The City of San Diego

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

Los Patios - Mixed Use

Insert Permit Application Numbers

Drawing Number (If Applicable) & Internal Order Number (If Applicable)

ENGINEER OF WORK:

Michael MaGee, PE

Provide Wet Signature and Stamp Above Line

PREPARED FOR:

The Red Office

640 West Beech Street #4

San Diego, CA 92101

619-889-2760

PREPARED BY:

BergerABAM

10525 Vista Sorrento Parkway

San Diego, CA 92121

8585004532

DATE:

August 22, 2017

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: Los Patios - Mixed Use
Permit Application Number: Insert Permit Application Number

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

Michael MaGee
Print Name

BergerABAM
Company

August 22, 2017
Date

Engineer's Stamp

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Project Name: Los Patios - Mixed Use

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	6/14/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Initial Submittal
2	8/22/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Response to Cycle 2 comments
3	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.
4	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.

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Project Name: **Los Patios - Mixed Use**

PROJECT VICINITY MAP

Project Name: Los Patios - Mixed Use
Permit Application Number: Insert Application Number.

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Project Name: Los Patios - Mixed Use

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

Project Address: 1776 National Avenue, San Diego 92113	Project Number *(for the City Use Only)*: Click here to enter project number

SECTION 1. Construction Storm Water BMP Requirements:

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

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

PART A: Determine Construction Phase Storm Water Requirements.

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

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

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

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

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

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

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

   ☐ Yes; no document required

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

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

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

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

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

PART B: Determine Construction Site Priority.

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

Complete PART B and continued to Section 2

1. ☐ ASBS

a. Projects located in the ASBS watershed. A map of the ASBS watershed can he found here *<placeholder for ASBS map link>*

2. ☐ High Priority

a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ Medium Priority

a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☒ Low Priority

a. Projects not subject to ASBS, high or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

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

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

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

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

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

PART D: PDP Exempt Requirements.

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

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

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

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

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

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

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

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

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

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

Project Name: Los Patios - Mixed Use

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☐ Yes ☒ No
6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☐ Yes ☒ No
7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging- directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☐ Yes ☒ No
8. **New development or redevelopment projects of a retail gasoline outlet that creates and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic of 100 or more vehicles per day.	☐ Yes ☒ No
9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is **NOT SUBJECT TO STORM WATER REQUIREMENTS**.	☐
2. The project is a **STANDARD PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires hydromodification management.	☑

Name of Owner or Agent *(Please Print):* Meriam Chihwaro	Title: Assistant Engineer
Signature:	Date: June 12, 2017

Project Name: Los Patios - Mixed Use

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: Los Patios - Mixed Use

Permit Application Number: Insert Application Number. | Date: 6/12/17

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): Click or tap here to enter text.		
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: Click or tap here to enter text.		

Form I-1 Page 2		
Step	Answer	Progression
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.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☐ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply): Click or tap here to enter text.		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☐ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply: Click or tap here to enter text.		
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.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☐ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: Based on the WMAA (project clean water) mapping on Google Earth, no critical coarse sediment yield areas exist at the project site or upstream of the site. An aerial capture showing the project site clear of any highlighted or mapped critical coarse sediment areas nearby is provided in Attachment 2.		

Project Name: Los Patios - Mixed Use

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Los Patios - Mixed Use
Project Address	1776 National Avenue, San Diego CA 92113
Assessor's Parcel Number(s) (APN(s))	538-050-12-00
Permit Application Number	Click here to enter text.
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)	0.32 Acres ([SQFT] Square Feet)
Area to be disturbed by the project (Project Footprint)	0.32 Acres ([SQFT] Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.23 Acres (10,000 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.09 Acres (4,000 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.	-28 %

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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: Click or tap here to enter text.
Existing Land Cover Includes (select all that apply): ☐ Vegetative Cover ☐ Non-Vegetated Pervious Areas ☒ Impervious Areas Description / Additional Information: Click or tap here to enter text.
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: Click or tap here to enter text.

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:

Runoff at the project site currently sheets flows towards a low point from the east corner of the site to the west corner. Runoff then continues to flow offsite along National Avenue, northwest, towards Commercial St., where runoff is captured by an existing curb inlet.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The proposed project will consist of the demolition of the existing hardscape paving to grade the lot for a new development consisting of new multiuse units, along with all required hardscape, softscape and utilities.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Buildings, parking lots/vehicular pavers, concrete, building overhangs

List/describe proposed pervious features of the project (e.g., landscape areas):

Pervious pavers, trees/landscape

Does the project include grading and changes to site topography?

- [x] Yes
- [ ] No

Description / Additional Information:

The grading and change in topography on the site is minimal. Grading the site is necessary to accommodate for the new proposed work and units at the site. Runoff at the proposed site will sheet flow towards a low point at the center of the site, where the proposed pervious pavers are installed. Runoff will then infiltrate and be stored in a subsurface gravel storage layer, where runoff will then be pumped via new pump and storm drain pipe to an oulet location on National Avenue, where it will then continue to flow in a similar fashion to the existing conditions.

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

- [x] Yes
- [ ] No

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

Description / Additional Information:

The proposed project will include installation of a new perforated pipe along the pervious paver section, as well as a new pump and storm drain pipe.

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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:
Click or tap here to enter text.

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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) Runoff from the site sheet flows along National Avenue towards a curb inlet at the corner of National Avenue and Commercial Street. Runoff is then conveyed via underground storm drain system towards a final point of discharge at the San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. - IND - NAV - REC 1 - REC2 - COMM - BIOL - EST - WILD - RARE - MAR - MIGR - SPWN - SHELL
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations. N/A
Provide distance from project outfall location to impaired or sensitive receiving waters. San Diego Bay - Approx. 6,000'
Sumarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands N/A

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	Copper and PCB's	TBD 2019
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
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Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

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	☒	☐	☐

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Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- [x] 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):

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
- [x] No, No critical coarse sediment yield areas to be protected based on WMAA maps

Discussion / Additional Information:

See aerial of WMAA mapping in Attachment 2. No critical coarse sediment yield areas.

Form I-3B Page 10 of 11

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

The POC for the Los Patios project occurs at the curb outlet located on National Avenue (see Site Map in Attachment 2). Runoff from the site sheet flows along National Avenue towards a curb inlet at the corner of National Avenue and Commercial Street. Runoff is then conveyed via underground storm drain system towards a final point of discharge at the San Diego Bay.

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:

Click or tap here to enter text.

Discussion / Additional Information: (optional)

Click or tap here to enter text.

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.

One of the constraints at the site is the low infiltration rates. Due to this, a full infiltration capability is not feasible. This in turn, requires all the stored runoff which has been infiltrated by the pervious pavers, to be discharged; and since the invert elevation of the proposed storm drain pipe is too low in comparison to the elevation at the property line, a pump must be installed to allow for drainage of the stored runoff.

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.

Click or tap here to enter text.

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Project Name: Los Patios - Mixed Use

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: Click or tap here to enter text.			
SC-2 Storm Drain Stenciling or Signage	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-2 not implemented: No inlets/catch basins proposed			
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: Click or tap here to enter text.			
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: Click or tap here to enter text.			
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: Click or tap here to enter text.			

Project Name: Los Patios - Mixed Use

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. Click or tap here to enter text.			

Project Name: Los Patios - Mixed Use

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: Click or tap here to enter text.			
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: Click or tap here to enter text.			

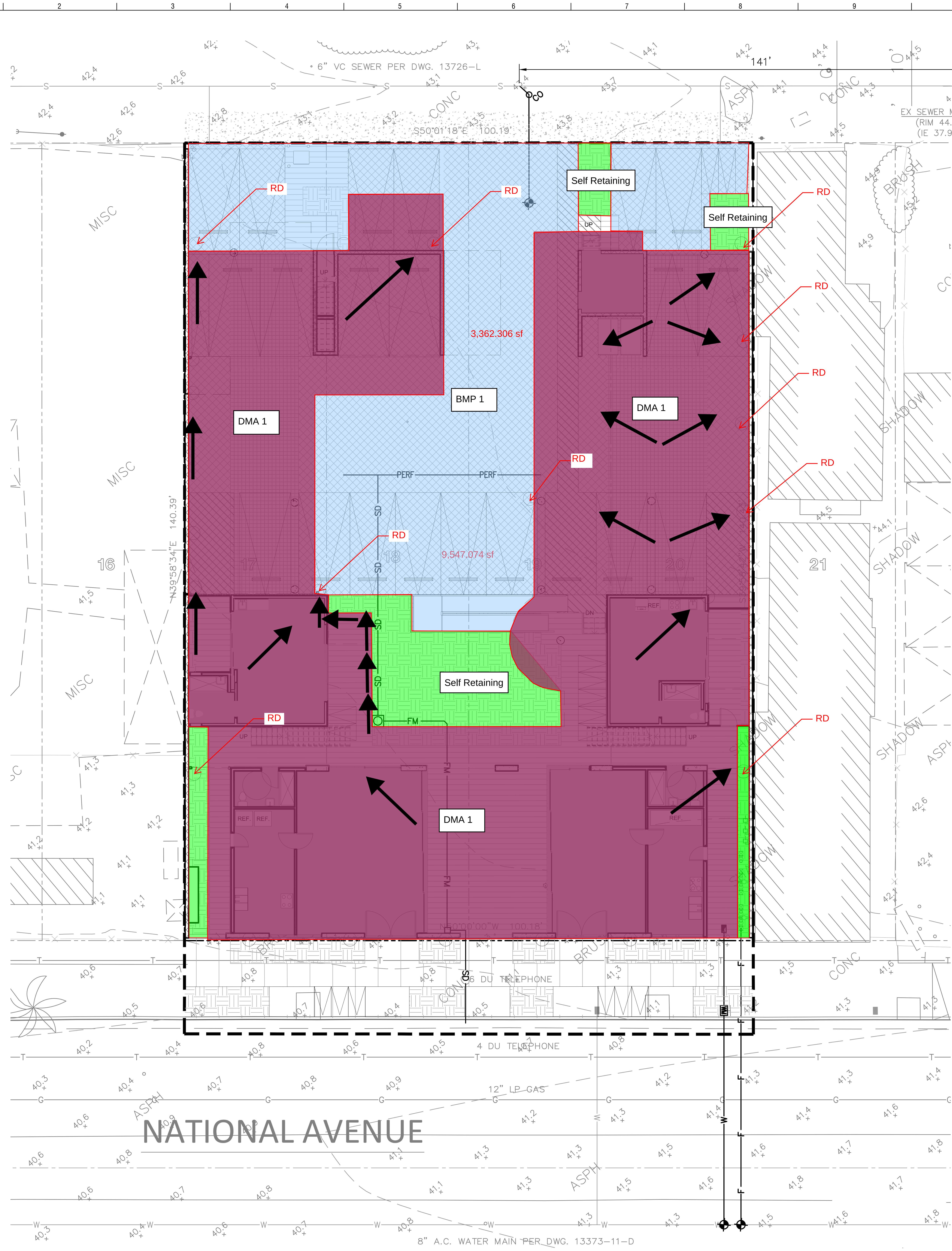
Project Name: Los Patios - Mixed Use

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: Click or tap here to enter text.			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented: Click or tap here to enter text.			
SD-5 Impervious Area Dispersion	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-5 not implemented: Click or tap here to enter text.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☒ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☒ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Project Name: Los Patios - Mixed Use

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: Click or tap here to enter text.			
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: Click or tap here to enter text.			
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-8 not implemented: Click or tap here to enter text.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A

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



LEGEND	STD. DWG.	SYMBOL
EXISTING WATER MAIN		W
EXISTING CURB & PAVING		
EXISTING STORM DRAIN		SD
EXIST. CONCRETE		
EXIST. SEWER LINE		S
NEW BUILDING		
DIRECTION OF FLOW AND SLOPE		
TOP OF CURB ELEVATION FINISH SURFACE ELEVATION		65.90 TC 65.40 FS
FLOW LINE ELEVATION		64.90 FL
PROPERTY LINE		
NEW VEHICULAR PAVERS		
NEW VEHICULAR PERMEABLE PAVERS		
PEDESTRIAN PERMEABLE PAVERS		
PERMEABLE SURFACE		
NEW PCC SIDEWALK CITY STANDARD		
NEW 6" PVC STORM DRAIN		SD
NEW 2" SCH-80 PVC FORCE MAIN		FM
NEW 6" PVC PERFORATED PIPE		PERF
DOWNSPOUT TERMINAL		DS

Roof Areas Draining to BMP 1	9550 sf
Permeable Pavers/BMP	3360 sf
Vegetation/Self Retaining	1100 sf

LEGAL DESCRIPTION

LOTS 17, 18, 19, 20 , BLOCK 139, MANNASSE & SCHILLER'S SUBDIVISION OF PUEBLO LOT 1157, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP NO. 209. (NO TITLE REPORT PROVIDED)

BENCHMARK:

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE SOUTHWEST CORNER OF BEARDSLEY STREET AND NATIONAL AVENUE. ELEVATION 41.90' MEAN SEA LEVEL N.G.V.D. 1929.

BASIS OF BEARINGS

A PORTION OF THE EASTERLY RIGHT OF WAY OF NATIONAL AVENUE AS SHOWN ON CORNER RECORD NO. 23826. I.E. NORTH 50°00'00" WEST.

APN/ADDRESS

ASSESSOR'S PARCEL NUMBER: 538-050-12-00
ADDRESS: 1776 NATIONAL AVENUE

DATE OF SURVEY

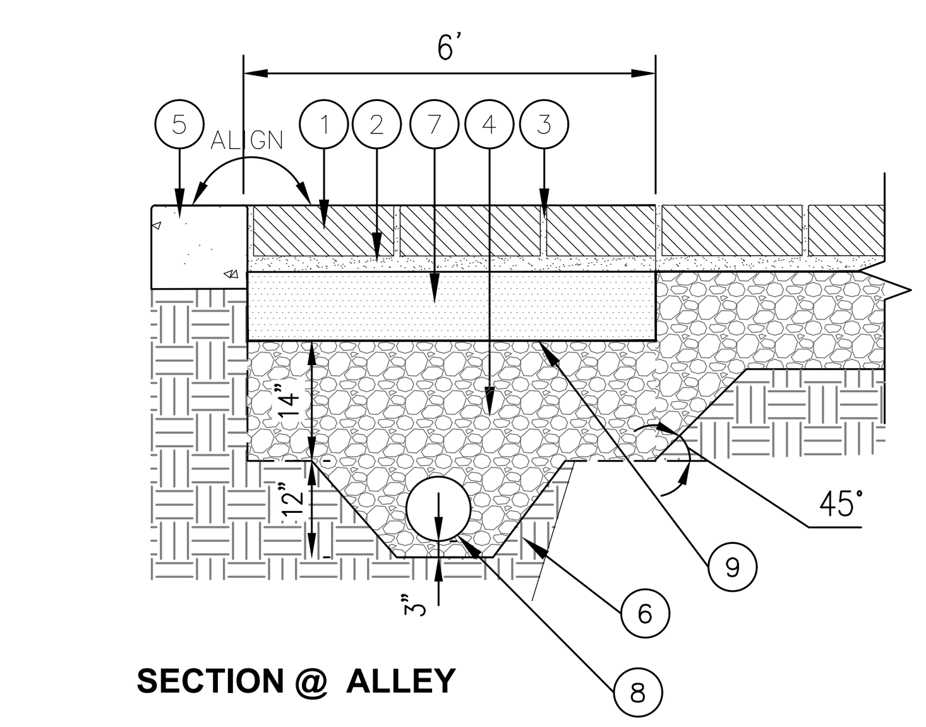
JUNE 1, 2007

TOPOGRAPHICAL SOURCE:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

OWNER

THE FACTORY ROWHOMES, LLC
961 SOUTH 16th STREET
SAN DIEGO, CA 92113



1. 3" MIN. PERMEABLE CONCRETE UNIT PAVERS, SIZE AND TYPE PER ARCHITECTURAL PLANS; INSTALL PER MANUFACTURER SPECIFICATIONS
2. 1"DEEP #8 STONE BEDDING (COLOR TO COMPLIMENT PAVERS)
3. MAX. JOINT WIDTH 1/4" MAX. PER MANUFACTURER
4. 14" DEEP, 3/4" #57 STONE
5. PCC PAVEMENT
6. 90% RELATIVE COMPACTED SUBGRADE
7. 18" DEEP, LOAMY SAND
8. 6" PERFORATED SDR 35 PVC AS SHOWN ON PLAN
9. FILTER FABRIC: MIRAFI -140N

NOTES:
1. REFER TO ARCHITECTURAL PLANS AND LEGEND FOR STAKING, LAYOUT AND PATTERN OF PAVERS
2. PAVERS SHALL BE FLUSH WITH ADJACENT PAVING.

PERMEABLE CONCRETE UNIT PAVER WITH STORMWATER STORAGE

SCALE: NTS

DRAINAGE BMP NOTE:

ALL ON SITE STORM DRAIN ROOF LEADERS TO DISCHARGE TO THE PERMEABLE PAVER.

WATER NOTE:

ALL ON SITE WATER FACILITIES TO BE PRIVATE.

1" = 10'
10 0 10 20
scale feet

REGISTERED PROFESSIONAL ENGINEER
WILLIAM RYAN LUND
NO. 36812
Expires 6/30/2018
CIVIL
STATE OF CALIFORNIA

PRELIMINARY-NOT FOR CONSTRUCTION

BergerABAM
506 West Graham Avenue, Suite 104, Lake Elsinore, CA 92530
10525 Vista Sorrento Parkway, Suite 350, San Diego, CA 92121
(951) 471-1625 Fax: (951) 471-1635
(858) 500-4500 Fax: (858) 500-4501

ARCHITECT:
KATE MEAIRS
+
DEVELOPER:
THE RED OFFICE

LICENSED ARCHITECT
KATHRYN V. MEAIRS
C-31908
REN 12/31/17
STATE OF CALIFORNIA

LOS PATIOS - MIXED USE

1776 NATIONAL AVENUE
BARRIO LOGAN
CALIFORNIA 92113

REVISIONS

DATE & NO.	DESCRIPTION
8/17/16	CDP COMPLETENESS CHECK SUBMITTAL
9/12/16	CDP SUBMITTAL

PROJECT NUMBER:	160306
AGENCY PROJECT NUMBER:	
DATE:	9/22/16
DRAWN BY:	SLL

SWQMP

C4.0

SCALE: As indicated
SHEET: X OF XX

Project Name: Los Patios - Mixed Use

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.

For the Los Patios Mixed Use project, pollutant control and HMP requirements will be achieved by implementing permeable pavers (INF-3). The site has been graded and designed to allow for runoff to sheet flow towards a low point at the center of the site where permeable pavers have been proposed. Stormwater which is infiltrated by the pavers and through a soil media section will then be stored in a gravel section and discharged at National Avenue via new storm drain pipe and pump.

Since the infiltration rates at the site are low, the permeable pavers have been implemented as a flow-thru treatment BMP for storm water pollutant control. The system will be equiped with an underdrain and pump.

Based on worksheet B.2-1, the site produces a DCV of 374 cf. Please see worksheet B. 5-1 for storage and footprint calcs. .

Due to site constraints regarding the elevations at the site, the invert elevation of the proposed storm drain pipe is too low in comparison to the elevation at the property line, therefore, a pump must be installed to allow for drainage of the stored runoff. This pump will also be utilized to assist in the hydromodification requirements at the site. The pump will discharge treated and stored runoff from the permeable pavers at a rate OF 25 GPM (0.056 CFS), which is siginifcantly less than the current 1.23 CFS leaving the site). Please note that the increase in pervious surfaces throughout the proposed site has also resulted in a decrease of full CFS leaving the site. The proposed site would not cause any erosion downstream because runoff leaving the site would be at a rate less than the runoff currently leaving the site.

(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) Click or tap here to enter text.

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No. C-1	
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	Property Owner
Who will be the final owner of this BMP?	Property Owner
Who will maintain this BMP into perpetuity?	Property Owner
What is the funding mechanism for maintenance?	Property Owner

Form I-6 Page 4 of X (Copy as many as needed)
Structural BMP ID No. Click or tap here to enter text.
Construction Plan Sheet No. Click or tap here to enter text.
Discussion (as needed): Click or tap here to enter text.

Project Name: Los Patios - Mixed Use

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

Date Prepared: 8/22/2017	Project No.: Click here to enter text.
Project Applicant: Meriam Chihwaro	Phone: 858-500-4532
Project Address: 1776 National Avenue, San Diego CA 92113	
Project Engineer: Michael MaGee	Phone: 858-500-4519

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

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

Signature: _____

Date of Signature: _ August 22, 2017___

Printed Name: _Michael MaGee__

Title: _Senior Project Manager__

Phone No. _858-500-4519__

Engineer's Stamp

DS-563 (12-15)

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Project Name: Los Patios - Mixed Use

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: Los Patios - Mixed Use

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)

1" = 10'

10 0 10 20
scale feet

LEGEND	STD. DWG.	SYMBOL
EXISTING WATER MAIN		W
EXISTING CURB & PAVING		
EXISTING STORM DRAIN		SD
EXIST. CONCRETE		
EXIST. SEWER LINE		S
NEW BUILDING		
DIRECTION OF FLOW AND SLOPE		
TOP OF CURB ELEVATION / FINISH SURFACE ELEVATION		65.90 TC / 65.40 FS
FLOW LINE ELEVATION		64.90 FL
PROPERTY LINE		
NEW VEHICULAR PAVERS		
NEW VEHICULAR PERMEABLE PAVERS		
PEDESTRIAN PERMEABLE PAVERS		
PERMEABLE SURFACE		
NEW PCC SIDEWALK CITY STANDARD		
NEW 6" PVC STORM DRAIN		SD
NEW 2" SCH-80 PVC FORCE MAIN		FM
NEW 6" PVC PERFORATED PIPE		PERF
DOWNSPOUT TERMINAL		DS

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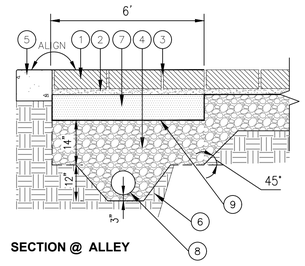
Permeable Pavers/BMP	3360 sf
Vegetation/Self Retaining	1100 sf



SECTION @ ALLEY

1. 3" MIN. PERMEABLE CONCRETE UNIT PAVERS, SIZE AND TYPE PER ARCHITECTURAL PLANS; INSTALL PER MANUFACTURER SPECIFICATIONS
2. 1"DEEP #8 STONE BEDDING (COLOR TO COMPLIMENT PAVERS)
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DRAINAGE BMP NOTE:

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BASIS OF BEARINGS

A PORTION OF THE EASTERLY RIGHT OF WAY OF NATIONAL AVENUE AS SHOWN ON CORNER RECORD NO. 23826. I.E. NORTH 50°00'00" WEST.

APN/ADDRESS

ASSESSOR'S PARCEL NUMBER: 538-050-12-00
ADDRESS: 1776 NATIONAL AVENUE

DATE OF SURVEY

JUNE 1, 2007

TOPOGRAPHICAL SOURCE:

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SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

OWNER

THE FACTORY ROWHOMES, LLC
961 SOUTH 16th STREET
SAN DIEGO, CA 92113

REGISTERED PROFESSIONAL ENGINEER
WILLIAM RYAN LUND
NO. 36812
Expires 6/30/2018
CIVIL
STATE OF CALIFORNIA

PRELIMINARY-NOT FOR CONSTRUCTION

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DRAWN BY: SLL
REVIEWED BY: WRL

ARCHITECT:
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STATE OF CALIFORNIA

LOS PATIOS - MIXED USE

1776 NATIONAL AVENUE
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REVISIONS

NO.	DATE & DESCRIPTION
	8/17/16 CDP COMPLETENESS CHECK SUBMITTAL
	9/12/16 CDP SUBMITTAL

PROJECT NUMBER: 160306
AGENCY PROJECT NUMBER:
DATE: 9/22/16
DRAWN BY: SLL

SWQMP

C4.0

SCALE: As indicated
SHEET: X OF XX

B.1. DCV

DCV is defined as the volume of storm water runoff resulting from the 85th percentile, 24-hr storm event. The following hydrologic method shall be used to calculate the DCV:

Equation B.1-1. Hydrologic Method for DCV

$$DCV = C \times d \times A \times 43{,}560\ sf/ac \times 1/12\ in/ft$$
$$DCV = 3{,}630 \times C \times d \times A$$

where:

DCV	=	Design Capture Volume in cubic feet
C	=	Runoff factor (unitless); refer to section B.1.1
d	=	85th percentile, 24-hr storm event rainfall depth (inches), refer to section B.1.3
A	=	Tributary area (acres) within the project footprint.

DMA 1
C = 0.9 (roof)
d = 0.52
A = 9550 sf = 0.22 ac

DCV = (3630)*(0.9)*(0.55)*(0.22) = 374 cf

DMA 1 flows towards a permeable pavement area which treats, and stores the runoff. The permeable pavement area is sized using the biofiltration method.

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and the following equation.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x = Runoff factor for area X

A_x = Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.

