The City of San Diego

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

GOLDEN HILLS BROADWAY

PTS#456328

DWG# AND I.O.#

ENGINEER OF WORK:

REGISTERED PROFESSIONAL ENGINEER
HOSSEIN ZOMORRODI
No. 43235
EXP. 3-31-18
CIVIL
STATE OF CALIFORNIA

HOSSEIN ZOMORRODI RCE 43235, EXP. 3-31-18

Provide Wet Signature and Stamp Above Line

PREPARED FOR:

METROPOLITAN/SDPB BROADWAY, LLC CONTACT: Bennet Greenwald
2929 Canon Street, Suite "A"
San Diego, CA 92106
(619) 540-0467

PREPARED BY:

K&S ENGINEERING, INC.
Planning Engineering Surveying

K & S Engineering, Inc.

7801 Mission Center Court, Suite 100
San Diego, CA 92108
(619) 296-5565

DATE: 11/09/2016

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: GOLDEN HILLS BROADWAY
Permit Application Number: PTS#456328

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

RCE 43235, EXP. 3-31-18

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

HOSSEIN ZOMORRODI

Print Name

K & S Engineering, Inc.

Company

11/10/16

Date

REGISTERED PROFESSIONAL ENGINEER
HOSSEIN ZOMORRODI
No. 43235
EXP. 3-31-18
CIVIL
STATE OF CALIFORNIA

Engineer's Stamp

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SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plan check comments is included. When applicable, insert response to plan check comments.

Submittal Number	Date	Project Status	Changes
1	03/29/2016	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	10/05/2016	☐ Preliminary Design/Planning/CEQA ☑ Final Design	Resubmittal
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

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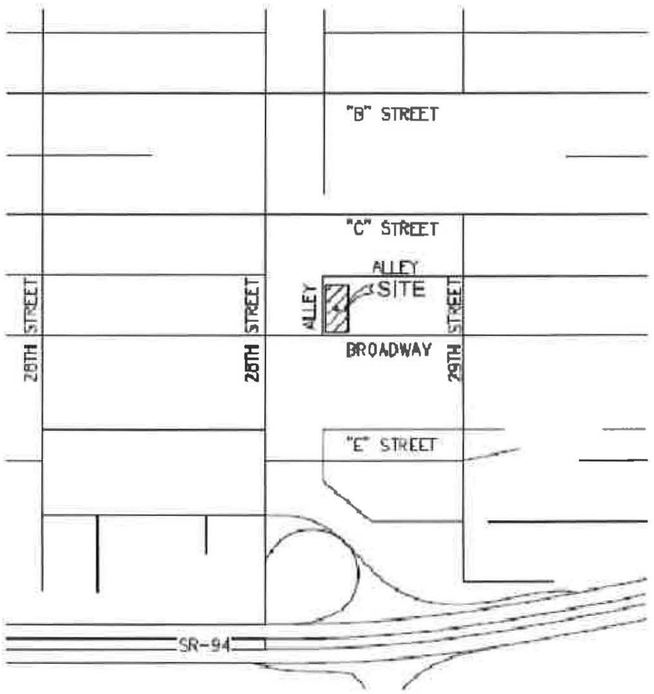
PROJECT VICINITY MAP

Project Name: GOLDEN HILLS BROADWAY
Permit Application Number:



VICINITY MAP

NOT TO SCALE
THOMAS PAGE 1289, GRID E-3

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STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST

Complete and attach DS-560 Form included in Appendix A.1

THE CITY OF SAN DIEGO

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

Storm Water Requirements Applicability Checklist

FORM
DS-560
FEBRUARY 2016

Project Address: 2828-2834 Broadway San Diego CA 92102	Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

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

For all project 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 3-4 ☐ No; next question

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

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

4. Does the project only include the following Permit types listed below?

- Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
- Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes 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 proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

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

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

PART B: Determine Construction Site Priorit

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

Complete PART B and continued to Section 2

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed.

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

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

4. ☑ **Low Priority**
   a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

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

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

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

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

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

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

PART D: PDP Exempt Requirements.

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

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:
   - Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
   - Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;
   - Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

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

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

   ☐ Yes; PDP exempt requirements apply ☑ No; project not exempt. 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.

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

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

7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ Yes ☑ No

8. **New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☑ No

9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☑ No

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☑ No

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

1. The project is **NOT SUBJECT TO STORM WATER REQUIREMENTS**. ☐

2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐

3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐

4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management ☑

Name of Owner or Agent *(Please Print)*: Hossein Zomorrodi, KTS Engineering

Title: Agent Project engineer.

Signature:

Date: 5/25/10

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Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name GOLDEN HILLS BROADWAY		
Permit Application Number: PTS#456328		Date: 11/09/2016
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):		
Step 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:		

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 (<u>not required if prior lawful approval does not apply</u>):		
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 <u>not</u> apply:		
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 <u>not</u> apply: There is no CCYSA draining into the project, there is no CCYSA onsite		

Site Information Checklist For PDPs — Form I-3B

Project Summary Information

Project Name	GOLDEN HILLS BROADWAY
Project Address	2828-2834 Broadway San Diego, CA 92102
Assessor's Parcel Number(s) (APN(s))	539-522-25-00 & 539-522-26-00
Permit Application Number	
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 places (9XX.XX)	CHOLLAS CREEK 908.22
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	0.36 Acres (157,852 Square Feet)
Area to be disturbed by the project (Project Footprint)	0.36 Acres (15,852 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.30 Acres (13,006 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.06 Acres (2,846 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.	42 %

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):
☑ Existing development
☐ Previously graded but not built out
☐ Agricultural or other non-impervious use
☐ Vacant, undeveloped/natural
Description / Additional Information:

The Site is currently developed with one residential apartment and vacant lot, the entire site drains to the southwest corner into Broadway & Alley

Existing Land Cover Includes (select all that apply):
☑ Vegetative Cover
☐ Non-Vegetated Pervious Areas
☑ Impervious Areas
Description / Additional Information:

The existing site is already developed with 6,350 sf of impervious area.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):
☐ NRCS Type A ✓ Undetermined
☐ 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
✓ There is no GW 1000ft Radius from the site and per the soils engineer report

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☑ None
Description / Additional Information:

There are no existing natural hydrologic features, the site is surrounded by residential dwellings area.

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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:

Currently the existing urban lot is developed with one multi-family building, concrete steps, retaining walls, concrete walk way & landscape. The runoff sheet flow towards the southwest corner of the lot then into the street intersection of Broadway and the alley. There is no offsite drainage , there are no existing drainage conveyances, noir any type of existing storm water treatment facility .

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Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The construction of three story multi-family apartments, underground parking garage, landscape & one biofiltration facility for water treatment.

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

Concrete parking are proposed in the basement and on grade ac paving parking spaces in the alley, one (3 story building) , concrete steps , concrete walkway, trash enclosure area and courtyard.

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

Development is proposing street trees/planting and onsite one bioretention facility, trees, planting.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

Project proposes grading 100% of the site.

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

☑ Yes

☐ No

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

Description / Additional Information:

The existing residential building are to be demolished to accommodate for 34 unit multi-family apartment building. The proposed structure will be three stories over parking garage, with the corresponding landscape areas, slopes, one biofiltration facility (bioretention with liner). The proposed roof runoff and storm drain catch basins drain into the biofiltration facility for pollutant and hydromodification control. The biofiltration facility has a 36"x36 catch basin which collects the treated runoff flow then discharges into Broadway generating a total Q100=1.38CFS

There are no drainage conveyance network on Broadway. The existing total runoff is 0.94 cfs and the post development runoff is 1.38 cfs. The runoff will be detained in the biofiltration; thereby resulting in routed runoff of 0.94 cfs. There will be no increase in runoff due to this development and therefore no impact onto the downstream system. The analysis and calculations for the determination of Pre and Post-Development 100 year return period peak flow is included hereon under Hydrology report and the Technical Memorandum.

The following table depicts the existing and proposed runoff for the 0.36 acre project:

	Existing Condition	Proposed Condition
Runoff (Q100)	0.94 cfs	1.38 cfs
Routed (Q100)	0.94 cfs	0.94 cfs

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

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

Description / Additional Information:

Form I-3B Page 7 of 11

Identification and Narrative of Receiving Water

Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)

The site drains indirectly to Chollas Creek (908.22) then to the San Diego Bay

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.

Inland Surface Water: Chollas Creek: REC1, REC2, WARM & WILD

Coastal Water: San Diego Bay: IND, NAV, REC1, 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.

Site drains to San Diego Bay, there are no areas of ASBS downstream of project

Provide distance from project outfall location to impaired or sensitive receiving waters.

Project does not drain into to ESA

Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands

The post-construction storm water BMP is located 0.5 miles south of the City's Multi Habitat Planning Area, it does not drain to it.

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
Chollas Creek	Copper, Diazinon, Indicator Bacteria, Lead, Phosphorus, Total Nitrogen as N, Trash, Zinc & Ammonia	Uncategorized, Pesticides, Bacteria, heavy Metals, Nutrients, Oxygen Demanding, Trash & Debris, Heavy Metals
San Diego Bay Shoreline near Chollas Creek	Benthic Community Effetcts, Sediment Toxicity	Sediment, Sediment

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

Form I-3B Page 9 of 11

Hydromodification Management Requirements

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

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

No upstream CCSYA drain into site, There is no CCYSA onsite.

Form I-3B Page 10 of 11

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply

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

Project will have one point of compliance located at the southwest corner of the site.

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:

N/A

Discussion / Additional Information: (optional)

N/A

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.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

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Source Control BMP Checklist for All Development Projects

Form I-4

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-3 not implemented:			
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:			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☑ Yes	☐ No	☐ N/A
Interior parking garages	☑ Yes	☐ No	☐ N/A
Need for future indoor & structural pest control	☑ Yes	☐ No	☐ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☐ Yes	☐ No	☑ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☑ N/A

Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.

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 Drainage Pathways and Hydrologic Features	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-1 not implemented: Site is already developed, there are no natural drainage pathways.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☑ No	
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☑ No	
1-3 Implemented trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☑ No	
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☑ No	
SD-2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-2 not implemented: There are no natural areas or vegetation onsite			

Form I-5 Page 2 of 4

Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-5 not implemented: There is no overflow or runoff from impervious draining into the the proposed 2:1 slopes. The Rooftops drain to the biofiltration			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☑ Yes	☐ No	

Form I-5 Page 3 of 4

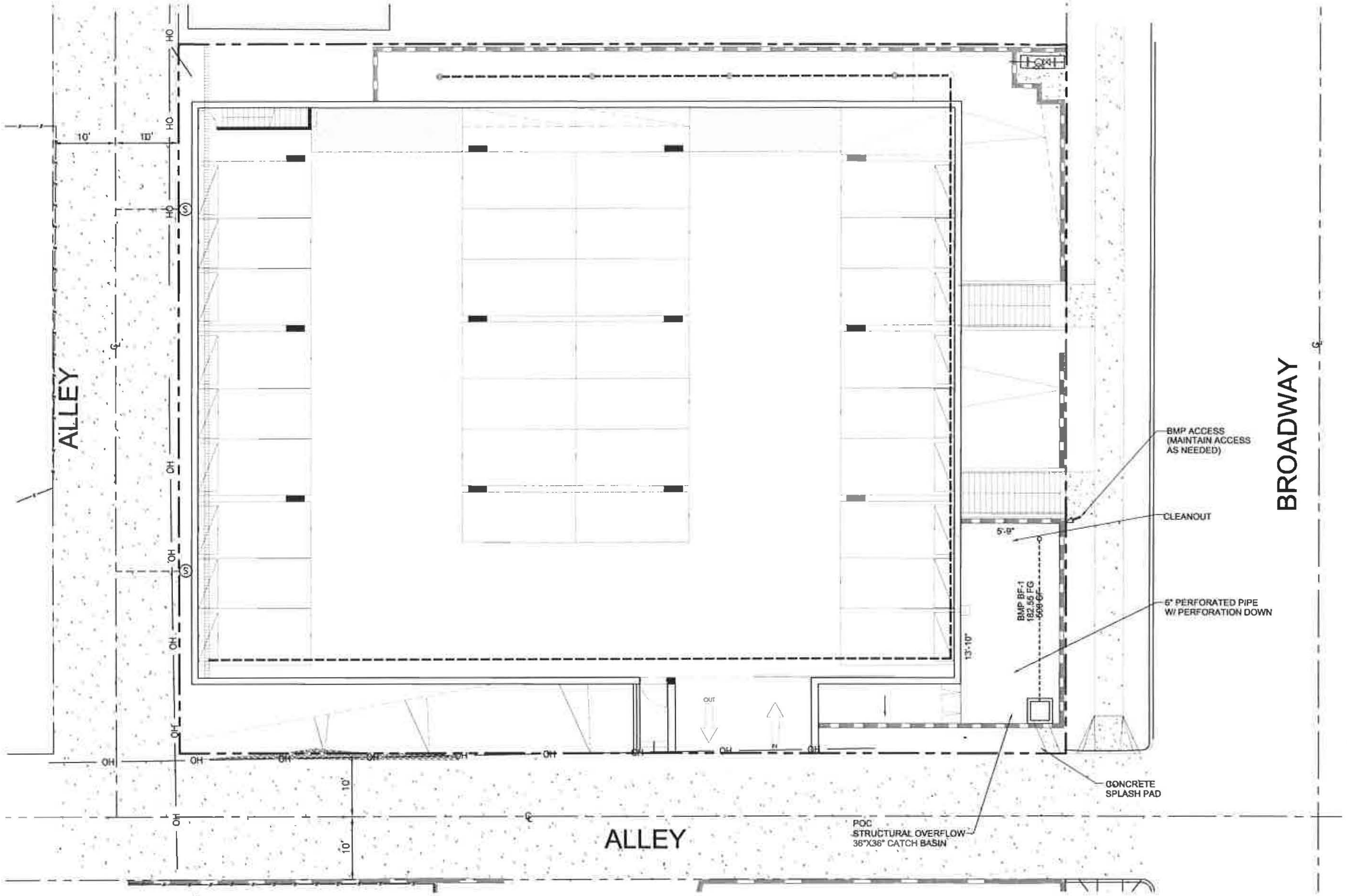
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☑ No	
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	
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☑ No	
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented: Landscape will include drought tolerant /native trees and shrubs			
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☑ N/A
Discussion / justification if SD-8 not implemented: Harvesting is unfeasible, the proposed development has relatively small areas for landscape (2:1 slopes) and there is no space for barrels or other means of storm drain storage. Being proposed is underground parking and the rest of the area is occupied by the building.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☑ No	

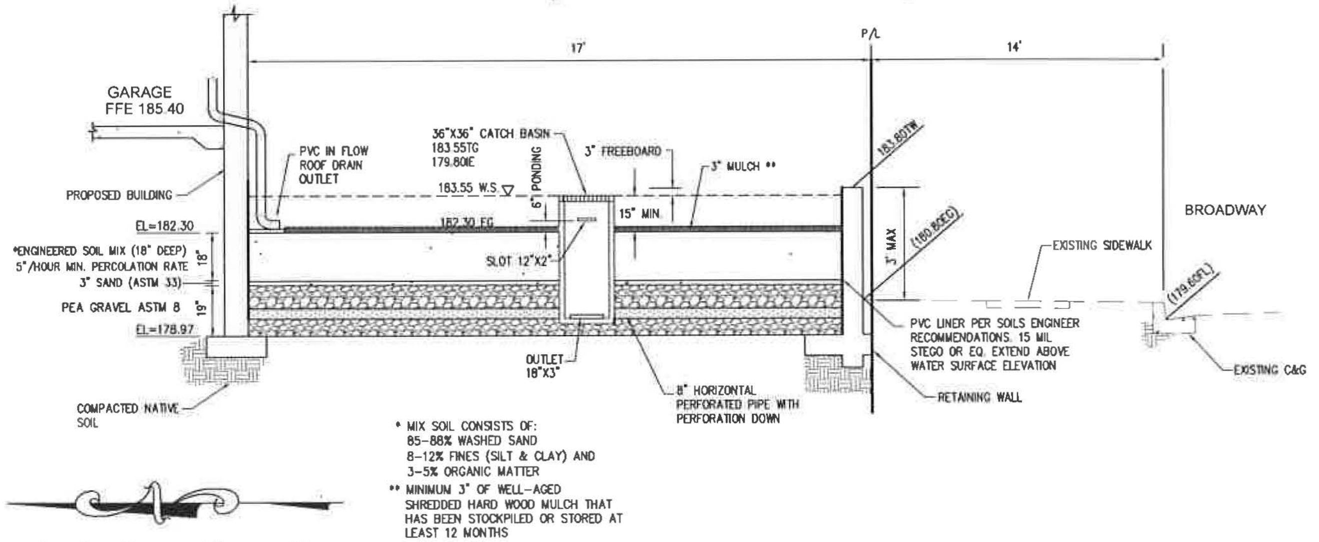
Form I-5 Page 4 of 4

Insert Site Map with all site design BMPs identified:

For Site Map with all site design BMP see BMP exhibit on the following page

CONCEPTUAL BMP FOR
PROPOSED MULTI-FAMILY APARTMENTS 2828-2834 BROADWAY SAN DIEGO, CA 92102



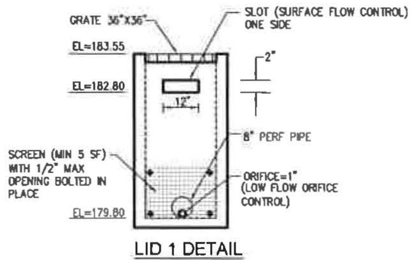


* MIX SOIL CONSISTS OF:
85-88% WASHED SAND
8-12% FINES (SILT & CLAY) AND
3-5% ORGANIC MATTER

** MINIMUM 3" OF WELL-AGED SHREDDED HARD WOOD MULCH THAT HAS BEEN STOCKPILED OR STORED AT LEAST 12 MONTHS

BIOFILTRATION FACILITY DETAIL

NOT TO SCALE



LID 1 DETAIL

NOT TO SCALE

LEGEND:

ITEM	SYMBOL
DRAINAGE MANAGEMENT AREA	
ACCESS FOR STRUCTURAL BMP INSPECTION AND MAINTENANCE	→
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	▨
DRAINAGE DIRECTION	— — —

BMP CATEGORY/TYPE

BIOFILTRATION BMP (BF-1) (W/ IMPERMEABLE LINER AND UNDERDRAIN)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR – GOLDEN HILLS BROADWAY
DATE – MARCH 29, 2016
PREPARED BY – K&S ENGINEERING, INC.

MAINTENANCE AGREEMENT DOCUMENT

TBD

OPERATIONS AND MAINTENANCE PLAN

TBD

RESPONSIBLE PARTY INFORMATION

METROPOLITAN/SDPB BROADWAY, LLC
CONTACT NAME: MIKE DONOVAN

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.

2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.

3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.

4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.

5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK).

PLANTING NOTES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN.

GROUNDWATER

THERE IS NO UNDERGROUND WELLS NEAR THE SITE PER WATERBOARDS GAMA GEOTRACKER

WDID NO:

N/A

STORM WATER PRIORITY:

LOW

NO.43235
EXP 3-31-18
CIVIL

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:

02.16.2016 SITE DEVELOPMENT SUBMITTAL
11.12.2015 COMPLETENESS CHECK

DRAWING TITLE:
BMP SHEET

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO	
DATE	Novemnver 08, 2016
DRAWN BY	NA
SCALE	1" = 10'
SHEET NO	BMP 1

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

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

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

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

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The majority of DMA1 area runoff will drain towards a proposed bmp-1 biofiltration facility (bioretention with liner) where stormwater will be treated, addressing water quality and hydromodification requirements. The runoff from DMA2, DMA3 and DMA5 are self-treated/ self-mitigating and the remaining DMA4 consist of very small area, and therefore are not considered to be significant contributors of pollutants.

This SWQMP has shown LID design, source control and treatment BMP's that should satisfy the requirements identified in the order and standards by treating and mitigating runoff to the most extend practicable, and it is anticipated that the downstream waters will not be affected by the proposed development.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of 4
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of 4 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. BMP-1 BF-1

Construction Plan Sheet No. GRD_C4-BMP.dwg

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

☐ 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	K & S Engineering, Inc. Hossein Zomorrodi PE 43235 619.296.5565
Who will be the final owner of this BMP?	Metropolitan/SDPB Broadway, LLC. Mike Donovan
Who will maintain this BMP into perpetuity?	Metropolitan/SDPB Broadway, LLC. Mike Donovan
What is the funding mechanism for maintenance?	Maintenance Agreement

Form I-6 Page 4 of 4 (Copy as many as needed)
Structural BMP ID No. BMP-1 BF-1
Construction Plan Sheet No. GRD_C4-BMP.dwg
Discussion (as needed):

THE CITY OF SAN DIEGO

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

Permanent BMP Construction

Self Certification Form

FORM
DS-563
January 2016

Date Prepared:	Project No.:
Project Applicant: Metropolitan/SDPB Broadway, LLC	Phone: (619) 540-0467

Project Address:
2828-2834 Broadway San Diego CA 92102

Project Engineer: K & S Engineering, Inc. Hossein Zomorrodi PE 43235	Phone: (619) 296-5565

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

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

CERTIFICATION:

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

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

Signature: ______________________________

Date of Signature:

Printed Name:

Title:

Phone No.

Engineer's Stamp

DS-563 (01-16)

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Indicate which Items are Included:

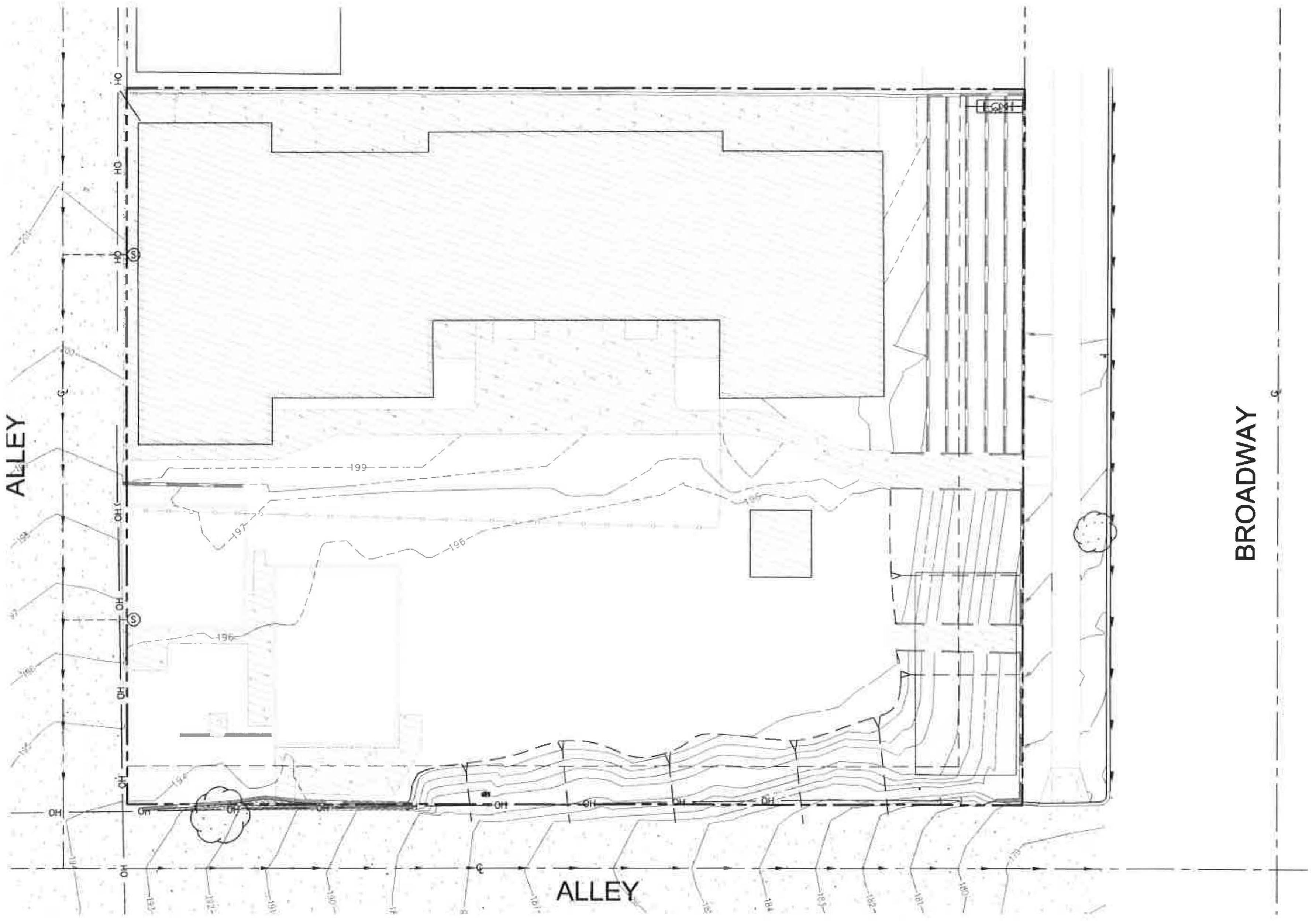
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included 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 ☑ Not feasible see page A-47 SWQMP
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

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)

CONCEPTUAL DMA PLAN FOR GOLDEN HILL
EXISTING CONDITION



LEGEND

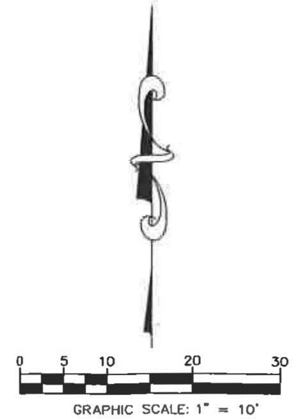
ITEM	SYMBOL
EXISTING PERVIOUS AREA	☐
EXISTING IMPERVIOUS AREA	▨

PROJECT AREA:

15,852 SF

DISTURBED AREA:

15,852 SF = 100% OF TOTAL SITE



GRAPHIC SCALE: 1" = 10'

GROUNDWATER NOTE:

THERE IS NO GROUNDWATER ON SITE, OR 1,000 FEET RADIUS FROM THE SITE PER GEOTRACKER GAMA GROUNDWATER.

NO GROUNDWATER WAS ENCOUNTERED IN THE EXPLORATORY TRENCHES PER SOILS REPORT BY ALLIED EARTH TECHNOLOGY DATED MARCH 22, 2016.

SOIL TYPE NOTE:

THE ENTIRE SITE IS CLASSIFIED AS Ur URBAN LAND PER NRCS WEB SOILS

CCSYA NOTE:

PROJECT IS NOT WHITIN OR DOESN'T RECEIVE OR DRAINS FROM CRITICAL COARSE SEDIMENT YIELD AREAS

K & S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

HOSSEIN ZOMORRODI
NO.43235
EXP 3-31-18
CIVIL

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

Notes

All ideas, arrangements, drawings and plans set forth on this sheet are the original work product of, owned by and are the property of dbrds and use of this said work product is limited to a specified project of the purchaser, and for the construction of one building, any use, reuse or disclosure of said plans, reproductions, ideas, designs and/or arrangements, other than by dbrds, is strictly prohibited by law without the written permission of dbrds. Written dimensions on these drawings shall have precedence over scaled dimensions; contractors shall verify, and be responsible for all dimensions and conditions on the job and this office must be notified of any variations from the dimensions and conditions shown these drawings.

PROJECT TEAM

OWNER:

METROPOLITIAN/SDPB BROADWAY, LLC

2929 CANON STREET, SUITE 'A'
SAN DIEGO, CA 92106

PHONE: (619) 540-0467
CONTACT: MIKE DONOVAN
EMAIL: mdolaf@gmail.com

DESIGN:

DE BARTOLO + RIMANIC DESIGN STUDIO

363 5TH AVE, SUITE 203
SAN DIEGO, CA 92101

PHONE: (858) 220 5262
CONTACT: PAULY DE BARTOLO
EMAIL: pauly@dbrds.com

CIVIL ENGINEER

K & S ENGINEERING, INC.

7801 MISSION CENTER COURT, SUITE 100
SAN DIEGO, CA 92108

PHONE: (619) 296-5565
CONTACT: HOSSEIN ZOMORRODI
EMAIL: H-ZOMORRODI@KS-ENGR.COM

LANDSCAPE ARCHITECT

McCULLOUGH LANDSCAPE ARCHITECTURE

703 16TH STREET, SUITE 100
SAN DIEGO CA 92101

PHONE: (619) 296-3150
CONTACT: DAVID McCULLOUGH
EMAIL: David@mlasd.com

REVISION:

02.16.2016 SITE DEVELOPMENT SUBMITTAL JR
11.12.2015 COMPLETENESS CHECK SR

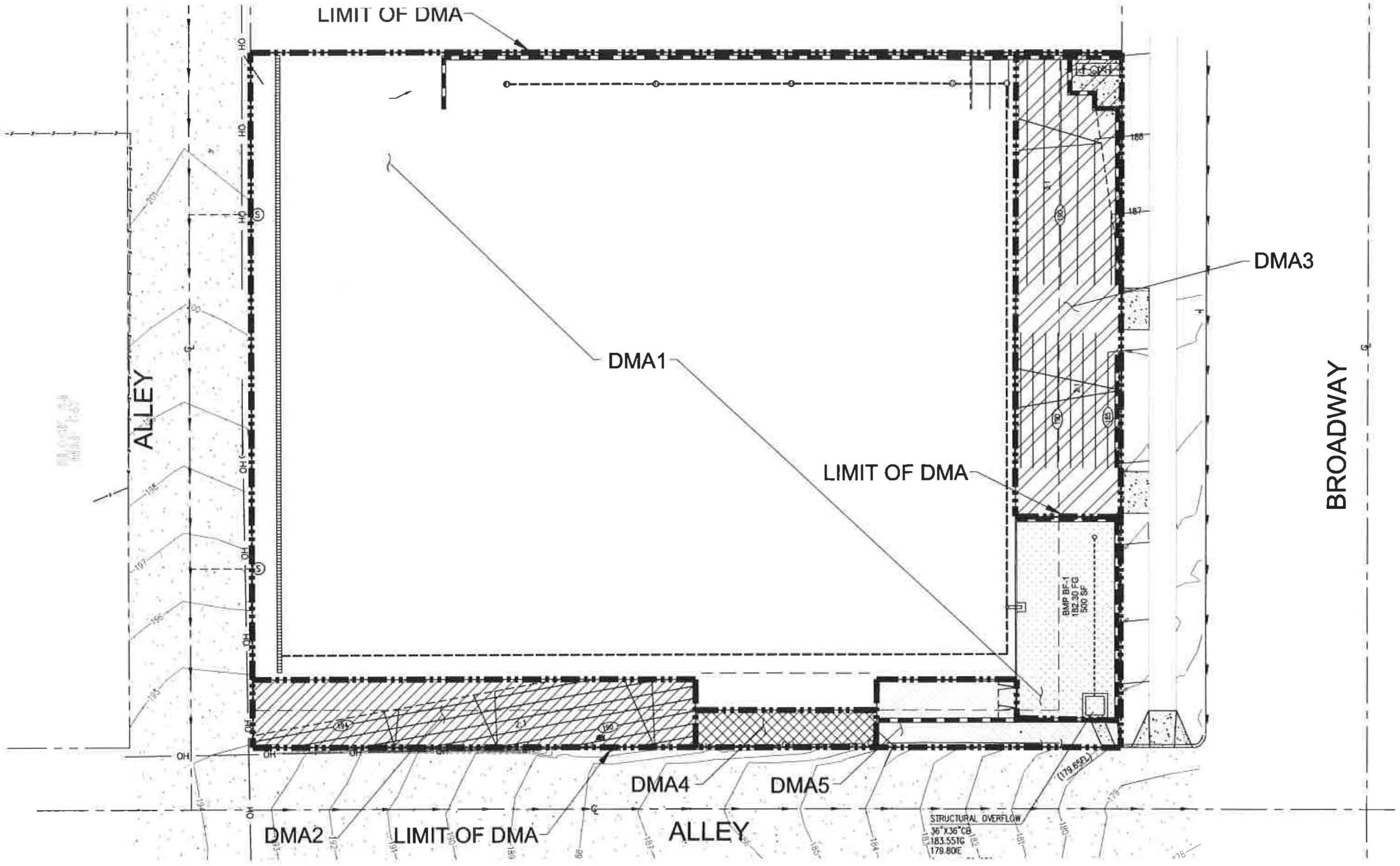
DRAWING TITLE:
DMA EXHIBIT 1 EXISTING

PROJECT:
PROPOSED MULTI-FAMILY APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO
DATE: OCTOBER 05, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: DMA 1

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.20.2016

CONCEPTUAL DMA PLAN FOR GOLDEN HILL
PROPOSED CONDITION



LEGEND

ITEM	SYMBOL
LIMIT OF DRAINAGE MANAGEMENT AREA	▬ ▪ ▪ ▬ ▪ ▪ ▬
DMA1 (BIOFILTRATION)	☐
DMA2 (SELF-MITIGATING)	▨
DMA3 (SELF-MITIGATING)	▨
DMA4 (DE MINIMIS)	▩
DMA5 (MITIGATING)	▨

PROJECT AREA:

15,852 SF

DISTURBED AREA:

15,852 SF = 100% OF TOTAL SITE

IMP AREA CALCULATION FACILITY (FOR WATER QUALITY ONLY)

LOW IMPACT DEVELOPMENT DESIGN (LID) SUMMARY TABLE

DRAINAGE MANAGEMENT AREA (DMA)		BMP
DMA-1	13,292 SF	BIOFILTRATION BF-1
DMA-2	790 SF	SELF-TREATING (PERVIOUS)
DMA-3	1,274 SF	SELF-TREATING (PERVIOUS)
DMA-4	176 SF	DE MINIMIS
DMA-5	320 SF	SELF-TREATING (PERVIOUS)
TOTAL	15,852 SF	

K & S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

HOSSEIN ZOMORRODI
NO.43235
EXP 3-31-18

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY

Notes

All ideas, arrangements, drawings and plans set forth on this sheet are the original work product of, owned by and are the property of dbrds and use of this said work product is limited to a specified project of the purchaser, and for the construction of one building, any use, reuse or disclosure of said plans, reproductions, ideas, designs and/or arrangements, other than by dbrds, is strictly prohibited by law without the written permission of dbrds. Written dimensions on these drawings shall have precedence over scaled dimensions; contractors shall verify, and be responsible for all dimensions and conditions on the job and this office must be notified of any variations from the dimensions and conditions shown these drawings

PROJECT TEAM

OWNER:

METROPOLITIAN/SDPB BROADWAY, LLC

2929 CANON STREET, SUITE 'A'
SAN DIEGO, CA 92106

PHONE: (619) 540-0467
CONTACT: MIKE DONOVAN
EMAIL: mdolal@gmail com

DESIGN:

DE BARTOLO + RIMANIC DESIGN STUDIO

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7801 MISSION CENTER COURT, SUITE 100
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LANDSCAPE ARCHITECT

McCULLOUGH LANDSCAPE ARCHITECTURE

703 16TH STREET, SUITE 100
SAN DIEGO CA 92101

PHONE: (619) 296-3150
CONTACT: DAVID McCULLOUGH
EMAIL: David@mlasd com

REVISION:

02.16.2016 SITE DEVELOPMENT SUBMITTAL
11.12.2015 COMPLETENESS CHECK

DRAWING TITLE:
DMA EXHIBIT 2 PROPOSED

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: -
DATE: OCTOBER 05, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: DMA 2

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

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=	0.31	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.85	unitless
4	Trees Credit Volume	TCV=	-	cubic-feet
5	Rain barrels Credit Volume	RCV=	-	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	498	cubic-feet

PER STORM WATER STANDARDS TABLE B.1-1
RUNOFF FACTOR FOR:
- CONCRETE OR ASPHALT= 0.90
-AMMENDED, MULCHED SOILS OR LANDSCAPE= 0.10

WEIGHTED RUNOFF FACTOR EQUATION;

Wc=(C*)(AREA imp)+(C*)(AREA perv)/TOTAL AREA

Where:

Aimp=Tributary Area 12,728sf
Aperv=Tributary Area 784sf

Wc=(0.90)(12,728sf)+(0.10)(752sf)/13,480sf
Wc=0.85

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	498	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0.102	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]	3.672	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	9.18	inches
7	Assumed surface area of the biofiltration BMP	500	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	240.5	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	258	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	21	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	9	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)]	13.8	inches
19	Total Depth Treated [Line 17 + Line 18]	43.8	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]	386.3	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	105.8	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]	193.1	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	167.9	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	13,480	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.85	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	343.74	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	343.78	sq-ft
Check for Volume Reduction [Not applicable for No Infiltration Condition]			
29	Calculate the fraction of DCV retained in the BMP [Line 9/Line 1]	0.483	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.

Required BMP footprint is 343.78 sq-ft, Provide BMP footprint is 500 sq-ft therefore Ok

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design Infiltration Rate Worksheet			**Worksheet D.5-1**		
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) $p = w \times v$
A	Suitability Assessment	Soil 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	2	0.50
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.25
B	Design	Level of pretreatment/ expected sediment loads	0.5	1	0.5
		Redundancy/resiliency	0.25	1	0.25
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1.0
Combined Safety Factor, $S_{total} = S_A \times S_B$				2.25	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				0.23 in/hr	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				0.102 in/hr	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms: Refer to geotechnical study					

Appendix E

BMP Design Fact Sheets

The following fact sheets were developed to assist the project applicants with designing BMPs to meet the storm water obligations:

MS4 Category	Manual Category	Design Fact Sheet
Source Control	Source Control	SC: Source Control BMP Requirements SC-6A: Large Trash Generating Facilities SC-6B: Animal Facilities SC-6C: Plant Nurseries and Garden Centers SC-6D: Automotive-related Uses
Site Design	Site Design	SD-1: Trees SD-4: Amended Soils SD-5: Impervious Area Dispersion SD-6A: Green Roofs SD-6B: Permeable Pavement (Site Design BMP) SD-8: Rain Barrels
Retention	Harvest and Use	HU-1: Cistern
	Infiltration	INF-1: Infiltration Basins INF-2: Bioretention INF-3: Permeable Pavement (Pollutant Control) INF-4: Dry Wells
	Partial Retention	PR-1: Biofiltration with Partial Retention
Biofiltration	Biofiltration	BF-1: Biofiltration BF-2: Nutrient Sensitive Media Design BF-3: Proprietary Biofiltration
Flow-thru Treatment Control	Flow-thru Treatment Control with Alternative Compliance	FT-1: Vegetated Swales FT-2: Media Filters FT-3: Sand Filters FT-4: Dry Extended Detention Basin FT-5: Proprietary Flow-thru Treatment Control
		PL: Plant List

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E.1. Source Control BMP Requirements

Worksheet E.1-1: Source Control BMP Requirements

How to comply: Projects shall comply with this requirement by implementing all source control BMPs listed in this section that are applicable to their project. Applicability shall be determined through consideration of the development project's features and anticipated pollutant sources. Appendix E.1 provides guidance for identifying source control BMPs applicable to a project. Checklist I.4 in Appendix I shall be used to document compliance with source control BMP requirements.

How to use this worksheet:

1. Review Column 1 and identify which of these potential sources of storm water pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your project site plan.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your project-specific storm water management report. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternatives.

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.

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.

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:______________

Landtype (Table B.3-1)= Residential
Total use per resident/employee (Table B.3-1)= 9.3
Plant water Use (Table B.3-2)= Moderate
36hr Irrigation demand (Table B.3-3)= 1,470 Gal/Ac (per 36hr period))
Total Resident/Employee= 34 Residents, 68 Persons

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]

$$\text{T \& U} = \frac{9.3\ \text{Gal}}{\text{Day}} \times \frac{68\ \text{Persons} \times 1.5\ \text{day}}{7.48\ \text{Gal/Ft3}} = 126.81$$

LI = 3,124 sf, Landscape Area = $\frac{0.071\ \text{Ac}}{\text{Day-Ac}} = \frac{1{,}470\ \text{Gal} \times 0.071 \times 1.5\ \text{Day}}{7.48\ \text{Gal/Ft3}} = 20.92$

$$\text{Total 36hr demand} = \frac{\text{T \& U} + \text{LI}}{\text{DCV}} = \frac{126.81 + 20.92}{498} = 0.29$$

3. Calculate the DCV using worksheet B-2.1.
DCV = ___498___ (cubic feet)

3a. Is the 36 hour demand greater than or equal to the DCV? ☐ Yes / ☑ No ⇨ ⇩	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV? ☐ Yes / ☑ No ⇨ ⇩	3c. Is the 36 hour demand less than 0.25DCV? ☑ 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.

Categorization of Infiltration Feasibility Condition	**Form I-8**

Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

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

Provide basis:

Unfactored infiltration rate of 0.23 in/hr was obtained

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

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

Provide basis:

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

Form I-8 Page 2 of 4

Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Form I-8 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Form I-8 Page 4 of 4

Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Appendix F

Biofiltration Standard and Checklist

Introduction

The MS4 Permit and this manual define a specific category of storm water pollutant treatment BMPs called "biofiltration BMPs." The MS4 Permit (Section E.3.c.1) states:

Biofiltration BMPs must be designed to have an appropriate hydraulic loading rate to maximize storm water retention and pollutant removal, as well as to prevent erosion, scour, and channeling within the BMP, and must be sized to:

a) **Treat 1.5 times the DCV not reliably retained onsite, OR**

b) **Treat the DCV not reliably retained onsite with a flow-thru design that has a total volume, including pore spaces and pre-filter detention volume, sized to hold at least 0.75 times the portion of the DCV not reliably retained onsite.**

A project applicant must be able to affirmatively demonstrate that a given BMP is designed and sized in a manner consistent with this definition to be considered as a "biofiltration BMP" as part of a compliant storm water management plan. Retention is defined in the MS4 Permit as evapotranspiration, infiltration, and harvest and use of storm water vs. discharge to a surface water system.

Contents and Intended Uses

This appendix contains a checklist of the key underlying criteria that must be met for a BMP to be considered a biofiltration BMP. The purpose of this checklist is to facilitate consistent review and approval of biofiltration BMPs that meet the "biofiltration standard" defined by the MS4 Permit.

This checklist includes specific design criteria that are essential to defining a system as a biofiltration BMP; however it does not present a complete design basis. This checklist was used to develop BMP Fact Sheets for PR-1 biofiltration with partial retention and BF-1 biofiltration, which do present a complete design basis. Therefore, biofiltration BMPs that substantially meet all aspects of the Fact sheets PR-1 or BF-1 should be able to complete this checklist without additional documentation beyond what would already be required for a project submittal.

Other biofiltration BMP designs[7] (including both non-proprietary and proprietary designs) may also meet the underlying MS4 Permit requirements to be considered biofiltration BMPs. These BMPs may

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[7] Defined as biofiltration designs that do not conform to the specific design criteria described in Fact Sheets PR-1 or BF-1. This category includes proprietary BMPs that are sold by a vendor as well as non-proprietary BMPs that are designed and constructed of primarily of more elementary construction materials.

be classified as biofiltration BMPs if they (1) meet the minimum design criteria listed in this appendix, including the pollutant treatment performance standard in Appendix F.1, (2) are designed and maintained in a manner consistent with their performance certifications (See explanation in Appendix F.2), if applicable, and (3) are acceptable at the discretion of the City Engineer. The applicant may be required to provide additional studies and/or required to meet additional design criteria beyond the scope of this document in order to demonstrate that these criteria are met.

Organization

The checklist in this appendix is organized into the seven (7) main objectives associated with biofiltration BMP design. It describes the associated minimum criteria that must be met in order to qualify a biofiltration BMP as meeting the biofiltration standard. The seven main objectives are listed below. Specific design criteria and associated manual references associated with each of these objectives is provided in the checklist in the following section.

1. Biofiltration BMPs shall be allowed only as described in the BMP selection process in this manual (i.e., retention feasibility hierarchy).
2. Biofiltration BMPs must be sized using acceptable sizing methods described in this manual.
3. Biofiltration BMPs must be sited and designed to achieve maximum feasible infiltration and evapotranspiration.
4. Biofiltration BMPs must be designed with a hydraulic loading rate to maximize pollutant retention, preserve pollutant control/sequestration processes, and minimize potential for pollutant washout.
5. Biofiltration BMPs must be designed to promote appropriate biological activity to support and maintain treatment processes.
6. Biofiltration BMPs must be designed to prevent erosion, scour, and channeling within the BMP.
7. Biofiltration BMP must include operations and maintenance design features and planning considerations to provide for continued effectiveness of pollutant and flow control functions.

Biofiltration Criteria Checklist

The applicant shall provide documentation of compliance with each criterion in this checklist as part of the project submittal. The right column of this checklist identifies the submittal information that is recommended to document compliance with each criterion. Biofiltration BMPs that substantially meet all aspects of Fact Sheets PR-1 or BF-1 should still use this checklist; however additional documentation (beyond what is already required for project submittal) should not be required.

1	**Biofiltration BMPs shall be allowed to be used only as described in the BMP selection process based on a documented feasibility analysis.** Intent: This manual defines a specific prioritization of pollutant treatment BMPs, where BMPs that retain water (retained includes evapotranspired, infiltrated, and/or harvested and used) must be used before considering BMPs that have a biofiltered discharge to the MS4 or surface waters. Use of a biofiltration BMP in a manner in conflict with this prioritization (i.e., without a feasibility analysis justifying its use) is not permitted, regardless of the adequacy of the sizing and design of the system.	
☐	The project applicant has demonstrated that it is not technically feasible to retain the full DCV onsite.	Document feasibility analysis and findings in SWQMP per Appendix C.
2	**Biofiltration BMPs must be sized using acceptable sizing methods.** Intent: The MS4 Permit and this manual defines specific sizing methods that must be used to size biofiltration BMPs. Sizing of biofiltration BMPs is a fundamental factor in the amount of storm water that can be treated and also influences volume and pollutant retention processes.	
☑	The project applicant has demonstrated that biofiltration BMPs are sized to meet one of the biofiltration sizing options available (Appendix B.5).	Submit sizing worksheets (Appendix B.5) or other equivalent documentation with the SWQMP.
3	**Biofiltration BMPs must be sited and designed to achieve maximum feasible infiltration and evapotranspiration.** Intent: Various decisions about BMP placement and design influence how much water is retained via infiltration and evapotranspiration. The MS4 Permit requires that biofiltration BMPs achieve maximum feasible retention (evapotranspiration and infiltration) of storm water volume.	
☐	The biofiltration BMP is sited to allow for maximum infiltration of runoff volume based on the feasibility factors considered in site planning efforts. It is also designed to maximize evapotranspiration through the use of amended media and plants (biofiltration designs without amended media and plants may be permissible; see Item 5).	Document site planning and feasibility analyses in SWQMP per Section 5.4.
☐	For biofiltration BMPs categorized as "Partial Infiltration Condition," the infiltration storage depth in the biofiltration design has been selected to drain in 36 hours (+/-25%) or an alternative value shown to maximize infiltration on the site.	Included documentation of estimated infiltration rate per Appendix D; provide calculations using Appendix B.4 and B.5 to show that the infiltration storage depth meets this criterion. Note, depths that are too shallow or too deep may not be acceptable.

☐	For biofiltration BMP locations categorized as "Partial Infiltration Condition," the infiltration storage is over the entire bottom of the biofiltration BMP footprint.	Document on plans that the infiltration storage covers the entire bottom of the BMP (i.e., not just underdrain trenches); or an equivalent footprint elsewhere on the site.
☐	For biofiltration BMP locations categorized as "Partial Infiltration Condition," the sizing factor used for the infiltration storage area is not less than the minimum biofiltration BMP sizing factors calculated using Worksheet B.5.1.	Provide a table that compares the minimum sizing factor per Worksheet B.5.1 to the provided sizing factor. Note: The infiltration storage area could be a separate storage feature located downstream of the biofiltration BMP, not necessarily within the same footprint.
☑	An impermeable liner or other hydraulic restriction layer is only used when needed to avoid geotechnical and/or subsurface contamination issues in locations identified as "No Infiltration Condition."	If using an impermeable liner or hydraulic restriction layer, provide documentation of feasibility findings per Appendix C that recommend the use of this feature.
☑	The use of "compact" biofiltration BMP design[8] is permitted only in conditions identified as "No Infiltration Condition" and where site-specific documentation demonstrates that the use of larger footprint biofiltration BMPs would be infeasible.	Provide documentation of feasibility findings that recommend no infiltration is feasible. Provide site-specific information to demonstrate that a larger footprint biofiltration BMP would not be feasible.
4	**Biofiltration BMPs must be designed with a hydraulic loading rate to maximize pollutant retention, preserve pollutant control processes, and minimize potential for pollutant washout.** Intent: Various decisions about biofiltration BMP design influence the degree to which pollutants are retained. The MS4 Permit requires that biofiltration BMPs achieve maximum feasible retention of storm water pollutants.	

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[8] Compact biofiltration BMPs are defined as features with infiltration storage footprint less than the minimum sizing factors required to achieve 40% volume retention. Note that if a biofiltration BMP is accompanied by an infiltrating area downstream that has a footprint equal to at least the minimum sizing factors calculated using Worksheet B.5.1 assuming a partial infiltration condition, then it is not considered to be a compact biofiltration BMP for the purpose of Item 4 of the checklist. For potential configurations with a higher rate biofiltration BMP upstream of an larger footprint infiltration area, the BMP would still need to comply with Item 5 of this checklist for pollutant treatment effectiveness.

