)	0.089 (0.065-0.124)
7-day	0.014 (0.013-0.017)	0.019 (0.017-0.022)	0.025 (0.022-0.029)	0.029 (0.025-0.035)	0.036 (0.030-0.043)	0.040 (0.033-0.050)	0.045 (0.036-0.057)	0.050 (0.039-0.065)	0.056 (0.043-0.076)	0.061 (0.045-0.085)
10-day	0.011 (0.010-0.013)	0.015 (0.013-0.017)	0.019 (0.017-0.022)	0.023 (0.020-0.027)	0.028 (0.023-0.034)	0.031 (0.026-0.039)	0.035 (0.028-0.044)	0.039 (0.031-0.050)	0.044 (0.033-0.059)	0.048 (0.035-0.066)
20-day	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.012 (0.010-0.014)	0.014 (0.012-0.016)	0.017 (0.014-0.021)	0.019 (0.016-0.024)	0.021 (0.017-0.027)	0.024 (0.019-0.031)	0.027 (0.020-0.036)	0.029 (0.021-0.040)
30-day	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.008-0.011)	0.011 (0.010-0.013)	0.013 (0.011-0.016)	0.015 (0.012-0.019)	0.017 (0.014-0.021)	0.019 (0.015-0.024)	0.021 (0.016-0.028)	0.023 (0.017-0.032)
45-day	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.007-0.010)	0.010 (0.009-0.013)	0.012 (0.010-0.014)	0.013 (0.010-0.016)	0.014 (0.011-0.019)	0.016 (0.012-0.022)	0.018 (0.013-0.024)
60-day	0.004 (0.003-0.004)	0.005 (0.004-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.009)	0.009 (0.007-0.011)	0.010 (0.008-0.012)	0.011 (0.009-0.014)	0.012 (0.010-0.016)	0.014 (0.010-0.018)	0.015 (0.011-0.020)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PROGRAM OUTPUT REPORT

POST-DEVELOPMENT Q100

Autodesk® Storm and Sanitary Analysis 2014 - Version 8.1.46 (Build 1)

****
Project Description
****
File Name PostDevelopmentDrainagePlan2.4.SPF

****
Analysis Options
****
Flow Units .... cfs
Subbasin Hydrograph Method. Rational
Time of Concentration...... FAA
Return Period.............. 100 years
Link Routing Method .... Hydrodynamic
Storage Node Exfiltration.. Constant rate, free surface area
Starting Date JUN-03-2017 00:00:00
Ending Date JUN-03-2017 01:00:00
Report Time Step 00:00:10

****
Element Count
****
Number of subbasins 23
Number of nodes 15
Number of links 13

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Flow Length ft	Average Slope %
BMP-1	0.01	30.00	0.5000
BMP-2	0.01	10.00	0.5000
DMA-1_I1	0.07	130.00	0.5000
DMA-1_I2	0.01	95.00	0.5000
DMA-1_I3	0.04	68.00	0.7000
DMA-1_P1	0.02	80.00	1.9000
DMA-1_P2	0.01	40.00	0.5000
DMA-1_P3	0.01	40.00	0.5000
DMA-2_I1	0.02	31.00	0.5000
DMA-2_I2	0.02	33.00	0.5000
DMA-2_I3	0.02	33.00	0.5000
DMA-2_I4	0.02	31.00	0.5000
DMA-2_I5	0.17	170.00	1.6000
DMA-2_I6	0.09	190.00	1.5000

DMA-2_I7	0.04	100.00	2.6000
DMA-2_I8	0.01	170.00	1.6000
DMA-2_I9	0.05	132.00	1.7000
DMA-2_P1	0.02	60.00	0.5000
DMA-2_P2	0.01	39.00	0.5000
DMA-2_P3	0.01	39.00	1.0000
DMA-2_P4	0.01	41.00	1.0000
DMA-2_P5	0.02	30.00	0.5000
DMA-2_P6	0.01	16.00	0.5000

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
JNCT-1AB	JUNCTION	7.97	9.83	0.00	
JNCT-1BC	JUNCTION	7.79	10.15	0.00	
JNCT-1CD	JUNCTION	7.44	9.50	0.00	
JNCT-2RW1	JUNCTION	8.58	10.21	0.00	
JNCT-2RW2	JUNCTION	8.32	9.95	0.00	
JNCT-2RW3	JUNCTION	8.01	9.64	0.00	
JNCT-2RW4	JUNCTION	7.75	9.38	0.00	
JNCT-2RW4C	JUNCTION	6.65	8.00	0.00	
OUTFALL-1	OUTFALL	3.83	5.33	0.00	
BMP-1_Inflow	STORAGE	8.65	9.65	242.00	
BMP-2_Inflow	STORAGE	6.65	8.00	915.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
DI-2	NEENAH FOUNDRY	R-1792-AG	On Sag	1	6.72	7.75	35.00	6.72	50.00
DI-BMP-1	NEENAH FOUNDRY	R-1792-AG	On Sag	1	7.99	9.49	204.00	7.99	50.00
DI-BMP-2	NEENAH FOUNDRY	R-1792-AG	On Sag	1	5.65	7.65	683.60	5.65	50.00
DI-OS1	NEENAH FOUNDRY	R-1792-AG	On Sag	1	3.91	8.50	10.00	5.41	0.00

****
Roadway and Gutter Summary

****

Inlet ID	Roadway Longitudinal Slope ft/ft	Roadway Cross Slope ft/ft	Roadway Manning's Roughness	Gutter Cross Slope ft/ft	Gutter Width ft	Gutter Depression in
DI-2	-	0.0200	0.0160	0.0620	2.00	2.00
DI-BMP-1	-	0.0200	0.0160	0.0620	2.00	2.00
DI-BMP-2	-	0.0200	0.0160	0.0620	2.00	2.00
DI-OS1	-	0.0200	0.0160	0.0620	2.00	2.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
SD-1C	DI-BMP-1	JNCT-1AB	CONDUIT	4.0	0.5000	0.0120
SD-1D	JNCT-1AB	JNCT-1BC	CONDUIT	35.0	0.5143	0.0120
SD-1E	JNCT-1BC	JNCT-1CD	CONDUIT	70.0	0.5000	0.0120
SD-1F	JNCT-1CD	DI-BMP-2	CONDUIT	72.0	0.5000	0.0120
SD-2	DI-2	BMP-2_Inflow	CONDUIT	13.0	0.5385	0.0120
SD-2RW1	JNCT-2RW1	JNCT-2RW2	CONDUIT	26.0	1.0000	0.0120
SD-2RW2	JNCT-2RW2	JNCT-2RW3	CONDUIT	26.0	1.1923	0.0120
SD-2RW3	JNCT-2RW3	JNCT-2RW4	CONDUIT	26.0	1.0000	0.0120
SD-2RW4	JNCT-2RW4	JNCT-2RW4C	CONDUIT	23.0	4.7826	0.0120
SD-OUTLET-1	DI-BMP-2	DI-OS1	CONDUIT	20.0	0.5000	0.0120
SD-OUTLET-2	DI-OS1	OUTFALL-1	CONDUIT	9.0	0.8889	0.0150
DI-BMP-1-INFLOW	BMP-1_Inflow	DI-BMP-1	WEIR			
DI-BMP-2-iNFLOW	BMP-2_Inflow	DI-BMP-2	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
SD-1C	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-1D	CIRCULAR	0.50	0.50	1	0.20	0.13	0.44
SD-1E	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-1F	CIRCULAR	0.50	0.50	1	0.20	0.13	0.43
SD-2	RECT_CLOSED	0.33	0.67	1	0.22	0.11	0.47
SD-2RW1	CIRCULAR	0.33	0.33	1	0.09	0.08	0.21
SD-2RW2	CIRCULAR	0.33	0.33	1	0.09	0.08	0.23
SD-2RW3	CIRCULAR	0.33	0.33	1	0.09	0.08	0.21
SD-2RW4	CIRCULAR	0.33	0.33	1	0.09	0.08	0.45
SD-OUTLET-1	CIRCULAR	1.00	1.00	1	0.79	0.25	2.73
SD-OUTLET-2	CIRCULAR	1.50	1.50	1	1.77	0.38	8.58

```
**************************        Volume         Depth
Runoff Quantity Continuity       acre-ft        inches
**************************     ---------       -------
Total Precipitation ......         0.018         0.327
Continuity Error (%) .....         0.168


**************************        Volume        Volume
Flow Routing Continuity          acre-ft      Mgallons
**************************     ---------     ---------
External Inflow ..........         0.000         0.000
External Outflow .........         0.002         0.001
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.014         0.004
Continuity Error (%) .....        -0.004


**************************************
Runoff Coefficient Computations Report
**************************************

-----------------
Subbasin BMP-1
-----------------
                                             Area        Soil      Runoff
Soil/Surface Description                   (acres)      Group      Coeff.
--------------------------------------------------------------------------------
-                                             0.01          -        0.50
Composite Area & Weighted Runoff Coeff.                 0.01                    0.50

-----------------
Subbasin BMP-2
-----------------
                                             Area        Soil      Runoff
Soil/Surface Description                   (acres)      Group      Coeff.
--------------------------------------------------------------------------------
-                                             0.01          -        0.50
Composite Area & Weighted Runoff Coeff.                 0.01                    0.50

--------------------
Subbasin DMA-1_I1
--------------------
                                             Area        Soil      Runoff
Soil/Surface Description                   (acres)      Group      Coeff.
--------------------------------------------------------------------------------
-                                             0.07          -        0.95
Composite Area & Weighted Runoff Coeff.                 0.07                    0.95

--------------------
Subbasin DMA-1_I2
--------------------
                                             Area        Soil      Runoff
Soil/Surface Description                   (acres)      Group      Coeff.
--------------------------------------------------------------------------------
```

-	0.01	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.01		0.95

Subbasin DMA-1_I3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.04	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.04		0.95

Subbasin DMA-1_P1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.02		0.50

Subbasin DMA-1_P2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-1_P3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_I1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.03	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.03		0.95

Subbasin DMA-2_I2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.

```
-                                    0.03        -      0.95
Composite Area & Weighted Runoff Coeff.           0.03              0.95

--------------------
Subbasin DMA-2_I3
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
-                                    0.03        -      0.95
Composite Area & Weighted Runoff Coeff.           0.03              0.95

--------------------
Subbasin DMA-2_I4
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
-                                    0.03        -      0.95
Composite Area & Weighted Runoff Coeff.           0.03              0.95

--------------------
Subbasin DMA-2_I5
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
-                                    0.17        -      0.95
Composite Area & Weighted Runoff Coeff.           0.17              0.95

--------------------
Subbasin DMA-2_I6
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
-                                    0.09        -      0.95
Composite Area & Weighted Runoff Coeff.           0.09              0.95

--------------------
Subbasin DMA-2_I7
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
-                                    0.04        -      0.95
Composite Area & Weighted Runoff Coeff.           0.04              0.95

--------------------
Subbasin DMA-2_I8
--------------------
                                     Area       Soil     Runoff
Soil/Surface Description           (acres)     Group     Coeff.
------------------------------------------------------------------------------------------
```

-	0.01	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.01		0.95

Subbasin DMA-2_I9

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.05	-	0.95	
Composite Area & Weighted Runoff Coeff.		0.05		0.95

Subbasin DMA-2_P1

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.02		0.50

Subbasin DMA-2_P2

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P3

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P4

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.	
-	0.01	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.01		0.50

Subbasin DMA-2_P5

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.

-	0.02	-	0.50	
Composite Area & Weighted Runoff Coeff.		0.02		0.50

Subbasin DMA-2_P6

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.01	-	0.50
Composite Area & Weighted Runoff Coeff.	0.01		0.50

****
FAA (Federal Aviation Agency) Time of Concentration Computations Report
****

Tc = (1.8 * (1.1 - C) * (L^0.5) * (S^-0.333))

Where:

Tc = Time of Concentration (min)
C = Runoff Coefficient
L = Flow Length (ft)
S = Slope (%)

Subbasin BMP-1

Runoff Coefficient: 0.50
Flow Length (ft): 30.00
Slope (%): 0.50
Computed TOC (minutes): 7.45

Subbasin BMP-2

Runoff Coefficient: 0.50
Flow Length (ft): 10.00
Slope (%): 0.50
Computed TOC (minutes): 4.30

Subbasin DMA-1_I1

Runoff Coefficient: 0.95
Flow Length (ft): 130.00
Slope (%): 0.50
Computed TOC (minutes): 3.88

Subbasin DMA-1_I2

Runoff Coefficient: 0.95
Flow Length (ft): 95.00
Slope (%): 0.50
Computed TOC (minutes): 3.31

Subbasin DMA-1_I3

Runoff Coefficient: 0.95
Flow Length (ft): 68.00
Slope (%): 0.70
Computed TOC (minutes): 2.51

Subbasin DMA-1_P1

Runoff Coefficient: 0.50
Flow Length (ft): 80.00
Slope (%): 1.90
Computed TOC (minutes): 7.80

Subbasin DMA-1_P2

Runoff Coefficient: 0.50
Flow Length (ft): 40.00
Slope (%): 0.50
Computed TOC (minutes): 8.60

Subbasin DMA-1_P3

Runoff Coefficient: 0.50
Flow Length (ft): 40.00
Slope (%): 0.50
Computed TOC (minutes): 8.60

Subbasin DMA-2_I1

Runoff Coefficient: 0.95
Flow Length (ft): 31.00
Slope (%): 0.50
Computed TOC (minutes): 1.89

Subbasin DMA-2_I2

Runoff Coefficient: 0.95
Flow Length (ft): 33.00
Slope (%): 0.50
Computed TOC (minutes): 1.95

Subbasin DMA-2_I3

Runoff Coefficient: 0.95
Flow Length (ft): 33.00
Slope (%): 0.50
Computed TOC (minutes): 1.95

Subbasin DMA-2_I4

Runoff Coefficient: 0.95
Flow Length (ft): 31.00
Slope (%): 0.50
Computed TOC (minutes): 1.89

Subbasin DMA-2_I5

Runoff Coefficient: 0.95
Flow Length (ft): 170.00
Slope (%): 1.60
Computed TOC (minutes): 3.01

Subbasin DMA-2_I6

Runoff Coefficient: 0.95
Flow Length (ft): 190.00
Slope (%): 1.50
Computed TOC (minutes): 3.25

Subbasin DMA-2_I7

Runoff Coefficient: 0.95
Flow Length (ft): 100.00
Slope (%): 2.60
Computed TOC (minutes): 1.96

Subbasin DMA-2_I8

Runoff Coefficient: 0.95
Flow Length (ft): 170.00
Slope (%): 1.60
Computed TOC (minutes): 3.01

Subbasin DMA-2_I9

Runoff Coefficient: 0.95
Flow Length (ft): 132.00
Slope (%): 1.70
Computed TOC (minutes): 2.60

Subbasin DMA-2_P1

Runoff Coefficient: 0.50
Flow Length (ft): 60.00
Slope (%): 0.50
Computed TOC (minutes): 10.54

Subbasin DMA-2_P2

Runoff Coefficient: 0.50
Flow Length (ft): 39.00
Slope (%): 0.50
Computed TOC (minutes): 8.50

Subbasin DMA-2_P3

Runoff Coefficient: 0.50
Flow Length (ft): 39.00
Slope (%): 1.00
Computed TOC (minutes): 6.74

Subbasin DMA-2_P4

Runoff Coefficient: 0.50
Flow Length (ft): 41.00
Slope (%): 1.00
Computed TOC (minutes): 6.92

Subbasin DMA-2_P5

Runoff Coefficient: 0.50
Flow Length (ft): 30.00
Slope (%): 0.50
Computed TOC (minutes): 7.45

Subbasin DMA-2_P6

Runoff Coefficient: 0.50
Flow Length (ft): 16.00
Slope (%): 0.50
Computed TOC (minutes): 5.44

****
Subbasin Runoff Summary
****

Subbasin ID	Accumulated Precip in	Rainfall Intensity in/hr	Total Runoff in	Peak Runoff cfs	Weighted Runoff Coeff	Time of Concentration days hh:mm:ss
BMP-1	0.46	3.70	0.23	0.01	0.500	0 00:07:27
BMP-2	0.36	5.02	0.18	0.02	0.500	0 00:04:18
DMA-1_I1	0.34	5.30	0.32	0.34	0.950	0 00:03:52
DMA-1_I2	0.32	5.76	0.30	0.06	0.950	0 00:03:18
DMA-1_I3	0.28	6.67	0.26	0.28	0.950	0 00:02:30
DMA-1_P1	0.47	3.62	0.24	0.03	0.500	0 00:07:48
DMA-1_P2	0.50	3.45	0.25	0.01	0.500	0 00:08:36
DMA-1_P3	0.50	3.45	0.25	0.01	0.500	0 00:08:36
DMA-2_I1	0.24	7.75	0.23	0.11	0.950	0 00:01:53
DMA-2_I2	0.25	7.63	0.24	0.14	0.950	0 00:01:57
DMA-2_I3	0.25	7.63	0.24	0.14	0.950	0 00:01:57
DMA-2_I4	0.24	7.75	0.23	0.11	0.950	0 00:01:53
DMA-2_I5	0.30	6.06	0.29	0.96	0.950	0 00:03:00
DMA-2_I6	0.32	5.82	0.31	0.52	0.950	0 00:03:15
DMA-2_I7	0.25	7.61	0.24	0.30	0.950	0 00:01:57
DMA-2_I8	0.30	6.06	0.29	0.06	0.950	0 00:03:00
DMA-2_I9	0.29	6.55	0.28	0.33	0.950	0 00:02:36
DMA-2_P1	0.55	3.12	0.27	0.03	0.500	0 00:10:32
DMA-2_P2	0.49	3.47	0.25	0.01	0.500	0 00:08:30
DMA-2_P3	0.43	3.88	0.22	0.02	0.500	0 00:06:44
DMA-2_P4	0.45	3.83	0.22	0.01	0.500	0 00:06:55
DMA-2_P5	0.46	3.70	0.23	0.04	0.500	0 00:07:27
DMA-2_P6	0.39	4.30	0.20	0.02	0.500	0 00:05:26

****
Node Depth Summary

****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
JNCT-1AB	0.11	0.29	8.26	0 00:06	0	0	0:00:00
JNCT-1BC	0.10	0.27	8.06	0 00:06	0	0	0:00:00
JNCT-1CD	0.09	0.22	7.66	0 00:08	0	0	0:00:00
JNCT-2RW1	0.00	0.00	8.58	0 00:00	0	0	0:00:00
JNCT-2RW2	0.00	0.00	8.32	0 00:00	0	0	0:00:00
JNCT-2RW3	0.00	0.00	8.01	0 00:00	0	0	0:00:00
JNCT-2RW4	0.00	0.00	7.75	0 00:00	0	0	0:00:00
JNCT-2RW4C	0.00	0.00	6.65	0 00:00	0	0	0:00:00
OUTFALL-1	0.06	0.79	4.62	0 00:00	0	0	0:00:00
BMP-1_Inflow	0.80	0.88	9.53	0 00:05	0	0	0:00:00
BMP-2_Inflow	0.84	0.96	7.61	0 00:30	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days hh:mm
JNCT-1AB	JUNCTION	0.00	0.28	0 00:05	0.00	
JNCT-1BC	JUNCTION	0.00	0.24	0 00:06	0.00	
JNCT-1CD	JUNCTION	0.00	0.21	0 00:07	0.00	
JNCT-2RW1	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW2	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW3	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW4	JUNCTION	0.00	0.00	0 00:00	0.00	
JNCT-2RW4C	JUNCTION	0.00	0.00	0 00:00	0.00	
OUTFALL-1	OUTFALL	0.00	4.69	0 00:00	0.00	
BMP-1_Inflow	STORAGE	0.57	0.57	0 00:03	0.00	
BMP-2_Inflow	STORAGE	0.82	1.43	0 00:02	0.00	

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days hh:mm

DI-2	425.16	10.93	3.18	0 00:04
DI-BMP-1	0.00	9.49	0.00	0 00:06
DI-BMP-2	0.00	7.65	0.00	0 00:08
DI-OS1	0.00	8.50	0.00	0 00:00

****
Inlet Flow Summary
****

Inlet ID	Peak Flow cfs	Peak Lateral Flow cfs	Peak Flow Intercepted by Inlet cfs	Peak Flow Bypassing Inlet cfs	Inlet Efficiency during Peak Flow %	Total Flooding acre-in	Total Time Flooded minutes
DI-2	1.48	1.48	-	-	-	0.000	1
DI-BMP-1	0.00	0.00	-	-	-	0.000	0
DI-BMP-2	0.00	0.00	-	-	-	0.000	0
DI-OS1	0.00	0.00	-	-	-	0.000	0

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Storage Node Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
BMP-1_Inflow	0.118	81	0 00:05	0.104	72	0.26	0.00	0:00:00	0.000
BMP-2_Inflow	0.484	58	0 00:30	0.414	50	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
OUTFALL-1	60.84	0.11	4.69
System	60.84	0.11	4.69

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
SD-1C	CONDUIT	0 00:05	3.48	1.00	0.28	0.43	0.65	0.63	0	Calculated
SD-1D	CONDUIT	0 00:06	3.04	1.00	0.24	0.44	0.56	0.53	0	Calculated
SD-1E	CONDUIT	0 00:07	2.88	1.00	0.21	0.43	0.48	0.44	0	Calculated
SD-1F	CONDUIT	0 00:08	1.99	1.00	0.15	0.43	0.35	0.41	0	Calculated
SD-2	CONDUIT	0 00:04	3.69	1.00	0.82	0.47	1.76	1.00	57	SURCHARGED
SD-2RW1	CONDUIT	0 00:00	0.00	1.00	0.00	0.21	0.00	0.00	0	Calculated
SD-2RW2	CONDUIT	0 00:00	0.00	1.00	0.00	0.23	0.00	0.00	0	Calculated
SD-2RW3	CONDUIT	0 00:00	0.00	1.00	0.00	0.21	0.00	0.00	0	Calculated
SD-2RW4	CONDUIT	0 00:00	0.00	1.00	0.00	0.45	0.00	0.00	0	Calculated
SD-OUTLET-1	CONDUIT	0 00:08	1.72	1.00	0.15	2.73	0.05	0.17	0	Calculated
SD-OUTLET-2	CONDUIT	0 00:00	4.56	1.00	4.69	8.58	0.55	0.71	0	Calculated
DI-BMP-1-INFLOW	WEIR	0 00:05			0.26			0.04		
DI-BMP-2-iNFLOW	WEIR	0 00:00			0.00			0.00		

****
Highest Flow Instability Indexes
****
Link SD-2 (2)

Analysis began on: Fri Jun 09 10:31:50 2017
Analysis ended on: Fri Jun 09 10:31:50 2017
Total elapsed time: < 1 sec

Geotechnical Investigation Report

Chevron Facility No. 9-2239
2959 Midway Drive
San Diego, California 92110

Prepared for:
Chevron Products Company
145 South State College Boulevard,
Suite 400
Brea, California 92821

Prepared by:
Stantec Consulting Services Inc.
25864 Business Center Drive, Suite F
Redlands, California 92374

Project No: 185850087

May 5, 2017

Stantec Consulting Services Inc.
25864 Business Center Drive, Suite F
Redlands, California 92374

May 5, 2017

Mr. Sergio Linares
Chevron Products Company
145 South State College Boulevard, Suite 400
Brea, California 92821

SUBJECT: GEOTECHNICAL INVESTIGATION REPORT
Chevron 9-2239
2959 Midway Drive
San Diego, California 92110

Dear Mr. Linares:

This letter transmits Stantec Consulting Services Inc.'s (Stantec) geotechnical investigation report for the proposed rebuild of Chevron Facility No. 9-2239 retail gasoline station located in San Diego, California.

The purpose of this report is to evaluate the subsurface conditions and provide geotechnical recommendations for design and construction of the project.

We appreciate the opportunity to work with you on this project. If you have any questions, please call us at the number below.

Respectfully submitted,

STANTEC CONSULTING SERVICES INC.

LICENSED PROFESSIONAL ENGINEER
JARET FISCHER
C 80383
EXP. 3/31/19
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1.0 INTRODUCTION

This report presents the results of Stantec's geotechnical investigation for the proposed rebuild of Chevron Facility No. 9-2239 retail gasoline station located in San Diego, California. The project location is shown on the Site Vicinity Map, Figure 1.

1.1 PROPOSED CONSTRUCTION

Chevron proposes to build a new 2,918 square feet (sf) convenience store building with an attached 867 sf carwash, a new 2,744 sf fueling canopy, install two new 20,000-gallon double wall fiberglass underground storage tanks (USTs) with four dispensers, and install associated pavement and landscaping located at 2959 Midway Drive, in the City of San Diego, California. The new USTs will be installed at an approximate depth of 17 feet below the ground surface (bgs) and are approximately 28 feet northeast of the proposed convenience store building. The area of the proposed site improvements are shown on the Site Plan, Figure 2. The existing Chevron retail gasoline facility and carwash facility improvements will be razed.

1.2 PURPOSE AND SCOPE OF WORK

1.2.1 Purpose

The purpose of this report is to evaluate the subsurface conditions and provide geotechnical recommendations for design and construction of the new facilities. This report has been conducted in general accordance with accepted geotechnical engineering principles and in general conformance with the approved proposal and cost estimate for the project by Stantec, dated November 11, 2016.

1.2.2 Scope of Work

Our scope of work consisted of the following:

- Review available subsurface information for the site and nearby locations,
- Perform a site reconnaissance to evaluate general geotechnical and site conditions,
- Perform a field subsurface exploration program consisting of four hollow stem auger borings and two cone penetrometer (CPT) soundings,
- Perform percolation testing,
- Perform geotechnical laboratory tests on selected samples,
- Perform geotechnical engineering analyses, and
- Preparation of this geotechnical investigation report for the proposed project.

2.0 FIELD INVESTIGATION

2.1 PRE-DRILLING PROCEDURES

Underground Service Alert (USA) was notified before commencing drilling activities to identify underground utilities that could conflict with the proposed borings. In addition, a private utility locator was retained to clear each of the boring and CPT locations for potential conflicts with underground utilities. Prior to drilling, each boring and CPT location was investigated in the field for potential conflicts with marked or observed utility lines and other obstructions.

2.2 HOLLOW STEM AUGER DRILLING

Two test borings were drilled using a truck mounted drill rig equipped with a hollow-stem auger on April 3, 2017 and April 7, 2017, by ABC Liovin Drilling (ABC) to a maximum depth of 71.5 feet at the locations shown on Figure 2. The borings were logged by a Stantec field engineer who also collected samples of the materials encountered for examination and laboratory testing.

2.3 SAMPLING

Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. CAL sampling followed ASTM D3550 (Standard Practice for Ring-Lined Barrel Sampling of Soils) procedures. Disturbed samples were obtained using a Standard Penetration Test (SPT) sampler, which is a split tube sampler with a 2-inch outer diameter and 1⅜-inch inner diameter. SPTs were performed in accordance with ASTM D1586 (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils), and D6066 (Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential). Disturbed bulk samples were also obtained from the drill cuttings.

The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the samplers the final 12 inches of an 18-inch drive is noted on the borings logs as “Driving Resistance (blows/foot of drive).” A recent email provided to us by ABC Drilling indicates the drill rig used on this project has an average hammer efficiency of 83%.

Samples were classified in the field using the Unified Soil Classification System (USCS), in accordance with ASTM D2488 (Standard Practice for Description and Identification of Soils [Visual-Manual Method]) procedures. The laboratory testing confirmed or modified field classifications as necessary for presentation on the boring logs. Soil samples were removed from the samplers, placed in appropriate containers, and transported in accordance with ASTM D4220 (Standard Practice for Preserving and Transporting Soil Samples).

The test boring logs are located in Appendix A. Soils are classified in accordance with the USCS, which is explained in “Symbols and Terms Used on Borehole and Test Pit Records” in Appendix A.

2.4 CONE PENETRATION TESTS

Two CPTs were completed on April 7, 2017, by Gregg Drilling and Testing, Inc. (Gregg) under a Stantec engineer's direction. CPT soundings were performed in accordance with ASTM D6441 (Standard Test Method for Mechanical Cone Penetration Tests of Soils).

The CPTs were advanced using a truck mounted CPT rig to a maximum depth of approximately 75 feet below the ground surface at the locations shown on Figure 2. Piezo-cone penetrometers were advanced using a push rod equipped with an instrumented penetrometer tip. Continuous tip, side friction, and dynamic pore pressure data were collected for each sounding. Once the CPTs were completed, the holes were grouted. CPT data are included in Appendix B.

2.5 LABORATORY TESTING

The following laboratory tests were performed in general accordance with ASTM and California Test procedures:

- <u>In-Situ Moisture and Density (ASTM D2216)</u>: In-situ moisture and density are calculated by weighing and measuring the drive samples obtained from the borings.
- <u>Sieve Analysis (ASTM D422 and ASTM C136):</u> This test is used to evaluate the distribution of soil grain sizes, which constitute the soil fabric and is used in soil classification and assessment of soil engineering behavior.
- <u>No. 200 Sieve Wash (ASTM D1140)</u>: This test is used to evaluate the amount of soil grain sizes finer than the 0.075 mm (No. 200 sieve) and is used in soil classification and assessment of soil engineering behavior.
- <u>Direct Shear Test (ASTM D3080)</u>: Direct shear tests were performed to obtain shear strength parameters that can be used to estimate bearing capacity, lateral earth pressures, resistance to sliding, and other engineering characteristics.
- <u>Atterberg Limits (ASTM D 4318)</u>: The Atterberg Limits are utilized to classify fine-grained soils and correlate them to specific engineering properties. The Atterberg limits are composed of the liquid limit, and the plastic limit. The liquid limit is the moisture where the soil changes from a plastic to a liquid state and the plastic limit is the moisture content where the soil changes from a semi-solid state to a plastic state.
- <u>Maximum Dry Density and Optimum Moisture Content (ASTM D1557)</u>: The maximum dry density and optimum moisture content are used to determine the relative compaction of existing soils and to evaluate the level of compaction achieved during earthwork.
- <u>Chemical Tests for Corrosion Potential (Applicable EPA, ASTM or local test methods)</u>: The pH, resistivity, soluble sulfate content and chloride ion content useful in the assessment of corrosion potential were evaluated in a near surface soil sample.

The laboratory test results are presented in Appendix C.

2.6 PERCOLATION WELL INSTALLATION

Two soil borings were converted into percolation wells on April 3, 2017, by 2R Drilling under a Stantec engineer's direction at locations shown on Figure 2. The three-inch diameter percolation wells were screened between 2 and 5 feet bgs. A traffic rated well-box was installed at the surface to protect the percolation well. Percolation well details are included in the boring logs in Appendix A and percolation data are included in Appendix D.

3.0 GEOLOGIC SETTING AND SITE CONDITIONS

3.1 REGIONAL GEOLOGY

The regional geology as shown on the geologic map by Kennedy and Tan, (California Geological Survey, 2008) indicates the site is overlain by artificial fill (af), young alluvial floodplain deposits (Qya), and very old paralic deposits (Qvop).

3.2 SURFACE CONDITIONS

The existing retail gasoline facility and adjacent carwash are located at 2959 Midway Drive and 3405 Rosecrans Street, in San Diego, California. The retail gasoline facility consists of a convenience store, two fueling islands, one fueling island canopy, three USTs, and associated paved driveway and parking areas, and landscape areas. The eastern fueling canopy was removed several years ago. The former carwash facility includes four abandoned buildings, associated paved parking and driveway areas, and landscape areas. A retaining wall approximately five to six feet tall is located along the southeastern and southwestern property lines.

The existing ground surface in the immediate vicinity of the proposed addition lies predominantly between elevations of 8 and 11 feet (1988, NAVD). The site is relatively flat and the surrounding ground surface slopes gently from west to east toward Midway Drive.

3.3 SUBSURFACE CONDITIONS

The materials encountered in the borings consist of artificial fill, Bay Deposits, and Old Paralic Deposit formational material. Descriptions of the materials are presented below.

Artificial Fill Deposits (af) – The artificial fill (late Holocene) consists of interbedded layers of very loose to loose sand (SP-SM and SM USCS soil types), and soft silt (ML USCS soil type). The artificial fill encountered in the borings extends to a depth of approximately 4 to 7 feet below ground surface.

Young Alluvium (Qya) – Alluvium encountered in the borings at the site generally consist of loose to medium dense, gray, silty sand (SP-SM, SM, and SC USCS soil types) with occasional shell fragments and gravels, and soft to stiff silt and clay (CL, CH, and ML USCS soil types). The alluvium extends to depths of approximately 65 to 75 feet bgs.

Very Old Paralic Deposits (Qvop) - Very Old Paralic Deposits encountered in the borings at the site generally consist of very dark grayish brown to dark olive brown medium dense to dense sand (SP-SM and SM USCS soil types) and very stiff clay (CL USCS soil type). The Very Old Paralic Deposits extend to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively.

Groundwater - Groundwater was encountered in borings B-1 and B-2 at a depth of approximately 7 feet below the existing ground surface (bgs) during this investigation. Previous onsite investigations indicate groundwater was encountered at a depth of approximately 17 feet bgs (Stantec, 2015). Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

4.0 GEOLOGIC HAZARDS

4.1 FAULTING AND SURFACE RUPTURE

The site is located in a seismically active area. The estimated distance from the site to nearby mapped active faults is presented in the table below.

Table 1 – Faults in Site Vicinity

Fault	Distance (miles) (1)	Maximum Moment Magnitude (1)
Newport Inglewood (onshore)	0.8	7.5
Rose Canyon	0.8	6.9
Coronado Bank	11.8	7.4
Palos Verdes	11.8	7.7
Newport Inglewood (offshore)	30.9	7.0
Elsinore	41.9	7.9

1. Measured from 2008 National Seismic Hazard Maps - USGS (USGS, 2008).

As noted above, the closest known active fault is the Newport Inglewood (onshore) Fault, located approximately 0.8 miles northeast of the Site. The Site is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults are known to underlie or project toward the site. Therefore, the probability of fault rupture is considered low.

4.2 CALIFORNIA BUILDING CODE SEISMIC CRITERIA

A geologic hazard likely to affect the project is ground shaking as a result of movement along an active fault zone in the vicinity of the subject site. The seismic parameters in accordance with the 2016 California Building Code (CBC) are presented below:

Table 2 – 2016 CBC Seismic Parameters and Peak Ground Acceleration

2016 CBC Seismic Parameters and Peak Ground Acceleration	
Parameter	**Value**
Site Coordinates	Latitude : 32.749211° Longitude : -117.205963°
Mapped Spectral Acceleration Value at Short Period: S_s	1.275g
Mapped Spectral Acceleration Value at 1-Second Period: S_1	0.492g
Site Classification	E

2016 CBC Seismic Parameters and Peak Ground Acceleration	
Short Period Site Coefficient: F_a	0.900
1-Second Period Site Coefficient: F_v	2.400
Design Spectral Response Acceleration at Short Periods: S_{DS}	0.765g
Design Spectral Response Acceleration at 1-Second Period: S_{D1}	0.787g
Peak Ground Acceleration adjusted for Site Class Effects: PGA_M	0.577g

4.3 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction is the transformation of a deposit of soil from a solid state to a liquefied state as a consequence of increased pore pressure and reduced effective stress. Often, this transformation results from the cyclic loading of an earthquake and the soil acquires "mobility" sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, saturated (below groundwater), and uniformly graded fine-grained sands. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity. Cohesive soils are generally not considered susceptible to soil liquefaction.

Stantec reviewed readily available and relevant maps and publications regarding liquefaction potential at the subject property. According to the City of San Diego Seismic Safety Study Map (CSD, 2008), the property is located within a liquefaction hazard zone.

The liquefaction potential was evaluated with the CLiq v2.1.6.7 computer program (Geologismiki, 2017) using the CPT data. Liquefaction triggering methods developed by Idriss and Boulanger (2014) were used in our liquefaction evaluation. Our evaluation was based on the site class adjusted peak ground acceleration of 0.58g, as presented in Table 2, and an earthquake magnitude of 7.5. The in-situ groundwater depth of approximately 7 feet was used to evaluate the cyclic resistance ratio of the on-site soils. The historic high groundwater depth of 5.5 feet was used to evaluate the cyclic stress ratio for the design earthquake.

Our evaluation indicates that relatively significant portions of the sandy alluvium between depths of approximately 11 to 60 feet is potentially liquefiable.

We estimate the total and differential seismically-induced settlement may be on the order of 5 to 9-inches and 4 to 7-inches, respectively, across a 40-foot span. A discussion of options for mitigation of seismically-induced settlement are provided in this report. The results of the liquefaction analysis are provided in Appendix C.

4.4 LIQUEFACTION INDUCED LATERAL SPREADING

Lateral spreading of sloping ground, or towards the free face of stream bank, is often associated with liquefaction. The site is nearly flat and there are no free faces in the vicinity of the project. On that basis, there appears to be low risk for significant horizontal displacements due to lateral spreading.

4.5 CITY OF SAN DIEGO SEISMIC SAFETY STUDY

Figure 3 shows the approximate site location on the City of San Diego Seismic Safety Study map. The site is located in Geologic Hazard Category 31, which is defined as high liquefaction potential with shallow groundwater, major drainages, or hydraulic fills. As discussed above, our liquefaction analysis also indicates that there is a liquefaction potential at the Site.

4.6 LANDSLIDES AND SLOPE STABILITY

Evidence of landslides or slope instabilities was not observed. The potential for landslides or slope instabilities to occur at the site is considered negligible.

4.7 FLOODING, TSUNAMIS AND SEICHES

The site is not located within a flood zone or dam inundation area. The site is not located within a mapped area on the State of California Tsunami Inundation Maps (Cal EMA, 2009); therefore, damage due to flooding or tsunamis is considered low. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located immediately adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is considered low.

4.8 INFILTRATION RATE

Following the San Diego County Best Management Practice (BMP) Design Manual (SDCBMPDM, 2016) procedure for determining the infiltration rate, the field test results in Appendix D indicate the average of the final three percolation rates ranged between 8.6 and 8.7 inches per hour. After applying a reduction factor and a safety factor, the adjusted infiltration rate ranged between 1.4 and 1.5 inches per hour. However, a separation of at least 10 feet is required from the bottom of the infiltration facility to the high groundwater level. Since the historic high groundwater level is approximately 5.5 feet, and the groundwater level at the time of our investigation was approximately 7 feet, it is our opinion that infiltration is not feasible at this site.

4.9 EXPANSIVE SOILS

The near-surface soils consist of clayey sand and silty sand. Based on the plasticity index testing results, near surface soils are considered non-expansive, as defined by the 2016 California Building Code. Mitigation for expansive soils is not anticipated, based on samples tested.

If imported soils are used for earthwork, Stantec recommends that the proposed soils be tested for expansion potential prior to import. Imported soils should be approved by the Project Soils Engineer before being placed.

5.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed retail gasoline facility development from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that will warrant mitigation and/or consideration during planning stages. The main geotechnical conclusions for the project are presented in the following sections.