[2]Surface shall be designed in accordance with SD-4 (Amended soils) fact sheet in Appendix E

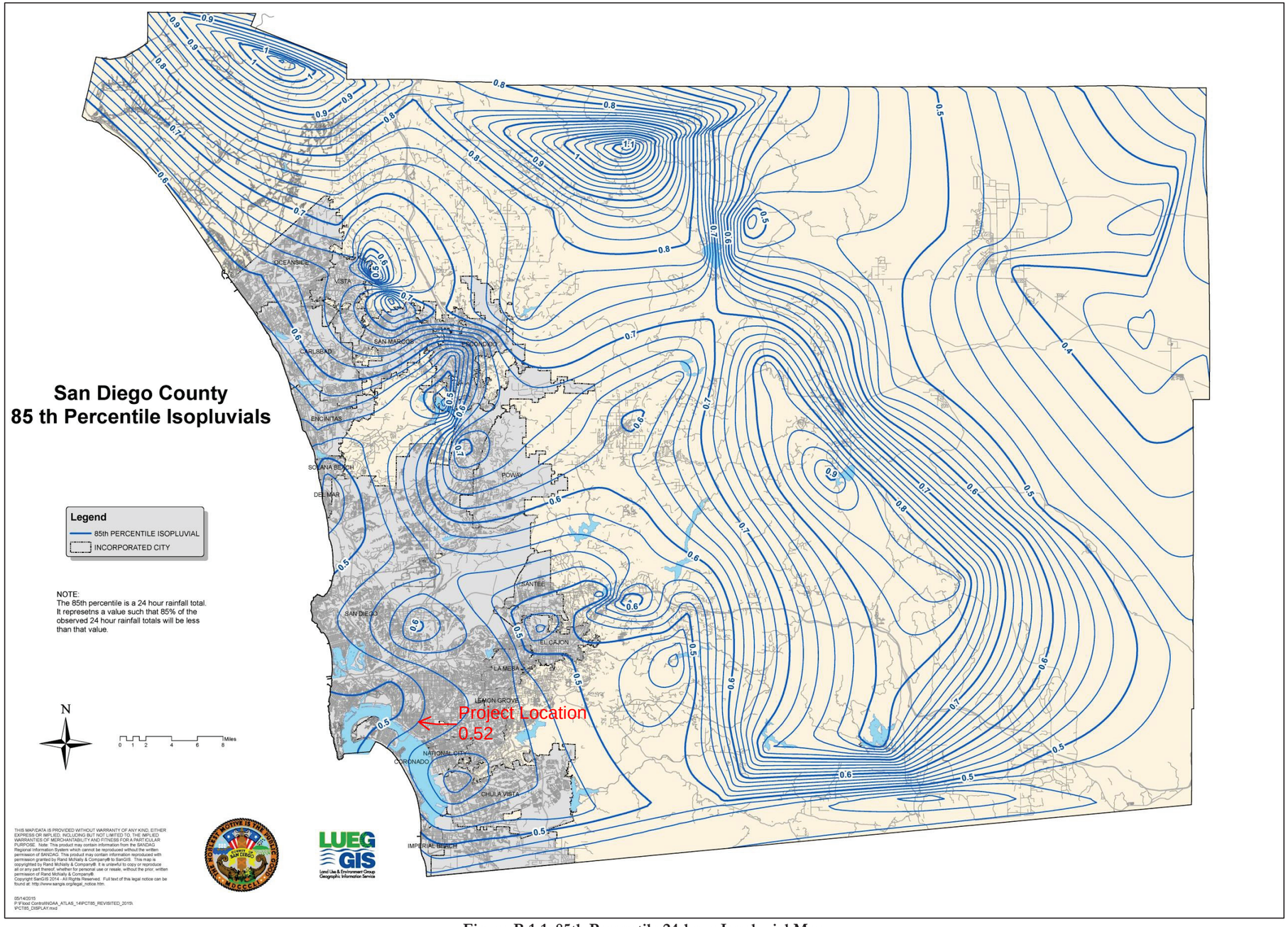


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

- **Linear interpolation** shall be performed if the impervious to pervious area ratio of the site is in between one of ratios for which an adjustment factor was developed;
- Use adjustment factor for a ratio of 1 when the impervious to pervious area ratio is less than 1; and
- Adjustment factor is not allowed when the impervious to pervious area ratio is greater than 4, when the pervious area is designed as a site design BMP.

Example B.2-1: DMA is comprised of one acre of impervious area that drains to a 0.4 acre hydrologic soil group B pervious area and then the pervious area drains to a BMP. Impervious area dispersion is implemented in the DMA in accordance with SD-5 factsheet. Estimate the adjusted runoff factor for the DMA.

- Baseline Runoff Factor per Table B.1-1 = [(1*0.9+0.4*0.14)/1.4] = 0.68.
- Impervious to Pervious Ratio = 1 acre impervious area/ 0.4 acre pervious area = 2.5; since the ratio is 2.5 adjustment can be claimed.
- From Table B.2-1 the adjustment factor for hydrologic soil group B and a ratio of 2 = 0.27; ratio of 3 = 0.42.
- Linear interpolated adjustment factor for a ratio of 2.5 = 0.27 + {[(0.42 -0.27)/(3-2)]*(2.5-2)} = 0.345.
- Adjusted runoff factor for the DMA = [(1*0.9*0.345+0.4*0.14)/1.4] = 0.26.
- Note only the runoff factor for impervious area is adjusted, there is no change made to the pervious area.

B.2.1.2 Green Roofs

When green roofs are implemented in accordance with the SD-6A factsheet the green roof footprint shall be assigned a runoff factor of 0.10 for adjusted runoff factor calculations when the green roof receives runon from other areas within the project footprint.

If a DMA only contains a green roof that is designed in accordance with SD-6A fact sheet, then it can be considered as a self-retaining DMA that meets the storm water pollutant control obligations and no additional DCV calculations are necessary for this DMA.

B.2.1.3 Permeable Pavement

When a permeable pavement is implemented in accordance with the SD-6B factsheet and it **does not have an impermeable liner** and has storage greater than the 85th percentile depth below the underdrain, if an underdrain is present, then the footprint of the permeable pavement shall be assigned a runoff factor of 0.10 for adjusted runoff factor calculations.

Permeable Pavement can also be designed as a structural BMP to treat run on from adjacent areas. Refer to INF-3 factsheet and Appendix B.4 for additional guidance.

Worksheet B.2-1 DCV

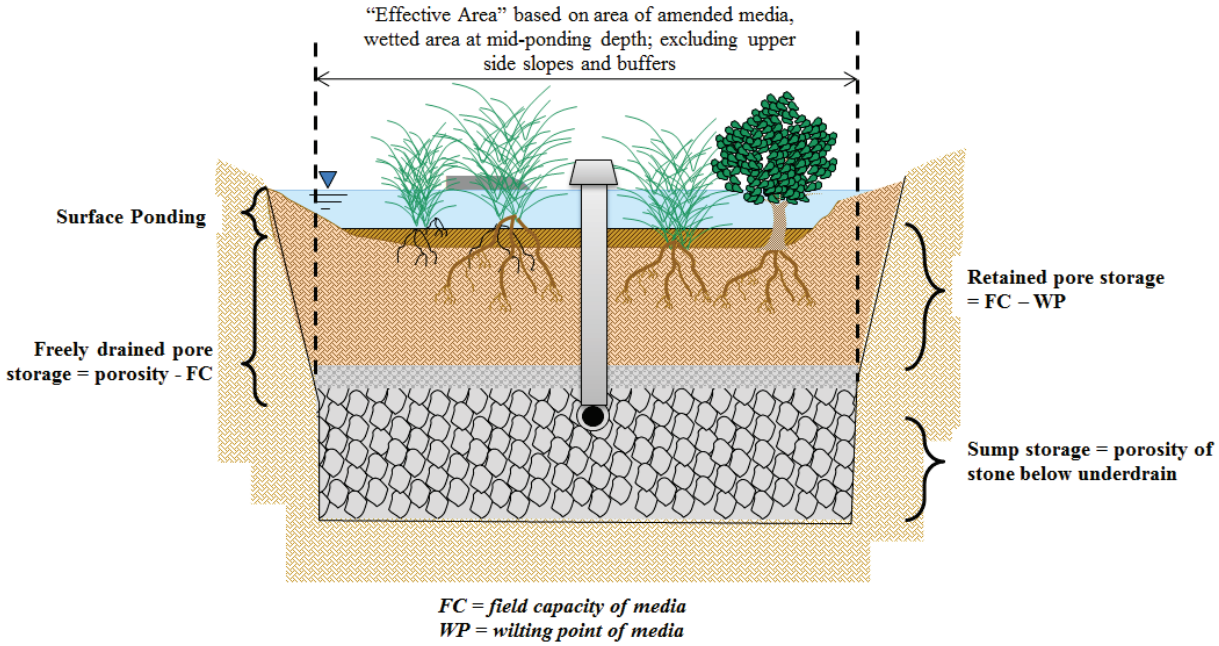
Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	0.22	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.90	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	374	cubic-feet

B.5. Biofiltration BMPs

Biofiltration BMPs shall be sized by one of the following sizing methods:

Option 1: Treat 1.5 times the portion of the DCV not reliably retained onsite, OR

Option 2: Treat 1.0 times the portion of the DCV not reliably retained onsite; and additionally check that the system has a total static (i.e., non-routed) storage volume, including pore spaces and pre-filter detention volume, equal to at least 0.75 times the portion of the DCV not reliably retained onsite.



Explanation of Biofiltration Volume Compartments for Sizing Purposes

Worksheet B.5-1 provides a simple sizing method for sizing biofiltration BMP with partial retention and biofiltration BMP.

When using sizing option 1 a routing period of 6 hours is allowed. The routing period was estimated based on 50th percentile storm duration for storms similar to 85th percentile rainfall depth. It was estimated based on inspection of continuous rainfall data from Lake Wohlford, Lindbergh and Oceanside rain gages.

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

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	374	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]	0	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	0	inches
7	Assumed surface area of the biofiltration BMP	0	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	0	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	374	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	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	14	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)]	14.2	inches
19	Total Depth Treated [Line 17 + Line 18]	44.2	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]	561	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	152	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]	280	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	237	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	9550	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.9	
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]	257	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	257	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 Appendix F.

E.11. INF-3 Permeable Pavement (Pollutant Control)

Location: Kellogg Park, San Diego, California

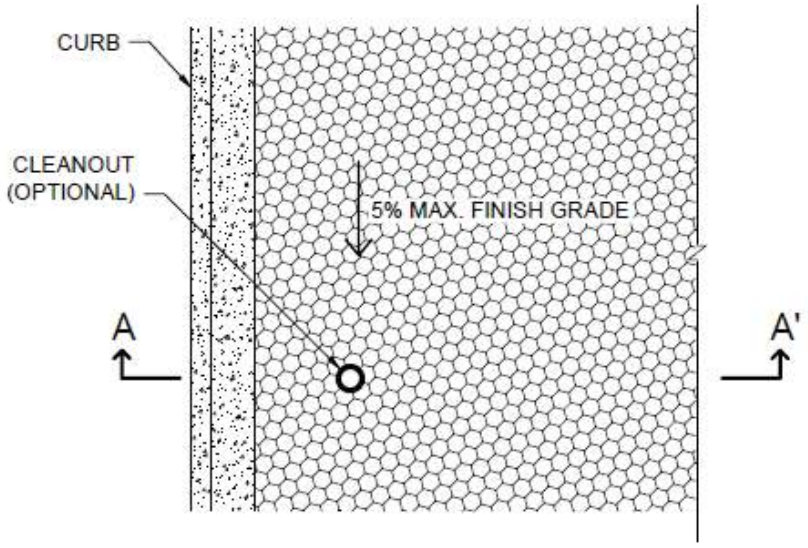
MS4 Permit Category
Retention Flow-thru Treatment Control
Manual Category
Infiltration Flow-thru Treatment Control
Applicable Performance Standard
Pollutant Control Flow Control
Primary Benefits
Volume Reduction Peak Flow Attenuation

Description

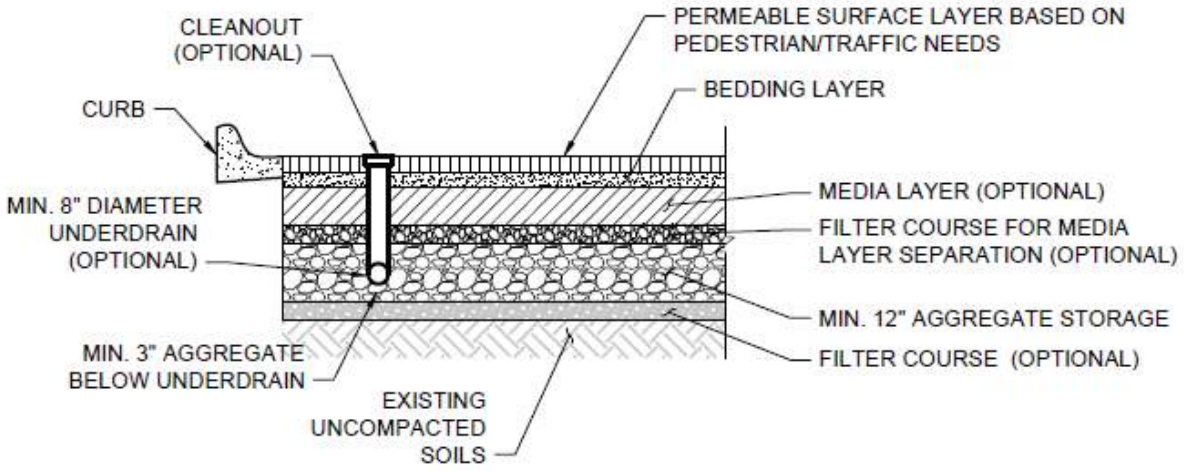
Permeable pavement is pavement that allows for percolation through void spaces in the pavement surface into subsurface layers. The subsurface layers are designed to provide storage of storm water runoff so that outflows, primarily via infiltration into subgrade soils or release to the downstream conveyance system, can be at controlled rates. Varying levels of storm water treatment and flow control can be provided depending on the size of the permeable pavement system relative to its drainage area, the underlying infiltration rates, and the configuration of outflow controls. Pollutant control permeable pavement is designed to receive runoff from a larger tributary area than site design permeable pavement (see SD-6B). Pollutant control is provided via infiltration, filtration, sorption, sedimentation, and biodegradation processes. **Permeable pavements proposed as a retention or partial retention BMP should not have an impermeable liner**.

Typical permeable pavement components include, from top to bottom:

- Permeable surface layer
- Bedding layer for permeable surface
- Aggregate storage layer with optional underdrain(s)
- Optional final filter course layer over uncompacted existing subgrade



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Figure E.11-E.11-1: Typical plan and Section view of a Permeable Pavement BMP

Subcategories of permeable pavement include modular paver units or paver blocks, pervious concrete, porous asphalt, and turf pavers. These subcategory variations differ in the material used for the permeable surface layer but have similar functions and characteristics below this layer.

Design Adaptations for Project Goals

Site design BMP to reduce impervious area and DCV. See site design option SD-6B.

Full infiltration BMP for storm water pollutant control. Permeable pavement without an underdrain and without impermeable liners can be used as a pollutant control BMP, designed to infiltrate runoff from direct rainfall as well as runoff from adjacent areas that are tributary to the pavement. The system must be designed with an infiltration storage volume (a function of the aggregate storage volume) equal to the full DCV and able to meet drawdown time limitations.

Partial infiltration BMP with flow-thru treatment for storm water pollutant control. Permeable pavement can be designed so that a portion of the DCV is infiltrated by providing an underdrain with infiltration storage below the underdrain invert. The infiltration storage depth should be determined by the volume that can be reliably infiltrated within drawdown time limitations. Water discharged through the underdrain is considered flow-thru treatment and is not considered biofiltration treatment. Storage provided above the underdrain invert is included in the flow-thru treatment volume.

Flow-thru treatment BMP for storm water pollutant control. The system may be lined and/or installed over impermeable native soils with an underdrain provided at the bottom to carry away filtered runoff. Water quality treatment is provided via unit treatment processes other than infiltration. This configuration is considered to provide flow-thru treatment, not biofiltration treatment. Significant aggregate storage provided above the underdrain invert can provide detention storage, which can be controlled via inclusion of an orifice in an outlet structure at the downstream end of the underdrain. **PDPs have the option to add saturated storage to the flow-thru configuration in order to reduce the DCV that the BMP is required to treat.** Saturated storage can be added to this design by including an upturned elbow installed at the downstream end of the underdrain or via an internal weir structure designed to maintain a specific water level elevation. The DCV can be reduced by the amount of saturated storage provided.

Integrated storm water flow control and pollutant control configuration. With any of the above configurations, the system can be designed to provide flow rate and duration control. This may include having a deeper aggregate storage layer that allows for significant detention storage above the underdrain, which can be further controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Permeable pavements must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	Intent/Rationale
□	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
□	Selection must be based on infiltration feasibility criteria.	Full or partial infiltration designs must be supported by drainage area feasibility findings.

	Siting and Design	Intent/Rationale
□	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
□	Permeable pavement is not placed in an area with significant overhanging trees or other vegetation.	Leaves and organic debris can clog the pavement surface.
□	For pollutant control permeable pavement, the ratio of the total drainage area (including the permeable pavement) to the permeable pavement should not exceed 4:1.	Higher ratios increase the potential for clogging but may be acceptable for relatively clean tributary areas.
□	Finish grade of the permeable pavement has a slope ≤ 5%.	Flatter surfaces facilitate increased runoff capture.
□	Minimum depth to groundwater and bedrock ≥ 10 ft.	A minimum separation facilitates infiltration and lessens the risk of negative groundwater impacts.
□	Contributing tributary area includes effective sediment source control and/or pretreatment measures such as raised curbed or grass filter strips.	Sediment can clog the pavement surface.
□	Direct discharges to permeable pavement are only from downspouts carrying "clean" roof runoff that are equipped with filters to remove gross solids.	Roof runoff typically carries less sediment than runoff from other impervious surfaces and is less likely to clog the pavement surface.
Permeable Surface Layer		
□	Permeable surface layer type is appropriately chosen based on pavement use and expected vehicular loading.	Pavement may wear more quickly if not durable for expected loads or frequencies.
□	Permeable surface layer type is appropriate for expected pedestrian traffic.	Expected demographic and accessibility needs (e.g., adults, children, seniors, runners, high-heeled shoes, wheelchairs, strollers, bikes) requires selection of appropriate surface layer type that will not impede pedestrian needs.
Bedding Layer for Permeable Surface		

Siting and Design		Intent/Rationale
□	Bedding thickness and material is appropriate for the chosen permeable surface layer type.	Porous asphalt requires a 2- to 4-inch layer of asphalt and a 1- to 2-inch layer of choker course (single-sized crushed aggregate, one-half inch) to stabilize the surface. Pervious concrete also requires an aggregate course of clean gravel or crushed stone with a minimum amount of fines. Permeable Interlocking Concrete Paver requires 1 or 2 inches of sand or No. 8 aggregate to allow for leveling of the paver blocks. Similar to Permeable Interlocking Concrete Paver, plastic grid systems also require a 1- to 2-inch bedding course of either gravel or sand. For Permeable Interlocking Concrete Paver and plastic grid systems, if sand is used, a geotextile should be used between the sand course and the reservoir media to prevent the sand from migrating into the stone media.
□	Aggregate used for bedding layer is washed prior to placement.	Washing aggregate will help eliminate fines that could clog the permeable pavement system aggregate storage layer void spaces or underdrain.
Media Layer (Optional) –used between bedding layer and aggregate storage layer to provide pollutant treatment control		
□	The pollutant removal performance of the media layer is documented by the applicant.	Media used for BMP design should be shown via research or testing to be appropriate for expected pollutants of concern and flow rates.
□	A filter course is provided to separate the media layer from the aggregate storage layer.	Migration of media can cause clogging of the aggregate storage layer void spaces or underdrain.
□	If a filter course is used, calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
□	Consult permeable pavement manufacturer to verify that media layer provides required structural support.	Media must not compromise the structural integrity or intended uses of the permeable pavement surface.
Aggregate Storage Layer		

	Siting and Design	Intent/Rationale
□	Aggregate used for the aggregate storage layer is washed and free of fines.	Washing aggregate will help eliminate fines that could clog aggregate storage layer void spaces or underdrain.
□	Minimum layer depth is 6 inches and for infiltration designs, the maximum depth is determined based on the infiltration storage volume that will infiltrate within a 36-hour drawdown time.	A minimum depth of aggregate provides structural stability for expected pavement loads.
Underdrain and Outflow Structures		
□	Underdrains and outflow structures, if used, are accessible for inspection and maintenance.	Maintenance will improve the performance and extend the life of the permeable pavement system.
□	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
□	Minimum underdrain diameter is 8 inches.	Smaller diameter underdrains are prone to clogging.
□	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
Filter Course (Optional)		
□	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog subgrade and impede infiltration.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where permeable pavement can be used in the site design to replace traditional pavement to reduce the impervious area and DCV. These permeable pavement areas can be credited toward reducing runoff generated through representation in storm water calculations as pervious, not impervious, areas but are not credited for storm water pollutant control. These permeable pavement areas should be designed as self-retaining with the appropriate tributary area ratio identified in the design criteria.
2. Calculate the DCV per Appendix B, taking into account reduced runoff from self-retaining permeable pavement areas.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design permeable pavement for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, maximum finish grade slope, and the recommended tributary area ratio for non-self-retaining permeable pavement. If infiltration is infeasible, the permeable pavement can be designed as flow-thru treatment per the sizing worksheet. If infiltration is feasible, calculations should follow the remaining design steps.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet to determine if full or partial infiltration of the DCV is achievable based on the available infiltration storage volume calculated from the permeable pavement footprint, aggregate storage layer depth, and in-situ soil design infiltration rate for a maximum 36-hour drawdown time. The applicant has an option to use a different drawdown time up to 96 hours if the volume of the facility is adjusted using the percent capture method in Appendix B.4.2.
4. Where the DCV cannot be fully infiltrated based on the site or permeable pavement constraints, an underdrain must be incorporated above the infiltration storage to carry away runoff that exceeds the infiltration storage capacity.
5. The remaining DCV to be treated should be calculated for use in sizing downstream BMP(s).

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, maximum finish grade slope, and the recommended tributary area ratio for non-self-retaining permeable pavement. Design for flow control can be achieving using various design configurations, but a flow-thru treatment design will typically require a greater aggregate storage layer volume than designs which allow for full or partial infiltration of the DCV.
2. Iteratively determine the area and aggregate storage layer depth required to provide infiltration and/or detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If the permeable pavement system cannot fully provide the flow rate and duration control required by this manual, a downstream structure with sufficient storage volume such as an underground vault can be used to provide remaining controls.
4. After permeable pavement has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

Harvest and Use Feasibility Checklist	Form I-7

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:_____

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]

Flushing - 9.3*15 = 139
Irrigation - 10

Total = 149

3. Calculate the DCV using worksheet B-2.1.
DCV = 374 (cubic feet)

3a. Is the 36 hour demand greater than or equal to the DCV?	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36 hour demand less than 0.25DCV?
☐ Yes / ☐ No ⇨ ⇩	☐ Yes / ☐ No ⇨ ⇩	☐ Yes ⇩
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.	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.	Harvest and use is considered to be infeasible.

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.

We will not use harvest and use BMPs for this site. It is not feasible as there is no storage space.

Categorization of Infiltration Feasibility Condition	Worksheet C.4-1

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

The following presents the results of our field infiltration tests:

P-1: 0.16 inches/hour (0.08 inches per hour with FOS=2)

P-2: 0.07 inches/hour (0.04 inches/hour with FOS=2)

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

The project geotechnical report presents undocumented fill, topsoil and Old Paralic Deposits underlie the property. Water that would be allowed to infiltrate would migrate laterally outside of the property limits to the existing right-of-ways and toward the adjacent downtown properties. The adjacent buildings would be affected if water were allowed to infiltrate. Therefore, based on the comprehensive geotechnical evaluation and the very low infiltration rates obtained, full infiltration is not feasible due to the dense to very dense and cemented nature of the underlying materials and the potential for distress to adjacent properties.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on the geotechnical report, groundwater at an elevation of about 5 feet MSL or 36 feet below existing grades. Therefore, infiltration would be feasible above an elevation of 15 feet MSL. 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: We do not expect infiltration will cause water balance issues such as seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters. 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		Not Full 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 to substantiate findings.

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

The following presents the results of our field infiltration tests:

P-1: 0.16 inches/hour (0.08 inches per hour with FOS=2)

P-2: 0.07 inches/hour (0.04 inches/hour with FOS=2)

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Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Criteria	Screening Question	Yes	No
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

The project geotechnical report presents undocumented fill, topsoil and Old Paralic Deposits underlie the property. Water that would be allowed to infiltrate would migrate laterally outside of the property limits to the existing right-of-ways and toward the adjacent downtown properties. The adjacent buildings would be affected if water were allowed to infiltrate. Therefore, based on the comprehensive geotechnical evaluation and the infiltration rates obtained, partial infiltration is feasible.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on the geotechnical report, groundwater at an elevation of about 5 feet MSL or 36 feet below existing grades. Therefore, infiltration would be feasible. 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: We did not provide a study regarding water rights. However, these rights are not typical in the San Diego area. 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.**		Partial 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 to substantiate findings.