☐	Media selected for the biofiltration BMP meets minimum quality and material specifications per Appendix F.4 or County LID Manual, including the maximum allowable design filtration rate and minimum thickness of media.	Provide documentation that media meets the specifications in Appendix F.4 or County LID Manual.
	OR	
☐	Alternatively, for proprietary designs and custom media mixes not meeting the media specifications contained in Appendix F.4 or County LID Manual, field scale testing data are provided to demonstrate that proposed media meets the pollutant treatment performance criteria in Section F.1 below.	Provide documentation of performance information as described in Section F.1.
☐	To the extent practicable, filtration rates are outlet controlled (e.g., via an underdrain and orifice/weir) instead of controlled by the infiltration rate of the media.	Include outlet control in designs or provide documentation of why outlet control is not practicable.
☐	The water surface drains to at least 12 inches below the media surface within 24 hours from the end of storm event flow to preserve plant health and promote healthy soil structure.	Include calculations to demonstrate that drawdown rate is adequate. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.
☐	If nutrients are a pollutant of concern, design of the biofiltration BMP follows nutrient-sensitive design criteria.	Follow specifications for nutrient sensitive design in Fact Sheet BF-2. Or provide alternative documentation that nutrient treatment is addressed and potential for nutrient release is minimized.
☑	Media gradation calculations demonstrate that migration of media between layers will be prevented and permeability will be preserved.	Follow specification for choking layer in Fact Sheet PR-1 or BF-1. Or include calculations to demonstrate that choking layer is appropriately specified.
5	**Biofiltration BMPs must be designed to promote appropriate biological activity to support and maintain treatment processes.** Intent: Biological processes are an important element of biofiltration performance and longevity.	

☑	Plants have been selected to be tolerant of project climate, design ponding depths and the treatment media composition.	Provide documentation justifying plant selection. Refer to the plant list in Appendix E.20.
☐	Plants have been selected to minimize irrigation requirements.	Provide documentation describing irrigation requirements for establishment and long term operation.
☐	Plant location and growth will not impede expected long-term media filtration rates and will enhance long term infiltration rates to the extent possible.	Provide documentation justifying plant selection. Refer to the plant list in Appendix E.20.
☐	If plants are not part of the biofiltration design, other biological processes are supported as needed to sustain treatment processes (e.g., biofilm in a subsurface flow wetland).	For biofiltration designs without plants, describe the biological processes that will support effective treatment and how they will be sustained. Refer to Appendix F.3
6	**Biofiltration BMPs must be designed with a hydraulic loading rate to prevent erosion, scour, and channeling within the BMP.** Intent: Erosion, scour, and/or channeling can disrupt treatment processes and reduce biofiltration effectiveness.	
☐	Scour protection has been provided for both sheet flow and pipe inflows to the BMP, where needed.	Provide documentation of scour protection as described in Fact Sheets PR-1 or BF-1 or approved equivalent.
☐	Where scour protection has not been provided, flows into and within the BMP are kept to non-erosive velocities.	Provide documentation of design checks for erosive velocities as described in Fact Sheets PR-1 or BF-1 or approved equivalent.
☐	For proprietary BMPs, the BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification[9] (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).	Provide copy of manufacturer recommendations and conditions of third-party certification.

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[9] Certifications or verifications issued by the Washington Technology Acceptance Protocol-Ecology program and the New Jersey Corporation for Advanced Technology programs are typically accompanied by a set of guidelines regarding appropriate design and maintenance conditions that would be consistent with the certification/verification

7	**Biofiltration BMP must include operations and maintenance design features and planning considerations for continued effectiveness of pollutant and flow control functions.** Intent: Biofiltration BMPs require regular maintenance in order provide ongoing function as intended. Additionally, it is not possible to foresee and avoid potential issues as part of design; therefore plans must be in place to correct issues if they arise.	
☑	The biofiltration BMP O&M plan describes specific inspection activities, regular/periodic maintenance activities and specific corrective actions relating to scour, erosion, channeling, media clogging, vegetation health, and inflow and outflow structures.	Include O&M plan with project submittal as described in Chapter 7.
☑	Adequate site area and features have been provided for BMP inspection and maintenance access.	Illustrate maintenance access routes, setbacks, maintenance features as needed on project water quality plans.
☐	For proprietary biofiltration BMPs, the BMP maintenance plan is consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies).	Provide copy of manufacturer recommendations and conditions of third-party certification.

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

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Indicate which Items are Included:

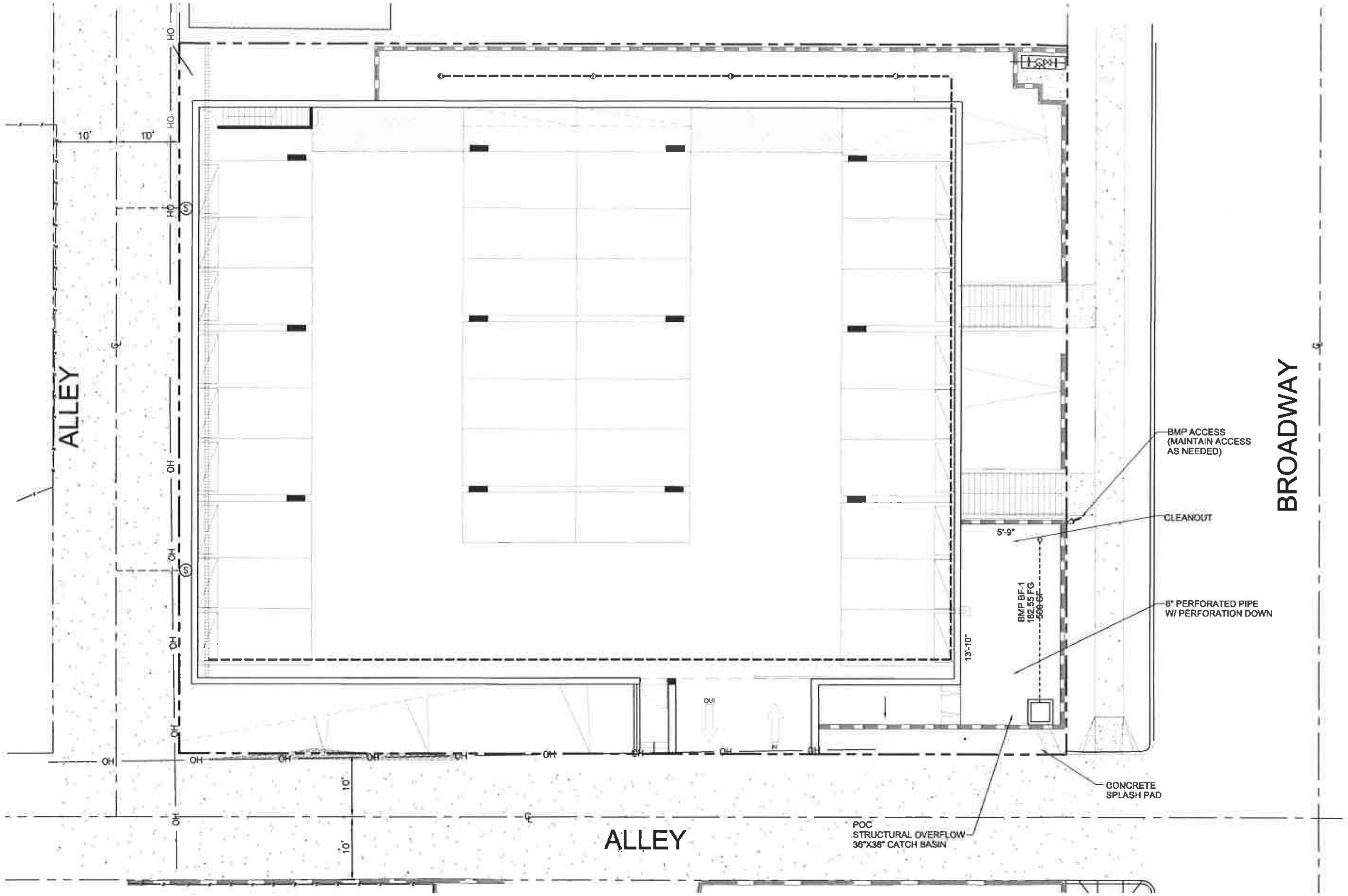
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section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

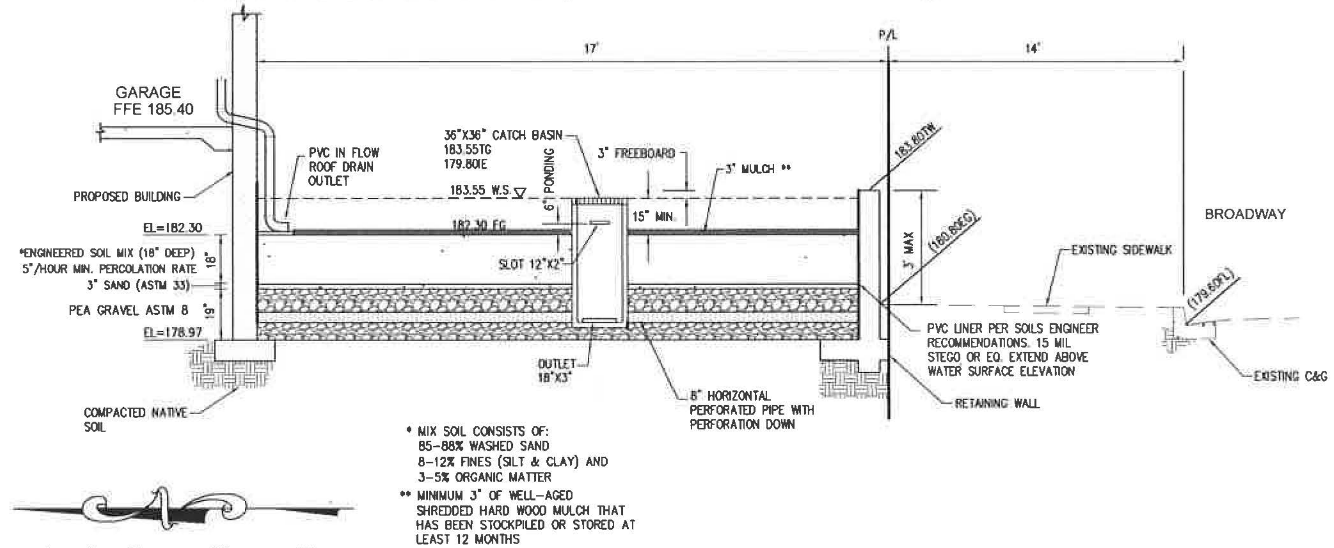
Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

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)

CONCEPTUAL BMP FOR
PROPOSED MULTI-FAMILY APARTMENTS 2828-2834 BROADWAY SAN DIEGO, CA 92102



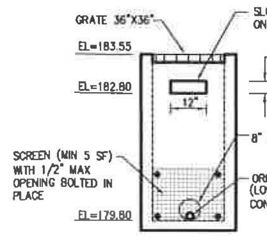


GRAPHIC SCALE: 1" = 10'

* MIX SOIL CONSISTS OF:
85-88% WASHED SAND
8-12% FINES (SILT & CLAY) AND
3-5% ORGANIC MATTER

** MINIMUM 3" OF WELL-AGED SHREDDED HARD WOOD MULCH THAT HAS BEEN STOCKPILED OR STORED AT LEAST 12 MONTHS

BIOFILTRATION FACILITY DETAIL
NOT TO SCALE



LID 1 DETAIL
NOT TO SCALE

LEGEND:

ITEM	SYMBOL
DRAINAGE MANAGEMENT AREA	
ACCESS FOR STRUCTURAL BMP INSPECTION AND MAINTENANCE	➾
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	▭
DRAINAGE DIRECTION	→

BMP CATEGORY/TYPE

BIOFILTRATION BMP (BF-1) (W/ IMPERMEABLE LINER AND UNDERDRAIN)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR - GOLDEN HILLS BROADWAY
DATE - MARCH 29, 2016
PREPARED BY - K&S ENGINEERING, INC.

MAINTENANCE AGREEMENT DOCUMENT

TBD

OPERATIONS AND MAINTENANCE PLAN

TBD

RESPONSIBLE PARTY INFORMATION

METROPOLITAN/SDPB BROADWAY, LLC
CONTACT NAME: MIKE DONOVAN

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.

2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.

3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.

4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.

5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK).

PLANTING NOTES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN.

GROUNDWATER

THERE IS NO UNDERGROUND WELLS NEAR THE SITE PER WATERBOARDS GAMA GEOTRACKER

WDID NO:

N/A

STORM WATER PRIORITY:

LOW

NO.42335
EXP. 3-31-18

K & S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:
02.16.2016 SITE DEVELOPMENT SUBMITTAL IR
11.12.2015 COMPLETENESS CHECK IR

DRAWING TITLE:
HMP SHEET

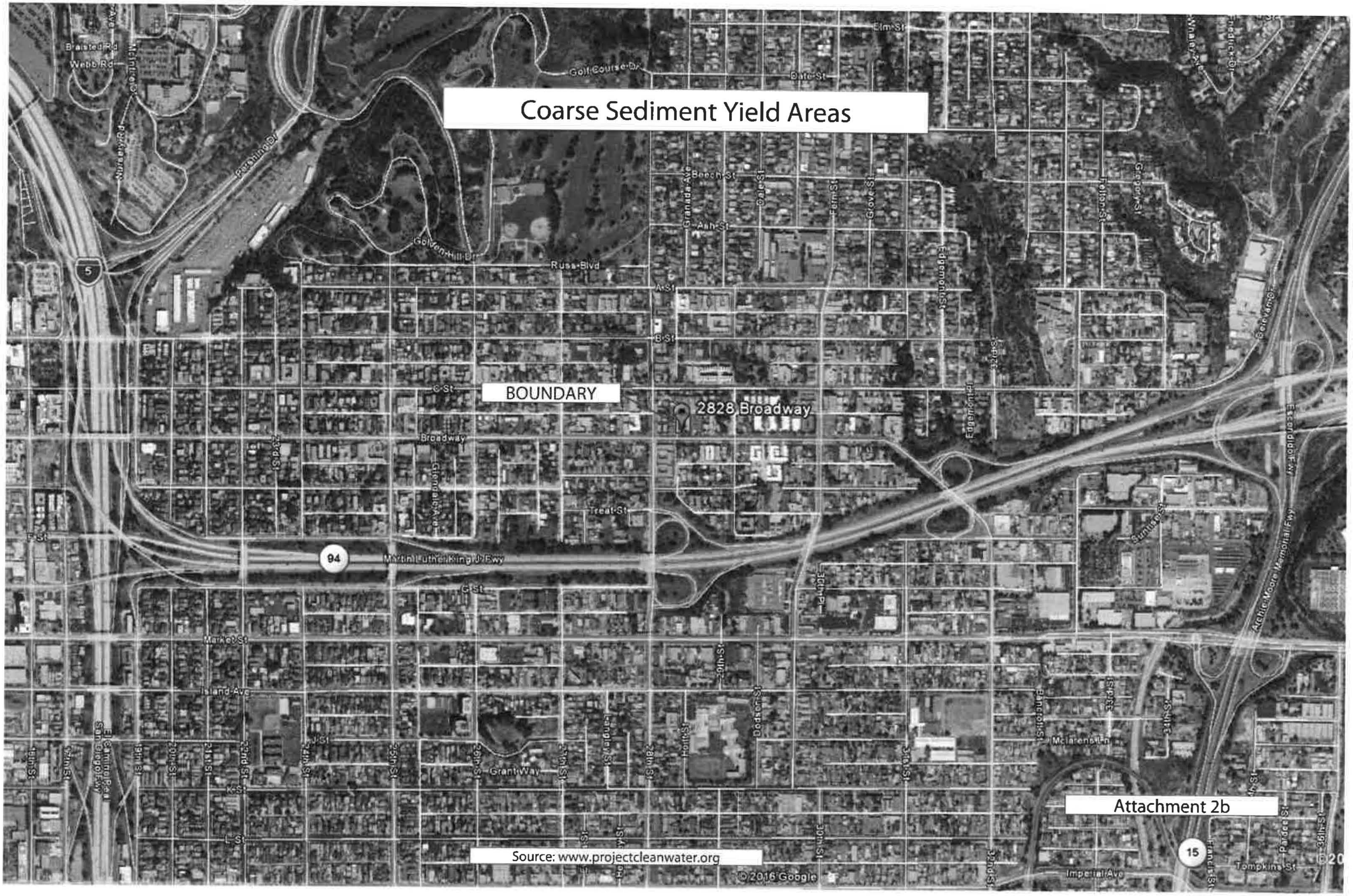
PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: -
DATE: Novemnver 08, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: BMP 1

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

Coarse Sediment Yield Areas

Attachment 2b



Source: www.projectcleanwater.org

TECHNICAL MEMORANDUM:

SWMM Modeling for Hydromodification Compliance of:

2828 Broadway

Prepared For:

The Greenwald Company

Prepared by:

Luis Parra, PhD, CPSWQ, ToR, D.WRE.
R.C.E. 66377

REGISTERED PROFESSIONAL ENGINEER
LUIS A PARRA-ROSALES
No. 66377
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

REC Consultants
2442 Second Avenue
San Diego, CA 92101
Telephone: (619) 232-9200

R·E·C

TECHNICAL MEMORANDUM

TO: The Greenwald Company

FROM: Luis Parra, PhD, PE, CPSWQ, ToR, D.WRE.
David Edwards, PE.

DATE: May 17, 2016 (Revised November 8, 2016)

RE: Summary of SWMM Modeling for Hydromodification Compliance for 2828 Broadway, San Diego, CA.

INTRODUCTION

This memorandum summarizes the approach used to model the proposed residential site in the City of San Diego using the Environmental Protection Agency (EPA) Storm Water Management Model 5.0 (SWMM). SWMM models were prepared for the pre and post-developed conditions at the site in order to determine if the proposed LID biofiltration facility has sufficient volume to meet Order R9-2013-001 requirements of the California Regional Water Quality Control Board San Diego Region (SDRWQCB), as explained in the Final Hydromodification Management Plan (HMP), dated March 2011, prepared for the County of San Diego by Brown and Caldwell.

SWMM MODEL DEVELOPMENT

The 2828 Broadway site consists of a proposed multifamily residential development on the current residential site (see Vicinity Map). Two (2) SWMM models were prepared for this study: the first for the pre-developed and the second for the post-developed conditions. The project site drains to one (1) Point of Compliance (POC) located to the south west of the project site at the adjacent Broadway.

The SWMM model was used since we have found it to be more comparable to San Diego area watersheds than the alternative San Diego Hydrology Model (SDHM) and also because it is a non-proprietary model approved by the HMP document. For both SWMM models, flow duration curves were prepared to determine if the proposed HMP facilities are sufficient to meet the current HMP requirements.

The inputs required to develop SWMM models include rainfall, watershed characteristics, and BMP configurations. The Lindbergh Field Gage from the Project Clean Water website was used for this study, since it is the most representative of the project site precipitation due to elevation and proximity to the project site.

Per the California Irrigation Management Information System "Reference Evaporation Zones" (CIMIS ETo Zone Map), the project site is located within the Zone 4 Evapotranspiration Area. Thus evapotranspiration vales for the site were modeled using Zone 4 average monthly values from Table G.1-1 from the 2016 BMP Design Manual. Per the NRCS web soil survey, the project site is situated upon Class Urban/D soils. Soils have been assumed to be compacted in the existing condition to represent the current developed condition of the site, while fully compacted in the post developed conditions. Other

SWMM inputs for the subareas are discussed in the appendices to this document, where the selection of parameters is explained in detail.

HMP MODELING

PRE DEVELOPED CONDITIONS

In current existing conditions, runoff from the existing single family residential site discharges via overland flow to one (1) point of compliance located at Broadway to the south-western boundary of the project site. Table 1 below illustrates the pre-developed area and impervious percentage accordingly.

TABLE 1 – SUMMARY OF PRE-DEVELOPED CONDITIONS

POC	DMA	Tributary Area, A (Ac)	Impervious Percentage, Ip⁽¹⁾
POC-1	DMA-1-D	0.364	0%
TOTAL	--	**0.364**	--

Notes: (1) – Per the 2013 RWQCB permit, existing condition impervious surfaces are not to be accounted for in existing conditions analysis.

DEVELOPED CONDITIONS

Runoff from the developed project site is drained to one (1) onsite receiving biofiltration LID BMP. Once flows are routed via the proposed LID BMP, all onsite flows are then discharged to the adjacent Broadway. A portion of the project site including landscaping areas and a small impervious driveway (176 sq.ft., below the 250 sq.ft. de minimus threshold) bypass the BMP facility and confluence directly at the POC. Table 2 summarizes the post-developed area and impervious percentage accordingly.

TABLE 2 – SUMMARY OF POST-DEVELOPED CONDITIONS

POC	DMA	Tributary Area, A (Ac)	Impervious Percentage, Ip
POC-1	DMA-1-D	0.310	98.06%
	DMA-BYPASS	0.054	7.42%
TOTAL	**TOTAL**	**0.364**	N/A

One (1) LID biofiltration basin is located within the project site and is responsible for handling hydromodification requirements for the project site. In developed conditions, the basin will have a surface depth of 18-inches and a riser spillway structure set to an elevation of 12-inches (see dimensions in Table 3). Flows will then discharge from the basin via a low flow orifice outlet within the gravel layer or the surface riser structure. The riser structure will act as a spillway such that peak flows can be safely discharged to the receiving storm drain.

Beneath the basins' invert lies the proposed LID biofiltration portion of the drainage facility. This portion of the basin is comprised of a 3-inch layer of mulch, an 18-inch layer of amended soil (a highly sandy, organic rich composite with an infiltration capacity of at least 5 inches/hr) and a layer of gravel for additional detention and to accommodate the French drain system. These systems are to be located beneath the biofiltration layer to intercept treated storm water and convey these flows to a small diameter lower outlet orifice. Once flows have been routed by the outlet structure, flows are then drained to the receiving storm drain (POC-1). The biofiltration basin will feature a partial retention sublayer such that the base of the facility will be unlined.

The biofiltration basin was modeled using the biofiltration LID module within SWMM. The biofiltration module can model the underground gravel storage layer, underdrain with an orifice plate, amended soil layer, and a surface storage pond up to the elevation of the invert of the spillway. It should be noted that detailed outlet structure location and elevations will be shown on the construction plans based on the recommendations of this study.

Water Quality BMP Sizing

It is assumed all storm water quality requirements for the project will be met by the biofiltration LID. However, detailed water quality requirements are not discussed within this technical memo.

The Bio-filtration basins have been designed in accordance with City of San Diego sizing criteria (which include maximum draw down requirements). For further information in regards to storm water quality requirements for the project (including sizing and drawdown) please refer to the site specific Storm Water Quality Management Plan (SWQMP).

BMP MODELING FOR HMP PURPOSES

One (1) LID BMP biofiltration basin is proposed for water quality treatment and hydromodification conformance for the project site. Tables 3 & 4 illustrate the dimensions required for HMP compliance according to the SWMM model that was undertaken for the project.

TABLE 3 – SUMMARY OF DEVELOPED DUAL PURPOSE BMP

BMP	Tributary Area (Ac) (7)	DIMENSIONS					
		BMP Area(1), (ft^2)	Low Flow Orifice (3) (in)	Gravel Depth (2) (in)	Depth Riser Invert (ft)(4)	Weir Perimeter Length(5) (ft)	Total Surface Depth(6) (ft)
BR-1	0.298	500	0.6875	22	1.25-ft	12-ft	1.5-ft

Notes:
(1): Area of amended soil equal to area of gravel
(2): Gravel depth (including 3-inch sand filter layer), 12-inches located above French drain invert, 10-inches below the French drain invert for partial retention storage.
(3): Diameter of orifice in gravel layer with invert at bottom of layer; tied with hydromod min threshold ($0.1 \cdot Q_2$).
(4): Depth of ponding beneath riser structure's surface spillway.
(5): Overflow length, the internal perimeter of the riser is 8ft (36" x 36" internal dimensions).
(6): Total surface depth of BMP from top crest elevation to surface invert.
(7): Tributary area to basin not including area of BMP.

TABLE 4 – SUMMARY OF RISER DETAILS:

BMP	Lower Slot			Top Riser	
	Width (ft)	Height (ft)	Elevation(1) (ft)	Length(2) (ft)	Elev.(1) (ft)
BR-1	1.0	0.167	0.5	12	1.25

Notes:
(1): Basin ground surface elevation assumed to be 0.00 ft elevation.
(2): Overflow length is the internal perimeter of the riser structure.

FLOW DURATION CURVE COMPARISON

The Flow Duration Curve (FDC) for the site was compared at the POC by exporting the hourly runoff time series results from SWMM to a spreadsheet.

Q_2 and Q_{10} were determined with a partial duration statistical analysis of the runoff time series in an Excel spreadsheet using the Cunnane plotting position method (which is the preferred plotting methodology in the HMP Permit). As the SWMM Model includes a statistical analysis based on the Weibull Plotting Position Method, the Weibull Method was also used within the spreadsheet to ensure that the results were similar to those obtained by the SWMM Model.

The range between 10% of Q_2 and Q_{10} was divided into 100 equal time intervals; the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally, the intermediate peaks with a return period "i" were obtained (Q_i with i=3 to 9). For the purpose of the plot, the values were presented as percentage of time exceeded for each flow rate. FDC comparison at the POC is illustrated in Figure 1 in both normal and logarithmic scale. Attachment 5 provides a detailed drainage exhibit for the post-developed condition.

As can be seen in Figure 1, the FDC for the proposed condition with the HMP BMP is within 110% of the curve for the existing condition in both peak flows and durations. The additional runoff volume generated from developing the site will be released to the existing point of discharge at a flow rate below the 10% Q_2 lower threshold for POC-1. Additionally, the project will also not increase peak flow rates between the Q_2 and the Q_{10}, as shown in the peak flow tables in Attachment 1.

SUMMARY

This study has demonstrated that the proposed HMP BMP provided for the 2828 Broadway site is sufficient to meet the current HMP criteria for the Point of Compliance (POC), if the cross-section area and volume recommended within this technical memorandum, and the respective orifice and outlet structure are incorporated as specified within the proposed project site.

KEY ASSUMPTIONS

1. Type D Soils is representative of the existing condition site.

ATTACHMENTS

1. Q_2 to Q_{10} Comparison Tables
2. FDC Plots (log and natural "x" scale) and Flow Duration Table.
3. List of the "n" largest Peaks: Pre-Development and Post-Development Conditions
4. Elevations vs. Discharge Curves to be used in SWMM
5. Pre & Post Development Maps, Project plan and section sketches
6. SWMM Input Data in Input Format (Existing and Proposed Models)
7. SWMM Screens and Explanation of Significant Variables
8. Geotechnical Documentation
9. Summary files from the SWMM Model

REFERENCES

[1] – *"Review and Analysis of San Diego County Hydromodification Management Plan (HMP): Assumptions, Criteria, Methods, & Modeling Tools – Prepared for the Cities of San Marcos, Oceanside & Vista",* May 2012, TRW Engineering.

[2] – *"Final Hydromodification Management Plan (HMP) prepared for the County of San Diego",* March 2011, Brown and Caldwell.

[3] - Order R9-20013-001, California Regional Water Quality Control Board San Diego Region (SDRWQCB).

[4] – "*Handbook of Hydrology*", David R. Maidment, Editor in Chief. 1992, McGraw Hill.

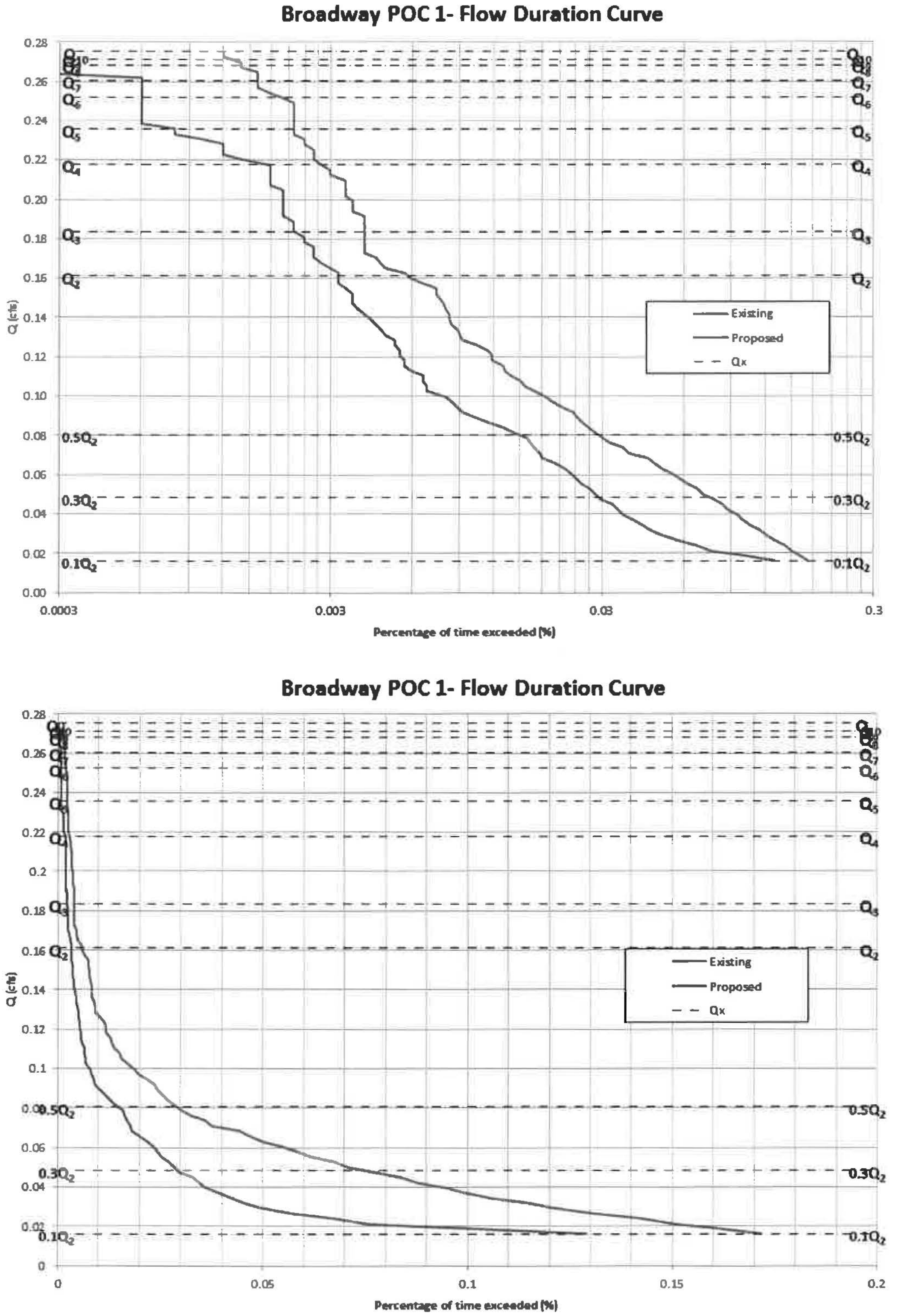


Figure 1a and 1b. Flow Duration Curve Comparison (logarithmic and normal "x" scale)

ATTACHMENT 1.

Q_2 to Q_{10} Comparison Table – POC 2

Return Period	Existing Condition (cfs)	Mitigated Condition (cfs)	Reduction, Exist - Mitigated (cfs)
2-year	0.161	0.100	0.061
3-year	0.183	0.135	0.049
4-year	0.218	0.167	0.051
5-year	0.236	0.182	0.054
6-year	0.252	0.201	0.051
7-year	0.260	0.213	0.047
8-year	0.268	0.220	0.048
9-year	0.271	0.222	0.049
10-year	0.275	0.226	0.049

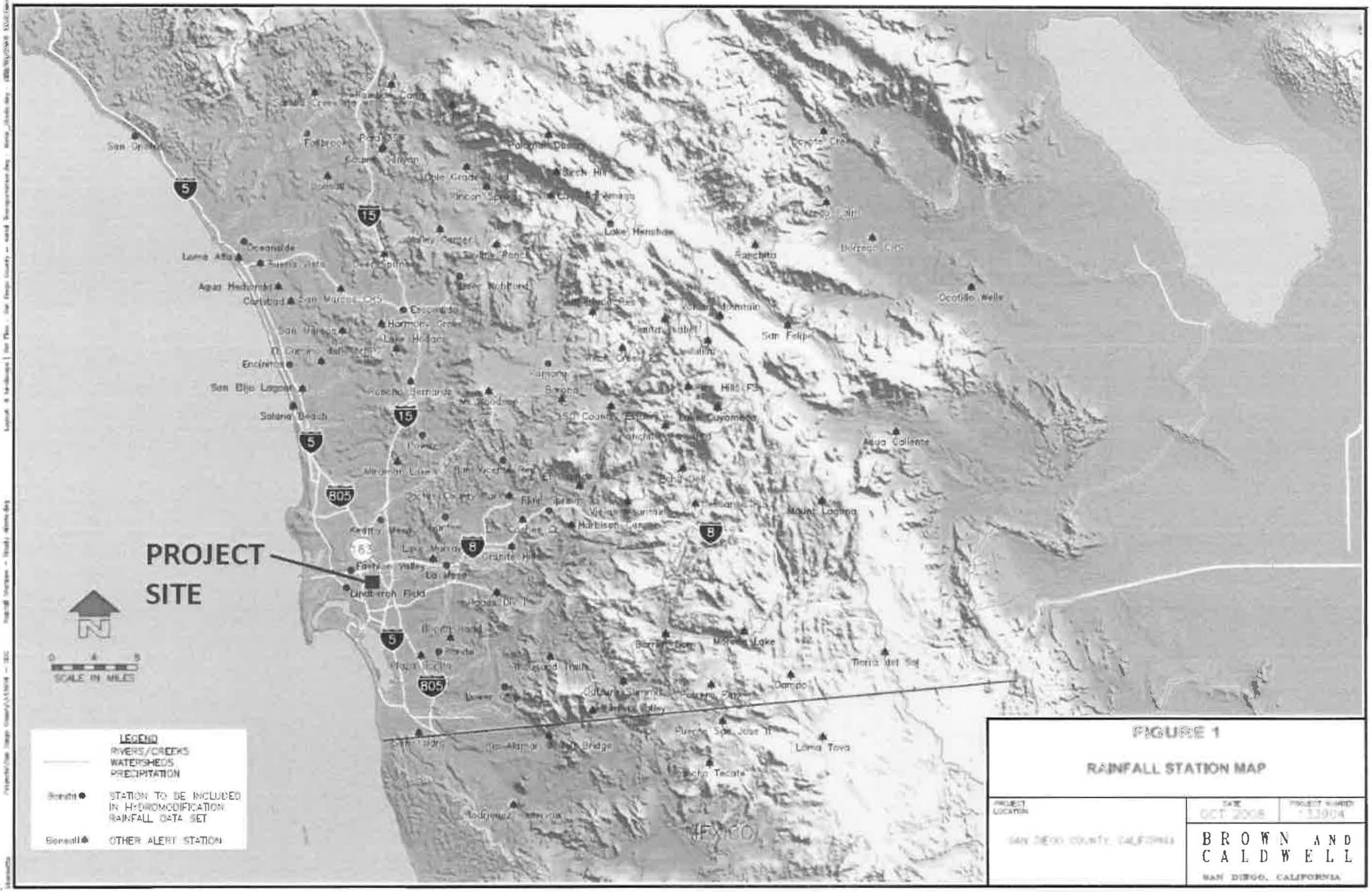


FIGURE 1

RAINFALL STATION MAP

PROJECT LOCATION
SAN DIEGO COUNTY, CALIFORNIA

DATE
OCT 2008

PROJECT NUMBER
133904

BROWN AND CALDWELL
SAN DIEGO, CALIFORNIA

ATTACHMENT 2

FLOW DURATION CURVE ANALYSIS

1) Flow duration curve shall not exceed the existing conditions by more than 10%, neither in peak flow nor duration.

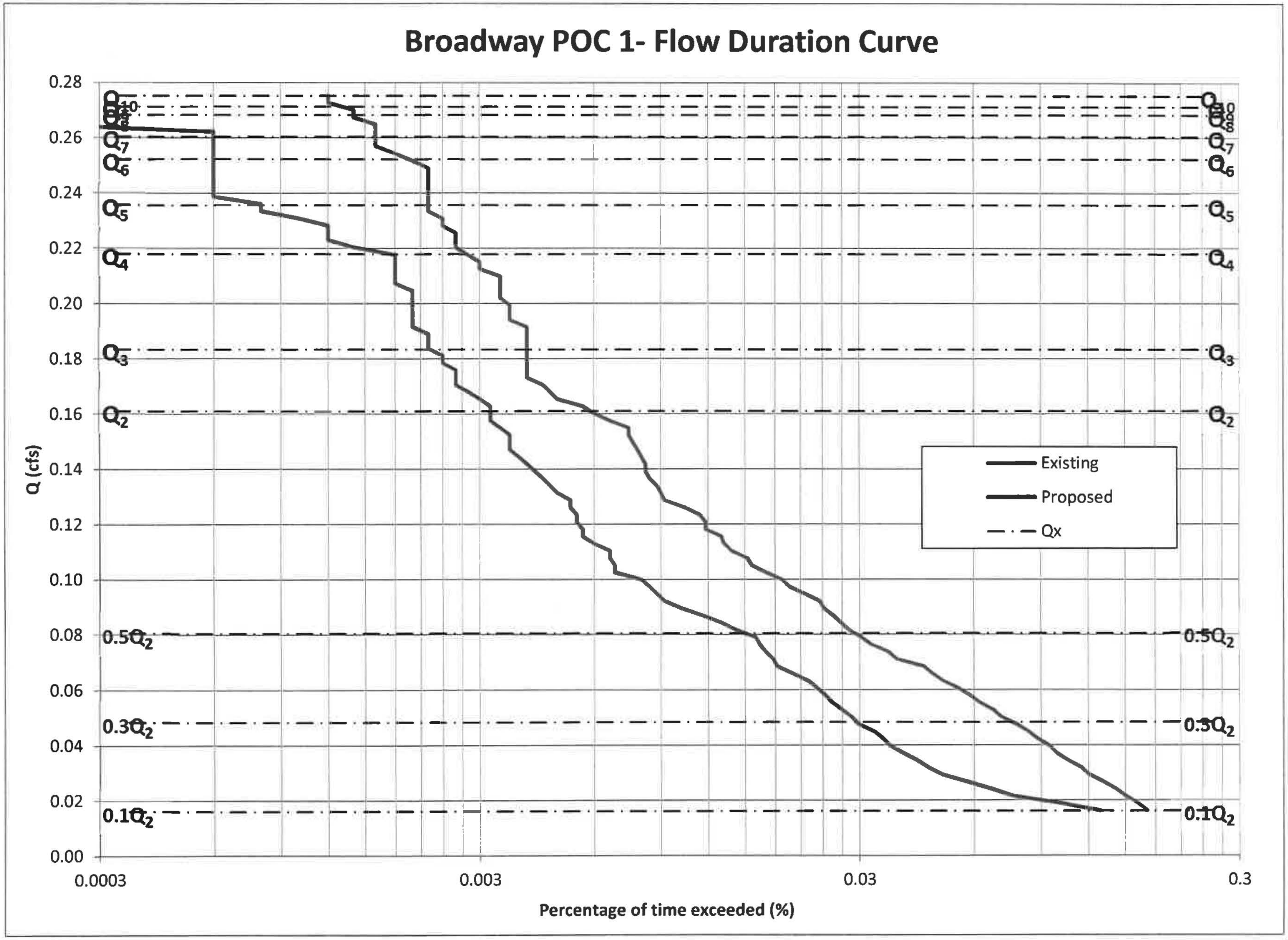
The figures on the following pages illustrate that the flow duration curve in post-development conditions after the proposed BMP is below the existing flow duration curve. The flow duration curve table following the curve shows that if the interval $0.10Q_2 - Q_{10}$ is divided in 100 sub-intervals, then a) the post development divided by pre-development durations are never larger than 110% (the permit allows up to 110%); and b) there are no more than 10 intervals in the range 101%-110% which would imply an excess over 10% of the length of the curve (the permit allows less than 10% of excesses measured as 101-110%).

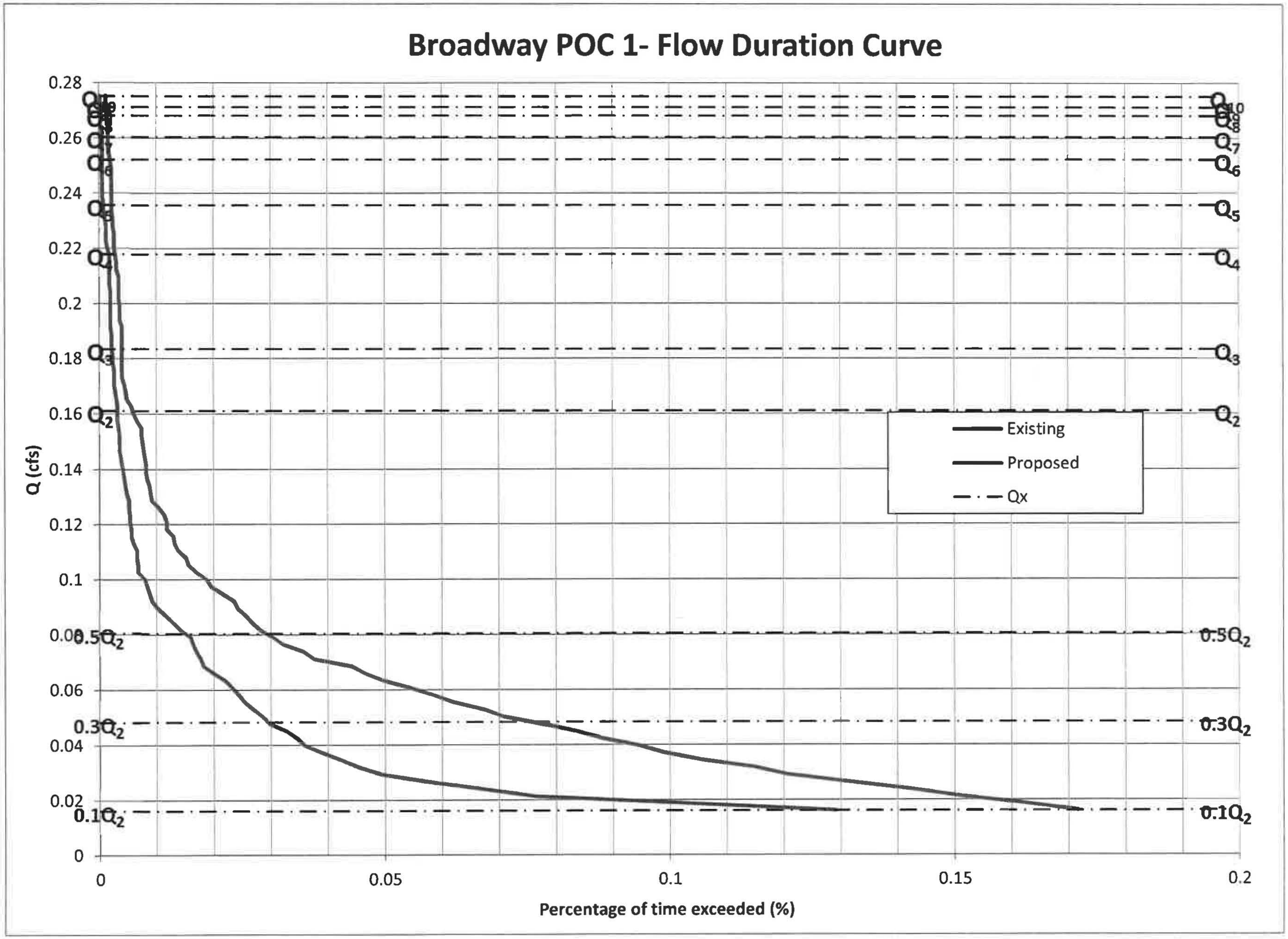
Consequently, the design passes the hydromodification test.

It is important to note that the flow duration curve can be expressed in the "x" axis as percentage of time, hours per year, total number of hours, or any other similar time variable. As those variables only differ by a multiplying constant, their plot in logarithmic scale is going to look exactly the same, and compliance can be observed regardless of the variable selected. However, in order to satisfy the City of San Diego HMP example, % of time exceeded is the variable of choice in the flow duration curve. The selection of a logarithmic scale in lieu of the normal scale is preferred, as differences between the pre-development and post-development curves can be seen more clearly in the entire range of analysis. Both graphics are presented just to prove the difference.

In terms of the "y" axis, the peak flow value is the variable of choice. As an additional analysis performed by REC, not only the range of analysis is clearly depicted (10% of Q_2 to Q_{10}) but also all intermediate flows are shown (Q_2, Q_3, Q_4, Q_5, Q_6, Q_7, Q_8 and Q_9) in order to demonstrate compliance at any range $Q_x - Q_{x+1}$. It must be pointed out that one of the limitations of both the SWMM and SDHM models is that the intermediate analysis is not performed (to obtain Q_i from i = 2 to 10). REC performed the analysis using the Cunnane Plotting position Method (the preferred method in the HMP permit) from the "n" largest independent peak flows obtained from the continuous time series.

The largest "n" peak flows are attached in this appendix, as well as the values of Q_i with a return period "i", from i=2 to 10. The Q_i values are also added into the flow-duration plot.