- The property is underlain by artificial fill, alluvium, and Very Old Paralic Deposits. The artificial fill and alluvium are relatively similar, consisting of interbedded layers of very loose to medium dense sand with variable amounts of silt and clay (SW-SM, SP-SM, SM, and SC USCS soil types) and soft to stiff clay (CL and CH USCS soil types) and silt (ML USCS soil type) to an approximate depth of 60 to 75 feet bgs. Old Paralic Deposits consisting of medium dense to dense sands (SP-SM, SC, and SM USCS soil type) and very stiff clay (CL USCS soil type) were encountered to the maximum depths explored in borings B-1 and B-2, at depths of approximately 72 and 82 feet bgs, respectively.

- Groundwater was encountered at a depth of approximately seven feet bgs in borings B-1 and B-2 during our geotechnical evaluation. Groundwater was previously encountered at a depth of 17 to 20 feet bgs in soil borings GT-1 and GT-2 (Stantec, 2015). Shallow groundwater will be an issue for the design and construction of the proposed UST's.

- The artificial fill and alluvium at the site are considered susceptible to liquefaction and seismically induced settlement. The estimated total and differential seismically settlements exceed building and canopy tolerances. Accordingly, mitigation will be necessary to reduce settlement to acceptable levels. Either ground improvement or structural mitigation consisting of deep foundations can be used to mitigate the seismic settlement hazard. We consider that vibro-stone columns would be a viable ground improvement option at this site. A shallow foundation system could be used in conjunction with ground improvement. A structural mitigation option consisting of deep foundations would also be a suitable option for the site. Deep foundations such as augercast pressure grouted (APG) piles or Augercast pressure-grouted displacement (APGD) piles may be considered. A cost comparison between the ground improvement and deep foundation systems should be completed to determine the most cost effective approach. Specialty ground improvement contractors can provide significant input to the selection of appropriate methods, given the site-specific soil conditions and project requirements.

- Areas where ground improvement is not implemented or where support is not provided through deep foundations will be subject to seismic settlement as described above.

- Based on recent developments, the ground improvement option may be a more cost-effective foundation solution as compared with the deep foundation option.
- Some ground improvement methods such as vibro compaction in stone columns cause vibration and ground settlement. Accordingly, these ground improvement options may not be suitable in areas close to existing off-site structures, since these activities could cause damage to these existing off-site structures.

6.0 RECOMMENDATIONS

6.1 EARTHWORK

6.1.1 Site Preparation

The extent of site preparation will depend on whether the liquefaction hazard is mitigated through the use of deep foundations or with ground improvement. In general site preparation should begin with the removal of existing improvements, vegetation and debris. Grading should conform to the guidelines presented in the 2016 California Building Code (CBC, 2016), as well as the requirements of the City of San Diego.

6.1.2 Remedial Grading

Building Foundation Areas:

The extent of remedial grading below building foundations will depend on whether the liquefaction hazard is mitigated through deep foundations, or with ground improvement. In general, for ground improvement options, remedial grading should be performed to provide an approximate three-foot thick re-compacted fill layer between the top of ground improvement and the underside of shallow foundation. For the deep foundation option, remedial grading should be performed to reinstate disturbed material from the installation of the deep foundations. Removal, replacement, and compaction should be completed laterally at least five feet beyond the outside edge of the footings unless constrained by existing structures.

The bottom of the remedial grading excavations should be scarified to a depth of 8-inches, moisture conditioned to within 2 percentage points of the optimum moisture content and compacted to 95% relative compaction based on the ASTM D1557 laboratory test procedure. All references to optimum moisture content and relative compaction in this report are based on this test method.

Concrete Pavement and Hardscape:

Beneath paved driveway and parking areas, the existing soils should be excavated to a depth of at least one foot below the existing ground surface or final subgrade elevation, whichever is lower. Scarification and compaction for driveway areas should extend horizontally at least 2 feet beyond the outside edge of the areas to be paved or as property line or structure constraints dictate.

The surface exposed by excavation should be scarified to a depth of 6 inches, moisture conditioned to within 2 percentage points of the optimum moisture content, and compacted to 90% relative compaction.

Field Observations:

The Project Soils Engineer should check the bottom of excavations. If soft, loose, or otherwise unsuitable soils are encountered, the depth of removal may be extended.

6.1.3 Engineered Fill Placement and Compaction

Excavated materials determined by the geotechnical engineer to be satisfactory can be replaced as compacted fill. It is anticipated the majority of the excavated materials can be used as compacted fill soils. The geotechnical engineer should approve the fill material before placement.

Fill should be placed in 6- to 8-inch thick loose lifts, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557. Utility trench backfill beneath structures, pavements and hardscape should be compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavements should be compacted to at least 95% relative compaction.

6.1.4 Expansive Soil

The onsite materials appear to have a very low expansion potential. Design for expansive soils is not considered necessary.

6.1.5 Imported Material

Imported materials, if used for fill, should be predominately granular, contain no rocks or lumps greater than 3 inches in maximum dimension, and have an Expansion Index of less than 20 or a Plasticity Index less than 15. Imported materials should be reviewed and approved by the project Soils Engineer before being brought to the site.

Soft or saturated soils may be encountered during removal of soils below the proposed building extensions. The excavation bottom and backfill soil should be inspected and approved by a representative of the Soils Engineer prior to use as backfill.

6.1.6 Site Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order. Difficult excavation and gravel and cobbles should not be anticipated within the artificial fill and recent bay deposits.

6.1.7 Oversized Material

Excavations are not likely to generate oversized material.

6.1.8 Temporary Excavations

Temporary excavations to depths up to approximately 20 feet bgs are anticipated for construction of the UST's. The existing fill and alluvial soils can be considered Type C for excavation in accordance with OSHA and Cal-OSHA requirements. Temporary excavations should be shored or excavated with a slope not steeper than 1½:1 (horizontal to vertical) in accordance with OSHA and Cal-OSHA requirements. Temporary excavations 3 feet deep or less can be made vertically.

The excavations should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation.

Stantec should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces. Slopes steeper than those described above will require shoring.

6.1.9 Temporary Cantilever Shoring

Temporary excavations to depths up to approximately 20 feet bgs are anticipated for construction of the UST's. Where cantilevered shoring is used in lieu of sloping the temporary excavation sidewalls, the shoring design may be tentatively based upon an active earth pressure equal to a fluid weighing 43 pounds per cubic foot (pcf) above the groundwater level. Below the groundwater level, a buoyant active earth pressure equal to a fluid weighing 22 pcf can be used in combination with hydrostatic water pressure. These pressures do not include a safety factor and are based on level backfill conditions.

Allowable passive pressures above the groundwater level may be based on a fluid weighing 260 pcf. Below the groundwater level, a buoyant passive pressure equal to a fluid weighing 130 pcf can be used in combination with hydrostatic water pressure. These pressures are based on level ground conditions in front of the wall.

6.1.10 Braced Shoring System

For braced shoring above the groundwater level, a uniform rectangular pressure distribution should be used from top to bottom of the shoring equivalent to the following,

Bracing: 30H psf/ft

where H is the depth of the excavation, in feet. Hydrostatic pressure should be added for bracing below the groundwater level.

The earth pressures indicated above do not include a safety factor; therefore, the shoring design should include an appropriate safety factor for the overall performance of the system.

6.1.11 Dewatering

Dewatering will likely be required for construction of the UST's. Dewatering may be facilitated with the use of well points. Lowering the groundwater can cause increased internal stresses and consolidation. Compressible soils may be present beneath the streets and private properties beyond the site boundaries. Conventional dewatering would require that perimeter wells lower the groundwater to a level at least several feet below the bottom of the planned excavations to achieve a stable surface for construction and excavations. This may cause increased internal stress, and subsequent compression of soils in the surrounding area and consideration should be given to effect of dewatering system on the surrounding properties.

6.1.12 Slopes

Although grading information is currently unavailable, no permanent slopes on the Site are anticipated for the project. The stability of slopes, if any, should be evaluated when design-grading information becomes available.

6.1.13 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures. Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

6.1.14 Grading Plan Review

Stantec should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

6.2 STRUCTURAL SUPPORT

The potential for settlement in the event of a major earthquake must be considered in selecting the retail gasoline facility's foundation systems. Methods for reducing the potential for damage to the new facilities will depend on the structure type and its location within the overall proposed development. Two alternative approaches should be considered for specific structures:

1. Deep Foundations: The foundation layout for the new structures are not known. Deep foundations that develop support in the dense Very Old Paralic Deposits below the liquefiable materials would be a suitable foundation option. Deep foundation depth would likely be on the order of 75 to 80 feet in order to obtain sufficient capacity below the deepest liquefiable depth. However, settlement of the ground surface around the foundation elements would still be expected in the event of a major seismic event.

2. Ground Improvement: The liquefaction potential can be substantially reduced by improving the ground in place. If ground improvements are used to successfully mitigate the liquefaction hazards, then shallow foundations may be suitable for supporting various project structures. Ground improvement methods that might be considered for this site include:

    - Vibro-compaction uses a vibratory probe to densify the soils at depth.
    - Vibro-replacement (stone columns) densifies the in-situ soils, while also installing a stronger stone column that improves drainage during seismic loading.
    - Rammed aggregate piers (RAP) provide similar benefits as stone columns, but usually for shallower depths of treatment.
    - Various types of grouting (jet grouting, compaction grouting, etc.) can be used to treat smaller, isolated areas.

    Some ground improvement methods such as vibro compaction in stone columns cause vibration and ground settlement. Accordingly, these ground improvement options may not be suitable in areas close to existing off-site structures, since these activities could cause damage to these existing off-site structures. This condition may be present on the South and East sides of the property where existing off-site structures are located. In areas where ground improvement is required close to existing off-site structures, compaction grouting should be considered as an alternative ground improvement method.

    Ground improvement should be designed such that static and dynamic settlements are within the structures tolerable limits. In general, maximum total liquefaction induced settlement should be less than 2 inches, and liquefaction induced differential settlement should be less than 1 inch. The project structural engineer should review these estimates to determine if they are adequate for the proposed structure. We anticipate ground improvement will likely be required to a depth of at least 40 feet. A specialty ground improvement contractor should be consulted to provide cost information and other ground improvement details.

6.3 FOUNDATIONS

6.3.1 Shallow Foundations

Shallow foundations constructed over one of the ground improvement methods described above are expected to provide adequate support for the proposed convenience store and carwash buildings provided they are founded in properly compacted fill prepared in accordance with the recommendations of Section 6.1.2. For isolated or continuous footings bearing entirely in compacted fill soils, an allowable bearing pressure of 2,500 pounds per square foot (psf) may be incorporated in the design. The bearing capacity can be increased by one third for transient loading conditions such as earthquake and wind. The following recommendations should be incorporated into the foundation design:

- Minimum foundation embedment depth of 18 inches, measured from the bottom of the footing to the lowest adjacent soil subgrade.
- Minimum foundation width of 24 inches,
- Minimum Footing Longitudinal Reinforcement: Two #4 bars, top and bottom
- Horizontal bearing surfaces with steps at changes in bearing elevation.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using an allowable lateral pressure of 260 psf per foot of depth below the ground surface for level ground conditions. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

6.3.2 Canopy Foundations

Typical shallow drilled pier footings for the canopy columns in conjunction with one of the ground improvement methods described above are expected to provide adequate support for the proposed structures provided that the recommendations provided herein are incorporated in the design. We understand that typical canopy column footings consist of reinforced concrete drilled piers having a minimum diameter or width of 4.0 feet and embedded a minimum depth of 7 feet bgs. Based on these assumptions and the anticipated subsurface conditions, an allowable bearing pressure of 4,000 psf may be used in the design. For resistance to transient lateral loads, such as earthquake and wind loads, the aforementioned allowable bearing capacity may be increased by one-third.

6.3.3 Deep Structural Foundations

Numerous proprietary and non-proprietary deep foundation systems may be considered for support of the proposed convenience store building, carwash building, and fueling canopy. Two types are described below:

- Augercast pressure-grouted displacement (APGD) piles
- Augercast pressure-grouted (APG) piles

APGD piles use a hollow-stem auger that is plugged at the bit to displace the soil as it is drilled into the ground. When the design tip elevation is reached, the plug is removed and high-strength grout is pumped into the hole as the auger is withdrawn. This pile type can minimize cuttings returned to the surface, although difficult drilling conditions could be encountered in deeper layers of dense sand.

APG piles utilize a hollow stem auger with a plugged bit to drill to the design tip elevation, where the plug is removed and high-pressure grout is pumped into the hole as the auger is withdrawn. This is similar to APGD piles, except that as the APG auger is withdrawn, the soil removed with the auger is approximately the same volume as the drilled hole. The removed soil is replaced in the ground with the high-pressure grout. APG piles are widely used, and may be more economical than APGD piles, despite the increased spoil disposal requirements.

We performed analyses to provide preliminary estimates of axial capacity for the deep foundation option. We evaluated the axial capacity for an 18 inch diameter Pressure Grouted Auger Cast Displacement Pile. The minimum pile depth was determined based on the required capacity during the design seismic event where liquefaction extends to a depth of approximately 60 feet. For this load condition, down drag on the pile occurs as a result of liquefaction induced settlement. The minimum pile depth needed to resist the down drag forces is estimated to be 75 feet below ground surface.

The allowable static, axial capacity for an 18 inch diameter Pressure Grouted Auger Cast Displacement Pile with the pile tip at a depth of 75 feet is estimated at 105 tons. Deep foundations should have a center to center spacing of at least three pile diameters. A group capacity reduction is not required provided this spacing is used.

Lateral pile capacity will be affected by liquefaction and pile group spacing. A lateral pile analysis using L-Pile or similar software programs should be completed if deep foundations are used for the project. We can perform these analyses if needed. To account for reductions in capacity due to liquefaction, we recommend using a P-Multiplier equal to 0.1 within the zones susceptible to liquefaction.

For pile group effects, we recommend using P-Multiplier's for center to center spacings less than six pile diameters. The P-Multiplier varies depending on the actual spacing and the position of the pile within the group. We can also perform these analyses if needed.

The floor slabs should also be supported on deep foundations, otherwise significant floor slab damage will occur in the event of seismically induced liquefaction.If a deep foundation option is selected, the ground surface below the floor slab and adjacent to the pile supported structure will still settle.

Recommendations for pile installation will be specific for the type of pile selected. We can provide these recommendations after the pile type has been determined.

Significant ground surface settlements could occur during an earthquake as a result of liquefaction in subsurface soils. Total seismic induced settlements, in the event of the design earthquake, are expected to be on the order of 5 to 9 inches with approximately 4 to 7 inches of differential settlement. Mitigation measures including deep foundations or ground improvement with shallow foundations should be incorporated into the design to minimize permanent deformations in these structures.

6.3.4 Foundation Plan Review

Stantec should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

6.3.5 Foundation Excavation Observations

A representative from Stantec should observe deep foundation or ground improvement installation, and all foundation excavations prior to forming or placing reinforcing steel.

6.4 SLABS-ON-GRADE

6.4.1 Interior Slabs on Grade

If a ground improvement technique is incorporated into the design, slabs-on-grade may be utilized. The top 24 inches of material below interior concrete slabs-on-grade should have an expansion index of 20 or less. The project structural engineer should design the interior concrete slabs-on-grade floor. However, we recommend a minimum thickness of 5 inches.

A vapor barrier should be placed beneath slabs where moisture sensitive floor coverings will be installed. If plastic is used, a minimum 10-mil is recommended. The plastic should comply with ASTM E1745. Installation should comply with ASTM E1643. Current construction practice typically includes placement of a 2-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture to the underside of the slab that can increase the time required to reduce vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The slab can be placed directly on the vapor retarder/barrier. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed. The project team should determine the appropriate treatment for the specific application.

In addition to the moisture vapor barrier, a capillary moisture break can be constructed below the slab to further reduce moisture transmission from the subgrade soil, if desired. The capillary moisture break should consist of at least 4-inches of clean, free-draining gravel or crushed rock placed below the moisture vapor retarder/barrier. The components of the capillary moisture break should meet the particle-size gradation presented in Table 3.

Table 3 – Gradation for Capillary Moisture Break

Gradation for Capillary Moisture Break	
Sieve Size	**Percentage Passing Sieve**
1 inch	100
3/4 inch	30-75
1/2 inch	5–10
3/8 inch	0-2

6.4.2 Exterior Slabs on Grade

The top 24 inches of material below exterior concrete slabs-on-grade should have an expansion index of 20 or less determined in accordance with ASTM D4829 or a Plasticity Index less than 15. Exterior slabs should have a minimum thickness of 4 inches and be reinforced with at least No. 4 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns.

6.5 UNDERGROUND STORAGE TANK BACKFILL

Dead man anchors may be used to resist buoyant forces on UST's. The anchors should be designed to resist buoyant forces based on a groundwater level at the ground surface for static conditions. For liquefaction conditions, the unit weight of the groundwater should be taken as 110 pcf.

Backfilling adjacent to and over the top of the underground storage tanks should be performed in accordance with the tank manufacturer's specifications. Pea gravel used for tank backfill should be encapsulated ("burrito wrapped") in a geotextile fabric to prevent migration of fines into the voids in the pea gravel, which could cause ground settlement. The pea gravel backfill should be covered with a structural concrete slab designed to bridge over localized settlement of the gravel backfill.

Depending on the actual quality and composition of the gravel utilized to backfill the USTs, little or no mechanical compactive effort is generally necessary to place the gravel in a dense manner. However, to increase the density of the gravel backfill and to mitigate future settlement of the gravel backfill the following methods should be utilized. The gravel shall be compacted with a concrete vibrator or mechanical compaction equipment, at approximate two to three foot intervals. Backfilling adjacent to and over the top of the underground storage tanks should be performed in accordance with the tank manufacturer's specifications.

6.6 PRELIMINARY PAVEMENT SECTION RECOMMENDATIONS

Tentative pavement structural sections were developed based on the AASHTO design method in accordance with Chevron's preferences, visual onsite soil classifications, laboratory resistance R-Value of 40 and traffic index (TI) values below. The design below applies to pavement sections supported on compacted existing onsite soils.

Table 4 - Flexible Pavement Sections

Traffic Type	Traffic Index	Asphalt Concrete (inches)	Aggregate Base* (inches)
Vehicle Traffic	4.5	4	4
Truck Traffic	6.5	4	5

***Aggregate Base should conform to Class 2 Aggregate Base in accordance with the Caltrans Standard Specifications or Crushed Miscellaneous Base in accordance with the Standard Specifications for Public Works Construction.**

Table 5 - Portland Cement Concrete Pavement Sections

Traffic Type	Traffic Index	JPCP* (inches)	Aggregate Base* (inches)
Vehicle Traffic	4.5	6	6
Truck Traffic	6.5	8	6

***Jointed Plain Concrete Pavement**

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be removed and replaced with compacted fill. The aggregate base and asphalt concrete should be compacted to at least 95% relative compaction. All materials and methods of construction should conform to good engineering practices and the minimum standards of the City of San Diego.

The concrete should exhibit a minimum 28-day compressive strength of 4,500 psi. Minimum reinforcement for concrete pavement in vehicle traffic areas should include #4 bars on 18-inch centers. Additional reinforcement and/or slab thickness may be appropriate as structural conditions dictate, as determined by the project structural or civil engineer. Other design and construction criteria for concrete pavements, such as mix design, strength, durability, reinforcement, joint spacing, thickened edges, etc., should conform to current specifications recommended by the American Concrete Institute (ACI).

6.7 CORROSIVITY

Four samples of the onsite soils were tested to provide a preliminary indication of the corrosion potential of the onsite soils. The test results are presented in Appendix C. A brief discussion of the corrosion test results is provided in the following text.

- The sample tested had a soluble sulfate concentration of 0.019 percent, which indicates the sample has a negligible sulfate corrosion potential relative to concrete. It should be noted that soluble sulfate in the irrigation water supply, and/or the use of fertilizer may cause the sulfate content in the surficial soils to increase with time. This may result in a higher sulfate exposure than that indicated by the test results reported herein. Studies have shown that the use of improved cements in the concrete, and a low water-cement ratio will improve the resistance of the concrete to sulfate exposure.

- The shallow samples tested had a chloride concentration of 255 to 450 parts per million (ppm), which indicates the sample has a negligible chloride corrosion potential relative to metal.

- The deep samples tested had a chloride concentration of 6,360 parts per million (ppm), which indicates the sample has a very severe chloride corrosion potential relative to metal.

- The samples tested had a minimum resistivity of 130 to 1,600 ohm-cm, which indicates the samples are corrosive to severely corrosive to ferrous metals.

- The sample tested had a pH of 7.8 to 8.39, which indicates the sample is moderately alkaline.

Based on the test results, the near surface soils are expected to have a corrosion potential for concrete ranging from low to very severe (Caltrans, 2014) and a high corrosion potential for steel (Romanoff, 1989). As such, special design considerations for steel in direct contact with soil and deep concrete may be required. The project structural engineer should evaluate the requirements of ACI 318-14 and determine their applicability to the site.

Additional testing should be performed after grading to evaluate the as-graded corrosion potential of the onsite soils. Stantec are not corrosion engineers. A corrosion consultant should be retained to provide corrosion control recommendations if deemed necessary.

6.8 POST INVESTIGATION SERVICES

Post investigation services are an important and necessary continuation of this investigation, and it is recommended that Stantec be retained as the Project Soils Engineer to perform such services. Final project grading and foundation plans, foundation details and specifications should be reviewed by Stantec prior to construction to check that the intent of the recommendations presented herein have been applied to the design. Following review of plans and specifications, observation during construction should be performed to correlate the findings of this exploration with the actual subsurface conditions exposed.

7.0 CLOSURE

Our conclusions, recommendations, and discussions presented herein are based upon an evaluation and interpretation of the findings from the field and laboratory programs, with interpolation and extrapolation of subsurface conditions between and beyond the exploration locations. This report contains information that is valid as of the report's date and to the extent directly known to Stantec. However, conditions can change with the passage of time or construction subsequent to this report's preparation that may invalidate, either partially or wholly, the conclusions and recommendations presented herein.

Inherent in most projects performed in the heterogeneous subsurface environment, continuing subsurface explorations and analyses may reveal conditions that are different than those described in this report. The findings and recommendations contained in this report were developed in accordance with generally accepted, current professional principles and practice ordinarily exercised, under similar circumstances, by geotechnical engineers and geologists practicing in this locality. No other warranty, express or implied, is made.

8.0 REFERENCES

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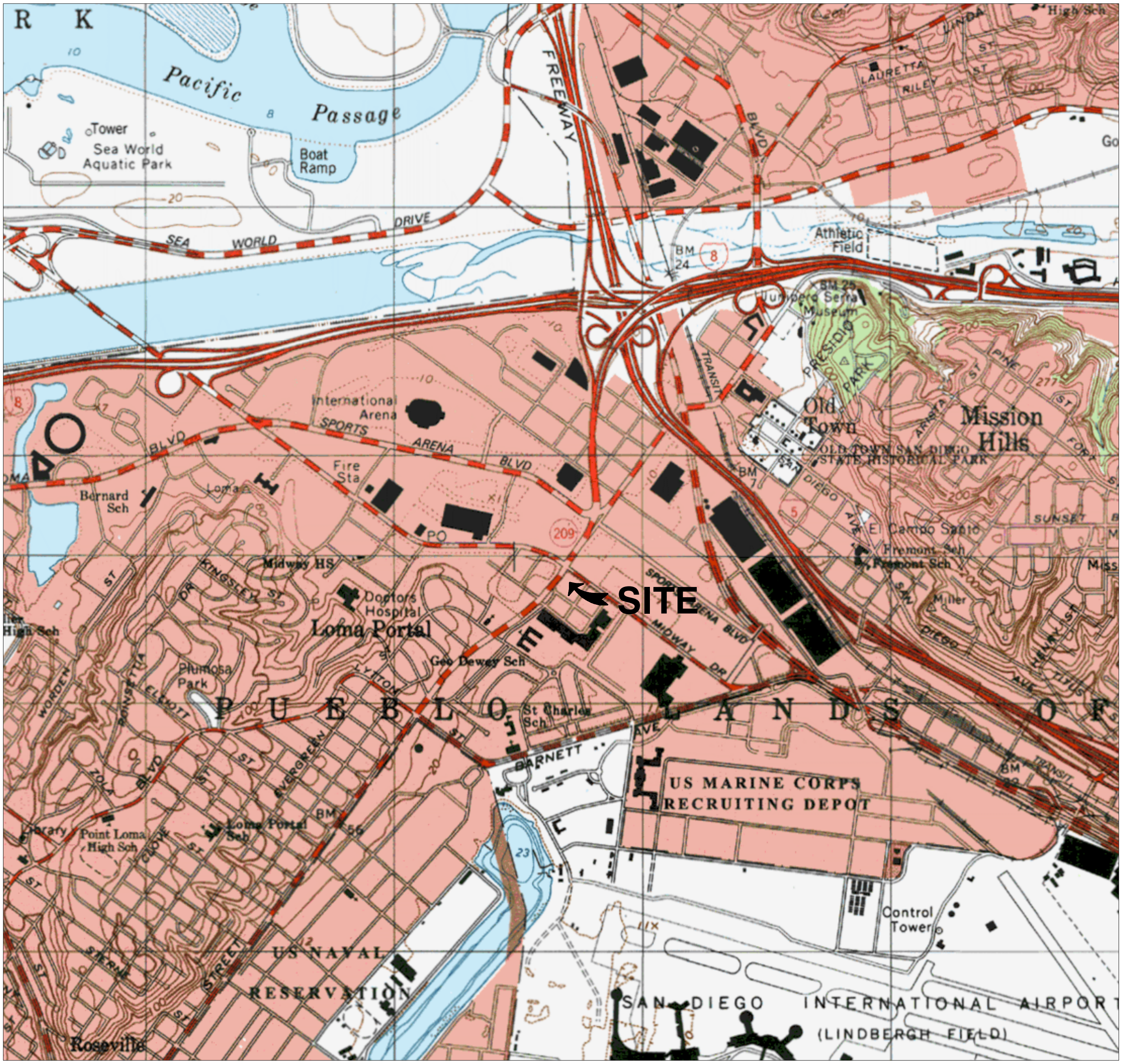
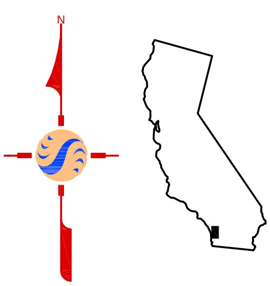
FIGURES





1 1/2 0 1

SCALE IN MILE

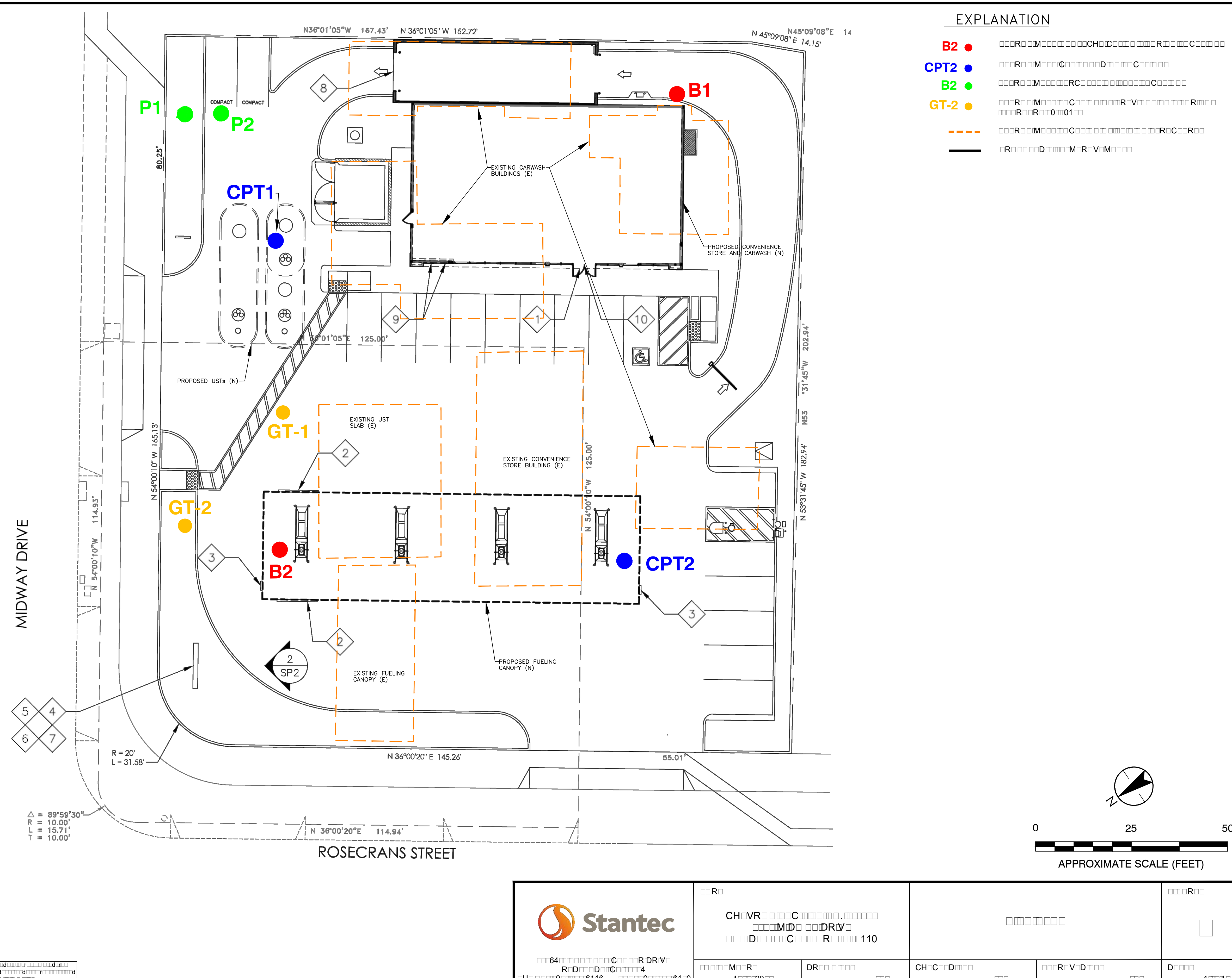
1000 0 1000 2000 3000 4000 5000 6000 7000

SCALE IN FEET

REFERENCE: USGS 7.5 X 15 MINUTE QUADRANGLE; LA JOLLA, CA 1996

Stantec
25864-F BUSINESS CENTER DRIVE
REDLANDS, CA 92374

FOR:		SITE LOCATION MAP	FIGURE:
CHEVRON FACILITY NO. 9-2239 2959 MIDWAY DRIVE SAN DIEGO, CALIFORNIA 92110			1
JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:



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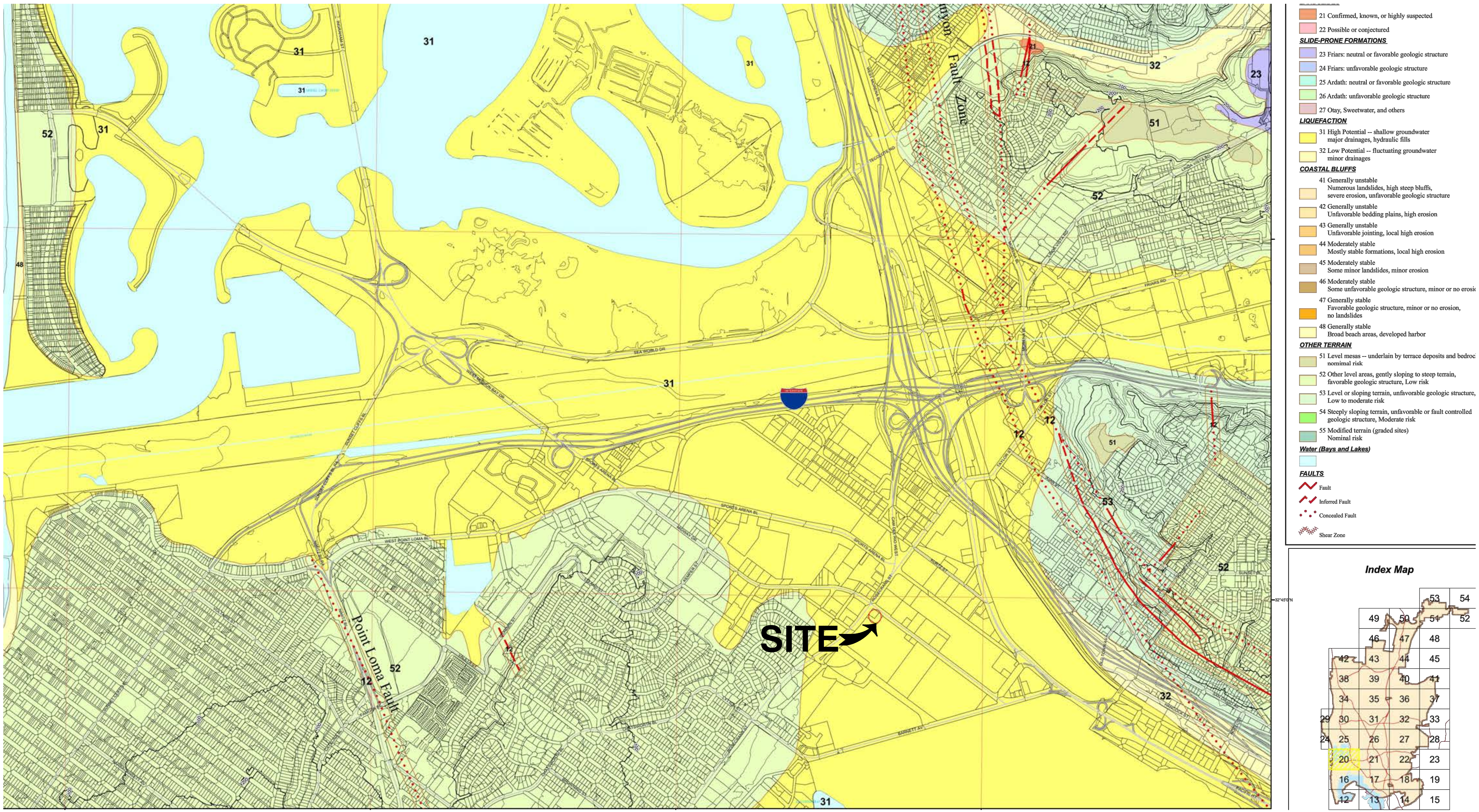

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Stantec

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APPENDIX A
BORING LOGS

PROJECT: **Geotechnical Legend**
LOCATION: **123 Main St. Anywhere USA**
PROJECT NUMBER: **00AB.12345.00**

WELL / PROBEHOLE / BOREHOLE NO: **Legend** PAGE 1 OF 1

Stantec

DRILLING: STARTED **1/1/06**	COMPLETED: **1/1/06**	NORTHING (ft):	EASTING (ft):
INSTALLATION: STARTED **1/1/06**	COMPLETED: **1/1/06**	LATITUDE:	LONGITUDE:
DRILLING COMPANY: **Driling Sub-contractor**		GROUND ELEV (ft):	TOC ELEV (ft):
DRILLING EQUIPMENT: **Drilling Equipment**		INITIAL DTW (ft): **NE**	BOREHOLE DEPTH (ft): **25.0**
DRILLING METHOD: **Drilling Method**		STATIC DTW (ft): **NE**	WELL DEPTH (ft): **25.0**
SAMPLING EQUIPMENT: **Sampling Equipment**		WELL CASING DIAMETER (in): **NA**	BOREHOLE DIAMETER (in):
		LOGGED BY: **Onsite Technician**	CHECKED BY: **Project Eng.**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Geotechnical Lab Testing	Environmental Lab Testing	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
			Geotechnical Lab Testing							Surface Completion
			CNSL - Consolidation		CNSL					
			CRSN - Corrosion		CRSN					
			EI - Expansion Index		EI					
			HA - Hydrometer Analysis		HA					
5			MD - Moisture Density		MD				5	
			M - Moisture		M					
			R-Val - R-Value		R-Val			As Shown		
			SA - Sieve Analysis		SA					
			DS - Direct Shear		DS					
			UC - Unconfined Compression		UC					
			AL - Atterberg Limits		AL					
10			#200 - #200 Sieve Wash		#200				10	
			MP - Modified Proctor		MP					
			Environmental Lab Testing							
			8015M - Volatile and/or Extractable Petroleum Hydrocarbons			8015M				Backfill Description
			8260 - Halogenated Volatile Organic Compounds with Oxygenates			8260				
15			8270 - Semi-Volatile Organic Compounds			8270			15	
			8081 - Organochlorine Pesticides			8081				
			Hand Auger Sample							
20			Driven Sample, Blows Per 6 Inches, 2.5 Inch ID California Modified Sample Interval				10 11 15		20	
			Driven Sample, Blows Per 6 Inches, 1.5 Inch ID SPT Sample Interval				20 22 23			
25			Hole terminated at 25 feet.						25	
30									30	
35									35	

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488). The classification excludes particles larger than 76 mm (3 inches). The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test N-Value (also known as N-Index). A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests.

Consistency	Undrained Shear Strength	
	kips/sq.ft.	kPa
Very Soft	<0.25	<12.5
Soft	0.25 - 0.5	12.5 - 25
Firm	0.5 - 1.0	25 - 50
Stiff	1.0 - 2.0	50 – 100
Very Stiff	2.0 - 4.0	100 - 200
Hard	>4.0	>200

ROCK DESCRIPTION

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor*
25-50	*Poor*
50-75	*Fair*
75-90	*Good*
90-100	*Excellent*

Rock quality classification is based on a modified core recovery percentage (RQD) in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on NW core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures. The terminology describing rock mass quality based on RQD is subjective and is underlain by the presumption that sound strong rock is of higher engineering value than fractured weak rock.