GEOCON

Aardvark Permeameter Data Analysis

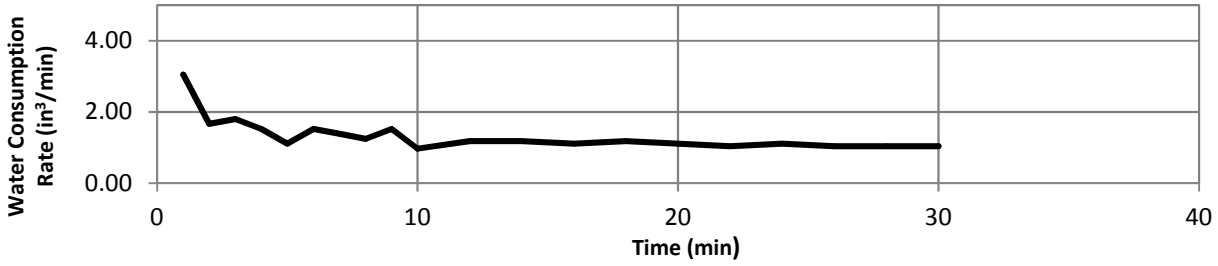
Project Name:	Los Patios	Date:	9/19/2016
Project Number:	G2035-11-01	By:	JML
Borehole Location:	P-1	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

Borehole Diameter (inches):	4.00
Borehole Depth, **H** (feet):	6.33
Distance Between Reservoir & Top of Borehole (feet)	2.54
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	2.00

Wetted Area, **A** (in^2): 130.55

Distance Between Resevoir and APM, **D** (feet):	8.10
Head Height, **h** (inches):	9.39
Distance Between Constant Head and Water Table, **L** (inches):	1133

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			21.140			
2	1.00	1.00		21.030	0.11	0.11	3.05
3	2.00	1.00		20.970	0.06	0.17	1.66
4	3.00	1.00		20.905	0.06	0.23	1.80
5	4.00	1.00		20.850	0.05	0.29	1.52
6	5.00	1.00		20.810	0.04	0.33	1.11
7	6.00	1.00		20.755	0.05	0.39	1.52
8	7.00	1.00		20.705	0.05	0.44	1.39
9	8.00	1.00		20.660	0.04	0.48	1.25
10	9.00	1.00		20.605	0.05	0.54	1.52
11	10.00	1.00		20.570	0.04	0.57	0.97
12	12.00	2.00		20.485	0.09	0.66	1.18
13	14.00	2.00		20.400	0.09	0.74	1.18
14	16.00	2.00		20.320	0.08	0.82	1.11
15	18.00	2.00		20.235	0.09	0.91	1.18
16	20.00	2.00		20.155	0.08	0.98	1.11
17	22.00	2.00		20.080	0.08	1.06	1.04
18	24.00	2.00		20.000	0.08	1.14	1.11
19	26.00	2.00		19.925	0.07	1.22	1.04
20	28.00	2.00		19.850	0.07	1.29	1.04
21	30.00	2.00		19.775	0.08	1.37	1.04
						Steady Flow Rate, Q (in^3/min):	1.04



Field-Saturated Hydraulic Conductivity

Case 1: L/h > 3 K_{sat} = 0.0027 in/min 0.16 in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Los Patios	Date:	9/19/2016
Project Number:	G2035-11-01	By:	JML
Borehole Location:	P-2	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

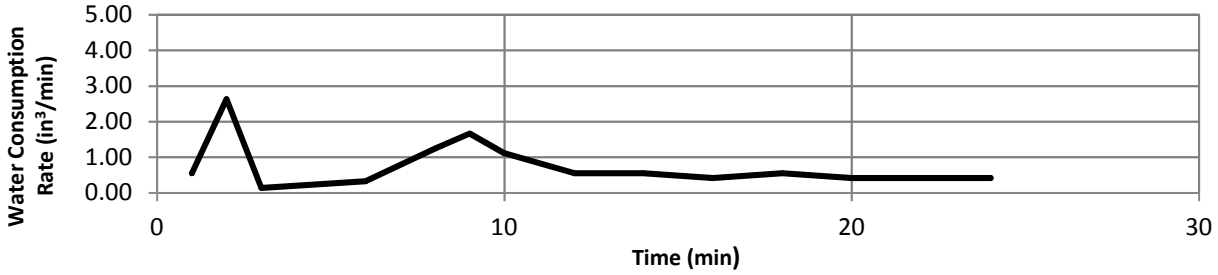
Borehole Diameter (inches):	4.00
Borehole Depth, **H** (feet):	6.13
Distance Between Reservoir & Top of Borehole (feet)	2.42
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	2.00

Wetted Area, **A** (in^2): 128.58

Distance Between Resevoir and APM, **D** (feet):	7.78
Head Height, **h** (inches):	9.23
Distance Between Constant Head and Water Table, **L** (inches):	1136

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			22.300			
2	1.00	1.00		22.280	0.020	0.02	0.55
3	2.00	1.00		22.185	0.095	0.12	2.63
4	3.00	1.00		22.180	0.005	0.12	0.14
5	6.00	3.00		22.145	0.035	0.16	0.32
6	8.00	2.00		22.055	0.090	0.25	1.25
7	9.00	1.00		21.995	0.060	0.31	1.66
8	10.00	1.00		21.955	0.040	0.35	1.11
9	12.00	2.00		21.915	0.040	0.39	0.55
10	14.00	2.00		21.875	0.040	0.43	0.55
11	16.00	2.00		21.845	0.030	0.46	0.42
12	18.00	2.00		21.805	0.040	0.50	0.55
13	20.00	2.00		21.775	0.030	0.53	0.42
14	22.00	2.00		21.745	0.030	0.56	0.42
15	24.00	2.00		21.715	0.030	0.59	0.42

Steady Flow Rate, Q (in^3/min): 0.42



Field-Saturated Hydraulic Conductivity

Case 1: L/h > 3 K_{sat} = 0.0011 in/min 0.07 in/hr

If These Sources Will Be on the Project Site …	… Then Your SWQMP Shall Consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ A. Onsite storm drain inlets ❑ Not Applicable	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide storm water pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ B. Interior floor drains and elevator shaft sump pumps ❑ Not Applicable		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ C. Interior parking garages ❑ Not Applicable		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ D1. Need for future indoor & structural pest control ❑ Not Applicable		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ D2. Landscape/ Outdoor Pesticide Use ❑ Not Applicable	❑ Show locations of existing trees or areas of shrubs and ground cover to be undisturbed and retained. ❑ Show self-retaining landscape areas, if any. ❑ Show storm water treatment facilities.	❑ State that final landscape plans will accomplish all of the following. ❑ Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible. ❑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. ❑ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of periodic saturated soil conditions. ❑ Consider using pest-resistant plants, especially adjacent to hardscape. ❑ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	❑ Maintain landscaping using minimum or no pesticides. ❑ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. ❑ Provide IPM information to new owners, lessees and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ E. Pools, spas, ponds, decorative fountains, and other water features. ❑ Not Applicable	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	❑ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
❑ F. Food service ❑ Not Applicable	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ G. Refuse areas ❑ Not Applicable	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. Also show how the designated area will be protected from wind dispersal. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ H. Industrial processes. ❑ Not Applicable	❑ Show process area.	❑ If industrial processes are to be located onsite, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
❑ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) ❑ Not Applicable	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or runoff from area and protected from wind dispersal. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release Prevention Program ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ J. Vehicle and Equipment Cleaning ❑ Not Applicable	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. ❑ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ K. Vehicle/Equipment Repair and Maintenance ❑ Not Applicable	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to protect from rainfall, run-on runoff, and wind dispersal. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the report, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ L. Fuel Dispensing Areas ❑ Not Applicable	❑ Fueling areas[1] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are (1) graded at the minimum slope necessary to prevent ponding; and (2) separated from the rest of the site by a grade break that prevents run-on of storm water to the MEP. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

[1] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
M. Loading Docks ❑ Not Applicable	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ N. Fire Sprinkler Test Water ❑ Not Applicable		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

O. Miscellaneous Drain or Wash Water ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim ❑ Not Applicable		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps onsite shall feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on Drawings	3 Permanent Controls—List in Table and Narrative	4 Operational BMPs—Include in Table and Narrative
❑ P. Plazas, sidewalks, and parking lots. ❑ Not Applicable			❑ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

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: Los Patios - Mixed Use

Indicate which Items are Included:

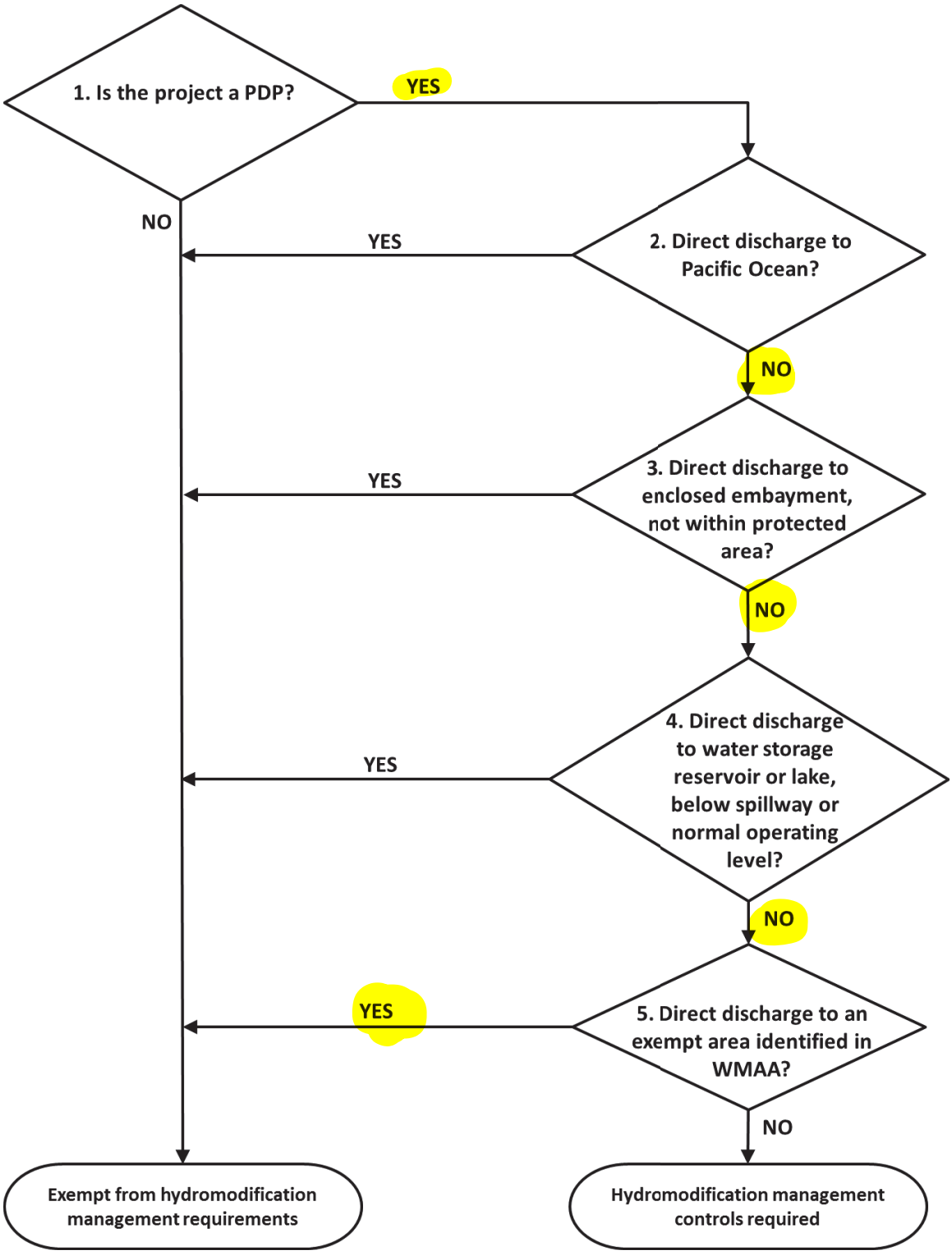
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 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

Project Name: Los Patios - Mixed Use

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

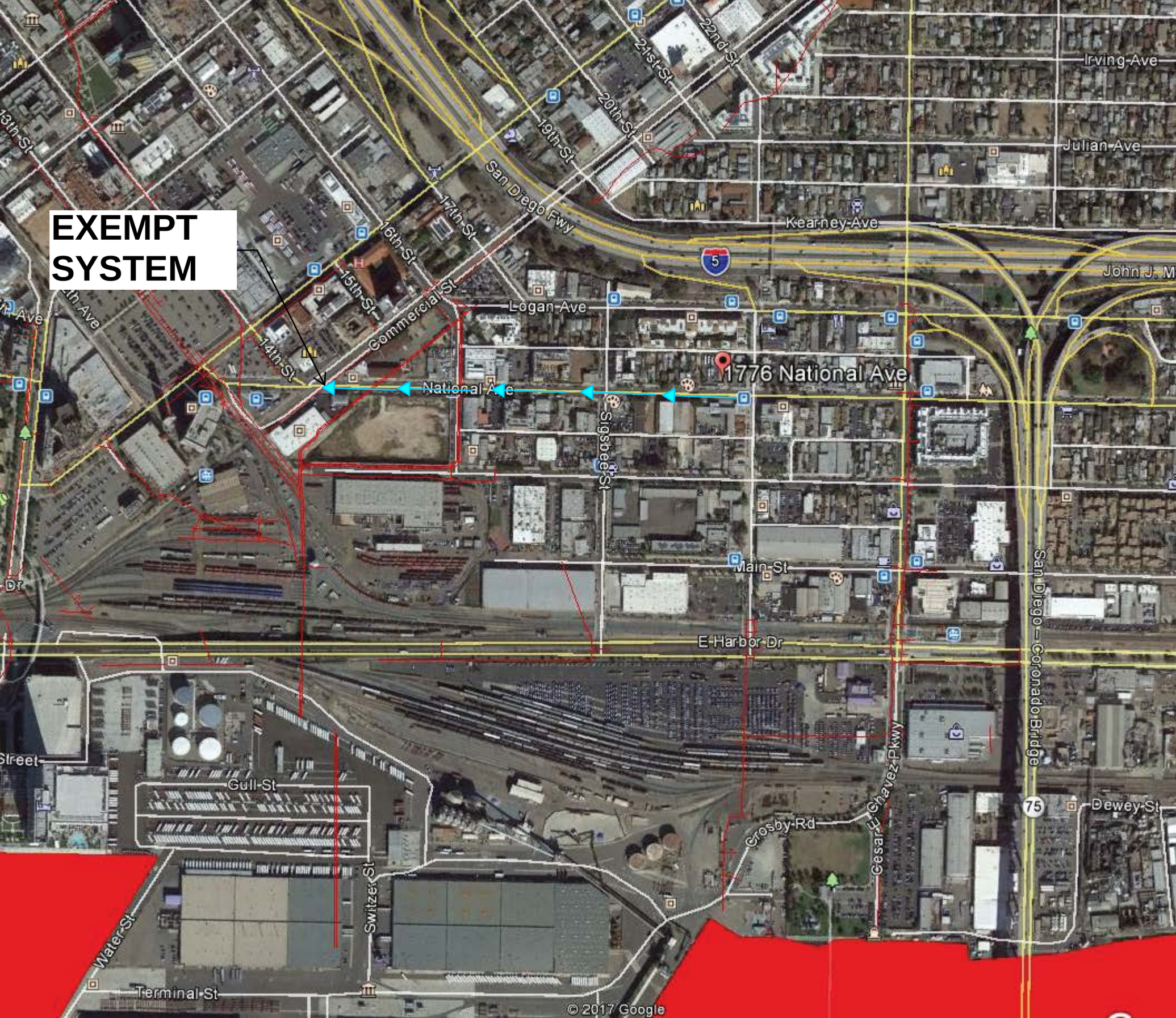
The Hydromodification Management Exhibit must identify:

☐ Underlying hydrologic soil group
☐ Approximate depth to groundwater
☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☐ Critical coarse sediment yield areas to be protected
☐ Existing topography
☐ Existing and proposed site drainage network and connections to drainage offsite
☐ Proposed grading
☐ Proposed impervious features
☐ Proposed design features and surface treatments used to minimize imperviousness
☐ Point(s) of Compliance (POC) for Hydromodification Management
☐ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
☐ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)



*Direct discharge refers to an uninterrupted hardened conveyance system; Note to be used in conjunction with Node Descriptions.

Figure 1-2. Applicability of Hydromodification Management BMP Requirements


EXEMPT SYSTEM
1776 National Ave
National Ave
Logan Ave
Commercial St
San Diego Fwy
Kearney Ave
Irving Ave
Julian Ave
John J. M
Sigsbee St
Main St
E Harbor Dr
San Diego – Coronado Bridge
Dewey St
Crosby Rd
Cesar E Chavez Pkwy
Gull St
Switzer St
Water St
Terminal St
13th St
14th St
15th St
16th St
17th St
19th St
20th St
21st St
22nd St
5
75
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ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Project Name: Los Patios - Mixed Use

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

Project Name: Los Patios - Mixed Use

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

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:

  ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

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 7-3. Maintenance Indicators and Actions for Non-Vegetated Infiltration BMPs

Typical Maintenance Indicator(s) for Non-Vegetated Infiltration BMPs	Maintenance Actions
Accumulation of sediment, litter, or debris in infiltration basin, pre-treatment device, or on permeable pavement surface	Remove and properly dispose accumulated materials.
Standing water in infiltration basin without subsurface infiltration gallery for longer than 96 hours following a storm event	Remove and replace clogged surface soils.
Standing water in subsurface infiltration gallery for longer than 96 hours following a storm event	This condition requires investigation of why infiltration is not occurring. If feasible, corrective action shall be taken to restore infiltration (e.g. flush fine sediment or remove and replace clogged soils). BMP may require retrofit if infiltration cannot be restored. If retrofit is necessary, the City Engineer shall be contacted prior to any repairs or reconstruction.
Standing water in permeable paving area	Flush fine sediment from paving and subsurface gravel. Provide routine vacuuming of permeable paving areas to prevent clogging.
Damage to permeable paving surface	Repair or replace damaged surface as appropriate.
Note: When inspection or maintenance indicates sediment is accumulating in an infiltration BMP, the DMA draining to the infiltration BMP should be examined to determine the source of the sediment, and corrective measures should be made as applicable to minimize the sediment supply.	

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):Click or tap here to enter text..

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)Click or tap here to enter text..

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):Click or tap here to enter text.

(Owner Signature)

Click or tap here to enter text.

(Print Name and Title)

Click or tap here to enter text.

(Company/Organization Name)

Click or tap to enter a date.

(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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ATTACHMENT 5
DRAINAGE REPORT

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

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Hydrology and Drainage Basin Calculations

for

Grading & Improvements

at

LOS PATIOS MIXED USE
1776 National Avenue
San Diego, California 92113

Drawing # xxxxxx-D
Project # xxxxxx
IO # xxxxxxx
APN # 538-050-12-00

PREPARED FOR:

The Red Office, LLC
640 West Beech Street #4
San Diego, CA 92101

PREPARED BY:

BergerABAM

10525 Vista Sorrento Parkway, Suite 350
San Diego, CA 92121
(858) 500-4500 FAX: (858) 500-4501

BergerABAM #A17.090
June 2017

TAB A

Table of Contents

1.0 GENERAL PROJECT INFORMATION

A. Project Site Information

Project Name: Los Patios Mixed Use
Onsite Site Acreage (Private Improvements): 0.32 Acres
Project Address: 1776 National Avenue, San Diego CA 92113
Latitude/Longitude: 32.702370, -117.146970
Flood Plain Status: Zone "X" per FEMA Map Number 06073C1885G, dated May 16th 2012 Areas determined to be outside the 0.2% annual chance flood.

C. Existing Conditions

The Los Patios Mixed Use project is located in the City of San Diego, San Diego County, California. The project site consists of Lots 17 thru 20 of Block 139 of Map number 209 of the City of San Diego. The site is bordered by an alley and additional development/buildings to the north, a separate lot with associated development to the east, National Avenue to the south and additional lots and development to the west. The existing site is currently developed and is completely paved with asphalt surface. The lot consists of one existing building, and the remainder of the site is utilized for bus parking. The existing landscape and pervious areas on the site are minimal to none. The site itself is approximately 100% impervious and 0% pervious. The runoff coefficient, C was determined based on Table 2 of the City of San Diego Drainage Design Manual.

The site currently drains via sheet flow to National Avenue, where runoff continues to flow northwest where it is captured by an existing curb inlet on the corner of National Avenue and Commercial Street.

D. Proposed Conditions

The proposed project will require the demolition of the existing building and all associated hardscape. Multi use units will be constructed on the site, along with all associated hardscape, parking and vehicular pavers, landscaping, trees and pervious pavement.

Drainage from the proposed site will sheet flow towards a low point in the center of the site to allow for runoff to infiltrate through the new proposed pervious pavers. Stormwater will then be stored in a subsurface gravel layer below the pervious pavers, and discharged via new storm drain pipe towards an outlet location on National Avenue. This would allow runoff to follow similar patterns to existing conditions where the pumped runoff will continue to flow along National Avenue, northwest, to the curb inlet on the corner of National Avenue and Commercial Street.

The project site will be approximately 68% impervious and 32% pervious. The runoff coefficient, C was determined based on Table 2 of the City of San Diego Drainage Design Manual.

2.0 DESIGN CRITERIA

Since the project site is less than 320 acres (0.5 square mile), the Rational Method will be used to calculate the runoff rate, as indicated in the City of San Diego Drainage Design Manual.

The Rational Method

Rational Method equation:

$$Q = CIA$$

Where:

Q= Peak Rate of Flow, cfs
C= Runoff Coefficient
I= Average Rainfall Intensity, inches/hour, corresponding with the Time of Concentration
A= Drainage Area, acres

Runoff Coefficient:

A runoff coefficient, C=0.95 will be used for the Impervious Areas of the Los Patios Mixed Use Project per the City of San Diego Drainage Design Manual, dated April 1984. A runoff coefficient of 0.95 will be used for the entire project site.

Table 2. Runoff coefficients (Rational Method)

Developed Areas (Urban)	
Land Use	Coefficient, C Soil Type D
Residential:	
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 0.5 acre)	.45
Commercial	
80% Impervious	**.85***
Industrial	
90% Impervious	**.95**

Notes:

(1) Type D soil to be used for all areas
(2) Where actual conditions deviate, significantly from the tabulated imperviousness values of 80% or 90%, the values given for the coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than **0.50**.

Time of Concentration equation:

The Time of Concentration is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.
The Time of Concentration can be determined using the Urban Areas Overland Time of Flow curves of the City of San Diego Drainage Design Manual.

For the purposes of this report, Time of Concentration was calculated using the following equation:

$$T_C = \left[\frac{1.8 * (1.1 - C) * \sqrt{D}}{\sqrt[3]{s}} \right]$$

Where:

T_C = Time of Concentration, minutes
C = Runoff Coefficient
D = Watercourse Distance (D), ft
S = Slope

The spreadsheet for the Time of Concentration calculation has been set up such that its value cannot be less than five minutes. This results from the small size of the drainage areas, which results in short hydraulic lengths.

Rainfall Intensity:
Rainfall intensity is determined using the Intensity-Duration-Frequency Curves from the City of San Diego Drainage Design Manual.

3.0 EXAMPLE HYDROLOGY CALCULATIONS

Sample area peak flow calculation for Drainage Basin 1 (50-Year Storm Event)

- **Runoff Coefficient (C) = 0.85** (See Table 2 in Tab B)
- **I = 4.00 in/hr** (See Rainfall Intensity-Duration-Frequency Curve in Tab B)
- **Area** = 0.22 acres

Q = 0.85* 4.00 in/hr * 0.22 acres = 0.75 cfs

4.0 Conclusions

Due to the increase in pervious areas from the existing to proposed conditions, the proposed Q leaving the site has decreased.

Per the Rational Method, the 50-yr storm runoff flow under existing conditions is 1.23 cfs. Per the Rational Method, the 50-yr storm runoff flow under proposed conditions is 1.09 cfs. Due to the fact that the proposed site is expected to follow similar drainage patterns to the existing site, and the decrease in runoff, it is therefore not anticipated that the proposed project will have any negative impacts to any adjacent properties or downstream systems.

The project runoff discharges into exempt waters (See Tab B), therefore this project does not require any hydromidifcation analysis.

TAB B

Existing Conditions - Los Patios Mixed Use
Drainage Basin Hydrology: 50 Yr-Storm

Drainage Basin #	Total Area (sf)	Total Area (acres)	Pervious Area (acres)	Impervious Area (acres)	Impervious Area (%)	Pervious Area (%)	*Runoff Coefficient, C	Hydraulic Length (ft)	Change in Elevation (ΔH)	Time of Concentration, Tc (min.)	Slope of Basin (%)	$P_{6, 50\text{-yr}}$ Storm	Intensity, I_{50} (in/hr)	Flow, Q_{50} (cfs)
A	14067	0.32	0.00	0.32	100.00	0.00	0.95	155	2.0	5.0	1.3	2.1	4.00	1.23
Total	14067	0.32	0.00	0.32	100.00	0.00								1.23

APPLICABLE EQUATIONS:

Time of Concentration:
Minimum allowable T_C= 5.0 minutes
See report text for equation.

Expected Runoff/Flow from Drainage Basin (cfs):
Q=C*I*A

Proposed Conditions - Los Patios Mixed Use
Drainage Basin Hydrology: 50 Yr-Storm

Drainage Basin #	Total Area (sf)	Total Area (acres)	Pervious Area (acres)	Impervious Area (acres)	Impervious Area (%)	Pervious Area (%)	*Runoff Coefficient, C	Hydraulic Length (ft)	Change in Elevation (ΔH)	Time of Concentration, Tc (min.)	Slope of Basin (%)	P_6, 50-yr Storm	Intensity, I_{50} (in/hr)	Flow, Q_{50} (cfs)
DMA 1	9550	0.22	0.00	0.22	100.00	0.00	0.85	27	0.5	5.0	1.7	2.1	4.00	0.75
BMP 1	3360	0.08	0.08	0.00	0.00	100.00	0.85	25	0.38	5.0	1.5	2.1	4.00	0.26
Landscape	1100	0.03	0.03	0.00	0.00	100.00	0.85	10	0.5	5.0	5.0	2.1	4.00	0.09
	14010	0.32	0.10	0.22	68.17	31.83								1.09

APPLICABLE EQUATIONS:

Time of Concentration:
Minimum allowable T_C= 5.0 minutes
See report text for equation.

Expected Runoff/Flow from Drainage Basin (cfs):
Q=C*I*A

TAB C

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
	D
Residential:	
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

(1) Type D soil to be used for all areas.