Broadway POC 1- Flow Duration Curve
Q (cfs)
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0003
0.003
0.03
0.3
Percentage of time exceeded (%)
Q_{10}
Q_9
Q_8
Q_7
Q_6
Q_5
Q_4
Q_3
Q_2
$0.5Q_2$
$0.3Q_2$
$0.1Q_2$
Existing
Proposed
Qx


Broadway POC 1- Flow Duration Curve
Q (cfs)
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Q10
Q9
Q8
Q7
Q6
Q5
Q4
Q3
Q2
0.5Q2
0.3Q2
0.1Q2
Existing
Proposed
Qx
0
0.05
0.1
0.15
0.2
Percentage of time exceeded (%)

Flow Duration Curve Data for 2828 Broadway POC-1 , City of San Diego CA

Q2 =	0.16	cfs	Fraction	10 %
Q10 =	0.28	cfs		
Step =	0.0026	cfs		
Count =	499679	hours		
	57.00	years		

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
1	0.016	858	1.72E-01	663	1.33E-01	77%	Pass
2	0.019	810	1.62E-01	529	1.06E-01	65%	Pass
3	0.021	753	1.51E-01	377	7.54E-02	50%	Pass
4	0.024	709	1.42E-01	320	6.40E-02	45%	Pass
5	0.027	655	1.31E-01	272	5.44E-02	42%	Pass
6	0.029	602	1.20E-01	235	4.70E-02	39%	Pass
7	0.032	574	1.15E-01	216	4.32E-02	38%	Pass
8	0.034	528	1.06E-01	205	4.10E-02	39%	Pass
9	0.037	494	9.89E-02	189	3.78E-02	38%	Pass
10	0.040	473	9.47E-02	174	3.48E-02	37%	Pass
11	0.042	440	8.81E-02	167	3.34E-02	38%	Pass
12	0.045	417	8.35E-02	158	3.16E-02	38%	Pass
13	0.048	387	7.74E-02	144	2.88E-02	37%	Pass
14	0.050	354	7.08E-02	135	2.70E-02	38%	Pass
15	0.053	337	6.74E-02	130	2.60E-02	39%	Pass
16	0.055	310	6.20E-02	120	2.40E-02	39%	Pass
17	0.058	293	5.86E-02	115	2.30E-02	39%	Pass
18	0.061	272	5.44E-02	108	2.16E-02	40%	Pass
19	0.063	249	4.98E-02	101	2.02E-02	41%	Pass
20	0.066	233	4.66E-02	93	1.86E-02	40%	Pass
21	0.068	221	4.42E-02	88	1.76E-02	40%	Pass
22	0.071	188	3.76E-02	84	1.68E-02	45%	Pass
23	0.074	179	3.58E-02	80	1.60E-02	45%	Pass
24	0.076	161	3.22E-02	76	1.52E-02	47%	Pass
25	0.079	152	3.04E-02	73	1.46E-02	48%	Pass
26	0.082	141	2.82E-02	67	1.34E-02	48%	Pass
27	0.084	134	2.68E-02	57	1.14E-02	43%	Pass
28	0.087	128	2.56E-02	51	1.02E-02	40%	Pass
29	0.089	121	2.42E-02	48	9.61E-03	40%	Pass
30	0.092	118	2.36E-02	44	8.81E-03	37%	Pass
31	0.095	108	2.16E-02	43	8.61E-03	40%	Pass
32	0.097	98	1.96E-02	40	8.01E-03	41%	Pass
33	0.100	94	1.88E-02	37	7.40E-03	39%	Pass
34	0.102	85	1.70E-02	33	6.60E-03	39%	Pass
35	0.105	78	1.56E-02	33	6.60E-03	42%	Pass
36	0.108	76	1.52E-02	33	6.60E-03	43%	Pass
37	0.110	69	1.38E-02	32	6.40E-03	46%	Pass
38	0.113	66	1.32E-02	30	6.00E-03	45%	Pass

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
39	0.116	65	1.30E-02	28	5.60E-03	43%	Pass
40	0.118	59	1.18E-02	28	5.60E-03	47%	Pass
41	0.121	59	1.18E-02	26	5.20E-03	44%	Pass
42	0.123	57	1.14E-02	26	5.20E-03	46%	Pass
43	0.126	52	1.04E-02	26	5.20E-03	50%	Pass
44	0.129	46	9.21E-03	26	5.20E-03	57%	Pass
45	0.131	45	9.01E-03	24	4.80E-03	53%	Pass
46	0.134	44	8.81E-03	23	4.60E-03	52%	Pass
47	0.136	42	8.41E-03	21	4.20E-03	50%	Pass
48	0.139	41	8.21E-03	19	3.80E-03	46%	Pass
49	0.142	41	8.21E-03	19	3.80E-03	46%	Pass
50	0.144	40	8.01E-03	18	3.60E-03	45%	Pass
51	0.147	39	7.81E-03	18	3.60E-03	46%	Pass
52	0.150	38	7.60E-03	18	3.60E-03	47%	Pass
53	0.152	37	7.40E-03	18	3.60E-03	49%	Pass
54	0.155	37	7.40E-03	17	3.40E-03	46%	Pass
55	0.157	33	6.60E-03	16	3.20E-03	48%	Pass
56	0.160	30	6.00E-03	16	3.20E-03	53%	Pass
57	0.163	28	5.60E-03	16	3.20E-03	57%	Pass
58	0.165	24	4.80E-03	15	3.00E-03	63%	Pass
59	0.168	23	4.60E-03	14	2.80E-03	61%	Pass
60	0.170	22	4.40E-03	13	2.60E-03	59%	Pass
61	0.173	20	4.00E-03	12	2.40E-03	60%	Pass
62	0.176	20	4.00E-03	12	2.40E-03	60%	Pass
63	0.178	20	4.00E-03	12	2.40E-03	60%	Pass
64	0.181	20	4.00E-03	12	2.40E-03	60%	Pass
65	0.184	20	4.00E-03	11	2.20E-03	55%	Pass
66	0.186	20	4.00E-03	11	2.20E-03	55%	Pass
67	0.189	20	4.00E-03	10	2.00E-03	50%	Pass
68	0.191	20	4.00E-03	10	2.00E-03	50%	Pass
69	0.194	18	3.60E-03	10	2.00E-03	56%	Pass
70	0.197	18	3.60E-03	10	2.00E-03	56%	Pass
71	0.199	18	3.60E-03	10	2.00E-03	56%	Pass
72	0.202	17	3.40E-03	9	1.80E-03	53%	Pass
73	0.205	17	3.40E-03	9	1.80E-03	53%	Pass
74	0.207	17	3.40E-03	9	1.80E-03	53%	Pass
75	0.210	17	3.40E-03	8	1.60E-03	47%	Pass
76	0.212	15	3.00E-03	8	1.60E-03	53%	Pass
77	0.215	15	3.00E-03	8	1.60E-03	53%	Pass
78	0.218	14	2.80E-03	8	1.60E-03	57%	Pass
79	0.220	13	2.60E-03	7	1.40E-03	54%	Pass
80	0.223	13	2.60E-03	6	1.20E-03	46%	Pass
81	0.225	13	2.60E-03	6	1.20E-03	46%	Pass
82	0.228	12	2.40E-03	5	1.00E-03	42%	Pass
83	0.231	12	2.40E-03	4	8.01E-04	33%	Pass

Interval	Existing Condition			Detention Optimized			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
84	0.233	11	2.20E-03	4	8.01E-04	36%	Pass
85	0.236	11	2.20E-03	4	8.01E-04	36%	Pass
86	0.239	11	2.20E-03	3	6.00E-04	27%	Pass
87	0.241	11	2.20E-03	3	6.00E-04	27%	Pass
88	0.244	11	2.20E-03	3	6.00E-04	27%	Pass
89	0.246	11	2.20E-03	3	6.00E-04	27%	Pass
90	0.249	11	2.20E-03	3	6.00E-04	27%	Pass
91	0.252	10	2.00E-03	3	6.00E-04	30%	Pass
92	0.254	9	1.80E-03	3	6.00E-04	33%	Pass
93	0.257	8	1.60E-03	3	6.00E-04	38%	Pass
94	0.259	8	1.60E-03	3	6.00E-04	38%	Pass
95	0.262	8	1.60E-03	3	6.00E-04	38%	Pass
96	0.265	8	1.60E-03	1	2.00E-04	13%	Pass
97	0.267	7	1.40E-03	1	2.00E-04	14%	Pass
98	0.270	7	1.40E-03	1	2.00E-04	14%	Pass
99	0.273	6	1.20E-03	1	2.00E-04	17%	Pass
100	0.275	6	1.20E-03	1	2.00E-04	17%	Pass

Peak Flows calculated with Cunnane Plotting Position

Return Period (years)	Pre-dev. Q (cfs)	Post-Dev. Q (cfs)	Reduction (cfs)
10	0.275	0.226	0.049
9	0.271	0.222	0.049
8	0.268	0.220	0.048
7	0.260	0.213	0.047
6	0.252	0.201	0.051
5	0.236	0.182	0.054
4	0.218	0.167	0.051
3	0.183	0.135	0.049
2	0.161	0.100	0.061

ATTACHMENT 3

List of the “n” Largest Peaks: Pre & Post-Developed Conditions

Basic Probabilistic Equation:

$R = 1/P$ R: Return period (years).

P: Probability of a flow to be equaled or exceeded any given year (dimensionless).

Cunnane Equation:

$$P = \frac{i-0.4}{n+0.2}$$

Weibull Equation:

$$P = \frac{i}{n+1}$$

i: Position of the peak whose probability is desired (sorted from large to small)

n: number of years analyzed.

Explanation of Variables for the Tables in this Attachment

Peak: Refers to the peak flow at the date given, taken from the continuous simulation hourly results of the n year analyzed.

Posit: If all peaks are sorted from large to small, the position of the peak in a sorting analysis is included under the variable Posit.

Date: Date of the occurrence of the peak at the outlet from the continuous simulation

Note: all peaks are not annual maxima; instead they are defined as event maxima, with a threshold to separate peaks of at least 12 hours. In other words, any peak P in a time series is defined as a value where $dP/dt = 0$, and the peak is the largest value in 25 hours (12 hours before, the hour of occurrence and 12 hours after the occurrence, so it is in essence a daily peak).

List of Peak events and Determination of Q2 and Q10 (Pre-Development)

2828 Broadway - POC-1

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**0.28**	**0.28**
9	**0.27**	**0.27**
8	**0.27**	**0.27**
7	**0.26**	**0.26**
6	**0.25**	**0.25**
5	**0.24**	**0.24**
4	**0.22**	**0.22**
3	**0.18**	**0.19**
2	**0.16**	**0.16**

Note:
Cunnane is the preferred method by the HMP permit.

Peaks (cfs)			Period of Return (Years)	
	Date	Posit	Weibull	Cunnane
0.118	11/25/1983	57	1.02	1.01
0.118	4/22/1988	56	1.04	1.03
0.118	2/8/1993	55	1.05	1.05
0.118	2/23/2005	54	1.07	1.07
0.122	5/8/1977	53	1.09	1.09
0.122	1/4/1995	52	1.12	1.11
0.124	2/17/1971	51	1.14	1.13
0.124	2/23/2000	50	1.16	1.15
0.124	2/12/2003	49	1.18	1.18
0.125	2/6/1950	48	1.21	1.20
0.126	12/21/2002	47	1.23	1.23
0.127	2/8/1976	46	1.26	1.25
0.127	4/6/1986	45	1.29	1.28
0.128	11/13/1950	44	1.32	1.31
0.128	1/18/1993	43	1.35	1.34
0.131	12/31/1976	42	1.38	1.38
0.133	1/14/1969	41	1.41	1.41
0.134	2/17/1998	40	1.45	1.44
0.138	2/6/1969	39	1.49	1.48
0.143	11/10/1949	38	1.53	1.52
0.147	1/18/1952	37	1.57	1.56
0.15	3/17/1982	36	1.61	1.61
0.155	2/21/2005	35	1.66	1.65
0.156	3/24/1983	34	1.71	1.70
0.156	11/17/1986	33	1.76	1.75
0.156	3/11/1995	32	1.81	1.81
0.158	12/28/2004	31	1.87	1.87
0.159	12/18/1967	30	1.93	1.93
0.161	2/3/1958	29	2.00	2.00
0.162	3/1/1981	28	2.07	2.07
0.163	1/6/1979	27	2.15	2.15
0.164	2/25/1981	26	2.23	2.23
0.165	12/4/1987	25	2.32	2.33
0.165	4/21/1988	24	2.42	2.42
0.166	1/31/1993	23	2.52	2.53
0.17	3/6/1975	22	2.64	2.65
0.171	2/14/1995	21	2.76	2.78
0.172	3/1/1983	20	2.90	2.92
0.194	1/12/1960	19	3.05	3.08
0.194	12/23/1995	18	3.22	3.25
0.212	12/4/1974	17	3.41	3.45
0.212	3/16/1986	16	3.63	3.67
0.217	11/5/1987	15	3.87	3.92
0.22	3/8/1968	14	4.14	4.21
0.226	1/10/1978	13	4.46	4.54
0.233	1/10/1955	12	4.83	4.93
0.251	2/24/1998	11	5.27	5.40
0.252	1/25/1995	10	5.80	5.96
0.256	10/27/2004	9	6.44	6.65
0.267	11/21/1967	8	7.25	7.53
0.27	2/28/1970	7	8.29	8.67
0.276	1/31/1979	6	9.67	10.21
0.281	11/16/1972	5	11.60	12.43
0.302	12/29/2004	4	14.50	15.89
0.32	2/20/1980	3	19.33	22.00
0.351	3/7/1952	2	29.00	35.75
0.48	12/10/1965	1	58.00	95.33

List of Peak events and Determination of Q2 and Q10 (Post-Development)

2828 Broadway - POC-1

T (Year)	Cunnane (cfs)	Weibull (cfs)
10	**0.23**	**0.23**
9	**0.22**	**0.22**
8	**0.22**	**0.22**
7	**0.21**	**0.22**
6	**0.20**	**0.20**
5	**0.18**	**0.18**
4	**0.17**	**0.17**
3	**0.13**	**0.13**
2	**0.10**	**0.10**

Note:
Cunnane is the preferred
method by the HMP permit.

Peaks (cfs)			Period of Return (Years)	
	Date	Posit	Weibull	Cunnane
0.073	3/16/1952	57	1.02	1.01
0.073	3/1/1983	56	1.04	1.03
0.076	3/16/1986	55	1.05	1.05
0.079	1/29/1950	54	1.07	1.07
0.08	1/10/1978	53	1.09	1.09
0.081	3/1/1991	52	1.12	1.11
0.081	11/22/1996	51	1.14	1.13
0.082	1/29/1980	50	1.16	1.15
0.082	11/25/1985	49	1.18	1.18
0.083	11/5/1987	48	1.21	1.20
0.083	2/21/2000	47	1.23	1.23
0.084	5/8/1977	46	1.26	1.25
0.084	2/17/1998	45	1.29	1.28
0.084	2/14/2003	44	1.32	1.31
0.085	2/4/1958	43	1.35	1.34
0.085	3/2/1992	42	1.38	1.38
0.086	11/16/1965	41	1.41	1.41
0.088	1/12/1960	40	1.45	1.44
0.088	2/8/1976	39	1.49	1.48
0.089	2/7/1950	38	1.53	1.52
0.09	2/19/1993	37	1.57	1.56
0.09	2/3/1998	36	1.61	1.61
0.091	3/1/1981	35	1.66	1.65
0.093	3/22/1954	34	1.71	1.70
0.095	8/17/1977	33	1.76	1.75
0.096	2/8/1998	32	1.81	1.81
0.097	1/18/1952	31	1.87	1.87
0.098	12/5/1966	30	1.93	1.93
0.1	3/2/1983	29	2.00	2.00
0.101	1/14/1978	28	2.07	2.07
0.102	2/24/1998	27	2.15	2.15
0.112	12/30/1951	26	2.23	2.23
0.114	1/15/1993	25	2.32	2.33
0.12	1/22/1967	24	2.42	2.42
0.12	3/6/1975	23	2.52	2.53
0.131	11/13/1950	22	2.64	2.65
0.132	10/10/1986	21	2.76	2.78
0.134	1/4/1995	20	2.90	2.92
0.135	3/17/1982	19	3.05	3.08
0.139	4/21/1988	18	3.22	3.25
0.156	1/14/1969	17	3.41	3.45
0.163	2/21/2005	16	3.63	3.67
0.167	11/21/1967	15	3.87	3.92
0.168	11/16/1972	14	4.14	4.21
0.171	2/14/1995	13	4.46	4.54
0.181	1/6/1979	12	4.83	4.93
0.188	1/10/1955	11	5.27	5.40
0.201	1/31/1979	10	5.80	5.96
0.209	1/25/1995	9	6.44	6.65
0.219	12/29/2004	8	7.25	7.53
0.221	3/8/1968	7	8.29	8.67
0.227	12/4/1974	6	9.67	10.21
0.229	2/20/1980	5	11.60	12.43
0.238	10/27/2004	4	14.50	15.89
0.264	3/7/1952	3	19.33	22.00
0.264	2/28/1970	2	29.00	35.75
0.407	12/10/1965	1	58.00	95.33

ATTACHMENT 4

AREA VS ELEVATION

The storage provided by the LID BMP is entered into the LID Module within SWMM – please refer to Attachment 7 for further information.

Volume provided above the first surface outlet is accounted for in the basin Module within SWMM. A stage-storage relationship is provided within this Module, a copy of which is located on the following pages.

DISCHARGE VS ELEVATION

The orifices have been selected to maximize their size while still restricting flows to conform with the required 10% of the Q2 event flow as mandated in the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011. While REC acknowledges that these orifices are small, to increase the size of these outlets would impact the basin's ability to restrict flows beneath the HMP thresholds, thus preventing the BMP from conformance with HMP requirements.

In order to further reduce the risk of blockage of the orifices, regular maintenance of the riser and orifices must be performed to ensure potential blockages are minimized. A detail of the orifice and riser structure is provided in Attachment 5 of this memorandum.

A stage-discharge relationship is provided on the following pages for the surface outlet structure. The LID low flow orifice discharge relationship is addressed within the LID Module within SWMM – please refer to Attachment 7 for further information.

DRAWDOWN CALCULATIONS

Drawdown calculations are provided in the project specific SWQMP. Please refer to this aforementioned document for further information.

DISCHARGE EQUATIONS

1) Weir:

$$Q_W = C_W \cdot L \cdot H^{3/2} \tag{1}$$

2) Slot:

As an orifice: $$Q_s = B_s \cdot h_s \cdot c_g \cdot \sqrt{2g\left(H - \frac{h_s}{2}\right)} \tag{2.a}$$

As a weir: $$Q_s = C_W \cdot B_s \cdot H^{3/2} \tag{2.b}$$

For H > h_s slot works as weir until orifice equation provides a smaller discharge. The elevation such that equation (2.a) = equation (2.b) is the elevation at which the behavior changes from weir to orifice.

3) Vertical Orifices

As an orifice: $$Q_o = 0.25 \cdot \pi D^2 \cdot c_g \cdot \sqrt{2g\left(H - \frac{D}{2}\right)} \tag{3.a}$$

As a weir: Critical depth and geometric family of circular sector must be solved to determined Q as a function of H:

$$\frac{Q_O^2}{g} = \frac{A_{cr}^3}{T_{cr}}; \quad H = y_{cr} + \frac{A_{cr}}{2 \cdot T_{cr}}; \quad T_{cr} = 2\sqrt{y_{cr}(D - y_{cr})}; \quad A_{cr} = \frac{D^2}{8}[\alpha_{cr} - sin(\alpha_{cr})];$$

$$y_{cr} = \frac{D}{2}[1 - sin(0.5 \cdot \alpha_{cr})] \qquad \text{(3.b.1, 3.b.2, 3.b.3, 3.b.4 and 3.b.5)}$$

There is a value of H (approximately H = 110% D) from which orifices no longer work as weirs as critical depth is not possible at the entrance of the orifice. This value of H is obtained equaling the discharge using critical equations and equations (3.b).

A mathematical model is prepared with the previous equations depending on the type o discharge.

The following are the variables used above:

Q_W, Q_s, Q_O = Discharge of weir, slot or orifice (cfs)

C_W, c_g : Coefficients of discharge of weir (typically 3.1) and orifice (0.61 to 0.62)

L, B_s, D, h_s : Length of weir, width of slot, diameter of orifice and height of slot, respectively; (ft)

H: Level of water in the pond over the invert of slot, weir or orifice (ft)

A_{cr}, T_{cr}, y_{cr}, α_{cr}: Critical variables for circular sector: area (sq-ft), top width (ft), critical depth (ft), and angle to the center, respectively.

BASIN 1 STAGE-STORAGE

Elev (ft)	Area (ft^2)	Volume (ft^3)	
0	500.0	0.00	**LID AREA**
0.5	500.0	250.00	**SURFACE OUTLET**
1.500	500.0	750.00	

Outlet structure for Discharge of BR-1

(note: 0.0 elev = 0.5 ft actual elevation)

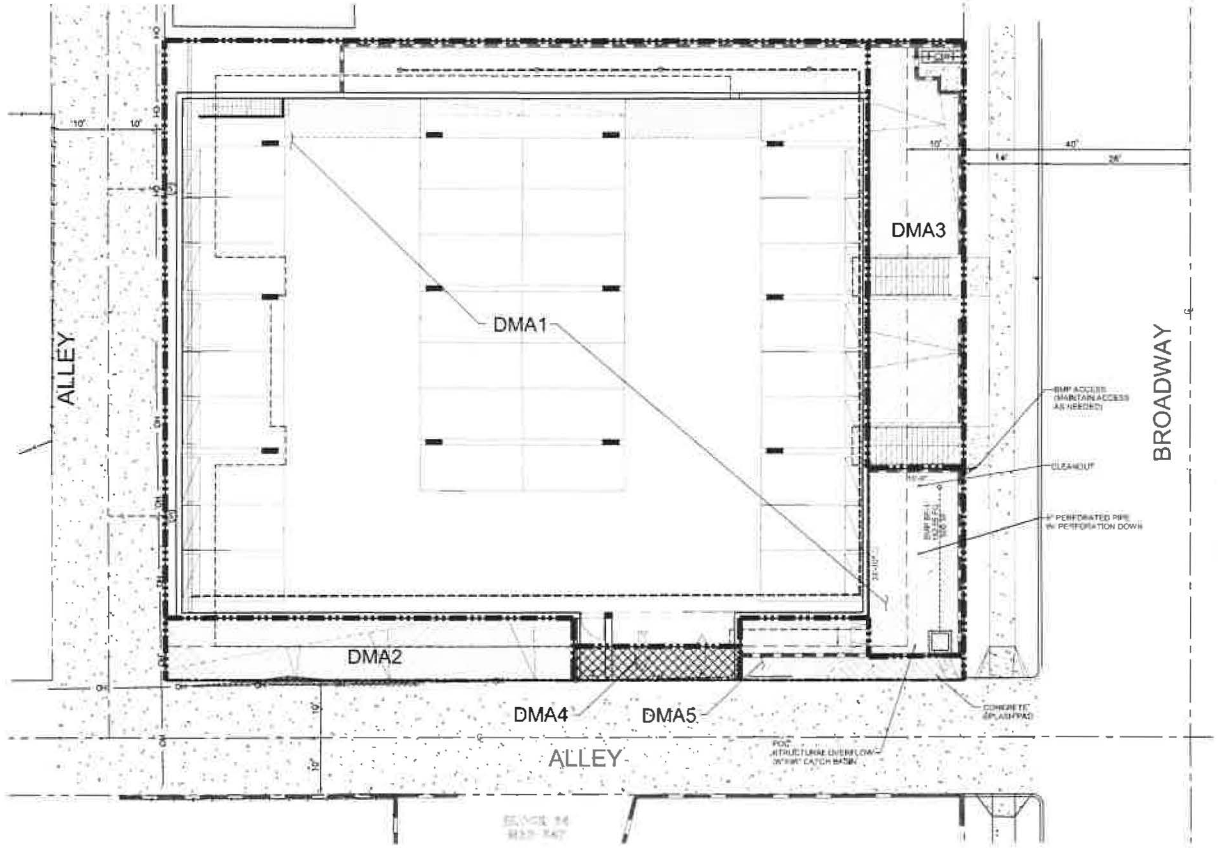
Discharge vs Elevation Table

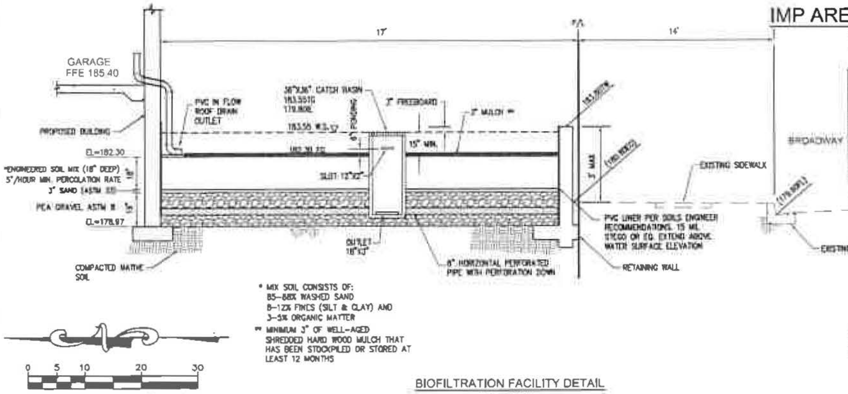
Low orifice:	1 "	**Lower slot**		Emergency Weir	
Number:	0	Invert:	0.00 ft	Invert:	**0.750** ft
Cg-low:	0.62	B	**1.00** ft	B:	**12** ft
Middle orifice:	1 "	h	**0.167** ft		
number of orif:	0	Upper slot			
Cg-middle:	0.62	Invert:	0.000 ft		
invert elev:	0.00 ft	B:	0.00 ft		
		h	0.000 ft		

h (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qslot-low (cfs)	Qslot-upp (cfs)	Qemer (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.042	0.500	0.488	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.000	0.026
0.083	1.000	0.988	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.075
0.125	1.500	1.488	0.000	0.000	0.000	0.000	0.000	0.000	0.137	0.000	0.000	0.137
0.167	2.000	1.988	0.000	0.000	0.000	0.000	0.000	0.000	0.211	0.000	0.000	0.211
0.208	2.500	2.488	0.000	0.000	0.000	0.000	0.000	0.000	0.288	0.000	0.000	0.288
0.250	3.000	2.988	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.333
0.292	3.500	3.488	0.000	0.000	0.000	0.000	0.000	0.000	0.372	0.000	0.000	0.372
0.333	4.000	3.988	0.000	0.000	0.000	0.000	0.000	0.000	0.408	0.000	0.000	0.408
0.375	4.500	4.488	0.000	0.000	0.000	0.000	0.000	0.000	0.441	0.000	0.000	0.441
0.417	5.000	4.988	0.000	0.000	0.000	0.000	0.000	0.000	0.471	0.000	0.000	0.471
0.458	5.500	5.488	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500
0.500	6.000	5.988	0.000	0.000	0.000	0.000	0.000	0.000	0.527	0.000	0.000	0.527
0.542	6.500	6.488	0.000	0.000	0.000	0.000	0.000	0.000	0.552	0.000	0.000	0.552
0.583	7.000	6.988	0.000	0.000	0.000	0.000	0.000	0.000	0.577	0.000	0.000	0.577
0.625	7.500	7.488	0.000	0.000	0.000	0.000	0.000	0.000	0.600	0.000	0.000	0.600
0.667	8.000	7.988	0.000	0.000	0.000	0.000	0.000	0.000	0.623	0.000	0.000	0.623
0.708	8.500	8.488	0.000	0.000	0.000	0.000	0.000	0.000	0.645	0.000	0.000	0.645
0.750	9.000	8.988	0.000	0.000	0.000	0.000	0.000	0.000	0.666	0.000	0.000	0.666
0.792	9.500	9.488	0.000	0.000	0.000	0.000	0.000	0.000	0.687	0.000	0.316	1.003
0.833	10.000	9.988	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.000	0.895	1.601
0.875	10.500	10.488	0.000	0.000	0.000	0.000	0.000	0.000	0.726	0.000	1.644	2.370
0.917	11.000	10.988	0.000	0.000	0.000	0.000	0.000	0.000	0.745	0.000	2.531	3.276
0.958	11.500	11.488	0.000	0.000	0.000	0.000	0.000	0.000	0.763	0.000	3.537	4.301
1.000	12.000	11.988	0.000	0.000	0.000	0.000	0.000	0.000	0.781	0.000	4.650	5.431

ATTACHMENT 5

Pre & Post-Developed Maps, Project Plan and Detention Section Sketches





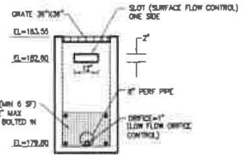
* MIX SOIL CONSISTS OF:
85-88% WASHED SAND
8-12% FINES (SILT & CLAY) AND
3-5% ORGANIC MATTER

** MINIMUM 3" OF WELL-AGED
SHREDDED HARD WOOD MULCH THAT
HAS BEEN STOCKPILED OR STORED AT
LEAST 12 MONTHS

BIOFILTRATION FACILITY DETAIL
NOT TO SCALE

IMP AREA CALCULATION FACILITY (FOR WATER QUALITY ONLY)

LOW IMPACT DEVELOPMENT DESIGN (LID) SUMMARY TABLE		
DRAINAGE MANAGEMENT AREA (DMA)		BMP
DMA-1	13,282 SF	BIOFILTRATION BF-1
DMA-2	780 SF	SELF-TREATING (PERVIOUS)
DMA-3	1,274 SF	SELF-TREATING (PERVIOUS)
DMA-4	176 SF	DE MINIMIS
DMA-5	320 SF	SELF-TREATING (PERVIOUS)
TOTAL	15,832 SF	



LID 1 DETAIL
NOT TO SCALE

LEGEND:

ITEM	SYMBOL
DRAINAGE MANAGEMENT AREA	▬ ▪ ▪ ▬
ACCESS FOR STRUCTURAL BMP INSPECTION AND MAINTENANCE	→
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	▭
DRAINAGE DIRECTION	— — —
DMA1	☐
DMA2	☐
DMA3	☐
DMA4	▨
DMA5	☐

BMP CATEGORY/TYPE

BIOFILTRATION BMP (BF-1) (W/ IMPERMEABLE LINER AND UNDERDRAIN)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR – GOLDEN HILLS BROADWAY
DATE – MARCH 29, 2016
PREPARED BY – K&S ENGINEERING, INC.

MAINTENANCE AGREEMENT DOCUMENT

TBD

OPERATIONS AND MAINTENANCE PLAN

TBD

RESPONSIBLE PARTY INFORMATION

METROPOLITAN/SDPB BROADWAY, LLC
CONTACT NAME: MIKE DONOVAN

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.

2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.

3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.

4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS. PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.

5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK)

PLANTING NOTES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN.

GROUNDWATER

THERE IS NO UNDERGROUND WELLS NEAR THE SITE PER WATERBOARDS GAMA GEOTRACKER

WDID NO:

N/A

STORM WATER PRIORITY:

LOW

K&S ENGINEERING, INC.
Planning Engineering Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:
02.14.2016 SDP DEVELOPMENT SUBMITTAL JP
11.12.2015 COMPLETENESS CHECK JP

DRAWING TITLE:
BMP SHEET

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: JN 16-020
DATE: October 06, 2016
DRAWN BY: NS
SCALE: 1" = 10'
SHEET NO: C4

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

ATTACHMENT 6

SWMM Input Data in Input Format (Existing & Proposed Models)

PRE_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           10/17/1948
START_TIME           00:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    00:00:00
END_DATE             10/17/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.041  0.076  0.118  0.192  0.237  0.318  0.308  0.286  0.217  0.14   0.067  0.041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00   1.0    TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
DMA-1-D          LINDBERGH        POC-1            0.364    0        91       2.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1-D          0.012      0.1        0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA-1-D          9          0.01875    0.3

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "LbergRain.prn"

[REPORT]
INPUT      NO
```

```
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            2500.000           2700.000

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1-D          2427.184           5983.010
DMA-1-D          2427.184           5983.010

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1525.424           6864.407
```

POST_DEV

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           10/17/1948
START_TIME           00:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    00:00:00
END_DATE             10/17/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      0.06   0.08   0.11   0.15   0.17   0.19   0.19   0.18   0.15   0.11   0.08   0.06
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00   1.0    TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;                                                Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
DMA-1-D          LINDBERGH        BR-1             0.298    98.06    82       1.5      0
BR-1             LINDBERGH        DIV-1            0.011478 0        10       0        0
DMA-BYPASS       LINDBERGH        POC-1            0.054    7.42     38       9.5      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1-D          0.012      0.1        0.05       0.1        25         OUTLET
BR-1             0.01       0.1        0.05       0.05       25         OUTLET
DMA-BYPASS       0.012      0.1        0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DMA-1-D          9          0.01875    0.3
BR-1             1.5        0.225      0.33
DMA-BYPASS       9          0.01875    0.3

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
BR-1             BC
BR-1             SURFACE    6          0.05       0          0          5
BR-1             SOIL       18         0.4        0.2        0.1        5          5          1.5
BR-1             STORAGE    22         0.67       0.102      0
```

POST_DEV

```
BR-1             DRAIN      0.3148     0.5        10         6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
BR-1             BR-1             1       500        0          0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
POC-1            0          FREE                        NO

[DIVIDERS]
;;               Invert     Diverted         Divider
;;Name           Elev.      Link             Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV-1            0          BYPASS           CUTOFF     0.01256    0          0          0          0

[STORAGE]
;;               Invert   Max.     Init.    Storage    Curve                      Ponded   Evap.    Infiltration
;;Name           Elev.    Depth    Depth    Curve      Params                     Area     Frac.    Infiltration
Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- -----------------
------
BASIN            0        1        0        TABULAR    BASIN                      500      1

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
BYPASS           DIV-1            BASIN            10         0.01       0          0          0          0
UDRAIN           DIV-1            POC-1            10         0.01       0          0          0          0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet          Qcoeff/                     Flap
;;Name           Node             Node             Height     Type            QTable           Qexpon     Gate
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- ----
ORIFICE          BASIN            POC-1            0          TABULAR/DEPTH   SLOT                        NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
BYPASS           DUMMY        0                0          0          0          1
UDRAIN           DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
SLOT             Rating     0.000      0.000
SLOT                        0.042      0.026
SLOT                        0.083      0.075
SLOT                        0.125      0.137
SLOT                        0.167      0.211
SLOT                        0.208      0.288
SLOT                        0.250      0.333
SLOT                        0.292      0.372
SLOT                        0.333      0.408
SLOT                        0.375      0.441
SLOT                        0.417      0.471
SLOT                        0.458      0.500
SLOT                        0.500      0.527
SLOT                        0.542      0.552
SLOT                        0.583      0.577
SLOT                        0.625      0.600
SLOT                        0.667      0.623
SLOT                        0.708      0.645
```

POST_DEV

```
SLOT                        0.750      0.666
SLOT                        0.792      1.003
SLOT                        0.833      1.601
SLOT                        0.875      2.370
SLOT                        0.917      3.276
SLOT                        0.958      4.301
SLOT                        1.000      5.431

BASIN            Storage    0.000      500
BASIN                       1.0        500

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "LbergRain.prn"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            3400.000           1687.170
DIV-1            3400.000           4225.122
BASIN            1696.574           3425.775

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1-D          3379.791           6620.209
DMA-1-D          3379.791           6620.209
BR-1             3400.000           5000.000
DMA-BYPASS       5638.629           1744.548

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1525.424           6864.407
```

ATTACHMENT 7

EPA SWMM FIGURES AND EXPLANATIONS

Per the attached, the reader can see the screens associated with the EPA-SWMM Model in both pre-development and post-development conditions. Each portion, i.e., sub-catchments, outfalls, storage units, weir as a discharge, and outfalls (point of compliance), are also shown.

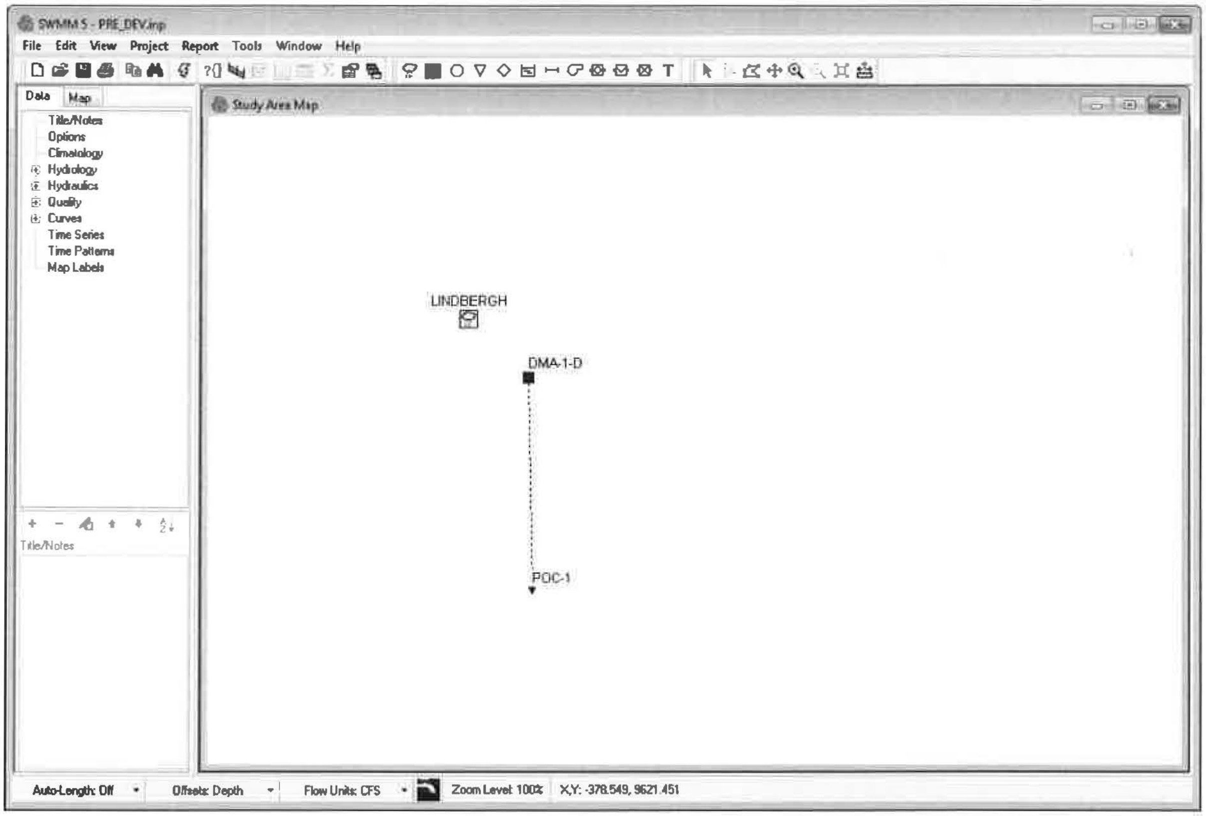
Variables for modeling are associated with typical recommended values by the EPA-SWMM model, typical values found in technical literature (such as Maidment's Handbook of Hydrology). Recommended values for the SWMM model have been attained from the interim Orange County criteria established for their SWMM calibration. Currently, no recommended values have been established by the San Diego County HMP Permit for the SWMM Model.

Soil characteristics of the existing soils were determined from the NRCS Web Soil Survey (located in Attachment 8 of this report).

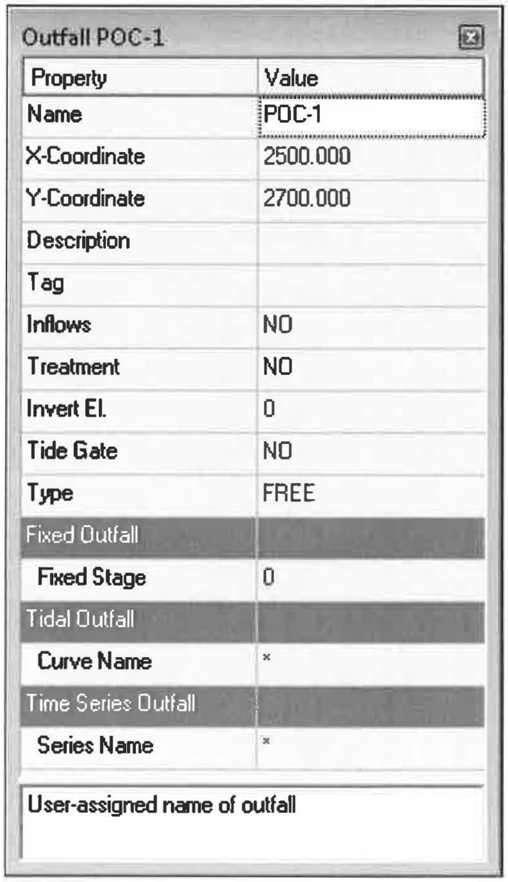
Some values incorporated within the SWMM model have been determined from the professional experience of REC using conservative assumptions that have a tendency to increase the size of the needed BMP and also generate a long-term runoff as a percentage of rainfall similar to those measured in gage stations in Southern California by the USGS.

A Technical document prepared by Tory R Walker Engineering for the Cities of San Marcos, Oceanside and Vista (Reference [1]) can also be consulted for additional information regarding typical values for SWMM parameters.

PRE-DEVELOPED CONDITION



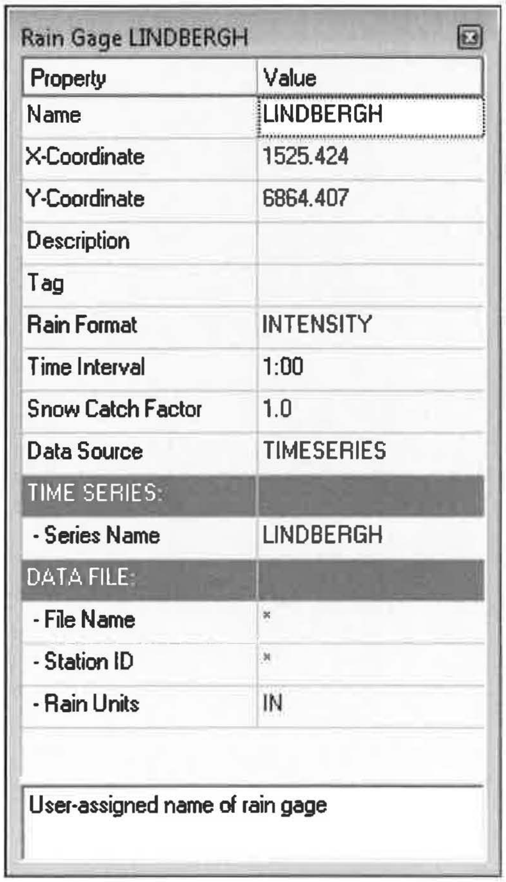
Auto-Length: Off
Offsets: Depth
Flow Units: CFS
Zoom Level: 100%
X,Y: -378.549, 9621.451



Outfall POC-1

Property	Value
Name	POC-1
X-Coordinate	2500.000
Y-Coordinate	2700.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

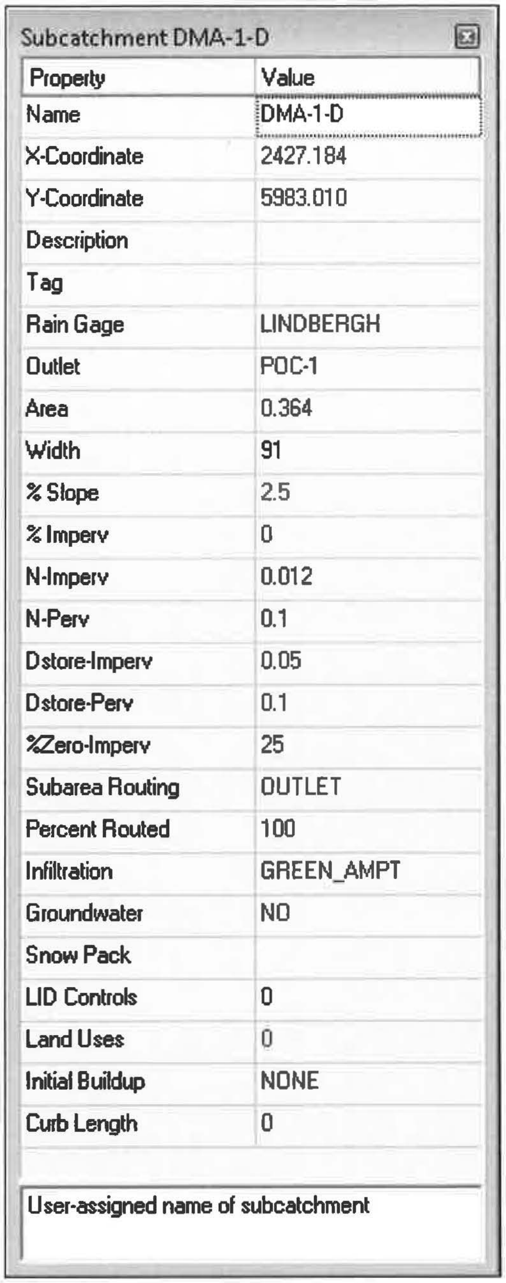
User-assigned name of outfall



Rain Gage LINDBERGH

Property	Value
Name	LINDBERGH
X-Coordinate	1525.424
Y-Coordinate	6864.407
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	LINDBERGH
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

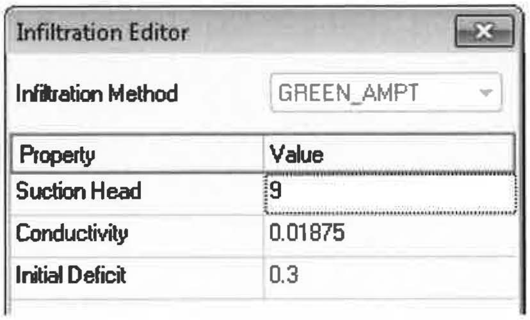
User-assigned name of rain gage



Subcatchment DMA-1-D

Property	Value
Name	DMA-1-D
X-Coordinate	2427.184
Y-Coordinate	5983.010
Description	
Tag	
Rain Gage	LINDBERGH
Outlet	POC-1
Area	0.364
Width	91
% Slope	2.5
% Imperv	0
N-Imperv	0.012
N-Perv	0.1
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment

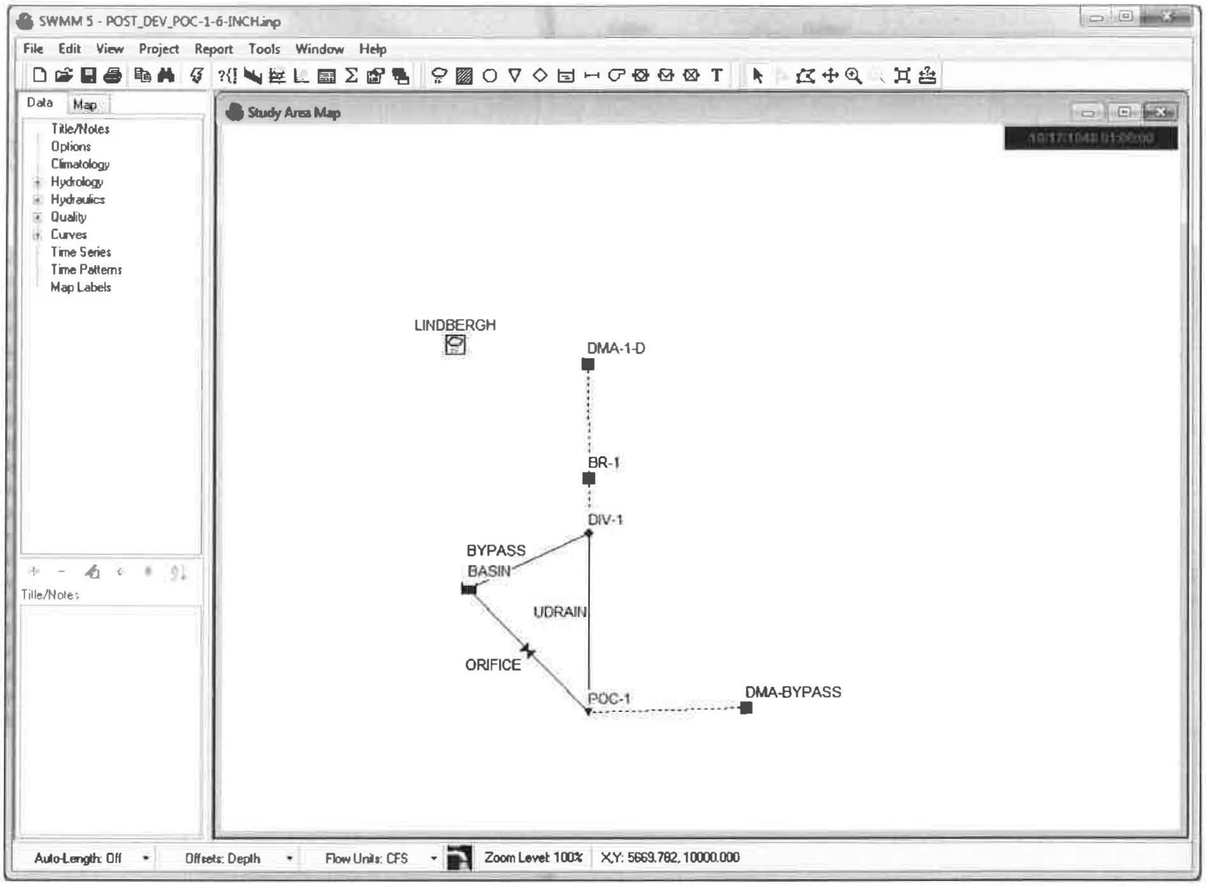


Infiltration Editor

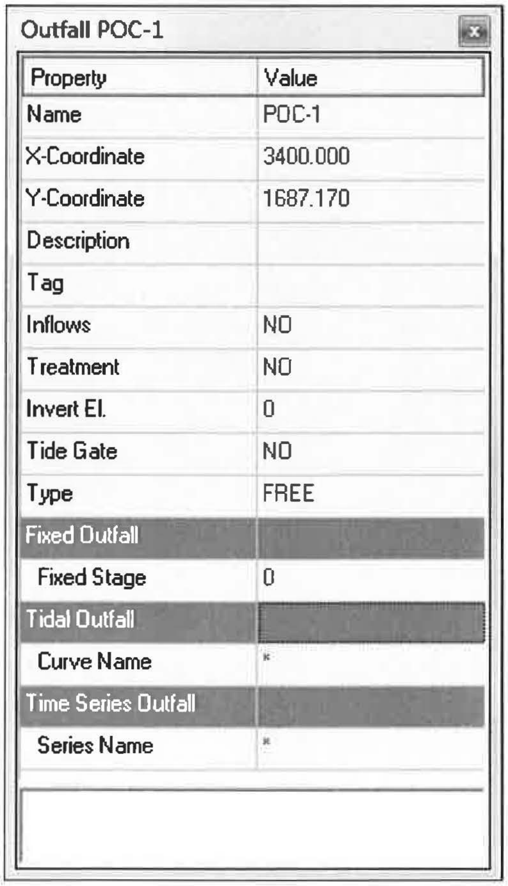
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

POST-DEVELOPED CONDITION

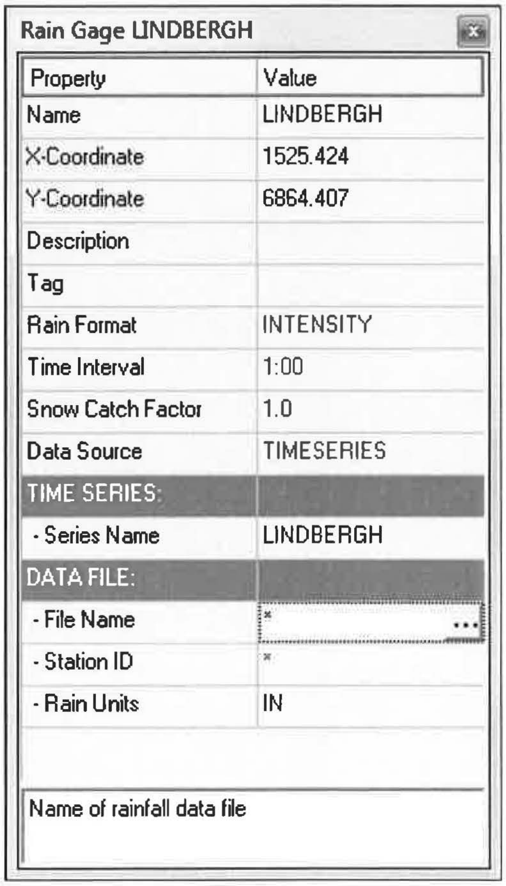


Auto-Length: Off
Offsets: Depth
Flow Units: CFS
Zoom Level: 100%
X,Y: 5669.782, 10000.000