Terminology describing rock mass:

Spacing (mm)	Joint Classification	Bedding, Laminations, Bands
> 6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

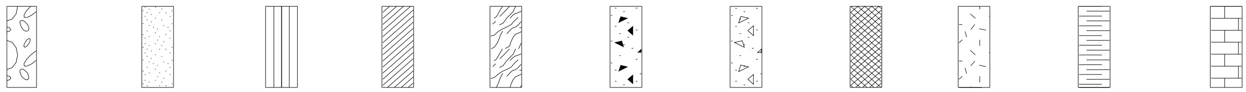
Strength Classification	Unconfined Compressive Strength (MPa)
Extremely Weak	< 1
Very Weak	1 – 5
Weak	5 – 25
Medium Strong	25 – 50
Strong	50 – 100
Very Strong	100 – 250
Extremely Strong	> 250

Terminology describing rock weathering:

Term	Description
Fresh	No visible signs of rock weathering. Slight discolouration along major discontinuities
Slightly Weathered	Discolouration indicates weathering of rock on discontinuity surfaces. All the rock material may be discoloured.
Moderately Weathered	Less than half the rock is decomposed and/or disintegrated into soil.
Highly Weathered	More than half the rock is decomposed and/or disintegrated into soil.
Completely Weathered	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



Boulders Cobbles Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Metamorphic Bedrock | Sedimentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
WS	Wash sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

▼ measured in standpipe, piezometer, or well

▽ inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and N-values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N value corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to A size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (305 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

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PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-1**

Stantec

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **7** BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55** WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
		4" Asphalt						
		7" Aggregate Base (AB)						
	ML	ARTIFICIAL FILL: **SANDY SILT** ; ML; 2.5Y 3/1 very dark gray; 4.3% fine gravel; 43.8% very fine to coarse grained sand; 51.9% non-plastic fines; moist; hydrocarbon odor present; staining present (FILL)	B1-BULK	MDD				3 Feet Concrete Cap
			0938 B1-2	SA				
5	SM	YOUNG ALLUVIUM (Qya): **SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 85% very fine to medium grained sand; 15% non-plastic fines; moist; hydrocarbon odor present; staining present (NATIVE)	0945 B1-5		6 6 5		5	
		80% very fine to medium grained sand; 20% non-plastic fines; wet; loose below 7 feet.	0947 B1-7		0 1 1			
10			0951 B1-10	MD	1 1 2		10	Backfilled With Cement/ Bentonite Grout
15		10YR 3/4 dark yellowish brown; 85% very fine to fine grained sand; 15% non-plastic fines below 15 feet.	0955 B1-15		0 1 2		15	
	CH	**FAT CLAY** ; CH; 2.5Y 3/1 very dark gray; 5% very fine grained sand; 95% high plasticity fines; wet; soft; no odor; no staining						
20	SM	**SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 74.5% very fine to fine grained sand; 25.5% non-plastic fines; wet; very loose.	1000 B1-20	SA, MD	1 2 4		20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-1**

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7**
BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CONT'D):							
25			2.5Y 3/2 very dark grayish brown; 86.3 percent fine to medium grained sand; 13.7% fines; medium dense below 25 feet.	X	1004 B1-25	SA	4 4 7		25	
30			80% very fine to fine grained sand; 20% non-plastic fines; loose below 30 feet.	X	1010 B1-30		3 4 4		30	
35				X	1017 B1-35		3 4 6		35	Backfilled With Cement/ Bentonite Grout
40		SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; loose; no odors; no staining	X	1024 B1-40		2 3 3		40	
		CH	**FAT CLAY** ; CH; 2.5Y 3/1 very dark gray; 5% very fine grained sand; 95% high plasticity fines; moist; firm; no odor; no staining							
		SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; loose; no odors; no staining							

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-1**

Stantec

NORTHING (ft): | EASTING (ft):
LATITUDE: | LONGITUDE:
GROUND ELEV (ft): | TOC ELEV (ft):
INITIAL DTW (ft): **7** | BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **55** | WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** | BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** | CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CONT'D):	X	1032 B1-45		1 3 3			
		CH	**FAT CLAY** ; CH; 2.5Y 3/2 very dark grayish brown; 10% very fine grained sand; 90% high plasticity fines; moist; firm; no odors; no staining							
50		SM	**SILTY SAND** ; SM; 2.5Y 3/2 very dark grayish brown; 85% very fine to fine grained sand; 15% non-plastic fines; moist; loose; no staining; no odor.	X	1038 B1-50		2 4 5		50	
55			Wet/ saturated; very loose below 55 feet.	X	1045 B1-55		0 1 1		55	Backfilled With Cement/ Bentonite Grout
60			Medium dense below 60 feet.	X	1057 B1-60		1 5 14		60	
		SC	**CLAYEY SAND** ; SC; 2.5Y 3/2 very dark grayish brown; 80% very fine to medium grained sand; 20% medium plasticity fines; very stiff; no staining; no odor							
65		SP-SM	**POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 90% very fine to fine grained sand; 10% non-plastic fines; wet; medium dense; no odors; no staining.	X	1104 B1-65		5 8 13		65	
		CL	VERY OLD PARALIC DEPOSITS (Qvop): **SANDY LEAN CLAY** ; CL; 10YR 3/2 very dark grayish brown; 35% very fine to fine grained sand; 65% medium plasticity fines;							

PROJECT: **Chevron 9-2239**	WELL / PROBEHOLE / BOREHOLE NO:
LOCATION: **2959 Midway Ave. San Diego, CA**	**B-1** PAGE 4 OF 4
PROJECT NUMBER: **185850087**	
DRILLING: STARTED **4/3/17** COMPLETED: **4/3/17**	NORTHING (ft): / EASTING (ft):
INSTALLATION: STARTED **4/3/17** COMPLETED: **4/3/17**	LATITUDE: / LONGITUDE:
DRILLING COMPANY: **ABC Liovin Drilling**	GROUND ELEV (ft): / TOC ELEV (ft):
DRILLING EQUIPMENT: **CME 75**	INITIAL DTW (ft): **7** / BOREHOLE DEPTH (ft): **71.5**
DRILLING METHOD: **Hollow Stem Auger**	STATIC DTW (ft): **55** / WELL DEPTH (ft): **---**
	WELL CASING DIAMETER (in): **---** / BOREHOLE DIAMETER (in): **8**
SAMPLING EQUIPMENT: **Split Spoon**	LOGGED BY: **M. Sapp** / CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			very stiff; dry; no staining; no odor							Backfilled With Cement/ Bentonite Grout
70		SM	**SILTY SAND** ; SM; 2.5Y 3/2 very dark grayish brown; 83.4% very fine to fine grained sand; 16.3% non-plastic fines; wet; dense; no odors; no staining.	X	1119 B1-70	SA	2 17 29		70	
		SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL** ; SP-SM; 2.5Y 3/2 very dark grayish brown; 15% coarse gravel; 70% very fine to fine grained sand; 15% non-plastic fines; wet; medium dense; no odors; no staining.							
			Hole terminated at 71.5 feet.							
75									75	
80									80	
85									85	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-2** PAGE 1 OF 4

Stantec

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **7** BOREHOLE DEPTH (ft): **81.5**
STATIC DTW (ft): **41** WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
		4" Asphalt						
	SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to medium grained sand; 15% non-plastic fines; moist; medium dense; hydrocarbon odor present; staining present	B2-BULK 0917 B2-2	MD	6 7 9			3 Feet Concrete Cap
5	SP-SM	YOUNG ALLUVIUM (Qya): **POORLY GRADED SAND WITH SILT** ; SP-SM; 2.5Y 3/2 dark olive brown; 90% very fine to fine grained sand; 10% non-plastic fines; moist; loose; no odor; no staining	0921 B2-5	#200, AL	1 2 2		5	
	ML	**SANDY SILT** ; ML; 10YR 3/4 dark yellowish brown; 23% very fine grained sand; 77% non-plastic fines; wet; soft; no staining; no odor	0928 B2-7		1 2 2			
10	SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 75% very fine to fine grained sand; 25% non-plastic fines; wet; very loose; no odor; no staining	0939 B2-10		1 1 2		10	Backfilled With Cement/ Bentonite Grout
15	CH	**FAT CLAY** ; CH; 10YR 3/1 very dark gray; 98% very fine grained sand; 2% high plasticity fines; wet; soft; no odor; no staining	0944 B2-15	MD, #200, AL	1 1 2		15	
20	SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to medium grained sand; 15% non-plastic fines; wet; very loose; hydrocarbon odor present; staining present	0948 B2-20		0 1 2		20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
B-2
Stantec

NORTHING (ft): | EASTING (ft):
LATITUDE: | LONGITUDE:
GROUND ELEV (ft): | TOC ELEV (ft):
INITIAL DTW (ft): **7** | BOREHOLE DEPTH (ft): **81.5**
STATIC DTW (ft): **41** | WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** | BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** | CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CONT'D):							
25			Very loose, shells present below 25 feet.	X	0953 B2-25		2 1 3		25	
30			80% very fine to medium grained sand; 20% non-plastic fines; loose below 30 feet.	X	0959 B2-30		1 3 7		30	
35		CH	**FAT CLAY WITH SAND** ; CH; 2.5Y 3/3 dark olive brown; 25% very fine to coarse grained sand; 75% high plasticity fines; wet; soft; no odors; no staining	X	1004 B2-35		2 2 2		35	Backfilled With Cement/ Bentonite Grout
		ML	**SILT WITH SAND** ; ML; 2.5Y 3/3 dark olive brown; 25% very fine grained sand; 75% non-plastic fines; wet; soft; no odors; no staining							
40		SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 70% very fine to fine grained sand; 30% non-plastic fines; wet; medium dense; no odor; no staining	X	1015 B2-40		2 5 8		40	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO: **B-2**

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7**
BOREHOLE DEPTH (ft): **81.5**
STATIC DTW (ft): **41**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
	SW-SM	YOUNG ALLUVIUM (Qya) (CONT'D): **WELL GRADED SAND WITH SILT** ; SW-SM; 2.5Y 3/3 dark olive brown; 90% fine to coarse grained sand; 10% non-plastic fines; wet; medium dense; no odors; no staining	1022 B2-45		2 4 6			
50	SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 60% very fine to fine grained sand; 40% non-plastic fines; wet; very loose; no staining; no odor; shells present.	1148 B2-50		1 1 3		50	
55		80% fine to coarse grained sand; 20% non-plastic fines; loose below 55 feet.	1155 B2-55		1 3 5		55	Backfilled With Cement/ Bentonite Grout
60	SP	**POORLY GRADED SAND** ; SP; 2.5Y 3/3 dark olive brown; 98% very fine to medium grained sand; 2% non-plastic fines; wet; medium dense.	1204 B2-60	SA	4 5 5		60	
		VERY OLD PARALIC DEPOSITS:						
65			1211 B2-65		3 11 13		65	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
B-2

Stantec

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **7** BOREHOLE DEPTH (ft): **81.5**
STATIC DTW (ft): **41** WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---** BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp** CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
70					1222 B2-70		0 7 12		70	
75			95% very fine to medium grained sand; 5% non-plastic fines; medium dense below 75 feet.		1244 B2-75	SA	7 8 18		75	Backfilled With Cement/ Bentonite Grout
80			Dense below 80 feet.		1307 B2-80		7 18 21		80	
			Hole terminated at 81.5 feet.							
85									85	

PROJECT: **Chevron 9-2239**		WELL / PROBEHOLE / BOREHOLE NO: **P-1** PAGE 1 OF 1	
LOCATION: **2959 Midway Ave. San Diego, CA**			
PROJECT NUMBER: **185850087**			
DRILLING: STARTED **4/3/17**	COMPLETED: **4/3/17**	NORTHING (ft):	EASTING (ft):
INSTALLATION: STARTED **4/3/17**	COMPLETED: **4/3/17**	LATITUDE:	LONGITUDE:
DRILLING COMPANY: **ABC Liovin Drilling**		GROUND ELEV (ft):	TOC ELEV (ft):
DRILLING EQUIPMENT: **CME 75**		INITIAL DTW (ft): **NE**	BOREHOLE DEPTH (ft): **6.5**
DRILLING METHOD: **Hollow Stem Auger**		STATIC DTW (ft): **NE**	WELL DEPTH (ft): **---**
SAMPLING EQUIPMENT: **Split Spoon**		WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **8**
		LOGGED BY: **M. Sapp**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			4" Asphalt							
			7" AB							Backfilled with bentonite.
		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 10YR 3/3 dark brown; 85% very fine to medium grained sand; 20% non-plastic fines; moist; medium dense; no odor; no staining		1358 P1-2	SA	4 8 8			Backfilled with gravel pack.
5			85% very fine to fine grained sand; 15% non-plastic fines; moist; very loose below 5 feet.		1406 P1-5		1 1 1		5	Backfilled with bentonite.
			Hole terminated at 6.5 feet.							
10									10	
15									15	
20									20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **4/7/17** COMPLETED: **4/7/17**
INSTALLATION: STARTED **4/7/17** COMPLETED: **4/7/17**
DRILLING COMPANY: **ABC Liovin Drilling**
DRILLING EQUIPMENT: **CME 75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

P-2 PAGE 1 OF 1

Stantec

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **NE**	BOREHOLE DEPTH (ft): **6.5**
STATIC DTW (ft): **NE**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **8**
LOGGED BY: **M. Sapp**	CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			7" Asphalt							
		SM	ARTIFICIAL FILL: **SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 85% very fine to fine grained sand; 15% non-plastic fines; moist; loose; no odor; no staining (FILL)		0742 P2-2		3 3 2			Backfilled with bentonite. Backfilled with gravel pack.
5			No recovery, very loose.				1 2 2		5	Backfilled with bentonite.
			Hole terminated at 6.5 feet.							
10									10	
15									15	
20									20	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:

GT-1

Stantec

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **17**	BOREHOLE DEPTH (ft): **61.5**
STATIC DTW (ft): **15.5**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**	CHECKED BY: **J. Fischer**

Time	Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Borehole Backfill
			4" Asphalt					3' Concrete Cap
			ARTIFICIAL FILL:					
1320		SM	**SILTY SAND** ; SM; 10YR 3/3 dark brown; 60% fine grained sand; 40% fines; moist; no odors; no staining	1320 GT1-2		--	--	
1335	5		...same as above ; 2.5Y 3/3 dark olive brown; 55.4% fine grained sand; 44.4% fines; 0.1% fine gravel; loose	1335 GT1-5	SA	2 2 2	--	
1338		SC	YOUNG ALLUVIUM (Qya): **CLAYEY SAND** ; SC; 2.5Y 3/3 dark olive brown; 58.4% fine grained sand; 41.6% fines; moist; very loose; no odors; no staining	1338 GT1-7	DS	0 0 6	--	
1342	10	SM	**SILTY SAND** ; SM; 2.5Y 3/3 dark olive brown; 80% fine grained sand; 20% fines; wet; very loose; no odors; no staining	1342 GT1-10	SA	0 1 2	--	
1350	15	CH	**CLAY** ; CH; 2.5Y 2.5/1 black; high plasticity; 96.3% fines; 3.7% fine grained sand; wet; soft; moderate odor; no staining	1350 GT1-15	HA, AL, DS, M	1 2 2	--	
1355	20	SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 55% fine grained sand; 45% fines; wet; loose; slight odor; no staining	1355 GT1-20		2 4 5	--	Backfilled With Cement/ Bentonite Grout
1400	25	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; poorly graded; 87.9% fine grained sand; 12.9% fines; wet; loose to medium dense; no odors; no staining	1400 GT1-25	HA, AL, M	4 5 5	--	
1406	30		...same as above ; loose	1406 GT1-30		2 3 3	--	
1412	35	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 54.4% fine grained sand; 45.6% fines; wet; loose; no odors; no staining	1412 GT1-35	HA, AL, M	0 2 2	--	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
GT-1

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **17**
BOREHOLE DEPTH (ft): **61.5**
STATIC DTW (ft): **15.5**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
			YOUNG ALLUVIUM (Qya) (CNT'D):							
1417 40		CH	**CLAY** ; CH; 2.5Y 2.5/1 black; high plasticity; 90% fines; 10% fine grained sand; wet; soft; no odors; no staining		1417 GT1-40		0 1 1	--	40	
1425 45			...same as above ; 85.1% fines; 14.9% fines grained sand; very soft		1425 GT1-45	HA, AL, M	0 0 1	--	45	
1433 50			...same as above ; high plasticity; 95% fines; 5% fine grained sand; firm		1433 GT1-50		2 3 4	--	50	Backfilled With Cement/ Bentonite Grout
1441 55		SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; poorly graded; 85.7% fine grained sand; 14.3% fines; wet; loose; no odors; no staining		1441 GT1-55	HA, AL, M	0 3 6	--	55	
1451 60		SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; wet; medium dense; no odors; no staining		1451 GT1-60		3 5 8	--	60	
			VERY OLD PARALIC DEPOSITS (Qvop):							
1505 65			...same as above; 2.5Y 3/3 dark olive brown; 53.7% fine grained sand; 46.3% fines; medium dense		1505 GT1-65	HA, AL, M	8 10 19	--	65	
1520 70		SM	**SILTY SAND** ; SM; 2.5Y 3/1 very dark gray; 80% fine grained sand; 20% fines; wet; very dense; no odors; no staining		1520 GT1-70		33 50-4"	--	70	
			Groundwater encountered @ ~17' BGS. Static depth to water ~15.5' BGS. Hole terminated at 71.5 feet.							
75									75	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
GT-2

Stantec

NORTHING (ft):	EASTING (ft):
LATITUDE:	LONGITUDE:
GROUND ELEV (ft):	TOC ELEV (ft):
INITIAL DTW (ft): **20**	BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **25**	WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**	BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**	CHECKED BY: **J. Fischer**

Time	Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Borehole Backfill
			4" Asphalt					3' Concrete Cap
0850		SC	ARTIFICIAL FILL: **CLAYEY SAND** ; SC; 10YR 3/1 very dark gray; low plasticity; 53.2% fines; 46.8% fine grained sand; moist; slight odor; no staining	0850 GT2-2	#200	--	--	
0903	5	SM	**SILTY SAND** ; SM; 10YR 2/2 very dark brown; 65% fine grained sand; 35% fines; moist; very loose; slight odor; no staining	0903 GT2-5	MD	2 2 3	--	
0907		CL	YOUNG ALLUVIUM (Qya): **CLAY** ; CL; 2.5Y 3/3 very dark grayish brown; medium plasticity; 80.8% fines; 19.2% fine grained sand; wet; soft; strong petroleum hydrocarbon odor; no staining	0907 GT2-7	#200	0 1 1	--	
0910	10	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 60% fine grained sand; 40% fines; wet; very loose; strong petroleum hydrocarbon odor; no staining	0910 GT2-10	DS	2 2 3	--	
0919	15	CL	**CLAY** ; CL; 2.5Y 2.5/1 black; high plasticity; 95% fines; 5% fine grained sand; wet; soft; slight petroleum hydrocarbon odor; no staining	0919 GT2-15		0 1 1	--	
0924	20	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; wet; medium dense; no odors; no staining	0924 GT2-20	MD	3 6 11	--	Backfilled With Cement/ Bentonite Grout
0929	25		...same as above ; loose	0929 GT2-25		3 3 3	--	
0934	30	SP	**SAND** ; SP; 2.5Y 2.5/1 black; 95% fine grained sand; 5% fines; trace shell fragments; wet; very loose; no odors; no staining	0934 GT2-30		1 1 1	--	
0940	35	CL	**CLAY** ; CL; 2.5Y 2.5/1 black; low plasticity; 95% fines; 5% fine grained sand; wet; firm; no odors; no staining	0940 GT2-35		3 3 3	--	

PROJECT: **Chevron 9-2239**
LOCATION: **2959 Midway Ave. San Diego, CA**
PROJECT NUMBER: **185850087**
DRILLING: STARTED **2/20/15** COMPLETED: **2/20/15**
INSTALLATION: STARTED **2/20/15** COMPLETED: **2/20/15**
DRILLING COMPANY: **Cal-Pac**
DRILLING EQUIPMENT: **Mobil B-61**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / PROBEHOLE / BOREHOLE NO:
GT-2 PAGE 2 OF 2

Stantec

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **20**
BOREHOLE DEPTH (ft): **71.5**
STATIC DTW (ft): **25**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **MAC**
CHECKED BY: **J. Fischer**

Time & Depth (feet)	USCS	Description	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Borehole Backfill
		YOUNG ALLUVIUM (Qya) (CNT'D):						
0946 40	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 80% fine grained sand; 20% fines; trace shell fragments; wet; very loose; no odors; no staining	0946 GT2-40		1 1 1	--	40	
0958 45	CL	**CLAY** ; CL; 2.5Y 2.5/1 black; high plasticity; 95% fines; 5% fine grained sand; moist; soft; no odors; no staining	0958 GT2-45		1 1 2	--	45	
1007 50		...same as above ; 90% fines; 10% fine grained sand; trace shell fragments; wet; stiff	1007 GT2-50		3 5 6	--	50	Backfilled With Cement/ Bentonite Grout
1029 55	SM	**SILTY SAND** ; SM; 2.5Y 2.5/1 black; 70% fine grained sand; 30% fines; trace shell fragments; wet; very loose; no odors; no staining	1029 GT2-55		0 0 1	--	55	
1040 60	SC	**CLAYEY SAND** ; SC; 2.5Y 2.5/1 black; 60% fine grained sand; 40% fines; wet; medium dense; no odors; no staining	1040 GT2-60		4 6 6	--	60	
65		Groundwater encountered @ ~ 20' BGS. Static depth to water ~ 25'.					65	
70		Hole terminated at 71.5 feet.					70	
75							75	

APPENDIX B
CONE PENETROMETER SOUNDINGS

GREGG

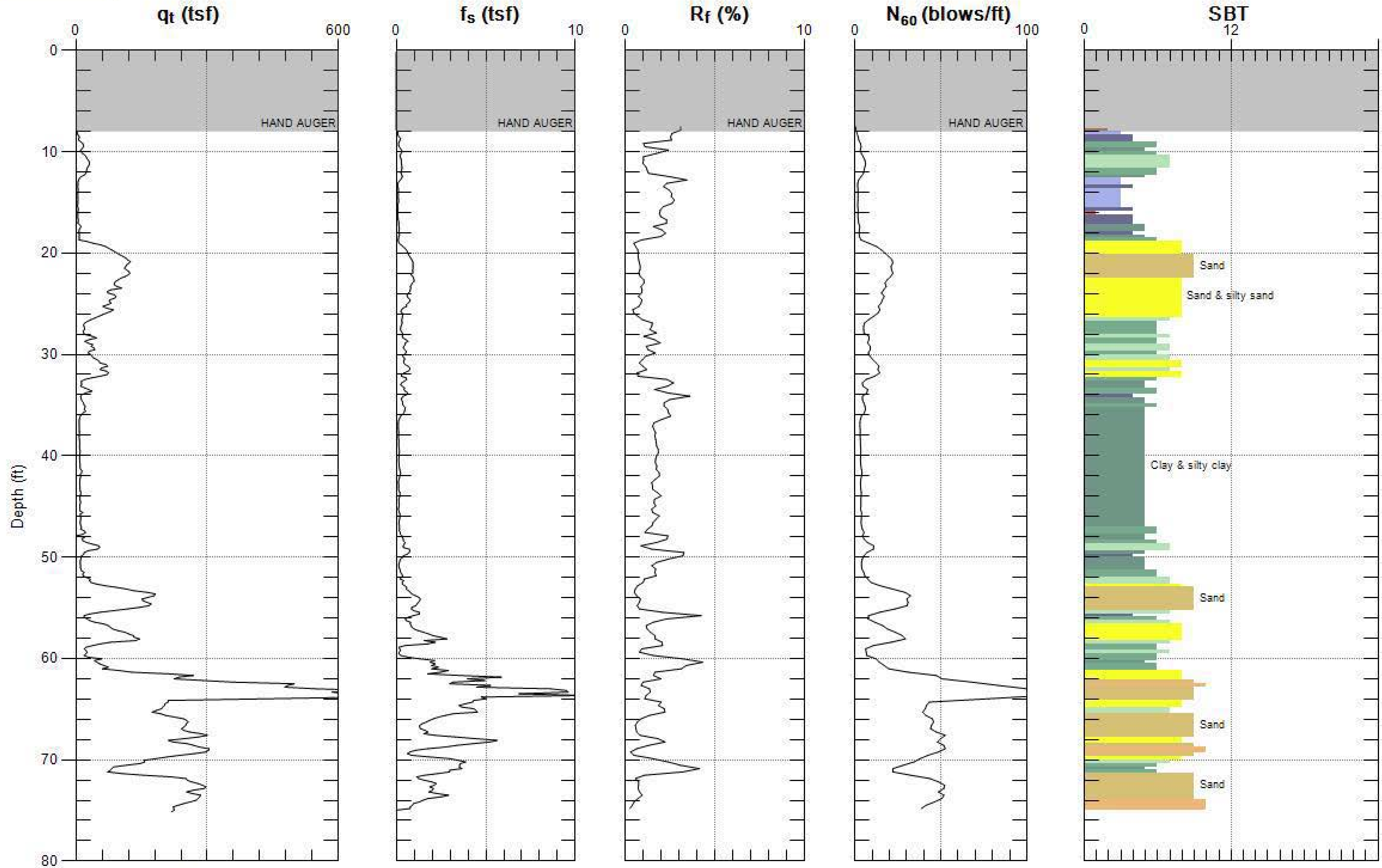
STANTEC CONSULTING

Site: CHEVRON 9-2239

Sounding: CPT-1

Engineer: M.SAPP

Date: 4/7/17 11:20



Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

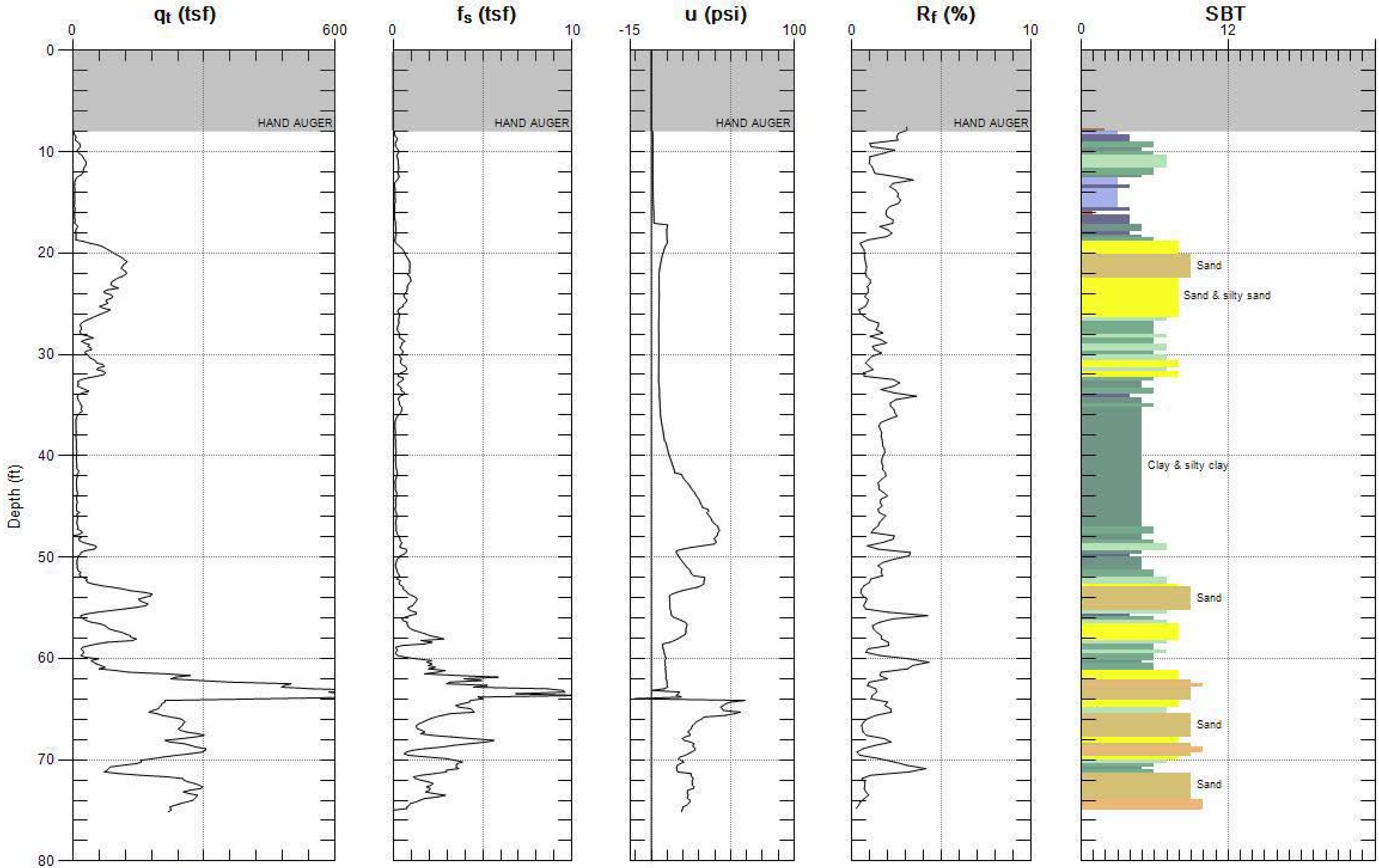
SBT: Soil Behavior Type (Robertson 1990)

GREGG

STANTEC CONSULTING

Site: CHEVRON 9-2239
Sounding: CPT-1

Engineer: M.SAPP
Date: 4/7/17 11:20



Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

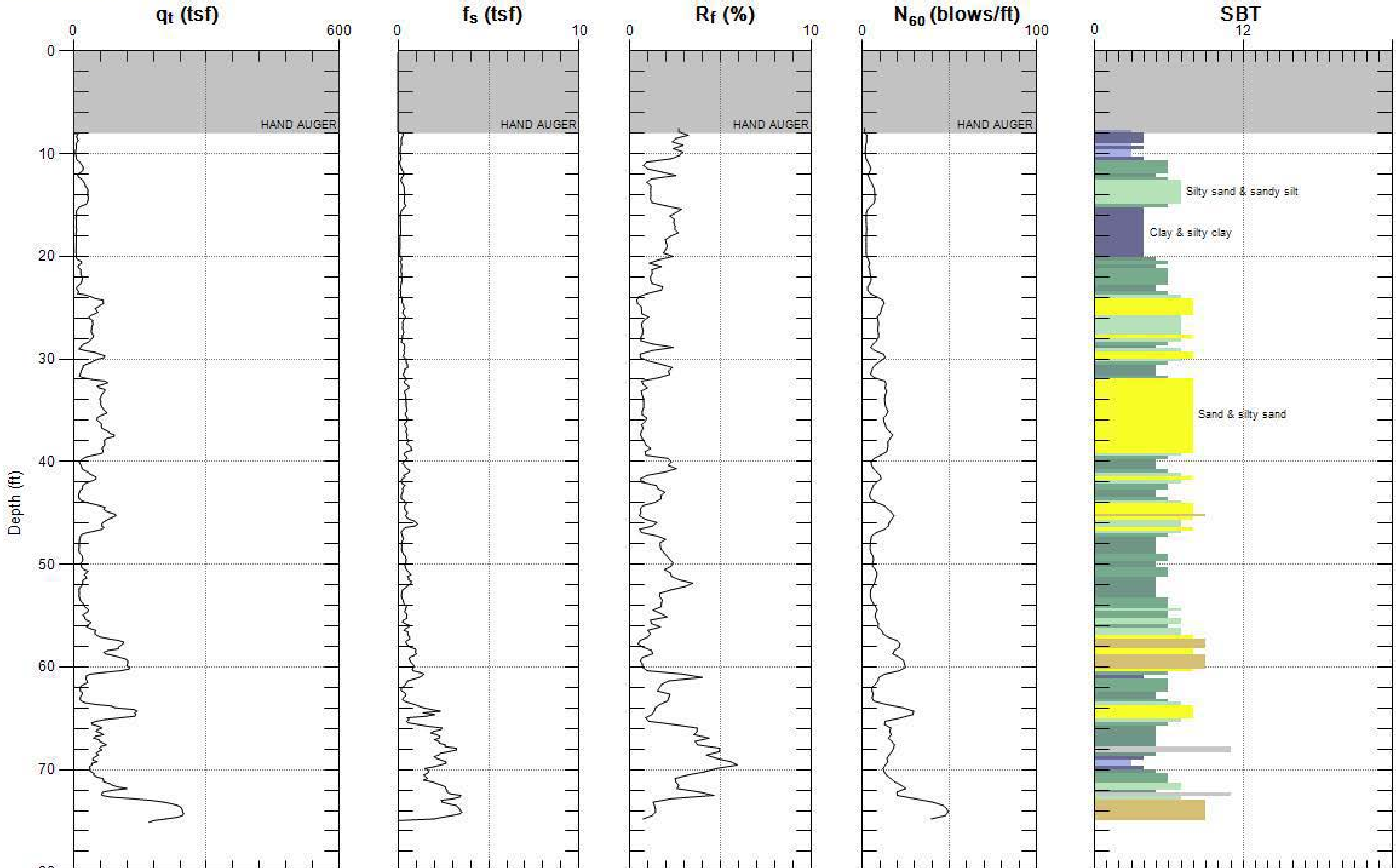
STANTEC CONSULTING

Site: CHEVRON 9-2239

Sounding: CPT-3

Engineer: M.SAPP

Date: 4/7/17 07:12



Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

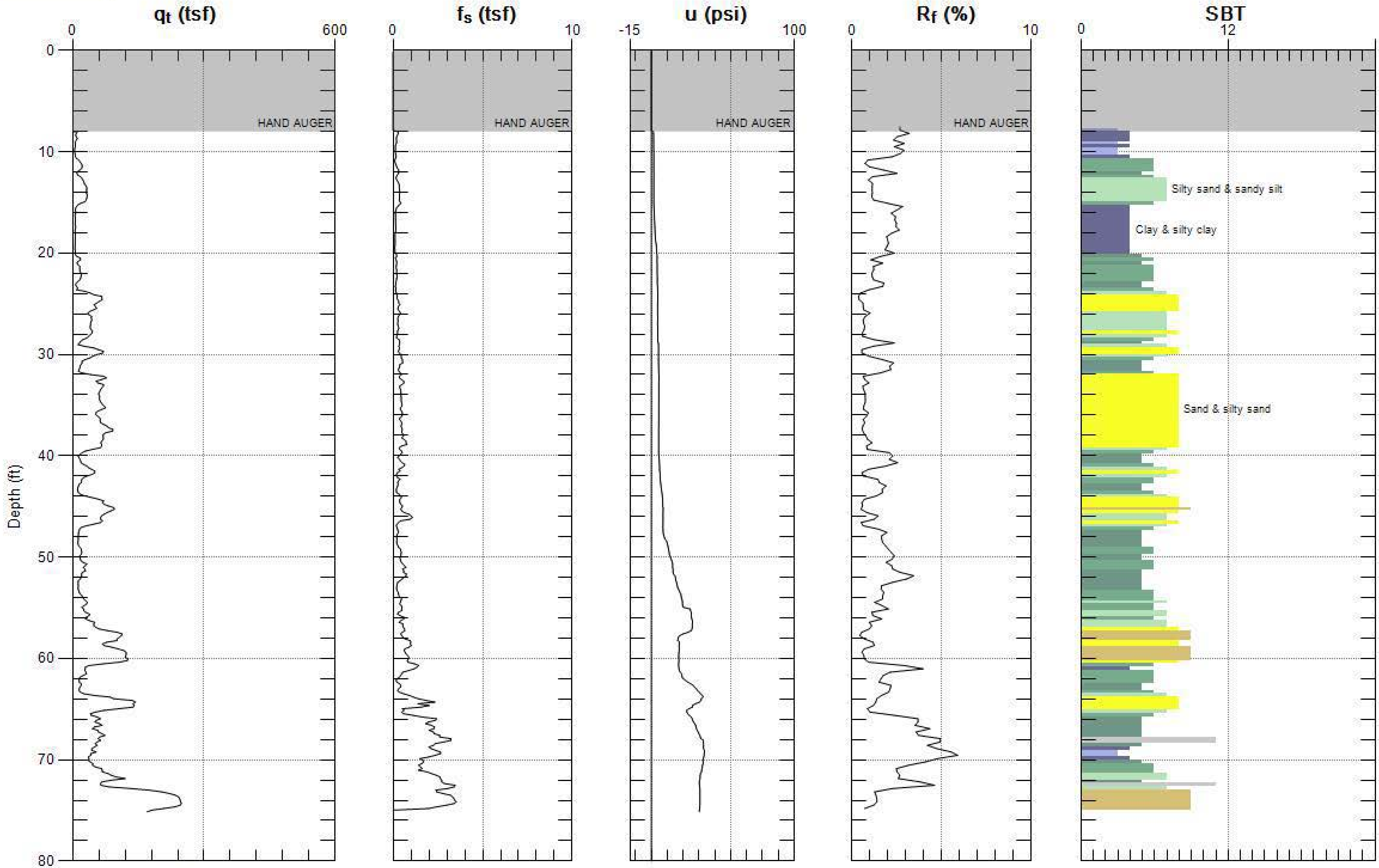
STANTEC CONSULTING

Site: CHEVRON 9-2239

Sounding: CPT-3

Engineer: M.SAPP

Date: 4/7/17 07:12



Max. Depth: 75.131 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

APPENDIX C
LABORATORY TEST RESULTS

SUMMARY OF SOIL DENSITY TEST RESULTS

ASTM D 2216

Boring Location	Sample Depth (ft)	Wet Density (lb/ft^3)	Dry Density (lb/ft^3)	Moisture Content (percent)
B1-10	10	117.7	90.0	30.9
B1-20	20	119.3	88.1	35.4
B2-2	2	142.2	128.8	10.4
B2-15	15	109.2	69.7	56.7
GT2-5	5	106.0	86.3	22.5
GT2-20	20	124.3	99.5	25.0

Stantec

Gradation Analysis
ASTM D 422

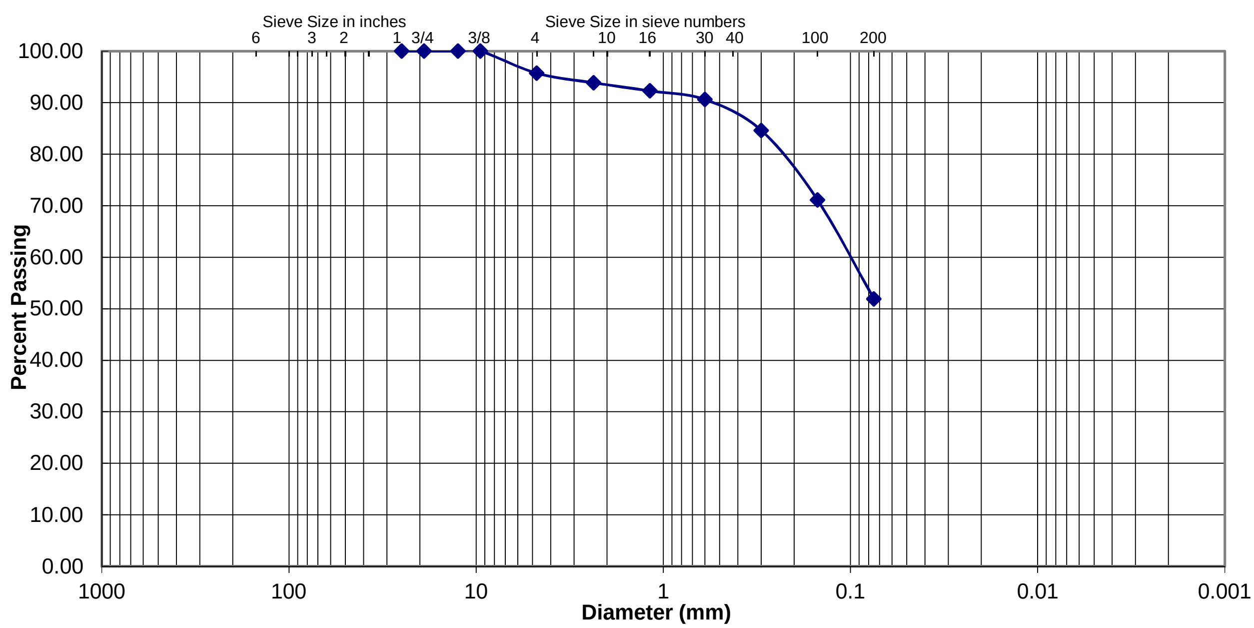
Project Name	Chevron 9-2239	Project Number	185850087
Source	B1-2'	Lab ID	B1-2
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	Angular	Test Date	04-18-2017
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	277.80		
Moisture Content (%)	16.8		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	11.90	4.3	95.7
No. 8	5.20	1.9	93.8
No. 16	4.30	1.5	92.3
No. 30	4.70	1.7	90.6
No. 50	16.60	6.0	84.6
No. 100	37.50	13.5	71.1
No. 200	53.40	19.2	51.9
Pan	144.20	51.9	---