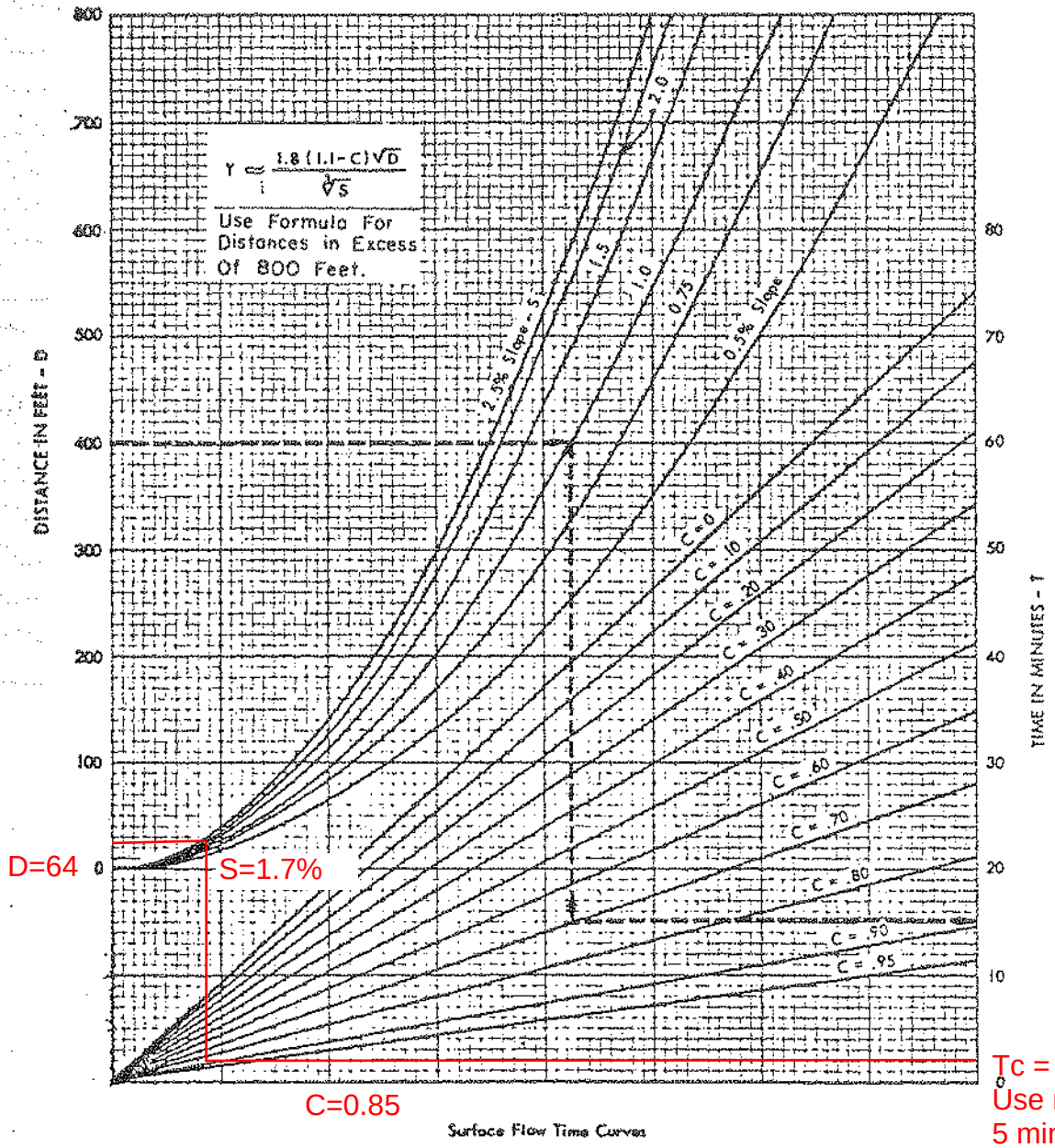
(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

Revised C = $\frac{50}{80}$ x 0.85 = 0.53

URBAN AREAS OVERLAND TIME OF FLOW CURVES

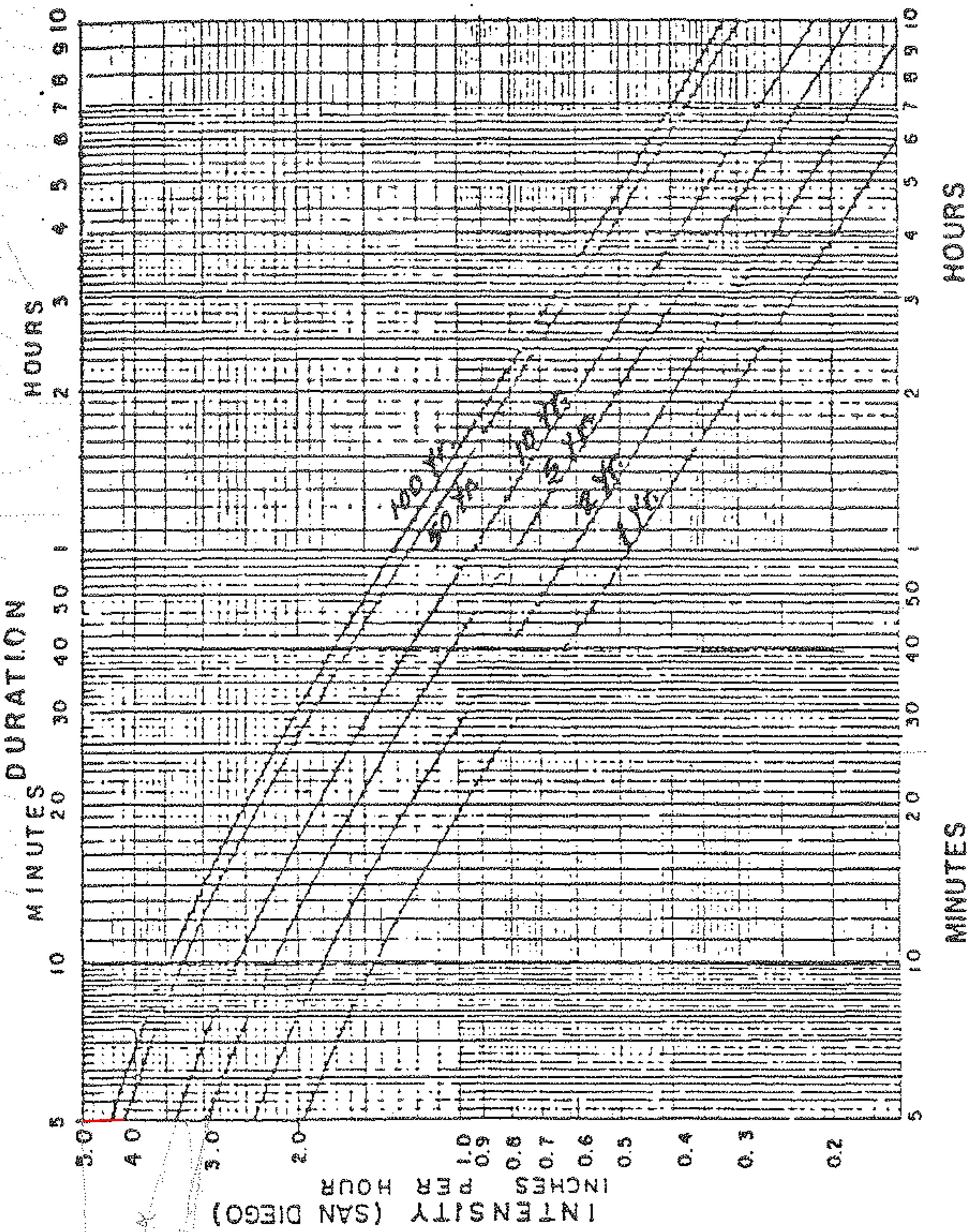


Tc = 2 minutes
Use minimum
5 minutes

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.
SLOPE = 1.0 %
COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES



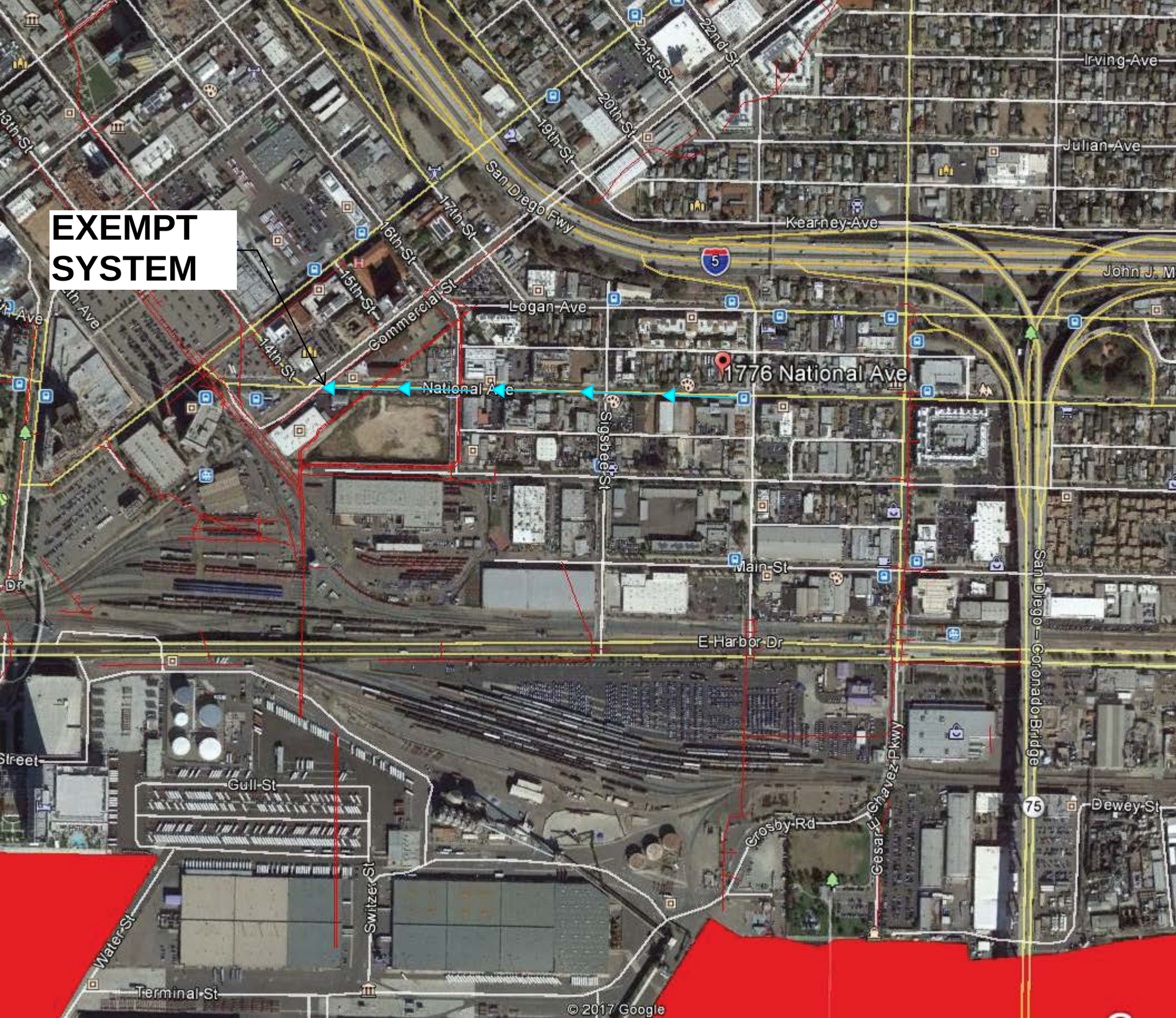
I = 4.0 in/hr

ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

RAINFALL INTENSITY – DURATION – FREQUENC CURVES for COUNTY OF SAN DIEGO

APPENDIX I-


EXEMPT SYSTEM
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VICINITY MAP

LOS PATIOS MIXED USE
1776 NATIONAL AVENUE,
SAN DIEGO 92113

MRC			DATE: June 2017	PROJECT NUMBER: A17.0090	FIG 1

TAB D

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

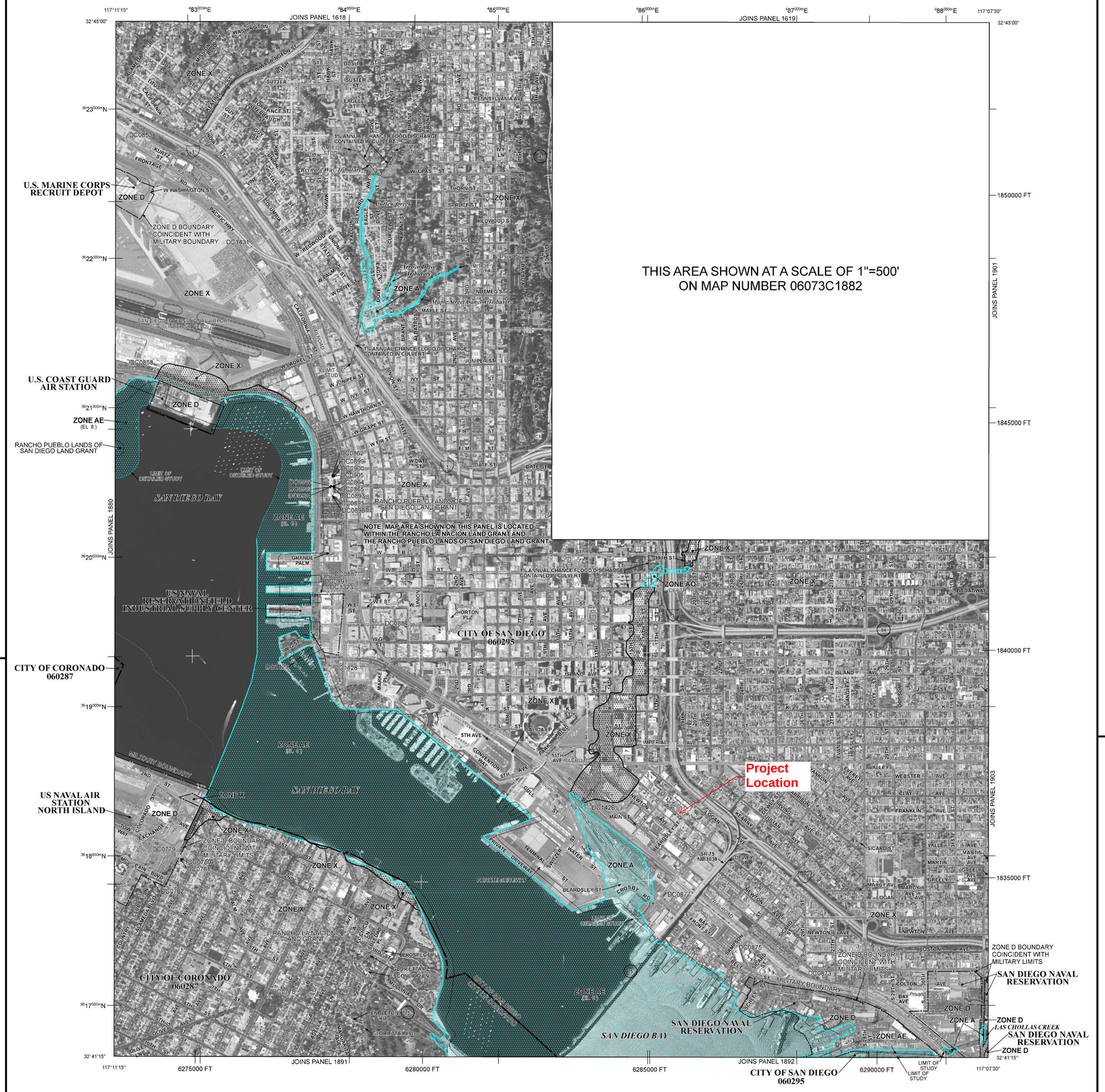
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 (EL 987)	Base Flood Elevation line and value; elevation in feet*
	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT	5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1885G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1885 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CORONADO, CITY OF	060287	1885	G
SAN DIEGO, CITY OF	060295	1885	G

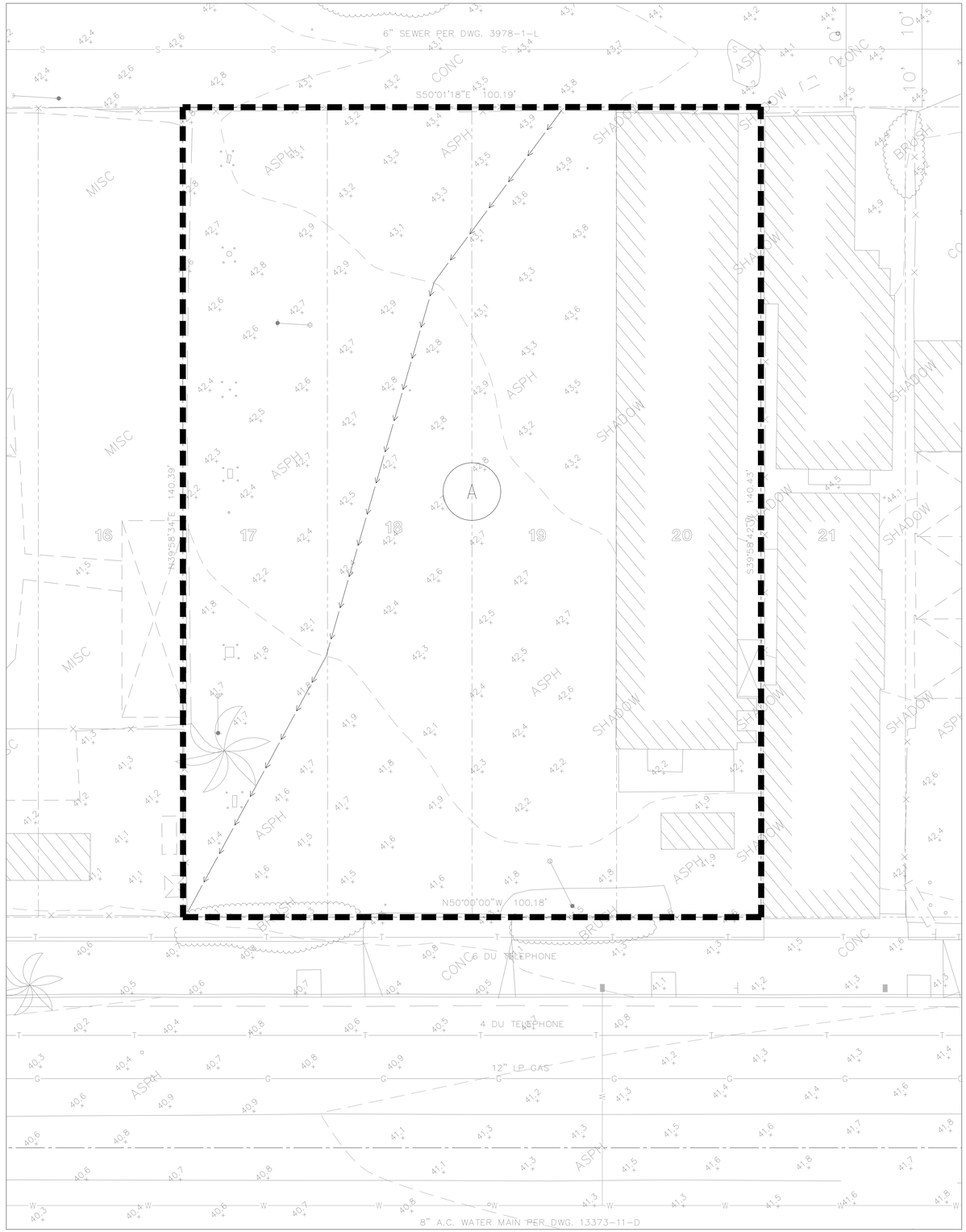
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 06073C1885G

MAP REVISED MAY 16, 2012

Federal Emergency Management Agency

TAB E



LIMIT OF WORK/BASIN

FLOWLINE

A — BASIN IDENTIFIER

E□□□□□□□ C□□d□□□□□ □L□□ □□□□□ M□□□d □□□

□r□□□□□ □ □□□□ □□dr□□□□□□□ **Yr S**□r□

□r□□□□□ □ □□□□ □	T□□□ **Ar**□□ □□□	T□□□ **Ar**□□ □□r□□□	□□r□□□□ **Ar**□□ □□r□□□	I□ □□r□□□□ **Ar**□□ □□r□□□	I□ □□r□□□□ **Ar**□□ □□ □	□□r□□□□ **Ar**□□ □□ □	□□□□□□□ **C** □□□□□□□□ **c**	□□dr□□□□ **L**□□□□ □□□	**C** □□□□□□ □□ **E**□□□□□□	T□□ □ □□ **C** □□□□□r□□□T□ □□ □□□	**S**□□□ □□ □□□□ □□ □	□□□ □□□r **S**□r□	I□□□□□□□□ I□□ □□□r□.	□□□□ □□ □□ □□□□
A	1□0□□	0.32	0.00	0.32	100.00	0.00	0.□□	1□□	2.0	□.0	1.3	2.1	□.00	1.23
T□□□□	1□0□□	0.32	0.00	0.32	100.00	0.00								1.23

1" = 10' scale 10 0 10 20 feet

REGISTERED PROFESSIONAL ENGINEER — WILLIAM RYAN LUND — NO. 36812 — Expires 6/30/2018 — CIVIL — STATE OF CALIFORNIA

PRELIMINARY-NOT FOR CONSTRUCTION

BergerABAM
506 West Graham Avenue, Suite 104, Lake Elsinore, CA 92530
10525 Vista Sorrento Parkway, Suite 350, San Diego, CA 92121
(951) 471-1625 Fax: (951) 471-1635
(858) 500-4500 Fax: (858) 500-4501

DATE: 06/13/17
PLOTTED: 2:10 P
ABAM PROJECT NO: A17.0090
DESIGN BY: MM/SLL
DRAWN BY: SLL
REVIEWED BY: WRL

ARCHITECT:
KATE MEAIRS
+
DEVELOPER:
THE RED OFFICE

LICENSED ARCHITECT — KATHRYN V. MEAIRS — C-31908 REN 12/31/17 — STATE OF CALIFORNIA

LOS PATIOS - MIXED USE

1776 NATIONAL AVENUE
BARRIO LOGAN
CALIFORNIA 92113

NO.	DATE & NO.	REVISIONS DESCRIPTION
	8/17/16	CDP COMPLETENESS CHECK SUBMITTAL
	9/12/16	CDP SUBMITTAL

PROJECT NUMBER: 160306
AGENCY PROJECT NUMBER:
DATE: 9/22/16
DRAWN BY: SLL

EXISTING DRAINAGE CONDITIONS

C1.0

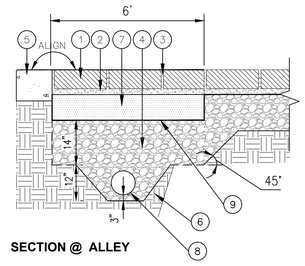
SCALE: As indicated
SHEET: 1 OF XX

1" = 10'

10 0 10 20
scale feet

LEGEND	STD. DWG.	SYMBOL
EXISTING WATER MAIN		W
EXISTING CURB & PAVING		
EXISTING STORM DRAIN		SD
EXIST. CONCRETE		
EXIST. SEWER LINE		S
NEW BUILDING		
DIRECTION OF FLOW AND SLOPE		
TOP OF CURB ELEVATION / FINISH SURFACE ELEVATION		65.90 TC / 65.40 FS
FLOW LINE ELEVATION		64.90 FL
PROPERTY LINE		
NEW VEHICULAR PAVERS		
NEW VEHICULAR PERMEABLE PAVERS		
PEDESTRIAN PERMEABLE PAVERS		
PERMEABLE SURFACE		
NEW PCC SIDEWALK CITY STANDARD		
NEW 6" PVC STORM DRAIN		SD
NEW 2" SCH-80 PVC FORCE MAIN		FM
NEW 6" PVC PERFORATED PIPE		PERF
DOWNSPOUT TERMINAL		DS

Roof Areas Draining to BMP 1	9550 sf
Permeable Pavers/BMP	3360 sf
Vegetation/Self Retaining	1100 sf



SECTION @ ALLEY

1. 3" MIN. PERMEABLE CONCRETE UNIT PAVERS, SIZE AND TYPE PER ARCHITECTURAL PLANS; INSTALL PER MANUFACTURER SPECIFICATIONS
2. 1"DEEP #8 STONE BEDDING (COLOR TO COMPLIMENT PAVERS)
3. MAX. JOINT WIDTH 1/4" MAX. PER MANUFACTURER
4. 14" DEEP, 3/4" #57 STONE
5. PCC PAVEMENT
6. 90% RELATIVE COMPACTED SUBGRADE
7. 18" DEEP, LOAMY SAND
8. 6" PERFORATED SDR 35 PVC AS SHOWN ON PLAN
9. FILTER FABRIC: MIRAFI -140N

NOTES:
1. REFER TO ARCHITECTURAL PLANS AND LEGEND FOR STAKING, LAYOUT AND PATTERN OF PAVERS
2. PAVERS SHALL BE FLUSH WITH ADJACENT PAVING.

PERMEABLE CONCRETE UNIT PAVER WITH STORMWATER STORAGE
SCALE: NTS

DRAINAGE BMP NOTE:

ALL ON SITE STORM DRAIN ROOF LEADERS TO DISCHARGE TO THE PERMEABLE PAVER.

WATER NOTE:

ALL ON SITE WATER FACILITIES TO BE PRIVATE.

LEGAL DESCRIPTION

LOTS 17, 18, 19, 20 , BLOCK 139, MANNASSE & SCHILLER'S SUBDIVISION OF PUEBLO LOT 1157, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP NO. 209. (NO TITLE REPORT PROVIDED)

BENCHMARK:

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE SOUTHWEST CORNER OF BEARDSLEY STREET AND NATIONAL AVENUE. ELEVATION 41.90' MEAN SEA LEVEL N.G.V.D. 1929.

BASIS OF BEARINGS

A PORTION OF THE EASTERLY RIGHT OF WAY OF NATIONAL AVENUE AS SHOWN ON CORNER RECORD NO. 23826. I.E. NORTH 50°00'00" WEST.

APN/ADDRESS

ASSESSOR'S PARCEL NUMBER: 538-050-12-00
ADDRESS: 1776 NATIONAL AVENUE

DATE OF SURVEY

JUNE 1, 2007

TOPOGRAPHICAL SOURCE:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

OWNER

THE FACTORY ROWHOMES, LLC
961 SOUTH 16th STREET
SAN DIEGO, CA 92113

REGISTERED PROFESSIONAL ENGINEER
WILLIAM RYAN LUND
NO. 36812
Expires 6/30/2018
CIVIL
STATE OF CALIFORNIA

PRELIMINARY-NOT FOR CONSTRUCTION

BergerABAM
506 West Graham Avenue, Suite 104, Lake Elsinore, CA 92530
10525 Vista Sorrento Parkway, Suite 350, San Diego, CA 92121
(951) 471-1625 Fax: (951) 471-1635
(858) 500-4500 Fax: (858) 500-4501

DATE: 10/23/17
PLOTTED: 0:11 A
ABAM PROJECT NO.: A17.0090
DESIGN BY: MM/SLL
DRAWN BY: SLL
REVIEWED BY: WRL

ARCHITECT:
KATE MEAIRS
+
DEVELOPER:
THE RED OFFICE

REGISTERED ARCHITECT
KATHRYN V. MEAIRS
C-31908
REN 12/31/17
STATE OF CALIFORNIA

LOS PATIOS - MIXED USE

1776 NATIONAL AVENUE
BARRIO LOGAN
CALIFORNIA 92113

REVISIONS

NO.	DATE & DESCRIPTION
	8/17/16 CDP COMPLETENESS CHECK SUBMITTAL
	9/12/16 CDP SUBMITTAL

PROJECT NUMBER: 160306
AGENCY PROJECT NUMBER:
DATE: 9/22/16
DRAWN BY: SLL

SWQMP

C4.0

SCALE: As indicated
SHEET: X OF XX

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.