Outfall POC-1

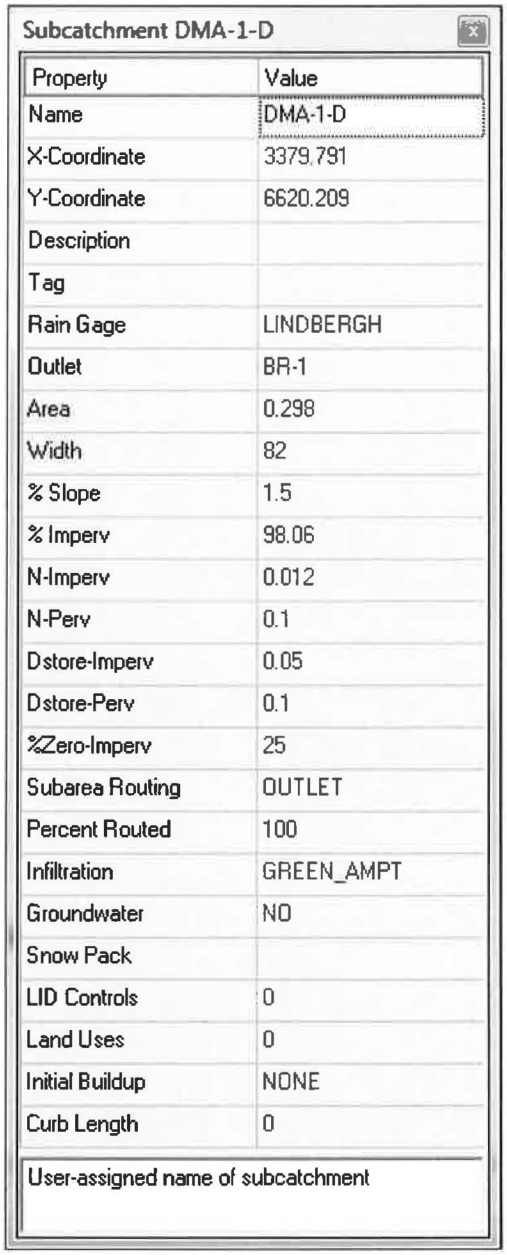
Property	Value
Name	POC-1
X-Coordinate	3400.000
Y-Coordinate	1687.170
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*



Rain Gage LINDBERGH

Property	Value
Name	LINDBERGH
X-Coordinate	1525.424
Y-Coordinate	6864.407
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
- Series Name	LINDBERGH
DATA FILE:	
- File Name	*
- Station ID	*
- Rain Units	IN

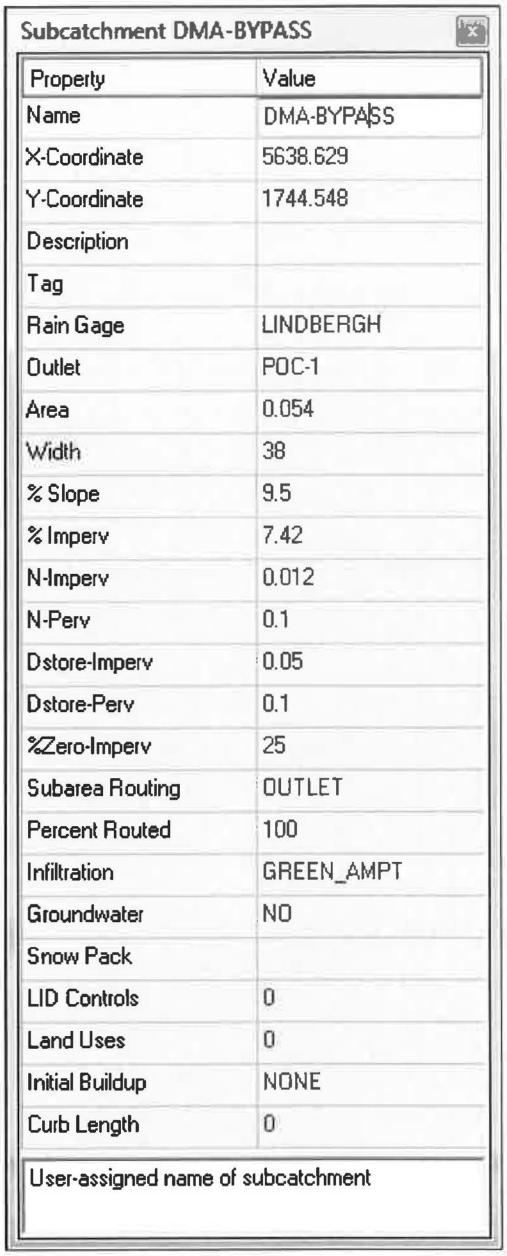
Name of rainfall data file



Subcatchment DMA-1-D

Property	Value
Name	DMA-1-D
X-Coordinate	3379.791
Y-Coordinate	6620.209
Description	
Tag	
Rain Gage	LINDBERGH
Outlet	BR-1
Area	0.298
Width	82
% Slope	1.5
% Imperv	98.06
N-Imperv	0.012
N-Perv	0.1
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

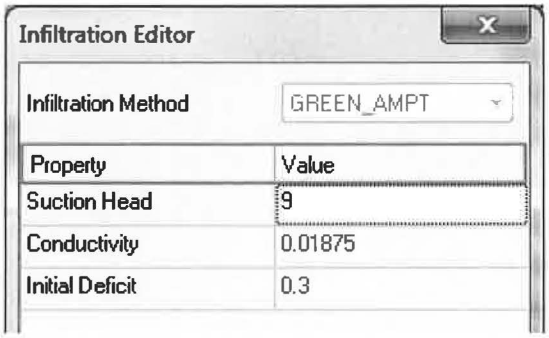
User-assigned name of subcatchment



Subcatchment DMA-BYPASS

Property	Value
Name	DMA-BYPASS
X-Coordinate	5638.629
Y-Coordinate	1744.548
Description	
Tag	
Rain Gage	LINDBERGH
Outlet	POC-1
Area	0.054
Width	38
% Slope	9.5
% Imperv	7.42
N-Imperv	0.012
N-Perv	0.1
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

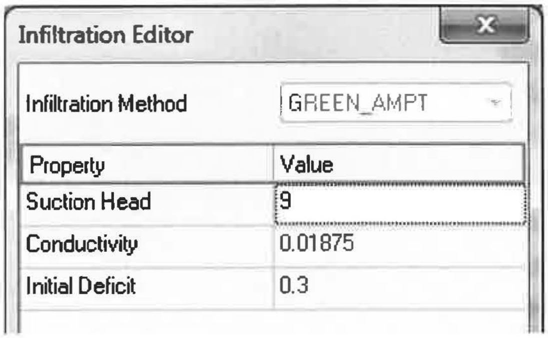
User-assigned name of subcatchment



Infiltration Editor

Infiltration Method: GREEN_AMPT

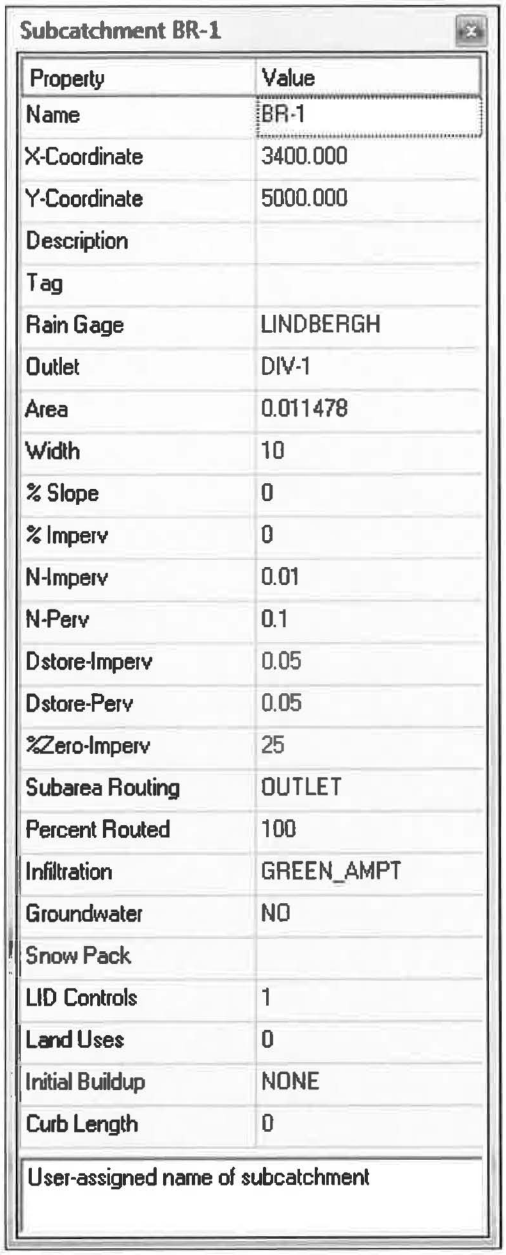
Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3



Infiltration Editor

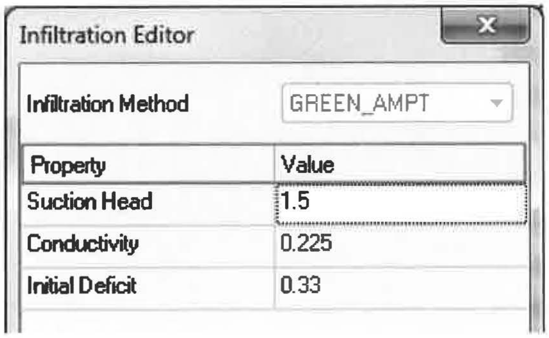
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3



Property	Value
Name	BR-1
X-Coordinate	3400.000
Y-Coordinate	5000.000
Description	
Tag	
Rain Gage	LINDBERGH
Outlet	DIV-1
Area	0.011478
Width	10
% Slope	0
% Imperv	0
N-Imperv	0.01
N-Perv	0.1
Dstore-Imperv	0.05
Dstore-Perv	0.05
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

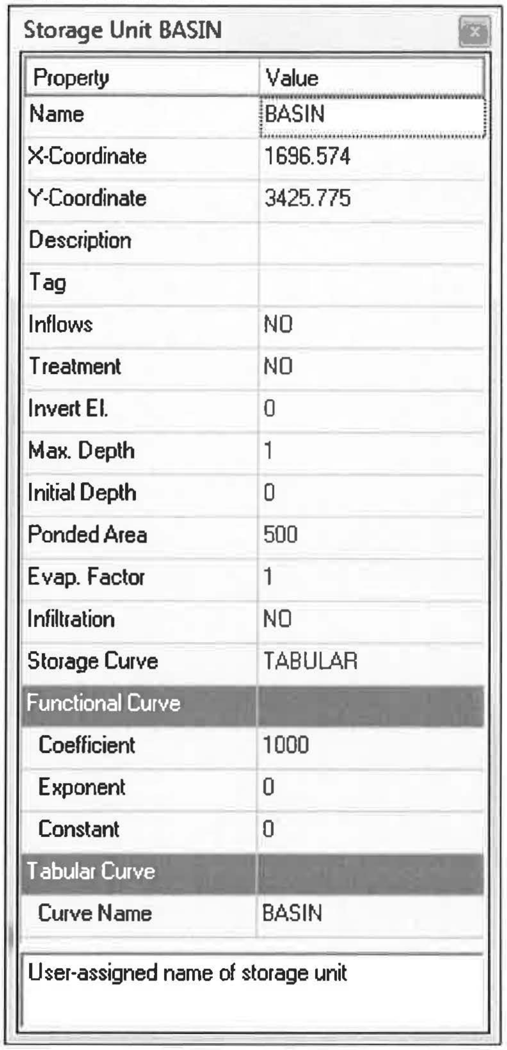
User-assigned name of subcatchment



Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	1.5
Conductivity	0.225
Initial Deficit	0.33

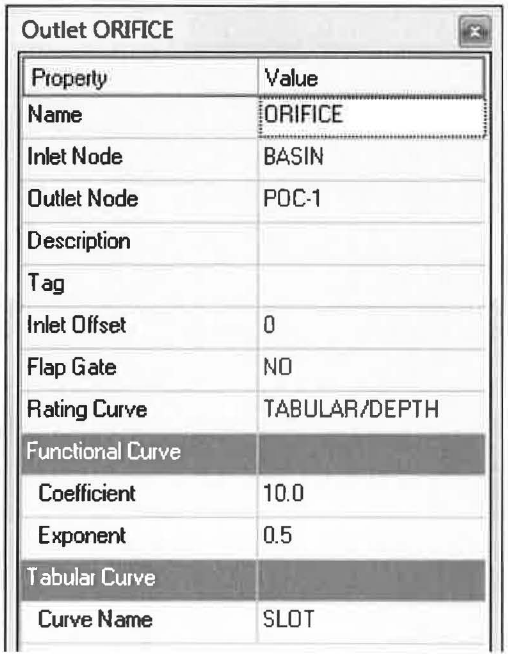
Detention Basin 1



Storage Unit BASIN

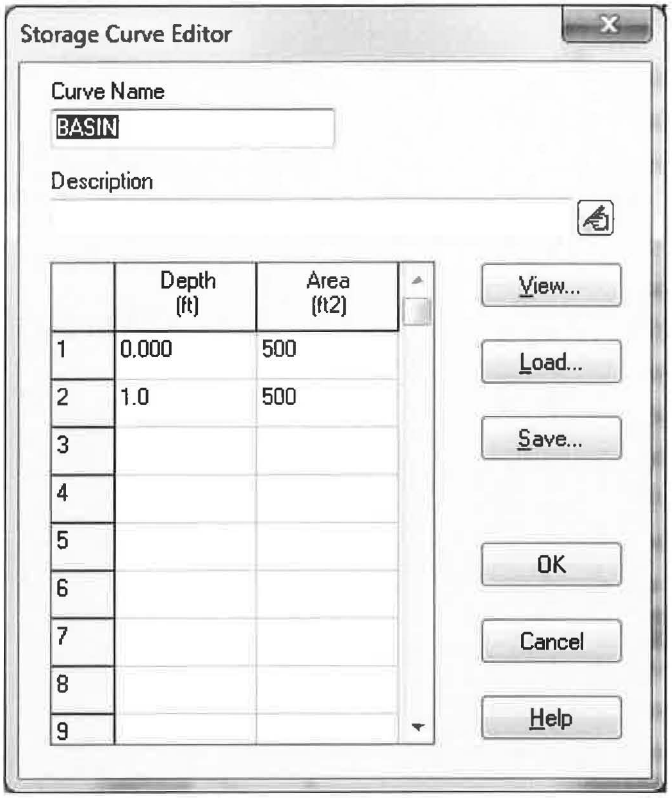
Property	Value
Name	BASIN
X-Coordinate	1696.574
Y-Coordinate	3425.775
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Max. Depth	1
Initial Depth	0
Ponded Area	500
Evap. Factor	1
Infiltration	NO
Storage Curve	TABULAR
Functional Curve	
Coefficient	1000
Exponent	0
Constant	0
Tabular Curve	
Curve Name	BASIN

User-assigned name of storage unit



Outlet ORIFICE

Property	Value
Name	ORIFICE
Inlet Node	BASIN
Outlet Node	POC-1
Description	
Tag	
Inlet Offset	0
Flap Gate	NO
Rating Curve	TABULAR/DEPTH
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	SLOT

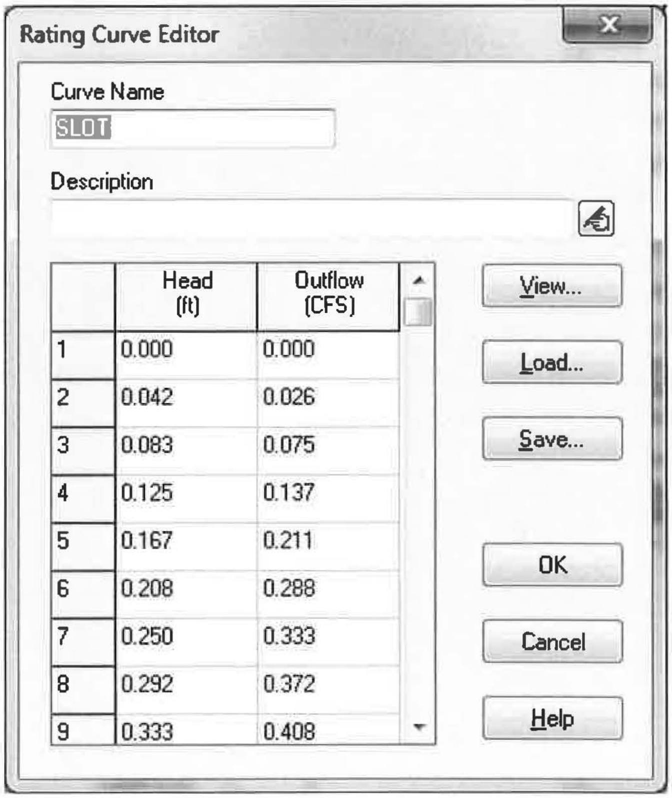


Storage Curve Editor

Curve Name: BASIN

Description:

	Depth (ft)	Area (ft2)
1	0.000	500
2	1.0	500
3		
4		
5		
6		
7		
8		
9		



Rating Curve Editor

Curve Name: SLOT

Description:

	Head (ft)	Outflow (CFS)
1	0.000	0.000
2	0.042	0.026
3	0.083	0.075
4	0.125	0.137
5	0.167	0.211
6	0.208	0.288
7	0.250	0.333
8	0.292	0.372
9	0.333	0.408

EXPLANATION OF SELECTED VARIABLES

Sub Catchment Areas:

Please refer to the attached diagrams that indicate the DMA and Bio-Retention BMPs (BMP) sub areas modeled within the project site at both the pre and post developed conditions draining to the POC.

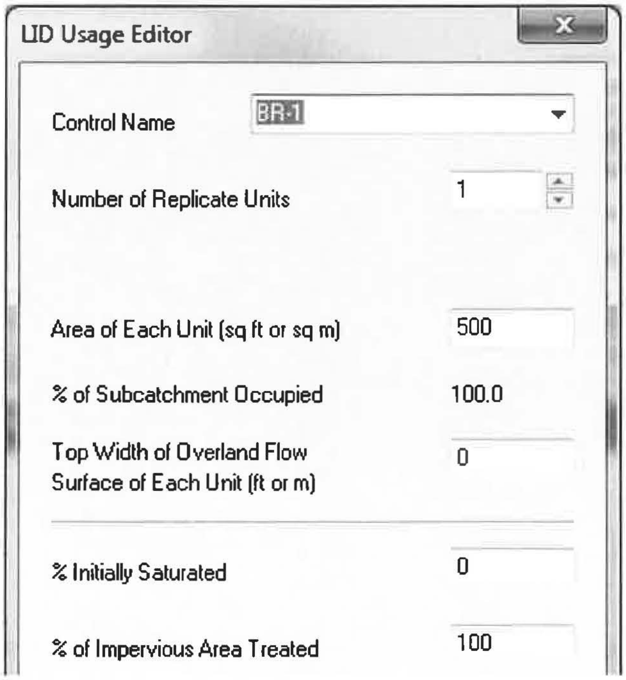
Parameters for the pre- and post-developed models include soil type D as determined from the NRCS websoil survey review (attached at the end of this appendix). Suction head, conductivity and initial deficit corresponds to average values expected for these soils types, according to sources consulted, professional experience, and approximate values obtained by the interim Orange County modeling approach.

REC selected infiltration values, such that the percentage of total precipitation that becomes runoff, is realistic for the soil types and slightly smaller than measured values for Southern California watersheds.

Selection of a Kinematic Approach: As the continuous model is based on hourly rainfall, and the time of concentration for the pre-development and post-development conditions is significantly smaller than 60 minutes, precise routing of the flows through the impervious surfaces, the underdrain pipe system, and the discharge pipe was considered unnecessary. The truncation error of the precipitation into hourly steps is much more significant than the precise routing in a system where the time of concentration is much smaller than 1 hour.

Sub-catchment BMP:

The area of biofiltration must be equal to the area of the development tributary to the biofiltration facility (area that drains into the biofiltration, equal external area plus bio-retention itself). Five (5) decimal places were given regarding the areas of the biofiltration to insure that the area used by the program for the LID subroutine corresponds exactly with this tributary.



Control Name BR-1

Number of Replicate Units 1

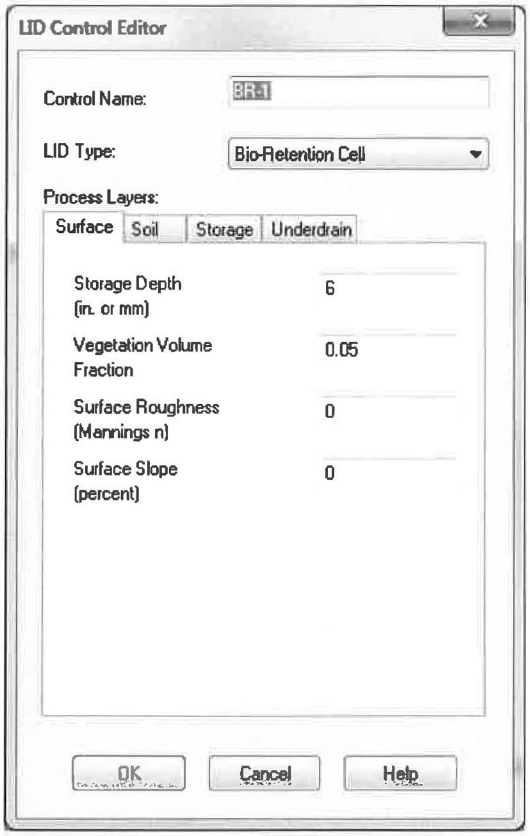
Area of Each Unit (sq ft or sq m) 500

% of Subcatchment Occupied 100.0

Top Width of Overland Flow Surface of Each Unit (ft or m) 0

% Initially Saturated 0

% of Impervious Area Treated 100

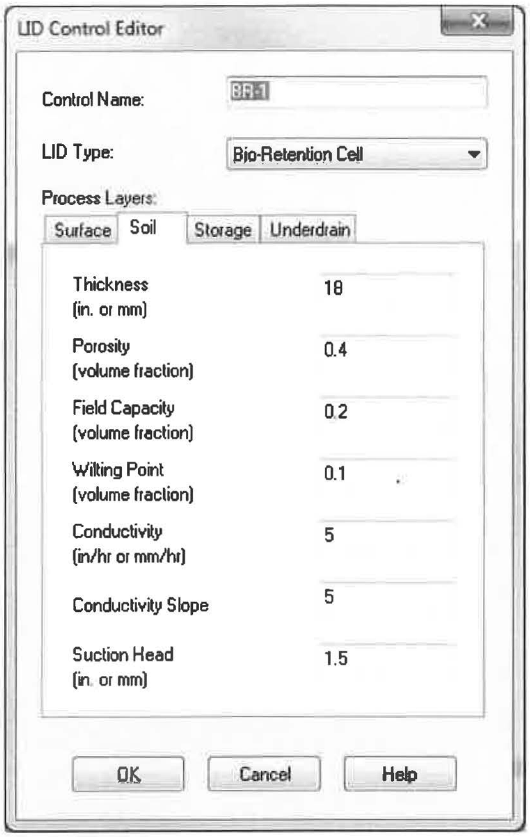


Control Name: BR-1

LID Type: Bio-Retention Cell

Process Layers: Surface

Storage Depth (in. or mm)	6
Vegetation Volume Fraction	0.05
Surface Roughness (Mannings n)	0
Surface Slope (percent)	0

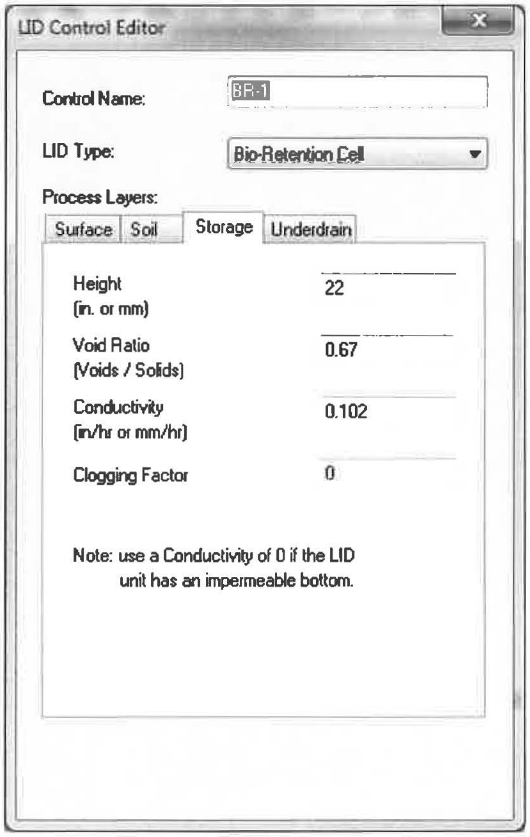


Control Name: BR-1

LID Type: Bio-Retention Cell

Process Layers: Soil

Thickness (in. or mm)	18
Porosity (volume fraction)	0.4
Field Capacity (volume fraction)	0.2
Wilting Point (volume fraction)	0.1
Conductivity (in/hr or mm/hr)	5
Conductivity Slope	5
Suction Head (in. or mm)	1.5



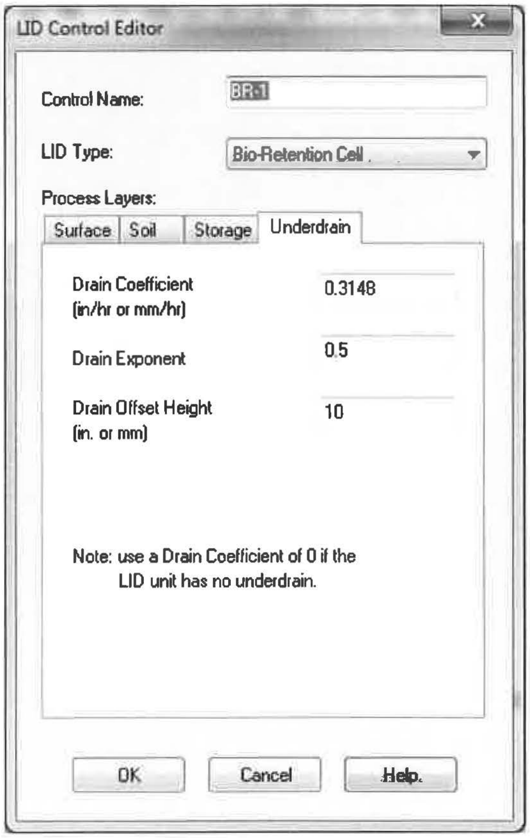
Control Name: BR-1

LID Type: Bio-Retention Cell

Process Layers: Storage

Height (in. or mm)	22
Void Ratio (Voids / Solids)	0.67
Conductivity (in/hr or mm/hr)	0.102
Clogging Factor	0

Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.



Control Name: BR-1

LID Type: Bio-Retention Cell

Process Layers: Underdrain

Drain Coefficient (in/hr or mm/hr)	0.3148
Drain Exponent	0.5
Drain Offset Height (in. or mm)	10

Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.

LID Control Editor: Explanation of Significant Variables

Storage Depth:

The storage depth variable within the SWMM model is representative of the storage volume provided beneath the surface riser outlet and the surface of the bio filtration facility.

In those cases where the surface storage has a variable area that is also different to the area of the gravel and amended soil, the SWMM model needs to be calibrated as the LID module will use the storage depth multiplied by the BMP area as the amount of volume stored at the surface.

Let A_{BMP} be the area of the BMP (area of amended soil and area of gravel). The proper value of the storage depth S_D to be included in the LID module can be calculated by using geometric properties of the surface volume. Let A_0 be the surface area at the bottom of the surface pond, and let A_i be the surface area at the elevation of the invert of the first row of orifices (or at the invert of the riser if not surface orifices are included). Finally, let h_i be the difference in elevation between A_0 and A_i. By volumetric definition:

$$A_{BMP} \cdot S_D = \frac{(A_0+A_i)}{2} h_i \tag{1}$$

Equation (1) allows the determination of S_D to be included as Storage Depth in the LID module.

Porosity: A porosity value of 0.4 has been selected for the model. The amended soil is to be highly sandy in content in order to have a saturated hydraulic conductivity of approximately 5 in/hr.

REC considers such a value to be slightly high; however, in order to comply with the HMP Permit, the value recommended by the Copermittees for the porosity of amended soil is 0.4, per Appendix A of the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011. Such porosity is equal to the porosity of the gravel per the same document.

Void Ratio: The ratio of the void volume divided by the soil volume is directly related to porosity as n/(1-n). As the underdrain layer is composed of gravel, a porosity value of 0.4 has been selected (also per Appendix A of the Final HMP document), which results in a void ratio of 0.4/(1-0.4) = 0.67 for the gravel detention layer.

Conductivity: The bioretention basin will feature a partial retention sub layer such that the base of the facility will remain unlined. Per the SWQMP a conductivity rate of 0.102 in/hr was determined for the project site.

Clogging factor: A clogging factor was not used (0 indicates that there is no clogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMP sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

Drain (Flow) coefficient: The flow coefficient C in the SWMM Model is the coefficient needed to transform the orifice equation into a general power law equation of the form:

$$q = C(H - H_D)^n \tag{2}$$

where q is the peak flow in in/hr, n is the exponent (typically 0.5 for orifice equation), H_D is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and in our design equal to 0) and H is the depth of the water in inches.

The general orifice equation can be expressed as:

$$Q = \frac{\pi}{4} c_g \frac{D^2}{144} \sqrt{2g \frac{(H-H_D)}{12}} \tag{3}$$

where Q is the peak flow in cfs, D is the diameter in inches, c_g is the typical discharge coefficient for orifices (0.61-0.63 for thin walls and around 0.75-0.8 for thick walls), g is the acceleration of gravity in ft/s^2, and H and H_D are defined above and are also used in inches in Equation (3).

It is clear that:

$$q\left(\frac{in}{hr}\right) X \frac{A_{BMP}}{12\ X\ 3600} = Q\ (cfs) \tag{4}$$

Cut-Off Flow: Q (cfs) and q (in/hr) are also the cutoff flow. For numerical reasons to insure the LID is full, the model uses cut-off = 1.01 Q.

ATTACHMENT 8

Geotechnical Documentation

Hydrologic Soil Group—San Diego County Area, California

Map Scale: 1:348 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

□ Area of Interest (AOI)

Soils

Soil Rating Polygons

▨ A

▨ A/D

▨ B

▨ B/D

▨ C

▨ C/D

▨ D

□ Not rated or not available

Soil Rating Lines

～ A

～ A/D

～ B

～ B/D

～ C

～ C/D

～ D

⋯ Not rated or not available

Soil Rating Points

■ A

■ A/D

■ B

■ B/D

■ C

■ C/D

■ D

□ Not rated or not available

Water Features

～ Streams and Canals

Transportation

┼┼┼ Rails

～ Interstate Highways

～ US Routes

～ Major Roads

～ Local Roads

Background

■ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ur	Urban land			
Totals for Area of Interest				

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ALLIED EARTH TECHNOLOGY
7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
PH. (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

ROBERT CHAN, P.E.

April 14, 2016

EA Renovations, Inc.
5841 Mission Gorge Road
San Diego, CA. 92120

Subject : Project No. 16-1268E3
Addendum to Geotechnical Investigation
Proposed Multi-Family Apartment Building Site
2828/2834 Broadway
San Diego, California

Gentlemen :

Reference is made to our Report of Geotechnical Investigation, same Project Number as above, dated March 21, 2016.

In accordance with your request, we have conducted a percolation test in the southwest portion of subject property, more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547 (APN 539-522-25 and 26-00), in the City and County of San Diego, State of California.

A 6-inch diameter boring, approximately 3 feet in depth, was drilled, and percolation test conducted following the guidelines of the San Diego Department of Environmental Health. The soils encountered consist of dense to very dense, cemented, reddish brown silty sands.

Test result indicate a percolation rate of 240 minutes per inch (1/4 inch/hour). Test result indicated that the on-site soils are not suitable for storm water infiltration purposes.

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

ROBERT CHAN
No. C-24613
Exp. 12/31/17
CIVIL

ROBERT CHAN
No. G-00198
Exp. 12/31/17
GEOTECHNICAL

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1		
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	3	0.75
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	2	0.5
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.25
B	Design	Level of pretreatment/ expected sediment loads	0.5	1	0.5
		Redundancy/resiliency	0.25	1	0.25
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1.0
Combined Safety Factor, $S_{total} = S_A \times S_B$				2.25	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				0.23 in/hr	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				0.102 in/hr	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms: Refer to geotechnical study.					

ATTACHMENT 9

Summary Files from the SWMM Model

PRE_DEV

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ OCT-17-1948 00:00:00
Ending Date .............. OCT-17-2005 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......        17.089       563.373
Evaporation Loss .........         0.685        22.567
Infiltration Loss ........        13.012       428.972
Surface Runoff ...........         3.711       122.352
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -1.867


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         3.711         1.209
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         3.711         1.209
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Subcatchment Runoff Summary
***************************

--------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total      Total       Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff      Runoff   Runoff   Coeff
Subcatchment                   in         in         in         in         in    10^6 gal      CFS
--------------------------------------------------------------------------------------------------------
DMA-1-D                    563.37       0.00      22.57     428.97     122.35        1.21     0.48   0.217

Analysis begun on:  Wed May 11 15:35:51 2016
Analysis ended on:  Wed May 11 15:36:12 2016
Total elapsed time: 00:00:21
```

POST_DEV

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ OCT-17-1948 00:00:00
Ending Date .............. OCT-17-2005 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit BYPASS

WARNING 04: minimum elevation drop used for Conduit UDRAIN

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......        17.064       563.372
Evaporation Loss .........         3.583       118.295
Infiltration Loss ........         5.812       191.871
Surface Runoff ...........         7.836       258.689
Final Surface Storage ....         0.006         0.186
Continuity Error (%) .....        -1.006


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         7.832         2.552
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         7.829         2.551
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.002         0.001
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.013


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
```

POST_DEV

```
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


***************************
Subcatchment Runoff Summary
***************************

------------------------------------------------------------------------------------------------------
                           Total      Total      Total      Total      Total       Total     Peak  Runoff
                          Precip      Runon       Evap      Infil     Runoff      Runoff   Runoff   Coeff
Subcatchment                  in         in         in         in         in    10^6 gal      CFS
------------------------------------------------------------------------------------------------------
DMA-1-D                   563.37       0.00     106.67       8.08     455.62        3.69     0.41   0.809
BR-1                      563.37   11829.20     864.12    4042.08    7446.45        2.32     0.38   0.601
DMA-BYPASS                563.37       0.00      23.93     387.77     158.47        0.23     0.07   0.281


***********************
LID Performance Summary
***********************

----------------------------------------------------------------------------------------------------------------
                                         Total      Evap     Infil   Surface     Drain     Init.     Final     Pcnt.
                                        Inflow      Loss      Loss   Outflow   Outflow   Storage   Storage     Error
Subcatchment      LID Control               in        in        in        in        in        in        in
----------------------------------------------------------------------------------------------------------------
BR-1              BR-1                12392.57    864.12   4042.08   1172.18   6274.28      0.00      5.29      0.28

******************
Node Depth Summary
******************

---------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max
                                  Depth    Depth      HGL   Occurrence
Node                 Type          Feet     Feet     Feet  days hr:min
---------------------------------------------------------------------
POC-1                OUTFALL       0.00     0.00     0.00     0  00:00
DIV-1                DIVIDER       0.00     0.00     0.00     0  00:00
BASIN                STORAGE       0.00     0.28     0.28  6263  09:16


*******************
Node Inflow Summary
*******************

-------------------------------------------------------------------------------------
                                 Maximum  Maximum                  Lateral       Total
                                 Lateral    Total  Time of Max      Inflow      Inflow
                                  Inflow   Inflow   Occurrence      Volume      Volume
Node                 Type            CFS      CFS  days hr:min    10^6 gal    10^6 gal
-------------------------------------------------------------------------------------
POC-1                OUTFALL        0.07     0.41  6263  09:03       0.232       2.551
DIV-1                DIVIDER        0.38     0.38  6263  09:15       2.320       2.320
BASIN                STORAGE        0.00     0.37  6263  09:15       0.000       0.353


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                           Max. Height   Min. Depth
                                 Hours     Above Crown    Below Rim
```

POST_DEV

```
Node                 Type       Surcharged           Feet         Feet
--------------------------------------------------------------------
DIV-1                DIVIDER     499679.02          0.000        0.000
BASIN                STORAGE     499679.02          0.278        0.722


*********************
Node Flooding Summary
*********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************

------------------------------------------------------------------------------------------
                       Average     Avg   E&I       Maximum     Max    Time of Max    Maximum
                        Volume    Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit          1000 ft3    Full  Loss      1000 ft3    Full   days hr:min         CFS
------------------------------------------------------------------------------------------
BASIN                    0.000       0     0         0.139      28   6263  09:16        0.36


***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                      Flow       Avg.        Max.       Total
                      Freq.      Flow        Flow      Volume
Outfall Node          Pcnt.       CFS         CFS    10^6 gal
-----------------------------------------------------------
POC-1                 1.80       0.01        0.41       2.551
-----------------------------------------------------------
System                1.80       0.01        0.41       2.551


********************
Link Flow Summary
********************

-----------------------------------------------------------------------------
                                  Maximum  Time of Max   Maximum    Max/    Max/
                                   |Flow|   Occurrence    |Veloc|   Full    Full
Link                 Type            CFS  days hr:min    ft/sec    Flow   Depth
-----------------------------------------------------------------------------
BYPASS               DUMMY          0.37  6263  09:15
UDRAIN               DUMMY          0.01  1237  16:00
ORIFICE              DUMMY          0.36  6263  09:16


*************************
Conduit Surcharge Summary
*************************

----------------------------------------------------------------------------
                                                          Hours        Hours
                      --------- Hours Full --------    Above Full   Capacity
Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
----------------------------------------------------------------------------
BYPASS                      0.01      0.01      0.01   499679.02        0.01
UDRAIN                      0.01      0.01      0.01   499679.02        0.01


Analysis begun on:  Tue Nov 08 14:01:36 2016
Analysis ended on:  Tue Nov 08 14:02:05 2016
Total elapsed time: 00:00:29
```

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☑ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	☑ Included ☐ Not Applicable

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

Preliminary Design / Planning / CEQA level submittal:

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

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).

THE CITY OF SAN DIEGO
RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:
Metropolitan/SDPB Broadway, LLC
2929 Canon Street, Suite "A"
San Diego, CA 92102

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

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:
	539-542-25 & 539-542-26	

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

the owner or duly authorized representative of the owner [Property Owner] of property located at:
2828-2834 Broadway San Diego, CA 92102

(PROPERTY ADDRESS)

and more particularly described as: Parcel 2, Lots 35, 36 & Por. of Lot 37 and Parcel 1 Lots 33 & 34 block 64 E. W. Morse's Subdivision of Pueblo Lot 1150 Map No. 547

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): ________________

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s):

Continued on Page 2

Page 2 of 2 | **City of San Diego • Development Services Department • Storm Water Requirements Applicability Checklist**

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):____________________

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

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):

____
(Owner Signature)

Mike Donovan
(Print Name and Title)

Metropolitan/SDPB Broadway, LLC
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control engineer Signature

____
(Print Name)

____
(Date)

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

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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

The plans must identify:

- ☑ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☑ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☑ Details and specifications for construction of structural BMP(s)
- ☑ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☑ How to access the structural BMP(s) to inspect and perform maintenance
- ☑ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☑ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☑ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☑ Recommended equipment to perform maintenance
- ☑ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☑ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☑ All BMPs must be fully dimensioned on the plans
- ☑ When proprietary 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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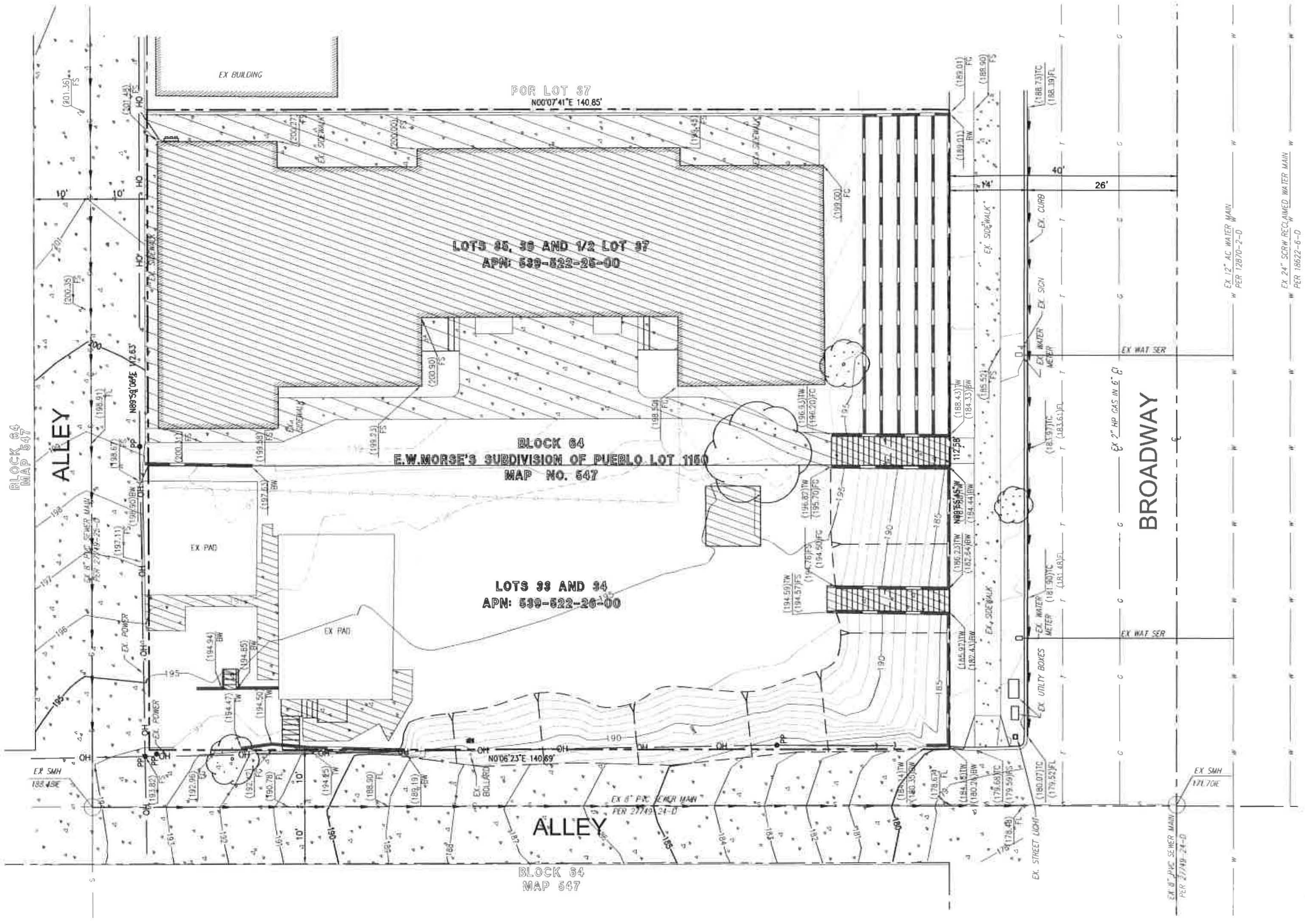


LEGEND

ITEM	STD	SYMBOL
CENTER LINE	-	— - —
BOUNDARY	-	━━
CONTOUR	-	—190—
OVERHEAD UTILITY LINES	-	—OH—
TELEPHONE CABLE	-	—T—
WATER MAIN	-	—W—
SEWER MAIN	-	—S—
GAS MAIN	-	—G—
CONCRETE	-	▨
SLOPE	-	V V

SITE ADDRESS

2828–2834 BROADWAY
SAN DIEGO, CA 92102

ASSESSORS PARCEL NUMBER

539–522–25–00 & 539–522–26–00

LEGAL DESCRIPTION

LOTS 33–36 AND 1/2 LOT 37, BLK 64 E.W.MORSE'S SUBDIVISION OF PUEBLO LOT 1150 MAP NO. 547

BENCHMARK

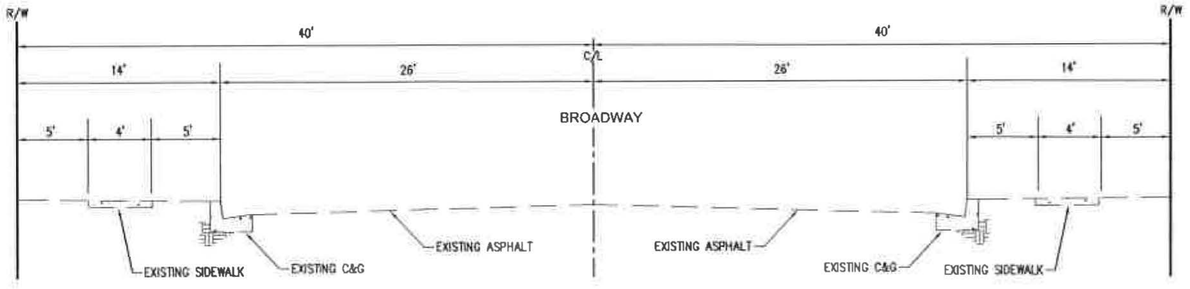
CITY OF SAN DIEGO BENCHMARK: #3684
LOCATION: S.E. CURB RETURN INTERSECTION OF BROADWAY & 29TH STREET
ELEVATION: 187.35 DATUM: M.S.L.

LOT AREA

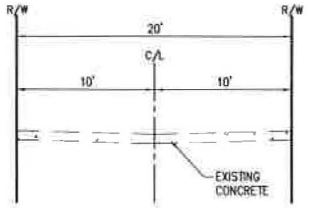
15,750 SF – 0.36 AC

TOPOGRAPHY SOURCE

FIELD SURVEY BY:
SPEAR & ASSOCIATES, INC. DATED 07/31/2015
475 PRODUCTION STREET, SAN MARCOS, CA 92078
PHONE (760) 736–2040 FAX (760) 736–4866
(619) 296–5565



TYPICAL STREET SECTION
NOT TO SCALE



TYPICAL ALLEY SECTION
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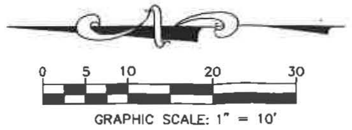


GRAPHIC SCALE: 1" = 10'

HOSSEIN ZOMORODI
NO. 63335
EXP 3-31-18

K & S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296–5565 Fax: (619) 296–5564

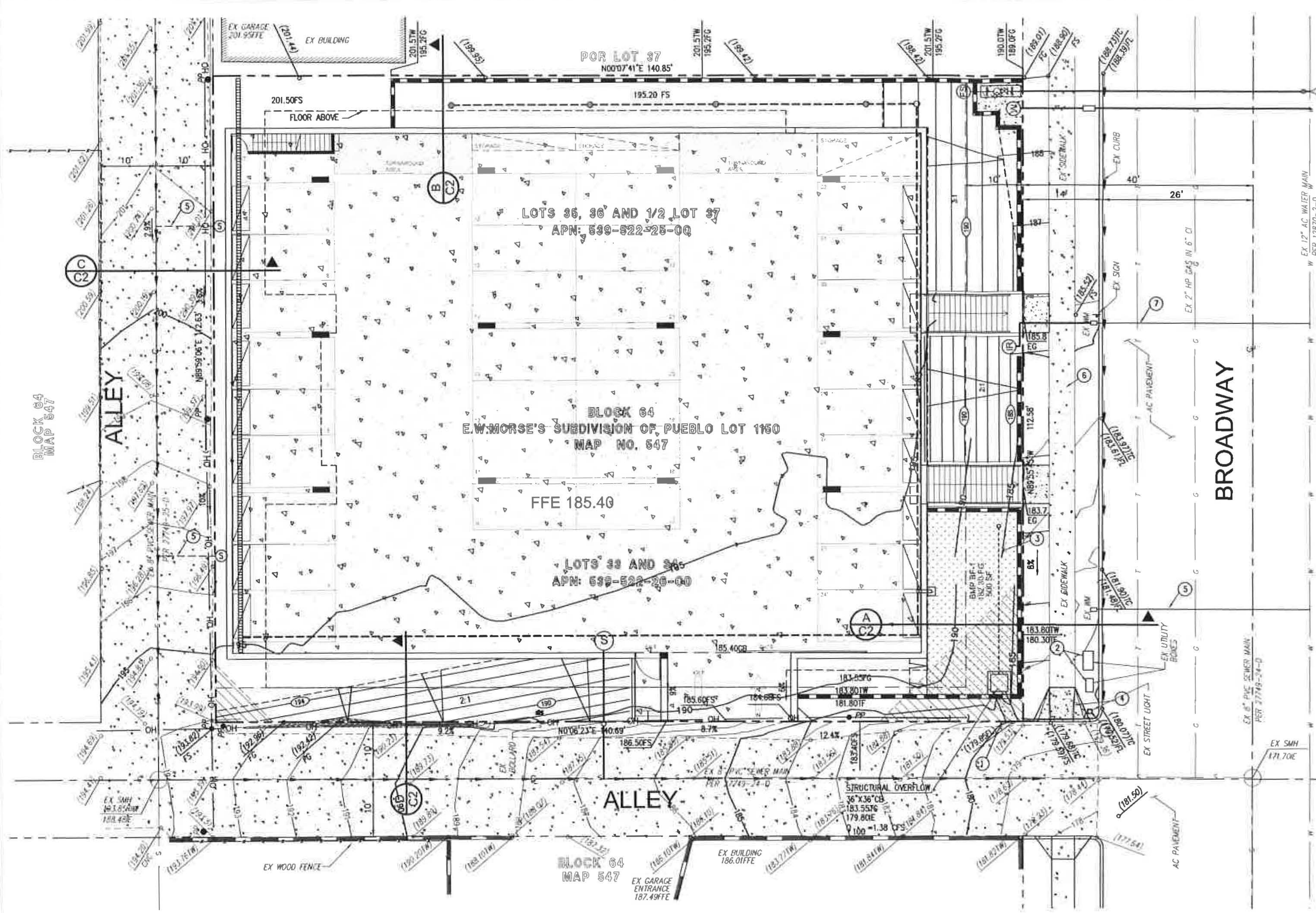
REVISION:
03.16.2016 SITE DEVELOPMENT SUBMITTAL IR
11.12.2015 COMPLETENESS CHECK IR

DRAWING TITLE:
TOPOGRAPHIC SHEET

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: KS 16-020
DATE: November 08, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: C1

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016



LEGEND

ITEM	STD	SYMBOL
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	–	▨
CONCRETE SPLASH PAD (2'X2')	–	☐
RETAINING WALL	–	▬
BASEMENT WALL	–	▨
SLOPE	–	▽ 2:1 ▽
WATER SERVICE WITH BFP (SIZE TBD)	–	Ⓦ
IRRIGATION SERVICE WITH BFP (SIZE TBD)	–	(IR)
FIRE SERVICE WITH FDC/BFP (SIZE TBD)	–	(FS)
SEWER LATERAL WITH TRAFFIC RATED CLEANOUT	–	Ⓢ
DIRECTION OF FLOW	–	
CURB RAMP	SDG-130 SDG-136	
CONTOUR	–	190
SITE VISIBILITY TRIANGLE	–	▨

CONSTRUCTION NOTES

① CONSTRUCT CONCRETE SPLASH PAD 2'X2'
② EXISTING UTILITIES PROTECT IN PLACE
③ CONSTRUCT BIOFILTRATION (SEE DETAIL C-3)
④ CONSTRUCT CURB RAMP PER RSD SDG 130 & 136
⑤ EX WAT SER TO BE KILLED AT MAIN. EX SEWER LAT TO BE ABANDONED/CAPPED AT PL.
⑥ RECONSTRUCT THE DAMAGED PORTIONS OF SIDEWALK MAINTAINING EXISTING SIDEWALK SCORING PATTERN
⑦ EXISTING WATER SERV TO BE USED FOR IRRIGATION PURPOSES (SEE LEGEND)

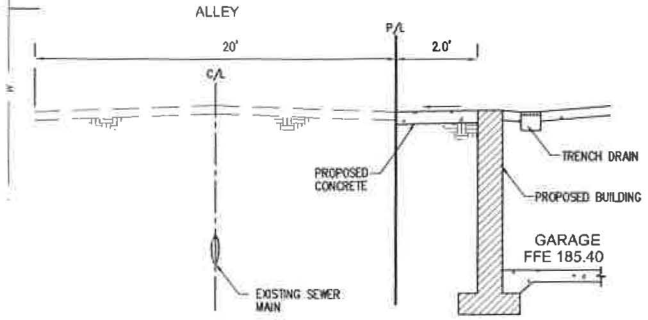
GRADING TABULATIONS

TOTAL AMOUNT OF SITE TO BE GRADED:
AREA 0.36 AC, % OF TOTAL SITE 100,
AMOUNT OF CUT: 6,650 CUBIC YARDS.
MAXIMUM DEPTH OF CUT: 17 FEET.
AMOUNT OF FILL: 350 CUBIC YARDS.
MAXIMUM DEPTH OF FILL: 10 FEET.
MAXIMUM HEIGHT OF FILL SLOPE: 10 FEET.
2:1 SLOPE RATIO.
MAXIMUM HEIGHT OF CUT SLOPE: 0 FEET.
0 SLOPE RATIO.
AMOUNT EXPORT SOIL: 6,300 CUBIC YARDS
RETAINING WALL:
MASONRY: LENGTH 242 FEET. MAXIMUM HEIGHT 8 FEET.