% Gravel	4.3
% Sand	43.8
% Fines	51.9
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name	Chevron 9-2239	Project Number	185850087
Source	B1-20'	Lab ID	B1-20
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	N/A	Test Date	04-18-2017
Particle Hardness	N/A		
Sample Dry Mass (g)	286.00		
Moisture Content (%)	35.4		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.00	0.0	100.0
No. 16	0.00	0.0	100.0
No. 30	0.60	0.2	99.8
No. 50	21.80	7.6	92.2
No. 100	72.90	25.5	66.7
No. 200	117.70	41.2	25.5
Pan	73.00	25.5	---

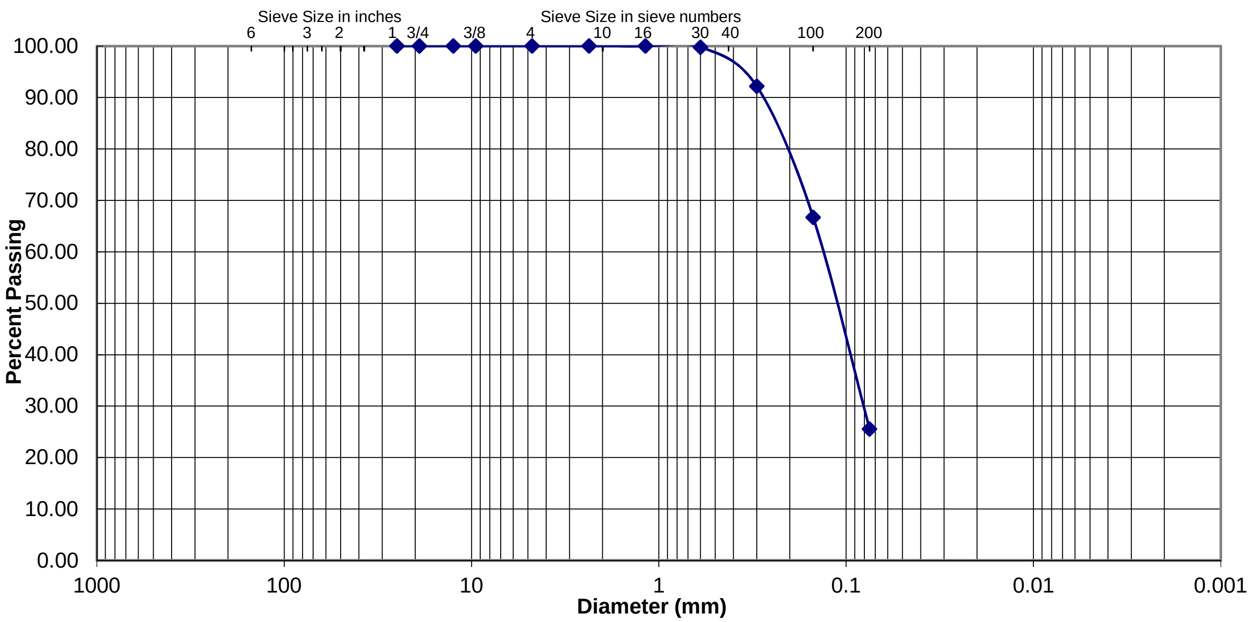
% Gravel	0.0
% Sand	74.5
% Fines	25.5
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis

ASTM D 422

Project Name Chevron 9-2239
Source B1-25'

Project Number 185850087
Lab ID B1-25
Date Received 04-17-2017
Preparation Date 04-17-2017
Test Date 04-18-2017

Preparation Method ASTM D 1140 Method A
Particle Shape N/A
Particle Hardness N/A
Sample Dry Mass (g) 294.00
Moisture Content (%) 28.2

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.00	0.0	100.0
No. 16	0.00	0.0	100.0
No. 30	0.20	0.1	99.9
No. 50	26.60	9.0	90.9
No. 100	163.00	55.4	35.4
No. 200	63.80	21.7	13.7
Pan	40.40	13.7	---

% Gravel 0.0
% Sand 86.3
% Fines 13.7
Fines Classification ML

D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

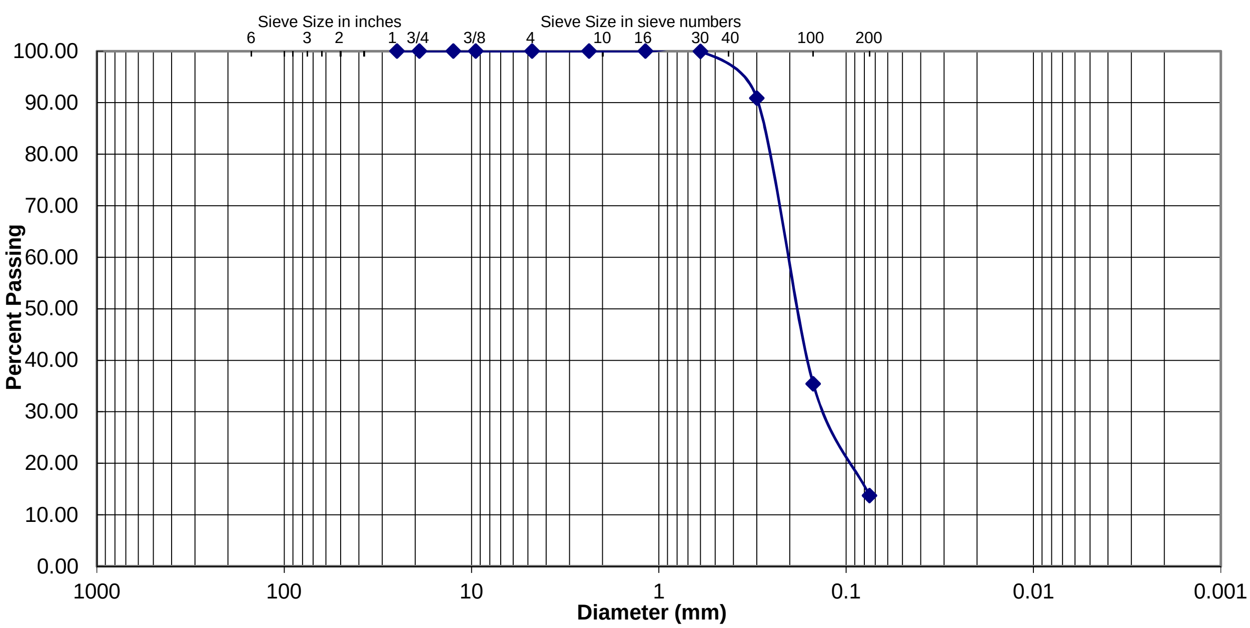
Cu N/A
Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis

ASTM D 422

Project Name	Chevron 9-2239	Project Number	185850087
Source	B1-70'	Lab ID	B1-70
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Preparation Date	04-17-2017
Particle Shape	Angular	Test Date	04-18-2017
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	301.70		
Moisture Content (%)	25.8		

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.90	0.3	99.7
No. 8	0.70	0.2	99.5
No. 16	1.10	0.4	99.1
No. 30	2.40	0.8	98.3
No. 50	26.40	8.8	89.6
No. 100	155.80	51.6	37.9
No. 200	65.20	21.6	16.3
Pan	49.20	16.3	---

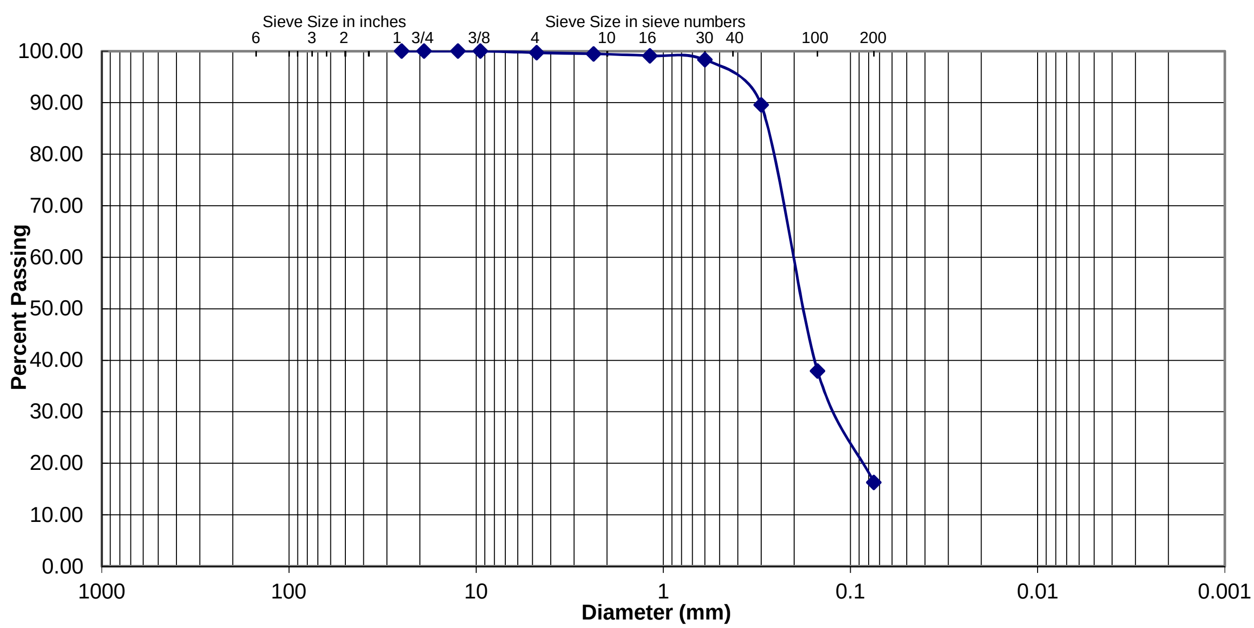
% Gravel	0.3
% Sand	83.4
% Fines	16.3
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Compaction Characteristics of Soil Using Modified Effort

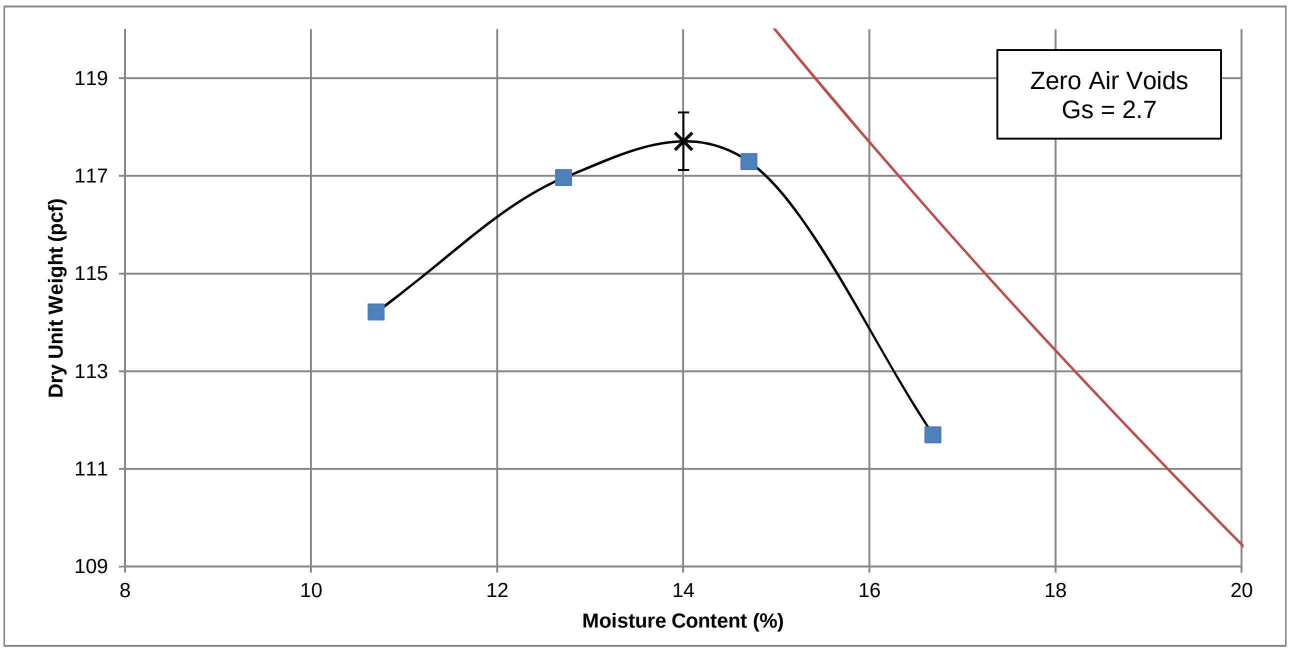
ASTM D 1557 - Method A

Project	Chevron 9-2239	Project No.	185850087
Source	B1 - 1 to 5 feet	Sample ID	Bulk 1
Description	Silty Sand (SM) Dark Brown	Date Received	04/14/2017
Visual Notes		Date Tested	04/19/2017

Test Fraction (%)			Oversized Fraction (%)		
Gs of Test Fraction	2.7	Estimated	Gs of Oversized Fraction	2.7	ASTM C 127
Oversized Fraction Sieve	3/4"		MC of Oversized Fraction (%)	11.1	

Mold Weight (g) 4218.48 Preparation Method Moist Rammer Type Manual

Wet Soil & Mold Weight (g)	Wet Soil Weight (g)	Moisture Content Determination: Wet Soil & Tare (g)	Dry Soil & Tare (g)	Tare (g)	Water Content (%)	Dry Unit Weight (pcf)
6128	1910	311.40	281.30	0.00	10.7	114.2
6210	1991	286.30	254.00	0.00	12.7	117.0
6251	2032	330.70	288.30	0.00	14.7	117.3
6187	1969	280.40	240.30	0.00	16.7	111.7



Maximun Dry Unit Weight (pcf) **117.7**

Optimum Moisture Content (%) **14.0**

Corrected Maximun Dry Unit Weight (pcf) **N/A**

Corrected Optimum Moisture Content (%) **N/A**

Comments

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	B2-7'	Lab ID	B2-7
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Test Date	04-18-2017

Initial Sample Wet Mass (g)	125.50	Moisture Content (%)	41.8
Initial Oven Dry Sample Mass (g)	88.50		
Final Oven Dry Sample Mass (g)	20.70		
Materials Finer Than 75µm (No. 200) Sieve (g)	67.80		
Percent Finer Than 75µm (No. 200) Sieve (%)	76.6		

Comments

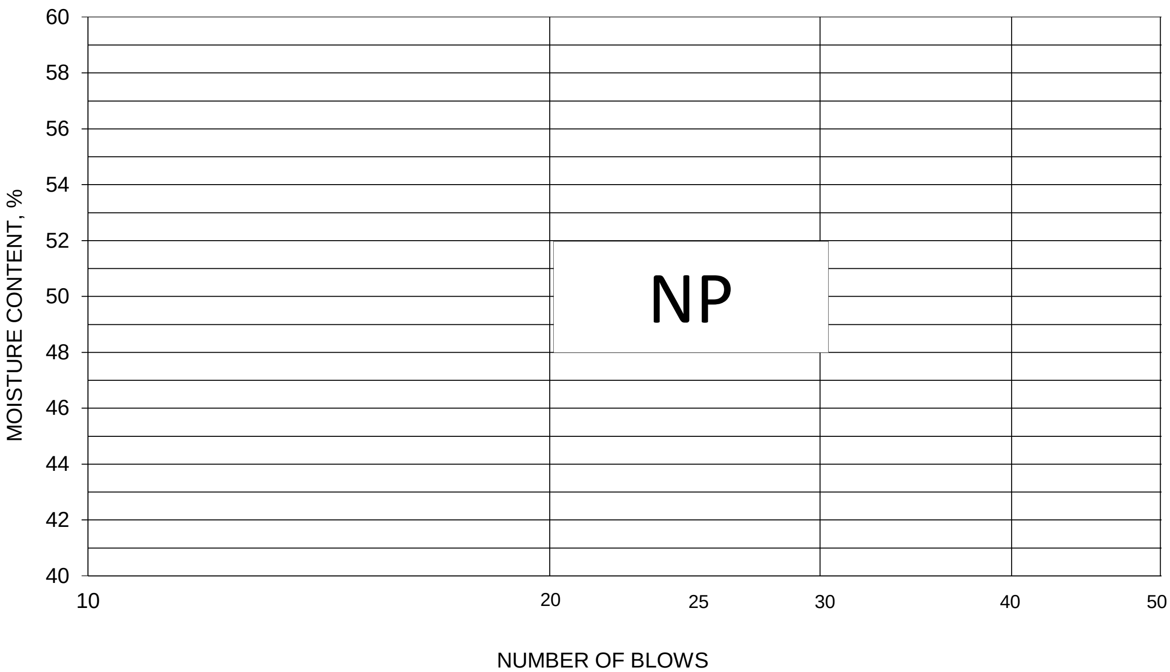
Reviewed By

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	B2-7'	Lab ID	B2-7
Tested By	JP	Test Method	ASTM D 4318
% + No. 40	0		
Test Date	04-20-2017	Prepared	Dry
Date Received	04-17-2017		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
					0

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	B2-15'	Lab ID	B2-15
		Date Received	04-17-2017
Preparation Method	ASTM D 1140 Method A	Test Date	04-18-2017

Initial Sample Wet Mass (g)	223.60	Moisture Content (%)	56.6
Initial Oven Dry Sample Mass (g)	142.80		
Final Oven Dry Sample Mass (g)	3.00		
Materials Finer Than 75µm (No. 200) Sieve (g)	139.80		
Percent Finer Than 75µm (No. 200) Sieve (%)	97.9		

Comments

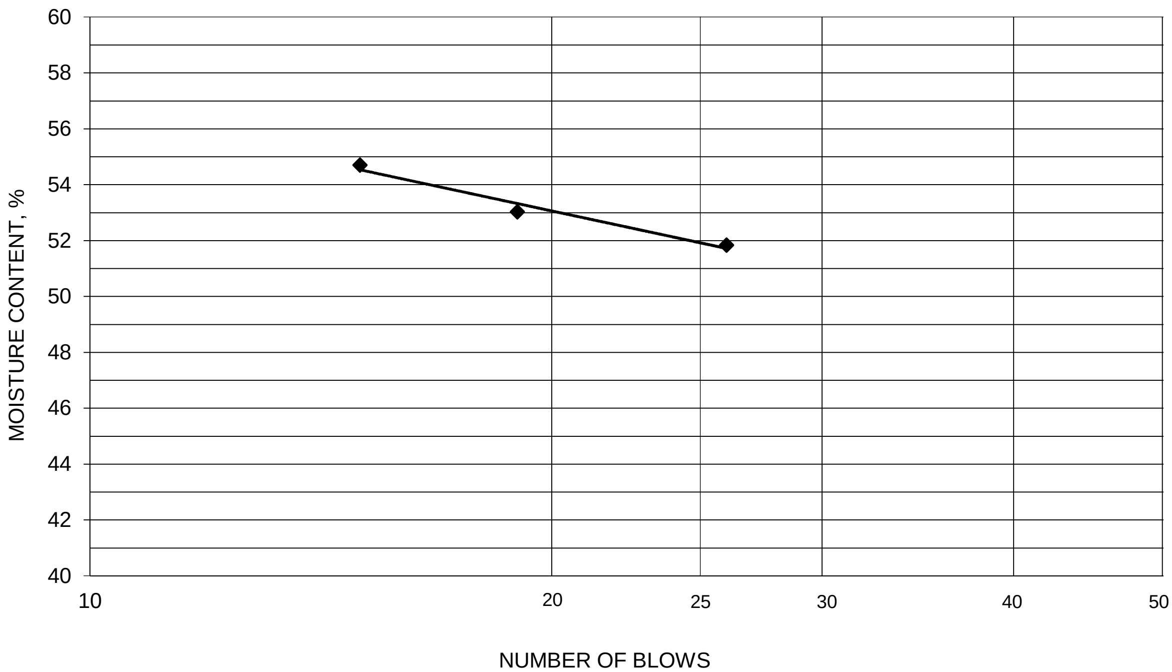
Reviewed By

ATTERBERG LIMITS

Project	Chevron 9-2239			Project No.	185850087
Source	B2-15'			Lab ID	B2-15
Tested By	JP	Test Method	ASTM D 4318	% + No. 40	0
Test Date	04-20-2017	Prepared	Dry	Date Received	04-17-2017

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
19.65	17.54	13.47	26	51.8	52
20.96	18.60	14.15	19	53.0	
20.82	18.20	13.41	15	54.7	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
20.56	18.66	13.44	36.4	36	16

Remarks:

Reviewed By

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source B2-60'

Project Number 185850087
Lab ID B2-60
Date Received 04-17-2017
Preparation Date 04-17-2017
Test Date 04-18-2017

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 294.00
Moisture Content (%) 31.2

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.50	0.2	99.8
No. 16	2.40	0.8	99.0
No. 30	17.50	6.0	93.1
No. 50	86.00	29.3	63.8
No. 100	143.10	48.7	15.1
No. 200	38.90	13.2	1.9
Pan	5.60	1.9	---

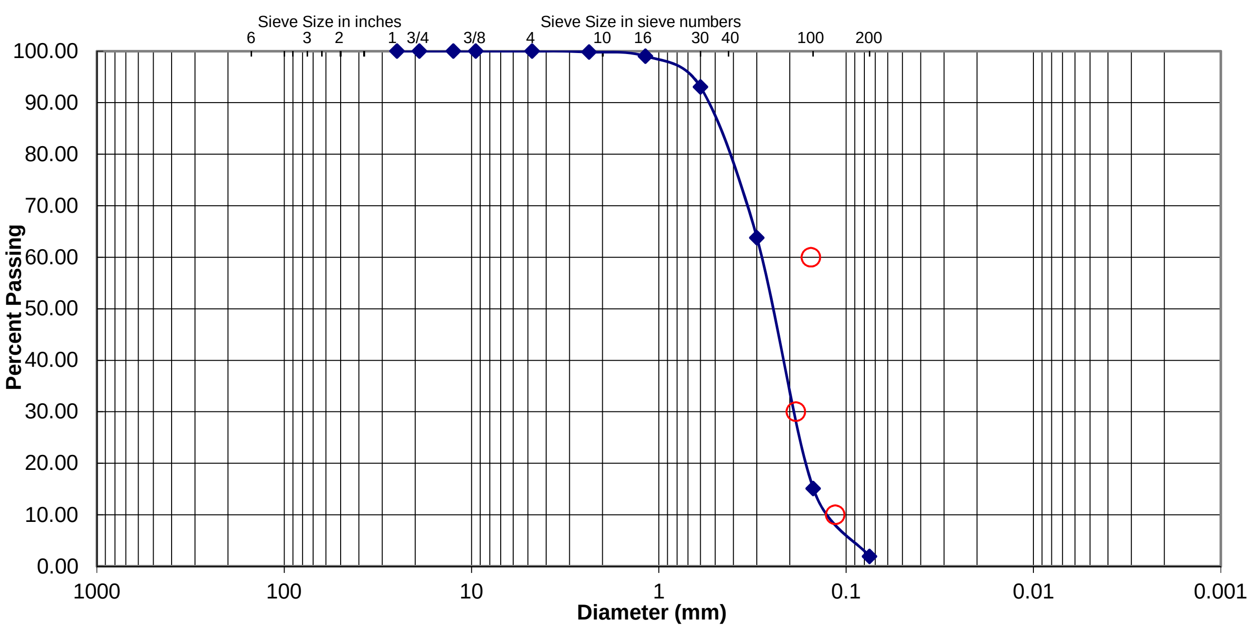
% Gravel	0.0
% Sand	98.1
% Fines	1.9
Fines Classification	ML
D_{10} (mm)	0.1146
D_{30} (mm)	0.1854
D_{60} (mm)	0.1542
Cu	1.35
Cc	1.94

Classification

Poorly Graded Sand (SP)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name: Chevron 9-2239
Source: B2-75'

Project Number: 185850087
Lab ID: B2-75
Date Received: 04-17-2017
Preparation Date: 04-17-2017
Test Date: 04-18-2017

Preparation Method: ASTM D 1140 Method A
Particle Shape: Angular
Particle Hardness: Hard and Durable
Sample Dry Mass (g): 306.30
Moisture Content (%): 18.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.40	0.1	99.9
No. 8	0.50	0.2	99.7
No. 16	5.90	1.9	97.8
No. 30	29.40	9.6	88.2
No. 50	126.60	41.3	46.8
No. 100	105.50	34.4	12.4
No. 200	23.60	7.7	4.7
Pan	14.40	4.7	---

% Gravel: 0.1
% Sand: 95.2
% Fines: 4.7
Fines Classification: ML

D_{10} (mm): 0.1208
D_{30} (mm): 0.2137
D_{60} (mm): 0.2440

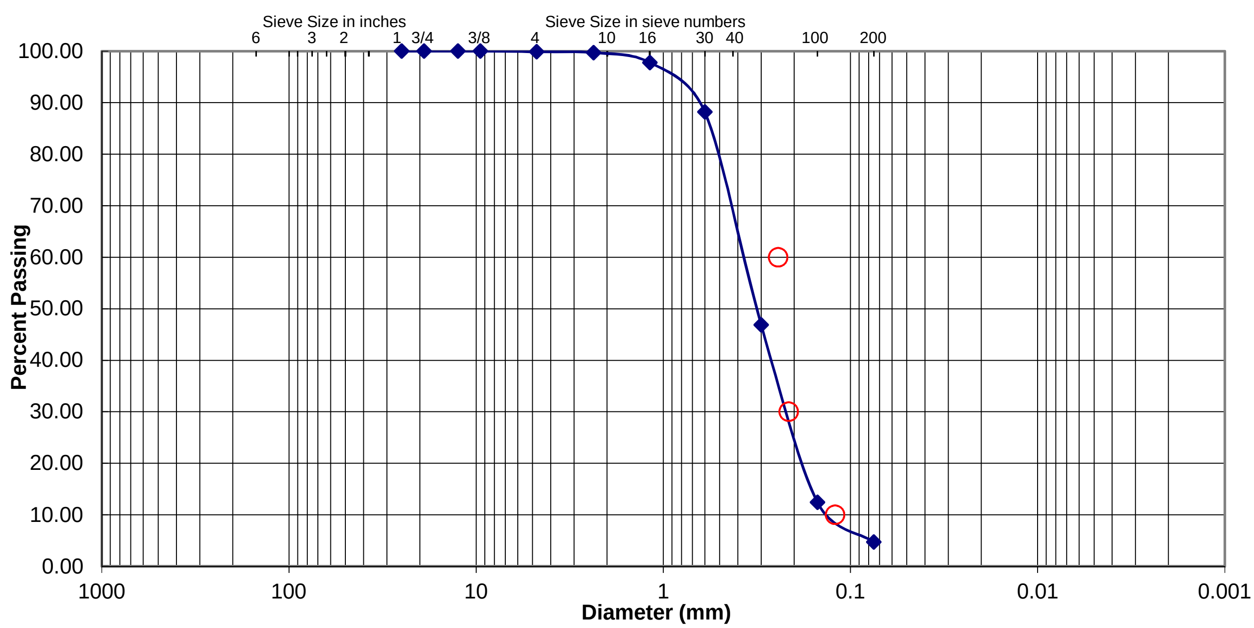
Cu: 2.02
Cc: 1.55

Classification

Poorly Graded Sand (SP)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source P1-5'

Project Number 185850087
Lab ID P1-5
Date Received 04-17-2017
Preparation Date 04-17-2017
Test Date 04-18-2017

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 300.10
Moisture Content (%) 17.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	0.00	0.0	100.0
1/2"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.10	0.0	100.0
No. 8	0.20	0.1	99.9
No. 16	0.20	0.1	99.8
No. 30	1.60	0.5	99.3
No. 50	31.50	10.5	88.8
No. 100	89.20	29.7	59.1
No. 200	73.70	24.6	34.5
Pan	103.60	34.5	---

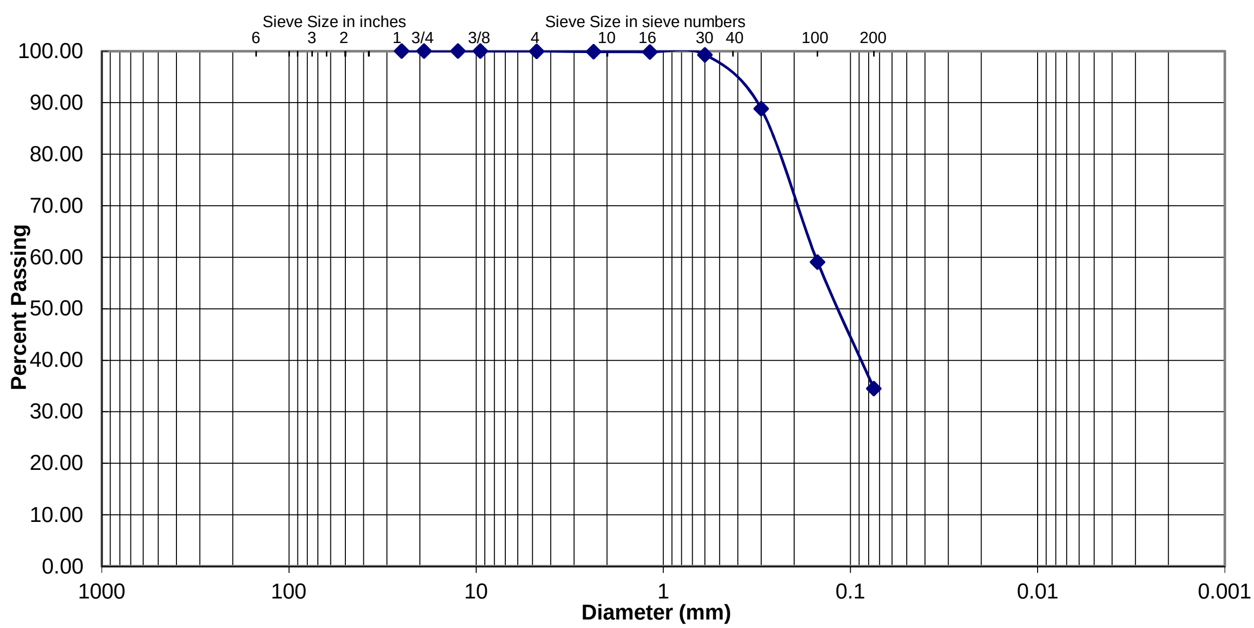
% Gravel	0.0
% Sand	65.4
% Fines	34.5
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	GT2-2	Lab ID	GT2-2
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Test Date	03-23-2015

Initial Sample Wet Mass (g)	492.10	Moisture Content (%)	15.3
Initial Oven Dry Sample Mass (g)	426.70		
Final Oven Dry Sample Mass (g)	199.70		
Materials Finer Than 75µm (No. 200) Sieve (g)	227.00		
Percent Finer Than 75µm (No. 200) Sieve (%)	53.2		

Comments

Reviewed By

Materials Finer Than 75µm (No. 200) Sieve
ASTM D 1140

Project Name	Chevron 9-2239	Project Number	185850087
Source	GT2-7	Lab ID	GT2-7
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Test Date	03-23-2015

Initial Sample Wet Mass (g)	458.90	Moisture Content (%)	38.9
Initial Oven Dry Sample Mass (g)	330.30		
Final Oven Dry Sample Mass (g)	63.40		
Materials Finer Than 75µm (No. 200) Sieve (g)	266.90		
Percent Finer Than 75µm (No. 200) Sieve (%)	80.8		

Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name Chevron 9-2239
Source GT1-5

Project Number 185850087
Lab ID GT1-5
Date Received 03-23-2015
Preparation Date 03-23-2015
Test Date 02-24-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 375.60
Moisture Content (%) 23.5

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.51	0.1	99.9
No. 8	0.20	0.1	99.8
No. 10	0.01	0.0	99.8
No. 20	0.45	0.1	99.7
No. 40	3.20	0.9	98.8
No. 50	10.28	2.7	96.1
No. 80	61.16	16.3	79.8
No. 100	34.15	9.1	70.7
No. 200	98.71	26.3	44.4
Pan	166.93	44.4	---

% Gravel 0.1
% Sand 55.4
% Fines 44.4
Fines Classification ML

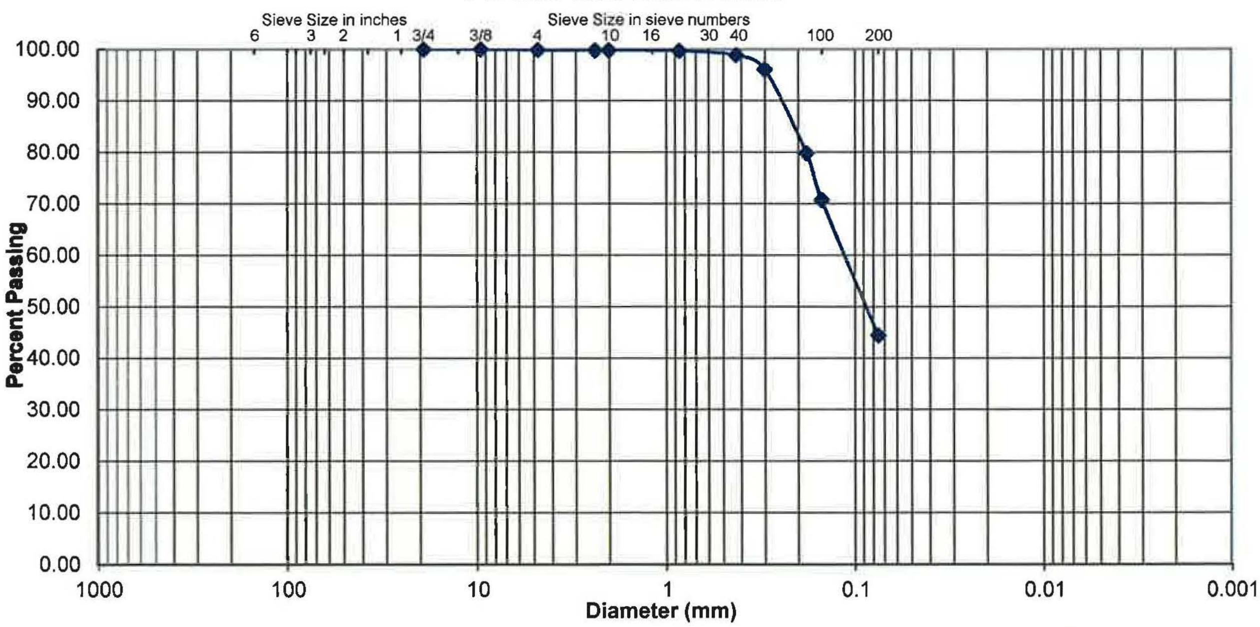
D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

Cu N/A
Cc N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name: Chevron 9-2239
Source: GT1-10

Project Number: 185850087
Lab ID: GT1-10
Date Received: 03-23-2015
Preparation Date: 03-23-2015
Test Date: 02-24-2015

Preparation Method: ASTM D 1140 Method A
Particle Shape: Angular
Particle Hardness: Hard and Durable
Sample Dry Mass (g): 346.10
Moisture Content (%): 35.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.22	0.1	99.9
No. 10	0.01	0.0	99.9
No. 20	0.11	0.0	99.9
No. 40	0.52	0.2	99.8
No. 50	2.77	0.8	99.0
No. 80	29.67	8.6	90.4
No. 100	55.78	16.1	74.3
No. 200	113.02	32.7	41.6
Pan	144.00	41.6	---

% Gravel: 0.0
% Sand: 58.4
% Fines: 41.6
Fines Classification: CL

D_{10} (mm): N/A
D_{30} (mm): N/A
D_{60} (mm): N/A

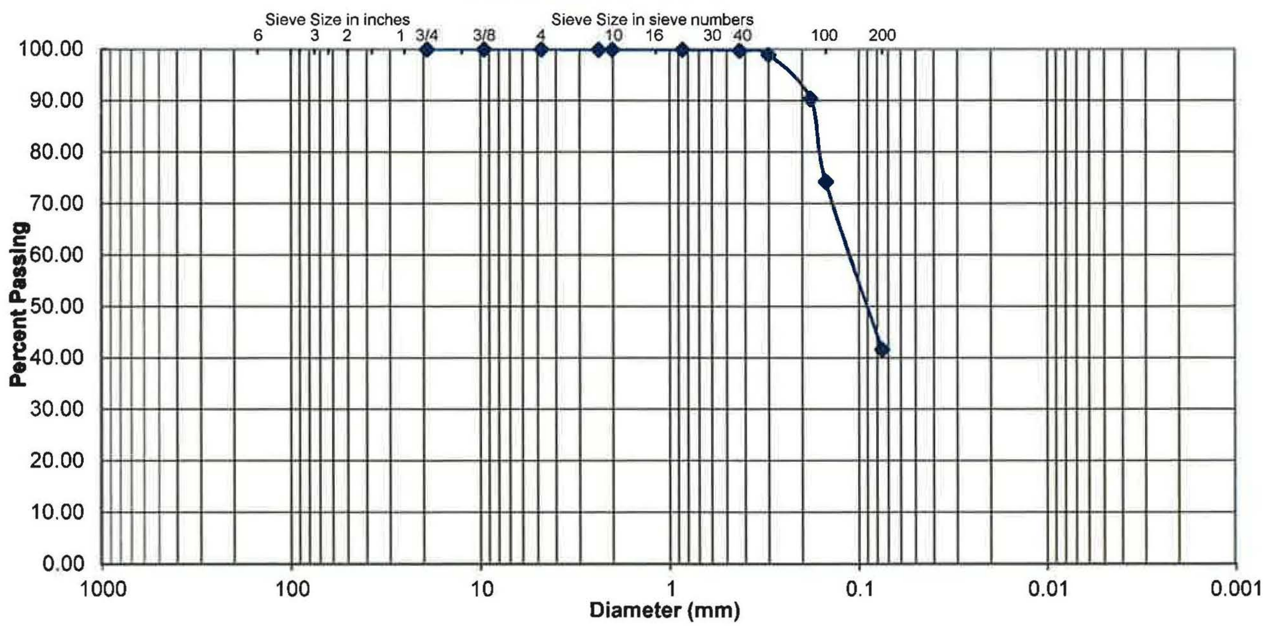
Cu: N/A
Cc: N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments ______