GEOCON

Aardvark Permeameter Data Analysis

Project Name: Los Patios
Project Number: G2035-11-01
Borehole Location: P-1
Date: 9/19/2016
By: JML
Ref. EL (feet, MSL):
Bottom EL (feet, MSL):

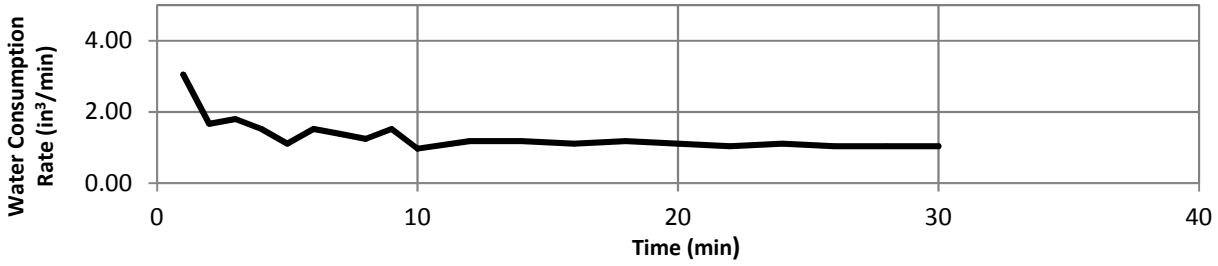
Borehole Diameter (inches): 4.00
Borehole Depth, **H** (feet): 6.33
Distance Between Reservoir & Top of Borehole (feet): 2.54
Depth to Water Table, **s** (feet): 100
Height APM Raised from Bottom (inches): 2.00

Wetted Area, **A** (in^2): 130.55

Distance Between Resevoir and APM, **D** (feet): 8.10
Head Height, **h** (inches): 9.39
Distance Between Constant Head and Water Table, **L** (inches): 1133

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			21.140			
2	1.00	1.00		21.030	0.11	0.11	3.05
3	2.00	1.00		20.970	0.06	0.17	1.66
4	3.00	1.00		20.905	0.06	0.23	1.80
5	4.00	1.00		20.850	0.05	0.29	1.52
6	5.00	1.00		20.810	0.04	0.33	1.11
7	6.00	1.00		20.755	0.05	0.39	1.52
8	7.00	1.00		20.705	0.05	0.44	1.39
9	8.00	1.00		20.660	0.04	0.48	1.25
10	9.00	1.00		20.605	0.05	0.54	1.52
11	10.00	1.00		20.570	0.04	0.57	0.97
12	12.00	2.00		20.485	0.09	0.66	1.18
13	14.00	2.00		20.400	0.09	0.74	1.18
14	16.00	2.00		20.320	0.08	0.82	1.11
15	18.00	2.00		20.235	0.09	0.91	1.18
16	20.00	2.00		20.155	0.08	0.98	1.11
17	22.00	2.00		20.080	0.08	1.06	1.04
18	24.00	2.00		20.000	0.08	1.14	1.11
19	26.00	2.00		19.925	0.07	1.22	1.04
20	28.00	2.00		19.850	0.07	1.29	1.04
21	30.00	2.00		19.775	0.08	1.37	1.04

Steady Flow Rate, Q (in^3/min): 1.04



Field-Saturated Hydraulic Conductivity

Case 1: L/h > 3 K_{sat} = 0.0027 in/min 0.16 in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Los Patios	Date:	9/19/2016
Project Number:	G2035-11-01	By:	JML
Borehole Location:	P-2	Ref. EL (feet, MSL):	
		Bottom EL (feet, MSL):	

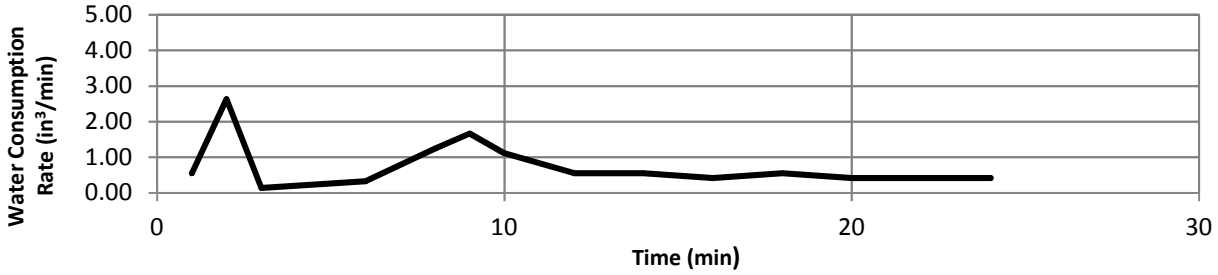
Borehole Diameter (inches):	4.00
Borehole Depth, **H** (feet):	6.13
Distance Between Reservoir & Top of Borehole (feet)	2.42
Depth to Water Table, **s** (feet):	100
Height APM Raised from Bottom (inches):	2.00

Wetted Area, **A** (in^2): 128.58

Distance Between Resevoir and APM, **D** (feet):	7.78
Head Height, **h** (inches):	9.23
Distance Between Constant Head and Water Table, **L** (inches):	1136

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			22.300			
2	1.00	1.00		22.280	0.020	0.02	0.55
3	2.00	1.00		22.185	0.095	0.12	2.63
4	3.00	1.00		22.180	0.005	0.12	0.14
5	6.00	3.00		22.145	0.035	0.16	0.32
6	8.00	2.00		22.055	0.090	0.25	1.25
7	9.00	1.00		21.995	0.060	0.31	1.66
8	10.00	1.00		21.955	0.040	0.35	1.11
9	12.00	2.00		21.915	0.040	0.39	0.55
10	14.00	2.00		21.875	0.040	0.43	0.55
11	16.00	2.00		21.845	0.030	0.46	0.42
12	18.00	2.00		21.805	0.040	0.50	0.55
13	20.00	2.00		21.775	0.030	0.53	0.42
14	22.00	2.00		21.745	0.030	0.56	0.42
15	24.00	2.00		21.715	0.030	0.59	0.42

Steady Flow Rate, Q (in^3/min): 0.42



Field-Saturated Hydraulic Conductivity

Case 1: L/h > 3 K_{sat} = 0.0011 in/min 0.07 in/hr

GEOTECHNICAL INVESTIGATION

LOS PATIOS – MIXED USE
1776 NATIONAL AVENUE
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

THE FACTORY ROWHOMES, LLC
SAN DIEGO, CALIFORNIA

OCTOBER 3, 2016
PROJECT NO. G2035-11-01

Project No. G2035-11-01
October 3, 2016

The Factory Rowhomes, LLC
121 Broadway, Suite 630
San Diego, California 92101

Attention: Mr. Alexander Alemany

Subject: GEOTECHNICAL INVESTIGATION
LOS PATIOS – MIXED USE
1776 NATIONAL AVENUE
SAN DIEGO, CALIFORNIA

Dear Mr. Alemany:

In accordance with your request and our Proposal No. LG-16269, dated July 20, 2016, we herein submit the results of our geotechnical investigation for the subject project. We performed our investigation to evaluate the underlying soil and geologic conditions and potential geologic hazards to assist in the design of the proposed mixed use development. The accompanying report presents the results of our study, conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The site is considered suitable for the proposed development provided the recommendations of this report are incorporated into the design and construction of the planned project.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

John Hoobs
CEG 1524

PROFESSIONAL GEOLOGIST
JOHN HOOBS
No. 1524
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Shawn Foy Weedon
GE 2714

REGISTERED PROFESSIONAL ENGINEER
SHAWN WEEDON
No. 2714
GEOTECHNICAL
STATE OF CALIFORNIA

JH:SFW:dmc

(e-mail) Addressee
(3/del) The Red Office
Attention: Mr. Hector Perez

TABLE OF CONTENTS

TABLE OF CONTENTS (Concluded)

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for the proposed Los Patios – Mixed Use development located in the community of Barrio Logan in San Diego, California (see Vicinity Map, Figure 1). The purpose of this geotechnical investigation is to evaluate the surface and subsurface soil conditions, general site geology, and to identify geotechnical constraints that may impact the planned development of the property. We also performed a fault evaluation to assess whether faults traverse the property. The site is located within a City of San Diego Downtown Special Studies Fault Zone and requires a detailed fault evaluation to satisfy the City of San Diego Building Department requirements. The property is also located east of a State of California Earthquake Fault Zone. In addition, this report provides 2013 CBC seismic design criteria, temporary slope recommendations, shallow foundation and concrete slab-on-grade recommendations, concrete flatwork, retaining wall and lateral load recommendations, storm water management recommendations, and discussions regarding the local geologic hazards including faulting and seismic shaking.

This report includes the area proposed for the construction of the new development and associated improvements as shown on the Geologic Map, Figure 2. We used the civil engineering plan prepared by Berger ABAM for the preparation of our Geologic Map.

The scope of this investigation included reviewing readily available published and unpublished geologic literature (see List of References) including two previous exploratory borings excavated in 2006 on the site to a maximum depth of 19½ feet, one fault trench excavated in 2006 at the site to a maximum depth of 12 feet, previous laboratory testing performed at the site; performing engineering analyses; and preparing this geotechnical investigation report. Appendix A presents the previous exploratory boring logs and fault investigation data. Appendix B presents the previous laboratory test results. In addition, we performed field infiltration testing within the near surface soils to prepare Storm Water Management Recommendations along with Worksheet C.4-1 included in Appendix C.

2. SITE AND PROJECT DESCRIPTION

The site consists of a rectangular-shaped parcel located at 1776 National Avenue in the Barrio Logan area near downtown San Diego, California. The site is occupied by a one-story steel structure in the eastern portion of the property with the remainder of the property containing a paved parking lot. The adjacent property to the west consists of one and two story residential structures and the property to the east consists of a parking lot and one-story retail building. A four-story residential apartment building is located to the north with one level of subterranean parking. National Avenue which fronts

the property to the south, slope gently to the west from approximate elevations of 43 feet to 41 feet above Mean Sea Level (MSL).

Based on our review of the *Architectural Plans for Los Patios – Mixed Use, 1776 National Avenue, Barrio Logan, San Diego, California* prepared by The Red Office dated June 10, 2016; we understand the existing building and parking lot will be demolished to construct a 19 unit, four-story mixed use residential and commercial space complex and on-grade parking for 25 stalls. We also reviewed the *Preliminary Grading, Drainage, and Utility Plan for Los Patios – Mixed Use, 1776 National Avenue, Barrio Logan, San Diego, California,* prepared by Berger ABAM dated September 22, 2016. We have used the grading plan to create our base for the Geologic Map, Figure 2. Based on the referenced plan, it appears permeable pavers will be constructed in the center of the property and would likely be used for storm water management. The location and description of the site and proposed development are based on discussions with you and observations during our previous field investigations. If project details vary significantly from those described herein, Geocon Incorporated should be contacted to evaluate the necessity for review and revision of this report.

3. GEOLOGIC SETTING

The site is located in the coastal plain within the southern portion of the Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges is a geologic and geomorphic province that extends from the Imperial Valley to the Pacific Ocean and from the Transverse Ranges to the north and into Baja California to the south. The coastal plain of San Diego County is underlain by a thick sequence of relatively undisturbed and non-conformable sedimentary rocks that thicken to the west and range in age from Upper Cretaceous through the Pleistocene with intermittent deposition. The sedimentary units are deposited on bedrock Cretaceous to Jurassic age igneous and metavolcanic rocks. Geomorphically, the coastal plain is characterized by a series of 21, stair-stepped marine terraces (younger to the west) that have been dissected by west flowing rivers. The coastal plain is a relatively stable block that is dissected by relatively few faults consisting of the potentially active La Nacion Fault Zone and the active Rose Canyon Fault Zone. The Peninsular Ranges Province is also dissected by the Elsinore Fault Zone that is associated with and sub-parallel to the San Andreas Fault Zone, which is the plate boundary between the Pacific and North American Plates.

The site is located on the western portion of the coastal plain. Marine sedimentary units make up the geologic sequence encountered on the site and consist of Pleistocene-age Old Paralic Deposits Unit 6 (formerly called the Bay Point Formation). The Old Paralic Deposits were deposited roughly 120k years ago and has been named the Nestor Terrace. The Old Paralic Deposits are shallow marine sandstone units with layers containing silt and clay. This unit is estimated to be roughly 35 to 40 feet thick and will extend to near sea level. The San Diego Formation is present below the Old Paralic Deposits and is in excess of 100 feet thick.

The regional geology in the area is predominately controlled by the active Rose Canyon Fault Zone (RCFZ) which transitions from a strike slip fault to the north of the site to several faults that have oblique movements of both strike slip and normal faulting to the west. The San Diego Bay was created as a down dropped block within this fault zone. The zone extends to the south and branches into three segments, Spanish Bight, Coronado, and Silver Strand Faults. There are two active fault zones in downtown area of San Diego: near First Street and in the vicinity of 16th Street and 17th Streets and extends to the south roughly 600 feet west of the site.

4. SOIL AND GEOLOGIC CONDITIONS

The field investigation indicates three geologic units underlie the site: undocumented fill, topsoil, and Old Paralic Deposits (formerly called the Bay Point Formation). The previous boring logs in Appendix A and the Geologic Map, Figure 2, show the occurrence, distribution, and description of the units encountered during our field investigation. The Geologic Cross-Section, Figure 3, and the geologic fault trench in Appendix A, presents a profile view of the underlying geologic conditions. The surficial soil and geologic units are described herein in order of increasing age.

4.1 Undocumented Fill (Qudf)

We encountered undocumented fill in the borings and trenches with a maximum thickness of approximately 7 feet below existing grade. In addition, fill materials with potentially greater thicknesses related to the removal of underground storage tanks (UST's) exist within portions of the property. The fill consists of loose to medium dense, grayish brown, reddish brown, and light to dark brown, silty to clayey sand with varying amounts of gravel. Debris including pieces of brick, asphalt, charcoal, and wood were encountered within the fill. The fault trench was backfilled with non-structural fill at the termination of field exploration activities. The trench backfill, tank removal backfill, and other undocumented fill soils are not suitable for the support of compacted fill or structural loads and remedial grading will be required. In addition, some portions of the undocumented fill may not be reusable as fill due to localized areas of concentrated debris.

4.2 Topsoil (Unmapped)

Topsoil was encountered in the fault trench and borings with a thickness of 3 to 4 feet. The topsoil consists of loose to medium dense, brown to grayish brown, clayey sand and stiff to very stiff sandy clay. The "A" and upper "B" horizon of a typical modern topsoil have been removed during previous site development leaving the lower "B" and "BC" horizons in-place. The topsoil was observed to contain carbonate pods and stringers, ped faces with polished surfaces, pinhole voids, and possess a blocky texture. The topsoil has a gradational lower contact between the "BC" horizon soil and underlying weathered Old Paralic Deposits. The topsoil unit was observed to be continuous across the site. Topsoil is not suitable for the support of compacted fill or structural loads and should be

removed during remedial grading and recompacted. Topsoil is not mapped on the Geologic Map, Figure 2, due to the relatively minor thickness encountered.

4.3 Old Paralic Deposits (Qop)

Pleistocene-age Old Paralic Deposits exist based on the borings and fault trench to the maximum depth explored. This geologic unit consists of dense to very dense and very stiff to hard, brown and olive, silty to clayey sand, clayey to sandy silt, sandy gravel with cobbles, silty sandstone, and clayey siltstone with interlayers of sand, silt, and clay. Localized areas of the sandstone, siltstone, and gravel beds are weakly to moderately cemented. The upper approximately 12 feet of the Old Paralic Deposits has been subdivided into separate, laterally distinctive units for the purpose of stratigraphic correlation (see Fault Trench Log, Appendix A). In general, the bedding within the Old Paralic Deposits was observed to be relatively flat-lying and continuous with no evidence of offset or displacement. In general, the deposits possess a "very low" to "medium" expansion potential (Expansion Index of 90 or less). Old Paralic Deposits are considered suitable for support of structural loads and new compacted fills. Excavations within this unit will likely encounter some difficulty in the cemented zones and oversize material may be generated.

5. GROUNDWATER

We did not encountered groundwater in the previous borings to the maximum depth explored of 19.5 feet or an elevation of roughly 21 feet above MSL. It is typical to see groundwater at an elevation of 0 to 5 feet above MSL in the downtown area which would be a depth of roughly 31 to 36 feet below adjacent existing grades. Based on proposed maximum depth of remedial grading of roughly 12 feet below existing grade, we do not expect groundwater to be encountered during construction of the proposed development. It is possible that perched seepage layers may be encountered during remedial grading operations due to adjacent irrigation and drainage practices. It is not uncommon for perched groundwater conditions to develop where none previously existed. Seepage is dependent on seasonal precipitation, irrigation, land use, among other factors, and varies as a result. Proper surface drainage will be important to future performance of the project.

6. GEOLOGIC HAZARDS

6.1 Geologic Hazard Category

The City of San Diego Seismic Safety Study, Geologic Hazards and Faults, Map Sheet 17 defines the site with a *Hazard Category 13: Downtown Special Fault Zone.* Based on a review of the map, a fault does not traverse the planned development area. In addition, the California Geological Survey has issued a State of California Earthquake Fault Zone Map for the Point Loma Quadrangle, which includes portions of the downtown San Diego area. The property is located about 160 feet east of the Earthquake Fault Zone, as shown in the Earthquake Fault Zone Map, Figure 4. A review of geologic

literature, the on-site fault evaluation, and experience with the soil and geologic conditions in the general area indicate that known active, potentially active, or inactive faults are not located at the site.

6.2 Faulting

By definition of California Geological Survey (CGS), an active fault is a fault that has had surface displacement in Holocene time (approximately 11,000 years). Potentially active faults are defined as faults with activities during the Pleistocene age (between 1,600,000 and 11,000 years ago). According to these definitions, Special Studies Zones mandated by the State of California (Alquist-Priolo) Geologic Hazards Zones Act was adopted. The purpose of this act is to assure that structures with human occupancy are not constructed across traces of active faults.

The California Geological Survey (CGS) has issued a revised State of California Earthquake Fault Zone Map for the Point Loma Quadrangle dated May 1, 2003, which includes portions of the downtown San Diego area. A review of geologic literature, previous fault evaluations, and experience with the soil and geologic conditions in the general area, indicate that known active, potentially active, or inactive faults are not located at the site. The site is, however, located in close proximity to known faults. The property is not located within a State of California Earthquake Fault Zone; however, the site is located approximately 600 feet from the nearest active fault trace designated in downtown San Diego. The property is also located within the City of San Diego Special Studies Fault Zone.

The site is located near the southern onshore portion of the Rose Canyon Fault Zone in an area that is transitional between the predominately right-lateral slip faulting characteristic of the faults north of the downtown area and the predominately dip-slip faulting characteristic of faults making up the southern portion of the Rose Canyon Fault Zone (Treiman, 1993). South of the downtown area, the major faults that compose the southern end of the Rose Canyon Fault Zone are the Spanish Bight, Coronado, and Silver Strand Faults. The east side of this zone is represented by the La Nación Fault (Treiman, 1993). Together, these faults define a wide and complexly faulted basin occupied by San Diego Bay and a narrow section of the continental shelf west of the Silver Strand.

Trenching by Lindvall and others (1990) on the Rose Canyon Fault in Rose Canyon several miles north of the site, by Owen Consultants (referenced by ICG, 1990) for the police station on a site north of E Street, and by Kleinfelder Incorporated at a site near First Avenue and Market Street in the downtown area, have shown that Holocene soil (soil 11,000 years old or less) has been displaced by faulting within the Rose Canyon Fault Zone.

We have reviewed two geotechnical investigation reports and fault studies within the immediate area to the site. The consultants did not observe faulting and, based on our review, we conclude that there was no indication of faulting in the immediate properties. The following is the specific information

from each of these sites that cover north-south and optimum coverage, according to the City of San Diego Guideline. The location of the site in relation to adjacent fault studies and study zones are depicted on the Earthquake Fault Zone Map, Figure 4.

On Site – Geocon performed a fault trench at the site in a roughly northeast – southwest direction to obtain maximum coverage across the property. The log of the fault trench has been included in Appendix A. The log indicates shallow undocumented fill overlying a roughly two foot thick topsoil layer overlying Old Paralic Deposits (formerly called the Bay Point Formation). The topsoil contains soil horizons "BC" and "C" with the upper soil horizons removed during prior grading operations. The Old Paralic Deposits were subdivided into 4 soil units with the upper two units mapped across the site. The information presented in the fault trench has sufficient descriptions and the detail of stratigraphy is adequate to render an opinion regarding the presence of faulting at the Los Patios – Mixed Use site. It is our professional opinion that the topsoil and underlying Old Paralic Deposits are not faulted and structural setbacks are not required for the proposed Los Patios – Mixed Use development.

Site 1 – This site is located on the majority of the city block west of Beardsley Street, south of Logan Avenue, east of Sigsbee Street and north of the alley located north of the Los Patios site. Geocon performed a fault study in 2006 within the public right-a-way north of Logan Avenue for the La Entrada Apartments. The report for the property is titled *Geotechnical and Geologic Fault Investigation, La Entrada, Logan Avenue and Beardsley Street, San Diego, California*, prepared by Geocon Incorporated dated November 22, 2006 (Project No. 07546-22-02). The fault trench was approximately 595 feet long, located in a northwest to southeast direction. The trench varied from 4 to 9 feet deep. A review of the trench log indicates that shallow undocumented fill existed at the surface overlying Old Paralic Deposits (formerly Bay Point Formation). The Old Paralic Deposits were subdivided into 5 soil units which consisted of light brown, grayish brown, and reddish brown, silty sand and clayey sand. The fault trench did expose paleo-liquefaction features consisting of sand dikes and sills. Because there was no shearing associated with these features, it was determined these features are not associated with faulting. The remainder of the soil units was near horizontal without signs of break or disruption evident; therefore, faulting does not exist on the La Entrada Apartment site. In addition, Geocon observed faulting was not present on the La Entrada Apartment site based on our observations during the grading and excavation of the subterranean parking and foundations. We reported our findings in the report titled *Final Report of Testing and Observation Services Performed During Site Grading, La Entrada, W.O. No. 42-7202, Drawing No. 34379-2-D, P.T.S. No. 118636, Logan Avenue and Beardsley Street, San Diego, California,* dated April 17, 2008 (Project No. 07546-22-03).

Based on the presence of detailed information obtained from the previous investigations performed on the site adjacent to the north (as discussed herein) and the information from our on-site

exploratory borings and fault study, it is our opinion the subsurface fault information presented in this report and previous reports is sufficient for the purposes of this project and additional fault trenching at the subject property is not warranted. Furthermore, it is our opinion that faults do not underlie the subject property and that the closest eastern branch of the Rose Canyon Fault to the west of the site is sufficiently defined based on survey data and is approximately located on the Earthquake Fault Zone Map, Figure 4. It is the opinion of Geocon Incorporated that building setbacks are not required for the proposed structures as presently planned.

6.3 Seismicity

The historic seismicity or instrumental seismic record in the San Diego area indicates that there have been numerous minor earthquakes in the San Diego Bay area, including events in 1964 and 1985 between M3 and 4+ (Treiman, 1993). Surface rupture has not been recorded with any of the seismic activity. Anderson and others (1989) indicate that the greatest peak acceleration recorded in the downtown area (at San Diego Light and Power) was 34 cm/sec^2 (0.03g) produced by an offshore earthquake in 1964 (M 5.6).

Anderson and others (1989) have also estimated recurrence times for major earthquakes that may affect the San Diego Region. By combining geologic data with their model for ground motion attenuation for each earthquake event, they have estimated the recurrence rate of various levels of peak ground acceleration in the San Diego area. The results of their work indicate that peak accelerations of 10 to 20 percent gravity (g) are expected approximately once every 100 years (Anderson and others, 1989). Higher peak accelerations will also occur but with a lower probability of occurrence or higher return period.

Lindvall and others (1991) have postulated a maximum likely slip rate of about 2 mm per year and a best estimate of about 1.5 mm per year, based on recent three-dimensional trenching on the Rose Canyon Fault in Rose Canyon several miles north of the site. They found stratigraphic evidence of at least three events during the past 8,100 years. The most recent surface rupture displaces the modern "A" horizon (topsoil), suggesting that this event probably occurred within the past 500 years.

Historically, the Rose Canyon Fault has exhibited low seismicity with respect to earthquakes in excess of magnitude 5.0 or greater. Earthquakes on the Rose Canyon Fault having a maximum magnitude of 6.5 are considered representative of the potential for seismic ground shaking within the property. The "maximum magnitude earthquake" is defined as the maximum earthquake that appears capable of occurring under the presently known tectonic framework.

According to the computer program *EZ-FRISK* (Version 7.65), six known active faults are located within a search radius of 50 miles from the property. We used the 2008 USGS fault database that provides several models and combinations of fault data to evaluate the fault information. Based on

this database, the nearest known active fault is the Newport-Inglewood/Rose Canyon Faults, located approximately 0.9 miles west of the site and is the dominant source of potential ground motion. Earthquakes that might occur on the Newport-Inglewood/Rose Canyon Faults or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Newport-Inglewood/Rose Canyon Faults are 7.5 and 0.61g, respectively. Table 6.3.1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We calculated peak ground acceleration (PGA) using Boore-Atkinson (2008) NGA USGS 2008, Campbell-Bozorgnia (2008) NGA USGS 2008, and Chiou-Youngs (2007) NGA USGS 2008 acceleration-attenuation relationships. The subject site can be classified as Site Class C.

TABLE 6.3.1
DETERMINISTIC SPECTRA SITE PARAMETERS

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Peak Ground Acceleration		
			Boore-Atkinson 2008 (g)	Campbell-Bozorgnia 2008 (g)	Chiou-Youngs 2007 (g)
Newport-Inglewood	0.9	7.5	0.52	0.47	0.61
Rose Canyon	0.9	6.9	0.48	0.47	0.56
Coronado Bank	12	7.4	0.21	0.17	0.21
Palos Verdes Connected	12	7.7	0.23	0.18	0.24
Elsinore	42	7.9	0.11	0.08	0.09
Earthquake Valley	46	6.8	0.06	0.05	0.03

We used the computer program *EZ-FRISK* to perform a probabilistic seismic hazard analysis. The computer program *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mappable Quaternary fault is proportional to the faults slip rate. The program accounts for fault rupture length as a function of earthquake magnitude, and site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore-Atkinson (2008) NGA USGS, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2007) NGA USGS 2008 in the

analysis. Table 6.3.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 6.3.2
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson, 2008 (g)	Campbell-Bozorgnia, 2008 (g)	Chiou-Youngs, 2007 (g)
2% in a 50 Year Period	0.58	0.56	0.68
5% in a 50 Year Period	0.35	0.35	0.40
10% in a 50 Year Period	0.22	0.22	0.24

While listing peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site. Seismic design of the structures should be evaluated in accordance with the California Building Code (CBC) guidelines currently adopted by the City of San Diego.

6.4 Ground Rupture

Ground surface rupture occurs when movement along a fault is sufficient to cause a gap or rupture where the upper edge of the fault zone intersects the earth surface. The potential for ground rupture is considered to be negligible due to the absence of active faults at the subject site.

6.5 Seiches and Tsunamis

Seiches are free or standing-wave oscillations of an enclosed water body that continue, pendulum fashion, after the original driving forces have dissipated. Seiches usually propagate in the direction of longest axis of the basin. The site located approximately 2,400 from San Diego Bay and is at an elevation of approximately 41 to 43 feet above Mean Sea Level (MSL), therefore, the potential of seiches impacting the site is considered to be very low.

A tsunami is a series of long-period waves generated in the ocean by a sudden displacement of large volumes of water. Causes of tsunamis may include underwater earthquakes, volcanic eruptions, or offshore slope failures. The first-order driving force for locally generated tsunamis offshore southern California is expected to be tectonic deformation from large earthquakes (Legg, *et al.*, 2002). The largest tsunami recorded in San Diego since 1950 occurred on May 22, 1960, which had maximum run-up amplitudes of 2.1 feet (0.7 meters) [URS, 2004]. Wave heights and run-up elevations from

tsunamis along the San Diego Coast have historically fallen within the normal range of the tides. Our review of the map titled *Tsunami Inundation Map for Emergency Planning, State of California, County of San Diego, Point Loma Quadrangle, June 1, 2009*, by CEMA, CGS, and USC, shows that the site is not located within the mapped tsunami hazard zone.