EARTHWORK QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY DUE TO SHRINKAGE, LOSSES DUE TO CLEARING OPERATIONS, COMPACTION, SETTLEMENT, ETC. CONTRACTOR SHOULD VERIFY QUANTITIES PRIOR TO BIDDING.

LOT AREA

15,750 SF – 0.36 AC



SECTION C
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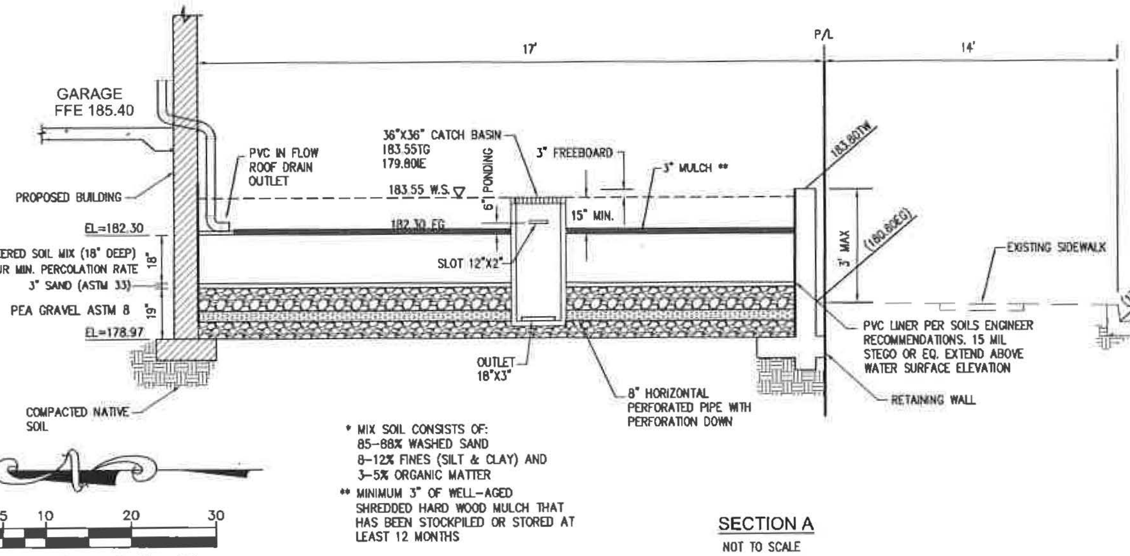
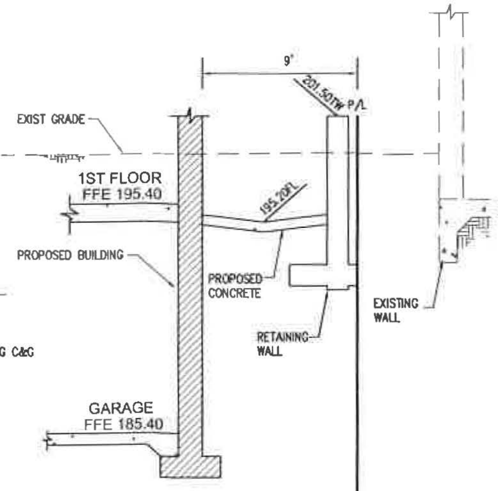


* MIX SOIL CONSISTS OF:
85-88% WASHED SAND
8-12% FINES (SILT & CLAY) AND
3-5% ORGANIC MATTER
** MINIMUM 3" OF WELL-AGED SHREDDED HARD WOOD MULCH THAT HAS BEEN STOCKPILED OR STORED AT LEAST 12 MONTHS

SECTION A
NOT TO SCALE



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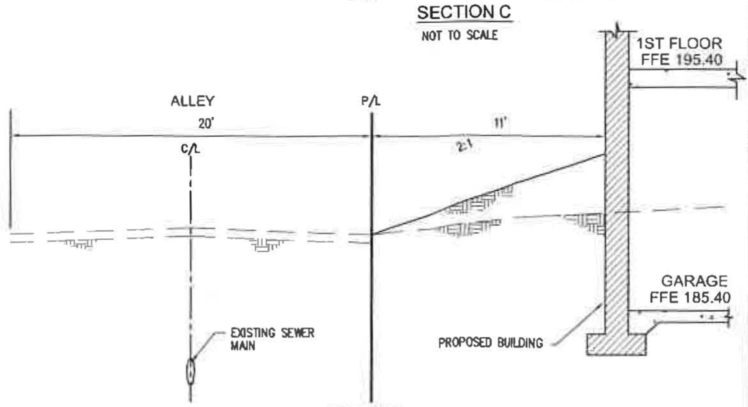

SECTION D
NOT TO SCALE

HOSSEIN ZOMORODI
NO.43235
EXP 3-31-18

K & S ENGINEERING, INC.
Planning Engineering Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:
02.16.2016 SITE DEVELOPMENT SUBMITTAL IR
11.12.2015 COMPLETENESS CHECK IR

DRAWING TITLE:
GRADING SHEET
GARAGE FLOOR

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO:	KS 16-020
DATE:	November 08, 2016
DRAWN BY:	NA
SCALE:	1" = 10'
SHEET NO:	C2

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

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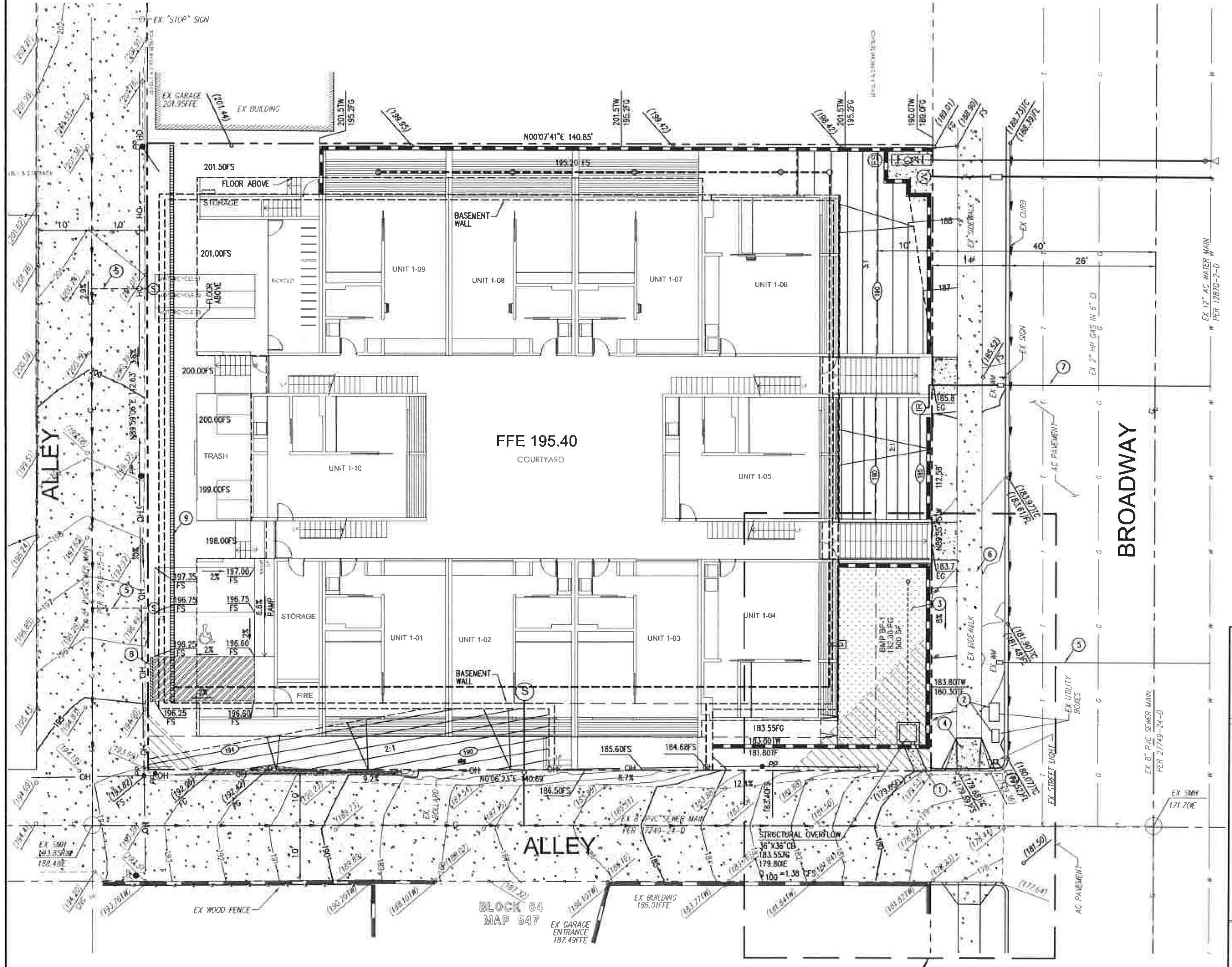

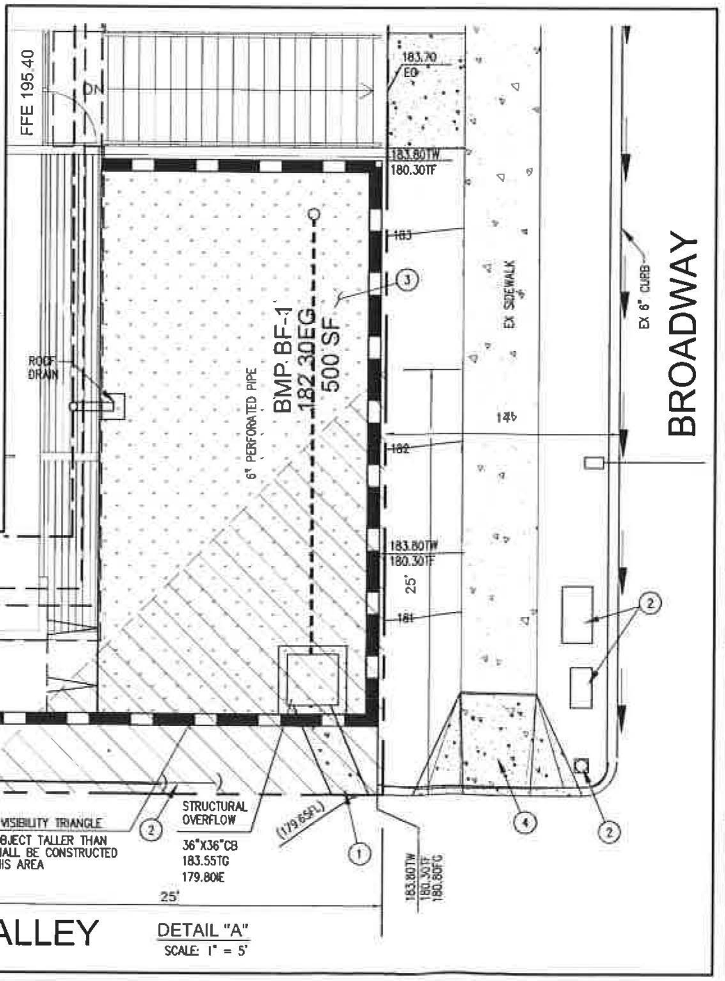

DETAIL "A"
SCALE: 1" = 5'

GRAPHIC SCALE: 1" = 10'

LEGEND

ITEM	STD	SYMBOL
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	–	▨
CONCRETE SPLASH PAD (2'X2')	–	▭
RETAINING WALL	–	▬ ▬ ▬
BASEMENT WALL	–	
SLOPE	–	▽ 2:1 ▽
WATER SERVICE WITH BFP (SIZE TBD)	–	Ⓦ
IRRIGATION SERVICE WITH BFP (SIZE TBD)	–	(IR)
FIRE SERVICE WITH FDC/BFP (SIZE TBD)	–	(FS)
SEWER LATERAL WITH TRAFFIC RATED CLEANOUT	–	Ⓢ
DIRECTION OF FLOW	–	
CURB RAMP	SDG-130 SDG-136	
CONTOUR	–	(190)
SITE VISIBILITY TRIANGLE	–	◺

CONSTRUCTION NOTES

① CONSTRUCT CONCRETE SPLASH PAD 2'X2'
② EXISTING UTILITIES PROTECT IN PLACE
③ CONSTRUCT BIOFILTRATION 9SEE DETAIL C-3)
④ CONSTRUCT CURB RAMP PER RSD SDG 130 & 136
⑤ EX WAT SER TO BE KILLED AT MAIN. EX SEWER LAT TO BE ABANDONED/CAPPED AT PL.
⑥ RECONSTRUCT THE DAMAGED PORTIONS OF SIDEWALK MAINTAINING EXISTING SIDEWALK SCORING PATTERN
⑦ EXISTING WATER SERV TO BE USED FOR IRRIGATION PURPOSES (SEE LEGEND)
⑧ CONSTRUCT 6" CURB
⑨ CONSTRUCT 6" TRENCH DRAIN

DISTURBED AREA

15,750 S.F. – 0.36 ACRES

SPECIAL NOTES

1.– PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.

2.– PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.

3.– PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT THE OWNER/PERMITTEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN PART 2 CONSTRUCTION BMP STANDARDS CHAPTER 4 OF THE CITY'S STORM WATER STANDARDS.

4.– PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL SUBMIT A TECHNICAL REPORT THAT WILL BE SUBJECT TO FINAL REVIEW AND APPROVAL BY THE CITY ENGINEER, BASED ON THE STORM WATER STANDARDS IN EFFECT AT THE TIME OF THE CONSTRUCTION PERMIT ISSUANCE.

5.– PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL IMPLEMENT THE MITIGATION MEASURES RELATED TO PALEONTOLOGICAL RESOURCES.

SPECIAL NOTES (CONTINUATION)

6.– HYDROSEED PROCEDURES:

a.– SEED MIXES SHALL BE SPECIFIED BY THE PURE LIVE SEED OF EACH SPECIES.

b.– FIBER MULCH SHALL BE APPLIED AT A MINIMUM RATE OF 2,000 POUNDS PER ACRE EXCEPT WHEN USED IN CONJUNCTION WITH STRAW MULCH, WHEN IT SHALL BE APPLIED AT A MINIMUM RATE OF 400 POUNDS PER ACRE.

c.– A WETTING AGENT CONSISTING OF 95 PERCENT ALKYL POLYETHYLENE GLYCOL ETHER SHALL BE APPLIED AS PER MANUFACTURERS' RECOMMENDATIONS.

d.– EQUIPMENT USED FOR THE APPLICATION OF SLURRY SHALL HAVE A BUILT-IN AGITATION SYSTEM TO SUSPEND AND HOMOGENEOUSLY MIX THE SLURRY. THE SLURRY MIX SHALL BE DYED GREEN. THE EQUIPMENT MUST HAVE A PUMP CAPABLE OF APPLYING SLURRY UNIFORMLY.

NO.43235
EXP 3-31-18

K & S ENGINEERING, INC.
Planning · Engineering · Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:
02.16.2016 SITE DEVELOPMENT SUBMITTAL IR
11.12.2015 COMPLETENESS CHECK IR

DRAWING TITLE:
GRADING SHEET
FIRST FLOOR

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO:	KS 16-020
DATE:	November 08, 2016
DRAWN BY:	NA
SCALE:	1" = 10'
SHEET NO:	C3

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

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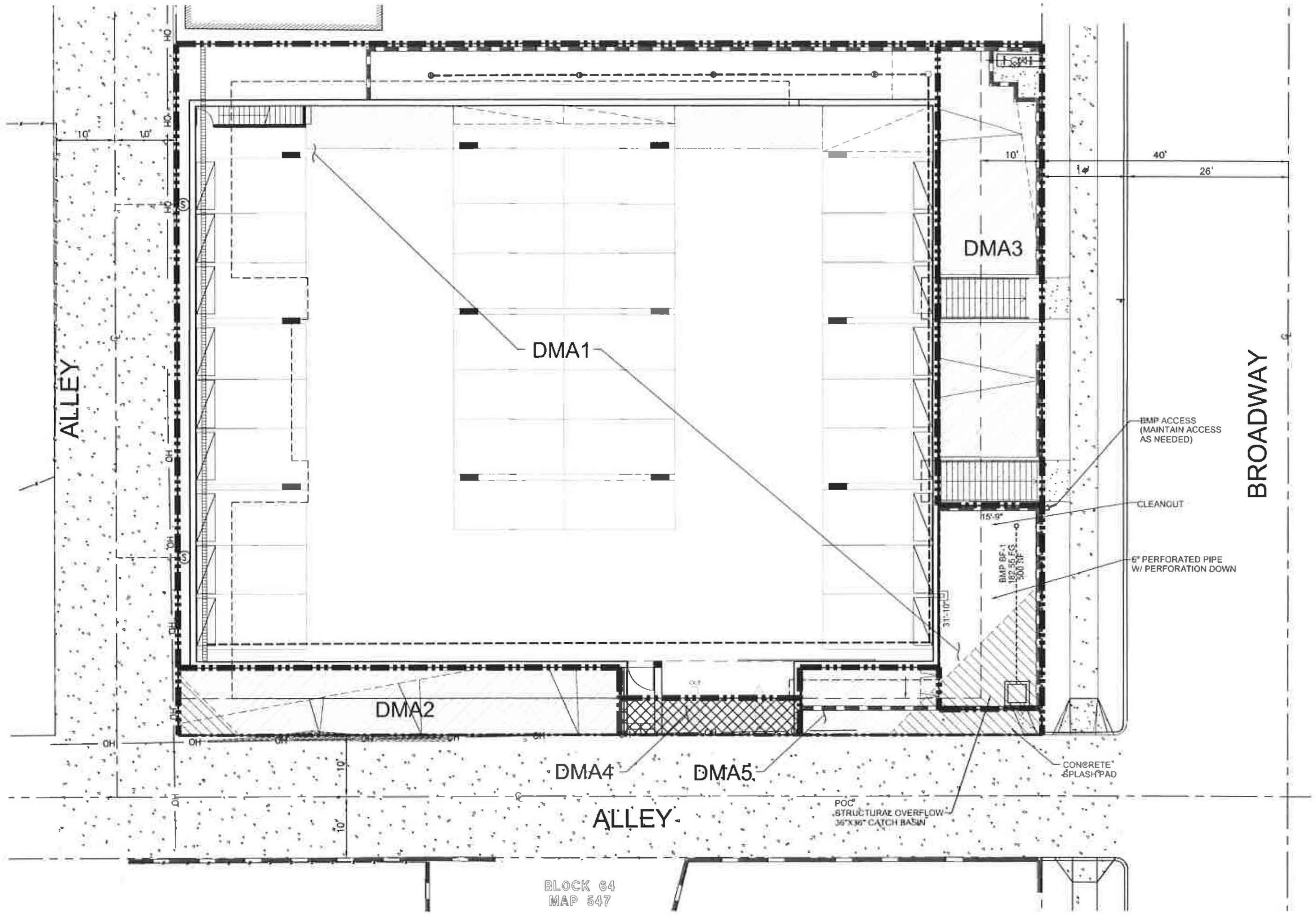
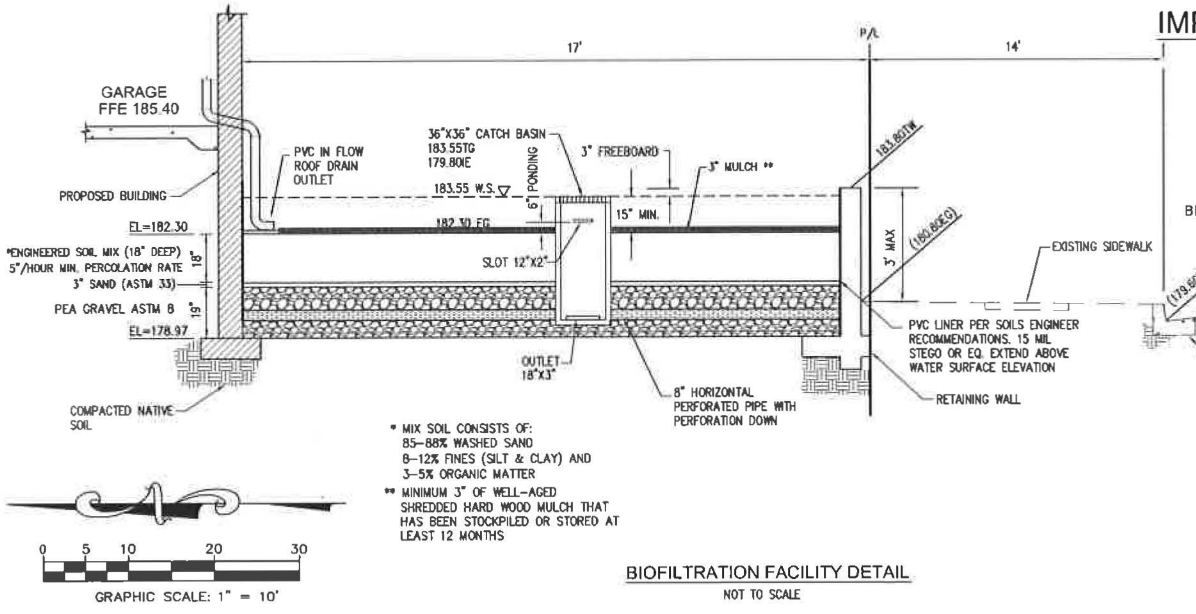




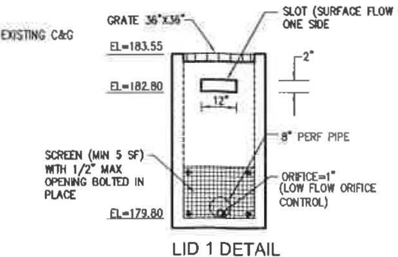
BIOFILTRATION FACILITY DETAIL

NOT TO SCALE

IMP AREA CALCULATION FACILITY (FOR WATER QUALITY ONLY)

BROADWAY

LOW IMPACT DEVELOPMENT DESIGN (LID) SUMMARY TABLE		
DRAINAGE MANAGEMENT AREA (DMA)		BMP
DMA-1	13,292 SF	BIOFILTRATION BF-1
DMA-2	790 SF	SELF-TREATING (PERVIOUS)
DMA-3	1,274 SF	SELF-TREATING (PERVIOUS)
DMA-4	176 SF	DE MINIMIS
DMA-5	320 SF	SELF-TREATING (PERVIOUS)
TOTAL	15,852 SF	



LID 1 DETAIL

NOT TO SCALE

LEGEND:

ITEM	SYMBOL
DRAINAGE MANAGEMENT AREA	▬ ▪ ▪ ▬ ▪ ▪ ▬
ACCESS FOR STRUCTURAL BMP INSPECTION AND MAINTENANCE	➡
BIOFILTRATION (BIORETENTION W/ LINER AND UNDERDRAIN)	▨
DRAINAGE DIRECTION	— — —
DMA1	☐
DMA2	☐
DMA3	☐
DMA4	▩
DMA5	☐

BMP CATEGORY/TYPE

BIOFILTRATION BMP (BF-1) (W/ IMPERMEABLE LINER AND UNDERDRAIN)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR – GOLDEN HILLS BROADWAY
DATE – MARCH 29, 2016
PREPARED BY – K&S ENGINEERING, INC.

MAINTENANCE AGREEMENT DOCUMENT

TBD

OPERATIONS AND MAINTENANCE PLAN

TBD

RESPONSIBLE PARTY INFORMATION

METROPOLITAN/SDPB BROADWAY, LLC
CONTACT NAME: MIKE DONOVAN

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.

2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.

3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.

4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.

5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK).

PLANTING NOTES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN.

GROUNDWATER

THERE IS NO UNDERGROUND WELLS NEAR THE SITE PER WATERBOARDS GAMA GEOTRACKER

WDID NO:

N/A

STORM WATER PRIORITY:

LOW

HOSSEIN ZOHOORI
NO.43235
EXP 3-31-18

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Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REVISION:
02.16.2016 SITE DEVELOPMENT SUBMITTAL IR
11.12.2015 COMPLETENESS CHECK IR

DRAWING TITLE:
BMP SHEET

PROJECT:
PROPOSED MULTI-FAMILY
APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: JN 16-020
DATE: November 08, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: C4

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

ATTACHMENT 5
DRAINAGE REPORT

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

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K&S ENGINEERING, INC.
Planning Engineering Surveying

HYDROLOGY STUDY

For

Proposed Multi-Family Apartments
2828-2834 Broadway San Diego, CA 92102

Project Address

2828-2834 Broadway San Diego, CA 92102
City of San Diego
P.T.S.#456328

REGISTERED PROFESSIONAL ENGINEER
HOSSEIN ZOMORRODI
No. 43235
Exp. 3-31-18
CIVIL
STATE OF CALIFORNIA

JN 16-020
Nov 9, 2016

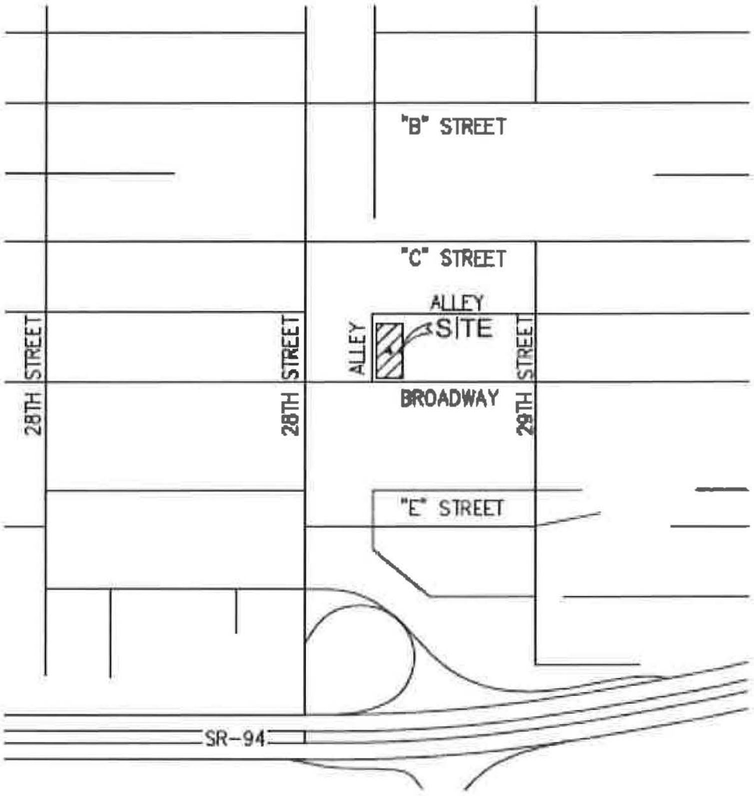
Hossein Zomorrodi RCE 43235

11/10/16
Date

7801 Mission Center Court, Suite 100 . San Diego, California 92108 . (619)296-5565 . Fax (619)296-5564

TABLE OF CONTENTS

2. VICINITY MAP



VICINITY MAP

NOT TO SCALE
THOMAS PAGE 1289, GRID E-3

3. HYDROLOGY DESIGN MODELS

A. *DESIGN METHODS*

THE RATIONAL METHOD IS USED IN THIS HYDROLOGY STUDY; THE RATIONAL FORMULA IS AS FOLLOWS:

Q = CIA, WHERE : Q= PEAK DISCHARGE IN CUBIC FEET/SECOND *

C = RUNOFF COEFFICIENT (DIMENSIONLESS)

I = RAINFALL INTENSITY IN INCHES/HOUR

A = TRIBUTARY DRAINAGE AREA IN ACRES

*1 ACRE INCHES/HOUR = 1.008 CUBIC FEET/SEC

THE OVERLAND METHOD IS ALSO USED IN THIS HYDROLOGY STUDY;
THE URBAN AREAS OVERLAND FORMULA IS AS FOLLOWS:

$$T=[1.8(1.1-C)(L)^{(.5)})]/[S(100)]^{.333}$$

L = LENGTH OF WATERSHED

C = COEFFICIENT OF RUNOFF

T = TIME IN MINUTES

S = DIFFERENCE IN ELEVATION DIVIDED BY DE LENGTH OF WATERSHED

B. *DESIGN CRITERIA*

- FREQUENCY 50 & 100 YEAR STORM.

- LAND USE PER SPECIFIC PLAN AND TENTATIVE MAP.
- RAIN FALL INTENSITY PER CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, APRIL 1984.

C. *REFERENCES*

- CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, APRIL 1984

- CITY OF SAN DIEGO 2006 STANDARD DRAWINGS.

- HAND BOOK OF HYDRAULICS BY BRATER & KING, SIXTH EDITION.

4. RATIONAL METHOD HYDROLOGY CALCULATION

EXISTING CONDITION STUDY
50 & 100 YEAR STORM

EXISTING CONDITION
50YR STORM EVENT
JN 16-020

```
              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5
Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 05/12/16
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
------------------------------------------------------------------------
Program License Serial Number 6303
------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used
Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.610 given for subarea
Initial subarea flow distance  =  182.000(Ft.)
Highest elevation =  201.480(Ft.)
Lowest elevation =  181.100(Ft.)
Elevation difference =   20.380(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6100)*( 182.000^.5)/(11.198^(1/3)]=   5.32
Rainfall intensity (I) =      4.150(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.610
Subarea runoff =       0.911(CFS)
Total initial stream area =         0.360(Ac.)
End of computations, total study area =          0.360 (Ac.)
```

```
             San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5
Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 05/12/16
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
------------------------------------------------------------------------
Program License Serial Number 6303
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used
Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.610 given for subarea
Initial subarea flow distance  =  182.000(Ft.)
Highest elevation =  201.480(Ft.)
Lowest elevation =  181.100(Ft.)
Elevation difference =   20.380(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.6100)*( 182.000^.5)/(11.198^(1/3)]=   5.32
Rainfall intensity (I) =      4.280(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.610
Subarea runoff =      0.940(CFS)
Total initial stream area =       0.360(Ac.)
End of computations, total study area =          0.360 (Ac.)
```

PROPOSED CONDITION STUDY
50 & 100 YEAR STORM

```
            San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 05/12/16
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
------------------------------------------------------------------------
Program License Serial Number 6303
------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used
Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.880 given for subarea
Initial subarea flow distance  =  156.000(Ft.)
Highest elevation =  201.480(Ft.)
Lowest elevation =  183.630(Ft.)
Elevation difference =   17.850(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     2.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8800)*( 156.000^.5)/(  11.442^(1/3)]=   2.19
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =      1.164(CFS)
Total initial stream area =        0.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station       3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =   183.630(Ft.)
Downstream point/station elevation =   182.630(Ft.)
Pipe length  =     6.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.164(CFS)
Given pipe size =      6.00(In.)
Calculated individual pipe flow  =     1.164(CFS)
Normal flow depth in pipe =    3.03(In.)
Flow top width inside pipe =    6.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.71(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     5.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station       4.000
```

```
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   182.630(Ft.)
Downstream point elevation =   182.300(Ft.)
Channel length thru subarea  =    12.000(Ft.)
Channel base width  =    0.000(Ft.)
Slope or 'Z' of left channel bank =  80.000
Slope or 'Z' of right channel bank =  80.000
Estimated mean flow rate at midpoint of channel =      1.182(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      1.182(CFS)
Depth of flow =   0.118(Ft.), Average velocity =   1.066(Ft/s)
Channel flow top width =  18.843(Ft.)
Flow Velocity =    1.07(Ft/s)
Travel time  =    0.19 min.
Time of concentration =    5.20 min.
Critical depth =      0.106(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.880 given for subarea
Rainfall intensity =      4.193(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.037(CFS) for    0.010(Ac.)
Total runoff =      1.200(CFS)   Total area =       0.32(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.880 given for subarea
Time of concentration =     5.20 min.
Rainfall intensity =      4.193(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.111(CFS) for    0.030(Ac.)
Total runoff =      1.311(CFS)   Total area =       0.35(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.880 given for subarea
Time of concentration =     5.20 min.
Rainfall intensity =      4.193(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.037(CFS) for    0.010(Ac.)
Total runoff =      1.348(CFS)   Total area =       0.36(Ac.)
End of computations, total study area =         0.360 (Ac.)
```

```
              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5
Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study       Date: 05/12/16
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
----------------------------------------------------------------------
Program License Serial Number 6303
----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used
Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.880 given for subarea
Initial subarea flow distance  =  156.000(Ft.)
Highest elevation =  201.480(Ft.)
Lowest elevation =  183.630(Ft.)
Elevation difference =   17.850(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     2.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8800)*( 156.000^.5)/(  11.442^(1/3)]=   2.19
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =      1.197(CFS)
Total initial stream area =        0.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =   183.630(Ft.)
Downstream point/station elevation =   182.630(Ft.)
Pipe length  =     6.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.197(CFS)
Given pipe size =      6.00(In.)
Calculated individual pipe flow  =     1.197(CFS)
Normal flow depth in pipe =    3.08(In.)
Flow top width inside pipe =    6.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.79(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     5.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