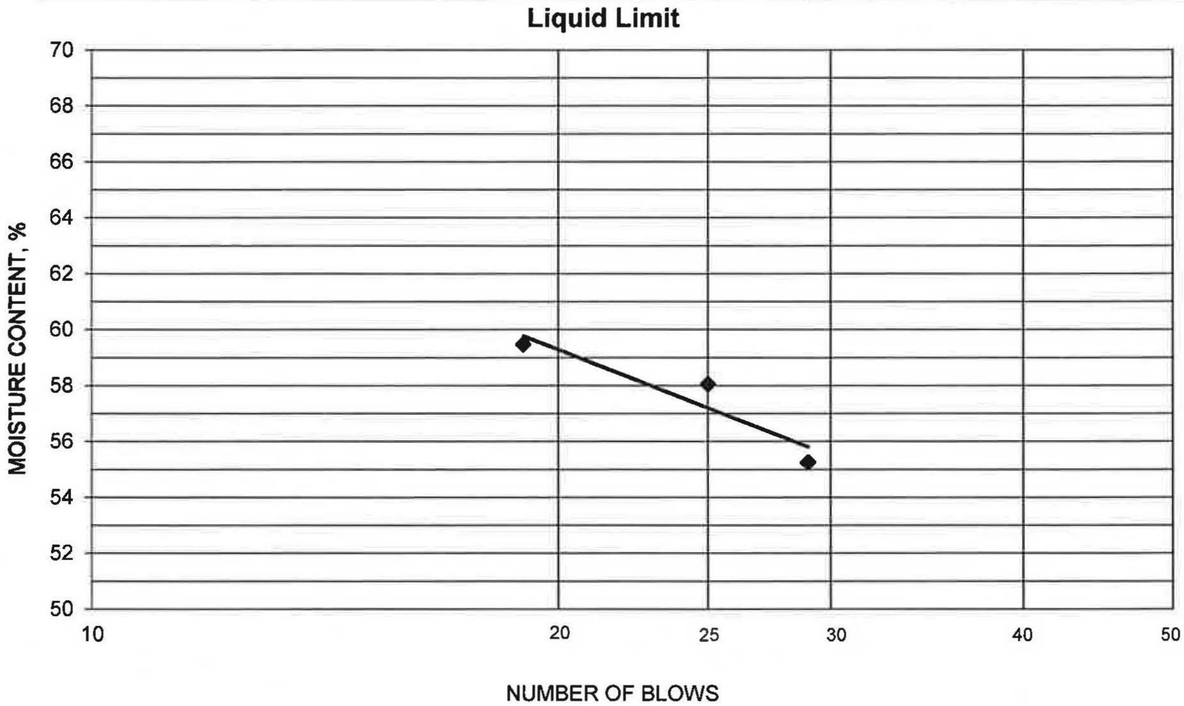
Reviewed By ______

Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-15	Lab ID	GT1-15
Tested By	MAC	Test Method	ASTM D 4318
% + No. 40	97		
Test Date	02-24-2015	Prepared	Dry
Date Received	02-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
49.33	44.70	36.32	29	55.3	57
47.12	43.12	36.23	25	58.1	
47.78	43.51	36.33	19	59.5	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.07	19.56	12.06	33.5	33	24

Remarks:

Reviewed By

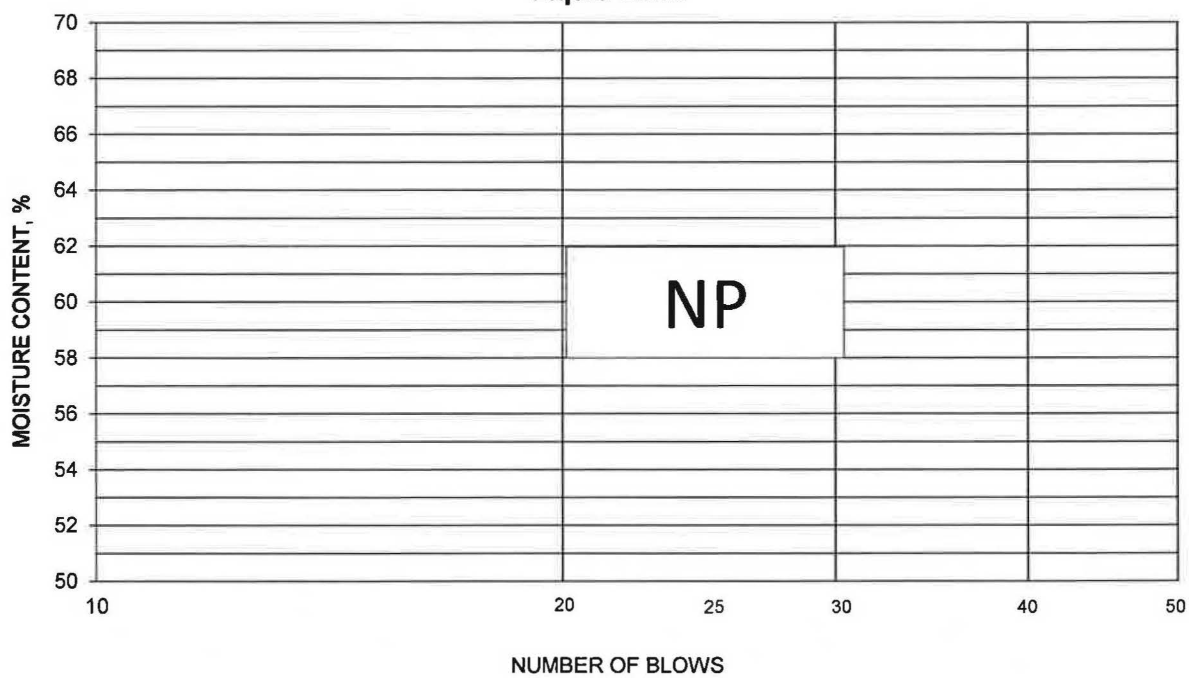
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-35	Lab ID	GT1-35
Tested By	MAC	Test Method	ASTM D 4318
% + No. 40	80		
Test Date	02-24-2015	Prepared	Dry
Date Received	02-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
27.17	24.01	10.91	35	24.1	
24.76	21.23	8.30	21	27.3	
25.92	21.99	8.84	15	29.9	26

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: ______________________

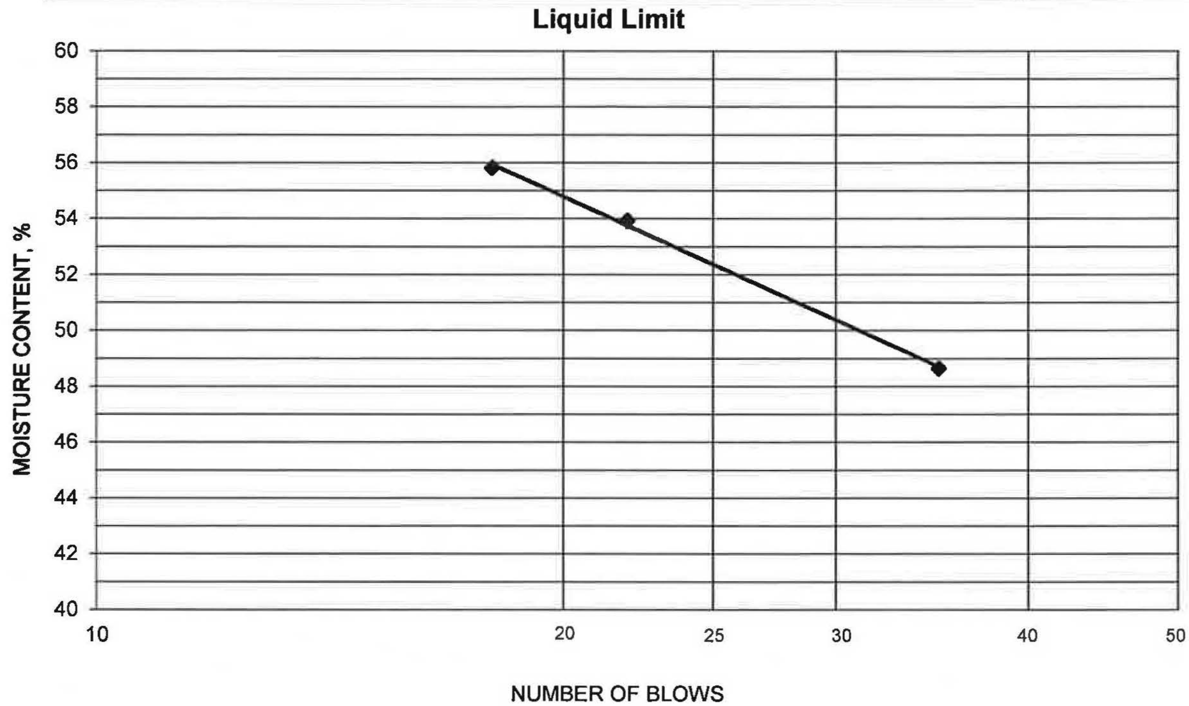
Reviewed By ______________

Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239	Project No.	185850087
Source	GT1-45	Lab ID	GT1-45
Tested By	MAC	Test Method ASTM D 4318	% + No. 40: 95
Test Date	02-24-2015	Prepared: Dry	Date Received: 02-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
25.92	21.05	11.04	35	48.7	
23.65	18.50	8.95	22	53.9	
25.51	20.33	11.05	18	55.8	52



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.27	19.77	12.10	32.6	33	19

Remarks: ______________________

Reviewed By ______________

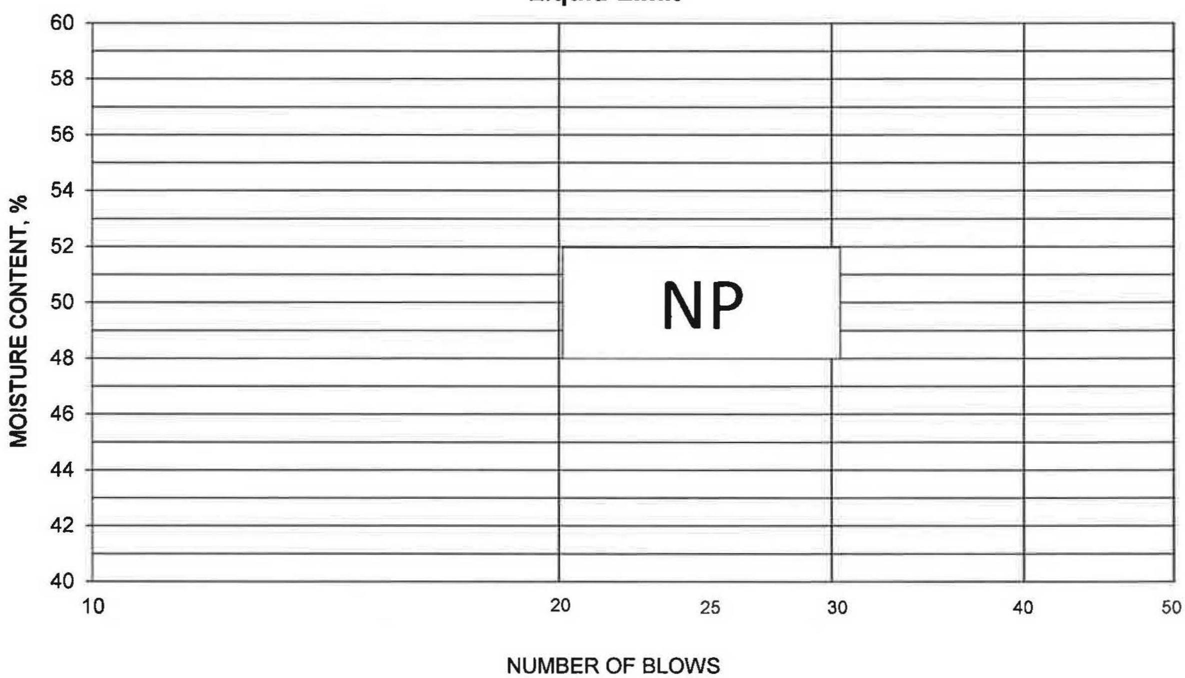
Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239			Project No.	185850087
Source	GT1-55			Lab ID	GT1-55
Tested By	MAC	Test Method	ASTM D 4318	% + No. 40	80
Test Date	02-24-2015	Prepared	Dry	Date Received	02-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
30.06	26.81	11.04	26	20.6	
26.39	23.40	10.65	21	23.5	
29.81	26.21	10.91	15	23.5	21

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks: ______________________

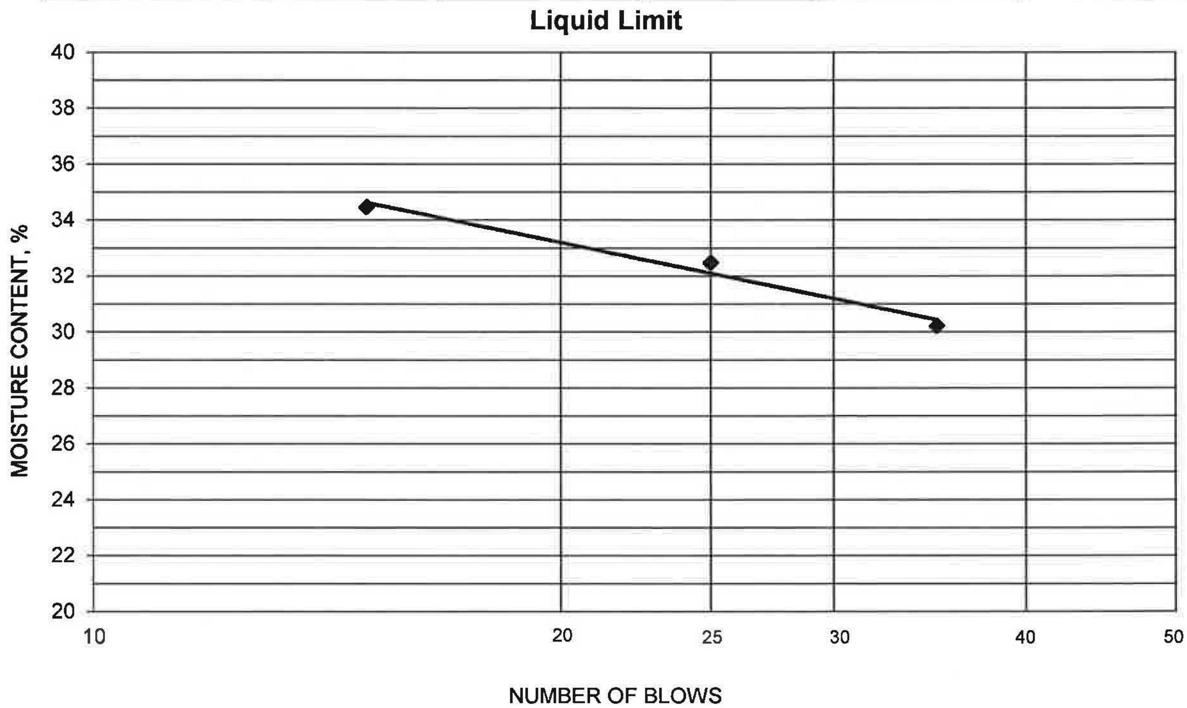
Reviewed By ______________________

Stantec

ATTERBERG LIMITS

Project	Chevron 9-2239			Project No.	185850087
Source	GT1-65			Lab ID	GT1-65
Tested By	MAC	Test Method	ASTM D 4318	% + No. 40	70
Test Date	02-24-2015	Prepared	Dry	Date Received	02-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
29.17	24.88	10.68	35	30.2	
28.98	24.58	11.03	25	32.5	
28.98	24.34	10.88	15	34.5	32



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
22.26	20.80	12.08	16.7	17	15

Remarks: ________

Reviewed By ________

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 1, 2017
Revised May 4, 2017

Mr. Jaret Fischer
Stantec Consulting, Inc.
25864-F Business Center Drive
Redlands, CA 92374

Subject: **LABORATORY TEST RESULTS**
Chevron # 185850087
Converse Project No. 17-81-108-08

Dear Mr. Fischer:

Enclosed are the results of the laboratory tests that you requested for the above-referenced project. We received the samples from you on April 3, 2017. The following tests were performed in accordance with the relevant standard.

- Two (2) Direct Shear Tests (ASTM D3080)
- Three (3) Soil Corrosion Tests (California Tests 417, 422, 643) performed by EGLab, Inc.
- One (1) R-Value Test (Caltrans 301)

We appreciate the opportunity to be of continued service to Stantec Consulting, Inc. If you should have any questions or need additional information, please feel free to contact us at 909-796-0544.

CONVERSE CONSULTANTS

REGISTERED PROFESSIONAL ENGINEER
JORDAN GREGORY ROPER
C 84175
CIVIL
STATE OF CALIFORNIA

Jordan Roper
Project Engineer

KVG/JR

Encl: Table No. 1, *Direct Shear Test Results*
Table No. 2, *Summary of Soil Corrosivity Test Result*
Table No. 3, *R-Value Test Results*
Drawing No. 1 - 2, *Direct Shear Test Results*

Table No. 1, Direct Shear Test Results

Sample/Depth (ft.)	Soil Description	Cohesion (psf)	Friction Angle (degree)
B-1 / 5.0	Sandy Silt (ML), Fine Grained, Dark-Brown	240	26
B-2 / 7.0	Sandy Silt (ML), Fine Grained, Dark-Brown	210	26

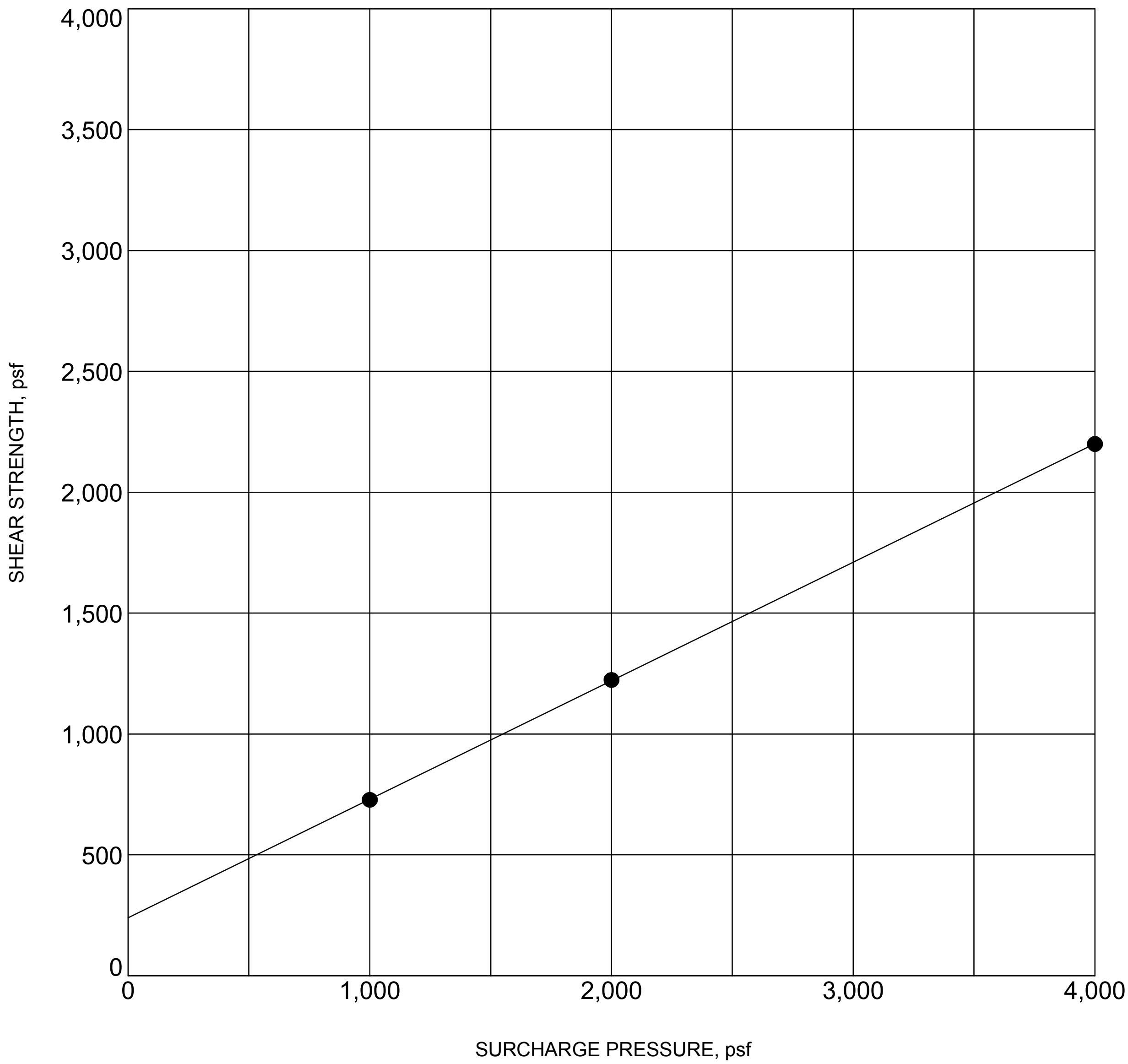
Table No. 2, Summary of Corrosion Test Results

Sample/Type/ Depth (ft)	pH	Soluble Sulfates (CA 417) (% by weight)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
B-1 / Bulk / NA	8.22	0.117	450	1030
B-2 / Bulk / NA	8.29	0.019	255	1600
B-2 / Bulk / 80	8.39	0.039	6360	130

*Tests performed by EGLab, Inc.

Table No. 3, R-value Test Results

Boring No.	Sample Type	Soil Description	R-value
B2	BULK	Silty Sand (SM), Fine to Coarse Grained, Brown	46



BORING NO. :	**BH-1**	DEPTH (ft) :	**5.0**
DESCRIPTION :	**Sandy Silt (ML), Fine Grained, Dark-Brown**		
COHESION (psf) :	**240**	FRICTION ANGLE (degrees):	**26**
MOISTURE CONTENT (%) :	**16.4**	DRY DENSITY (pcf) :	**107.5**

NOTE: Ultimate Strength.

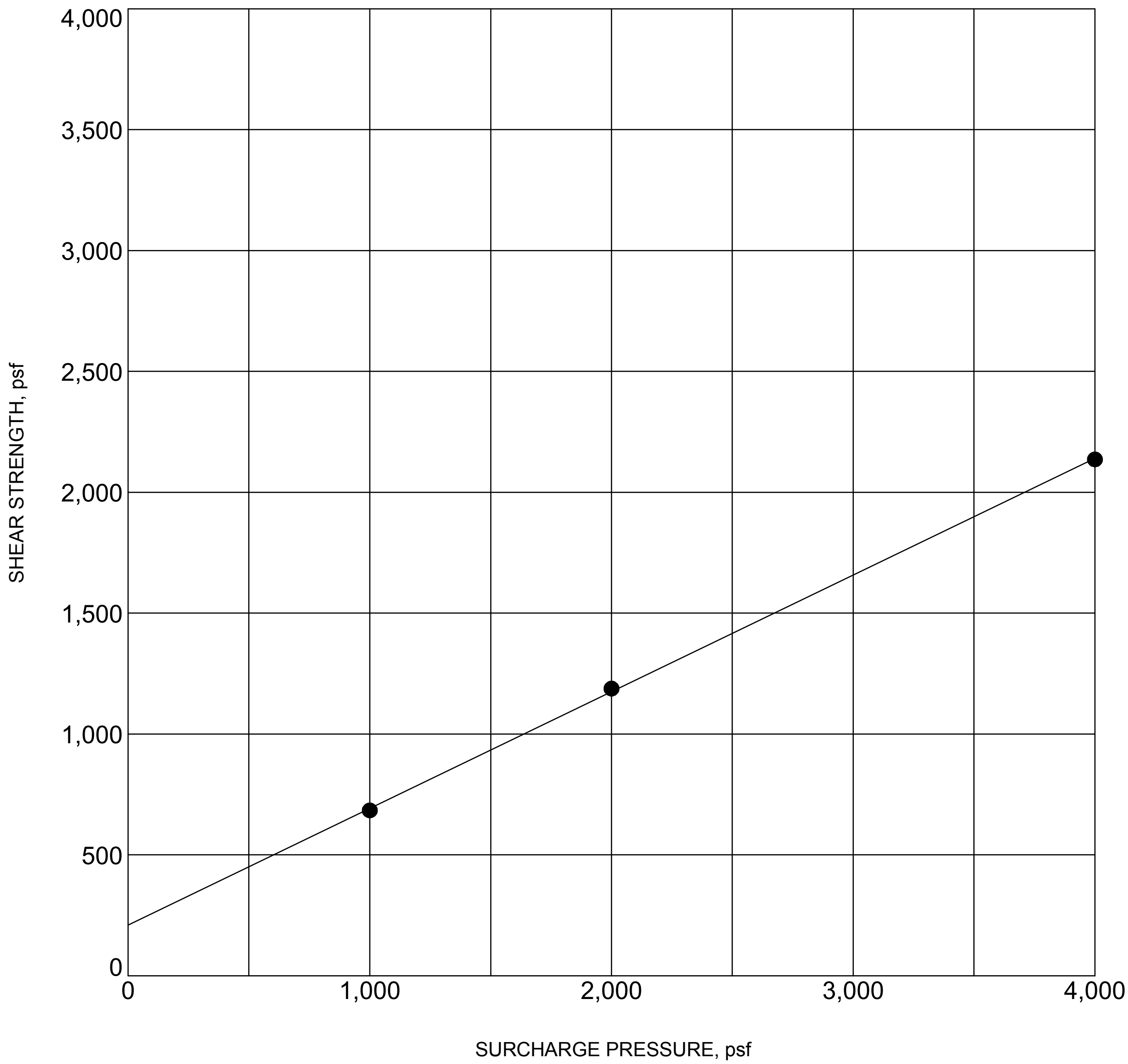
DIRECT SHEAR TEST RESULTS

Converse Consultants

Stantec Consulting, Inc.
Chevron #185850087

Project No. **17-81-108-08**

Drawing No. **1**



BORING NO. :	BH-2	DEPTH (ft) :	7.0
DESCRIPTION :	Sandy Silt (ML), Fine Grained, Dark-Brown		
COHESION (psf) :	210	FRICTION ANGLE (degrees):	26
MOISTURE CONTENT (%) :	14.2	DRY DENSITY (pcf) :	90.0

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Stantec Consulting, Inc.
Chevron #185850087

Project No. 17-81-108-08

Drawing No. 2

Converse Consultants
Geotechnical Engineering, Environmental and Groundwater Science, Inspection and Testing Services

March 9, 2015

Mr. Jaret Fischer
Stantec Consulting Inc.
25864-F Business Center Drive
Redlands, CA 92374

Subject: **LABORATORY TEST RESULTS**
185850087 – Chevron 9-2239
Converse Project No. 15-81-104-05

Dear Mr. Fischer:

Presented below are the results of the laboratory tests that you requested for the above-referenced project. We received the samples from your office on February 20, 2015. The following tests were performed in accordance with the relevant standard:

- One (1) Maximum Dry Density and Optimum Moisture Content Tests (ASTM D1557)
- Three (3) Direct Shear Tests (ASTM D3080)
- Six (6) Hydrometer Tests (ASTM D422)
- One (1) Soil Corrosivity Test (Caltrans 643, 422, 417, and 532)

We appreciate the opportunity to be of continued service to Stantec Consulting Inc. If you should have any questions or need additional information, please feel free to contact us at (909) 796-0544.

CONVERSE CONSULTANTS

Scot Mathis, PG, CEG
Senior Geologist

SM/kvg

Encl: Table No. 1, *Moisture – Density Relationship Test Results*
Table No. 2, *Direct Shear Test Results*
Table No. 3, *Hydrometer Test Results*
Table No. 4, *Corrosivity Test Results*
Drawing No. 1, *Moisture – Density Relationship Test Results*
Drawing No. 2 - 4, *Direct Shear Test Results*
Drawing No. 5 - 6, *Grain Sized Distribution Results*

10391 Corporate Drive, Redlands, California 92374
Telephone: (909) 796-0544 ♦ Facsimile: (909) 796-7675 ♦ www.converseconsultants.com

Table No. 1, Moisture - Density Relationship Test Results

Sample ID	Soil Classification	Maximum Dry Density (pcf)	Optimum Water Content (%)
GT-2	Silty Sand with Trace Clay (SM), Fine to Medium Grained, Olive-Gray	120.0	12.5

Table No. 2, Direct Shear Test Results

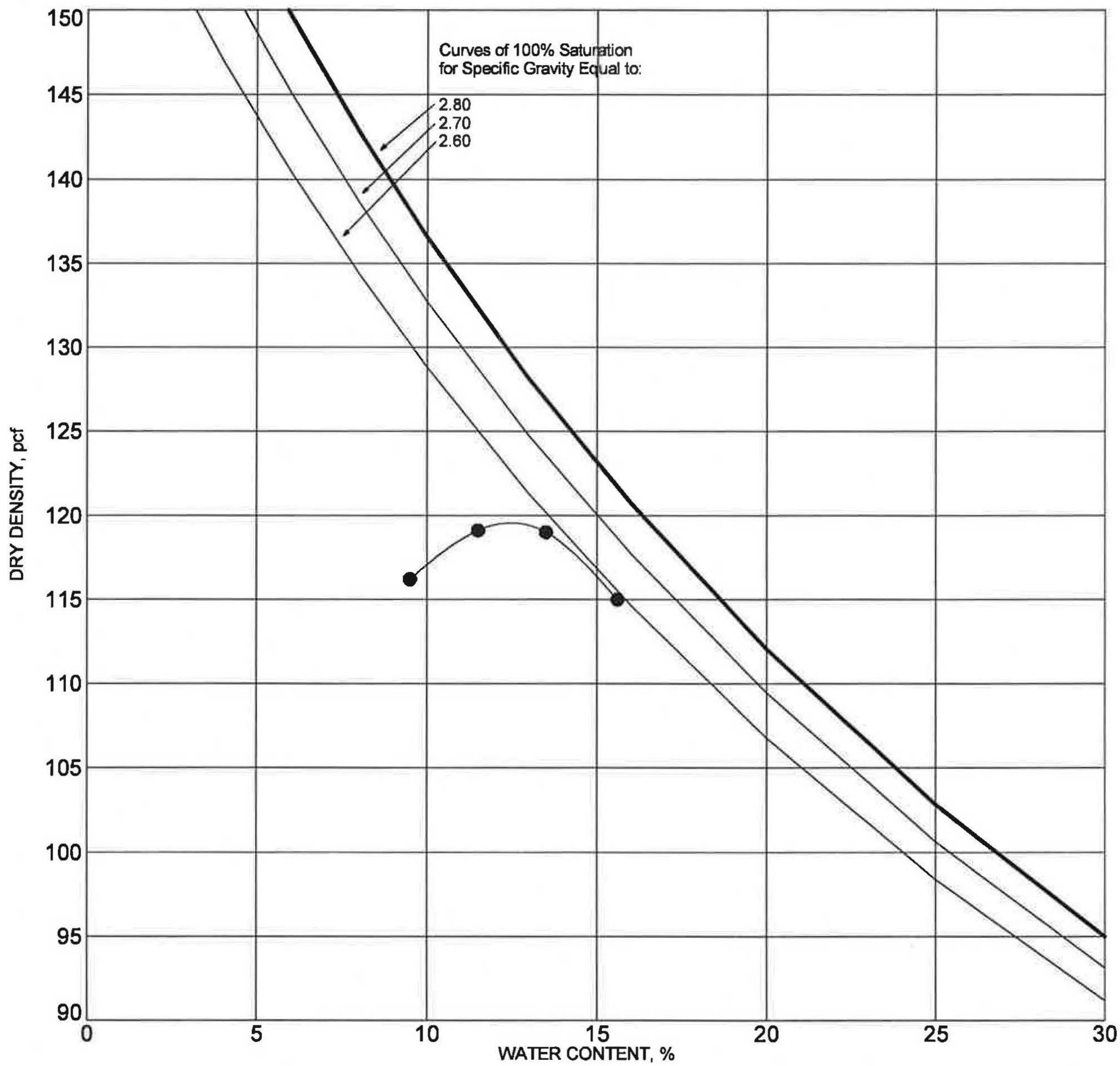
Sample ID	Depth (feet)	Soil Description	Cohesion	Friction Angle
GT-1 @ 7'	7.0	Clay (CL), Olive-Brown	105	29
GT-1 @ 15'	15.0	Silty Clay (CL-ML), Dark Gray	120	21
GT-2 @ 10'	10.0	Sandy Silt (ML), Gray	135	31

Table No. 3, Hydrometer Test Results

Sample ID	Depth (feet)	Percent Finer (%)			Silt (%)	Clay (%)
		#10	#50	#200		
GT-1 @ 15'	15	100.0	98.60	96.29	54.9	41.4
GT-1 @ 25'	25	100.0	94.24	12.90	9.2	3.7
GT-1 @ 35'	35	100.0	97.95	45.57	31.8	13.8
GT-1 @ 45'	45	98.78	98.95	85.13	50.9	34.2
GT-1 @ 55'	55	100.0	93.92	14.32	7.9	6.4
GT-1 @ 65'	65	96.60	86.82	46.32	28.7	17.6

Table No. 4, Corrosivity Test Results

Sample ID	pH	Soluble Sulfate (CA 417) (ppm)	Soluble Chlorides (CA 422) (ppm)	Saturated Resistivity (CA 643) Ohm-cm
GT-1	7.8	953	333	600



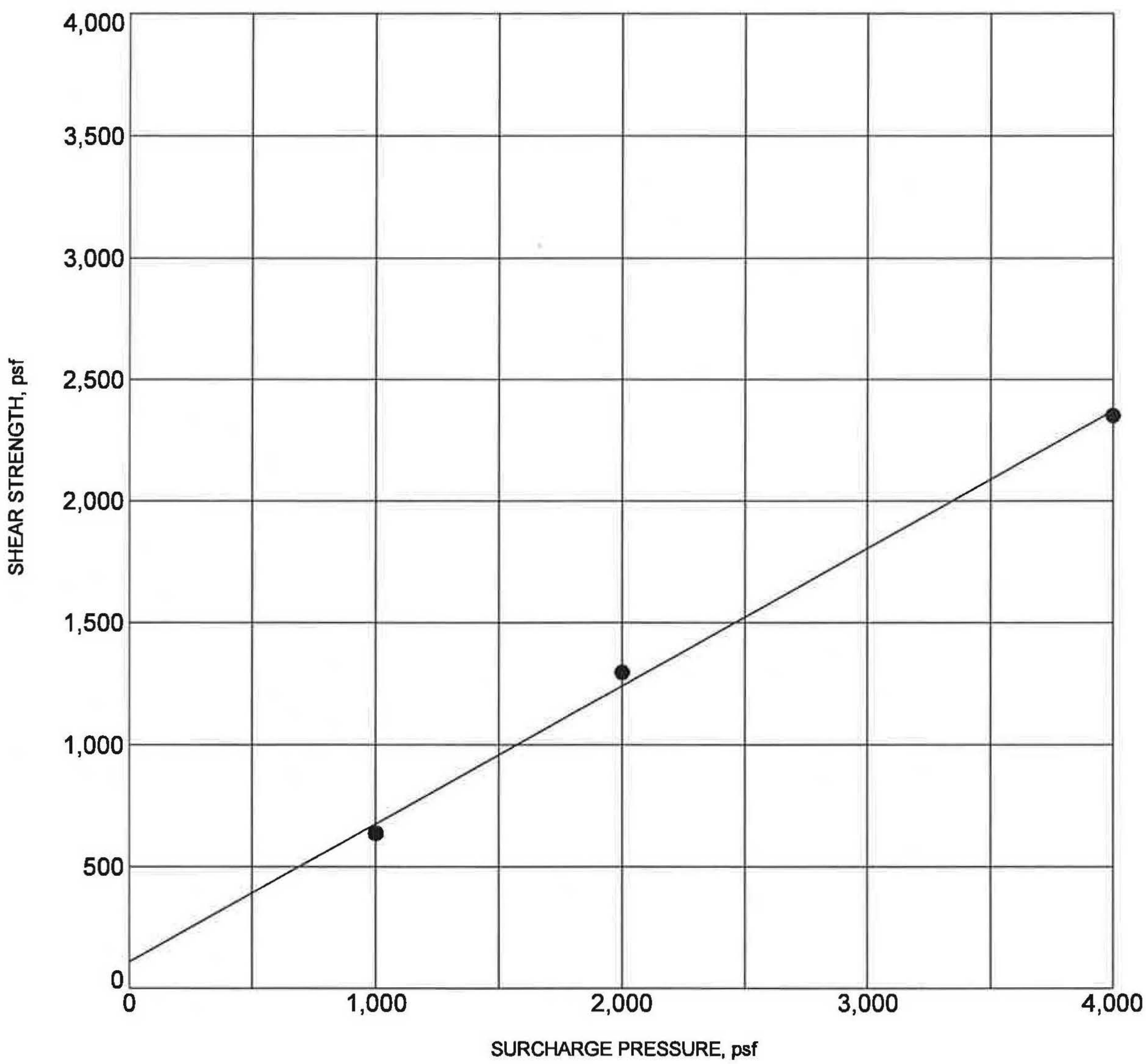
SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	GT-2	Not Reported	Silty Sand with Trace Clay (SM), Fine to Medium Grained, Olive-Gray	D1557 - A	12.5	120.0

NOTE:

MOISTURE-DENSITY RELATIONSHIP RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 **Job No: 185850087** **For: Stantec**	**15-81-104-05**	**1**



BORING NO.	:	GT-1 @ 7'	DEPTH (ft)	:	7
DESCRIPTION	:	Clay (CL), Olive-Brown			
COHESION (psf)	:	105	FRICTION ANGLE (degrees)	:	29
MOISTURE CONTENT (%)	:	40.2	DRY DENSITY (pcf)	:	80.0

NOTE: Ultimate Strength.

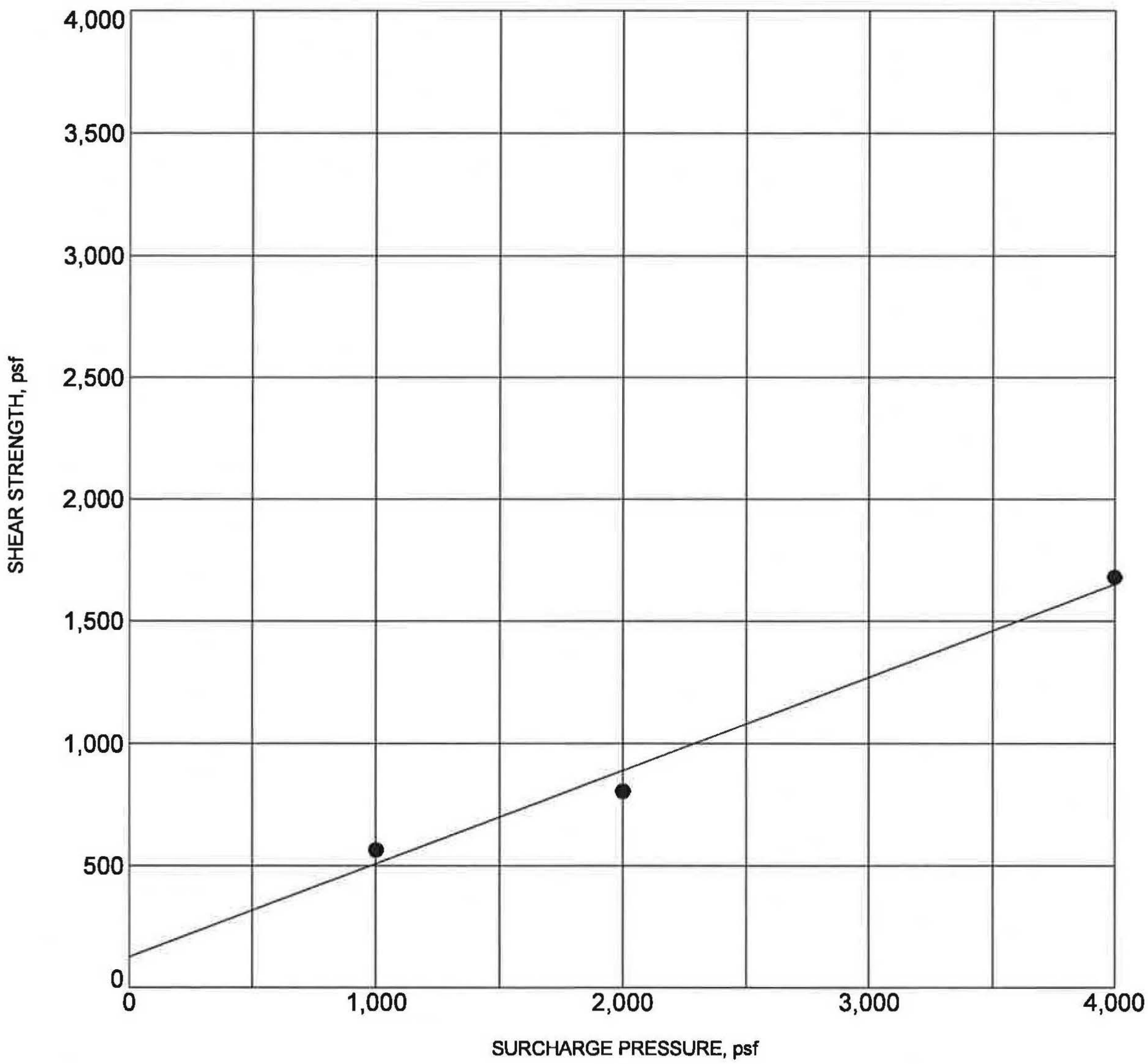
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
Chevron 9-2239
Job No: 185850087
For: Stantec

Project No. 15-81-104-05

Drawing No. 2



BORING NO.	:	GT-1 @ 15'	DEPTH (ft)	:	15
DESCRIPTION	:	Silty Clay (CL-ML), Dark Gray			
COHESION (psf)	:	120	FRICTION ANGLE (degrees)	:	21
MOISTURE CONTENT (%)	:	81.6	DRY DENSITY (pcf)	:	53.3

NOTE: Ultimate Strength.