6.6 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soil is cohesionless or silt/clay with low plasticity, groundwater is encountered within 50 feet of the surface, and soil relative densities are less than about 70 percent. If the four of the previous criteria are met, a seismic event could result in a rapid pore-water pressure increase from the earthquake-generated ground accelerations. Seismically induced settlement may occur whether the potential for liquefaction exists or not. The potential for liquefaction and seismically induced settlement occurring within the site soil is considered to be very low due to the age and dense nature of the Old Paralic Deposits.

6.7 Landslides

Based on observations during our field investigation and review of published geologic maps for the site vicinity, it is our opinion that potential landslides are not present at the subject property or at a location that could impact the proposed development.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 General

7.1.1 From a geotechnical engineering standpoint, it is our opinion that the site is suitable for development of the proposed mixed use development provided the recommendations presented herein are implemented in design and construction of the project.

7.1.2 With the exception of possible moderate to strong seismic shaking, we did not observe significant geologic hazards or are known to exist on the site that would adversely affect the proposed project.

7.1.3 The site is located within a fault study zone established by the City of San Diego. Our review of fault investigations for the site and adjacent properties and our observations during the previous grading operations to the site to the north indicate that there is no evidence of active, potentially active or inactive faulting observed in the Old Paralic Deposits at the site. It is our opinion that active or potentially active faulting does not pass beneath the site and building setbacks will not be required.

7.1.4 Our field investigation indicates the site is underlain by undocumented fill and topsoil overlying Old Paralic Deposits. The undocumented fill and topsoil is not considered suitable for the support of the proposed development and remedial grading will be required. The Old Paralic Deposits are considered suitable for the support of new compacted fills and settlement-sensitive structures.

7.1.5 We did not encounter groundwater during our previous field investigation to the maximum depth explored of 19.5 feet below the existing ground surface or at approximate elevations 21 feet above MSL. Groundwater in the downtown area is normally at an elevation of about 0 to 5 feet above mean sea level (MSL). Therefore, we do not expect groundwater will be encountered during construction of the proposed development.

7.1.6 The proposed structure can be supported on conventional shallow foundations founded in properly compacted fill.

7.1.7 The proposed project will not impact the structural integrity of the existing public improvements and street right-of-ways located adjacent to the site based on our review of the design plans.

7.1.8 Settlement monuments and canyon subdrains will not be required during development and construction of the planned improvements.

7.2 Excavation and Soil Conditions

7.2.1 Excavations within the undocumented fill, topsoil and Old Paralic Deposits should generally be possible with moderate to heavy effort using conventional heavy-duty equipment. Localized cemented or very hard zones may be encountered within the Old Paralic Deposits that will require very heavy effort to excavate with oversize material generated. The Old Paralic Deposits also can contain cohesionless sand layers. The contractors should be prepared to handle the potential for seepage and caving during the construction operations.

7.2.2 The soil encountered in our previous field investigation is considered to be "expansive" (expansion index greater than 20) as defined by 2013 California Building Code (CBC) Section 1803.5.3. Table 7.2 presents soil classifications based on the expansion index. Based on the results of our previous laboratory testing, presented in Appendix A, we expect the on-site materials will possess a "very low" to "medium" expansion potential (expansion index of 90 or less).

TABLE 7.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification	2013 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

7.2.3 We performed laboratory tests on previous samples to evaluate the percentage of water-soluble sulfate content. Appendix A presents the results from the previous laboratory water-soluble sulfate content tests. The test results indicate that on-site materials at the locations tested possess "Not Applicable" and "S0" sulfate exposure to concrete structures, as defined by 2013 CBC Section 1904 and ACI 318-08 Sections 4.2 and 4.3. The presence of water-soluble sulfate is not a visually discernible characteristic. Therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e. addition of fertilizers and other soil nutrients) may affect the concentration. We should perform additional laboratory tests to evaluate the soil at existing grade subsequent to the grading operations.

7.2.4 Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements that could be susceptible to corrosion are planned.

7.3 Seismic Design Criteria

7.3.1 We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. Table 7.3.1 summarizes site-specific design criteria obtained from the 2013 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class C. We evaluated the Site Class based on blow counts, the discussion in Section 1613.3.2 of the 2013 CBC, and Table 20.3-1 of ASCE 7-10. The values presented in Table 7.3.1 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 7.3.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC Reference
Site Class	C	Table 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.237g	Figure 1613..3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.477g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.000	Table 1613.3.3(1)
Site Coefficient, F_V	1.323	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.237g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.631g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.825g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.421g	Section 1613.3.4 (Eqn 16-40)

7.3.2 Table 7.3.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 7.3.2
2013 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.559g	Figure 22-7
Site Coefficient, F_{PGA}	1.000	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.559g	Section 11.8.3 (Eqn 11.8-1)

7.3.3 Conformance to the criteria in Tables 7.3.1 and 7.3.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive.

7.4 Grading

7.4.1 A pre-construction meeting with the city inspector, owner, general contractor, civil engineer, and geotechnical engineer should be held at the site prior to the beginning of grading excavation and shoring operations. Special soil handling requirements can be discussed at that time.

7.4.2 Earthwork should be observed and compacted fill tested by representatives of Geocon Incorporated.

7.4.3 Grading of the site should commence with the demolition of existing structures, removal of existing improvements, vegetation, and deleterious debris. Deleterious debris and asphalt concrete and concrete footings should be exported from the site and should not be mixed with the fill.

7.4.4 Undocumented fill, tank and trench backfill and topsoil within areas of the development should be removed to expose the underlying Old Paralic Deposits. The Geocon Incorporated fault trench will also require removal ranging up to 12 to 13 feet deep and recompaction during site grading. In addition, portions of the Old Paralic Deposits within the upper 5 feet of finish grade should be removed and replaced with compacted fill, resulting in a minimum fill thickness of 5 feet. The proposed foundation system can be founded in properly compacted fill.

7.4.5 Excavated soil that is generally free of deleterious debris and contamination can be placed as fill and compacted in layers to the design finish-grade elevations. Fill and backfill

materials that will require placement for elevators or adjacent surface improvements should be placed in loose thicknesses of 6 to 8 inches and compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM Test Method D 1557. Fill materials placed below optimum moisture content may require additional moisture conditioning prior to placing additional fill.

7.4.6 Import fill (if necessary) should consist of granular materials with a "very low" to "low" expansion potential (EI of 50 or less) free of deleterious material or stones larger than 3 inches and should be compacted as recommended herein. Geocon Incorporated should be notified of the import source and should perform laboratory testing of import soil prior to its arrival at the site to evaluate its suitability as fill material.

7.5 Temporary Excavations

7.5.1 The recommendations included herein are provided for stable temporary slope excavations. It is the responsibility of the contractor to provide safe excavations during the construction of the proposed project.

7.5.2 Temporary excavations should be made in conformance with OSHA requirements. The undocumented fill and topsoil materials can be considered a Type C soil, compacted fill can be considered a Type B Soil (Type C soil if seepage or groundwater is encountered) and the Old Paralic Deposits can be considered a Type A soil (Type B soil if seepage or groundwater is encountered) in accordance with OSHA requirements. In general, special shoring requirements will not be necessary if temporary excavations will be less than 4 feet in height. Temporary excavations greater than 4 feet in height, however, should be sloped back at an appropriate inclination. These excavations should not be allowed to become saturated or to dry out. Surcharge loads should not be permitted to a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 15 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 15 feet from an existing surface improvement should be shored in accordance with applicable OSHA codes and regulations.

7.5.3 The condition of adjacent buildings, streets, sidewalks, and other structures/improvements around the perimeter of the planned development should be documented prior to the start of grading and excavation work. Special attention should be given to documenting existing cracks or other indications of differential settlement within these adjacent structures, pavements and other improvements.

7.6 Foundation Recommendations

7.6.1 The following foundation recommendations are based on the assumption that the prevailing soils within 4 feet of finish grade will possess a “very low” to “medium” expansion potential (EI of 90 or less) as defined by the 2013 CBC Section 1803.5.3.

7.6.2 The proposed structures can be supported on a conventional shallow foundation system bearing on properly compacted fill. Foundations for the structures should consist of continuous strip footings and/or isolated spread footings. Continuous footings should be at least 12 inches wide and extend at least 24 inches below lowest adjacent pad grade. Isolated spread footings should have a minimum depth and width of 24 inches.

7.6.3 Steel reinforcement for continuous footings should consist of at least four No. 5 steel reinforcing bars placed horizontally in the footings; two near the top and two near the bottom. Steel reinforcement for the spread footings should be designed by the project structural engineer. Figure 5 presents a wall/column footing dimension detail.

7.6.4 The minimum reinforcement recommended herein is based on soil characteristics only (EI of 50 or less) and is not intended to replace reinforcement required for structural considerations.

7.6.5 The recommended allowable bearing capacity for foundations with minimum dimensions described herein is 2,500 psf for footings bearing in properly compacted fill. The allowable soil bearing pressure may be increased by an additional 500 psf for each additional foot of depth and 300 psf for each additional foot of width, to a maximum allowable bearing capacity of 4,000 psf for footings bearing in properly compacted fill soil.

7.6.6 The recommended allowable bearing pressures are for dead plus live loads only and may be increased by up to one-third when considering transient loads due to wind or seismic forces.

7.6.7 Total and differential settlement under the imposed allowable loads is estimated to be a maximum of 1 inch and ½ inch, respectively, with an 8-foot square foundation.

7.6.8 Interior concrete slabs-on-grade should be at least 5 inches thick. As a minimum, reinforcement for slabs-on-grade should consist of No. 4 reinforcing bars placed at 18 inches on center in both horizontal directions.

7.6.9 The concrete slab-on-grade recommendations are based on soil support characteristics only. The project structural engineer should evaluate the structural requirements of the concrete slabs for supporting equipment and storage loads.

7.6.10 Slabs that may receive moisture-sensitive floor coverings or used to store moisture-sensitive materials should be underlain by a vapor retarder. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity controlled environment.

7.6.11 The bedding sand or crushed aggregate thickness (if needed) should be determined by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations if the bedding sand is thicker than 6 inches. It is common to see 3 to 4 inches of sand or crushed aggregate below the concrete slab-on-grade for 5-inch-thick slabs in the southern California area. The foundation design engineer should provide appropriate concrete mix design criteria and curing measures to assure proper curing of the slab by reducing the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation design engineer present the concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

7.6.12 To control the location and spread of concrete shrinkage cracks, crack control joints should be provided. The crack control joints should be created while the concrete is still fresh using a grooving tool, or shortly thereafter using saw cuts. The structural engineer should take into consideration criteria of the American Concrete Institute when establishing crack control spacing patterns.

7.6.13 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisturized to maintain a moist condition as would be expected in any such concrete placement.

7.6.14 Where exterior flatwork abuts the structure at entrant or exit areas, the exterior slab should be dowelled into the structure's foundation stemwall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

7.6.15 Geocon Incorporated should be consulted to provide additional design parameters as required by the structural engineer.

7.6.16 As an alternative to a conventional foundation system, a post-tensioned foundation system can be used to support the planned structures. The post-tensioned systems should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI), Third Edition, as required by the 2013 California Building Code (CBC Section 1808.6). Although this procedure was developed for expansive soil conditions, it can also be used to reduce the potential for foundation distress due to differential fill settlement.

7.6.17 The post-tensioned design should incorporate the geotechnical parameters presented in Table 7.6 for the particular Foundation Category designated. The parameters presented in Table 7.6 are based on the guidelines presented in the PTI, Third Edition design manual. The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer.

TABLE 7.6
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI) Third Edition Design Parameters	Values
Thornthwaite Index	-20
Equilibrium Suction	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	5.1
Edge Lift, y_M (inches)	1.10
Center Lift Moisture Variation Distance, e_M (feet)	9.0
Center Lift, y_M (inches)	0.47

7.6.18 If the structural engineer proposes a post-tensioned foundation design method other than the 2013 CBC:

- The deflection criteria presented in Table 7.6 are still applicable.
- Interior stiffener beams should be used.
- The width of the perimeter foundations should be at least 12 inches.
- The perimeter footing embedment depths and exterior isolated column footings should be at least 24 inches. The embedment depths should be measured from the lowest adjacent pad grade.

7.6.19 Our experience indicates post-tensioned slabs can be susceptible to edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. Current PTI design procedures primarily address the potential center lift of slabs but, because of the placement of the reinforcing tendons in the top of the slab, the resulting eccentricity after tensioning reduces the ability of the system to mitigate edge lift. The structural engineer should design and the contractor should properly construct the foundation system to reduce the potential of edge lift occurring for the proposed structures.

7.6.20 During the construction of the post-tension foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints form between the footings/grade beams and the slab during the construction of the post-tension foundation system unless designed by the structural engineer.

7.6.21 Isolated footings located outside the building slab should have the minimum embedment depth of at least 24 inches. Isolated exterior footings should be connected to the building foundation system with grade beams.

7.6.22 Consideration should be given to connecting patio slabs, which exceed 5 feet in width, to the building foundation to reduce the potential for future separation to occur.

7.6.23 Foundation excavations should be observed by the geotechnical engineer (a representative of Geocon Incorporated) prior to the placement of reinforcing steel to check that the exposed soil conditions are similar to those expected and that they have been extended to the appropriate bearing strata. Foundation modifications may be required if unexpected soil conditions are encountered.

7.7 Concrete Flatwork

7.7.1 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations herein. Slab panels should be a minimum of 4 inches thick and, when in excess of 8 feet square, should be reinforced with 6 x 6 - W2.9/W2.9 (6 x 6 - 6/6) welded wire mesh or No. 3 reinforcing bars at 18 inches on center in both directions to reduce the potential for cracking. In addition, concrete flatwork should be provided with crack control joints to reduce and/or control shrinkage cracking. Crack control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing. Subgrade soil for exterior slabs not subjected to vehicle loads should be compacted in accordance with criteria presented in the grading section prior to concrete placement.

Subgrade soil should be properly compacted and the moisture content of subgrade soil should be checked prior to placing concrete.

7.7.2 Even with the incorporation of the recommendations within this report, the exterior concrete flatwork has a likelihood of experiencing some uplift due to potentially expansive soil beneath grade; therefore, the welded wire mesh should overlap continuously in flatwork to reduce the potential for vertical offsets within flatwork. Additionally, flatwork should be structurally connected to the curbs, where possible, to reduce the potential for offsets between the curbs and the flatwork.

7.7.3 Where exterior concrete flatwork abuts the structure at entrant or exit points, the exterior slab should be dowelled into the structure's foundation stemwall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

7.7.4 The recommendations presented herein are intended to reduce the potential for cracking of slabs and foundations as a result of differential movement. However, even with the incorporation of the recommendations presented herein, foundations and slabs-on-grade will still crack. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack control joints and proper concrete placement and curing. Literature provided by the Portland Concrete Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction, and curing practices, and should be incorporated into project construction.

7.8 Retaining Walls

7.8.1 Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 40 pounds per cubic foot (pcf). Where the backfill will be inclined at 2:1 (horizontal to vertical), an active soil pressure of 55 pcf is recommended. Soil with an expansion index (EI) of greater than 90 should not be used as backfill material behind retaining walls.

7.8.2 Unrestrained walls are those that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall) at the top of the wall. Where walls are restrained from movement at the top, an additional uniform (rectangular) pressure of 7H psf should be added to the active soil pressure where the planned walls are 8 feet or less. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to 2 feet of fill soil should be added. In

addition, the loading from adjacent structures should be incorporated into the design of planned retaining walls by the structural engineer.

7.8.3 The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted granular (EI of 90 or less) free-draining backfill material with no hydrostatic forces or imposed surcharge load. Figure 6 presents a typical retaining wall drain detail. If conditions different than those described are expected, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.

7.8.4 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the CBC. If the project possesses a seismic design category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 18.3.5.12 of the 2013 CBC. The seismic load is dependent on the retained height where H is the height of the wall, in feet, and the calculated loads result in pounds per square foot (psf) exerted at the base of the wall and zero at the top of the wall. A seismic load of 16H should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.559g calculated from ASCE 7-10 Section 11.8.3 and applied a pseudo-static coefficient of 0.3.

7.8.5 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

7.9 Lateral Loading

7.9.1 To resist lateral loads, a passive pressure exerted by an equivalent fluid weight of 350 pounds per cubic foot (pcf) should be used for the design of footings or shear keys poured neat in compacted fill. The passive pressure assumes a horizontal surface extending at least 5 feet, or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance.

7.9.2 If friction is to be used to resist lateral loads, an allowable coefficient of friction between soil and concrete of 0.35 should be used for design.

7.9.3 The passive and frictional resistant loads can be combined for design purposes. The lateral passive pressures may be increased by one-third when considering transient loads due to wind or seismic forces.

7.10 Preliminary Pavement Recommendations

7.10.1 We calculated the flexible pavement sections in general conformance with the *Caltrans Method of Flexible Pavement Design* (Highway Design Manual, Section 608.4) using an estimated Traffic Index (TI) of 5.0 and 5.5 for parking stalls and driveways, respectively. The project civil engineer and owner should review the pavement designations to determine appropriate locations for pavement thickness. The final pavement sections for the parking lot should be based on the R-Value of the subgrade soils encountered at final subgrade elevation. We have assumed an R-Value of 10 and 78 for the subgrade soil and base materials, respectively, for the purposes of this preliminary analysis. Table 7.10.1 presents the preliminary flexible pavement sections. We also understand that the use of pervious pavement is being considered and are discussed herein.

TABLE 7.10.1
PRELIMINARY FLEXIBLE PAVEMENT SECTION

Location	Assumed Traffic Index	Assumed Subgrade R-Value	Pervious or Standard Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Parking stalls	5.0	10	3	9
Driveways	5.5	10	3	11

7.10.2 Prior to placing base materials, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned as necessary, and recompacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM D 1557. Similarly, the base material should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Asphalt concrete should be compacted to a density of at least 95 percent of the laboratory Hveem density in accordance with ASTM D 2726.

7.10.3 Base materials should conform to Section 26-1.028 of the *Standard Specifications for The State of California Department of Transportation (Caltrans)* with a ¾-inch maximum size aggregate. The asphalt concrete should conform to Section 203-6 of the *Standard Specifications for Public Works Construction (Greenbook).*

7.10.4 A rigid Portland cement concrete (PCC) pavement section should be placed in driveway entrance aprons, trash bin loading/storage areas and cross gutters. The concrete pad for trash truck areas should be large enough such that all the truck wheels will be positioned on the concrete during loading. We calculated the rigid pavement section in general conformance with the procedure recommended by the American Concrete Institute report ACI 330R-08 Guide for Design and Construction of Concrete Parking Lots using the parameters presented in Table 7.10.2.

TABLE 7.10.2
RIGID PAVEMENT DESIGN PARAMETERS

Design Parameter	Design Value
Modulus of subgrade reaction, k	100 pci
Modulus of rupture for concrete, M_R	500 psi
Traffic Category, TC	A and C
Average daily traffic, ADTT	10 and 100

7.10.5 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 7.10.3.

TABLE 7.10.3
RIGID PAVEMENT RECOMMENDATIONS

Location	Portland Cement Concrete (inches)
Automobile Parking Stalls (TC=A)	6
Aprons, Driveways, and Cross Gutters (TC=C)	7

7.10.6 The PCC pavement should be placed over subgrade soil that is compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. This pavement section is based on a minimum concrete compressive strength of approximately 3,000 psi (pounds per square inch). Base material will not be required below concrete pavement and flatwork.

7.10.7 A thickened edge or integral curb should be constructed on the outside of concrete slabs subjected to wheel loads. The thickened edge should be 1.2 times the slab thickness or a minimum thickness of 2 inches, whichever results in a thicker edge, and taper back to the recommended slab thickness 4 feet behind the face of the slab (e.g., a 7-inch-thick slab would have a 9-inch-thick edge). Reinforcing steel will not be necessary within the

concrete for geotechnical purposes with the possible exception of dowels at construction joints as discussed herein.

7.10.8 To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab. Crack-control joints should not exceed 30 times the slab thickness with a maximum spacing of 15 feet for the 6- and 7-inch-thick slabs, and should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials. The depth of the crack-control joints should be determined by the referenced ACI report.

7.10.9 To provide load transfer between adjacent pavement slab sections, a butt-type construction joint should be constructed. The butt-type joint should be thickened by at least 20 percent at the edge and taper back at least 4 feet from the face of the slab. As an alternative to the butt-type construction joint, dowelling can be used between construction joints for pavements of 7 inches or thicker. As discussed in the referenced ACI guide, dowels should consist of smooth, 1-inch-diameter reinforcing steel 14 inches long embedded a minimum of 6 inches into the slab on either side of the construction joint. Dowels should be located at the midpoint of the slab, spaced at 12 inches on center and lubricated to allow joint movement while still transferring loads. In addition, tie bars should be installed at the as recommended in Section 3.8.3 of the referenced ACI guide. The structural engineer should provide other alternative recommendations for load transfer.

7.10.10 Concrete curb/gutter should be placed on soil subgrade compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Cross-gutters that will experience vehicular traffic should be placed on subgrade soil compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Base materials should not be placed below the curb/gutter, cross-gutters, or sidewalk so water is not able to migrate from the adjacent parkways to the pavement sections. Where flatwork is located directly adjacent to the curb/gutter, the concrete flatwork should be structurally connected to the curbs to help reduce the potential for offsets between the curbs and the flatwork.

7.10.11 We understand that the use of pervious pavement is being considered from a storm water management perspective. The use of pervious concrete pavement allows potential surface run-off to be stored on-site and infiltrated into the underlying subgrade soil; however, the existing soil underlying the pavement areas consist of compacted fill and is typically not conducive to water infiltration. Therefore, we expect the base/aggregate section for the pervious pavement to extend up to about 5 feet and expose Old Paralic Deposits at the

base. The fault trench backfill should be removed and replaced with two-sack slurry within the paver area. The backfill can be replaced with properly compacted fill within the building areas.

7.10.12 We calculated the decorative paver section general conformance with the *Caltrans Method of Flexible Pavement Design* (Highway Design Manual, Section 608.4) using an estimated Traffic Index (TI) of 10. Based on the Interlocking Concrete Pavement Institute (ICPI), the pavers should possess a minimum thickness of 3⅛ inches overlying 1 to 1½ inch of sand. In addition, the pavers should be installed in a pattern appropriate for vehicular traffic. Table 7.10.4 presents two options for the paver underlayment: compacted base materials or aggregate. Class 2 permeable base should be placed below the storm water quality pavers. The Class 2 permeable base can be replaced by aggregate in accordance with ASTM C 33 and the civil engineer/manufacturer's recommendations. Class 2 base, crushed aggregate base, or rigid pavement (with thicknesses described in Table 3) can be used below the non-storm water quality decorative pavers, if desired.

TABLE 7.10.4
PAVER SECTION RECOMMENDATIONS

Location	Traffic Index (TI)	Assumed Subgrade R-Value	Equivalent Paver Asphalt Concrete Thickness (inches)	Option 1		Option 2
				Estimated Sand Thickness (inches)	Base Materials (inches)	ASTM C 33 Aggregate
Parking Areas	5	10	3	1	9	2" #8 / 4" #57 / 6" #2
Driveways	5.5	10	3	1	11	2" #8 / 4" #57 / 8" #2

7.10.13 The Class 2 permeable base/aggregate section can be thickened to increase the water capacity as required by the project civil engineer. In areas where infiltration would not occur and prior to placing base/aggregate materials, the subgrade soil should be scarified, moisture conditioned as necessary, and recompacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM D 1557. The depth of compaction should be at least 12 inches. Similarly, the base materials should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. The contractor should apply some compactive effort during the installation of the aggregate if base materials are not used.

7.10.14 Water infiltration typically results in saturation of subgrade soil and loss of pavement support characteristics (pavement failure) within roadway areas. In addition, the presence of "free" water ponding under the pavement and/or within the aggregate base could cause a rapid deterioration of the pavement. If infiltration into the subgrade were allowed at the locations of the pervious pavement sections, water migration and the resulting seepage forces can negatively affect the stability of the improvements and cause erosion. Therefore, subdrains should be installed within the base materials as discussed herein.

7.10.15 In areas where pervious pavement is planned (e.g. pervious concrete, pavers), the subgrade materials should be graded to provide positive drainage into a subdrain and controlled drainage device as discussed below. Due to the introduction of water to the subgrade materials, some areas of distress may occur and future repairs may be required. In addition, the pervious pavement should be properly installed, constructed and maintained. The performance of pavement is highly dependent on providing positive drainage away from the edge of the pavement. Ponding of water on or adjacent to pavement areas will likely result in pavement distress and subgrade failure if allowed to occur.

7.10.16 The subgrade of the permeable pavement, pervious pavers, and grasscrete areas should be graded to allow water to flow to a subdrain at a minimum gradient of 2 percent. A subdrain should be installed within the base/rock materials at the low point of the subgrade to reduce the potential for water to build up within the paving section. The subdrain should consist of a 3-inch diameter perforated Schedule 40, PVC pipe and should be connected to an approved drainage device. A continuous impermeable liner or rigid impermeable barrier should be installed along the sides of the water quality paver section to prevent lateral water migration. The liner or impermeable barrier should consist of a high density polyethylene (HDPE) with a minimum thickness of 15 mil or equivalent and extend to the subgrade elevation. The liner/barrier should be sealed at the connections in accordance with manufacturer recommendations and should be properly waterproofed at the drain connection.

7.10.17 Drainage from landscaped areas should be directed to controlled drainage structures. Landscape areas adjacent to the edge of pavements are not recommended due to the potential for surface or irrigation water to infiltrate the underlying permeable aggregate base and cause distress. Where such a condition cannot be avoided, consideration should be given to incorporating measures that will significantly reduce the potential for subsurface water migration into the aggregate base. If planter islands are planned and liners are not installed, the perimeter curb should extend at least 6 inches below the level of the base materials.

7.11 Site Drainage and Moisture Protection

7.11.1 Adequate site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings and improvements. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2013 CBC 1804.3 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed structure.

7.11.2 In the case of basement walls or building walls retaining landscaping areas, a water-proofing system should be used on the wall and joints, and a Miradrain drainage panel (or similar) should be placed over the waterproofing. A perforated drainpipe of schedule 40 or better should be installed at the base of the wall below the floor slab and drained to an appropriate discharge area. Accordion-type pipe is not acceptable. The project architect or civil engineer should provide detailed specifications on the plans for all waterproofing and drainage.