```
________________________________________________________________________
Upstream point elevation =   182.630(Ft.)
Downstream point elevation =   182.300(Ft.)
Channel length thru subarea  =    12.000(Ft.)
Channel base width  =    0.000(Ft.)
Slope or 'Z' of left channel bank =  80.000
Slope or 'Z' of right channel bank =  80.000
Estimated mean flow rate at midpoint of channel =      1.217(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      1.217(CFS)
Depth of flow =   0.119(Ft.), Average velocity =   1.073(Ft/s)
Channel flow top width =   19.046(Ft.)
Flow Velocity =    1.07(Ft/s)
Travel time  =   0.19 min.
Time of concentration =    5.19 min.
Critical depth =      0.107(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.880 given for subarea
Rainfall intensity =      4.321(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.038(CFS) for    0.010(Ac.)
Total runoff =      1.235(CFS)   Total area =        0.32(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.880 given for subarea
Time of concentration =     5.19 min.
Rainfall intensity =      4.321(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.114(CFS) for    0.030(Ac.)
Total runoff =      1.349(CFS)   Total area =        0.35(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.880 given for subarea
Time of concentration =     5.19 min.
Rainfall intensity =      4.321(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.880
Subarea runoff =      0.038(CFS) for    0.010(Ac.)
Total runoff =      1.387(CFS)   Total area =        0.36(Ac.)
End of computations, total study area =         0.360 (Ac.)
```

WEIGHTED RUNOFF COEFFICIENT EXISTING CONDITION

$$C_W = \frac{A_I C_I + A_P C_P}{A_T}$$

$$C_W = \frac{(6,350)\ (1)\ +(9,502)\ (0.35)}{15,852} \qquad C_W = 0.61$$

WEIGHTED RUNOFF COEFFICIENT PROPOSED CONDITION

$$C_W = \frac{A_I C_I + A_P C_P}{A_T}$$

$$C_W = \frac{(13,006)\ (1)\ +(2,846)\ (0.35)}{15,852} \qquad C_W = 0.88$$

5. 100 YEAR ROUTING ANALYSIS

R·E·C

100-YEAR ROUTING ANALYSIS

For

2828 BROADWAY
SAN DIEGO, CA

Prepared For:

The Greenwald Company

May, 2016

REC Consultants
2442 Second Avenue
San Diego, CA 92101

Telephone: (619) 232-9200

Prepared by:

Luis Parra, PhD, CPSWQ, ToR, D.WRE.

R.C.E. 66377

REGISTERED PROFESSIONAL ENGINEER
LUIS A PARRA-ROSALES
No. 66377
Exp. 6-30-2016
CIVIL
STATE OF CALIFORNIA

TABLE OF CONTENTS

CHAPTER 1 - EXECUTIVE SUMMARY

1.1 - Introduction

The 2828 Broadway project site is located adjacent to Broadway near the intersection with 28th Street within the City of San Diego, California.

The project site drains to one (1) Point of Compliance (POC-1) located at Broadway to the southwest of the project site.

Per the drainage study – "*Drainage Study for 2828 Broadway*" by K&S Engineering, dated May 2016, Modified Rational Method hydrologic analysis has been undertaken for the project site.

This study performs a modified-puls detention routing analysis using developed condition 100-year peak flowrates from the development to the single POC using peak flow hydrology determined within the aforementioned drainage study.

Treatment of storm water runoff from the site has been addressed in a separate report - the "Storm Water Quality Management Plan for 2828 Broadway" by K&S Engineering. Hydromodification (HMP) analysis has been presented within the "Technical Memorandum: SWMM Modeling for 2828 Broadway", dated May, 2016 by REC.

Per City of San Diego drainage criteria, the Modified Rational Method should be used to determine peak design flowrates when the contributing drainage area is less than 1.0 square mile.

Methodology used for the computation of hydrographs is consistent with criteria set forth in the "2003 County of San Diego Drainage Design Manual." A more detailed explanation of methodology used for this analysis is listed in Chapter 2 of this report.

Hydraulic Modified-Puls detention basin routing of the aforementioned modified rational method hydrology was performed using the Army Corps of Engineers HEC-HMS 4.0 software.

1.2 – Summary of Existing Conditions

In current existing conditions, the project site is an existing single family residence that discharges runoff to a single point of compliance located to the south west of the project site to the receiving Broadway.

Per the "Drainage Study for 2828 Broadway" by K&S Engineering, the pre-developed peak flow is provided in Table 1 on the following page.

TABLE 1 – SUMMARY OF EXISTING CONDITIONS 100-YEAR EVENT FLOW

Discharge Location	Drainage Area (Ac)	Runoff Coefficient (C)	Tc (min)	100-Year Peak Flow (cfs)
POC-1	0.36	0.61	5.3	0.94

1.3 – Summary of Developed Conditions

The 2828 Broadway project comprises of a proposed multifamily residential development, including landscaping and associated parking lots.

Storm water runoff from the proposed project site is routed to one (1) POC located at the discharge location to the southwest corner of the project site. Runoff from the developed project site is drained to one (1) onsite receiving biofiltration LID BMP. Once flows are routed via the proposed LID BMP, developed onsite flows are then conveyed to the adjacent Broadway.

A portion of the project site including landscaping areas and a small impervious driveway (176 sq.ft., below the 250 sq.ft. de minimus threshold) bypass the BMP facility and confluence directly at the POC.

Per the "Drainage Study for 2828 Broadway" by K&S Engineering, the post-developed peak flow is provided in Table 2 below:

TABLE 2 – SUMMARY OF DEVELOPED CONDITION 100-YEAR EVENT FLOW

Drainage Location	Drainage Area (Ac)	Runoff Coefficient (C)	Tc (min)	100-Year Peak Flow (cfs)
POC-1	0.36	0.88	5.19	1.39

Prior to discharging from the site, first flush runoff will be treated via a BMP in accordance with standards set forth by the Regional Water Quality Control Board and the City of San Diego's Standards (see "Storm Water Quality Management Plan for 2828 Broadway" by K&S Engineering).

One (1) LID biofiltration basin is located within the southwest corner of the project site and is responsible for handling hydromodification requirements for the project. In developed conditions, the basin will have a surface depth of 1.5 feet and a riser spillway structure (see dimensions in Tables 3 & 4). Flows will then discharge from the basin via the outlet structure or infiltrate through the base of the facilities to the receiving amended soil and low flow orifice. The riser structure will act as a spillway such that peak flows can be safely discharged to the receiving storm drain system.

Beneath the basins' invert lies the proposed LID biofiltration portion of the drainage facility. This portion of the basin is comprised of a 3-inch layer of mulch, an 18-inch layer of amended soil (a highly sandy, organic rich composite with an infiltration capacity of at least 5 inches/hr) and a 6-inch layer of gravel. Due to the type D soils the basin will be lined for geotechnical safety concerns.

TABLE 3 – SUMMARY OF DEVELOPED DUAL PURPOSE BMP

BMP	DIMENSIONS					
	BMP Area(1), (ft²)	Low Flow Orifice (in)	Gravel Depth (in)	Depth Riser Invert (ft)(2)	Weir Perimeter Length(3) (ft)	Total Surface Depth(4) (ft)
BMP-1	500	0.6875	6	1.25-ft	12-ft	1.5-ft

Notes:
(1): Area of amended soil = area of gravel = area of the BMP
(2): Depth of ponding beneath riser structure's surface spillway.
(3): Overflow length, the internal perimeter of the riser is 12 ft (3 ft x 3 ft internal dimensions).
(4): Total surface depth of BMP from top crest elevation to surface invert.

TABLE 4 – SUMMARY OF RISER DETAILS

BMP	Lower Slot			Top Riser	
	Width (ft)	Height (ft)	Elevation(1) (ft)	Length(2) (ft)	Elev.(1) (ft)
BMP 1	1.0	0.167	0.5	12	1.25

Notes:
(1): Basin ground surface elevation assumed to be 0.00 ft elevation.
(2): Overflow length is the internal perimeter of the riser structure.

Per the K&S Drainage Study, the detention basin receives the following peak inflow as detailed in Table 5.

TABLE 5 – SUMMARY OF DETENTION BASIN INFLOW

Drainage Area	Drainage Area (Ac)	Runoff Coefficient (C)	Tc (min)	100-Year Peak Flow (cfs)
Basin Tributary	0.31	0.88	5.19	1.23

The developed condition peak flows calculated using modified rational method was then routed through the detention facility on the project site in HEC-HMS. The HMS Modified-Puls results are summarized in Table 6.

TABLE 6 – SUMMARY OF DETENTION BASIN ROUTING

Detention Basin	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)	Tc (min)	Peak Water Surface Elevation (ft)[1]
BMP-1	1.23	0.7	8	3.2

(1) : Biofiltration layer included as part of basin depth – volume reduced by voids accordingly

Input hydrographs for the HMS analysis were generated using the method set forth in the *"2003 County of San Diego Drainage Design Manual"* and are provided in Chapter 3 of this report.

Rational method hydrographs, stage-storage, stage-discharge relationships and HEC-HMS model output is provided in Chapter 3 of this report.

1.4 - Summary of Results

Table 7 below summarizes developed and existing condition drainage areas and resultant 100-year peak flow rates at the POC discharge location from the 2828 Broadway site.

TABLE 7 – SUMMARY OF PEAK FLOWS

Discharge Location	Drainage Area (Ac)	100 Year Peak Discharge (cfs)
POC-1		
-Existing Condition	0.36	0.94
-Developed Condition	0.36	0.86[1]
Difference	**0.0**	**-0.08**

(1) : As a conservative calculation, the peak flows have been directly added (0.7 cfs Basin outflows + 0.16 cfs bypass = 0.86 cfs total). Confluenced peak flows will be less than this value such that the "worst case" scenario presented by direct addition still is below existing conditions peak flow.

As shown in the above table, the development of the proposed 2828 Broadway project site will not increase peak when compared to the existing condition.

All developed runoff will receive water quality treatment in accordance with the site specific SWQMP. Additionally, the POC is HMP compliant as analyzed in the Hydromodification Technical Memo.

1.5 - References

City of San Diego Drainage Design Manual, April 1984

County of San Diego Design Hydrology Manual, June 2003

"Storm Water Quality Management Plan for 2828 Broadway", K&S Engineering, May, 2016.

"Technical Memorandum: SWMM Modeling for 2828 Broadway", REC Consultants, May, 2016.

"Drainage Study for 2828 Broadway", K&S Engineering, May, 2016.

CHAPTER 2

METHODOLOGY

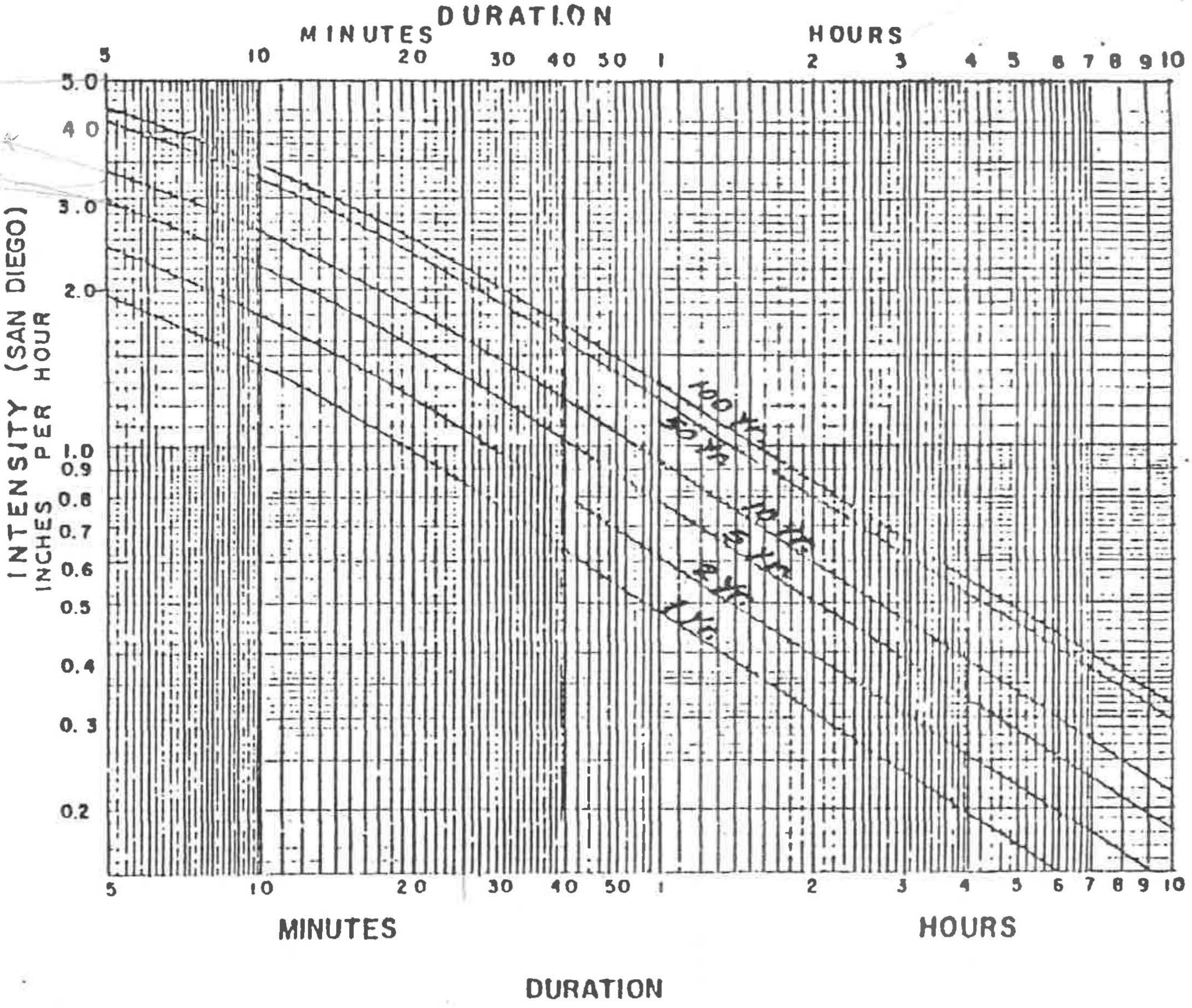
2.1 – City of San Diego Intensity Duration Frequency Curve

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

APPENDIX I-

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.



CHAPTER 2

METHODOLOGY

2.2 – Hydrograph Development Summary (from San Diego County Hydrology Manual)

SECTION 6
RATIONAL METHOD HYDROGRAPH PROCEDURE

6.1 INTRODUCTION

The procedures in this section are for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size. The RM, discussed in Section 3, is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. However, in some instances such as for design of detention basins, the peak runoff rate is insufficient information for the design, and a hydrograph is needed. Unlike the NRCS hydrologic method (discussed in Section 4), the RM itself does not create hydrographs. The procedures for detention basin design based on RM study results were first developed as part of the East Otay Mesa Drainage Study. Rick Engineering Company performed this study under the direction of County Flood Control. The procedures in this section may be used for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size.

6.2 HYDROGRAPH DEVELOPMENT

The concept of this hydrograph procedure is based on the RM formula:

$$Q = C\,I\,A$$

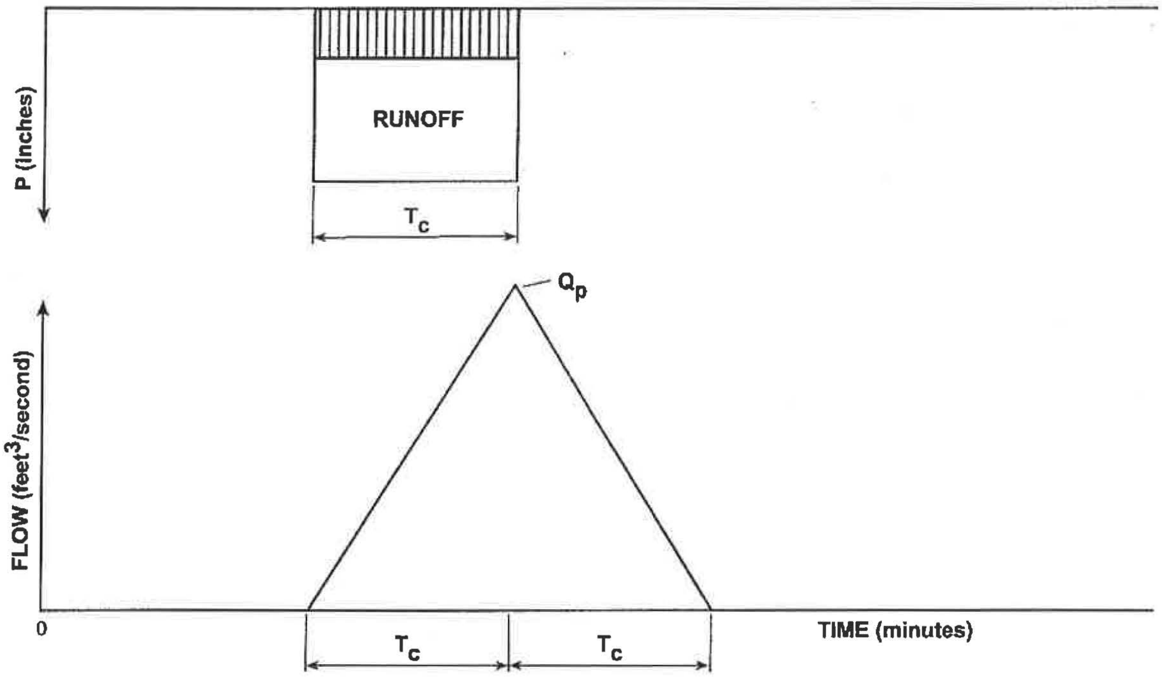
Where:
Q = peak discharge, in cubic feet per second (cfs)
C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour
A = drainage area contributing to the design location, in acres

The RM formula is discussed in more detail in Section 3.

An assumption of the RM is that discharge increases linearly over the T_c for the drainage area until reaching the peak discharge as defined by the RM formula, and then decreases linearly. A linear hydrograph can be developed for the peak flow occurring over the T_c as shown in Figure 6-1. However, for designs that are dependent on the total storm volume, it is not sufficient to consider a single hydrograph for peak flow occurring over the T_c at the beginning of a 6-hour storm event because the hydrograph does not account for the entire volume of runoff from the storm event. The volume under the hydrograph shown in Figure 6-1 is equal to the rainfall intensity multiplied by the duration for which that intensity occurs (T_c), the drainage area (A) contributing to the design location, and the runoff coefficient (C) for the drainage area. For designs that are dependent on the total storm volume, a hydrograph must be generated to account for the entire volume of runoff from the 6-hour storm event. The hydrograph for the entire 6-hour storm event is generated by creating a rainfall distribution consisting of blocks of rain, creating an incremental hydrograph for each block of rain, and adding the hydrographs from each block of rain. This process creates a hydrograph that contains runoff from all the blocks of rain and accounts for the entire volume of runoff from the 6-hour storm event. The total volume under the resulting hydrograph is equal to the following equation:

$$VOL = CP_6A \qquad \text{(Eq. 6-1)}$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)



Triangular Hydrograph

FIGURE

6-1

6.2.1 Rainfall Distribution

Figure 6-2 shows a 6-hour rainfall distribution consisting of blocks of rain over increments of time equal to T_c. The number of blocks is determined by rounding T_c to the nearest whole number of minutes, dividing 360 minutes (6 hours) by T_c, and rounding again to the nearest whole number. The blocks are distributed using a (2/3, 1/3) distribution in which the peak rainfall block is placed at the 4-hour time within the 6-hour rainfall duration. The additional blocks are distributed in a sequence alternating two blocks to the left and one block to the right of the 4-hour time (see Figure 6-2). The total amount of rainfall ($P_{T(N)}$) for any given block (N) is determined as follows:

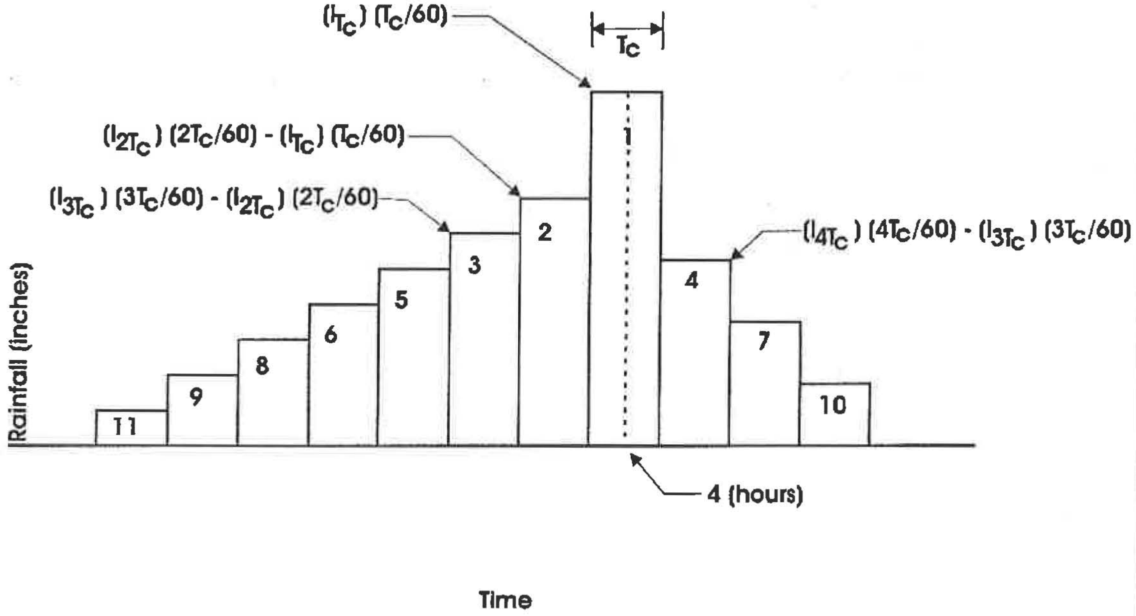
$$P_{T(N)} = (I_{T(N)}\ T_{T(N)}) / 60$$

Where: $P_{T(N)}$ = total amount of rainfall for any given block (N)
$I_{T(N)}$ = average rainfall intensity for a duration equal to $T_{T(N)}$ in inches per hour
$T_{T(N)}$ = NT_c in minutes (N is an integer representing the given block number of rainfall)

Intensity is calculated using the following equation (described in detail in Section 3):

$$I = 7.44\ P_6\ D^{-0.645}$$

Where: I = average rainfall intensity for a duration equal to D in inches per hour
P_6 = adjusted 6-hour storm rainfall
D = duration in minutes



Rainfall Distribution

FIGURE

6-2

Substituting the equation for I in the equation above for $P_{T(N)}$ and setting the duration (D) equal to $T_{T(N)}$ yields:

$$P_{T(N)} = [(7.44\ P_6/T_{T(N)}{}^{0.645})(T_{T(N)})] / 60$$
$$P_{T(N)} = 0.124\ P_6 T_{T(N)}{}^{0.355}$$

Substituting NT_c for T_T (where N equals the block number of rainfall) in the equation above yields:

$$P_{T(N)} = 0.124\ P_6\ (NT_c)^{0.355} \qquad \text{(Eq. 6-2)}$$

Equation 6-2 represents the total rainfall amount for a rainfall block with a time base equal to $T_{T(N)}$ (NT_c). The actual time base of each rainfall block in the rainfall distribution is T_c, as shown in Figure 6-2. The actual rainfall amount (P_N) for each block of rain is equal to P_T at N ($P_{T(N)}$) minus the previous P_T at N–1 ($P_{T(N-1)}$) at any given multiple of T_c (any NT_c). For example, the rainfall for block 2 is equal to $P_{T(N)}$ at $T_{T(N)} = 2T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 1T_c$, and the rainfall for block 3 equals $P_{T(N)}$ at $T_{T(N)} = 3T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 2T_c$, or P_N can be represented by the following equation:

$$P_N = P_{T(N)} - P_{T(N-1)} \qquad \text{(Eq. 6-3)}$$

For the rainfall distribution, the rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

6.2.2 Construction of Incremental Hydrographs

Figure 6-1 shows the relationship of a single block of rain to a single hydrograph. Figure 6-3 shows the relationship of the rainfall distribution to the overall hydrograph for the storm event. The peak flow amount from each block of rain is determined by the RM formula, $Q = CIA$, where I equals I_N (the actual rainfall intensity for the rainfall block). I_N is determined by dividing P_N by the actual time base of the block, T_c. The following equation shows this relationship:

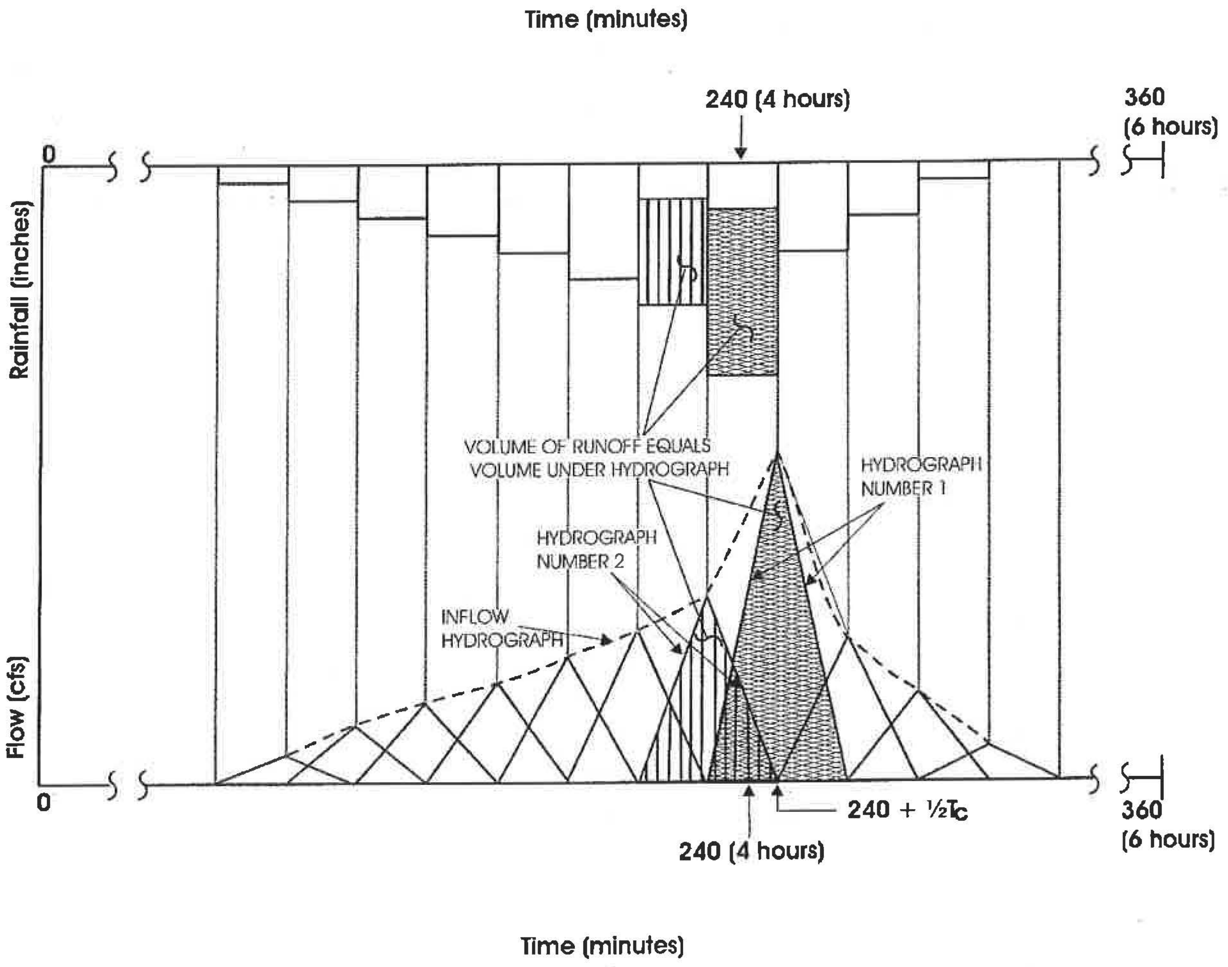
$$I_N = 60\ P_N/T_c \qquad \text{(Eq. 6-4)}$$

Where: I_N = average rainfall intensity for a duration equal to T_c in inches per hour
P_N = rainfall amount for the block in inches
T_c = time of concentration in minutes

By substituting equation 6-4 into the rational equation, the following relationship is obtained:

$$Q_N = 60\ CAP_N/T_c\ \text{(cfs)} \qquad \text{(Eq. 6-5)}$$

Finally, the overall hydrograph for the storm event is determined by adding all the hydrographs from each block of rain. Since the peak flow amount for each incremental hydrograph corresponds to a zero flow amount from the previous and proceeding hydrographs, as shown in Figure 6-3, the inflow hydrograph can be plotted by connecting the peak flow amounts (see the dashed line in Figure 6-3).



6-Hour Rational Method Hydrograph

FIGURE

6-3

6.3 GENERATING A HYDROGRAPH USING RATHYDRO

The rainfall distribution and related hydrographs can be developed using the RATHYDRO computer program provided to the County by Rick Engineering Company. A copy of this program is available at no cost from the County. The output from this computer program may be used with HEC-1 or other software for routing purposes.

The design storm pattern used by the RATHYDRO program is based on the (2/3, 1/3) distribution described in Sections 4.1.1 and 6.2.1. The ordinates on the hydrograph are calculated based on the County of San Diego Intensity-Duration Design Chart (Figure 3-1), which uses the intensity equation described in Sections 3.1.3 and 6.2.1 to relate the intensity (I) of the storm to T_c, $I = 7.44\ P_6 D^{-0.645}$. The computer program uses equations 6-2 and 6-3 described above and calculates I_N directly. The intensity at any given multiple of T_c is calculated by the following equation:

$$I_N = [(I_{T(N)})\ (T_{T(N)}) - (I_{T(N-1)})\ (T_{T(N-1)})] \ / \ T_c \qquad \text{(Eq. 6-6)}$$

Where: N = number of rainfall blocks

$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)

I_N = actual rainfall intensity at rainfall block N in inches per hour

$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour

Figure 6-2 shows the rainfall distribution used in the RM hydrograph, computed at multiples of T_c. The rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

As described in Section 6.2.2, the peak discharge (Q_N) of the hydrograph for any given rainfall block (N) is determined by the RM formula Q = CIA, where $I = I_N$ = the actual rainfall intensity for the rainfall block. The RATHYDRO program substitutes equation 6-6 into the RM formula to determine Q_N yielding the following equation:

$$Q_N = [(I_{T(N)})\,(T_{T(N)}) - (I_{T(N-1)})\,(T_{T(N-1)})]\;CA / T_c \qquad \text{(Eq. 6-7)}$$

Where: Q_N = peak discharge for rainfall block N in cubic feet per second (cfs)
N = number of rainfall blocks
$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)
$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour
C = RM runoff coefficient
A = area of the watershed (acres)

To develop the hydrograph for the 6-hour design storm, a series of triangular hydrographs with ordinates at multiples of the given T_c are created and added to create the hydrograph. This hydrograph has its peak at 4 hours plus ½ of the T_c. The total volume under the hydrograph is equal to the following equation (equation 6-1):

$$VOL = CP_6A$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)

CHAPTER 3

MODIFIED-PULS DETENTION ROUTING

3.1 – Rational Method Hydrographs

DETERMINATION OF 100 YR - 6 HR RUNOFF HYDROGRAPH
2828 BROADWAY - POST-DEV CONDITIONS

time	I (in/hr)	Position	Q (cfs)
0	0	0	0.000
5	0.154	1	0.042
10	0.155	2	0.043
15	0.158	3	0.043
20	0.160	4	0.044
25	0.163	5	0.045
30	0.165	6	0.045
35	0.168	7	0.046
40	0.170	8	0.047
45	0.174	9	0.048
50	0.176	10	0.048
55	0.180	11	0.049
60	0.182	12	0.050
65	0.187	13	0.051
70	0.189	14	0.052
75	0.194	15	0.053
80	0.197	16	0.054
85	0.202	17	0.055
90	0.205	18	0.056
95	0.211	19	0.058
100	0.215	20	0.059
105	0.222	21	0.061
110	0.225	22	0.062
115	0.233	23	0.064
120	0.238	24	0.065
125	0.247	25	0.068
130	0.252	26	0.069
135	0.262	27	0.072
140	0.268	28	0.073
145	0.280	29	0.077
150	0.287	30	0.079
155	0.302	31	0.083
160	0.310	32	0.085
165	0.328	33	0.090
170	0.338	34	0.093
175	0.361	35	0.099
180	0.374	36	0.102
185	0.403	37	0.111
190	0.420	38	0.115
195	0.461	39	0.126
200	0.485	40	0.133
205	0.544	41	0.149

210	0.581	42	0.159
215	0.679	43	0.186
220	0.744	44	0.204
225	0.937	45	0.257
230	1.089	46	0.299
235	1.682	47	0.461
240	2.404	48	0.659
245	**4.440**	**49**	**1.230**
250	1.313	50	0.360
255	0.827	51	0.227
260	0.625	52	0.171
265	0.513	53	0.141
270	0.439	54	0.120
275	0.388	55	0.106
280	0.349	56	0.096
285	0.318	57	0.087
290	0.294	58	0.081
295	0.274	59	0.075
300	0.257	60	0.070
305	0.242	61	0.066
310	0.229	62	0.063
315	0.218	63	0.060
320	0.208	64	0.057
325	0.199	65	0.055
330	0.192	66	0.053
335	0.184	67	0.051
340	0.178	68	0.049
345	0.172	69	0.047
350	0.166	70	0.046
355	0.161	71	0.044
360	0.157	72	0.043

CHAPTER 3

MODIFIED-PULS DETENTION ROUTING

3.2 – Stage-Storage & Stage-Discharge Relationships

BASIN 1 STAGE-STORAGE

	Elev (ft)	Area (ft^2)	Volume (ft^3)	Volume (ac-ft)
	0	200.0	0.00	0.000000
Gravel Layer	0.500	200.0	100.00	0.002296
	0.501	150.0	100.18	0.002300
Soil Layer	2.000	150.0	325.03	0.007462
LID AREA	2.001	500.0	325.35	0.007469
Surface Outlet	2.50	500.0	574.85	0.013197
Bains Top	3.500	500.0	1074.85	0.024675

Volume of Voids reduction factors of 0.4 and 0.3 applied to area for gravel and soil layers respectively

Outlet structure for Discharge of Detention Basin 1

Low orifice:	1 "	Lower slot		Emergency Weir		LID	0.00848 cfs
Number:	0	Invert:	0.00 ft	Invert:	0.750 ft	H	2.5 ft
Cg-low:	0.62	B	1.00 ft	B:	12 ft		
Middle orifice:	1 "	h	0.167 ft				
number of orif:	0	Upper slot					
Cg-middle:	0.62	Invert:	0.00 ft				
invert elev:	0.75 ft	B:	0.00 ft				
		h	0.167 ft				

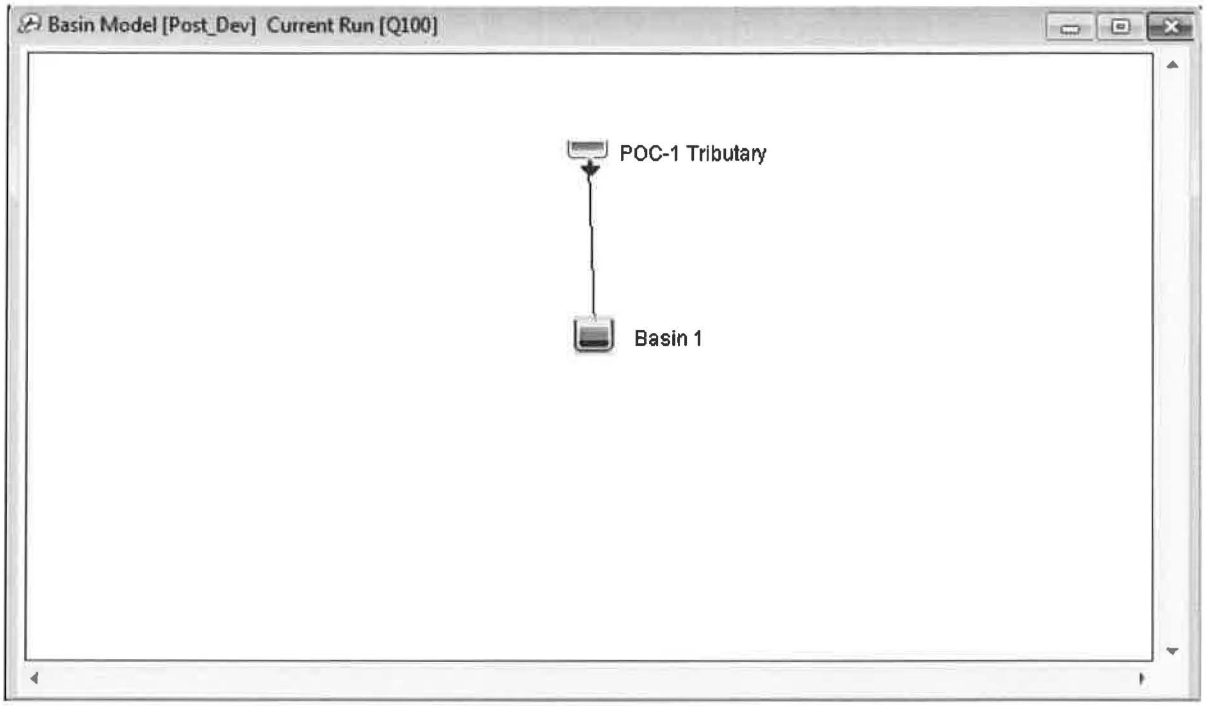
h (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qslot-low (cfs)	Qslot-upp (cfs)	Qemer (cfs)	Qtot (cfs)	Total H (ft)	Total Q (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.500	0.008
0.042	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.000	0.026	2.542	0.035
0.083	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.074	0.000	0.000	0.074	2.583	0.083
0.125	1.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.137	0.000	0.000	0.137	2.625	0.145
0.167	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.211	0.000	0.000	0.211	2.667	0.219
0.208	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288	0.000	0.000	0.288	2.708	0.297
0.250	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.333	2.750	0.341
0.292	3.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.372	0.000	0.000	0.372	2.792	0.381
0.333	4.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.408	0.000	0.000	0.408	2.833	0.416
0.375	4.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.441	0.000	0.000	0.441	2.875	0.449
0.417	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.471	0.000	0.000	0.471	2.917	0.479
0.458	5.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	2.958	0.508
0.500	6.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.527	0.000	0.000	0.527	3.000	0.535
0.542	6.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.552	0.000	0.000	0.552	3.042	0.561
0.583	7.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.577	0.000	0.000	0.577	3.083	0.585
0.625	7.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.600	0.000	0.000	0.600	3.125	0.609
0.667	8.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.623	0.000	0.000	0.623	3.167	0.632
0.708	8.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.645	0.000	0.000	0.645	3.208	0.653
0.750	9.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.666	0.000	0.000	0.666	3.250	0.675
0.792	9.500	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.687	0.000	0.315	1.002	3.292	1.010
0.833	10.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.000	0.893	1.600	3.333	1.608
0.875	10.500	1.500	0.000	0.000	0.000	0.000	0.000	0.000	0.726	0.000	1.642	2.368	3.375	2.376
0.917	11.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.745	0.000	2.529	3.274	3.417	3.282
0.958	11.500	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.763	0.000	3.535	4.298	3.458	4.306
1.000	12.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.781	0.000	4.647	5.428	3.500	5.437

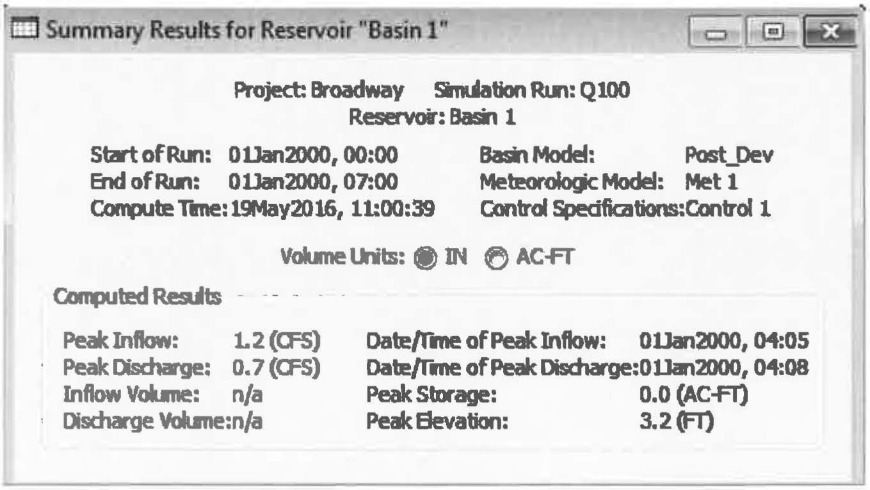
CHAPTER 3

MODIFIED-PULS DETENTION ROUTING

3.3 – HEC-HMS Modified-Puls Routing Results

HEC-HMS MODEL POC-1





Summary Results for Reservoir "Basin 1"

Project: Broadway Simulation Run: Q100
Reservoir: Basin 1

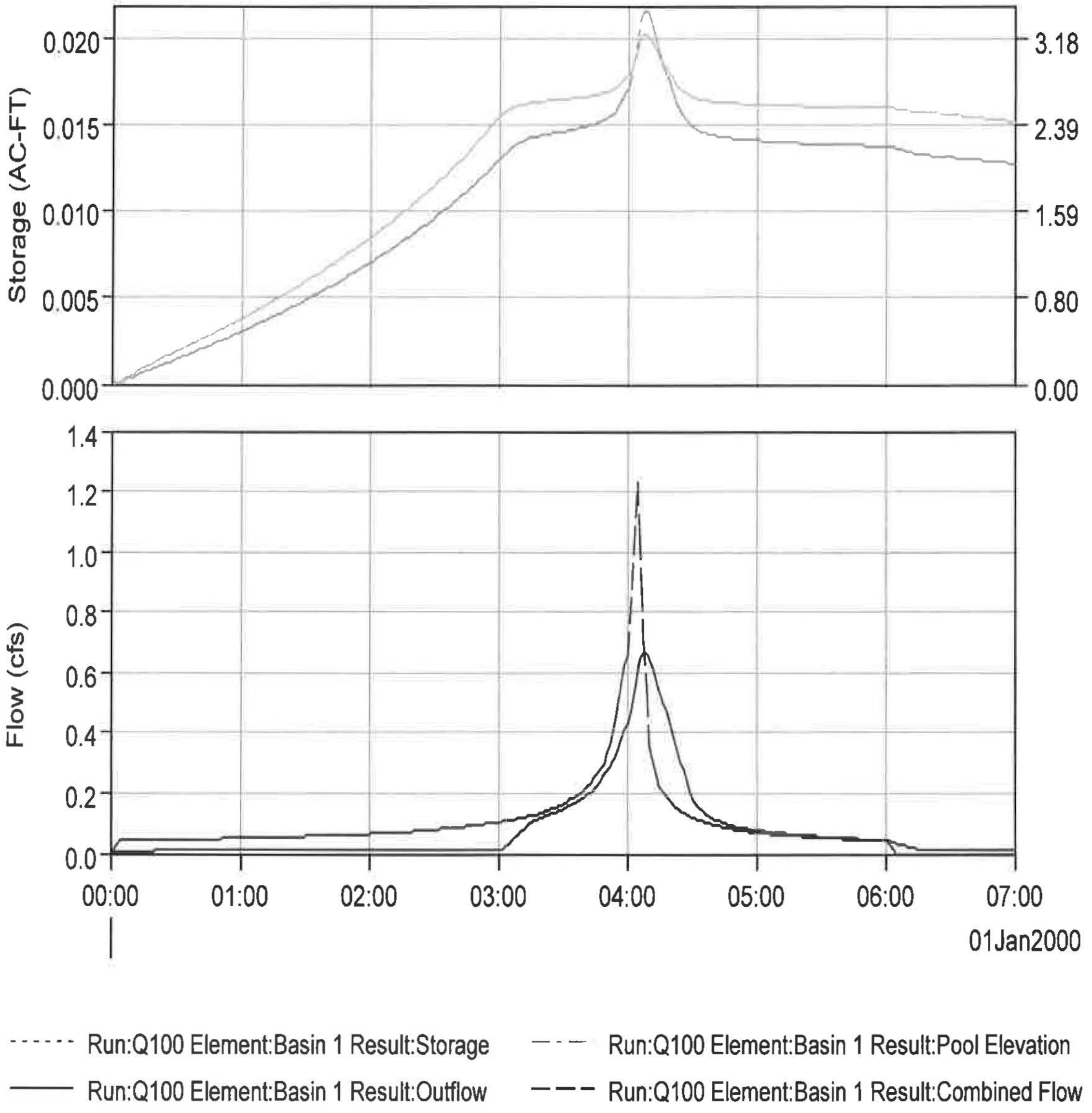
Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 07:00	Meteorologic Model:	Met 1
Compute Time:	19May2016, 11:00:39	Control Specifications:	Control 1

Volume Units: ● IN ○ AC-FT

Computed Results

Peak Inflow:	1.2 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:05
Peak Discharge:	0.7 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:08
Inflow Volume:	n/a	Peak Storage:	0.0 (AC-FT)
Discharge Volume:	n/a	Peak Elevation:	3.2 (FT)

Reservoir "Basin 1" Results for Run "Q100"



Project: Broadway Simulation Run: Q100
Reservoir: Basin 1

Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 07:00
Compute Time: 19May2016, 11:00:39

Basin Model: Post_Dev
Meteorologic Model: Met 1
Control Specifications:Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.0	0.0	0.0	0.0
01Jan2000	00:01	0.0	0.0	0.0	0.0
01Jan2000	00:02	0.0	0.0	0.0	0.0
01Jan2000	00:03	0.0	0.0	0.0	0.0
01Jan2000	00:04	0.0	0.0	0.0	0.0
01Jan2000	00:05	0.0	0.0	0.0	0.0
01Jan2000	00:06	0.0	0.0	0.0	0.0
01Jan2000	00:07	0.0	0.0	0.1	0.0
01Jan2000	00:08	0.0	0.0	0.1	0.0
01Jan2000	00:09	0.0	0.0	0.1	0.0
01Jan2000	00:10	0.0	0.0	0.1	0.0
01Jan2000	00:11	0.0	0.0	0.1	0.0
01Jan2000	00:12	0.0	0.0	0.1	0.0
01Jan2000	00:13	0.0	0.0	0.1	0.0
01Jan2000	00:14	0.0	0.0	0.1	0.0
01Jan2000	00:15	0.0	0.0	0.1	0.0
01Jan2000	00:16	0.0	0.0	0.2	0.0
01Jan2000	00:17	0.0	0.0	0.2	0.0
01Jan2000	00:18	0.0	0.0	0.2	0.0
01Jan2000	00:19	0.0	0.0	0.2	0.0
01Jan2000	00:20	0.0	0.0	0.2	0.0
01Jan2000	00:21	0.0	0.0	0.2	0.0
01Jan2000	00:22	0.0	0.0	0.2	0.0
01Jan2000	00:23	0.0	0.0	0.2	0.0
01Jan2000	00:24	0.0	0.0	0.2	0.0
01Jan2000	00:25	0.0	0.0	0.3	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.0	0.0	0.3	0.0
01Jan2000	00:27	0.0	0.0	0.3	0.0
01Jan2000	00:28	0.0	0.0	0.3	0.0
01Jan2000	00:29	0.0	0.0	0.3	0.0
01Jan2000	00:30	0.0	0.0	0.3	0.0
01Jan2000	00:31	0.0	0.0	0.3	0.0
01Jan2000	00:32	0.0	0.0	0.3	0.0
01Jan2000	00:33	0.0	0.0	0.3	0.0
01Jan2000	00:34	0.0	0.0	0.3	0.0
01Jan2000	00:35	0.0	0.0	0.3	0.0
01Jan2000	00:36	0.0	0.0	0.4	0.0
01Jan2000	00:37	0.0	0.0	0.4	0.0
01Jan2000	00:38	0.0	0.0	0.4	0.0
01Jan2000	00:39	0.0	0.0	0.4	0.0
01Jan2000	00:40	0.0	0.0	0.4	0.0
01Jan2000	00:41	0.0	0.0	0.4	0.0
01Jan2000	00:42	0.0	0.0	0.4	0.0
01Jan2000	00:43	0.0	0.0	0.4	0.0
01Jan2000	00:44	0.0	0.0	0.4	0.0
01Jan2000	00:45	0.0	0.0	0.4	0.0
01Jan2000	00:46	0.0	0.0	0.5	0.0
01Jan2000	00:47	0.0	0.0	0.5	0.0
01Jan2000	00:48	0.0	0.0	0.5	0.0
01Jan2000	00:49	0.0	0.0	0.5	0.0
01Jan2000	00:50	0.0	0.0	0.5	0.0
01Jan2000	00:51	0.0	0.0	0.5	0.0
01Jan2000	00:52	0.0	0.0	0.5	0.0
01Jan2000	00:53	0.0	0.0	0.5	0.0
01Jan2000	00:54	0.0	0.0	0.5	0.0
01Jan2000	00:55	0.0	0.0	0.5	0.0
01Jan2000	00:56	0.0	0.0	0.6	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.0	0.0	0.6	0.0
01Jan2000	00:58	0.0	0.0	0.6	0.0
01Jan2000	00:59	0.0	0.0	0.6	0.0
01Jan2000	01:00	0.0	0.0	0.6	0.0
01Jan2000	01:01	0.0	0.0	0.6	0.0
01Jan2000	01:02	0.0	0.0	0.6	0.0
01Jan2000	01:03	0.1	0.0	0.6	0.0
01Jan2000	01:04	0.1	0.0	0.6	0.0
01Jan2000	01:05	0.1	0.0	0.7	0.0
01Jan2000	01:06	0.1	0.0	0.7	0.0
01Jan2000	01:07	0.1	0.0	0.7	0.0
01Jan2000	01:08	0.1	0.0	0.7	0.0
01Jan2000	01:09	0.1	0.0	0.7	0.0
01Jan2000	01:10	0.1	0.0	0.7	0.0
01Jan2000	01:11	0.1	0.0	0.7	0.0
01Jan2000	01:12	0.1	0.0	0.7	0.0
01Jan2000	01:13	0.1	0.0	0.7	0.0
01Jan2000	01:14	0.1	0.0	0.8	0.0
01Jan2000	01:15	0.1	0.0	0.8	0.0
01Jan2000	01:16	0.1	0.0	0.8	0.0
01Jan2000	01:17	0.1	0.0	0.8	0.0
01Jan2000	01:18	0.1	0.0	0.8	0.0
01Jan2000	01:19	0.1	0.0	0.8	0.0
01Jan2000	01:20	0.1	0.0	0.8	0.0
01Jan2000	01:21	0.1	0.0	0.8	0.0
01Jan2000	01:22	0.1	0.0	0.8	0.0
01Jan2000	01:23	0.1	0.0	0.9	0.0
01Jan2000	01:24	0.1	0.0	0.9	0.0
01Jan2000	01:25	0.1	0.0	0.9	0.0
01Jan2000	01:26	0.1	0.0	0.9	0.0
01Jan2000	01:27	0.1	0.0	0.9	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.1	0.0	0.9	0.0
01Jan2000	01:29	0.1	0.0	0.9	0.0
01Jan2000	01:30	0.1	0.0	0.9	0.0
01Jan2000	01:31	0.1	0.0	1.0	0.0
01Jan2000	01:32	0.1	0.0	1.0	0.0
01Jan2000	01:33	0.1	0.0	1.0	0.0
01Jan2000	01:34	0.1	0.0	1.0	0.0
01Jan2000	01:35	0.1	0.0	1.0	0.0
01Jan2000	01:36	0.1	0.0	1.0	0.0
01Jan2000	01:37	0.1	0.0	1.0	0.0
01Jan2000	01:38	0.1	0.0	1.0	0.0
01Jan2000	01:39	0.1	0.0	1.1	0.0
01Jan2000	01:40	0.1	0.0	1.1	0.0
01Jan2000	01:41	0.1	0.0	1.1	0.0
01Jan2000	01:42	0.1	0.0	1.1	0.0
01Jan2000	01:43	0.1	0.0	1.1	0.0
01Jan2000	01:44	0.1	0.0	1.1	0.0
01Jan2000	01:45	0.1	0.0	1.1	0.0
01Jan2000	01:46	0.1	0.0	1.2	0.0
01Jan2000	01:47	0.1	0.0	1.2	0.0
01Jan2000	01:48	0.1	0.0	1.2	0.0
01Jan2000	01:49	0.1	0.0	1.2	0.0
01Jan2000	01:50	0.1	0.0	1.2	0.0
01Jan2000	01:51	0.1	0.0	1.2	0.0
01Jan2000	01:52	0.1	0.0	1.2	0.0
01Jan2000	01:53	0.1	0.0	1.2	0.0
01Jan2000	01:54	0.1	0.0	1.3	0.0
01Jan2000	01:55	0.1	0.0	1.3	0.0
01Jan2000	01:56	0.1	0.0	1.3	0.0
01Jan2000	01:57	0.1	0.0	1.3	0.0
01Jan2000	01:58	0.1	0.0	1.3	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.1	0.0	1.3	0.0
01Jan2000	02:00	0.1	0.0	1.3	0.0
01Jan2000	02:01	0.1	0.0	1.4	0.0
01Jan2000	02:02	0.1	0.0	1.4	0.0
01Jan2000	02:03	0.1	0.0	1.4	0.0
01Jan2000	02:04	0.1	0.0	1.4	0.0
01Jan2000	02:05	0.1	0.0	1.4	0.0
01Jan2000	02:06	0.1	0.0	1.4	0.0
01Jan2000	02:07	0.1	0.0	1.5	0.0
01Jan2000	02:08	0.1	0.0	1.5	0.0
01Jan2000	02:09	0.1	0.0	1.5	0.0
01Jan2000	02:10	0.1	0.0	1.5	0.0
01Jan2000	02:11	0.1	0.0	1.5	0.0
01Jan2000	02:12	0.1	0.0	1.5	0.0