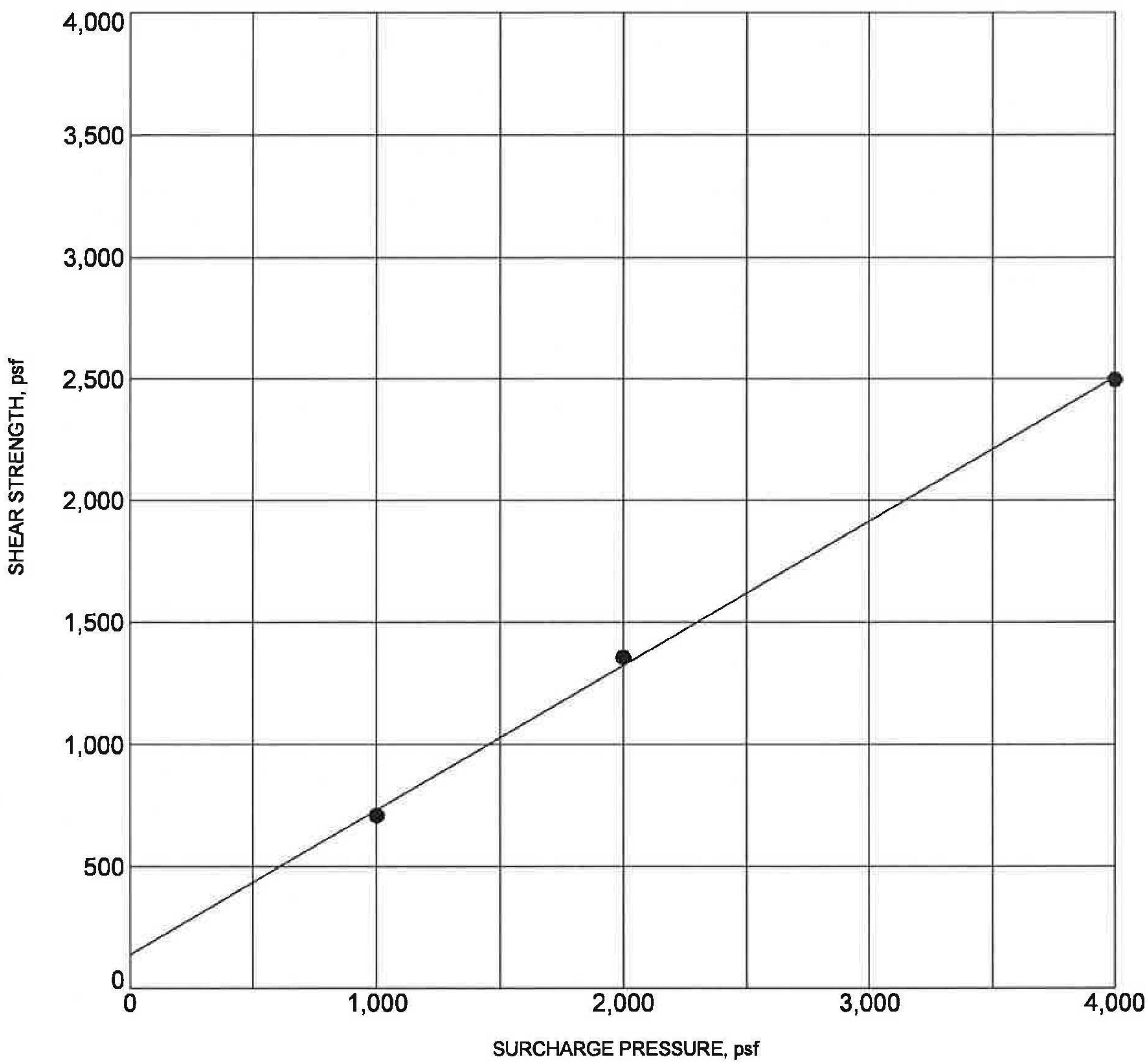
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
Chevron 9-2239
Job No: 185850087
For: Stantec

Project No. 15-81-104-05

Drawing No. 3



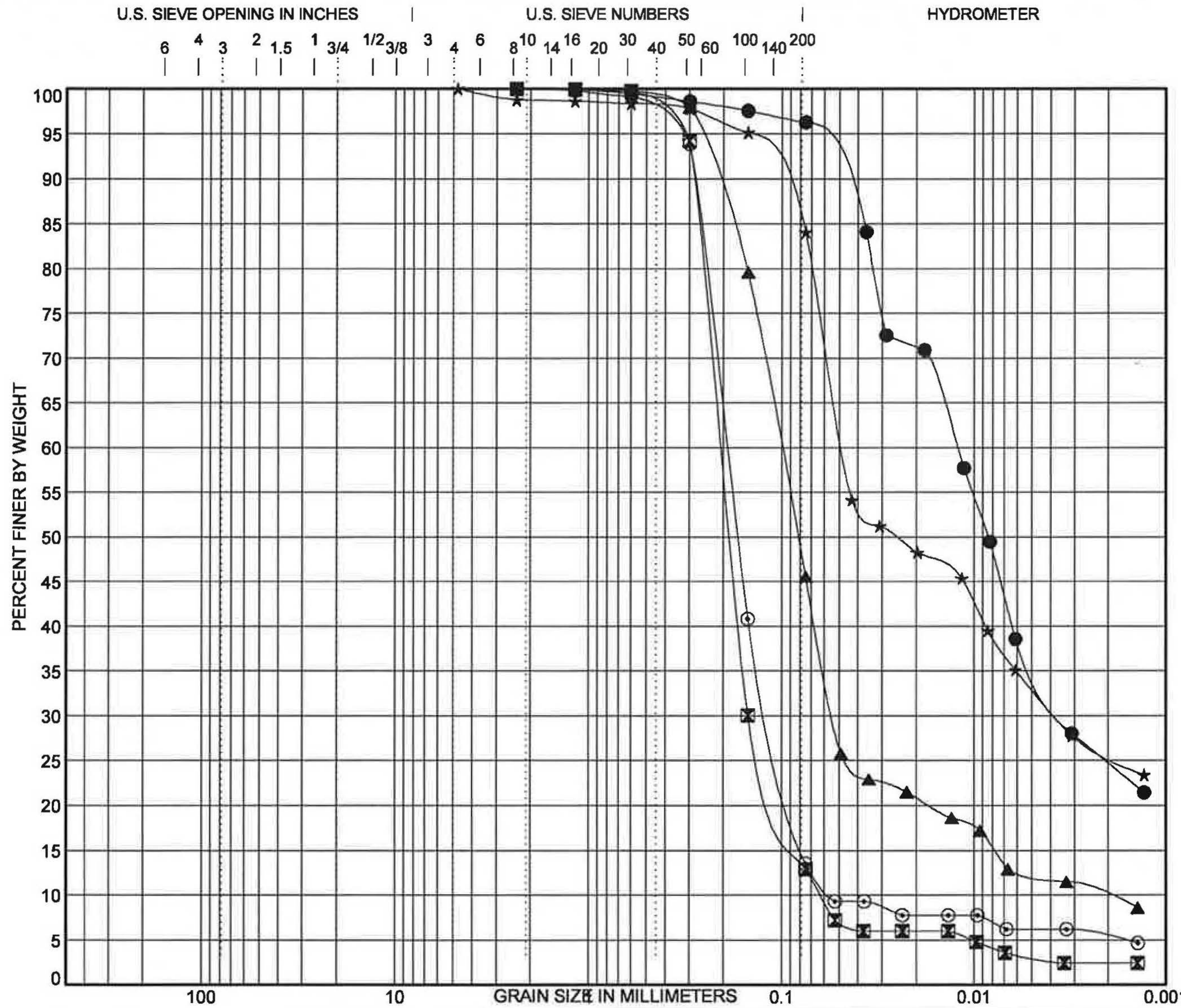
BORING NO.	:	GT-2 @ 10'	DEPTH (ft)	:	10
DESCRIPTION	:	Sandy Silt (ML), Gray			
COHESION (psf)	:	135	FRICTION ANGLE (degrees)	:	31
MOISTURE CONTENT (%)	:	41.1	DRY DENSITY (pcf)	:	82.1

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 Job No: 185850087 For: Stantec	15-81-104-05	4



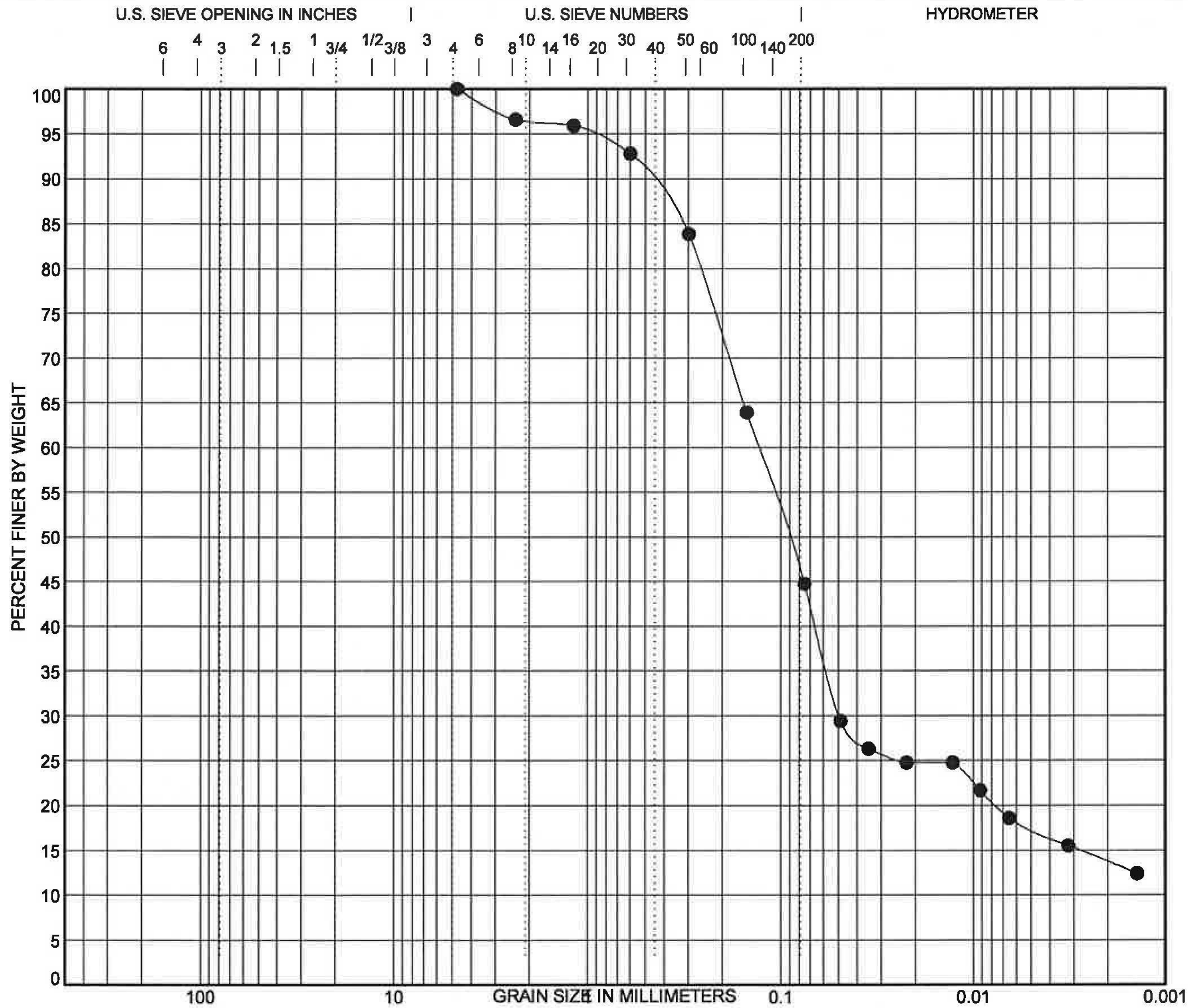
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
● GT-1 @ 15'	15	Silty Clay (CL-ML)					
⊠ GT-1 @ 25'	25	Silty Sand (SM)				1.73	3.31
▲ GT-1 @ 35'	35	Silty, Clayey Sand (SC-SM)				13.36	47.11
★ GT-1 @ 45'	45	Clayey Silt with Sand (ML-CL)					
⊙ GT-1 @ 55'	55	Silty, Clayey Sand (SC-SM)				1.21	3.46

Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● GT-1 @ 15'	15	2.36	0.012	0.004		0.0	3.7	96.3	
⊠ GT-1 @ 25'	25	2.36	0.207	0.15	0.063	0.0	87.1	12.9	
▲ GT-1 @ 35'	35	2.36	0.101	0.054	0.002	0.0	54.4	45.6	
★ GT-1 @ 45'	45	4.75	0.048	0.004		0.0	15.9	84.1	
⊙ GT-1 @ 55'	55	2.36	0.193	0.114	0.056	0.0	86.5	13.5	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants	Project Name	Project No.	Drawing No.
	Chevron 9-2239 Job No: 185850087 For: Stantec	15-81-104-05	5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
● GT-1 @ 65'	65	Silty, Clayey Sand (SC-SM)					

Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● GT-1 @ 65'	65	4.75	0.13	0.05		0.0	55.3	44.8	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Project Name	Project No.	Drawing No.
Chevron 9-2239 Job No: 185850087 For: Stantec	15-81-104-05	6

HDR

Table 1 - Laboratory Tests on Soil Samples

Converse Consultants
Stantec Chevron 9-2239
Your #15-81-104-05, HDR Lab #15-0176LAB
26-Mar-15

Sample ID			
			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	1,440
saturated		ohm-cm	600
pH			7.8
Electrical Conductivity		mS/cm	0.81
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	80
magnesium	Mg^{2+}	mg/kg	22
sodium	Na^{1+}	mg/kg	715
potassium	K^{1+}	mg/kg	39
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	201
fluoride	F^{1-}	mg/kg	2.8
chloride	Cl^{1-}	mg/kg	333
sulfate	SO_4^{2-}	mg/kg	953
phosphate	PO_4^{3-}	mg/kg	8.3
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	63
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

APPENDIX D
PERCOLATION TEST RESULTS

PERCOLATION TEST DATA SHEET

Project:	Chevron 9-2239		Project No.	185850087		Date:	4/7/2017
Test Hole No.	P1		Tested By:	M. Sapp			
Depth of Test Hole, D_T:		5' 0"	USCS Soil Classification		SM		
Test Hole Dimensions (inches)				Length	Width		
Diameter (if round)	8"	Sides (if rectangular)					

Sandy Soil Test Criteria*

Trial No.	Start Time	Stop Time	Time Interval, (min)	Initial Depth of Water (in)	Final Depth of Water (in)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	3:00pm	3:30pm	30.0	24.25	30.0	5.75	n
2	3:30pm	4:00pm	30.0	23.75	29.25	5.5	n

*This test is generally implemented similarly to the USBR Well Permeameter Method. Per the Riverside County Borehole Percolation method, a hole is bored to a depth at least 5 times the borehole radius. The hole is presoaked for 24 hours (or at least 2 hours if sandy soils with no clay). The hole is filled to approximately the anticipated top of the proposed infiltration basin. Rates of fall are measured for six hours, refilling each half hour (or 10 minutes for sand). Tests are generally repeated until consistent results are obtained.

Trial No.	Start Time	Stop Time	Δt, Time Interval, (min)	D_o, Initial Depth of Water (in)	D_f, Final Depth of Water (in)	ΔD, Change in Water Level (in.)	Percolation Rate (in/hr)
1	8:05am	8:35am	30	24.0	18.25	5.75	11.5
2	8:35am	9:05am	30	24.25	19.0	5.25	10.5
3	9:05am	9:35am	30	24.75	19.75	5.0	10.0
4	9:35am	10:05am	30	24.25	19.50	4.75	9.5
5	10:05am	10:35am	30	24.0	19.8	4.25	8.5
6	10:35am	11:05am	30	24.0	19.50	4.5	9.0
7	11:05am	11:35am	30	24.25	19.75	4.5	9.0
8	11:35am	12:05pm	30	23.75	19.50	4.25	8.5
9	12:05pm	12:35pm	30	23.75	19.5	4.25	8.5
10	12:35pm	1:05pm	30	24.0	19.5	4.5	9.0
11							
12							
13							
14							
15							

Comments:

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1 from Appendix D San Diego County BMP Design Manual		
Factor Category		**Factor Description**	**Assigned Weight (w)**	**Factor Value (v)**	**Product (p) p = w x v**
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	2	0.5
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	3	0.75
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2
B	Design	Level of pretreatment/ expected sediment loads	0.5	3	1.5
		Redundancy/resiliency	0.25	3	0.75
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			3
Combined Safety Factor, $S_{total} = S_A \times S_B$				6	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				8.7	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				1.45	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

PERCOLATION TEST DATA SHEET

Project:	Chevron 9-2239		Project No.	185850087		Date:	4/7/2017
Test Hole No.	P2		Tested By:	M. Sapp			
Depth of Test Hole, D_T:		5' 0"	USCS Soil Classification		SM		
Test Hole Dimensions (inches)				Length	Width		
Diameter (if round)	8"	Sides (if rectangular)					
Sandy Soil Test Criteria*							
Trial No.	Start Time	Stop Time	Time Interval, (min)	Initial Depth of Water (in)	Final Depth of Water (in)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:00am	8:30am	30.0	42.25	47.75	5.5	n
2	8:30am	9:00am	30.0	42.0	47.25	5.25	n

*This test is generally implemented similarly to the USBR Well Permeameter Method. Per the Riverside County Borehole Percolation method, a hole is bored to a depth at least 5 times the borehole radius. The hole is presoaked for 24 hours (or at least 2 hours if sandy soils with no clay). The hole is filled to approximately the anticipated top of the proposed infiltration basin. Rates of fall are measured for six hours, refilling each half hour (or 10 minutes for sand). Tests are generally repeated until consistent results are obtained.

Trial No.	Start Time	Stop Time	Δt, Time Interval, (min)	D_o, Initial Depth of Water (in)	D_f, Final Depth of Water (in)	ΔD, Change in Water Level (in.)	Percolation Rate (in/hr)
1	8:35am	9:05am	30	24.0	18.0	6.0	12.0
2	9:05am	9:35am	30	24.0	18.75	5.25	10.5
3	9:35am	10:05am	30	24.25	19.5	4.75	9.5
4	10:05am	10:35am	30	23.75	18.75	5.00	10.0
5	10:35am	11:05am	30	24.25	19.75	4.50	9.0
6	11:05am	11:35am	30	24.0	19.75	4.25	8.5
7	11:35am	12:05pm	30	24.0	19.5	4.5	9.0
8	12:05pm	12:35pm	30	24.25	20.25	4.0	8.0
9	12:35pm	1:05pm	30	23.75	19.5	4.25	8.5
10							
11							
12							
13							
14							
15							

Comments:

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1 from Appendix D San Diego County BMP Design Manual		
Factor Category		**Factor Description**	**Assigned Weight (w)**	**Factor Value (v)**	**Product (p) p = w x v**
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	2	0.5
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	3	0.75
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2
B	Design	Level of pretreatment/ expected sediment loads	0.5	3	1.5
		Redundancy/resiliency	0.25	3	0.75
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			3
Combined Safety Factor, $S_{total} = S_A \times S_B$				6	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				8.5	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				1.42	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

APPENDIX E
LIQUEFACTION ANALYSIS RESULTS

Stantec

Stantec Consulting Services Inc.
25864-F Business Center Drive
Redlands, California 92374
http://www.stantec.com

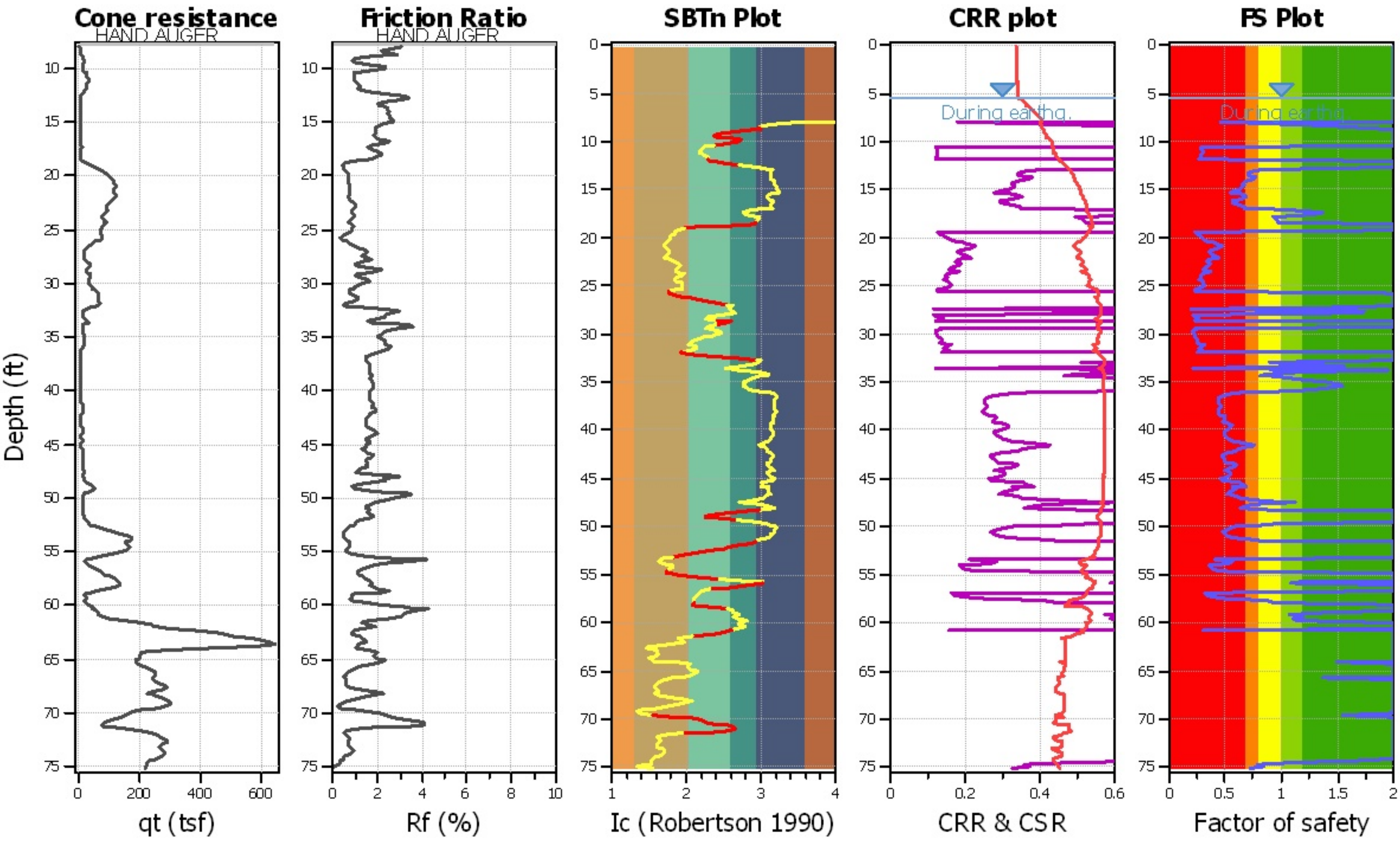
LIQUEFACTION ANALYSIS REPORT

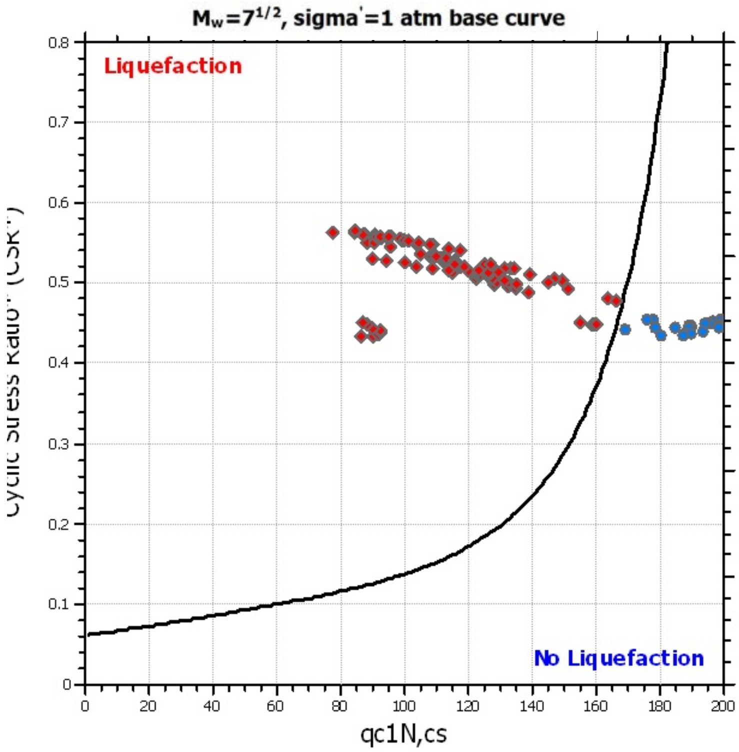
Project title : Chevron 9-2239 **Location : 2959 Midway Drive, San Diego, California**

CPT file : CPT-1

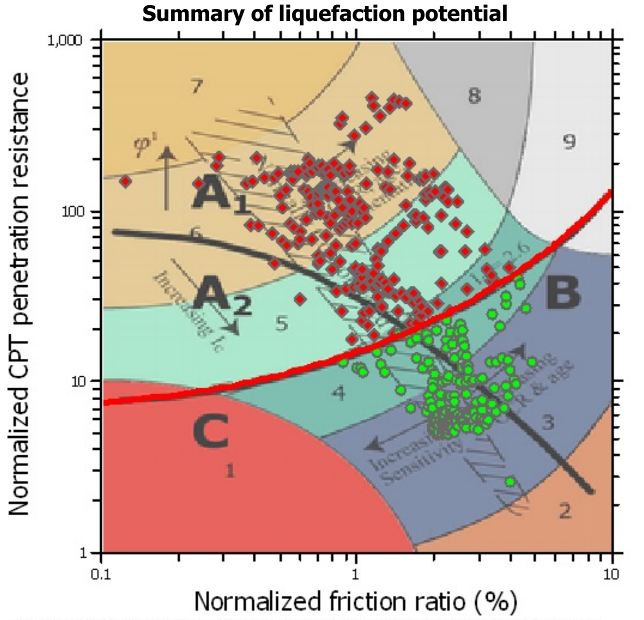
Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	7.00 ft	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		



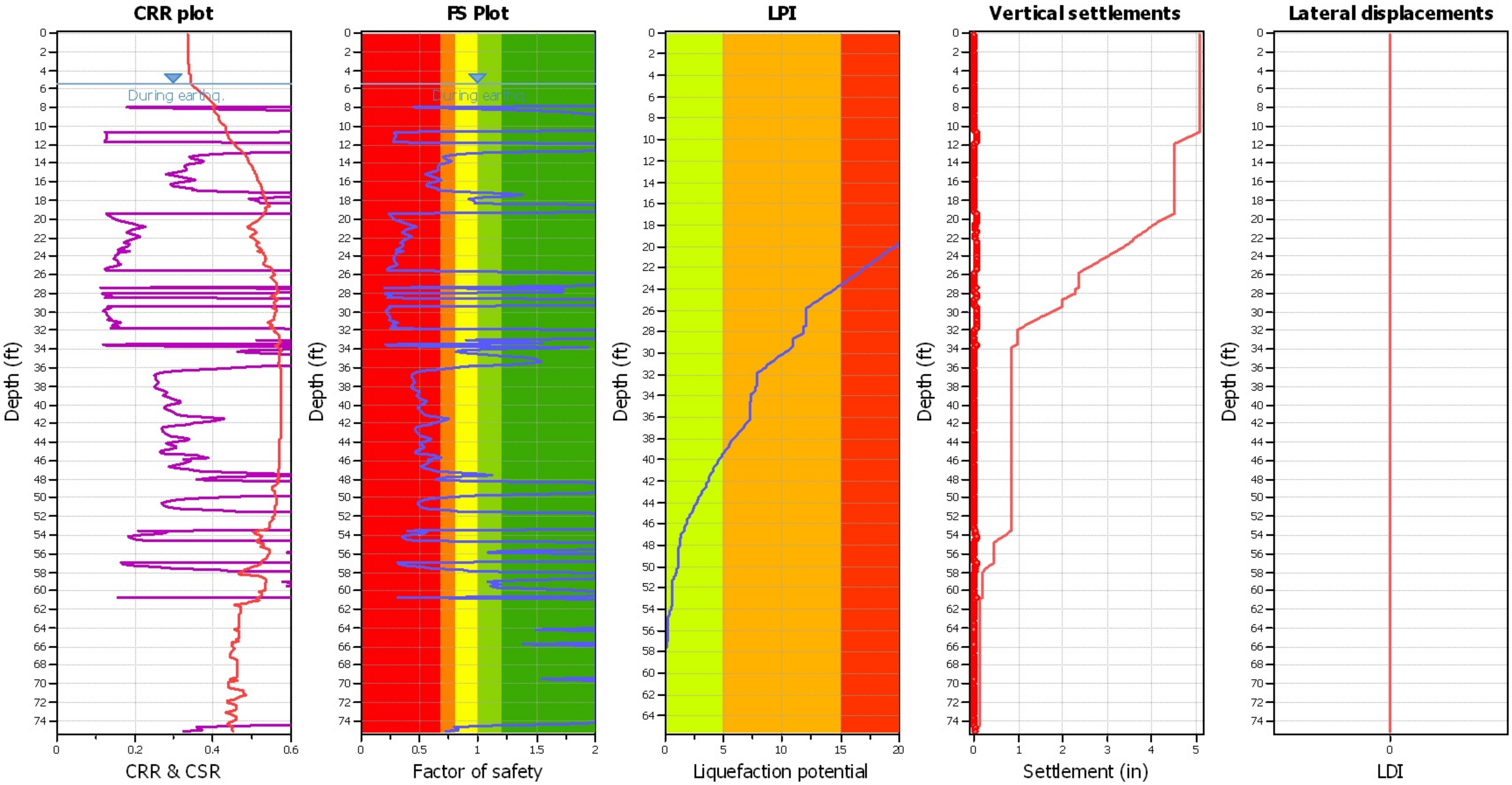


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.58	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	7.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Stantec Consulting Services Inc.
25864-F Business Center Drive
Redlands, California 92374
http://www.stantec.com

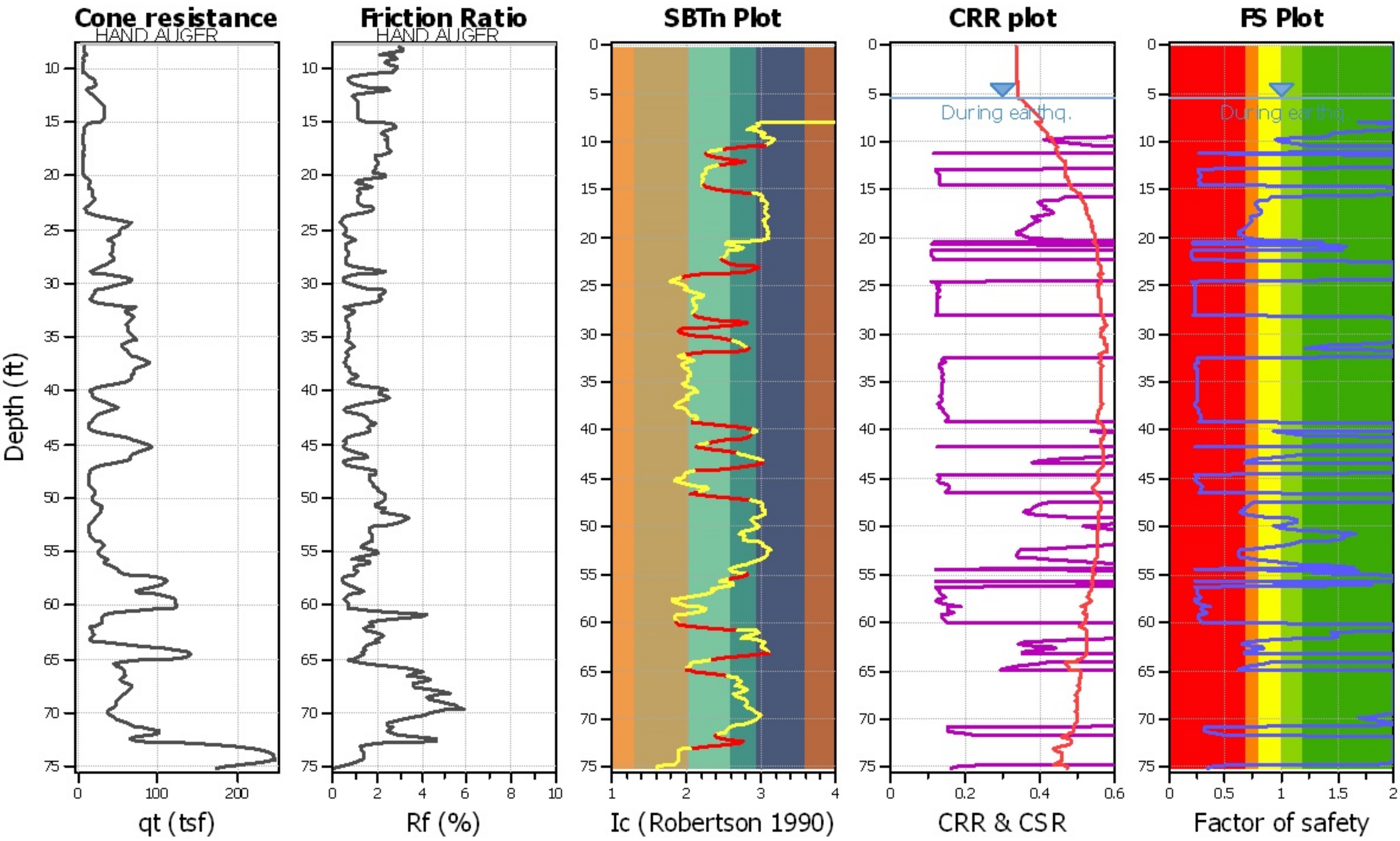
LIQUEFACTION ANALYSIS REPORT

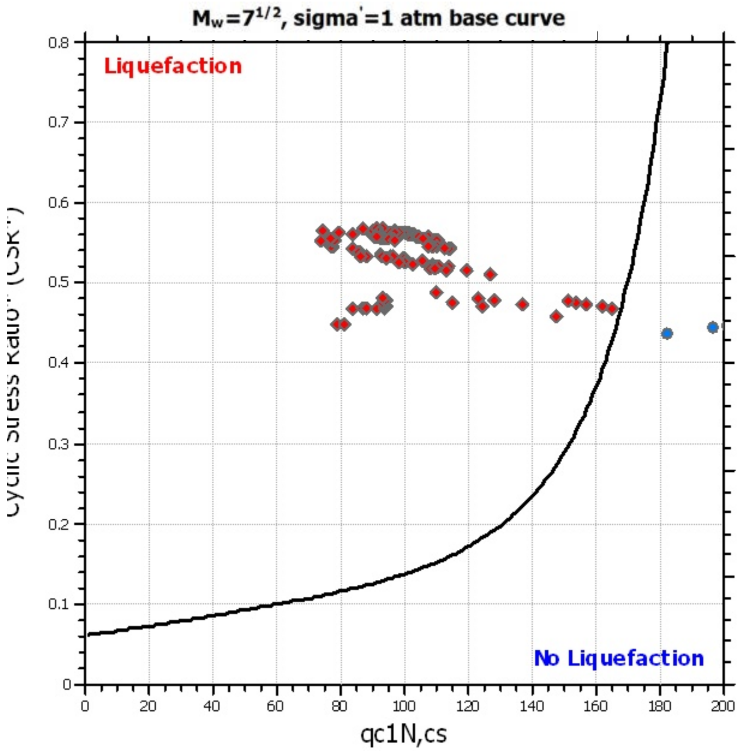
Project title : Chevron 9-2239 **Location : 2959 Midway Drive, San Diego, California**

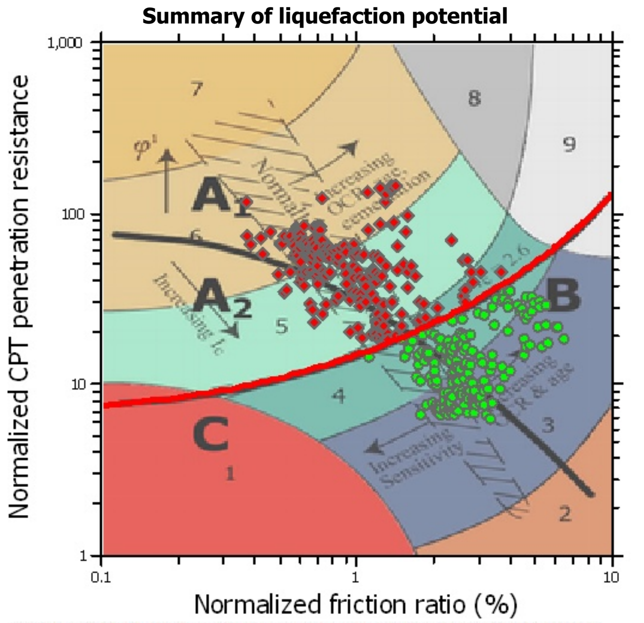
CPT file : CPT-2

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	7.00 ft	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

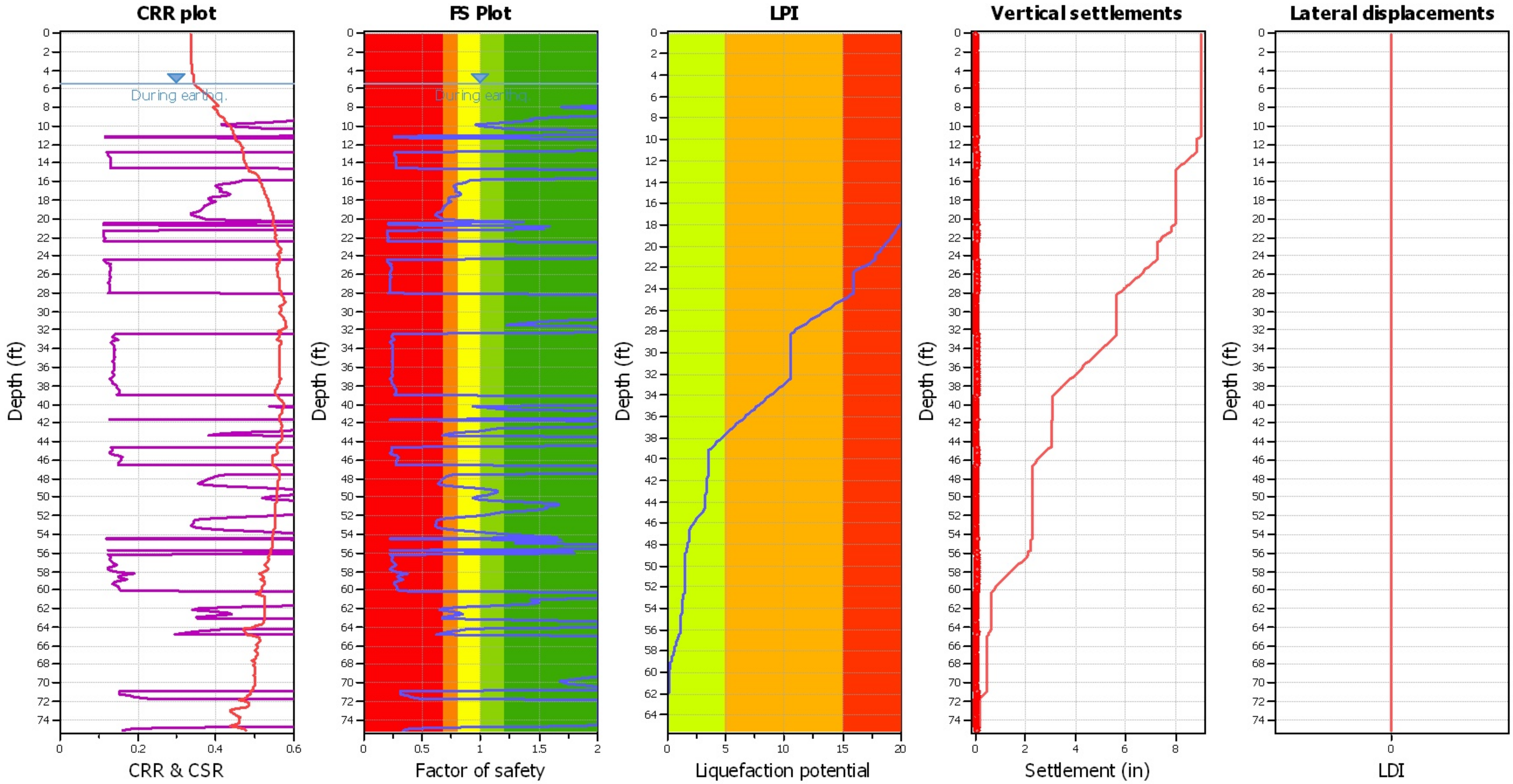






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.58	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	7.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Chevron 9-2239

Geotechnical Addendum

Stantec Consulting Services Inc.
25864-F Business Center Drive
Redlands CA 92374
Tel: (909) 335-6116
Fax: (909) 335-6120

November 1, 2017

Mr. Sergio Linares
Chevron Products Company
145 South State College Boulevard, Suite 400
Brea, California 92821

SUBJECT: **RESPONSE TO CITY OF SAN DIEGO GEOTECHNICAL REVIEW COMMENTS**
Chevron 9-2239
2959 Midway Drive
San Diego, California 92110

Dear Mr. Linares,

In accordance with your recent authorization, Stantec Consulting Services Inc. (Stantec) has prepared this response to City of San Diego (City) geotechnical review comments for the recent geotechnical report (Stantec, 2017) we prepared for the proposed rebuild of the Chevron retail gasoline facility located at 2959 Midway Drive in San Diego, California.