7.11.3 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

7.11.4 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that area drains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes be used. In addition, where landscaping is planned adjacent to the pavement, we recommend construction of a cutoff wall along the edge of the pavement that extends at least 6 inches below the bottom of the base materials.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based on the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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LOS PATIOS - MIXED USE
1776 NATIONAL AVENUE
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DATE 10 - 03 - 2016	PROJECT NO. G2035 - 11 - 01	FIG. 1

Plotted:10/03/2016 8:57AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G2035-11-01 Los Patios - Mixed Use\DETAILS\G2035-11-01_Vicinity Map.dwg

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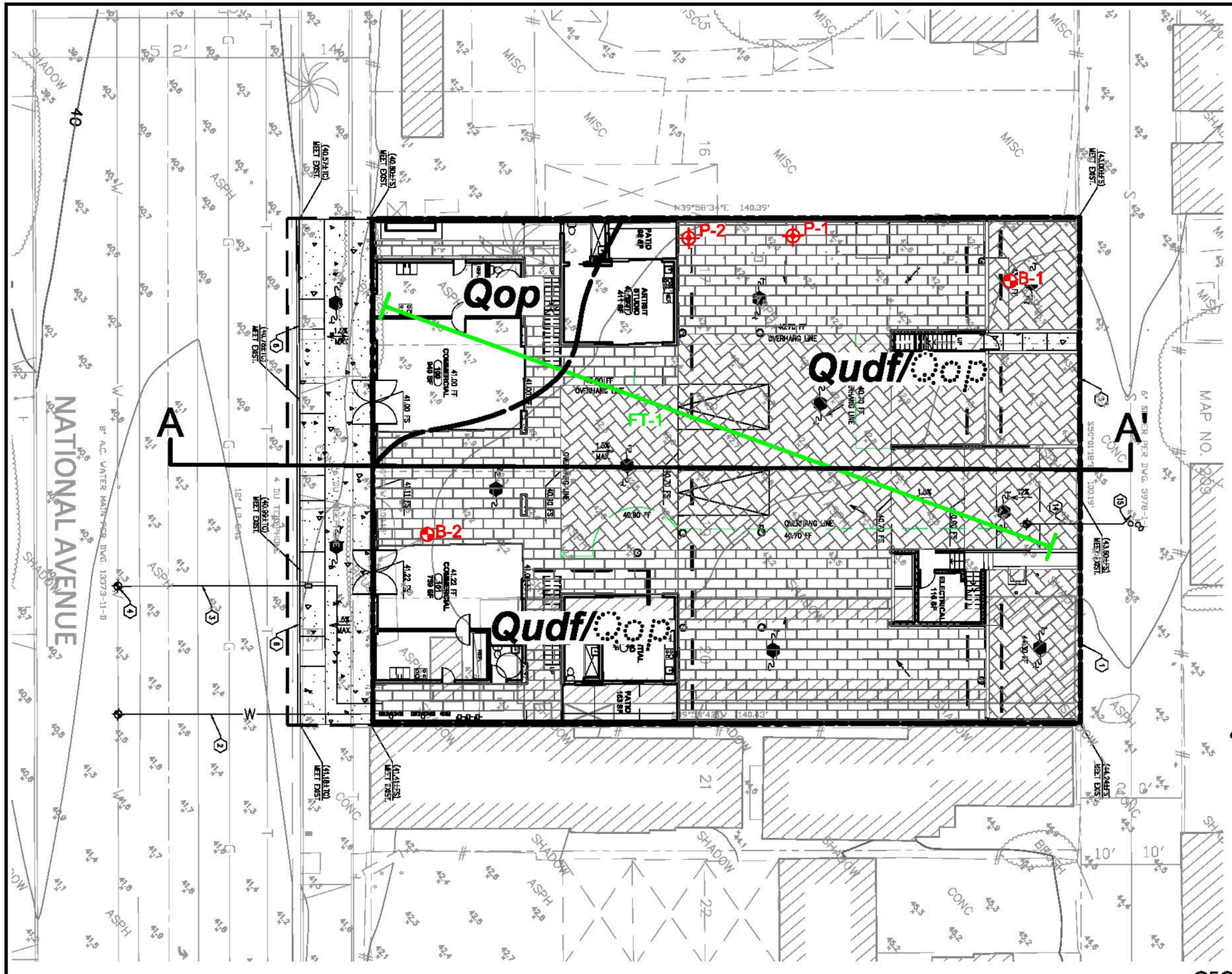

0' 20' 40'

SCALE 1"= 20' (On 11x17)

GEOCON LEGEND

- **Qudf** .....UNDOCUMENTED FILL
- **Qop** .....OLD PARALIC DEPOSITS (Dotted Where Buried)
- .....APPROX. LOCATION OF GEOLOGIC CONTACT
- B-2 .....APPROX. LOCATION OF EXPLORATORY BORING
- P-2 .....APPROX. LOCATION OF INFILTRATION TEST
- FT-1 .....APPROX. LOCATION OF FAULT TRENCH
- A A' .....APPROX. LOCATION OF CROSS-SECTION

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FIGURE 2
DATE 10 - 03 - 2016

GEOLOGIC MAP

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LOS PATIOS - MIXED USE
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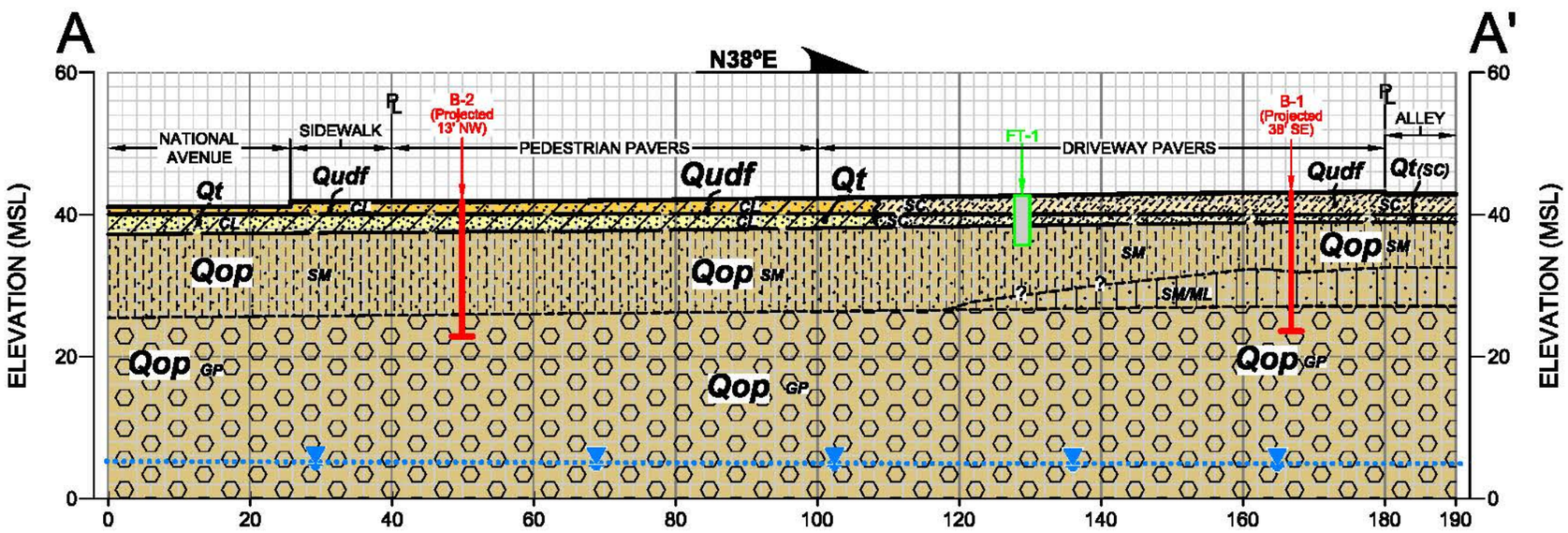

GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 20' (Vert. = Horiz.)

GEOCON LEGEND

- **Qudf** .....UNDOCUMENTED FILL
- **Qt** .....TOPSOIL
- **Qop** .....OLD PARALIC DEPOSITS
- B-2 .....APPROX. LOCATION OF EXPLORATORY BORING
- FT-1 .....APPROX. LOCATION OF FAULT TRENCH
- .....APPROX. LOCATION OF GROUNDWATER TABLE
- .....APPROX. LOCATION OF GEOLOGIC CONTACT
- .....APPROX. LOCATION OF INTRAFORMATIONAL CONTACT (Queried Where Uncertain)

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FIGURE 3
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GEOLOGIC CROSS - SECTION

Plotted:10/03/2016 3:04PM | By:JONATHAN WILKINS | File Location:Y:\PROJECTS\G2035-11-01 Los Patios - Mixed Use\SHEETS\G2035-11-01 Cross-Section.dwg

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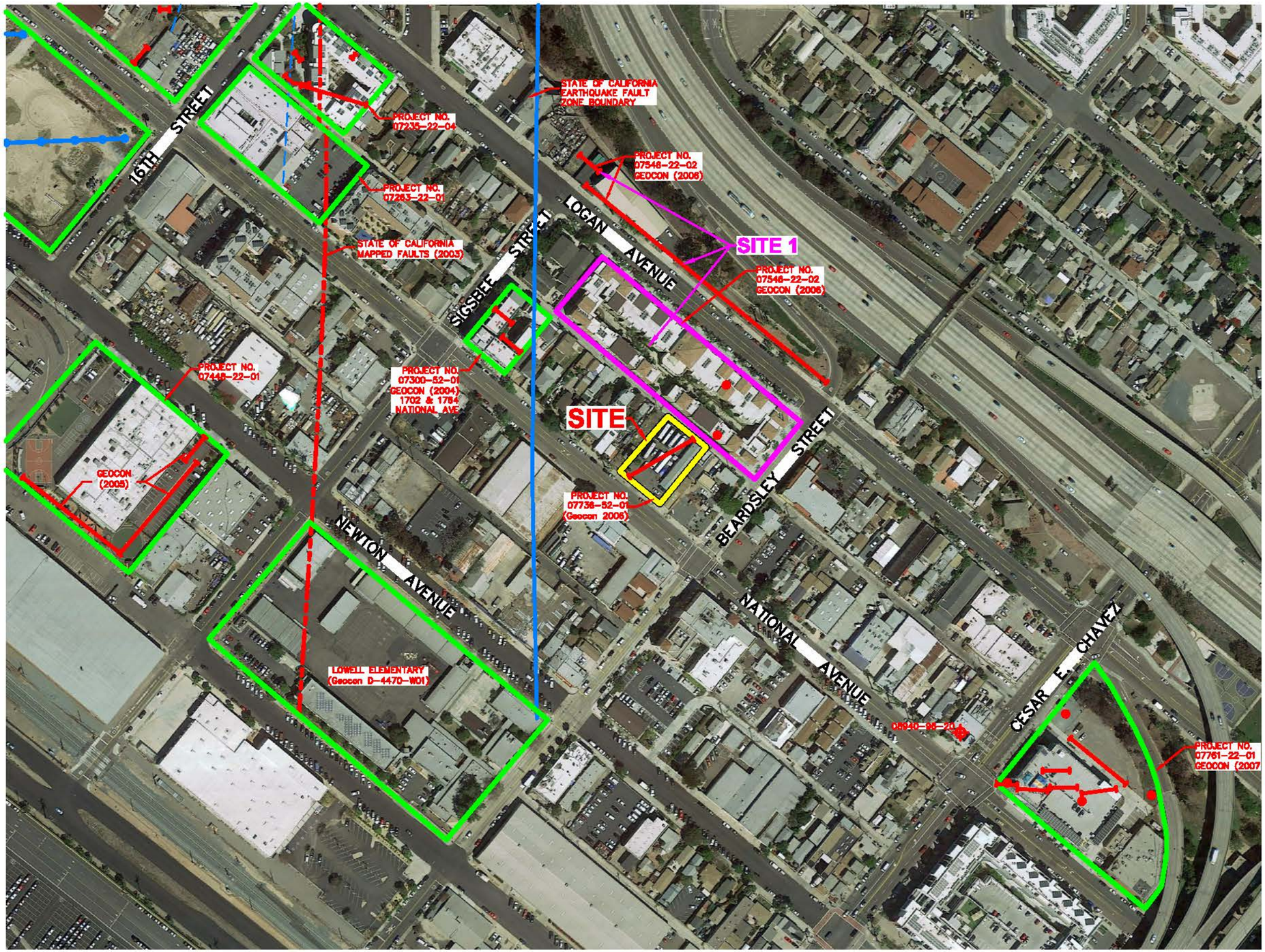

0' 200' 400'

SCALE 1"= 200' (On 11x17)

GEOCON LEGEND

- .....APPROX. LOCATION OF PROJECT BOUNDARY
- .....APPROX. LOCATION OF PROJECT
- .....APPROX. LOCATION OF BORING
- .....APPROX. LOCATION OF TRENCH/FAULT TRENCH
- .....APPROX. LOCATION OF CPT

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FIGURE 4
DATE 10 - 03 - 2016

EARTHQUAKE FAULT ZONE MAP

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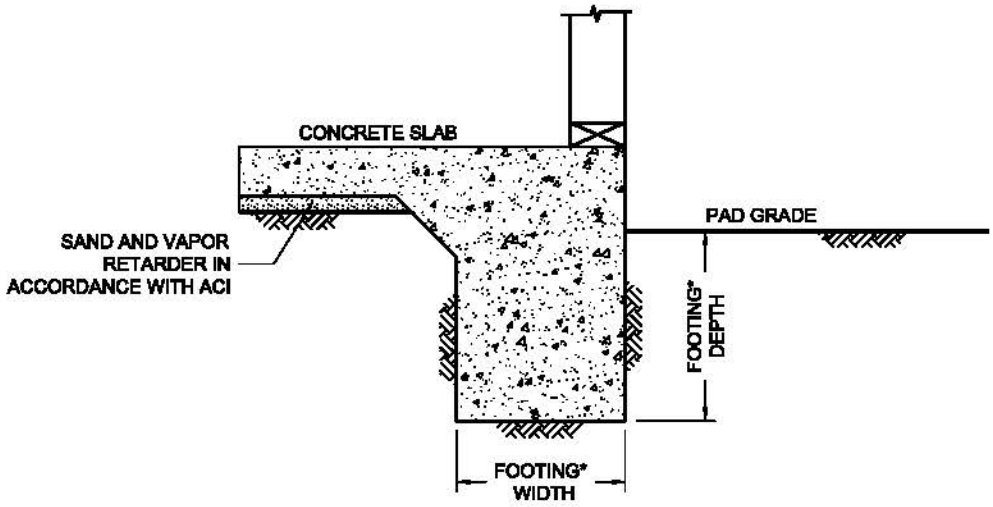

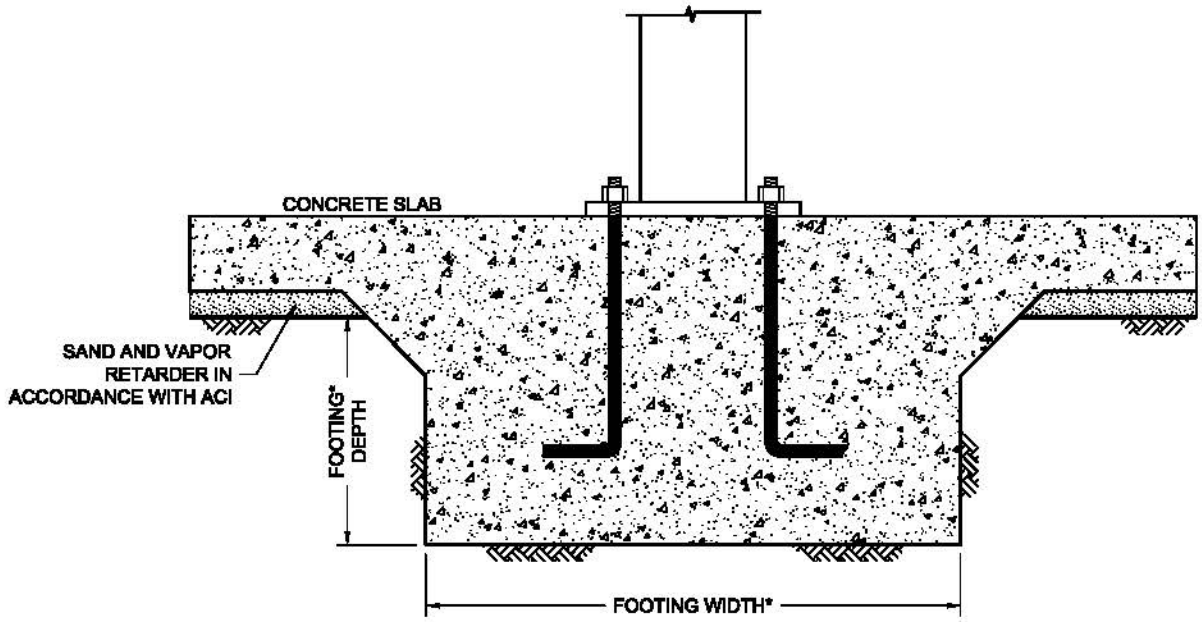

*....SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

WALL / COLUMN FOOTING DIMENSION DETAIL

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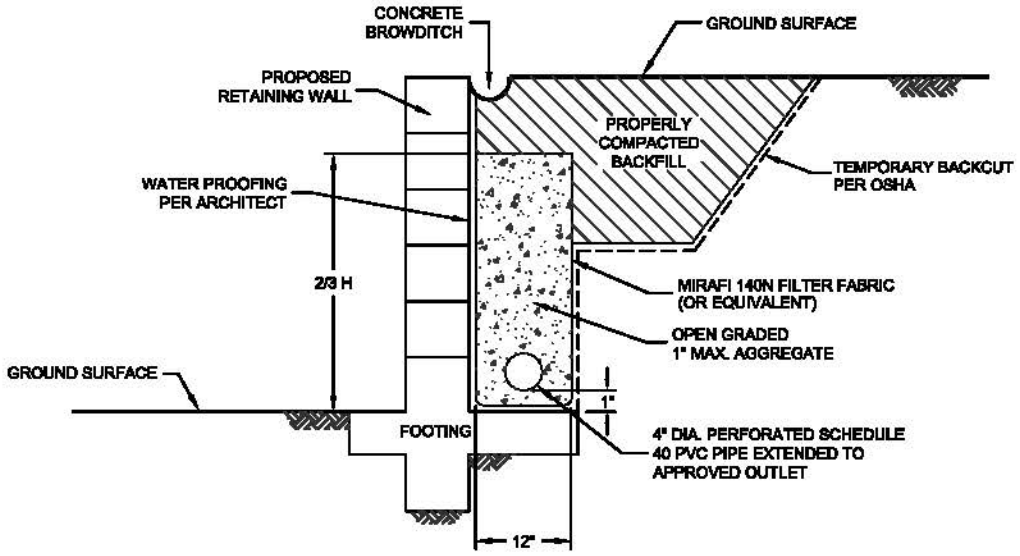
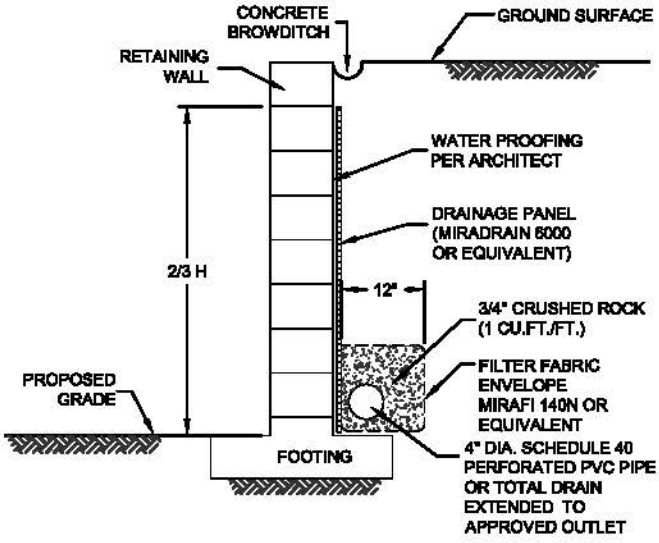
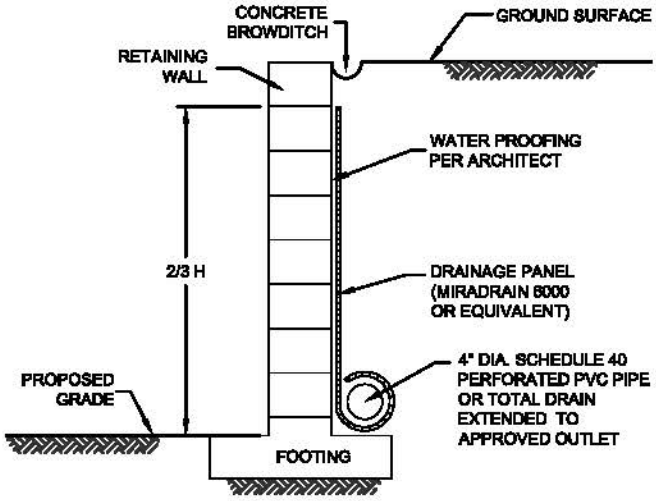
Plotted:10/03/2016 8:59AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G2035-11-01 Los Patios - Mixed Use\DETAILS\Wall-Column Footing Dimension Detail (COLFOOT2).dwg





NOTE :

DRAIN SHOULD BE UNIFORMLY SLOPED TO GRAVITY OUTLET OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPING



NO SCALE

TYPICAL RETAINING WALL DRAIN DETAIL

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LOS PATIOS - MIXED USE
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SAN DIEGO, CALIFORNIA

JH / CW		DSK/GTYPD

DATE 10 - 03 - 2016	PROJECT NO. G2035 - 11 - 01	FIG. 6

Plotted:10/03/2016 9:01AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G2035-11-01 Los Patios - Mixed Use\DETAILS\Typical Retaining Wall Drainage Detail (RWDD7A).dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

Fieldwork for our investigation was performed on September 21 and 22, 2006 and included a site visit, subsurface exploration, geologic logging, and soil sampling. The locations of the exploratory borings and fault trench are shown on the Geologic Map, Figure 2. Boring and trench logs and an explanation of the geologic units encountered are presented in figures following the text in this appendix. Borings and the trench were located in the field using a measuring tape and existing reference points. Therefore, actual locations may deviate slightly.

Subsurface exploration consisted of excavation of existing soil by a truck-mounted CME 75 drill rig and a backhoe. Samples were obtained during our subsurface exploration in the borings using a California sampler. The sampler is composed of steel and is driven to obtain ring samples. The California sampler has an inside diameter of 2.5 inches and an outside diameter of 3 inches. Up to 18 rings are placed inside the sampler that are 2.375 inches in diameter and 1 inch in height. The ring samples were obtained at appropriate intervals and were retained in moisture-tight containers and transported to the laboratory for testing. Bulk samples were also obtained and were transported for laboratory testing.

The samplers were driven 18 inches into the bottom of the excavations with the use of an automatic hammer and AW rods. The sampler is connected to the rods and is driven into the bottom of the excavation using a 140-pound hammer with a 30-inch drop. Blow counts are recorded for every 6 inches the sampler is driven. The penetration resistances shown on the boring logs are shown in terms of blows per foot. The values indicated on the boring logs are the sum of the 12 inches of the sampler if driven 18 inches. If the sampler was not driven for 18 inches, an approximate value is calculated in term of blows per foot or the final 6-inch interval is reported. These values are not to be taken as N-values; adjustments have not been applied.

If elevations are shown on the boring and trench logs, they were determined from either a topographic map or by using a temporary benchmark.

The fault trench was excavated to a maximum depth of approximately 12 feet with a backhoe and was logged by an engineering geologist. The fault trench log is shown in Figure A-3.

PROJECT NO. G2035-11-01

BORING B 1

ELEV. (MSL.) **43'** DATE COMPLETED **09-22-2006**

EQUIPMENT **8" HOLLOW STEM AUGER** BY: **N. ASH**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ASPHALT CONCRETE**: Approx. 6-inches thick			
				SM-SC	**UNDOCUMENTED FILL** Loose, damp, dark brown to dark reddish brown, Silty to Clayey SAND			
2								
	B1-1			SC-CL	**TOPSOIL** Medium dense to very stiff, moist, dark brown to brown, Clayey SAND to Sandy CLAY; some iron oxide staining and pinhole pores	24	114.5	16.2
4				SM				
	B1-2							
6	B1-3				**OLD PARALIC DEPOSITS** Dense, damp, olive brown to olive gray, Silty, fine to medium SAND; mottled colors; uncemented -Becomes fine- to coarse-grained with some subrounded gravel at 7 feet	37	104.2	3.8
8					-Grades fine- to medium-grained at 9 feet			
10								
				SM+ML	Very dense, damp to moist, olive gray to olive brown, Silty, fine-grained SANDSTONE with interbeds of Sandy SILTSTONE; weakly cemented; iron oxide staining			
12	B1-4					50/3"	116.9	12.8
14								
16								
				GP	Very dense, moist, yellowish to olive brown, fine to coarse, Sandy, gravel and cobble CONGLOMERATE; moderately cemented; subrounded clasts			
18	B1-5					12/8"	101.6	3.5
					BORING TERMINATED AT 19½ FEET No groundwater encountered Backfilled with bentonite chips			

Figure A-1,
Log of Boring B 1, Page 1 of 1

G2035-11-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. G2035-11-01

BORING B 2

ELEV. (MSL.) **42'** DATE COMPLETED **09-22-2006**

EQUIPMENT **8" HOLLOW STEM AUGER** BY: **N. ASH**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ASPHALT CONCRETE**: Approx. 6-inches thick			
				CL	**UNDOCUMENTED FILL** Stiff, damp, dark grayish brown, Sandy CLAY			
2	B2-1			CL	**TOPSOIL** Very stiff, moist, olive brown to brown, Sandy CLAY; scattered carbonate pods			
4				SM	**OLD PARALIC DEPOSITS**			
6	B2-2				Dense, moist, olive gray to reddish brown, Silty, fine to medium SAND; uncemented	25	123.6	10.3
8					-Becomes fine- to coarse-grained with subrounded gravel			
10	B2-3				-Yellowish to olive brown and fine- to medium-grained; some iron oxide mineralization	35	102.8	4.9
12								
14								
16	B2-4					43		5.5
				GP-GC	Dense to very dense, moist, olive brown to olive gray, Sandy and Clayey, gravel and cobble CONGLOMERATE; weakly to moderately cemented; subrounded clasts			
18								
					BORING TERMINATED AT 19 FEET No groundwater encountered Backfilled with bentonite chips			

Figure A-2,
Log of Boring B 2, Page 1 of 1

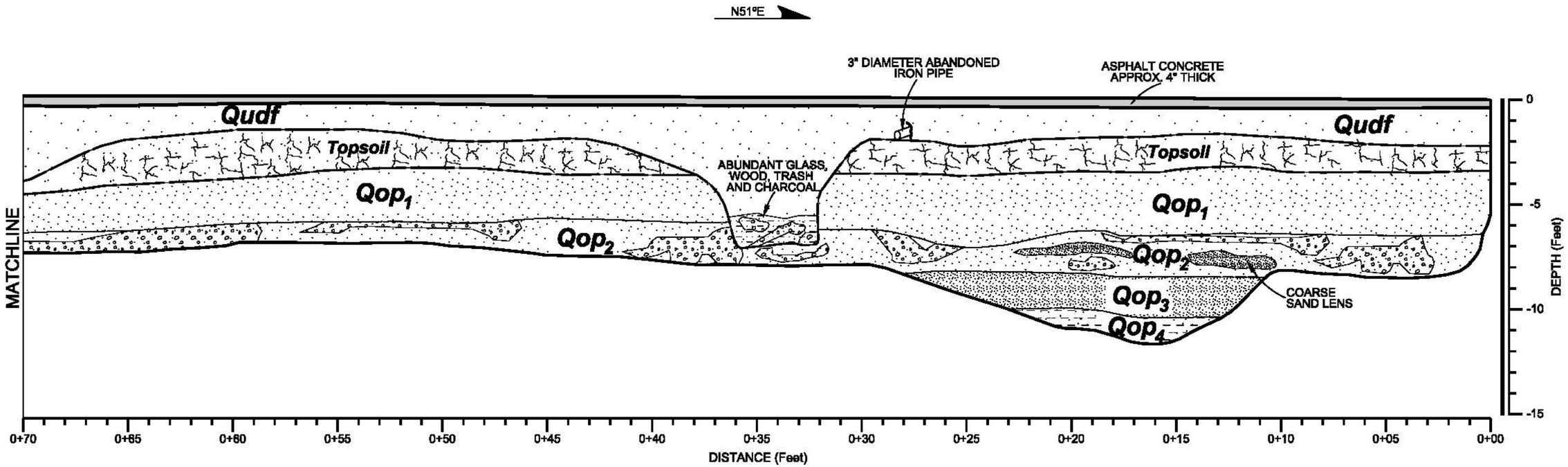
G2035-11-01.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON



FAULT TRENCH FT-1

SCALE: 1" = 5' (Horiz. = Vert.)