01Jan2000	02:13	0.1	0.0	1.5	0.0
01Jan2000	02:14	0.1	0.0	1.6	0.0
01Jan2000	02:15	0.1	0.0	1.6	0.0
01Jan2000	02:16	0.1	0.0	1.6	0.0
01Jan2000	02:17	0.1	0.0	1.6	0.0
01Jan2000	02:18	0.1	0.0	1.6	0.0
01Jan2000	02:19	0.1	0.0	1.6	0.0
01Jan2000	02:20	0.1	0.0	1.7	0.0
01Jan2000	02:21	0.1	0.0	1.7	0.0
01Jan2000	02:22	0.1	0.0	1.7	0.0
01Jan2000	02:23	0.1	0.0	1.7	0.0
01Jan2000	02:24	0.1	0.0	1.7	0.0
01Jan2000	02:25	0.1	0.0	1.7	0.0
01Jan2000	02:26	0.1	0.0	1.8	0.0
01Jan2000	02:27	0.1	0.0	1.8	0.0
01Jan2000	02:28	0.1	0.0	1.8	0.0
01Jan2000	02:29	0.1	0.0	1.8	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.1	0.0	1.8	0.0
01Jan2000	02:31	0.1	0.0	1.9	0.0
01Jan2000	02:32	0.1	0.0	1.9	0.0
01Jan2000	02:33	0.1	0.0	1.9	0.0
01Jan2000	02:34	0.1	0.0	1.9	0.0
01Jan2000	02:35	0.1	0.0	1.9	0.0
01Jan2000	02:36	0.1	0.0	1.9	0.0
01Jan2000	02:37	0.1	0.0	2.0	0.0
01Jan2000	02:38	0.1	0.0	2.0	0.0
01Jan2000	02:39	0.1	0.0	2.0	0.0
01Jan2000	02:40	0.1	0.0	2.0	0.0
01Jan2000	02:41	0.1	0.0	2.0	0.0
01Jan2000	02:42	0.1	0.0	2.1	0.0
01Jan2000	02:43	0.1	0.0	2.1	0.0
01Jan2000	02:44	0.1	0.0	2.1	0.0
01Jan2000	02:45	0.1	0.0	2.1	0.0
01Jan2000	02:46	0.1	0.0	2.1	0.0
01Jan2000	02:47	0.1	0.0	2.2	0.0
01Jan2000	02:48	0.1	0.0	2.2	0.0
01Jan2000	02:49	0.1	0.0	2.2	0.0
01Jan2000	02:50	0.1	0.0	2.2	0.0
01Jan2000	02:51	0.1	0.0	2.3	0.0
01Jan2000	02:52	0.1	0.0	2.3	0.0
01Jan2000	02:53	0.1	0.0	2.3	0.0
01Jan2000	02:54	0.1	0.0	2.3	0.0
01Jan2000	02:55	0.1	0.0	2.3	0.0
01Jan2000	02:56	0.1	0.0	2.4	0.0
01Jan2000	02:57	0.1	0.0	2.4	0.0
01Jan2000	02:58	0.1	0.0	2.4	0.0
01Jan2000	02:59	0.1	0.0	2.4	0.0
01Jan2000	03:00	0.1	0.0	2.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.1	0.0	2.5	0.0
01Jan2000	03:02	0.1	0.0	2.5	0.0
01Jan2000	03:03	0.1	0.0	2.5	0.0
01Jan2000	03:04	0.1	0.0	2.5	0.0
01Jan2000	03:05	0.1	0.0	2.5	0.0
01Jan2000	03:06	0.1	0.0	2.5	0.0
01Jan2000	03:07	0.1	0.0	2.6	0.0
01Jan2000	03:08	0.1	0.0	2.6	0.1
01Jan2000	03:09	0.1	0.0	2.6	0.1
01Jan2000	03:10	0.1	0.0	2.6	0.1
01Jan2000	03:11	0.1	0.0	2.6	0.1
01Jan2000	03:12	0.1	0.0	2.6	0.1
01Jan2000	03:13	0.1	0.0	2.6	0.1
01Jan2000	03:14	0.1	0.0	2.6	0.1
01Jan2000	03:15	0.1	0.0	2.6	0.1
01Jan2000	03:16	0.1	0.0	2.6	0.1
01Jan2000	03:17	0.1	0.0	2.6	0.1
01Jan2000	03:18	0.1	0.0	2.6	0.1
01Jan2000	03:19	0.1	0.0	2.6	0.1
01Jan2000	03:20	0.1	0.0	2.6	0.1
01Jan2000	03:21	0.1	0.0	2.6	0.1
01Jan2000	03:22	0.1	0.0	2.6	0.1
01Jan2000	03:23	0.1	0.0	2.6	0.1
01Jan2000	03:24	0.1	0.0	2.6	0.1
01Jan2000	03:25	0.1	0.0	2.6	0.1
01Jan2000	03:26	0.2	0.0	2.6	0.1
01Jan2000	03:27	0.2	0.0	2.6	0.1
01Jan2000	03:28	0.2	0.0	2.6	0.1
01Jan2000	03:29	0.2	0.0	2.6	0.1
01Jan2000	03:30	0.2	0.0	2.6	0.1
01Jan2000	03:31	0.2	0.0	2.6	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.2	0.0	2.6	0.2
01Jan2000	03:33	0.2	0.0	2.6	0.2
01Jan2000	03:34	0.2	0.0	2.6	0.2
01Jan2000	03:35	0.2	0.0	2.6	0.2
01Jan2000	03:36	0.2	0.0	2.6	0.2
01Jan2000	03:37	0.2	0.0	2.6	0.2
01Jan2000	03:38	0.2	0.0	2.6	0.2
01Jan2000	03:39	0.2	0.0	2.6	0.2
01Jan2000	03:40	0.2	0.0	2.7	0.2
01Jan2000	03:41	0.2	0.0	2.7	0.2
01Jan2000	03:42	0.2	0.0	2.7	0.2
01Jan2000	03:43	0.2	0.0	2.7	0.2
01Jan2000	03:44	0.2	0.0	2.7	0.2
01Jan2000	03:45	0.3	0.0	2.7	0.2
01Jan2000	03:46	0.3	0.0	2.7	0.2
01Jan2000	03:47	0.3	0.0	2.7	0.2
01Jan2000	03:48	0.3	0.0	2.7	0.2
01Jan2000	03:49	0.3	0.0	2.7	0.3
01Jan2000	03:50	0.3	0.0	2.7	0.3
01Jan2000	03:51	0.3	0.0	2.7	0.3
01Jan2000	03:52	0.4	0.0	2.7	0.3
01Jan2000	03:53	0.4	0.0	2.7	0.3
01Jan2000	03:54	0.4	0.0	2.7	0.3
01Jan2000	03:55	0.5	0.0	2.7	0.3
01Jan2000	03:56	0.5	0.0	2.8	0.3
01Jan2000	03:57	0.5	0.0	2.8	0.4
01Jan2000	03:58	0.6	0.0	2.8	0.4
01Jan2000	03:59	0.6	0.0	2.8	0.4
01Jan2000	04:00	0.7	0.0	2.9	0.4
01Jan2000	04:01	0.8	0.0	2.9	0.5
01Jan2000	04:02	0.9	0.0	2.9	0.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	1.0	0.0	3.0	0.5
01Jan2000	04:04	1.1	0.0	3.0	0.6
01Jan2000	04:05	1.2	0.0	3.1	0.6
01Jan2000	04:06	1.1	0.0	3.2	0.6
01Jan2000	04:07	0.9	0.0	3.2	0.7
01Jan2000	04:08	0.7	0.0	3.2	0.7
01Jan2000	04:09	0.5	0.0	3.2	0.7
01Jan2000	04:10	0.4	0.0	3.2	0.6
01Jan2000	04:11	0.3	0.0	3.2	0.6
01Jan2000	04:12	0.3	0.0	3.1	0.6
01Jan2000	04:13	0.3	0.0	3.1	0.6
01Jan2000	04:14	0.3	0.0	3.1	0.6
01Jan2000	04:15	0.2	0.0	3.0	0.5
01Jan2000	04:16	0.2	0.0	3.0	0.5
01Jan2000	04:17	0.2	0.0	2.9	0.5
01Jan2000	04:18	0.2	0.0	2.9	0.5
01Jan2000	04:19	0.2	0.0	2.9	0.4
01Jan2000	04:20	0.2	0.0	2.8	0.4
01Jan2000	04:21	0.2	0.0	2.8	0.4
01Jan2000	04:22	0.2	0.0	2.8	0.4
01Jan2000	04:23	0.2	0.0	2.8	0.4
01Jan2000	04:24	0.1	0.0	2.7	0.3
01Jan2000	04:25	0.1	0.0	2.7	0.3
01Jan2000	04:26	0.1	0.0	2.7	0.3
01Jan2000	04:27	0.1	0.0	2.7	0.3
01Jan2000	04:28	0.1	0.0	2.7	0.2
01Jan2000	04:29	0.1	0.0	2.7	0.2
01Jan2000	04:30	0.1	0.0	2.7	0.2
01Jan2000	04:31	0.1	0.0	2.6	0.2
01Jan2000	04:32	0.1	0.0	2.6	0.2
01Jan2000	04:33	0.1	0.0	2.6	0.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.1	0.0	2.6	0.1
01Jan2000	04:35	0.1	0.0	2.6	0.1
01Jan2000	04:36	0.1	0.0	2.6	0.1
01Jan2000	04:37	0.1	0.0	2.6	0.1
01Jan2000	04:38	0.1	0.0	2.6	0.1
01Jan2000	04:39	0.1	0.0	2.6	0.1
01Jan2000	04:40	0.1	0.0	2.6	0.1
01Jan2000	04:41	0.1	0.0	2.6	0.1
01Jan2000	04:42	0.1	0.0	2.6	0.1
01Jan2000	04:43	0.1	0.0	2.6	0.1
01Jan2000	04:44	0.1	0.0	2.6	0.1
01Jan2000	04:45	0.1	0.0	2.6	0.1
01Jan2000	04:46	0.1	0.0	2.6	0.1
01Jan2000	04:47	0.1	0.0	2.6	0.1
01Jan2000	04:48	0.1	0.0	2.6	0.1
01Jan2000	04:49	0.1	0.0	2.6	0.1
01Jan2000	04:50	0.1	0.0	2.6	0.1
01Jan2000	04:51	0.1	0.0	2.6	0.1
01Jan2000	04:52	0.1	0.0	2.6	0.1
01Jan2000	04:53	0.1	0.0	2.6	0.1
01Jan2000	04:54	0.1	0.0	2.6	0.1
01Jan2000	04:55	0.1	0.0	2.6	0.1
01Jan2000	04:56	0.1	0.0	2.6	0.1
01Jan2000	04:57	0.1	0.0	2.6	0.1
01Jan2000	04:58	0.1	0.0	2.6	0.1
01Jan2000	04:59	0.1	0.0	2.6	0.1
01Jan2000	05:00	0.1	0.0	2.6	0.1
01Jan2000	05:01	0.1	0.0	2.6	0.1
01Jan2000	05:02	0.1	0.0	2.6	0.1
01Jan2000	05:03	0.1	0.0	2.6	0.1
01Jan2000	05:04	0.1	0.0	2.6	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.1	0.0	2.6	0.1
01Jan2000	05:06	0.1	0.0	2.6	0.1
01Jan2000	05:07	0.1	0.0	2.6	0.1
01Jan2000	05:08	0.1	0.0	2.6	0.1
01Jan2000	05:09	0.1	0.0	2.6	0.1
01Jan2000	05:10	0.1	0.0	2.6	0.1
01Jan2000	05:11	0.1	0.0	2.6	0.1
01Jan2000	05:12	0.1	0.0	2.6	0.1
01Jan2000	05:13	0.1	0.0	2.6	0.1
01Jan2000	05:14	0.1	0.0	2.6	0.1
01Jan2000	05:15	0.1	0.0	2.6	0.1
01Jan2000	05:16	0.1	0.0	2.6	0.1
01Jan2000	05:17	0.1	0.0	2.6	0.1
01Jan2000	05:18	0.1	0.0	2.6	0.1
01Jan2000	05:19	0.1	0.0	2.6	0.1
01Jan2000	05:20	0.1	0.0	2.6	0.1
01Jan2000	05:21	0.1	0.0	2.6	0.1
01Jan2000	05:22	0.1	0.0	2.6	0.1
01Jan2000	05:23	0.1	0.0	2.6	0.1
01Jan2000	05:24	0.1	0.0	2.6	0.1
01Jan2000	05:25	0.1	0.0	2.6	0.1
01Jan2000	05:26	0.1	0.0	2.6	0.1
01Jan2000	05:27	0.1	0.0	2.6	0.1
01Jan2000	05:28	0.1	0.0	2.6	0.1
01Jan2000	05:29	0.1	0.0	2.6	0.1
01Jan2000	05:30	0.1	0.0	2.6	0.1
01Jan2000	05:31	0.1	0.0	2.6	0.1
01Jan2000	05:32	0.1	0.0	2.6	0.1
01Jan2000	05:33	0.1	0.0	2.6	0.1
01Jan2000	05:34	0.1	0.0	2.6	0.1
01Jan2000	05:35	0.1	0.0	2.6	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.0	0.0	2.6	0.1
01Jan2000	05:37	0.0	0.0	2.6	0.1
01Jan2000	05:38	0.0	0.0	2.6	0.1
01Jan2000	05:39	0.0	0.0	2.6	0.1
01Jan2000	05:40	0.0	0.0	2.6	0.1
01Jan2000	05:41	0.0	0.0	2.6	0.1
01Jan2000	05:42	0.0	0.0	2.6	0.1
01Jan2000	05:43	0.0	0.0	2.6	0.1
01Jan2000	05:44	0.0	0.0	2.6	0.1
01Jan2000	05:45	0.0	0.0	2.6	0.0
01Jan2000	05:46	0.0	0.0	2.6	0.0
01Jan2000	05:47	0.0	0.0	2.6	0.0
01Jan2000	05:48	0.0	0.0	2.6	0.0
01Jan2000	05:49	0.0	0.0	2.6	0.0
01Jan2000	05:50	0.0	0.0	2.6	0.0
01Jan2000	05:51	0.0	0.0	2.6	0.0
01Jan2000	05:52	0.0	0.0	2.6	0.0
01Jan2000	05:53	0.0	0.0	2.6	0.0
01Jan2000	05:54	0.0	0.0	2.6	0.0
01Jan2000	05:55	0.0	0.0	2.6	0.0
01Jan2000	05:56	0.0	0.0	2.6	0.0
01Jan2000	05:57	0.0	0.0	2.6	0.0
01Jan2000	05:58	0.0	0.0	2.6	0.0
01Jan2000	05:59	0.0	0.0	2.6	0.0
01Jan2000	06:00	0.0	0.0	2.6	0.0
01Jan2000	06:01	0.0	0.0	2.6	0.0
01Jan2000	06:02	0.0	0.0	2.6	0.0
01Jan2000	06:03	0.0	0.0	2.6	0.0
01Jan2000	06:04	0.0	0.0	2.5	0.0
01Jan2000	06:05	0.0	0.0	2.5	0.0
01Jan2000	06:06	0.0	0.0	2.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	06:07	0.0	0.0	2.5	0.0
01Jan2000	06:08	0.0	0.0	2.5	0.0
01Jan2000	06:09	0.0	0.0	2.5	0.0
01Jan2000	06:10	0.0	0.0	2.5	0.0
01Jan2000	06:11	0.0	0.0	2.5	0.0
01Jan2000	06:12	0.0	0.0	2.5	0.0
01Jan2000	06:13	0.0	0.0	2.5	0.0
01Jan2000	06:14	0.0	0.0	2.5	0.0
01Jan2000	06:15	0.0	0.0	2.5	0.0
01Jan2000	06:16	0.0	0.0	2.5	0.0
01Jan2000	06:17	0.0	0.0	2.5	0.0
01Jan2000	06:18	0.0	0.0	2.5	0.0
01Jan2000	06:19	0.0	0.0	2.5	0.0
01Jan2000	06:20	0.0	0.0	2.5	0.0
01Jan2000	06:21	0.0	0.0	2.5	0.0
01Jan2000	06:22	0.0	0.0	2.5	0.0
01Jan2000	06:23	0.0	0.0	2.5	0.0
01Jan2000	06:24	0.0	0.0	2.5	0.0
01Jan2000	06:25	0.0	0.0	2.5	0.0
01Jan2000	06:26	0.0	0.0	2.5	0.0
01Jan2000	06:27	0.0	0.0	2.5	0.0
01Jan2000	06:28	0.0	0.0	2.5	0.0
01Jan2000	06:29	0.0	0.0	2.5	0.0
01Jan2000	06:30	0.0	0.0	2.5	0.0
01Jan2000	06:31	0.0	0.0	2.5	0.0
01Jan2000	06:32	0.0	0.0	2.5	0.0
01Jan2000	06:33	0.0	0.0	2.5	0.0
01Jan2000	06:34	0.0	0.0	2.5	0.0
01Jan2000	06:35	0.0	0.0	2.5	0.0
01Jan2000	06:36	0.0	0.0	2.5	0.0
01Jan2000	06:37	0.0	0.0	2.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	06:38	0.0	0.0	2.5	0.0
01Jan2000	06:39	0.0	0.0	2.5	0.0
01Jan2000	06:40	0.0	0.0	2.5	0.0
01Jan2000	06:41	0.0	0.0	2.5	0.0
01Jan2000	06:42	0.0	0.0	2.5	0.0
01Jan2000	06:43	0.0	0.0	2.5	0.0
01Jan2000	06:44	0.0	0.0	2.5	0.0
01Jan2000	06:45	0.0	0.0	2.5	0.0
01Jan2000	06:46	0.0	0.0	2.5	0.0
01Jan2000	06:47	0.0	0.0	2.5	0.0
01Jan2000	06:48	0.0	0.0	2.4	0.0
01Jan2000	06:49	0.0	0.0	2.4	0.0
01Jan2000	06:50	0.0	0.0	2.4	0.0
01Jan2000	06:51	0.0	0.0	2.4	0.0
01Jan2000	06:52	0.0	0.0	2.4	0.0
01Jan2000	06:53	0.0	0.0	2.4	0.0
01Jan2000	06:54	0.0	0.0	2.4	0.0
01Jan2000	06:55	0.0	0.0	2.4	0.0
01Jan2000	06:56	0.0	0.0	2.4	0.0
01Jan2000	06:57	0.0	0.0	2.4	0.0
01Jan2000	06:58	0.0	0.0	2.4	0.0
01Jan2000	06:59	0.0	0.0	2.4	0.0
01Jan2000	07:00	0.0	0.0	2.4	0.0

Drawdown Calculations for BMP 1

Total Surface Drawdown Time: **6.03** hours
Total Surface Drawdown Time: 362 minutes

Surface Depth (ft)	Volume (cfs)	Q-disch. (cfs)	ΔT (hr)	Total Time (hr)	Total Time (min)
1.50	750	5.444	0.0000	0.0	0
1.42	708	3.288	0.0027	0.0	0
1.33	667	1.614	0.0047	0.0	0
1.25	625	0.679	0.0101	0.0	1
1.17	583	0.636	0.0176	0.0	2
1.08	542	0.589	0.0189	0.1	3
1.00	500	0.539	0.0205	0.1	4
0.92	458	0.484	0.0226	0.1	6
0.83	417	0.420	0.0256	0.1	7
0.75	375	0.346	0.0302	0.2	9
0.67	333	0.223	0.0407	0.2	12
0.58	292	0.087	0.0745	0.3	16
0.50	250	0.013	0.2322	0.5	30
0.42	208	0.013	0.9215	1.4	85
0.33	167	0.013	0.9215	2.3	141
0.25	125	0.013	0.9215	3.3	196
0.17	83	0.013	0.9215	4.2	251
0.08	42	0.013	0.9215	5.1	306
0.00	0	0.013	0.9215	6.0	362

6. TABLES AND CHARTS

Ernest F. Brater and Horace Williams King

HANDBOOK OF HYDRAULICS

For the Solution of Hydraulic Engineering Problems

Table 7-14. Values of K′ for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{8/3} s^{1/2}$$

D = depth of water d = diameter of channel

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00007	.00031	.00074	.00138	.00222	.00328	.00455	.00604	.00775
.1	.00967	.0118	.0142	.0167	.0195	.0225	.0257	.0291	.0327	.0366
.2	.0406	.0448	.0492	.0537	.0585	.0634	.0686	.0738	.0793	.0849
.3	.0907	.0966	.1027	.1089	.1153	.1218	.1284	.1352	.1420	.1490
.4	.1561	.1633	.1705	.1779	.1854	.1929	.2005	.2082	.2160	.2238
.5	.232	.239	.247	.255	.263	.271	.279	.287	.295	.303
.6	.311	.319	.327	.335	.343	.350	.358	.366	.373	.380
.7	.388	.395	.402	.409	.416	.422	.429	.435	.441	.447
.8	.453	.458	.463	.468	.473	.477	.481	.485	.488	.491
.9	.494	.496	.497	.498	.498	.498	.496	.494	.489	.483
1.0	.463									

Average Values of Roughness Coefficient (Manning's n)

Type of Waterway	Roughness Coefficient (n)
1. Closed Conduits (1)	
Steel (not lined)	0.015
Cast Iron	0.015
Aluminum	.021
Corrugated Metal (not lined)	0.024
Corrugated Metal (2) (smooth asphalt quarterlining)	0.021
Corrugated Metal (2) (smooth asphalt half lining)	0.018
Corrugated Metal (smooth asphalt full lining)	0.012
Concrete RCP	0.012
Clay (sewer)	0.013
Asbestos Cement & PVC	0.011
Drain Tile (terra cotta)	0.015
Cast-in-place Pipe	0.015
Reinforced Concrete Box	0.014
2. Open Channels (1)	
a. Unlined	
Clay Loam	0.023
Sand	0.020
b. Revetted	
Gravel	0.030
Rock	0.040
Pipe and Wire	0.025
Sacked Concrete	0.025
c. Lined	
Concrete (poured)	0.014
Air Blown Mortar (3)	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018
d. Vegetated (5)	
Grass lined, maintained	.035
Grass and Weeds	.045
Grass lined with concrete low flow channel	.032
3. Pavement and Gutters (1)	
Concrete	0.015
Bituminous (plant-mixed)	0.016

APPENDIX XVI. A

Type of Waterway	Roughness Coefficient (r)
4. Depressed Medians (10:1 slopes (1)	
Earth (without growth)	0.040
Earth (with growth)	0.050
Gravel	0.055
5. Natural Streams (4)	
a. Minor streams (surface width at flood stage < 100 ft)	
(1) Fairly regular section	
(a) Some grass and weeds, little or no brush	0.030
(b) Dense growth of weeds, depth of flow materially greater than weed height	0.040
(c) Some weeds, light brush on banks	0.040
(d) Some weeds, heavy brush on banks	0.060
(e) For trees within channel with branches submerged at high stage, increase all above values by 0.015	
(2) Irregular section, with pools, slight channel meander Channels (a) to (e) above, increase all values by 0.015	
(3) Mountain streams; no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage	
(a) Bottom, gravel, cobbles and few boulders	0.050
(b) Bottom, cobbles with large boulders	0.060
b. Flood plains (adjacent to natural streams)	
(1) Pasture, no brush	
(a) Short grass	0.030
(b) High grass	0.040
(2) Cultivated areas	
(a) No crop	0.040
(b) Mature row crops	0.040
(c) Mature field crops	0.050
(3) Heavy weeds, scattered brush	0.050
(4) Light brush and trees	0.060
(5) Medium to dense brush	0.090
(6) Dense willows	0.170
(7) Cleared land with tree stumps, 100-150 per acre	0.060
(8) Heavy stand of timber, little undergrowth	
(a) Flood depth below branches	0.110
(b) Flood depth reaches branches	0.140

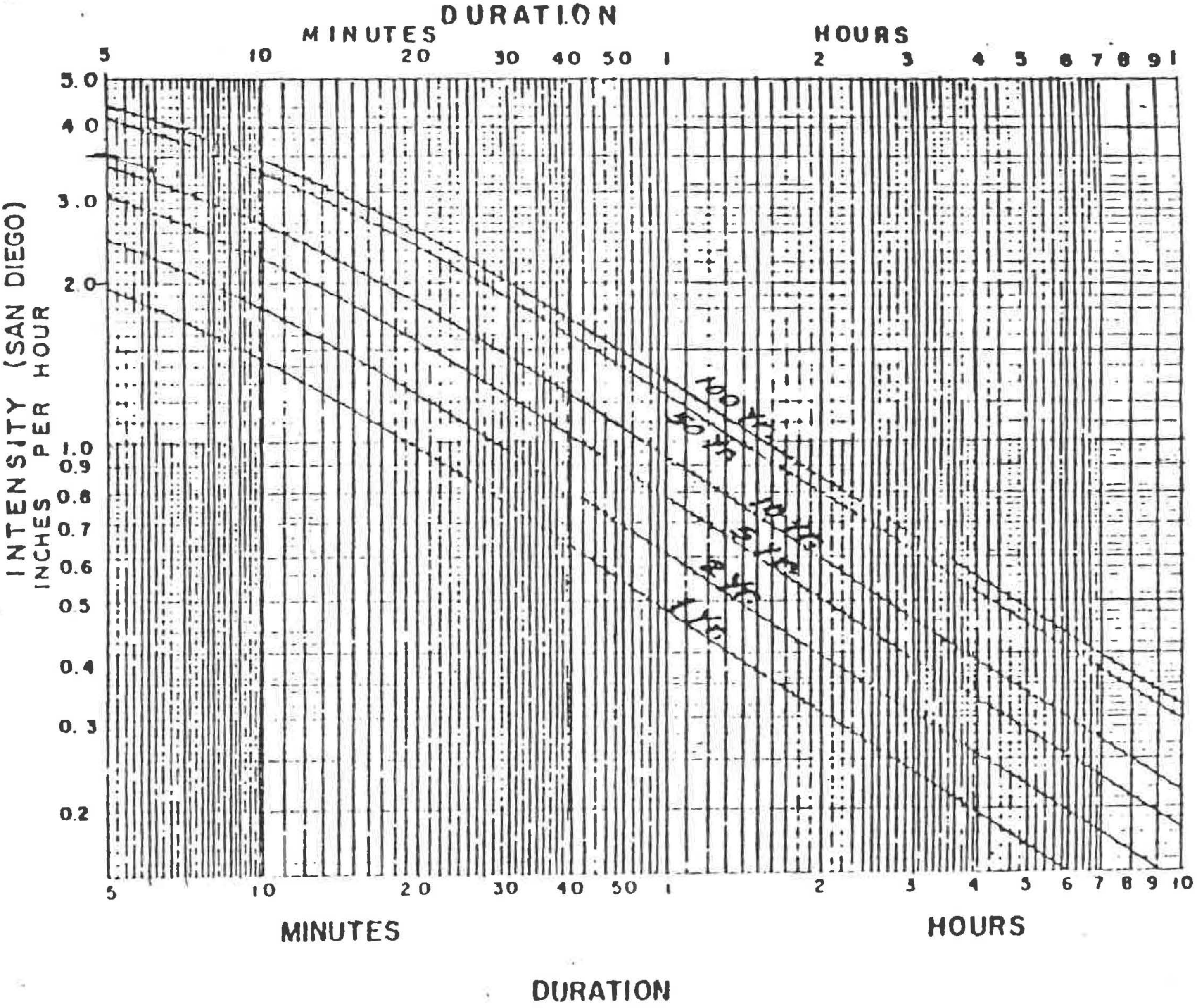
4.4

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

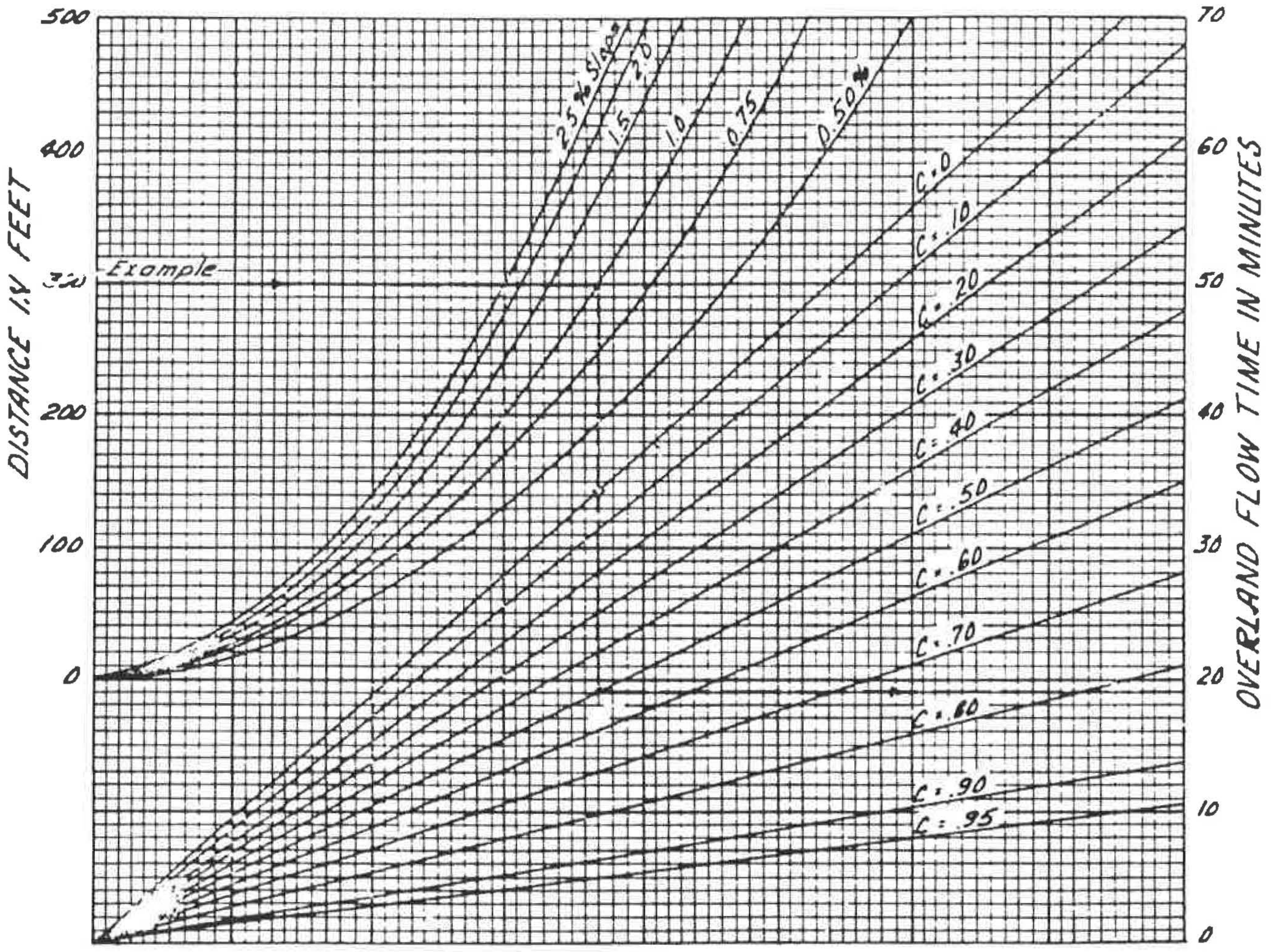
To obtain correct intensity, multiply intensity on chart by factor for design elevation.

RAINFALL
INTENSITY-DURATION-FREQUE
CURVES
for
COUNTY OF SAN DIEGO

APPENDI



URBAN AREAS OVERLAND TIME OF FLOW CURVES



Example:
Given: Length of Flow = 300 ft.
Slope = 1.0 %
Coefficient of Runoff. C = .50
Read: Overland Flowtime = 19 Minutes

SAN DIEGO COUNTY
DEPARTMENT OF SPECIAL DISTRICT SERVICES
DESIGN MANUAL
APPROVED

URBAN AREAS OVERLAND TIME
OF FLOW CURVES

DATE 12/1/69

APPENDIX X-C

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Group (1) A	 B	 C	 D
Residential:				
Single Family	.40	.45	.50	.55
Multi-Units	.45	.50	.60	.70
Mobile homes	.45	.50	.55	.65
Rural (lots greater than 1/2 acre)	.30	.35	.40	.45
Commercial(2) 80% Impervious	.70	.75	.80	.85
Industrial(2) 90% Impervious	.80	.85	.90	.95

NOTES:

(1) Soil Group maps are available at the offices of the Department of Public Works.

(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 group.

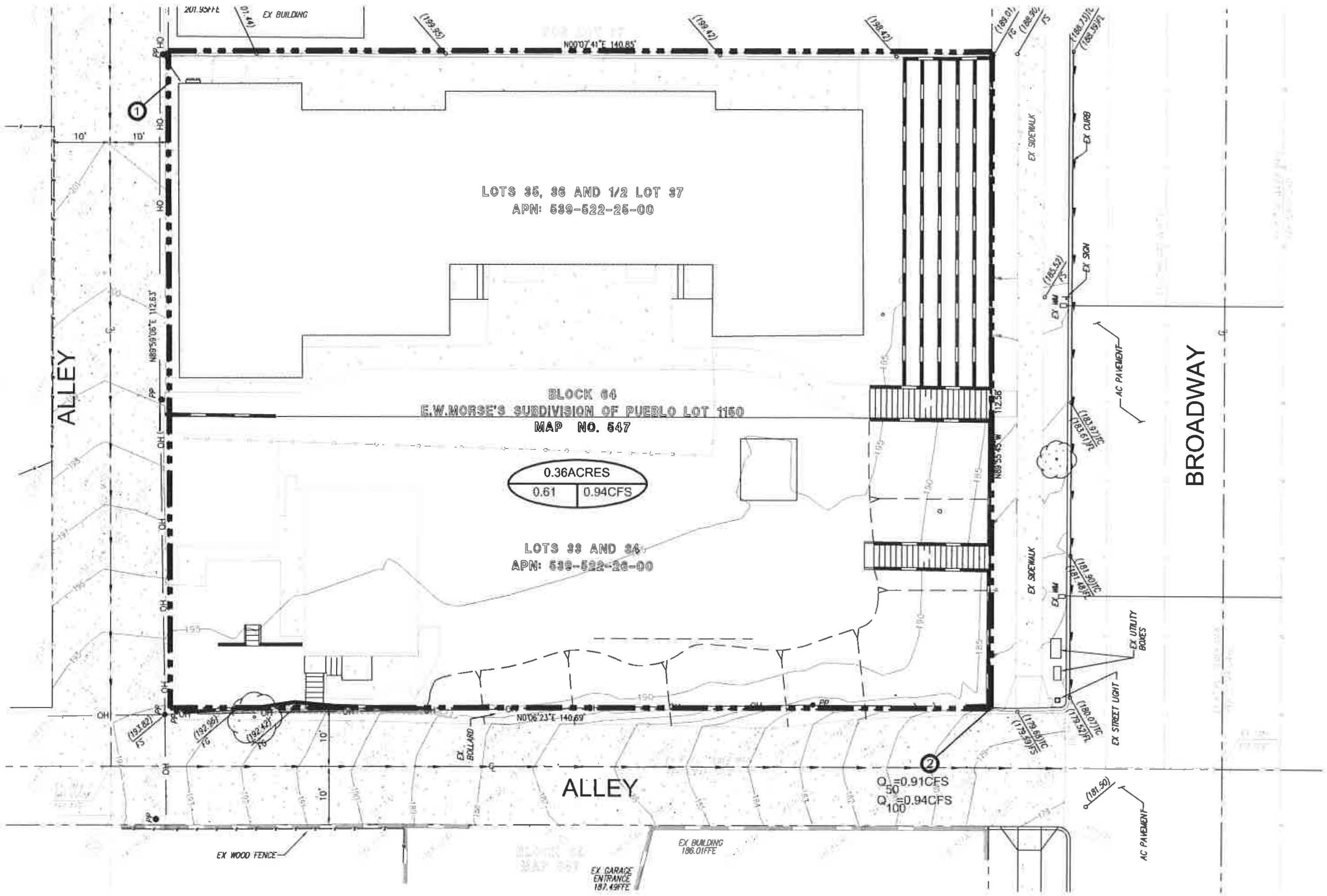
Actual Imperviousness = 50%

Tabulated imperviousness = 80%

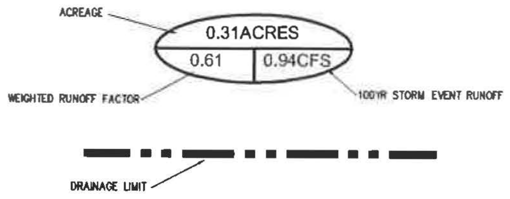
$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

7. HYDROLOGY MAPS

HYDROLOGY PLAN
EXISTING CONDITION

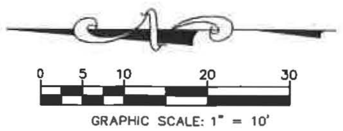


LEGEND



RUNOFF COFFIENT

WEIGHTED RUNOFF COEFFICIENT USED FOR EXISTING AREAS IS "C" = 0.61



GRAPHIC SCALE: 1" = 10'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

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HOSSEIN ZOMORRODI
NO. 43238
EXP 3-31-18
CIVIL

Notes:

All ideas, arrangements, drawings and plans set forth on this sheet are the original work product of owned by and are the property of dbrds and use of this said work product is limited to a specified project of the purchaser, and for the construction of one building. any use, reuse or disclosure of said plans, reproductions, ideas, designs and/or arrangements, other than by dbrcs, is strictly prohibited by law without the written permission of dbrcs. Written dimensions on these drawings shall have precedence over scaled dimensions; contractors shall verify and be responsible for all dimensions and conditions on the job and this office must be notified of any variations from the dimensions and conditions shown these drawings.

PROJECT TEAM

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McCULLOUGH LANDSCAPE ARCHITECTURE

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EMAIL: [illegible]

REVISION:

02.15.2016 SITE DEVELOPMENT SUBMITTAL IR

11.12.2015 COMPLETENESS CHECK IR

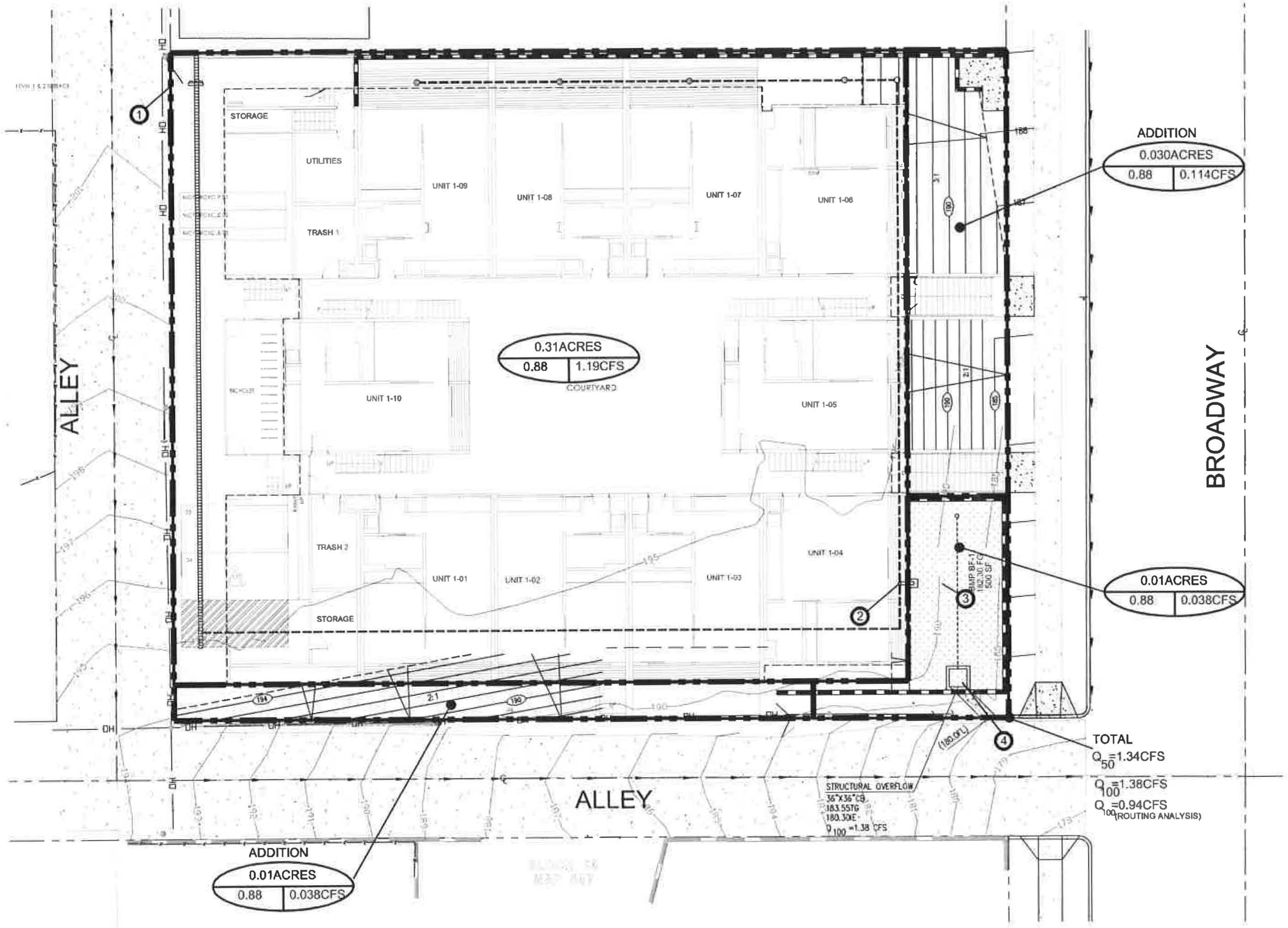
DRAWING TITLE:
HYDROLOGY EXISTING CONDITION

PROJECT:
PROPOSED MULTI-FAMILY APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

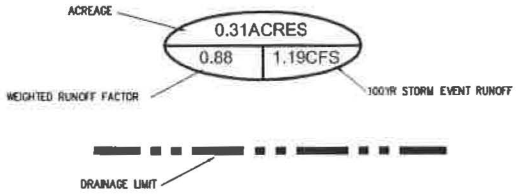
PROJECT NO: -
DATE: June 24, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: CH1

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

HYDROLOGY PLAN
PROPOSED CONDITION



LEGEND



RUNOFF COFFIENT

WEIGHTED RUNOFF COEFFICIENT USED FOR PROPOSED AREAS IS "C" = 0.88

0 5 10 20 30

GRAPHIC SCALE: 1" = 10'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

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NO.43235
EXP 3-31-18

Notes:

All ideas, arrangements, drawings and plans set forth on this sheet are the original work product of owned by and are the property of dbrds and use of this said work product is limited to a specified project of the purchaser, and for the construction of one building, any use, reuse or disclosure of said plans, reproductions ideas, designs and/or arrangements, other than by dbrds, is strictly prohibited by law without the written permission of dbrds. Written dimensions on these drawings shall have precedence over scaled dimensions; contractors shall verify and be responsible for all dimensions and conditions on the job and this office must be notified of any variations from the dimensions and conditions shown these drawings.

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REVISION:

02.16.2016 SITE DEVELOPMENT SUBMITTAL
11.12.2015 COMPLETENESS CHECK

DRAWING TITLE:
HYDROLOGY PROPOSED CONDITION

PROJECT:
PROPOSED MULTI-FAMILY APARTMENTS
2828-2834 BROADWAY
SAN DIEGO, CA 92102

PROJECT NO: -
DATE: JUNE 24, 2016
DRAWN BY: NA
SCALE: 1" = 10'
SHEET NO: CH2

SITE DEVELOPMENT PERMIT SUBMITTAL - 05.30.2016

ATTACHMENT 6
GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

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ALLIED EARTH TECHNOLOGY
7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
PH. (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

ROBERT CHAN, P.E.

April 14, 2016

EA Renovations, Inc.
5841 Mission Gorge Road
San Diego, CA. 92120

Subject : Project No. 16-1268E3
Addendum to Geotechnical Investigation
Proposed Multi-Family Apartment Building Site
2828/2834 Broadway
San Diego, California

Gentlemen :

Reference is made to our Report of Geotechnical Investigation, same Project Number as above, dated March 21, 2016.

In accordance with your request, we have conducted a percolation test in the southwest portion of subject property, more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547 (APN 539-522-25 and 26-00), in the City and County of San Diego, State of California.

A 6-inch diameter boring, approximately 3 feet in depth, was drilled, and percolation test conducted following the guidelines of the San Diego Department of Environmental Health. The soils encountered consist of dense to very dense, cemented, reddish brown silty sands.

Test result indicate a percolation rate of 240 minutes per inch (1/4 inch/hour). Test result indicated that the on-site soils are not suitable for storm water infiltration purposes.

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

ROBERT CHAN
No C-24613
Exp 12/31/17
CIVIL

ROBERT CHAN
No. G-00198
Exp 12/31/17
GEOTECHNICAL

ALLIED EARTH TECHNOLOGY
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ROBERT CHAN, P.E.

GEOTECHNICAL INVESTIGATION

PROPOSED MULTI-FAMILY BUILDING SITE

2828/2834 BROADWAY

SAN DIEGO, CALIFORNIA

FOR

EA RENOVATION, INC.

PROJECT NO. 16-1289E3

MARCH 22, 2016

ALLIED EARTH TECHNOLOGY
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ROBERT CHAN, P.E.

March 21, 2106

EA Renovations, Inc.
5841 Mission Gorge Road
San Diego, CA. 92120

Subject : Project No. 16-1268E3
Geotechnical Investigation
Proposed Multi-Family Apartmentt Building Site
2828/2834 Broadway
San Diego, California

Gentlemen :

In accordance with your request, we have completed the geotechnical investigation for the proposed multi-family building site on subject property, more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547 (APN 539-522-25 and 26-00), in the City and County of San Diego, State of California.

We are pleased to submit the accompanying geotechnical investigation report to present our findings, conclusions and recommendations relative to the proposed development of the site.

The geotechnical investigation was conducted under the supervision of the undersigned. The scope of our investigation included field exploration, laboratory testing and soil engineering analysis.

No major adverse geotechnical conditions were encountered which would prohibit the currently proposed development of the site.

This opportunity to be of service is sincerely appreciated. Should you have any questions, please do not hesitate to contact our office.

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

ROBERT CHAN
No. C-24613
Exp. 12/31/17

ROBERT CHAN
No. G-00198
Exp. 12/31/17

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'nd)

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ROBERT CHAN, P.E.

March 21, 2016

GEOTECHNICAL INVESTIGATION

INTRODUCTION

This report presents the findings and conclusions of a geotechnical investigation conducted at the site of a proposed 34 multi-family apartment building on subject property, located at 2828 and 2834 Broadway, in the City and County of San Diego, State of California.

Subject property is more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547, filed in the Office of the County Recorder of San Diego County on December 30, 1871 (APN 539-522-25, and 26-00).

The location of the property is shown on Figure No. 1, entitled, "Site Location Map".

DESCRIPTION OF PROJECT

It is our understanding that the existing residential structures on the east half of the property are to be demolished to accommodate a 34-unit multi-family apartment building. The proposed structure will be three stories over parking garages; of wood-frame/stucco and slab-on-grade construction.

SCOPE OF WORK

The objectives of the investigation were to inspect and determine the subsurface geotechnical conditions and certain physical engineering properties of the soils beneath the site, and to evaluate any potential adverse geotechnical conditions that could affect the proposed project, in order that engineering recommendations could be presented relative to the safe and economical development of the site; and checking and design of foundation for the proposed structure.

In order to accomplish these objectives, three exploratory trenches were excavated and inspected, and representative samples of the subsurface soils were collected for laboratory testing and analysis.

The data derived from the field observations and laboratory test results were reviewed and analyzed, and a summary of our preliminary findings, opinions and recommendations is presented in this report.

FIELD INVESTIGATION

The field exploratory phase of our investigation was performed on March 3, 2016. and involved a reconnaissance of the site, and the excavation of three exploratory trenches with a tractor-mounted backhoe equipped with a 24-inch bucket.

The exploratory trenches were excavated at accessible locations on the vacant west half of the property (2828 Broadway) where the most useful information relative to subsurface soil conditions may be obtained. The exploratory trenches were excavated to depths varying from 6 to 9 feet below existing ground surface.

The location of the exploratory trenches is shown on Figure No. 2, entitled, "Approximate Location of Exploratory Trenches".

The trenching operation was performed under the direction of our field personnel, and a continuous log of the soil types encountered in the trenches was recorded at the time of excavation, and is shown on Figure Nos. 3 to 5, inclusive, each entitled, "Trench Log Sheet".

The soils were visually and texturally classified by the field identification procedures set forth on the Unified Soil Classification Chart. Representative samples were obtained and the in-situ densities of the soils encountered were determined at various depths in the trenches.

LABORATORY TESTS

The samples collected during our field investigation were subjected to various tests in the laboratory to evaluate their engineering characteristics. The tests were performed in accordance with current A.S.T.M. testing standards or other regulatory agency testing procedures. A summary of the tests that were performed and the final test results are presented in Appendix II hereto.

The tests that were performed included determinations of the maximum dry densities and optimum moisture contents; the sulfate contents and Expansion Indices of the soils encountered.

SITE DESCRIPTION

Subject property is a rectangular-shaped property of 0.36 acres, situated on the north side of Broadway, between 28th and 29th Streets. The property consists of two level building pads at the same elevation as the adjacent alley to the north. Along Broadway, a 10-foot high cut slope ascends up to the building pads. Along the west side the cut slope tapers down in a northerly direction. An apartment complex occupies the adjacent property to the east, at approximately the same elevation as the on-site building pads.

On subject property, an apartment building (2834 Broadway) currently occupies the east half of the site. A small apartment building (2828 Broadway) previously occupy the north end of the west half of the property. At the time of our site investigation, this structure had been demolished, and the debris hauled away off-site. Currently the west half of the property is vacant.

This Golden Hill area of the City of San Diego in which the property is situated is fully developed. The property is bordered on the north and west by alleys; on the south by Broadway; and on the east existing apartment buildings.

PROPOSED SITE DEVELOPMENT

Site development will consist of the demolition of the existing structure at 2834 Broadway, and the construction of a 3-story apartment building over a subterranean garage, with access from the alley to the west. The proposed structure will be of wood-frame/stucco and slab-on-grade construction.

GENERAL GEOLOGY AND SUBSURFACE SOIL CONDITIONS

Regional Geology

The subject property is located within the southern coastal strip region of the Peninsular Range Geomorphic Province of California. This geomorphic province is characterized by mountainous terrain to the east composed mostly of Mesozoic igneous and metamorphic rocks and relatively low-lying coastal terraces to the west underlain by late Cretaceous, Tertiary and Quaternary sedimentary rocks. The Golden Hill area of the City of San Diego, including the site, occurs within the westerly region, and is underlain by Quaternary sedimentary rocks.

Site Geology and Subsurface Soil Conditions

A review of geologic maps as well as observations made during our subsurface exploration indicated that the general area is underlain by the Quaternary Very Old Paralic Deposits Unit No. 8 (formerly Lindavista Formation). On subject property, these Very Old Paralic Deposits were encountered in the form of dense to very dense, cemented reddish brown silty sands with abundant cobbles to 4 inches in diameter. Refusal in these very dense very old paralic deposits were encountered at depths of 6 to 8 feet below existing ground surface. The Very Old Paralic Deposits were overlain by a 2 to 3 feet residual/topsoil cap of silty sands and sandy clays.

Tectonic Setting

No evidence of faulting was noted during our surface reconnaissance or in our exploratory trenches. A review of available geologic literature did not reveal any major faulting in the area. It should be noted that much of southern California, including the City of San Diego, is characterized by a series of Quaternary-age fault zones which typically strike in a northerly to northwesterly direction. Some of these fault zones (and the individual faults within the zone) are classified as active while others are classified as only potentially active according to the criteria of of the California Division of Mines and Geology.

A review of available geologic maps indicate that the subject property is not within an Alquist-Priolo Special Studies Zone. No known or previously mapped fault cross the site or projects toward the site, and no evidence of active or potentially active faulting were encountered in the exploratory trenches.

A review of available geologic maps indicate that the subject property is approximately 9.6 km (6.0 miles) from the Rose Canyon Fault zone, and 70 km (43.8 miles) from the Elsinore-Julian Fault zone.

GROUNDWATER

No groundwater was encountered in the exploratory trenches to the maximum depth of exploration at 8 feet, and no seepage was observed on the 10-foot high cut slope along Broadway. No major groundwater related problems, either during or after construction, are anticipated. However, it should be recognized that minor seepage problems may occur after development of a site even where none were present before development. These are usually minor phenomena and are often the results of an alteration of the permeability characteristics of the soils; an alteration in drainage patterns due to grading; and an increase in the use of irrigation water. Based on the permeability characteristics of the soils and anticipated usage of the development, it is our opinion that any seepage problems which may occur will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they develop.

GEOLOGIC HAZARDS

Ground shaking – The most likely geologic hazard to affect the site is ground shaking as a result of movement along one of the active fault zones mentioned above.

For seismic design purposes, soil parameters in accordance with the 2013 edition of the California Building Code were determined, and presented hereinafter.

Surface Rupture - Surface rupture is the result of movement of an active fault reaching the surface. No faults were observed during our investigation of the site.