The geotechnical review comments from the City are provided on page 12 of the Cycles Issues Draft dated September 19, 2017 (City of San Diego, 2017). The City's comments and our responses are provided below.

City Comment Number 3

Provide a site specific geologic/geotechnical map that shows the distribution of fill and geologic units, and the proposed development on a topographic base map. Circumscribe the limits of recommended remedial grading.

Stantec Response Number 3

A site-specific geologic/geotechnical map is attached as Figure 1 with this letter.

City Comment Number 4

Provide representative geologic/geotechnical cross sections that show the existing and proposed grades, distribution of fill and geologic units, and groundwater conditions.

Stantec Response Number 4

Two geologic/geotechnical cross sections are attached as Figure 2 with this letter. Please note that the site grades are not changing. Accordingly, the ground surface shown on the cross sections is both existing and proposed.

City Comment Number 5

The project's geotechnical consultant should provide a conclusion regarding if the proposed development will destabilize or result in settlement of adjacent property or the Right-of-Way.

Reference: Response to City of San Diego Geotechnical Review Comments - Chevron 9-2239

Stantec Response Number 5

It is our opinion that the proposed development will not destabilize or result in settlement of adjacent property or the Right-of-Way provided the recommendations in our geotechnical report are incorporated into the design and construction of the project.

City Comment Number 6

The project's geotechnical consultant has recommended possible options to mitigate potential seismic settlement and liquefaction impacts. Clarify if the measures are project features or measures intended to "mitigate" CEQA impacts.

Stantec Response Number 6

The seismic settlement mitigation options provided in our report are intended to mitigate project features.

City Comment Number 7

If the measures intended to "mitigate" soil liquefaction and related phenomena are CEQA mitigation address the following: Where potential impacts may be mitigated in more than one specific way, the consultant should provide performance standards for these measures to mitigate the potential impacts. (See CEQA Guidelines, Section 15126.4(a)(1)(B).)

Stantec Response Number 7

Since the measures in the Stantec geotechnical report were intended to mitigate project features, CEQA guideline performance standards are not applicable.

City Comment Numbers 8a, 8b, and 8c

This proposed development is a Priority Development Project (PDP). The project's geotechnical consultant must submit (8a) an addendum geotechnical report that provides the information required in the Storm Water Standards, Part 1, the BMP Design Manual and (8b) Appendix F of the City's Guidelines for Geotechnical Reports. Include a completed (8c) C.4-1 Work Sheet also.

Stantec Response Number 8a

Section 5.4.2 of the City's Storm Water Standards, Part 1, the BMP Design Manual describes "Feasibility Screening for Infiltration Category BMPs". One of the conditions in this section includes a "No Infiltration Condition" where infiltration of any appreciable volume should be avoided.

As discussed in Appendix F of the City's Guidelines for Geotechnical Reports, sites are considered unsuitable for proposed infiltration/percolation where groundwater is within 10 feet of a proposed infiltration/percolation structure. As stated in Section 3.3 of our geotechnical report (Stantec, 2017), groundwater was encountered at a depth of 7 feet during our investigation. In addition, the historic high groundwater level at the site is 5.5 feet (Section 3.3) based on our review of soil boring logs adjacent to the project site.

Reference: Response to City of San Diego Geotechnical Review Comments - Chevron 9-2239

Based on this shallow groundwater depth, we concluded that the site is considered unsuitable for on-site infiltration/percolation (Section 4.8). Accordingly, further discussions and evaluations described in the City's Storm Water Standards, Part 1, BMP Design Manual are not considered necessary.

Stantec Response Number 8b

Appendix F of the City's Guidelines for Geotechnical Reports includes an introductory "Site Evaluation" section that lists "Unsuitable Conditions" relative to evaluating suitability for on-site infiltration/percolation. The first unsuitable conditions listed is high groundwater, within 10 feet of the base of infiltration/percolation. As stated in Section 3.3 of our geotechnical report, groundwater was encountered at a depth of 7 feet during our investigation. In addition, the historic high groundwater level at the site is 5.5 feet (Section 3.3) based on our review of soil boring logs adjacent to the project site.

Based on this shallow groundwater depth, we concluded that the site is considered unsuitable for on-site infiltration/percolation (Section 4.8). Accordingly, further discussions and evaluations described in Appendix F of the City's guidelines are not considered necessary.

Stantec Response Number 8c

Work Sheet C.4-1 from the County of San Diego BMP Design Manual, Appendix C is attached with this letter.

If you have any questions or need additional information, please contact us.

Respectfully submitted,
Stantec Consulting Services Inc.

Maurice Amendolagine, PE, GE
Senior Geotechnical Engineer
Phone: (619) 296-6195
Maurice.Amendolagine@stantec.com

Jaret Fischer, PE
Principal Engineer
Phone: (909) 335-6116
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LICENSED PROFESSIONAL ENGINEER
JARET FISCHER
C 80383
EXP. 3/31/19
CIVIL
STATE OF CALIFORNIA

ATTACHMENTS:

Attachment A - Work Sheet C.4-1

FIGURES:

Figure 1 – Site Specific Geologic Map
Figure 2 – Geologic Cross-Section A – A'
Figure 3 – Geologic Cross-Section B – B'

REFERENCES:

City of San Diego (2011), Guidelines for Geotechnical Reports, October 19.

City of San Diego (2016), Storm Water Standards, Part 1: BMP Design Manual for Permanent Site Design, Storm Water Treatment and Hydromodification Management, January.

City of San Diego (2017), LDR Geology, Cycles Issue Draft Review Comments, L64A – 003B, October 19.

San Diego County BMP Design Manual (2016), February 26.

Stantec Consulting Services Inc. (2017), Geotechnical Investigation Report, Chevron Facility No. 9-2239, 2959 Midway Drive, San Diego, California 92110, May 5.

ATTACHMENT A
WORKSHEET C.4-1

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Worksheet C.4-1</th></tr>
<tr><td colspan="4"><u>Part 1 - Full Infiltration Feasibility Screening Criteria</u>
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?
Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>2</td><td>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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>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 must be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>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 must be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">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</td><td>X</td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by County staff 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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

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 must be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

Infiltration is not considered feasible due to the shallow groundwater depth.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 5-8 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.</td><td>X</td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

C.5 Feasibility Screening Exhibits

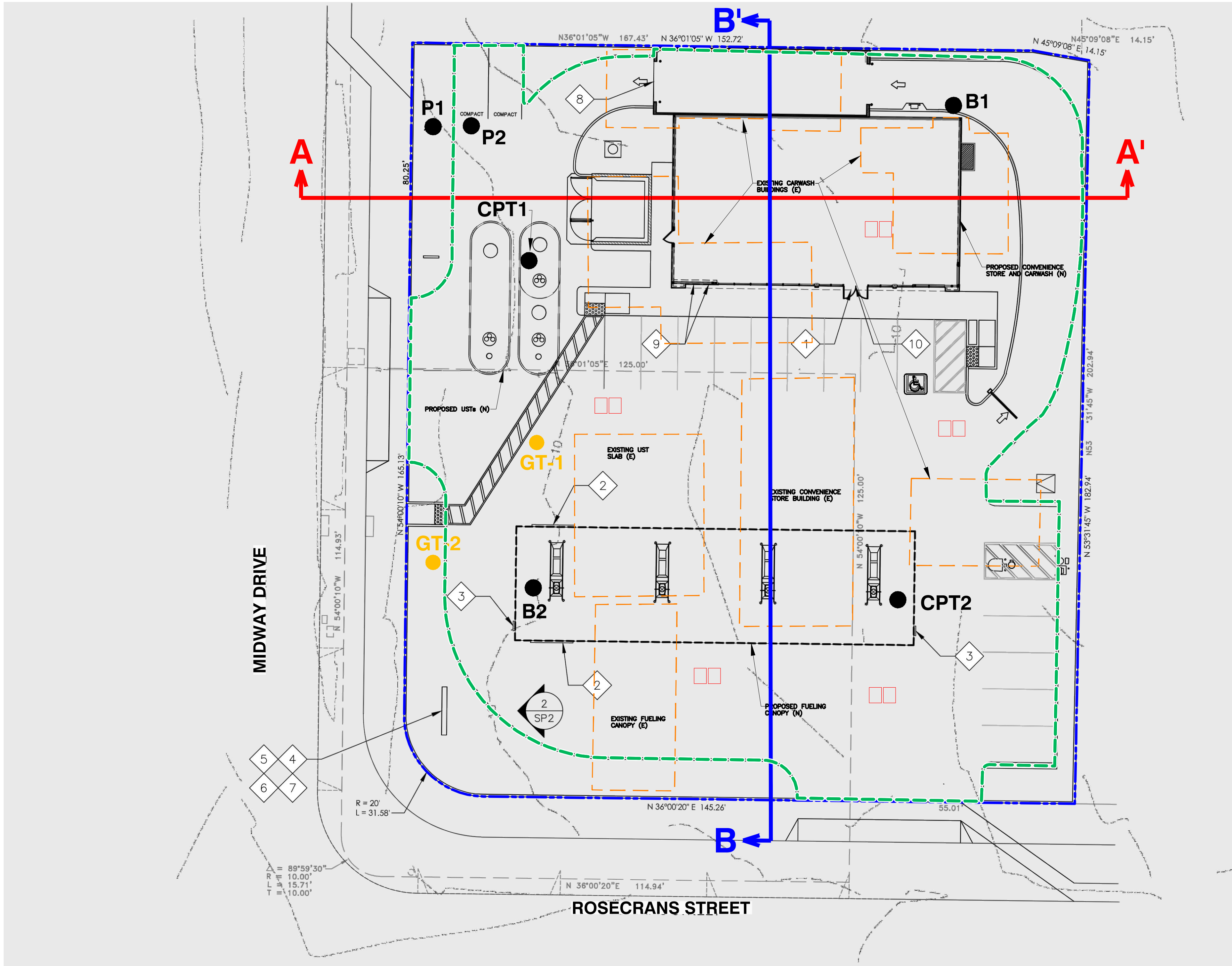
Table C.5-1 lists the feasibility screening exhibits that were generated using readily available GIS data sets to assist the project applicant to screen the project site for feasibility.

Table C.5-1: Feasibility Screening Exhibits

Figures	Layer	Intent/Rationale	Data Sources
C.1 Soils	Hydrologic Soil Group – A, B, C, D	Hydrologic Soil Group will aid in determining areas of potential infiltration	SanGIS http://www.sangis.org/
	Hydric Soils	Hydric soils will indicate layers of intermittent saturation that may function like a D soil and should be avoided for infiltration	USDA Web Soil Survey. Hydric soils, (ratings of 100) were classified as hydric. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
C.2: Slopes and Geologic Hazards	Slopes >25%	BMPs are hard to construct on slopes >25% and can potentially cause slope instability	SanGIS http://www.sangis.org/
	Liquefaction Potential	BMPs (particularly infiltration BMPs) must not be sited in areas with high potential for liquefaction or landslides to minimize earthquake/landslide risks	SanGIS http://www.sangis.org/
	Landslide Potential		SanGIS Geologic Hazards layer. Subset of polygons with hazard codes related to landslides was selected. This data is limited to the City of San Diego Boundary. http://www.sangis.org/
C.3: Groundwater Table Elevations	Groundwater Depths	Infiltration BMPs will need to be sited in areas with adequate distance (>10 ft) from the groundwater table	GeoTracker. Data downloaded for San Diego county from 2014 and 2013. In cases where there were multiple measurements made at the same well, the average was taken over that year. http://geotracker.waterboards.ca.gov/data_download_by_county.asp
C.4: Contaminated Sites	Contaminated soils and/or groundwater sites	Infiltration must limited in areas of contaminated soil/groundwater	GeoTracker. Data downloaded for San Diego county and limited to active cleanup sites http://geotracker.waterboards.ca.gov/

FIGURES

EXPLANATION



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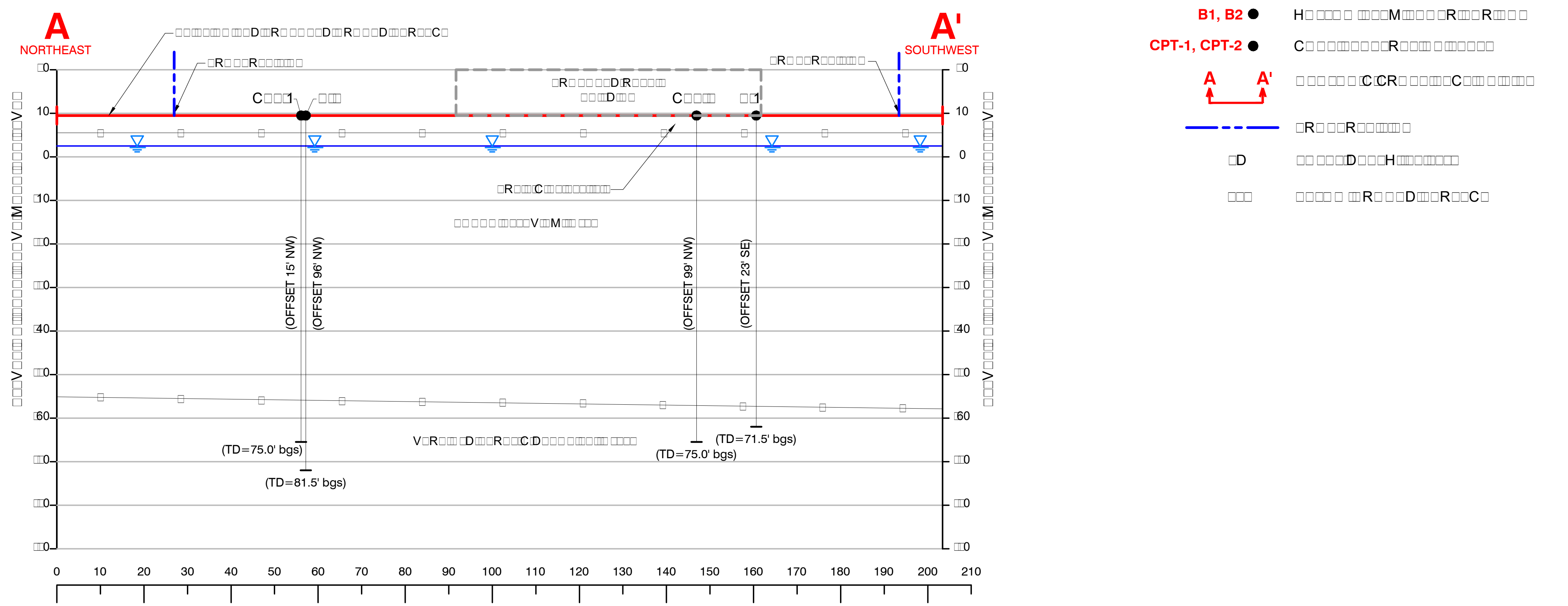

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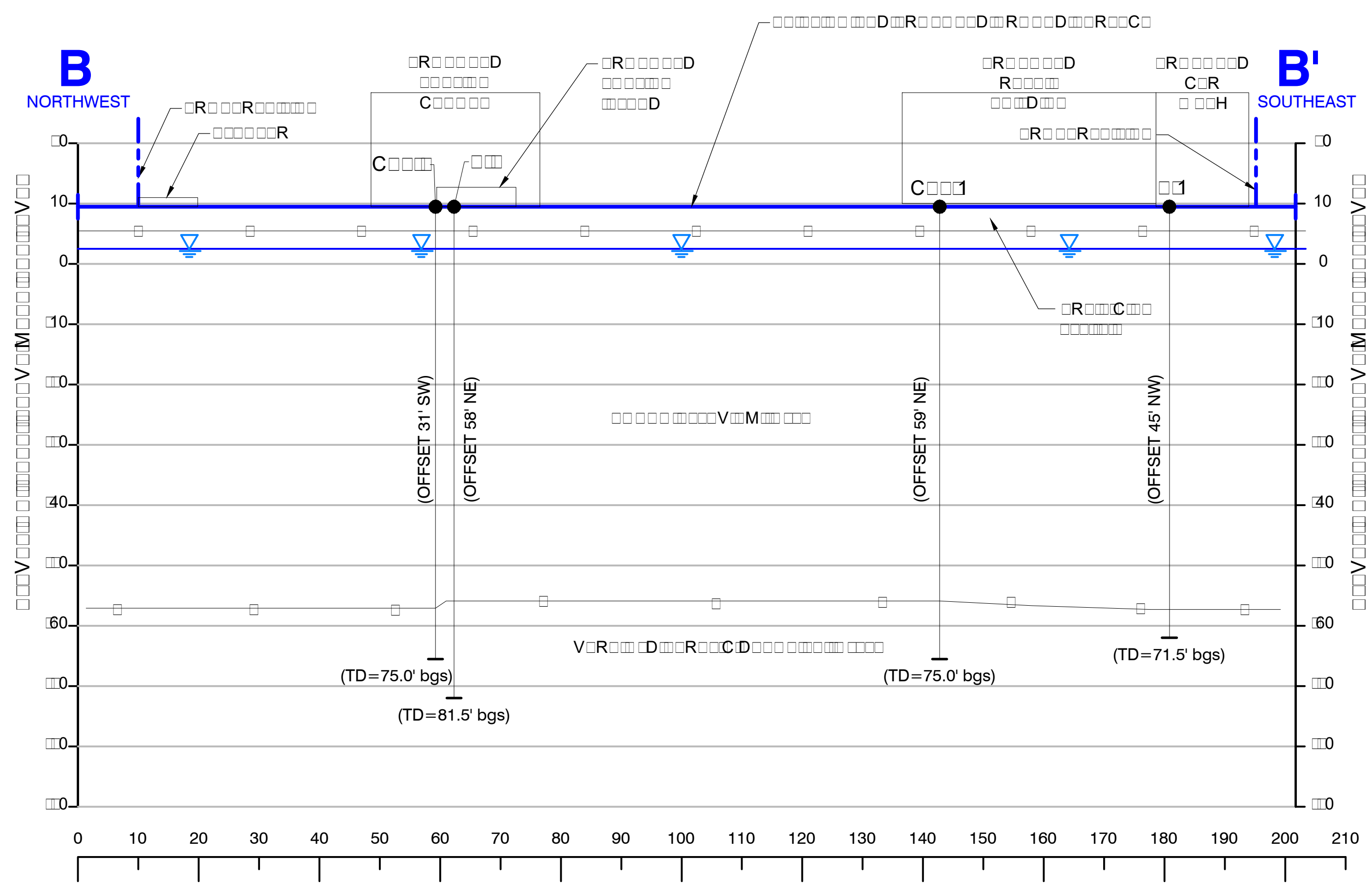

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CLIMATE ACTION PLAN CONSISTENCY CHECKLIST INTRODUCTION

In December 2015, the City adopted a Climate Action Plan (CAP) that outlines the actions that City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions. The purpose of the Climate Action Plan Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).[1]

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

The Checklist may be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law.

[1] 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.

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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: Chevron Service Station #92239

Property Address: 2959 Midway Drive

Applicant Name/Co.: Chris Brown/ PM design Group, Inc.

Contact Phone: (707) 921-1204 Contact Email: cbrown@pmdginc.com

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

Consultant Name: ________ Contact Phone: ________

Company Name: ________ Contact Email: ________

Project Information

1. What is the size of the project (acres)? 0.67 acres
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units):
   - ☐ Residential (indicate # of multi-family units):
   - ■ Commercial (total square footage): total site area = 29,567 s.f.; total building area = 6,516 s.f. (21% lot coverage)
   - ☐ Industrial (total square footage):
   - ☐ Other (describe):
3. Is the project or a portion of the project located in a Transit Priority Area? ■ Yes ☐ No
4. Provide a brief description of the project proposed:

Demolish (i.e. remove) existing convenience store, fuel canopy, underground fuel tanks, fuel dispensers, and associated piping, and existing block walls and planters. Construct a new convenience store, automated car wash, fueling canopy, install new underground fuel tanks, fueling system with 4 dispensers, trash enclosure, and associated landscaping and site work on APN's: 450-470-35-00 & 450-470-38-00.

[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
A. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR, the proposed project is part of the Midway Pacific Highway Corridor Community Plan, is zoned commercial (CC-1-3) with a land use designation of "community" B. 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, would the proposed amendment result in an increased density within a Transit Priority Area (TPA)[4] and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?; OR, C. 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?	The project will be consistent w/ the (E) general plan & community plan land use and zoning designations as shown in the plans ☑	☐

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

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.

The project may be conditionally approved in the CC zone and replaces the existing uses (car wash and service station) with the same uses. The project is consistent with the general (San Diego) and community plans (Midway Pacific Highway Corridor), and the zoning designation (CC-1-3).

[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.

[4] This category applies to all projects that answered in the affirmative to question 3 on the previous page: Is the project or a portion of the project located in a transit priority area.

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.[5] 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).

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 1: Energy & Water Efficient Buildings			
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. Chevron specifies an EPDM (an extremely durable synthetic rubber roofing membrane - ethylene propylene diene terpolymer) roofing with 3 year aged reflectance greater than the values specified.	The project roofing materials will have a minimum 3 year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the CGBSC ☑	☐	☐

[5] 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 or other permits that do not result in the expansion or enlargement of a building (e.g., decks, garages, etc.), 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.

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. Specified fixtures and fittings will not exceed the maximum flow rate in the California Green Building Standards Code.	Non-residential: Plumbing fixtures & fittings will not exceed the maximum flow rates specified in the CGBSC. ☑	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use			
3. *Electric Vehicle Charging* • Multiple-family projects of 17 dwelling units or less: Would 3% of the total parking spaces required, or a minimum of one space, whichever is greater, 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 17 dwelling units: Of the total required listed cabinets, boxes or enclosures, 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: Of the total required listed cabinets, boxes or enclosures, 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 a single-family project or would not require the provision of listed cabinets, boxes, or enclosures connected to a conduit linking the parking spaces with electrical service, e.g., projects requiring fewer than 10 parking spaces. The project will include a listed box, cabinet, or enclosure with a conduit linking the parking space to the electrical service to provide active electric vehicle charging stations ready for use. One EV van accessible charging space will be provided	Non-residentila project: At least 50% of the required cabinets, boxes, or enclosures will have the necessary EV supply equipment installed to provide active EV charging stations ready for use. ☑	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use (Complete this section if project includes non-residential or mixed uses)			
4. *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. Pursuant to the zoning code, 2 short term spaces and 0 long term space is required. The site will have 3 short term spaces and 1 long term space (3 bike rack and 1 bike locker)	Project will provide more short term bicycle parking spaces than spaces as required in the Muni code. ☑	☐	☐

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

5. *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?

Number of Tenant Occupants (Employees)	Shower/Changing Facilities Required	Two-Tier (12" X 15" X 72") Personal Effects Lockers Required
0-10	0	0
11-50	1 shower stall	2
51-100	1 shower stall	3
101-200	1 shower stall	4
Over 200	1 shower stall plus 1 additional shower stall for each 200 additional tenant-occupants	1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants

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).

There will not be over 10 tenant occupants.

☐ ☐ ☑

The project is non-residential and will not accomodate more than 10 employees.

6. *Designated Parking Spaces*

If the project includes a nonresidential 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?

Number of Required Parking Spaces	Number of Designated Parking Spaces
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10% of total

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 nonresidential use in a TPA.

There are 9 parking spaces required and therefore the number of required designated parking spaces is 0.

1 designated space is provided.

Per Green Code table 5.106.5.2 and San Diego Municipal code 142.0530(d)(B)(i) only 0 carpool/vanpool space required

There are 9 parking spaces required and therefore the required # of designated parking spaces is 0. 1 designated parking space is provided.

☑ ☐ ☐

7. *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 • 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). Less than 50 tenant occupants	☐	☐	Project will not have more than 50 employees; N/A ☑

Step 3: Project CAP Conformance Evaluation (if applicable)

N/A - Affirmative Option 'A'

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option B. 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 is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. In general, a project that would result in a reduction in density inside a TPA would not be consistent with Strategy 3.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?

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST
ATTACHMENT A

This attachment provides performance standards for applicable Climate Action Pan (CAP) Consistency Checklist measures.

Table 1 **Roof Design Values for Question 1: Cool/Green Roofs supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**

Land Use Type	Roof Slope	Minimum 3-Year Aged Solar Reflectance	Thermal Emittance	Solar Reflective Index
Low-Rise Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
High-Rise Residential Buildings, Hotels and Motels	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
Non-Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 residential and non-residential voluntary measures shown in Tables A4.106.5.1 and A5.106.11.2.2, respectively. Roof installation and verification shall occur in accordance with the CALGreen Code.

CALGreen does not include recommended values for low-rise residential buildings with roof slopes of ≤ 2:12 for San Diego's climate zones (7 and 10). Therefore, the values for climate zone 15 that covers Imperial County are adapted here.

Solar Reflectance Index (SRI) equal to or greater than the values specified in this table may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

Table 2	**Fixture Flow Rates for Non-Residential Buildings related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**
Fixture Type	**Maximum Flow Rate**
Showerheads	1.8 gpm @ 80 psi
Lavatory Faucets	0.35 gpm @60 psi
Kitchen Faucets	1.6 gpm @ 60 psi
Wash Fountains	1.6 [rim space(in.)/20 gpm @ 60 psi]
Metering Faucets	0.18 gallons/cycle
Metering Faucets for Wash Fountains	0.18 [rim space(in.)/20 gpm @ 60 psi]
Gravity Tank-type Water Closets	1.12 gallons/flush
Flushometer Tank Water Closets	1.12 gallons/flush
Flushometer Valve Water Closets	1.12 gallons/flush
Electromechanical Hydraulic Water Closets	1.12 gallons/flush
Urinals	0.5 gallons/flush

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Tables A5.303.2.3.1 and A5.106.11.2.2, respectively. See the California Plumbing Code for definitions of each fixture type.

Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

Acronyms:
gpm = gallons per minute
psi = pounds per square inch (unit of pressure)
in. = inch

Table 3	Standards for Appliances and Fixtures for Commercial Application related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan	
Appliance/Fixture Type	**Standard**	
Clothes Washers	Maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations.*	
Conveyor-type Dishwashers	0.70 maximum gallons per rack (2.6 L) (High-Temperature)	0.62 maximum gallons per rack (4.4 L) (Chemical)
Door-type Dishwashers	0.95 maximum gallons per rack (3.6 L) (High-Temperature)	1.16 maximum gallons per rack (2.6 L) (Chemical)
Undercounter-type Dishwashers	0.90 maximum gallons per rack (3.4 L) (High-Temperature)	0.98 maximum gallons per rack (3.7 L) (Chemical)
Combination Ovens	Consume no more than 10 gallons per hour (38 L/h) in the full operational mode.	
Commercial Pre-rinse Spray Valves (manufactured on or after January 1, 2006)	Function at equal to or less than 1.6 gallons per minute (0.10 L/s) at 60 psi (414 kPa) and • Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate. • Be equipped with an integral automatic shutoff. • Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gallons per minute (0.08 L/s) or less.	

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Section A5.303.3. See the California Plumbing Code for definitions of each appliance/fixture type.

Acronyms:
L = liter
L/h = liters per hour
L/s = liters per second
psi = pounds per square inch (unit of pressure)
kPa = kilopascal (unit of pressure)

Soil and Groundwater Management Plan

Chevron Station No. 9-2239

2959 Midway Drive

San Diego, CA 92110

Stantec Project No. 185850087.500

May 4, 2018

Prepared for:

Chevron Products Company
145 South State College Blvd., Suite 500
Brea, CA 92821

Prepared by:

Stantec Consulting Services Inc.
9665 Granite Ridge Drive, Suite 220
San Diego, CA 92123

Revision	Description	Author		Quality Check		Independent Review	

Sign-off Sheet

This document entitled Soil and Groundwater Management Plan was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Chevron Products Company (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ______________________________
(signature)

Jenna Martinez, Senior Scientist

Reviewed by ______________________________
(signature)

Patrick McConnell, Principal Geologist, PG # 7205

LICENSED PROFESSIONAL ENGINEER
JARET FISCHER
C 80383
EXP. 3/31/19
CIVIL
STATE OF CALIFORNIA

Approved by ______________________________
(signature)

Jaret Fischer, Principal Engineer, PE # 80383

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1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared a Soil and Groundwater Management Plan (SGMP) on behalf of Chevron Products Company (Chevron) for the proposed redevelopment of the retail gasoline station located at 2959 Midway Drive, in San Diego, California (the Site, Figures 1 and 2). Redevelopment activities will also include the adjacent property located at 3405 Rosecrans Street (former Auto Scrubber Car Wash). This SGMP is being submitted in conjunction with a County of San Diego, Voluntary Assistance Program (VAP) application for oversight of Site redevelopment activities, based on comments received from the City of San Diego during the project permit review process.

This SGMP has been prepared to provide guidance to project management, site management, and field personnel on the identification and management of soil (both impacted and clean) and groundwater during excavation, grading, and construction activities to be completed at the Site. According to preliminary guidance from Chevron, the Site will be redeveloped as a Chevron convenience store, retail gasoline station, and car wash.

1.1 PURPOSE

Waste materials derived from planned redevelopment activities may be impacted with residual petroleum hydrocarbons in the subsurface at the site. The objective of the SGMP is to outline how suspect hydrocarbon-impacted waste materials derived from the planned redevelopment, and related dewatering: 1) will be managed and disposed in accordance with local, State and federal requirements, and 2) what mitigations will be implemented to protect human health and the environment from such materials.

The SGMP provides site-specific procedures and protocols to be utilized when contaminated soil and/or shallow groundwater are encountered during grading and construction excavations, and if soil or groundwater contamination is persistent beyond the vertical and horizontal limits of the proposed construction excavations. Procedures and protocols are included to ensure that contaminated soil is excavated properly and efficiently and that unacceptable risks are not posed to human health and the environment from contaminated soil or shallow groundwater, which Chevron elects to leave in place, and as approved (if required to do so) by the engagement of the appropriate authorized regulatory agency(s).

The procedures provided in the SGMP for the handling, stockpiling, and screening of excavated soils must be followed to properly profile the soil for either on-site reuse or disposal to a facility that is licensed to accept and/or recycle the waste generated. Waste handling and disposal must also comply with applicable state and federal guidelines. Shallow groundwater is anticipated to be encountered during Site redevelopment. When dewatering is required to support redevelopment, water will be stored in appropriate containers and profiled for either discharge to an approved publicly owned treatment works (POTW) via the sanitary sewer system or transported off-Site to an approved disposal facility.

Potential construction-related concerns such as noise, storm water, air pollution, abatement of lead- and asbestos-containing materials, and mold are outside the scope of this guidance document. Additionally, the SGMP applies only to the excavation of contaminated soils and pumping of shallow impacted groundwater related to construction and redevelopment of the Site where time and space limitations are critical considerations, and where the excavated contaminated soil and groundwater generated during dewatering activities will be disposed off-Site. This SGMP was prepared to support and provide guidance for Chevron during construction and/or development projects; however, it does not consider any other remedial or treatment technologies, such as on-Site or in-situ treatment.

This SGMP together with a site-specific health and safety plan (HASP) will incorporate policies and best management practices (BMPs) that will minimize potential impacts to human health and the environment during proposed Site redevelopment activities.

2.0 SITE DESCRIPTION

A description of the location and characteristics of the Site and surrounding area is presented in the following subsections. Figure 1 illustrates the current configuration of the Site.

2.1 PROPERTY TYPE AND USE

The Chevron property (Assessor Parcel Number (APN) 450-470-38-00) consists of an existing retail gasoline service station comprised of one service station building which houses two restrooms, a small convenience store, and a storage area/stockroom. The fueling system consists of six double-sided, three-grade dispensers and three 10,000-gallon gasoline underground storage tanks (USTs). The former Auto Scrubber car wash property (APN 450-470-35-00) consists of a car wash, office, small kiosk, waiting area, and various storage areas.

Both properties had previous environmental cases with oversight provided by the County of San Diego Department of Environmental Health (discussed further in section 3.0).

2.2 GENERAL TYPE AND USE OF SURROUNDING AREAS

The Site is located within a commercial area of San Diego. The Site is bound to the north by Midway Drive; to the west by Rosecrans Street, beyond which are commercial properties; and to the south and east by Loma Square, which is a multi-tenant shopping center.

2.3 PROPOSED REDEVELOPMENT PLANS

Based on information provided by Chevron, existing Site buildings and features on both parcels will be demolished, the existing UST system will be removed, and the Site will be redeveloped with a new Chevron convenience store, retail gasoline station, and car wash. A Site Plan showing the proposed redevelopment layout is included as Figure 2. The proposed convenience store building will be approximately 2,918 square feet with an attached 867 square-foot car wash, located on the southeastern portion of the property. Chevron will also install two new 20,000-gallon double wall fiberglass USTs in the northeastern portion of the property, with four fueling dispensers in the western portion of the property. A new 2,744 square foot fueling canopy will be installed over the dispensers, along with associated pavement and landscaping. The new USTs will be installed at an approximate depth of 17 feet below ground surface (bgs).

3.0 ENVIRONMENTAL CONSIDERATIONS

This section includes a summary of environmental considerations related to historic property use and potential for encountering soil and groundwater impacts at the Site during redevelopment activities that include demolition, excavation, and grading.

3.1 CHEVRON STATION #9-2239 (H12451)

According to information available on Geotracker and in the DEH document library, there have been three previous environmental cases associated with Chevron Station 9-2239.

- The first case (H12451-001) was opened on February 13, 1989 and appears to be the result of a failed precision test on the waste oil tank. The case was closed on July 30, 1990 with no additional information available.
- The second case (H12451-002) was opened on September 15, 1993 and appears to be the result of a hydraulic oil release related to one of the former hydraulic lifts. Soil sampling, over-excavation, and confirmation soil sampling was completed at the Site. The case has a closure date of August 14, 2008.
- The third case (H12451-003) was opened on September 20, 1993 and appears to be related to the hydraulic oil release referenced above. The case has a closure date of January 24, 2005.

Five groundwater monitoring wells were installed between 2001 and 2003. Based on the closure letter for the case dated January 12, 2005, soil and groundwater impact appeared to be confined to the northern corner of the Site and approximately 40 feet northeast into Midway Drive. It was estimated that approximately 73 cubic yards of hydrocarbon impacted soil remains at the Site. Maximum concentrations of total petroleum hydrocarbons as gasoline (TPHg), total recoverable petroleum hydrocarbons (TRPH), benzene, and methyl-t-butyl ether (MTBE) remaining in soil at the time of case closure were 13,000 milligrams per kilogram (mg/kg), 32,000 mg/kg, 5.9 mg/kg, and 14 mg/kg, respectively. Maximum concentrations of TPHg, benzene, and MTBE remaining in groundwater at the time of case closure were 1,500 micrograms per liter (µg/L), 1,900 µg/L, and 810 µg/L, respectively.