GEOCON LEGEND

Qudf .....**UNDOCUMENTED FILL**
Loose, moist, brown to reddish and grayish brown, Clayey and Silty, fine to coarse SAND; scattered gravel and chunks of concrete; locally abundant pockets of clay and debris including, glass, charcoal, wood, and metal as trench backfill between Stations 0+30 through 0+ 38; fill thins toward west end of trench and is nonexistent west of Station 1+10.

Topsoil .....**TOPSOIL**
Medium dense to very stiff, damp, olive brown, Clayey SAND to Sandy CLAY; blocky texture with polished parting surfaces; some iron and manganese oxide staining along ped faces; local carbonate pods; soil developed from upper highly weathered portion of the Bay Point Formation displaying moderate to strong development; pinhole porosity and few thin roots; soil development decreases with depth and becomes gradational along base of unit; "A" and upper portions of the "B" horizons have been removed during site development; "BC" and "C" horizons still in place indicating in-place soil development.

Qop .....**OLD PARALIC DEPOSITS**

Qop_1 ....Medium dense, damp to moist, mottled olive to grayish and reddish brown, Silty to Clayey SAND; uncemented to very weakly cemented; fine- to medium-grained; massive bedding; locally discolored to greenish gray due to contamination; moderately to highly weathered at top of unit with gradational transition into topsoil development.

Qop_2 ....Loose to medium dense, dry to damp, light olive to yellowish and reddish brown, Silty, fine to coarse SAND with pockets of subrounded GRAVEL; iron oxide staining; unit grades coarser toward bottom; contacts gradational at top and well-defined at base of unit; uncemented; lenses of coarse sand locally thin or pinch out.

Qop_3 ....Medium dense, damp to moist, light olive brown to olive gray, Silty, fine-grained SANDSTONE; weakly cemented; massive unit; locally contaminated and stained greenish gray to dark gray with petroleum products extending roughly between Stations 0+12 and 0+21.

Qop_4 ....Medium dense to very stiff, damp, light yellowish to reddish brown, Silty, fine SAND to Sandy SILT; uncemented; local iron oxide staining.

~ .....Approximate location of interformational contact.

~ .....Approximate location of geologic contact.

FAULT TRENCH FT-1

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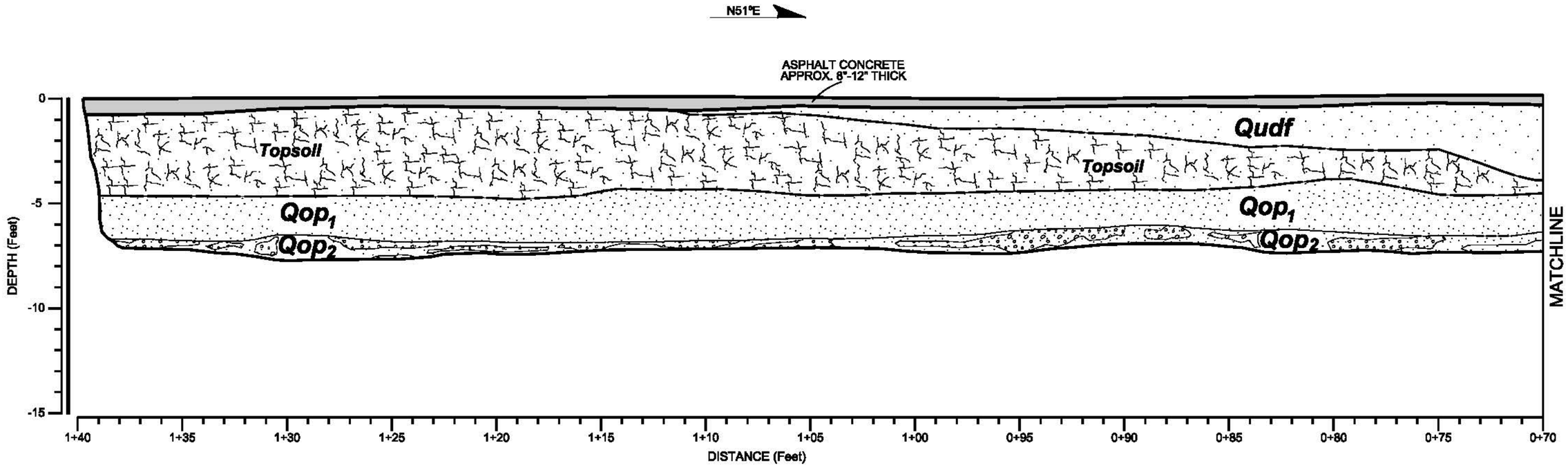
SCALE	DATE
1" = 5'	10 - 03 - 2016
PROJECT NO. G2035 - 11 - 01	FIGURE A-3
SHEET 1 OF 2	

Plotted:10/03/2016 8:47AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G2035-11-01 Los Patios - Mixed Use\SHEETS\G2035-11-01 FAULT TRENCH (FT-1).dwg



FAULT TRENCH FT-1

SCALE: 1" = 5' (Horiz. = Vert.)

GEOCON LEGEND

Qudf .....**UNDOCUMENTED FILL**
Loose, moist, brown to reddish and grayish brown, Clayey and Silty, fine to coarse SAND; scattered gravel and chunks of concrete; locally abundant pockets of clay and debris including, glass, charcoal, wood, and metal as trench backfill between Stations 0+30 through 0+ 38; fill thins toward west end of trench and is nonexistent west of Station 1+10.

Topsoil .....**TOPSOIL**
Medium dense to very stiff, damp, olive brown, Clayey SAND to Sandy CLAY; blocky texture with polished parting surfaces; some iron and manganese oxide staining along ped faces; local carbonate pods; soil developed from upper highly weathered portion of the Bay Point Formation displaying moderate to strong development; pinhole porosity and few thin roots; soil development decreases with depth and becomes gradational along base of unit; "A" and upper portions of the "B" horizons have been removed during site development; "BC" and "C" horizons still in place indicating in-place soil development.

Qop .....**OLD PARALIC DEPOSITS**

Qop_1 ....Medium dense, damp to moist, mottled olive to grayish and reddish brown, Silty to Clayey SAND; uncemented to very weakly cemented; fine- to medium-grained; massive bedding; locally discolored to greenish gray due to contamination; moderately to highly weathered at top of unit with gradational transition into topsoil development.

Qop_2 ....Loose to medium dense, dry to damp, light olive to yellowish and reddish brown, Silty, fine to coarse SAND with pockets of subrounded GRAVEL; iron oxide staining; unit grades coarser toward bottom; contacts gradational at top and well-defined at base of unit; uncemented; lenses of coarse sand locally thin or pinch out.

Qop_3 ....Medium dense, damp to moist, light olive brown to olive gray, Silty, fine-grained SANDSTONE; weakly cemented; massive unit; locally contaminated and stained greenish gray to dark gray with petroleum products extending roughly between Stations 0+12 and 0+21.

Qop_4 ....Medium dense to very stiff, damp, light yellowish to reddish brown, Silty, fine SAND to Sandy SILT; uncemented; local iron oxide staining.

.....Approximate location of interformational contact.

.....Approximate location of geologic contact.

FAULT TRENCH FT-1

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SCALE	DATE
1" = 5'	10 - 03 - 2016
PROJECT NO. G2035 - 11 - 01	FIGURE A-3
SHEET 2 OF 2	

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected soil samples were tested for their in-place dry density and moisture content, maximum dry density and optimum moisture content, shear strength, expansion, and water-soluble sulfate.

The results of our laboratory tests are presented on Tables B-I through B-IV. The in-place dry density and moisture content results are indicated on the exploratory boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY
AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-02

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
B2-1	Olive brown, fine to coarse, Sandy CLAY	127.5	9.8

TABLE B-II
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080-04

Sample No.	Dry Density (pcf)	Moisture Content (%)		Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
		Before Test	After Test		
B2-1	115.2	9.1	19.7	350	23

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829-03

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	Soil Classification	2013 CBC Classification
	Before Test	After Test				
B2-1	11.2	23.2	105.9	58	Medium	Expansive

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Sulfate Severity (Class)
B2-1	0.027	Not Applicable (S0)

APPENDIX C

APPENDIX C

STORM WATER MANAGEMENT INVESTIGATION

We understand storm water management devices are being proposed in accordance with the *2016 City of San Diego Storm Water Standards* (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table C-1 presents the descriptions of the hydrologic soil groups. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property is underlain by man-made previously placed fill and should be classified as Soil Group D. Table C-2 presents the information from the USDA website for the subject property.

TABLE C-2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (Inches/ Hour)
Urban Land	Ur	100	D	0.00 – 0.06

In-Situ Testing

The infiltration rate, percolation rates and saturated hydraulic conductivity are different and have different meanings. Percolation rates tend to overestimate infiltration rates and saturated hydraulic conductivities by a factor of 10 or more. Table C-3 describes the differences in the definitions.

TABLE C-3
SOIL PERMEABILITY DEFINITIONS

Term	Definition
Infiltration Rate	The observation of the flow of water through a material into the ground downward into a given soil structure under long term conditions. This is a function of layering of soil, density, pore space, discontinuities and initial moisture content.
Percolation Rate	The observation of the flow of water through a material into the ground downward and laterally into a given soil structure under long term conditions. This is a function of layering of soil, density, pore space, discontinuities and initial moisture content.
Saturated Hydraulic Conductivity (k_{SAT}, Permeability)	The volume of water that will move in a porous medium under a hydraulic gradient through a unit area. This is a function of density, structure, stratification, fines content and discontinuities. It is also a function of the properties of the liquid as well as of the porous medium.

The degree of soil compaction or in-situ density has a significant impact on soil permeability and infiltration. Based on our experience and other studies we performed, an increase in compaction results in a decrease in soil permeability.

We performed 2 Aardvark Permeameter tests within the borings at locations shown on the attached Geologic Map, Figure 2. The test borings were 4 inches in diameter. The results of the tests provide parameters regarding the saturated hydraulic conductivity and infiltration characteristics of on-site soil and geologic units. Table C-4 presents the results of the estimated field saturated hydraulic

conductivity and estimated infiltration rates obtained from the Aardvark Permeameter tests. The field sheets are also attached herein. Soil infiltration rates from in-situ tests can vary significantly from one location to another due to the heterogeneous characteristics inherent to most soil. Based on a discussion in the County of Riverside *Design Handbook for Low Impact Development Best Management Practices*, the infiltration rate should be considered equal to the saturated hydraulic conductivity rate.

TABLE C-4
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	Geologic Unit	Test Depth and Elevation (feet, MSL)	Field-Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Worksheet[1] Saturated Hydraulic Conductivity, k_{sat} (inch/hour)
P-1	Qop	4.2 feet (40.5 feet)	0.16	0.08
P-2	Qop	5.0 feet (35.5 feet)	0.07	0.04

[1] Using a factor of safety of 2 for Worksheet C.4-1.

STORM WATER MANAGEMENT CONCLUSIONS

The Geologic Map, Figure 2, depicts the existing property, the approximate lateral limits of the geologic units, the locations of the field excavations and the in-situ infiltration test locations.

Soil Types

Undocumented Fill – Undocumented fill exists on the property to depths of up to about 12 feet within the former fault trench. The undocumented fill varies in soil type, density and some areas possess a relatively high fines content (silt and clay). The fill should be considered to be highly variable on the property and within adjacent properties and right-of-ways. Water that is allowed to migrate within the undocumented fill soil cannot be controlled due to lateral migration potential, would destabilize support for the existing improvements, and would shrink and swell. Therefore, full and partial infiltration should be considered infeasible within the undocumented fill. Side liners should be installed and infiltration devices deepened below the undocumented fill to prevent water migration into the fill materials.

Old Paralic Deposits – The surficial soil and existing structure on the property are underlain by Old Paralic Deposits. Based on the boring logs, laboratory tests and our observations, the Old Paralic Deposits consist of dense to very dense, silty sand with gravel and cobbles and are moderately to well cemented. The Old Paralic Deposits have a greater propensity for lateral water migration over vertical water migration due to the presence of the cemented zones, the dense nature of the material, and the natural layering characteristics during the deposition of the deposits. The infiltration rates within the Old Paralic Deposits are considered to be very low with an average adjusted rate of 0.06 inches per

hour. Therefore, full infiltration is considered infeasible within the Old Paralic Deposits due to the very low rates. However, partial infiltration is considered feasible. Mitigation measures are not available to increase the infiltration rates of the existing materials.

Proposed Compacted Fill – Some compacted fill will be placed on the property during site development. The compacted fill will be comprised of on-site materials. In addition, the fill will be compacted to a dry density of at least 90 percent of the laboratory maximum dry density. In our experience, compacted fill does not possess infiltration rates appropriate with infiltration. Compacted fill will possess swelling (expansion) potential. Therefore, full and partial infiltration should be considered infeasible.

Hazards that occur in the saturation of fill soil include a potential for hydroconsolidation, long term fill settlement, and expansion. Some of these hazards are not easily evaluated without performing significant testing, modeling and evaluation with specific computer software.

Infiltration Rates

The results of the infiltration rates are 0.16 and 0.07 inches per hour (0.08 and 0.04 with a factor of safety of 2). Therefore, based on the results of the field infiltration tests, the laboratory tests and our experience, full infiltration can be considered feasible within the Old Paralic Deposits.

Groundwater Elevations

We did not encounter groundwater during the drilling operations of the property. However, we expect groundwater exists at an elevation of about 5 feet above mean sea level or 36 feet below existing grades. Infiltration due to groundwater elevations will not be a constraint on the property above an elevation of 15 feet MSL.

Soil or Groundwater Contamination

We did not perform an environmental study and we are unaware if a study has been performed. We expect infiltration can occur as long as it is above an elevation of 15 feet MSL or at least 10 feet above the groundwater elevation.

New or Existing Utilities

Utilities are present adjacent to the southern property boundaries within the existing streets. Therefore, full and partial infiltration near these utilities should be considered infeasible within these areas. Mitigation measures to prevent water from infiltrating the utilities consist of setbacks, installing cutoff walls around the utilities and installing subdrains and/or liners. We expect the water will be discharged into the underlying Old Paralic Deposits and utilities will not be affected as long

as side liners are installed for the storm water management devices. The lines should extend to the base of the excavation that exposes the Old Paralic Deposits.

Existing and Planned Structures

The Barrio Logan area of San Diego is considered a dense area with buildings (low-rise) located on property lines. If water is allowed to infiltrate into the soil, the water would migrate laterally and into other properties in the vicinity of the subject site. The water migration may negatively affect other buildings and improvements in the area (e.g. seepage into existing subterranean garages, additional hydrostatic loading to subterranean retaining walls, saturating soil adjacent to existing foundations). The storm water management devices should be set back form the property lines at least 5 feet.

Storm Water Management Devices

Liners and subdrains will be incorporated into the design and construction of the planned storm water devices. We understand the devices will include planters and the pavement area. Liners should be installed on the sidewalls of the devices and should extend to the subgrade elevation exposing Old Paralic Deposits. The impermeable liners should consist of high-density polyethylene (HDPE) with a thickness of about 30 mil or equivalent Polyvinyl Chloride**,** PVC to prevent lateral water migration. The base of the devices should lope to a subdrain. The subdrains should be perforated within the device area and be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

We understand planters will be used to manage the storm water for the project. The planters should be properly lined to prevent water migration into the adjacent improvements. Water storage devices can be installed to reduce the velocity and amount of water entering the storm drain system. The project civil engineer should provide the final design of the storm water management devices.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or I-8) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table C-5 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE C-5
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Based on our geotechnical investigation and the previous table, Table C-6 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE C-6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	2	0.50
Predominant Soil Texture	0.25	3	0.75
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.00

[1]The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data on this table. Additional information is required to evaluate the design factor of safety

Categorization of Infiltration Feasibility Condition	Worksheet C.4-1

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

The following presents the results of our field infiltration tests:

P-1: 0.16 inches/hour (0.08 inches per hour with FOS=2)

P-2: 0.07 inches/hour (0.04 inches/hour with FOS=2)

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

The project geotechnical report presents undocumented fill, topsoil and Old Paralic Deposits underlie the property. Water that would be allowed to infiltrate would migrate laterally outside of the property limits to the existing right-of-ways and toward the adjacent downtown properties. The adjacent buildings would be affected if water were allowed to infiltrate. Therefore, based on the comprehensive geotechnical evaluation and the very low infiltration rates obtained, full infiltration is not feasible due to the dense to very dense and cemented nature of the underlying materials and the potential for distress to adjacent properties.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on the geotechnical report, groundwater at an elevation of about 5 feet MSL or 36 feet below existing grades. Therefore, infiltration would be feasible above an elevation of 15 feet MSL. 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: We do not expect infiltration will cause water balance issues such as seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters. 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		Not Full 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 to substantiate findings.

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:

The following presents the results of our field infiltration tests:

P-1: 0.16 inches/hour (0.08 inches per hour with FOS=2)

P-2: 0.07 inches/hour (0.04 inches/hour with FOS=2)

.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Criteria	Screening Question	Yes	No
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:

The project geotechnical report presents undocumented fill, topsoil and Old Paralic Deposits underlie the property. Water that would be allowed to infiltrate would migrate laterally outside of the property limits to the existing right-of-ways and toward the adjacent downtown properties. The adjacent buildings would be affected if water were allowed to infiltrate. Therefore, based on the comprehensive geotechnical evaluation and the infiltration rates obtained, partial infiltration is feasible.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on the geotechnical report, groundwater at an elevation of about 5 feet MSL or 36 feet below existing grades. Therefore, infiltration would be feasible. 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: We did not provide a study regarding water rights. However, these rights are not typical in the San Diego area. 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.**		Partial 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 to substantiate findings.

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14. Kennedy, M. P., and S. S. Tan, 2008, *Geologic Map of the San Diego 30'x60' Quadrangle, California,* USGS Regional Map Series Map No. 3, Scale 1:100,000.

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15. Legg, M. R., J. C. Borrero, and C. E. Synolakis (2002), *Evaluation of Tsunami Risk to Southern California Coastal Cities*, 2002 NEHRP Professional Fellowship Report, dated January.

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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: Los Patios - Mixed Use

Property Address: 1776 National Avenue San Diego, Ca 92113

Applicant Name/Co.: Hector Perez

Contact Phone: 619.889.2760 Contact Email: Perezhm@mac.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)? .42
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units): _____
   - ■ Residential (indicate # of multi-family units): 22 Residential Units
   - ■ Commercial (total square footage): 2131 sf of Commercial (3 Units)
   - ☐ 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 EXISTING 1-STORY COMMERCIAL OFFICE BUILT IN 1946 CONSTRUCT A 4- LEVEL MIXED-USE APARTMENT PROJECT
22 - RESIDENTIAL UNITS (2 OF 22 TO BE AFFORDABLE, VERY LOW INCOME)
2 - GROUND LEVEL COMMERCIAL UNITS ALONG NATIONAL AVENUE
1 - GROUND LEVEL ARTIST STUDIO

[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,		
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?		

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.

A. The project is consistent with the existing General Plan of the Barrio Logan Planned District Redevelopment Subdistrict and the Barrio Logan Community Plan. The General Plan and Community Plan identifies the proposed project along National Avenue as a critical junction into downtown San Diego and recommends that the project proposes landscaping and architecture be established for beautification and enhancement of the urban context. The project meets this recommendation by increasing the amount of trees and green scape within the project. The Plan's further recommendations for the Redevelopment Area includes helping create a balanced mix of commercial and residential uses promoting neighborhood identity, and achieving an environment that reflects a high level of concern for architecture, landscape, urban design and land use principles and improved street design with the pedestrian in mind, these factors have been considered and applied within the proposed mixed use project. The project will also provide a safe and aesthetically pleasing environment for pedestrians and tenants and will not adversely affect the applicable land use plan. The proposed development is in conformity with the Barrio Logan Community Plan and Local Coastal Program and complies with the regulations of the certified implementation program and Land Development Code.

B. The proposed project is consistent with the existing land use plan and zoning designations and does not include zoning designation amendments. The project is also within the TPA and is proposing a residential and commercial density that is to the satisfaction of the Development Services Department.

C. The project is consistent with the existing land use plans and zoning designations and does not propose zoning amendments.

[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. The Mixed-Use project would propose the higher standard of the 'Low-Rise Residential' section of Table 1 of this project. The low rise residential class 'A' roof slope of less than 2:12 will maintain A solar reflectance of 3 years aged at .55, a thermal emittance of .75, and a solar reflective index of 64. In locations where the roof slope is greater than 2:12 will maintain A solar reflectance 3 years at .20 , a thermal emittance of .75, and a solar reflective index of 16. The mixed-use project will not propose a thermal mass over the roof membrane. The project location is located within CAL Green Climate Zone 7 which is a more temperate climate. The project will comply with Title 24 and CALGreen standards as it relates to the climate zone during the building energy analysis. The project will not include a combination of the above two options. It will be providing a class 'A' cool roof and solar reflectance values that are greater than what climate zone 7 is requiring, in addition the project will comply with the most current CALGreen title 24 requirements.	☑	☐	☐

[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. Within the mixed use project, the residential plumbing fixtures within the project shall incorporate 'low flow' systems that will be compliant with the 2016 California Green Building Code and Table 2 & 3 of this document. Kitchen faucets will not exceed 1.5 gallons per minute at 60 psi, a standard dish washer will not exceed 4.25 gallons per cycle, a compact dishwasher will not exceed 3.5 gallons per cycle and any clothes washers water factor will be 6 gallons per cubic feet of drum capacity.	☑	☐	☐

Within the mixed use project, the non-residential commercial plumbing fixtures within the project shall incorporate 'low flow' systems that will be compliant with the 2016 California Green Building Code Portion which is references on Table 2 & 3 of this document. The project shall be consistent with the Plumbing fixtures that do no exceed the maximum flow rate and are specified in table A5.303.2.3.1 (Voluntary measures) of the California Green Building Standards Code. The project Shower heads will not exceed 1.8 gpm @ 80 psi, Lavatory Faucets will not exceed .35 gpm @ 60 psi, Kitchen Faucets will not exceed 1.6 gpm @ 60 psi. No wash fountains or metering faucets will be used. Gravity Tank-type water closets shall not exceed 1.12 gallons/ flush. Flushometer tanks and or valves, & Electromechanical hydraulic water closets, and urinals will not be used in the commercial portion of the project.

Appliances and fixtures of commercial applications will meet the provisions of section A5.303.3 (Voluntary Measures) of the California Green Building Standards Code. All appliances shall be Energy Star Products and within the Tier 1 30 Percent savings [DSA-SS] Currently, the only non-residential appliance being used is a Standards Under-counter type Dishwashers will be used in the commercial portion of the project that will not exceed .90 maximum gallons per rack (3.7L) (High-Temperature) . (2) of the (3) commercial spaces will provide this appliance.

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 proposes more than (17) dwelling units. The project proposes (22) units. The residential componet requires 14 parking stalls, 3% of 14 is 0.42 parking stalls required (14 x 0.03 = .42) - Rounded to the nearest whole number- 1 electric vehicle charging station will be provided for the residential componet. The commercial componet requires 5 parking stalls, 3% of 5 is 0.15 parking stalls required. (5 x 0.03 = .15) - Rounded to the nearest whole number - 1 electric vehicle charging station will be provided for the commercial componet. The combined total electric vechicle charging station requirements are 2 parking stalls. (1 for residential and 1 for commercial) The project is proposing that both be fully operational, therefore more than 50% of the necessary electric vehicle charging stations will be 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. Per 142-05C (9) Bike parking stalls are required. The mixed use project provides (15) bicycle parking stalls throughout the project. (7) are considered short term stalls that are in the front Right of Way and at the rear of the site. (8) Stalls are considered long term parking and are in the courtyard of the project. This is more than what is require by the Development Services Department and is to their satisfaction.	☑	☐	☐

[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).

Within the non-residential portion of the Mixed-Use Project (3) Commercial tenants will have an average of (3-10) employees working in the units. Each of the (3) Commercial Tenants will provide changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code. The bathrooms will help encourage biking and walking to work since the project is in the Transit Priority Area. The project will not require a two-tier personal effects locker because the employee amount for the (3) units is less than (10).

☑	☐	☐

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.

The non-residential portion of the mixed use project provides (5) parking stalls for the commercial units to the satisfaction of the Development Services Department. None are required to be designated for parking of low-emitting, fuel efficient, and carpool/van vehicles since less than 10 stalls are required in accordance with the table above.

☐	☑	☐

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). This portion of the check list is N/A since the project proposes less than 50 tenant-occupants (employees).	☐	☐	☑

Step 3: Project CAP Conformance Evaluation (if applicable)

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)