A copy of the closure letter for case H12451-003 is included in Appendix A.

3.2 AUTO SCRUBBER (H00779)

According to information available on Geotracker and in the DEH document library, there have been two previous environmental cases associated with the Auto Scrubber facility.

- The first case (H00779-001) was opened in November 1986 and appears to be the result of a failed precision test on one of the USTs. The USTs were replaced and free product was observed on the groundwater table. Free product was removed with absorbent pads. Three monitoring wells were installed in the UST backfill. Based on soil and groundwater analytical results, the case was closed on February 10, 1987.

- The second case (H00779-002) was opened on October 2, 1991 and appears to be the result of a release from a dispenser caused by a customer that drove off with the dispenser nozzle left in the vehicle. This caused a break in the piping below ground surface and resulted in a release of 500 to 800 gallons of gasoline. The case has a closure date of April 19, 1996.

Based on the closure letter dated April 19, 1996, four groundwater monitoring wells were installed in 1992. Free product was observed in one of the monitoring wells. Approximately 456 tons of impacted soil and 4,300 gallons of impacted groundwater were transported for disposal during fueling system removal activities in 1993. Soil confirmation samples collected following excavation activities did not contain TPH concentrations exceeding clean up levels (100 mg/kg as requested by regulatory personnel). Maximum concentrations of TPHg and benzene remaining in soil at the time of case closure were 210 mg/kg and non-detect, respectively. Maximum concentrations of TPHg and benzene remaining in groundwater at the time of case closure were 200 µg/L and 4.6 µg/L, respectively.

A copy of the closure letter for case H00779-002 is included in Appendix A.

4.0 SCOPE OF WORK

4.1 GENERAL PERMITTING AND NOTIFICATIONS

The work scope described herein will be performed under the supervision of a California-licensed Professional Geologist (PG) or Professional Engineer (PE). It is assumed Chevron's contractor(s) will develop their own site-specific HASP, Storm Water Pollution and Prevention Plan (SWPPP), obtain all necessary permits, and make the appropriate notifications as necessary to conduct the demolition, excavation and construction activities. Standard dust control measures and BMPs should be implemented to prevent construction-related dust being generated beyond the boundaries of the Site.

In the event impacted soil and /or groundwater is encountered beyond what has been defined by previous investigations and deemed to be significant (estimated to potentially meet a reportable quantity), Chevron will notify the County of San Diego VAP.

4.1.1 Health and Safety Plan

Prior to implementing field activities, Stantec will prepare a site-specific worker HASP in accordance with 29 CFR 1910.120, for use by the Stantec workforce. The site-specific worker HASP will address potential health and safety concerns and hazards that field personnel may encounter during the field events.

4.2 GRADING AND SOIL EXCAVATION ACTIVITIES

Stantec will observe the grading and excavation work at the Site to be completed by the Chevron contractor's workforce and will oversee the contractor's efforts to minimize the potential public exposure to dust, vapors, mists or odors generated as a result of the proposed activities (e.g., covering the temporary segregated soil, misting excavations or stockpiles, etc.). If necessary during excavation, all exposed contaminated soil surfaces will be kept visibly moist by water spray, treated with an approved vapor suppressant, and covered with continuous heavy-duty plastic sheeting or other covering to minimize emissions of volatile organic compounds (VOCs) to the atmosphere. Air and dust monitoring should be conducted at the worker breathing zone and the work area boundary. Stantec will conduct air monitoring using a photoionization detector (PID) and will direct soil segregation (if necessary).

Prior to removal from the Site and disposal at a facility that is licensed to accept the waste soils generated, soil samples representative of the soil to be disposed of will be collected and analyzed for chemicals of potential concern (COPC). Laboratory analysis is a requirement in order to generate a waste soil profile prior to transportation and disposal of waste soils generated at the Site. Additional analysis of soils may be required based on field observations and screening and the results of any laboratory analyses completed.

4.2.1 STOCKPILE AND/OR CONTAINERIZED SOIL CHARACTERIZATION

For the purpose of this SGMP, stockpiled soil is soil that has been disturbed at the site via demolition, grading, excavation and/or drilling tasks. Soil that is designated for disposal requires an appropriate level of characterization before it can be handled, transported, and removed from the Site for disposal.

Procedures in the Environmental Protection Agency (EPA) Publication SW-846 provide a method for determining the mean concentration of a given contaminant within a soil mass and the appropriate number of samples necessary to calculate this mean to within a specified confidence level.

The following presents an overview and guideline of the minimum number of discrete samples required for stockpile sampling:

- **Stockpiles <10 Cubic Yards (yd^3)**– A minimum of two soil samples will be collected, one from each half of the stockpile. Select sample points randomly within each half;
- **Stockpiles from 10-20 yd^3**– A minimum of three soil samples will be collected, one from each third of the stockpile. Select sample points randomly within each third;
- **Stockpiles 20-100 yd^3**– A minimum of four soil samples will be collected, one from each quarter of the stockpile. Select sample points randomly within each quarter; and
- **Stockpiles 100-500 yd^3**– A minimum of one soil sample for each 25 yd^{3}or portion thereof will be collected (e.g., a 130 yd^3 stockpile would require 6 soil samples). Section the stockpile into 25 yd^3 portions and obtain a minimum of one soil sample from each 25 yd^3 portion. Select sample points randomly within each 25 yd^3 portion of the stockpile.

4.2.2 SOIL SCREENING LEVELS FOR POTENTIALLY IMPACTED SOIL

Soil screening levels are presented in this SGMP to assist project management and field personnel to manage potentially impacted soil during demolition and grading activities. The SGMP will also enable project management and field personnel to make effective decisions by efficiently managing excavated soils. Options for the handling of excavated soil include the following:

1) On-site reuse (must be pre-approved by VAP);
2) Off-site recycling and/or disposal at a Class II and III Waste Management Facility; or
3) Disposal at a Class I Hazardous Waste Facility.

Visual or olfactory evidence of the presence of hydrocarbons in soil or an average PID measurement in excess of 50 parts per million by volume (ppmv) sustained for 10 seconds approximately 6 inches above excavated soil will be considered to be suspect impacted soil for segregation purposes. Suspect clean and impacted soils will be stockpiled separately for future sampling and analysis.

Soil stockpiles will be placed on heavy duty plastic sheeting (visqueen™ or equivalent) and covered appropriately to reduce dust and in the event of rain, minimize the potential for water-borne migration of impacted soil and debris. Wherever possible, excavated soil will be stockpiled on plastic sheeting and preferably within areas of improved asphalt or concrete surfaces. Stockpile covering will be in good condition, joined at the seams, and securely anchored to minimize headspace where vapors accumulate. When not covered, soil stockpile surfaces will be kept visibly moist by water spray, as necessary.

The options presented above are dependent upon the concentrations of constituents of concern detected in soil and as verified by laboratory analytical testing, as well as regulatory criteria set forth by the applicable regulatory agencies (California Department of Health Services and the Regional Water Quality Control Board; RWQCB).

4.2.3 SAMPLING METHODS

Stockpile soil samples will be analyzed for the following minimum analyses in accordance with the appropriate EPA test method:

- Full range TPH by EPA Test Method 8015 and benzene, toluene, ethylbenzene and total xylenes (collectively known as BTEX), and MTBE by EPA Test Method 8260B; and
- Total lead by EPA Test Method 6010B.

All stockpile soil samples collected during the excavation and disposal activities will be relinquished to a State of California Certified Laboratory for chemical analysis. Other potential constituents of concern not listed above may be analyzed for, as warranted and based on field observations and screening, or as required by the receiving disposal facility. Soil samples will be collected from both the suspect "clean" and impacted soil stockpiles for potential disposal options.

A waste profile and manifests will be generated for transportation and disposal of the wastes. Copies of all waste manifests shall be provided to Chevron. Soil loaded into transport vehicles for off-Site disposal will be covered with continuous heavy-duty plastic or other covering to minimize emissions to the atmosphere. This covering will be in good condition, joined at the seams, and securely anchored to minimize headspace where vapors may accumulate.

5.0 GROUNDWATER MANAGEMENT PLAN

Groundwater beneath the site has had historic dissolved petroleum hydrocarbon concentrations and other VOC concentrations. During construction and redevelopment of the Site, any water recovered from dewatering activities and excavation work must be contained within appropriate temporary above-ground storage tanks (ASTs) located onsite. Temporary ASTs should be sized and located accordingly to handle the volume of water that may be generated without impeding redevelopment construction activities.

The stored water will need to be sampled, profiled, and disposed of offsite at a licensed treatment or disposal facility. Alternatively, and in the event large quantities of groundwater are generated by dewatering, Chevron may evaluate additional options for the removal of groundwater such as discharge to the sanitary sewer (POTW). Any water extracted will need to be treated and permitted with prior approval obtained in advance from the appropriate agencies prior to any discharge to the sanitary sewer.

5.1 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples will be collected from the holding tank using a Teflon bailer, placed into appropriate EPA approved containers, labeled, logged onto chain-of-custody records, and transported on ice in an insulated cooler to a California State-certified laboratory. If elected for disposal of groundwater off-Site to a recycling disposal facility and subject to suspected impacts to groundwater that may be present, representative groundwater samples will need to be analyzed for full range TPH by EPA Test Method 8015, BTEX and MTBE by EPA Test Method 8260B, and total lead by EPA Test Method 6010B. Other potential constituents of concern may be analyzed for, as required by the receiving disposal facility.

In the event Chevron elects to discharge to the sanitary sewer, additional analytes will likely be required to evaluate the initial baseline quality of water to be discharged, as well as additional samples to ensure the water discharged to the sanitary sewer does not exceed the total maximum daily limits (TMDLs) established under the permits issued. The permitting agency or receiving facility may specify which methods are to be used for various analytes.

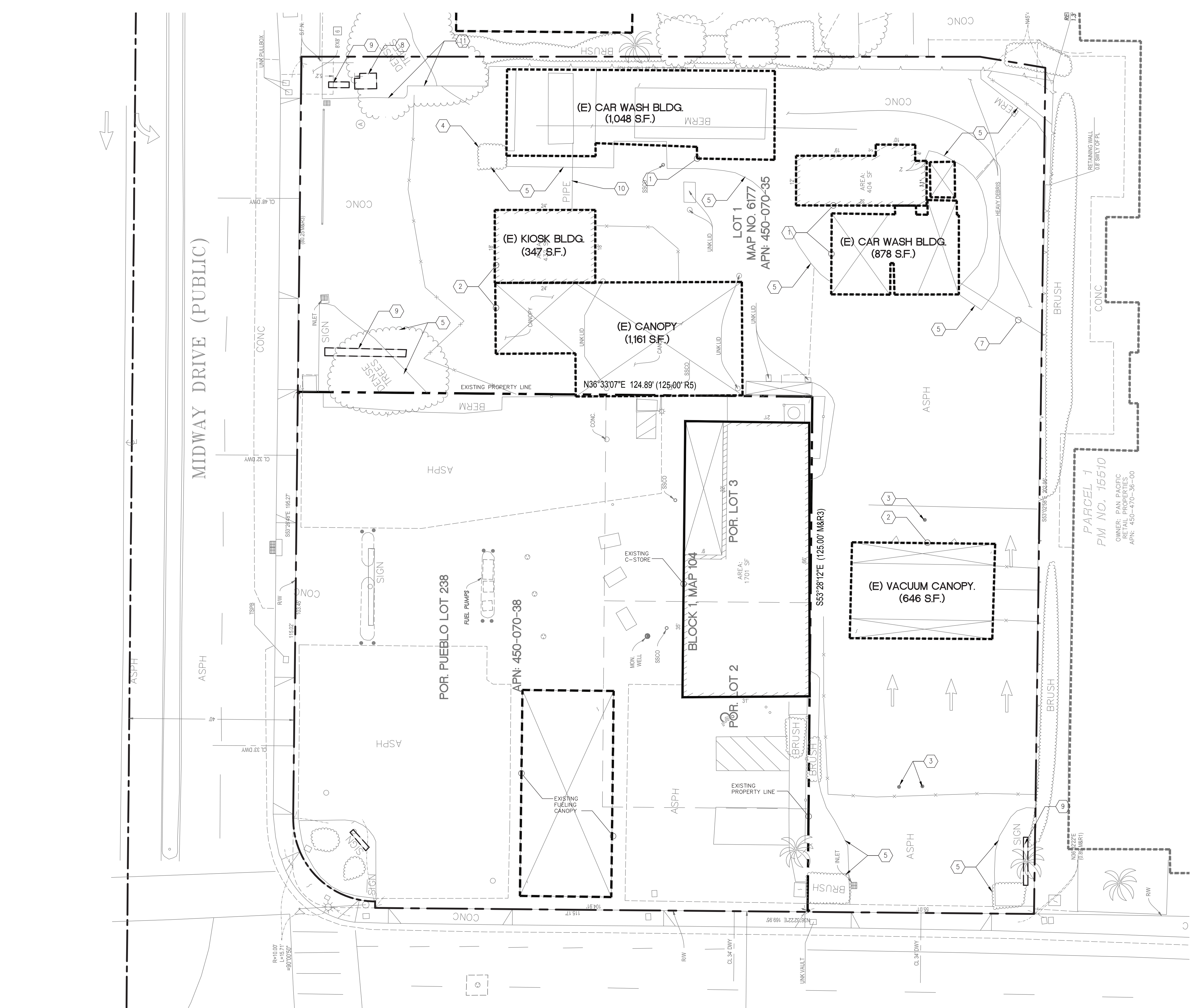
5.2 GROUNDWATER PROFILING AND DISPOSAL

Laboratory analytical data of the groundwater samples will be used to profile the extracted groundwater for offsite recycling/disposal at a licensed facility. The groundwater will be transported under manifest for proper off-Site disposal. The volume of groundwater transported for disposal will be documented on waste disposal manifests.

6.0 REPORTING

A report of the work under this SMGP will be prepared and will include soil disposal documentation (for soil segregated as possibly impacted), water disposal documentation, and laboratory analyses. The report will be reviewed and approved by a California-licensed Professional Geologist (PG) or Professional Civil Engineer (PE).

FIGURES



SITE DEMO PLAN KEY NOTES

1. CAR WASH STRUCTURES AND ALL ASSOCIATED EQUIPMENTS TO BE DEMOLISHED
2. KIOSK BUILDING, CANOPY, AND ALL ASSOCIATED EQUIPMENT TO BE DEMOLISHED
3. BOLLARDS TO BE DEMOLISHED
4. SIGNAGES TO BE DEMOLISHED
5. CURBS AND PLANTERS TO BE DEMOLISHED.
6. VACUUM CANOPY AND ALL ASSOCIATED EQUIPMENTS TO BE DEMOLISHED.
7. CAR WASH HEIGHT INDICATOR TO BE DEMOLISHED.
8. ELECTRICAL TRANSFORMER TO BE DEMOLISHED
9. PYLON AND MONUMENT SIGN TO BE DEMOLISHED
10. UNDERGROUND STORAGE TANKS, FUEL PIPING, AND ALL OTHER UNDERGROUND EQUIPMENT TO BE REMOVED.
11. DEMO PARTIAL (E) CURB AND PLANTERS TO ACCOMMODATE (N) PROPOSED CURB.

GENERAL NOTES

1. COORDINATE EXTENT OF DEMOLITION WITH NEW CONSTRUCTION.
2. REMOVE ANY EXISTING TENANT RELATED SIGNAGE NOT REQUIRED BY CODE.
3. REMOVE ANY EXISTING CONDUITS PIPING, CHASES, FLOOR OUTLETS, FLOOR DRAINS, RAISED CURBS, BOLTS, SCREWS AND ASSOCIATED ITEMS. PATCH AND REPAIR SURFACES AFFECTED BY REMOVAL THAT WILL NOT BE COVERED BY NEW WORK.
4. REMOVE ALL EXISTING WALLS, CEILINGS, ELECTRICAL, PLUMBING, AND MECHANICAL. CUT-OFF/GRIND STUB-UPS. ALL TRENCHES, HOLES, CONCRETE, AND INFILLS ARE TO BE FILLED WITH CONCRETE AND FINISHED FLUSH WITH EXISTING SUB-GRADE.

LEGEND

TO BE DEMOLISHED

TO REMAIN

NORTH

0 5 10 20 30 40

SCALE: 1"=10'-0"

PM DESIGN
Architectural Solutions Group
2455 Bennett Valley Rd. Suite A-102
Santa Rosa, CA. 95404
Ph. (707) 703-5618
Roy W. Pedro, Architect

Seal

MARK	DATE	REVISION
	7/27/16	SUBMITTAL TO PLANNING FOR PRELIM. REVIEW
△		
△		
△		
△		
△		
△		
△		

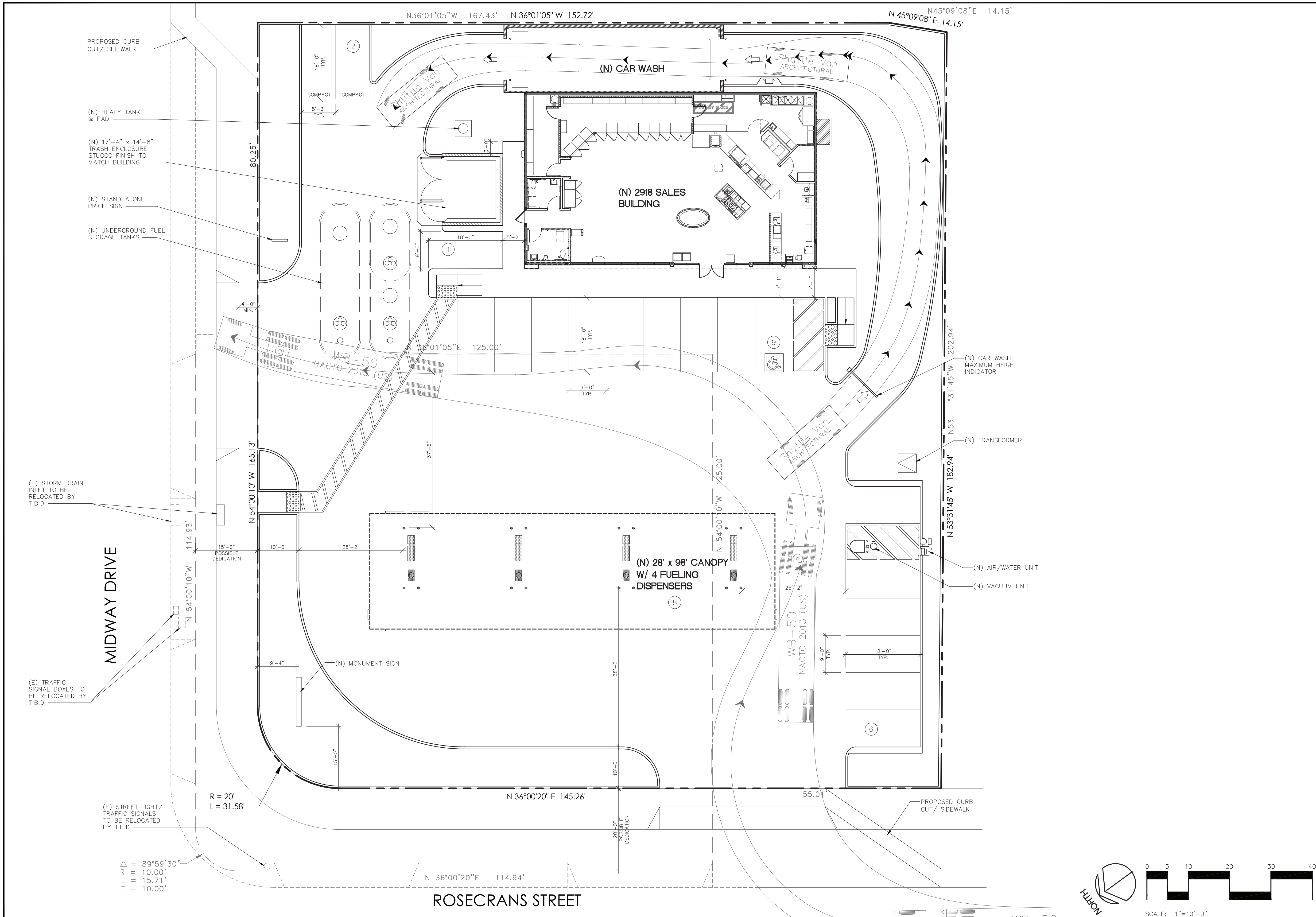
CHEVRON STATION
SS# 92239
2959 MIDWAY DR.
SAN DIEGO, CA.

Project Number
CHV16014.1

Sheet Name
SITE DEMOLITION PLAN

Sheet Number
Figure 1

1 SITE DEMOLITION PLAN
1"=10'-0"



1 SITE PLAN
1"=10'-0"

PM DESIGN
Architectural Solutions Group
2455 Bennett Valley Rd. Suite A-102
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Ph. (707) 703-5618
Roy W. Pedro, Architect

Seal

MARK	DATE	REVISION
	7/27/16	SUBMITTAL TO PLANNING FOR PRELIM. REVIEW

CHEVRON STATION
SS# 92239
2959 MIDWAY DR.
SAN DIEGO, CA.

Project Number
CHV16014.1

Sheet Name
SITE PLAN

Sheet Number
Figure 2

APPENDIX A

CASE CLOSURE LETTERS

GARY W. ERBECK
DIRECTOR

County of San Diego

DEPARTMENT OF ENVIRONMENTAL HEALTH
P.O. BOX 129261, SAN DIEGO, CA 92112-9261
(619) 338-2222 FAX (619) 338-2088
1-800-253-9933
www.sdcdeh.org

RICHARD HAAS
ASSISTANT DIRECTOR

January 24, 2005

Ms. Karen Streich
Chevron Environmental Management Company
P.O. Box 6012
San Ramon, CA 94583

Dear Ms. Streich:

UNDERGROUND STORAGE TANK (UST) CASE #H12451-003
CHEVRON SERVICE STATION #9-2239
2959 MIDWAY ROAD, SAN DIEGO, CALIFORNIA

This letter confirms the completion of a site investigation and corrective action for the underground storage tanks currently located at the above-described location. Thank you for your cooperation throughout this investigation. Your willingness and promptness in responding to our inquiries concerning the current underground storage tanks is greatly appreciated.

Based on information in the above-referenced file and with the provision that the information provided to this agency was accurate and representative of site conditions, this agency finds that the site investigation and corrective action carried out at your underground storage tanks site is in compliance with the requirements of subdivisions (a) and (b) of Section 25299.37 of the Health and Safety Code and with corrective action regulations adopted pursuant to Section 25299.77 of the Health and Safety Code and that no further action related to the petroleum release at the site is required.

This notice is issued pursuant to subdivision (h) of Section 25299.37 of the Health and Safety Code. Please contact Kent Huth at (619) 338-2243 if you have questions regarding this matter.

Sincerely,

Richard F. Haas

for GARY W. ERBECK, Director
Department of Environmental Health
Site Assessment and Mitigation Program

GWE:KH:kd

Enclosure

cc: John Odermatt, Regional Water Quality Control Board
Allan Patton, SWRCB, UST Cleanup Fund Program
Maurice Baron, SECOR (Mountain View)

WP/H12451-003-105VAPCLO

Case Closure Summary
Leaking Underground Fuel Storage Tank Program

I. AGENCY INFORMATION

DATE: January 12, 2005

Agency Name: COUNTY OF SAN DIEGO, ENVIRONMENTAL HEALTH, SAM	Address: P.O. BOX 129261
City/State/Zip: SAN DIEGO, CA 92112-9261	Phone: (619) 338-2222 FAX: (619) 338-2377
Responsible Staff Person: KENT HUTH	Title: ENVIRONMENTAL HEALTH SPECIALIST

II. CASE INFORMATION

Site Facility Name: CHEVRON #9-2239		
Site Facility Address: 2959 MIDWAY DR, SAN DIEGO 921103207		
RB LUSTIS Case No: 9UT2970	Local Case No: H12451-003	LOP Case No: N/A
URF Filing Date: 9/20/1993	SWEEPS No: N/A	

Responsible Parties	Address	Phone Number
CHEVRON U.S.A. PRODUCTS CO.	P.O. BOX 2833	562-694-7969
JEFFREY E. COLE	LA HABRA, CA 90632	

Tank No.	Size in Gal.	Contents	Status	Date
T002	1000 gallons	WASTE OIL	CLOSED BY REMOVAL	10/5/1993

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause Release: UNKNOWN, SUBSTANCE RELEASED FROM UST	Substance Released: GASOLINE (UNLEADED)	
Site Characterization complete: YES 11/19/2004	Date Approved By Oversight Agency: 11/19/2004	
Monitoring Wells Installed? YES	Number: 5	Proper Screened Interval? YES
Highest GW Depth B.G. Surface: 8.07 (MEASURED)	Lowest Depth: 9.9 (MEASURED)	Flow Direction: NORTHEAST (MEASURED)
Most Sensitive Current Use: Beneficial Groundwater Use: None Designated Existing Beneficial Surface Water Use: REC2 and Potential: REC1		
Are Drinking Water Wells Affected? NO	Aquifer Name: 908.21-Lindbergh Hydrologic Sub Area	
Is Surface Water Affected? NO	Nearest SW name: SAN DIEGO BAY	
Off-Site Beneficial Use Impacts (addresses/locations): NA		
Report(s) on file? YES	Where is Report(s) Filed? COUNTY OF SAN DIEGO, ENVIRONMENTAL HEALTH	

TREATMENT AND DISPOSAL OF AFFECTED MATERIAL

Material	Amount (Include Units)	Action (Treatment or Disposal)	Date
SOIL	18 CUBIC YARDS	RECYCLED	10/18/1993
TANK(S)	1000 GALLON	RECYCLED	10/5/1993

Case Closure Summary
Leaking Underground Fuel Storage Tank Program

III. RELEASE AND SITE CHARACTERIZATION INFORMATION (Continued) H12451-003

MAXIMUM DOCUMENTED CONTAMINANT CONCENTRATIONS

	MAXIMUM	REMAINING
SOIL		
Gasoline	= 13000 mg/kg	= 13000 mg/kg
Total Recoverable Petroleum Hydrocarbons (TRPH)	= 32000 mg/kg	= 32000 mg/kg
Benzene	= 5.9 mg/kg	= 5.9 mg/kg
Toluene	= 140 mg/kg	= 140 mg/kg
Ethyl benzene	= 61 mg/kg	= 61 mg/kg
Xylene (individual isomers or total)	= 200 mg/kg	= 200 mg/kg
Methyl-tert-butyl ether (MTBE)	= 15 mg/kg	= 15 mg/kg
tert-Butyl Alcohol (TBA)	< 10 mg/kg	< 10 mg/kg
tert-Amyl-methyl ether (TAME)	< 0.5 mg/kg	< 0.5 mg/kg
Ethyl-tert-butyl ether (ETBE)	< 0.5 mg/kg	< 0.5 mg/kg
di-isopropyl ether (DIPE)	< 0.5 mg/kg	< 0.5 mg/kg
WATER		
Gasoline	= 20000 ug/l	= 1500 ug/l
Benzene	= 5400 ug/l	= 1900 ug/l
Toluene	= 660 ug/l	= 31 ug/l
Ethyl benzene	= 2800 ug/l	= 1.8 ug/l
Xylene (individual isomers or total)	= 2200 ug/l	= 3.5 ug/l
Methyl-tert-butyl ether (MTBE)	= 1300 ug/l	= 810 ug/l
tert-Butyl Alcohol (TBA)	= 140 ug/l	= 42 ug/l
tert-Amyl-methyl ether (TAME)	< 500 ug/l	< 200 ug/l
Ethyl-tert-butyl ether (ETBE)	< 500 ug/l	< 200 ug/l
di-isopropyl ether (DIPE)	< 500 ug/l	< 200 ug/l

On September 17, 1993, concentrations of total petroleum hydrocarbons as gasoline (TPHg) up to 13,000 parts per million (ppm) were detected in soil samples collected during piping upgrade activities. In addition, total recoverable petroleum hydrocarbon (TRPH) concentrations up to 32,000 ppm were detected during waste oil tank removal activities. Based on these findings, DEH case H12451-003 was opened on October 12, 1993.

Following a period of inactivity, a total of 5 monitoring wells were installed from August 30, 2001 through August 10, 2003. Based on analysis of soil and groundwater during this investigation, it has been determined that soil and groundwater concentrations of TPHg, benzene, and MTBE are confined to the northern corner of the Site and approximately 40 feet northeast into Midway Drive with no migration beyond this point. TRPH concentrations were not detected beyond the southeast corner of the Site or below 5 feet beneath ground surface (bgs) in this area of the Site. It is estimated that a total of 73 cubic yards of TPHg impacted soil remains at the Site.

The Site is located in a non-beneficial use area. San Diego Bay is located approximately 0.5 mile from the Site while the San Diego River is located approximately ¾ mile to the north of the Site. There are no supply wells located down-gradient of the Site. Based on the site conceptual model, it is not anticipated that any sensitive receptors will be impacted by the remaining contamination at the Site.

IV. CLOSURE

Does completed corrective action protect existing beneficial uses per the Regional Board Basin Plan? YES -

Does completed corrective action protect potential beneficial uses per the Regional Board Basin Plan? YES -

Does corrective action protect public health for current land use? YES

Case oversight completed based upon the following site use: GASOLINE STATION – Gasoline Station

Site Management Requirements:
ANY CONTAMINATED SOIL EXCAVATED AS PART OF SUBSURFACE CONSTRUCTION WORK MUST BE MANAGED IN ACCORDANCE WITH THE LEGAL REQUIREMENTS AT THAT TIME.

Should corrective action be reviewed if land use changes? YES

Monitoring Wells Decommissioned: NO	Number Decommissioned: 0	Number Retained: 5

List Actions Taken: NOTICE OF REIMBURSEMENT / LOCAL

List Enforcement Actions Rescinded: NONE

Case Closure Summary
Leaking Underground Fuel Storage Tank Program

V. LOCAL AGENCY REPRESENTATIVE DATA H12451-003

Name: KEVIN HEATON	Title: SENIOR HYDROGEOLOGIST
Signature:	Date: 1/12/2005

VI. RWQCB NOTIFICATION

Date Submitted to RB:	RB Response: NA - NON-BENEFICIAL GW	
RWQCB Staff Name:	Title:	Date:

VII. ADDITIONAL COMMENTS, DATA, ETC.

A permit has been issued for the destruction of the existing monitoring wells on-site. The permit number is LMON102838.

This document and the related CASE CLOSURE LETTER, shall be retained by the lead agency as part of the official site file.

County of San Diego

DANIEL J. AVERA
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
P.O. BOX 85261, SAN DIEGO, CA 92186-5261
(619) 338-2222 FAX (619) 338-2377

SITE ASSESSMENT AND MITIGATION DIVISION

April 19, 1996

Mr. Jim Upshaw
Auto Scrubber
3405 Rosecrans Street
San Diego, CA 92110

Dear Mr. Upshaw:

UNDERGROUND STORAGE TANK (UST) CASE
AUTO SCRUBBER, 3405 ROSECRANS ST., SAN DIEGO, CA 92110
#H00779-002

This letter confirms the completion of site investigation and remedial action for the underground storage tanks formerly located at the above described location. Enclosed is the Case Closure Summary for the referenced site for your records.

Based upon the available information, including the current land use, and with the provision that the information provided to this agency was accurate and representative of site conditions, no further action related to the underground storage tank release is required.

This notice is issued pursuant to a regulation contained in Title 23, California Code of Regulations, Division 3, Chapter 16, Section 2721(e). If a change in land use is proposed, the owner must promptly notify this agency.

Please telephone Mike Vernetti at (619) 338-2242 if you have any questions regarding this matter.

Sincerely,

CHUCK PRYATEL, Division Manager
Site Assessment and Mitigation Division

CP:gl

Enclosure

cc: Regional Water Quality Control Board
State Water Resources Control Board, Underground Tanks Program
EnvirOmega Consultants

"Prevention Comes First"

WP/H00779

I. AGENCY INFORMATION   Date: 04/10/96

Agency Name: County of San Diego, Environmental Health, SAM	Address: PO Box 85261
City/State/ZIP: San Diego, CA 92186-5261	Phone: (619) 338-2222 Fax: (619) 338-2377
Responsible Staff Person: Johanna Barry	Title: Hazardous Materials Specialist

II. CASE INFORMATION

Site Facility Name: The Auto Scrubber		
Site Facility Address: 3405 Rosecrans Street, San Diego, CA 92110		
RB LUSTIS Case No: N/A	Local Case No: H00779-002	LOP Case No: N/A
URF Filing Date: 12/30/91	SWEEPS No: N/A	
Responsible Parties	Addresses	Phone Number
Mr. Jim Upshaw	3405 Rosecrans Street, San Diego CA 92110	

Tank No.	Size in Gal.	Contents	Closed in Place/Removed?	Date
1	10,000	Gasoline	Closed by removal	8/5/93
2	10,000	Gasoline	Closed by removal	8/5/93
3	10,000	Gasoline	Closed by removal	8/5/93

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause and Type of Release: Customer left the center pump island with a pump nozzle attached to the fuel filler pipe of the car. The resulting break of the pipeline elbow fitting below the ground surface at the base of the pump dispenser caused an estimated 500-800 gallons of gasoline (based on inventory reconciliation records) to be discharged into the subsurface before repairs were made to the product line.

Site Characterization complete? Yes	Date Approved By Oversight Agency: 4/10/96	
Monitoring Wells Installed? Yes	Number: 4	Proper Screened Interval? Yes
Highest GW Depth Below Ground Surface: 6.0'bgs	Lowest Depth: 8.0'bgs	Flow Direction: north to north west
Most Sensitive Current Use: Non-Beneficial Use. Basin 8.10		
Are Drinking Water Wells Affected? No	Aquifer Name: Basin 8.10	
Is Surface Water Affected? No	Nearest/affected SW name:	
Off-Site Beneficial Use Impacts (addresses/locations): None		
Report(s) on file? Yes	Where is Report(s) Filed? County of San Diego, Environmental Health	

TREATMENT AND DISPOSAL OF AFFECTED MATERIAL

Material	Amount (Include Units)	Action (Treatment or Disposal w/Destination)	Date
Tanks	3 10,000 Double-Wall Modern UST's removed on 8/5/93	Rendered non-hazardous and retro-fitted. Destination: Modern Tank, Fresno, CA	8/5/93
Piping		Decontamination and removed as scrap	8/5/93
Free Product	~4300 gallons of contaminated groundwater	Transported by Alternative Disposal to DeMenno/Kerdoon, Compton CA	8/5/93, 8/9/93, 8/24/93
Soil	~456 tons of contaminated soil	Clean Soils Inc., Bakersfield CA 93307	8/19/93, 8/20/93, 8/23/93, 8/24/93

Groundwater	~4300 gallons of contaminated groundwater	Transported by Alternative Disposal to DeMenno/Kerdonn, Compton CA	8/5/93, 8/9/93, 8/24/93
Barrels			

III. RELEASE AND SITE CHARACTERIZATION INFORMATION (Continued)

MAXIMUM DOCUMENTED CONTAMINANT CONCENTRATIONS -- BEFORE AND AFTER CLEANUP

Contaminant	Soil(ppm)		Water (ppm)		Contaminant	Soil (ppm)		Water (ppm)	
	Before	After	Before	After		Before	After	Before	After
TPH (Gas)	22000	210	free-product	*200 **74	Xylene	3200	nd	Free-product	*29 **58
TPH (Diesel)					Ethylbenzene	670	nd	Free-Product	*3.3 **5.6
Benzene	300	nd	Free-Product	*0.9 **4.6	Oil & Grease				
Toluene	1700	nd	Free-Product	*11 **44	Heavy Metals				
Other					Other				

Comments (Depth of Remediation, etc.): * Groundwater sample obtained with Geoprobe on 10/19/95.
** Groundwater sample obtained from groundwater monitoring well on 6/1/95.
The dissolved concentrations of TPH and BTEX observed in the Geoprobe sample are likey the result of two factors. First, residual petroleum hydrocarbons were likely dislodged and dispersed into the gravel in the excavation during the destruction of MW4. Second, the Geoprobe is likely to indicate a higher concentration of petroleum hydrocarbons than is actually present in the groundwater, primarily as a result of of sediment suspended in the water at the time of sample collection. This tendency to produce elevated measurements, coupled with with the dispersion of sediment into the gravel, is the likely cause of the higher concentration of TPH.

A Customer left the center pump island with a pump nozzle attached to the fuel filler pipe of the car. The resulting break of the pipeline elbow fitting below the ground surface at the base of the pump dispenser caused an estimated 500-800 gallons of gasoline (based on inventory reconciliation records) to be discharged into the subsurface before repairs were made to the product line. Three 10,000 gallon double-wall Modern UST's removed on 8/5/93. Excavation and disposal of ~456 tons of contaminated soil, and pumping and disposal of ~ 4300 gallons of contaminated groundwater during site mitigation activities. Soil excavted to a maximum depth of 11'.5" bgs. Confirmation/verification soil samples taken. The soil contamination levels do not exceed the general clean-up levels for the site. Completion of 1 year (4 periods) of post-mitigation groundwater sampling on monitoring wells MW2 and MW4. No free product observed in either well since post-mitigation activities. A groundwater sample collected downgradient of the former location of the petroleum hydrocarbon release, did not contain detectable concentrations of TPH. Low Risk Groundwater Case. The dissolved concentrations of TPH and BTEX observed in the groundwater sample AS-HAGW-1, collected from under the wall seperating the Auto Scrubber facility and the Chevron gasoline service station is suspected of being related to an ongoing Chevron release located at 2959 Midway Drive, San Diego, CA (H12451-003).

IV. CLOSURE

Does completed corrective action protect existing beneficial uses per the Regional Board Basin Plan? Yes

Does completed corrective action protect potential beneficial uses per the Regional Board Basin Plan? Yes

Does corrective action protect public health for current land use? Yes

Site Management Requirements: None

Should corrective action be reviewed if land use changes? Yes

Monitoring Wells Decommissioned: Yes	Number Decommissioned: 4	Number Retained: 0

List Enforcement Actions Taken: Notice of Corrective Action and Reimbursement Responsibility

List Enforcement Actions Rescinded: None

V. LOCAL AGENCY REPRESENTATIVE DATA

Name: Chuck Pryatel	Title: Division Manager Site Assessment and Mitigation
Signature: [illegible signature]	Date: 4-16-96
Hydrogeologist Concurrence: KMf	Date: 4/12/96

VI. RWQCB NOTIFICATION

Date Submitted to RB: 4/09/96	RB Response: Concurrence For Closure	
RWQCB Staff Name: Corey Walsh	Title: Assoc. Eng. Geologist	Date: 4/10/96

VII. ADDITIONAL COMMENTS, DATA, ETC.

The soil contamination levels do not exceed the general cleanup levels for the site. Low Risk Groundwater Case.

This document and the related CASE CLOSURE LETTER, shall be retained by the lead agency as part of the official site file.