Based on our observations, experience and review of the referenced geotechnical and geologic literature, it is our opinion that there is little probability of surface rupture due to faulting beneath the site. However, lurching and ground cracking are a possibility as a result of a significant seismic event on a regional active fault.

Liquefaction Potential - In consideration of the competent formational soils underlying the site; the soil types encountered; depth to groundwater and the distance from an active fault zone, it is our opinion that soil liquefaction does not present a significant geotechnical hazard to the proposed site development.

Landslides – Subject property is located in an area of relatively level terrain. A review of available geologic maps did not reveal the presence of any ancient landslides on subject or adjacent properties. The potential for landslides on subject and adjacent properties is considered minimal.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

General

1. Based on the results of the investigation, it is our opinion that the currently

proposed site development is feasible from a geotechnical engineering standpoint, provided that the recommendations presented in this report are incorporated into the design plan(s) and are properly implemented during the construction phase.

2. It is noted that some of the recommendations may have to be modified and supplemental recommendations may have to be presented, depending on the actual subsurface conditions encountered during construction.

3. Site grading and earthwork constructions will not impact the adjacent properties provided our recommendations are incorporated into the final designs and implemented during the construction phase. Additional field recommendations, however, may also be necessary and should be given by the project geotechnical consultant for the protection of adjacent properties and should be anticipated.

4. Prior to commencement of construction, a preconstruction conference should be held at the site with the owner, grading contractor, civil engineer and geotechnical engineer in attendance. Special soil handling and/or grading/improvement plans requirements can be discussed at that time.

Expansion Index of On-Site Soils

5. The clayey residual soils encountered on the site possess high expansion potential (Expansion Index = 95); while the silty sands of the Very Old Paralic Deposits possess Low expansion potential (Expansion Index = 25).

Sulfate Content of On-Site Soils

6. The soils encountered on the site are subject to negligible sulfate exposure (sulfate content of 75 ppm).

Grading

7. Site grading will consist primarily of excavation for the proposed basement garage. Existing on-site grades vary from 195 to 199 feet above mean seal level. The elevation of the proposed basement garage will be at 185.40, with excavation depths vary from 10 to 14 feet.

8. It is recommended that all earthwork be accomplished in accordance with the Grading Ordinance of the City of San Diego, current edition of the California Building Code, Appendix I attached hereto, entitled, "General Grading and Earthwork Specifications", and recommendations as presented in this Section.

9. Where the recommendations of this Section of the report conflict with those of Appendix I, this Section of the report takes precedence.

10. Grading should commence with the demolition of the existing structure and other improvements, including the asphaltic concrete pavement, and clearing and grubbing of the project site. All debris should be hauled away and disposed of offsite.

11. Approximately 5,000 cubic yards will be generated when excavation for the basement garage is completed. It is recommended that excess soils be exported from the site to a City approved dump site.

12. Any areas to receive fill soils should be properly prepared. The fill soils should be moistened, and uniformly compacted in lifts on the order of 6 to 8 inches until finished grade is achieved

13. All fill soils should be compacted to at least 90 percent of maximum dry density in accordance with ASTM D1557.

Foundation and Slab Design

14. It is recommended that a safe allowable soil bearing value of 3,000 pounds per square foot be used for the design and checking of continuous footings that are 12 inches in minimum horizontal dimension, and isolated pier footings that are 15 inches in minimum horizontal dimension; and are embedded at least 24 inches (for one to three stories) below the lowest adjacent exterior ground surface.

15. The above safe allowable soil bearing value may be increased 600 pounds per square feet for each additional foot of depth and width, to a maximum of 4,200 pounds per square foot.

16. The above safe allowable soil bearing value may be further increased by one-third when considering wind and/or seismic forces.

17. The settlements of foundation, when designed and loaded as outlined above, are expected to be less than 1 inch total and ¾ inch differential over a span of 40 feet.

18. It is recommended that our firm inspect the foundation trench excavations for the proposed structure to ensure proper embedment into competent formational soils. Any lenses or localize areas of clayey soils encountered in the foundation trench excavations should be removed.

19. It is recommended that all continuous footings be reinforced with a minimum of 4 #5 rebars; two rebars located near the top, and the other two rebars near the bottom of the footings. All isolated pier footings should be reinforced with a minimum of 2 #5 rebars in both directions, placed near the bottom of the footings.

20. The concrete slab-on-grade should be 5 ½ inches net in thickness, and be reinforced with #3 rebars @ 18 inches on center, placed at mid-height of concrete slab. The concrete slab should be underlain by 4 inches of clean sand. In areas to be tiled or carpeted, a 10-mil moisture barrier should be placed at grade and be overlain by one-inch of protective sand cover. This moisture barrier should be heavily overlapped or sealed at splices. Please note that the above foundation and slab reinforcement recommendations are based on soil characteristics, and should be superseded by the requirements of the project architect or structural engineer. architect.

21. The concrete compressive strength should be at least 3,000 psi.

22. 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 recommended slab thickness, with a maximum spacing of 15 feet, and should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials

23. To provide load transfer between adjacent pavement slab sections, a trapezoidal-keyed construction joint is recommended. As an alternative to the keyed joint, dowelling is recommended between construction joints. 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.

Temporary Excavation/Shoring

24. Temporary excavation varying from 10 to 15 feet will be required during the excavation for the basement garage. The temporary excavation may be excavated vertically for a height up to 5 feet. Above 5 feet, the temporary excavation may be flattened to a slope ratio of 1 : 1 (horizontal : vertical) or flatter.

25. The above recommendation assumes that there are no surcharge loads (such as existing buildings) within a distance behind the temporary excavation at least equal to the height of the excavation.

26. Due to the close proximity to the property line or existing building, temporary shoring will be required along the north side of the proposed building excavation; and along the east side at the north end where there is an existing structure close to the property line.

27. The temporary shoring should be designed by a licensed civil engineer and installed by specialty contractors with knowledge of the specific area soil conditions. It is recommended that the following lateral earth pressures be used for designing the shoring. It should be noted that in general, cantilever shoring is not recommended for excavations deeper than 15 to 20 feet, based on shoring deflection tolerances.

Cantilever Shoring System
Active pressure = 35 H (pcf)
Passive Pressure = 200h (psf)
H = wall height (active case) or h = embedment (passive case)

Retaining Wall Design

28. It is recommended that retaining walls be designed to withstand the pressure exerted by equivalent fluid weights given below :

Backfill Surface (horizontal : vertical)	Equivalent Fluid Pressure (pcf)
Level	35
2 : 1	50
1 ½ : 1	58

The above values assume that the retaining walls are unrestrained from movement, and have a granular backfill. For retaining walls restrained from movement at the top, such as basement retaining walls, an uniform horizontal pressure of 7H (where H is the height of the retaining wall in feet) should be applied in addition to the active pressures recommended above.

29. All retaining walls should be supplied with a backfill drainage system adequate to prevent the buildup of hydrostatic pressure. The subdrain should consist of one-inch gravel and a perforated pipe near the bottom of the retaining wall. The width of this subdrain should be at least 12 inches, and extend at least 2/3 height of the retaining wall. The subdrain should be enclosed in a geotextile fabric such as Mirafi 140N or equal.

30. All backfill soils behind the retaining wall should consist of soils having low expansion potential (Expansion Index < 50), and be compacted to at least 90 percent of maximum dry density in accordance with ASTM D1557.

Seismic Earth Pressure

31. Seismic earth pressure cn be taken as an inverted triangular distribution with Kh equal to 12h. This pressure is in addition to the static design wall load. The allowable passive pressure and bearing capacity can be increased by one-third in determining the stability of the retaining wall. A factor-of-safety of 1.2 can be used in determining the stability of the retaining wall under seismic conditions.

Lateral Loading

32. To resist lateral loads, it is recommended that the pressure exerted by an equivalent fluid weight of 320 pcf be used for footings or shear keys poured neat against competent natural or compacted fill soils. The upper 12 inches of material in areas not protected by floor slabs or pavements should not be included in the design for passive resistance. This value assumes that the horizontal distance of the soil mass extends at least 10 feet or three times the height of the surface generating the passive pressure, whichever is greater.

33. A coefficient of sliding friction of 0.35 may be used for cast-in-place concrete on competent natural or compacted fill soils. Footings can be designed to resist lateral loads by using a combination of sliding friction and passive resistance. The coefficient of friction should be applied to dead load forces only.

Seismic Coefficients

34. The seismic design factors were determined in accordance with the 2013 California Building Code, and presented below :

Site Coordinates : Latitude = 32.7161
Longitude = -117.1330
Site Class : = C
Spectral Response Acceleration
At Short Periods Ss = 1.157
Spectral Response Acceleration
At 1-second Period S1 = 0.445
Sms = FaSs = 1.157
Sm1 = FvS1 = 0.603
Sds = 2/3*Sms = 0.771
Sd1 = 2/3*Sm1 = 0.402

Concrete Flatwork

35. In consideration of the on-site soil conditions, it is recommended that concrete flatwork be a minimum of 3 ½ inches in thickness, and be reinforced with 6x6-W1.4xW1.4 (6x6-10/10) welded wire mesh, placed at mid-height of concrete slab. One inch expansion joints should be provided at 15-foot intervals, with ¼ inch weakened plane contraction joints at 5-foot intervals

Surface Drainage and Maintenance

36. Adequate drainage control and proper maintenance of all drainage facilities are imperative to minimize infiltration of surface water into the underlying soil mass in order to reduce settlement potential and to minimize erosion. The building pad should have drainage swales which direct storm and excess irrigation water away from the structures and into the street gutters or other drainage facilities. No surface runoff should be allowed to pond adjacent to the foundation of structures.

Grading and Foundation Plans Review

37. It is recommended that our firm review the final grading and foundation plans for the proposed site development to verify their compliance with our recommendations.

LIMITATION AND UNIFORMITY OF CONDITIONS

1. The preliminary findings and recommendations contained in this report pertain only to the site investigated and are based on the assumption that the soil conditions beneath the entire site do not deviate substantially from those disclosed in the exploratory trenches. If any variations or undesirable conditions are encountered during grading, or if the scope of the project differs from that

planned at the present time, our firm should be notified in order that supplemental recommendations can be presented, if necessary.

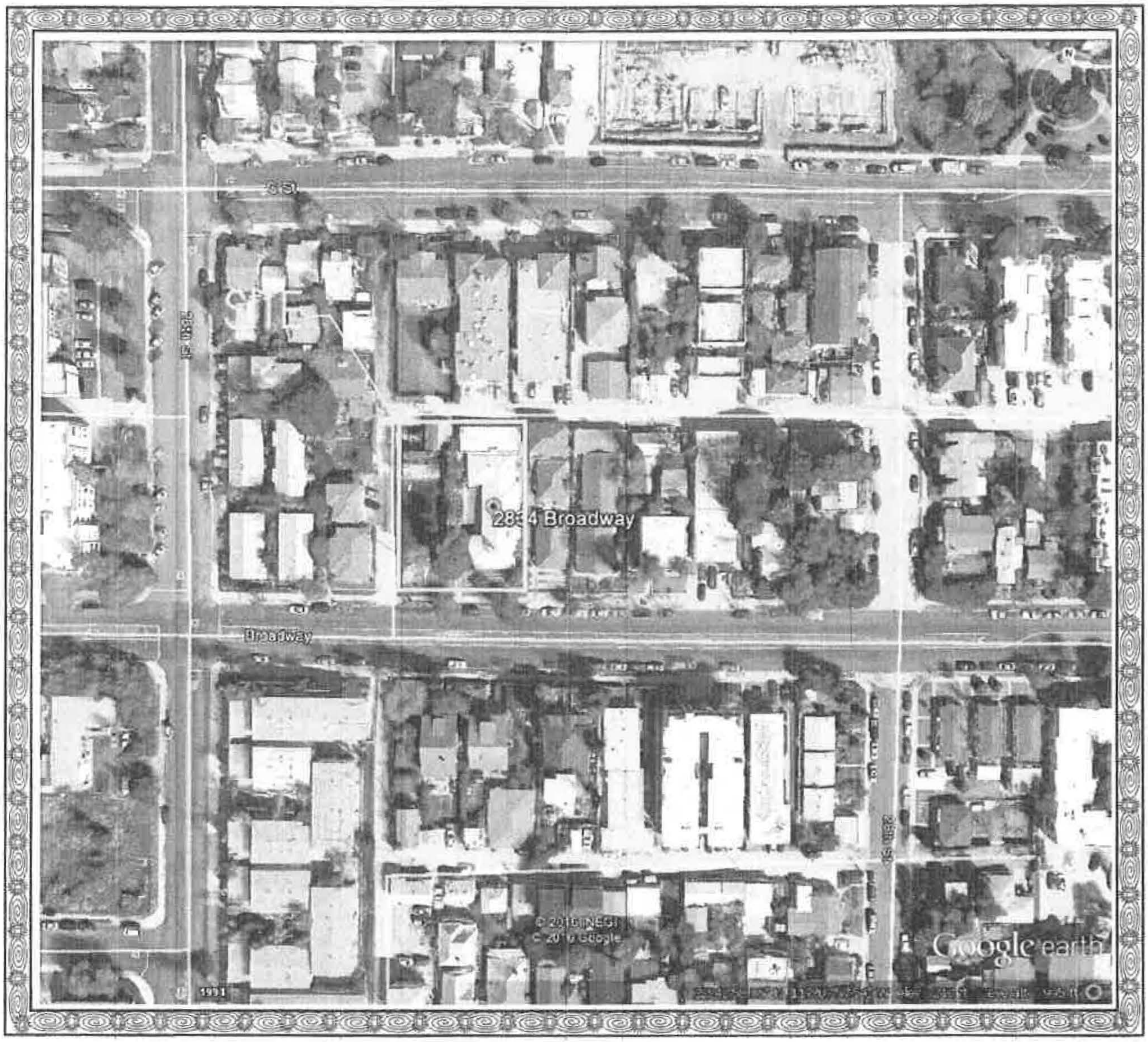
2. This report is issued with the understanding that it is the responsibility of the Owner, or his representative, to ensure that the information and recommendations presented herein are brought to the attention of the Project Architect and Engineer and are incorporated into the plans and specifications for the project. Furthermore, the Owner, or his representative, will also be responsible for taking the necessary measures to ensure that the Contractor and subcontractors properly carry out the recommendations in the field.

3. Professional opinions and recommendations presented in this report are based partly on our evaluation and analysis of the technical information gather during the study, partly on the currently available information regarding the proposed project, and partly on our previous experience with similar soil conditions and projects of similar scope. Our study has been performed in accordance with the minimum standards of car exercised by other professional geotechnical consultants currently practicing in the same locality. We do not, however, guarantee the performance of the proposed project in any respect, and no warranties of any kind, expressed or implied, are made or intended in connection with the study performed by our firm.

4. The findings and recommendations contained in this report are valid as of the

present date. However, changes in the conditions of the property could occur with the passage of time, whether they be due to natural processes or due to man-made actions on the subject and/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 of our control. Therefore, this report is subject to review by our firm and should not be relied upon after a period of two years.

Figure Nos. 1 to 5, inclusive, and Appendix I, II and III are parts of this report.

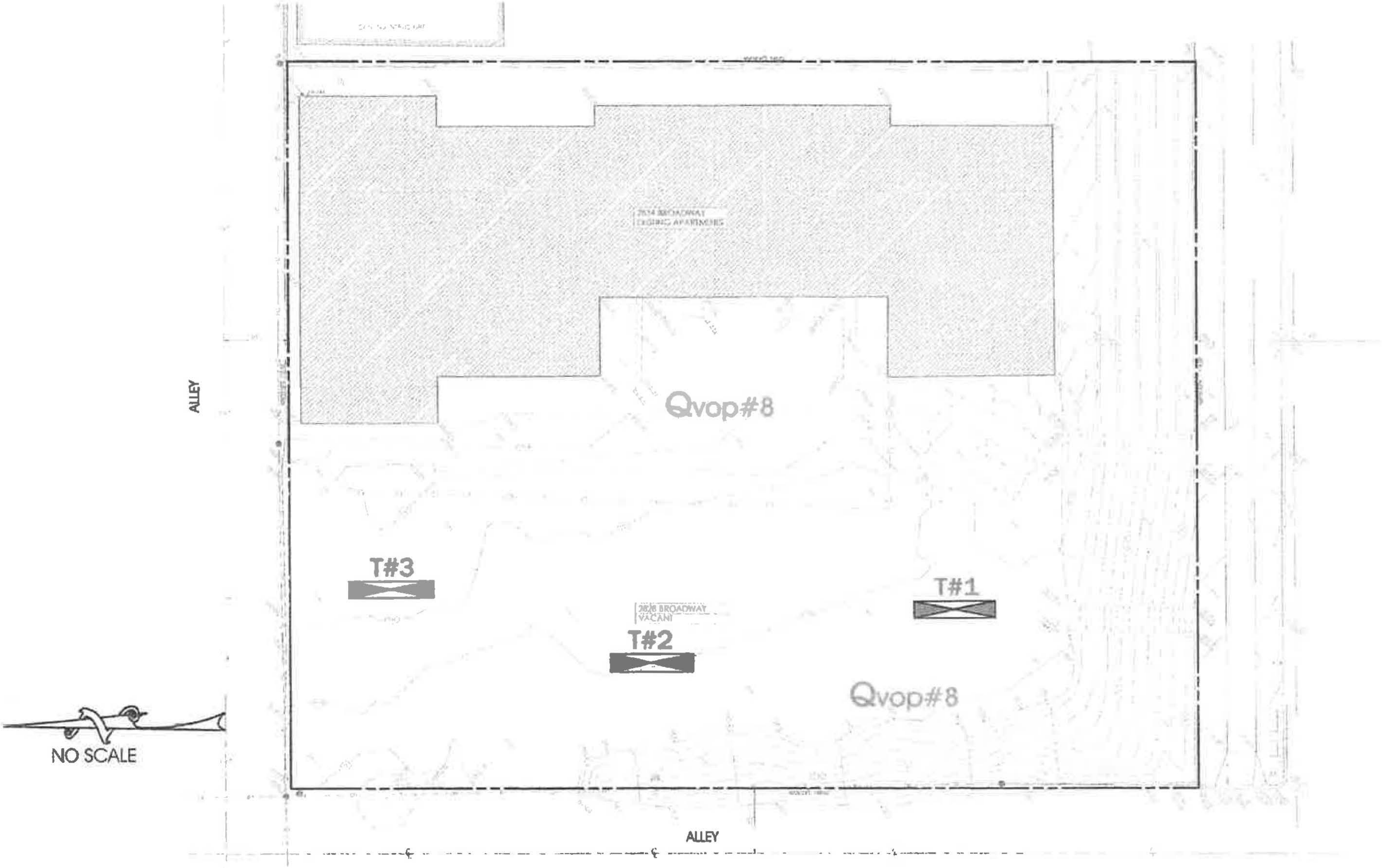


SITE LOCATON MAP

NOT TO SCALE

PROJECT NO. 16-1289 E3

FIGURE NO.1



APPROXIMATE LOCATION OF EXPLORATORY TRENCHES

LEGEND

☒ APPROXIMATE LOCATION OF EXPLORATORY TRENCH

Qvop#8 VERY OLD PARALIC DEPOSIT#8

PROJECT NO. 16- 1289 E3

FIGURE NO.2

TRENCH LOG SHEET

TRENCH NO. 1
ELEV. 194" msl

FT.	DESCRIPTION	SOIL TYPE
0	Light brown, damp, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
1		
2	①	
3		
4	Reddish brown, moist, dense, cemented (Very Old Paralic Deposit)	SILTY FINE SANDS (SM)
5	②	8.4*118.1*94.5%*
6		
7	Abundant cobbles to 4" dia. (30 to 45%)	
8		
9		

Bottom of Trench (Refusal in cemented formational soils))

LEGEND

○ – Indicates representative sample
⋆ – Indicates in-situ density test

TRENCH LOG SHEET

TRENCH NO. 2
ELEV. 195" msl

FT.	DESCRIPTION	SOIL TYPE
0	Dark brown, moist, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
1		
2		
3	Light brown/tan, moist, stiff ①	SANDY CLAY (CH)
4		
5	Reddish brown, most, dense, cemented (Old Paralic Deposit)	SILTY FINE SANDS (SM)
6	Very dense	

Bottom of Trench (Refusal in dense formational soils)

TRENCH LOG SHEET

TRENCH NO. 3
ELEV. 196'' msl

FT.	DESCRIPTION	SOIL TYPE
0 1 2	Dark brown, moist, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
3 4	Light brown/tan, moist, stiff ①	SANDY CLAY (CH)
5 6	Reddish brown, most, dense, cemented Abundant cobbles to 4 " dia. (30%) (Old Paralic Deposit) ① Very dense	SILTY FINE SANDS (SM)

Bottom of Trench (Refusal in dense formational soils)

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ROBERT CHAN, P.E.

APPENDIX I

GENERAL GRADING AND EARTHWORK SPECIFICATIONS

1.0 General

1.1 All earthwork shall be accomplished in accordance with the Grading Ordinance of the City of San Diego; Chapter 18 and 18A, and Appendix J of the 2010 edition of the California Building Code; Appendix I hereinafter, and recommendations as presented in the Geotechnical Report.

1.2 These recommended grading and earthwork specifications are intended to be a part of and to supplement the Geotechnical Report(s). In the event of a conflict, the recommendations of the Geotechnical Report(s) will supercede these specifications. Observations during the course of earthwork operations may result in addition, new or revised recommendations that could supercede these specifications and/or the recommendations in the Geotechnical Report(s).

1.3 The Owner or his authorized representative shall procure the services of a qualified Geotechnical Consulting Firm, hereinafter to be referred to as the "Geotechnical Consultant" (often the same entity that produced the Geotechnical Report(s).

1.4 The Geotechnical Consultant shall be given a schedule of work by the Earthwork contractor for the subject project, so as to be able to perform required observations; testing and mapping of work in progress in a timely manner.

1.5 The work herein includes all activities from clearing and grubbing through fine grading. Included are trenching, excavating, backfilling compacting and grading. All work shall be as shown on the approved project drawings.

1.6 The Geotechnical Consultant or a qualified representative shall be present on the site as required, to observe, map and document the subsurface exposures so as to verify the geotechnical design suppositions. In the event that observed conditions are found to be significantly different from the interpreted conditions during the design phase, the Geotechnical

Consultant shall notify the Owner, recommend appropriate changes in the design to suit the observed conditions and notify the agenc(ies) having jurisdiction, where required. Subsurface areas to be geotechnically observed, mapped, record elevations or tested included cleared natural ground for receiving fill or structures, "remedial removal" areas, key bottoms and benches.

1.7 The guidelines contained herein and any standard details attached herewith represent this firm's recommendations for the grading and all associated operations on the subject project. These guidelines shall be considered to be a part of these Specifications.

1.8 If interpretation of these guidelines or standard details result in a dispute(s), the Geotechnical Consultant shall conclude the appropriate interpretation.

1.9 The Geotechnical Consultant shall observe the processing of subgrade and fill materials and perform the necessary compaction testing. The test results shall be provided to the Owner and the Contractor and if so required, to the agenc(ies) having jurisdiction.

1.10 The Geotechnical Consultant shall not provide "supervision" or any "direction" of work in progress to the Earthwork Contractor, or to any of the Contractor's employees or to any of the Contractor's agent.

1.11 The Earthwork Contractor : The Earthwork Contractor (contractor) shall be qualified, experienced and knowledgeable in earthwork logistics; preparation and processing of ground to receive fill, moisture conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the Owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the Owner and the Geotechnical Consultant of change in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The

Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications and the recommendations in the approved geotechnical report (s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soils, improper moisture conditions, inadequate compaction, insufficient buttress key size, adverse weather, etc. are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the Owner that construction be stopped until the conditions are rectified.

2.0 <u>Preparation of Areas to be Filled</u>

2.1 Clearing and grubbing : vegetation, such as brush, grass, roots, and other deleterious materials shall be sufficiently removed and properly disposed of in a method acceptable to the Owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lifts shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fine and/or imprisonment and shall not be allowed.

Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 9 and 10; 40 CRF; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

2.2 Any asphaltic pavement material removed during clearing operations should be properly disposed of at an approved off-site facility. Concrete fragments which are free of reinforcing steel may be placed in fills, provided that they are placed in accordance with Section 3.1 of this document.

2.3 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated conditions.

2.4 Processing : Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay humps or clods and the working surface is reasonable uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.5 Over-excavation : In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, Soft, loose, dry, saturated, spongy, organic-rich highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.6 Benching : Where fills are to be placed on ground with slopes steeper than 5 : 1 (horizontal : vertical), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5 :1 (horizontal :

vertical) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.7 Evaluation/Acceptance of Fill Areas : All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

3.0 <u>Fill Material</u>

3.1 General : Materials to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill materials.

3.2 Oversized Material : Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import : If importing of fill materials is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant as least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 <u>Fill Placement and Compaction</u>

4.1 Fill Layer : Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near vertical layers generally not exceeding

8 inches in thickness when compacted. The Geotechnical Consultant may accept thicker layers if testing indicates that the grading procedure can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning : Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill : After each layer has been moisture-conditioned, mixed and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes : In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increment of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum dry density per ASTM Test Method D1557.

4.5 Compaction Testing : Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing : Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the

Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations : The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechincal Consultant based on the field evaluation of exposed conditions during grading. Where fill-overcut slopes are to be graded, the cut portion of the slopes shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfill

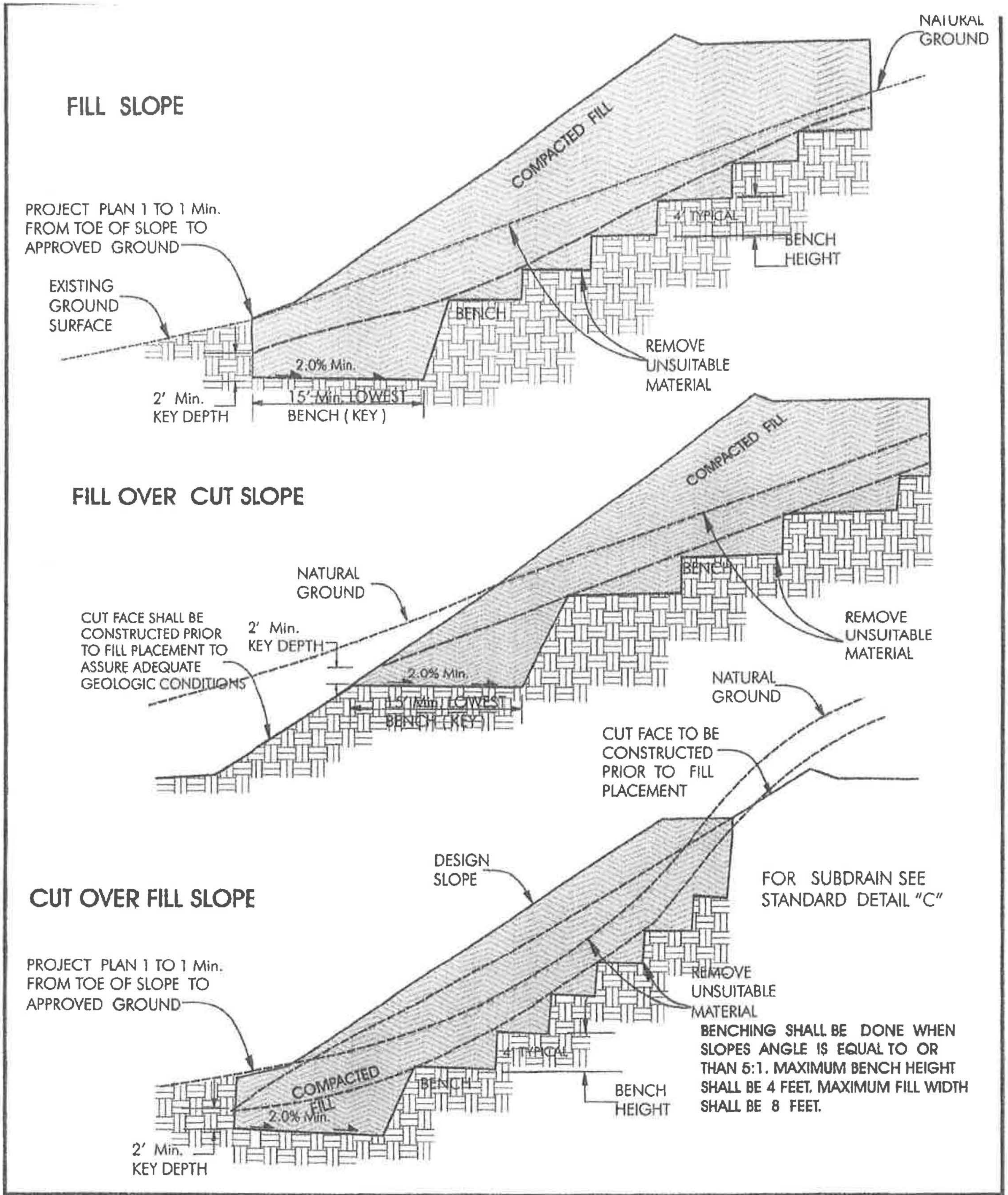
7.1 The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed and compacted to a minimum of 90 percent of maximum dry density from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

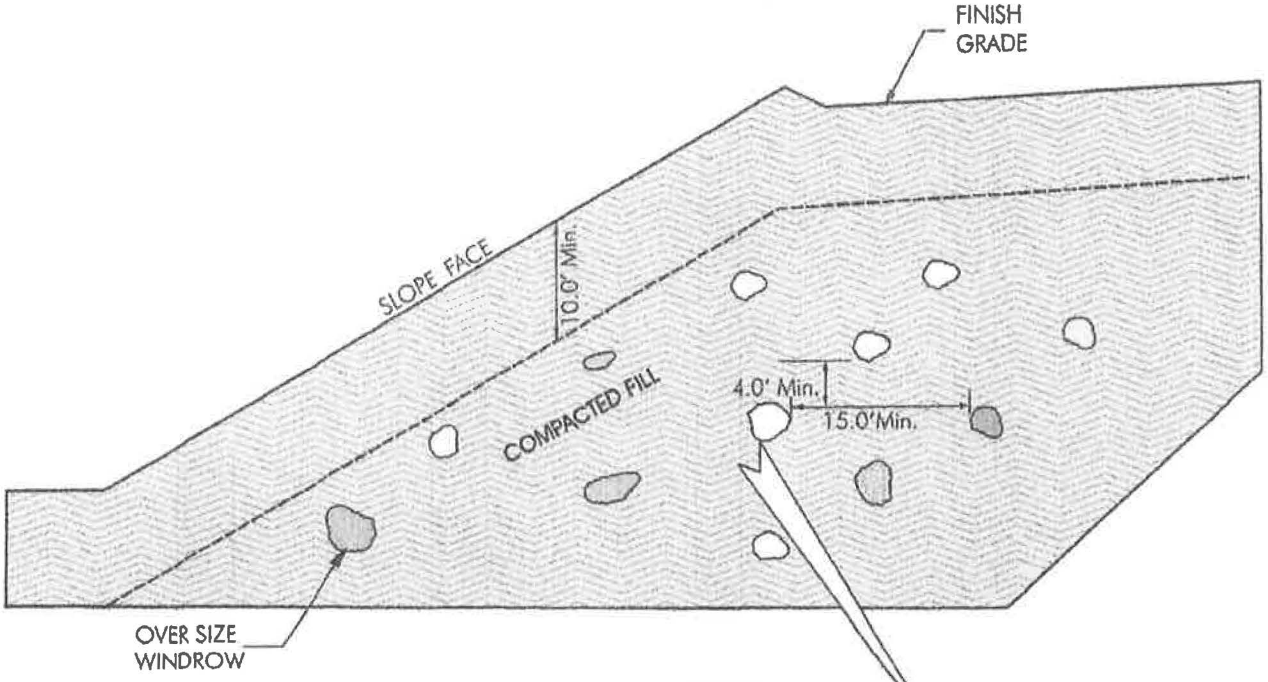
7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.



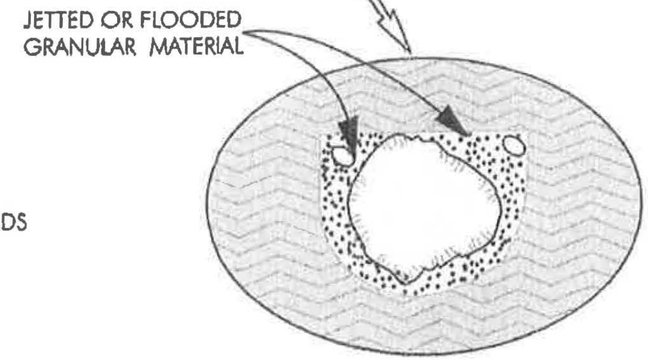
KEYING AND BENCHING

DETAIL A

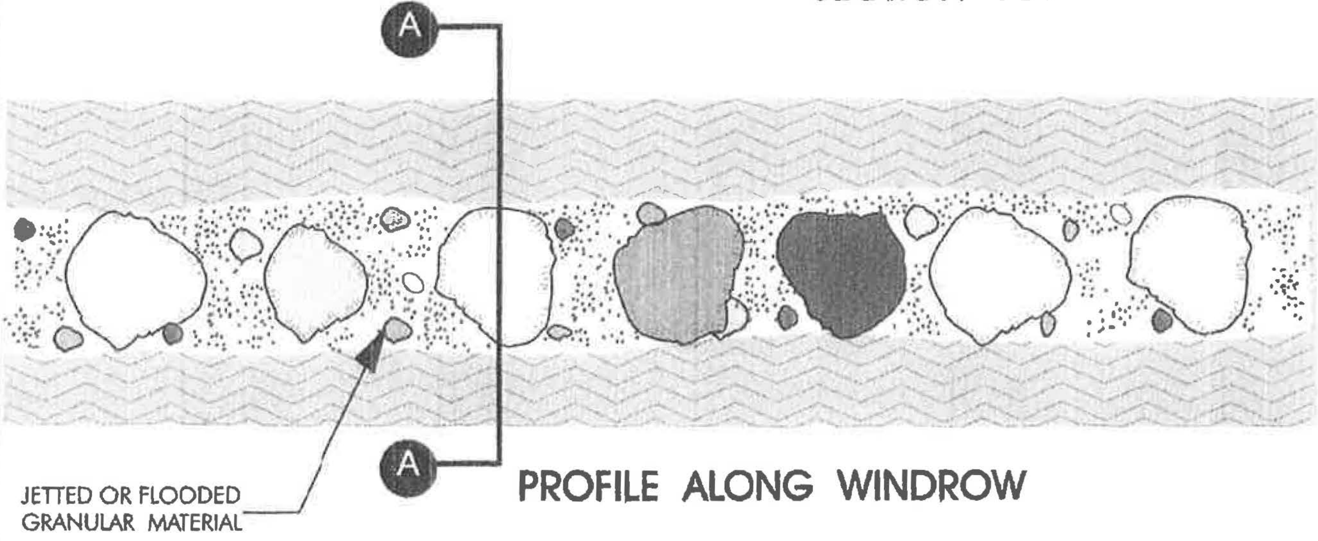
ALLIED EARTH TECHNOLOGY



- OVER SIZE ROCK IS LARGER THAN INCHES IN LARGEST DIMENSION
- EXCAVATE A TRENCH IN THE COMPACTED FILL DEEP ENOUGH TO BURY ALL THE ROCK
- BACKFILL WITH GRANULAR SOIL JETTED OR FLOODED IN PLACE TO FILL ALL THE ROCK VOIDS
- DO NOT BURY ROCK WITHIN 10 FEET OF FINISH GRADED.
- WINDROW OF BURIED ROCK SHALL BE PARALLEL TO THE FINISH SLOPE FILL.



SECTION "AA"

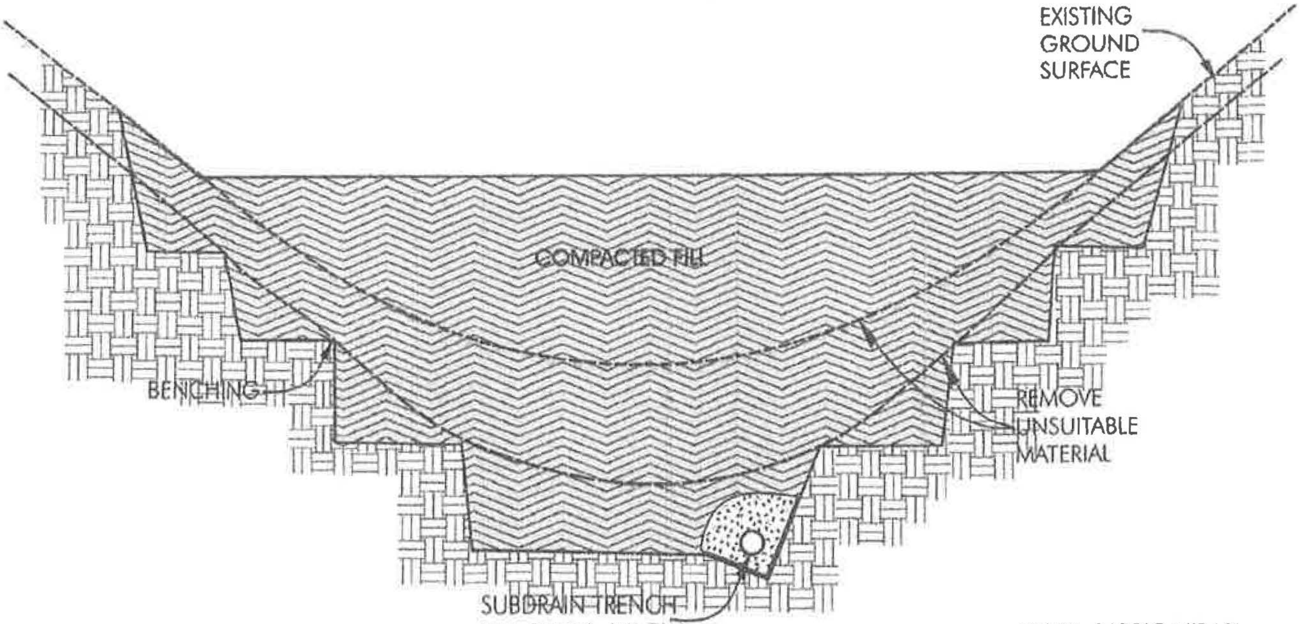


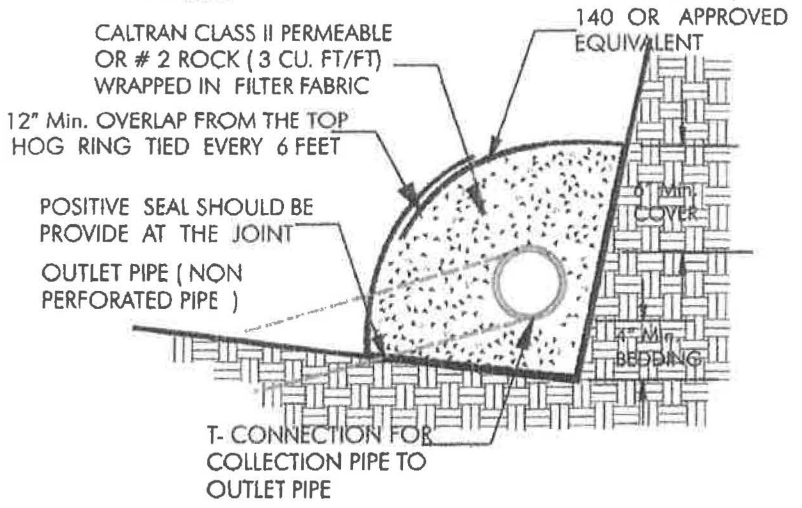
PROFILE ALONG WINDROW

OVER SIZE ROCK DISPOSAL

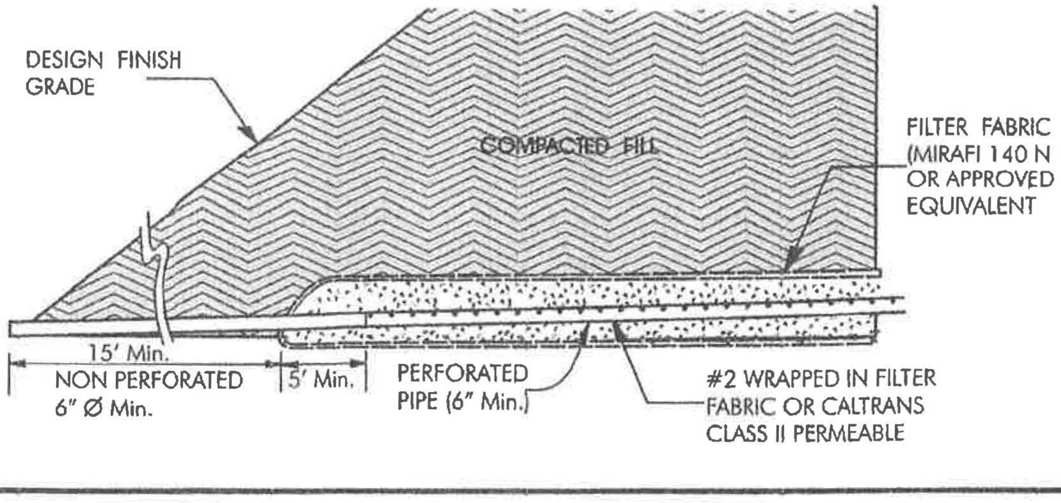
DETAIL B

ALLIED EARTH TECHNOLOGY





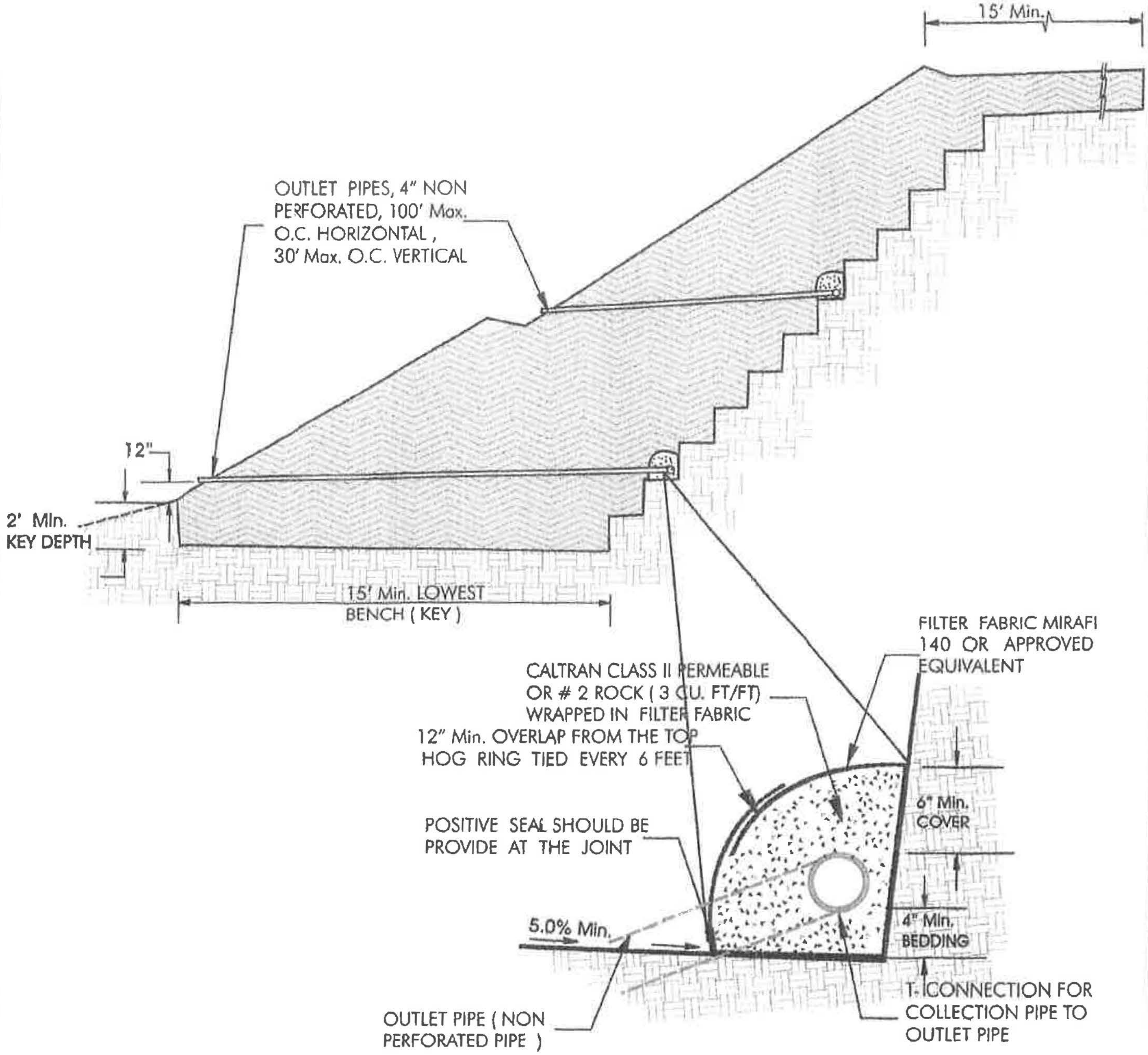
DETAIL OF CANYON SUBDRAIN TERMINAL



CANYON SUBDRAIN DETALS

DETAIL C

ALLIED EARTH
TECHNOLOGY



SUBDRAIN INSTALLATION- SUBDRAIN COLLECTOR PIPE SHALL BE INSTALLED WITH PERFORATIONS DOWN OR UNLESS OTHERWISE DESIGNED BY THE GEOTECHNICAL CONSULTAN. OUTLET SHALL BE NON-PERFORATED PIPE. THE S UBDRAIN PIPE SHALL HAVE AT LEAST 8 PERFORATIONS UNIFORMLY SPACED PER FOOT. PERFORATION SHALL BE 1/4" TO 1/2" IF DRILLED HOLES ARE USED. ALL SUBDRAIN PIPES SHALL HAVE A GRADIENT AT LEAST 2% TOWARD THE OUTLET.

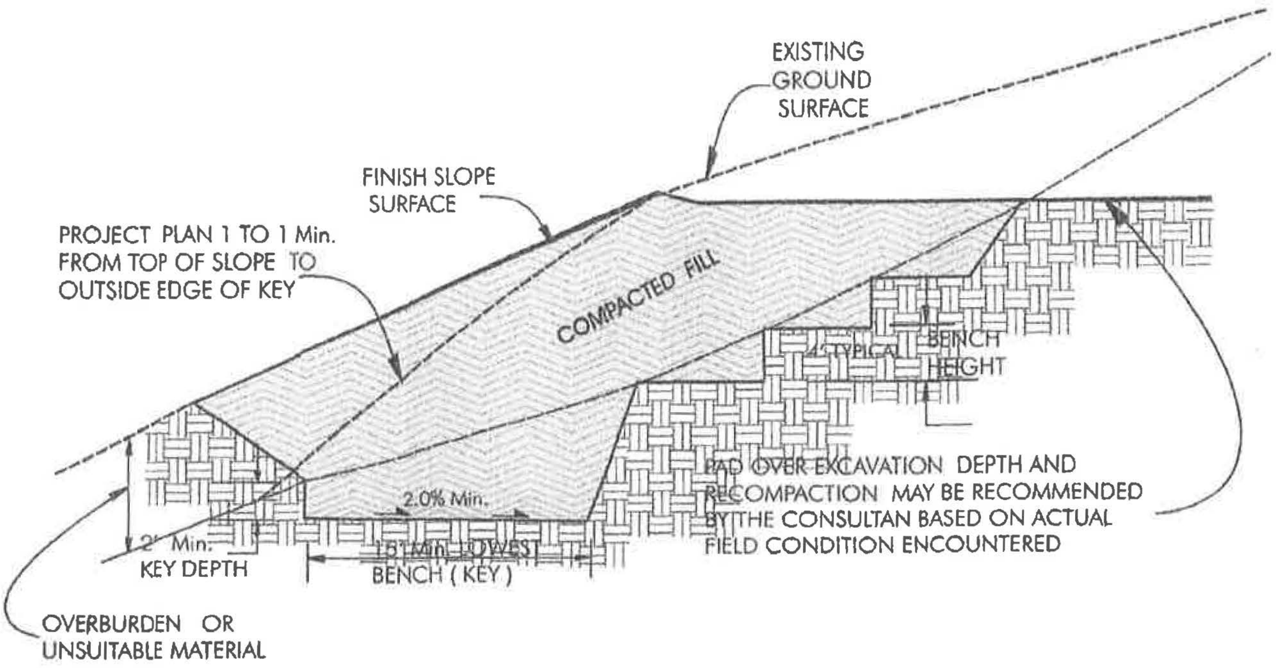
SUBDRAIN PIPES- SUBDRAIN PIPE SHALL BE **ASTMD 2751, SDR 23.5** OR **ASTMD 1527**, SCHEDULE 40, OR **ASTMD 3034, SDR 23.5**, SCHEDULE 40 POLYVINYL CHORIDE PLASTIC (PVC) PIPE.

ALL OUTLET PIPE SHALL BE PLACED IN A TRENCH NO WIDER THAN TWICE THE SUBDRAIN PIPE, PIE SHALL BE IN SOIL OF SE>30 JETTED OR FLOODED IN PLACED EXCEPT FOR THE OUTSIDE 5 FEET WHICH BE NATIVE SOIL BACKFILL

BUTRESS OR REPLACEMENT
SUBDRAIN

DETAIL D

ALLIED EARTH
TECHNOLOGY



NOTE: SUBDRAIN DETAILS AND KEY WIDTH RECOMMENDATIONS TO BE PROVIDED BASED ON EXPOSED SURFACE CONDITIONS

HILLSIDE STABILITY FILL

DETAIL E

ALLIED EARTH
TECHNOLOGY

APPENDIX II

LABORATORY TEST RESULTS

1. The maximum dry density and optimum moisture content of the fill soils encountered were determined in accordance with A.S.T.M. D1557, Method A. The results of the tests are presented as follows :

	Soil Description	Maximum Dry Density (lbs./cu.ft.)	Optimum Moisture Content (% Dry Wt.)
Trench #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	125.0	9.5

2. The Expansion Index of the most clayey soils was determined in accordance with A.S.T.M. D4929-08. The results of the test are presented as follows :

	Soil Description	Expansion Index
Trench #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	25*
Trench #2 Sample #1 Depth 3.0'	Light brown/tan sandy clay (CH)	95**

*Considered to possess LOW expansion potential
** " HIGH "

APPENDIX II

LABORATORY TEST RESULTS (Cont'nd)

3. The sulfate content of the soils were determined in accordance with A.S.T.M. D516. The results are presented below :

	Soil Description	Sulfate Content (ppm)	
Boring #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	75	Negligible

APPENDIX III

REFERENCES

- California Building Code, Volumes 1 & 2, International Conference of Building Officials, 2013
- California Department of Conservation, Division of Mines and Geology (California Geological Survey), 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California, DMG Special Publication 117, 71p.
- De Bartolo Rimanic Design Studio - Building Plans – Proposed Multi-Family Apartments, 2828/2834 Broadway, San Diego, California.
- "Foundations and Earth Structures", Naval Facilities Engineering Command, DM 7.02
- "Green Book" Standard Specifications for Public Works Construction, Public Works Standards, Inc. 2003 Edition.
- Kennedy, Michael P. – Geology of the San Diego Quadrangle, San Diego County, California, California Department of Conservation, Division of Mines and Geology
- San Diego Association of Geologists- Geotechnical Engineering Case Histories in San Diego County
- "Soil Mechanics", Naval Facilities Engineering Command, DM 7.01
- United States Geologic Survey. Seismic Hazard Curves, Response Parameters and Design Parameters.

ALLIED EARTH TECHNOLOGY
7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
PH. (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

ROBERT CHAN, P.E.

October 31, 2016

TO : EA Renovations, Inc.

FROM : Robert Chan, P.E.

SUBJECT : Response to City Comments dated 10/25/16
Proposed Multi-Family Apartment Building Site
2828-2834 Broadway
San Diego, California

REGISTERED PROFESSIONAL ENGINEER
ROBERT CHAN
No. C-24613
Exp. 12/31/17
CIVIL
STATE OF CALIFORNIA

Gentlemen :

The following are response to City of San Diego comments :

19. *As previously requested, the representative geologic/geotechnical cross sections should show the distribution of fill and geologic units*

See attached Figure Nos. 1 and 2.

20. *The answer to the screening question for criterion #5 of worksheet C.4-1 provides an infiltration rate of 0.23 in/hr. which is a partial infiltration feasibility condition. Therefore, the "yes" response should be checked for this criterion.*

Duly noted and changed.

21. *Currently, Criteriion #6 of worksheet C.4-1 still includes a general statement of geotechnical hazards on the site. In order for the City to accept the current geotechnical hazard justification, the project's geotechnical consultant must address each specific geologic or geotechnical hazard associated with stormwater infiltration that cannot be mitigated to an acceptable level. The analyses and supporting documentation should be submitted for review.*

Upon further evaluation, there are no geotechnical hazards that cannot be mitigated to an acceptable level. See corrected criterion #6.

22. *Note : A geotechnical condition created by the propoed development may not be considered a valid geotechnical hazard.*

Duly noted.

23. *The project's geotechnical consultant has indicated infiltration of storm water will cause hydro-consolidation of the foundation in the very dense Old Paralic Deposits which has a low infiltration rate of 0.23 in/hr. at the subject site. Provide the laboratory analysis confirming the hydro-consolidation potential of the very dense Old Paralic Deposits which Has low infiltration rate of 0.23 in/hr.*

Upon further evaluation, it is concluded that infiltration of storm water will not cause hydro-consolidation of the very dense Old Paralic Deposits, especially since there are no fill soils to be placed on site.

24. *The project's geotechnical consultant has indicated there are no measures available to mitigate the identified geologic or geotechnical hazards to an acceptable level. Provide a narrative discussion of the mitigation measures considered that could not mitigate the geotechnical hazards to an acceptable level and include this discussion in the response to criterion #6 of worksheet C.4-1.*

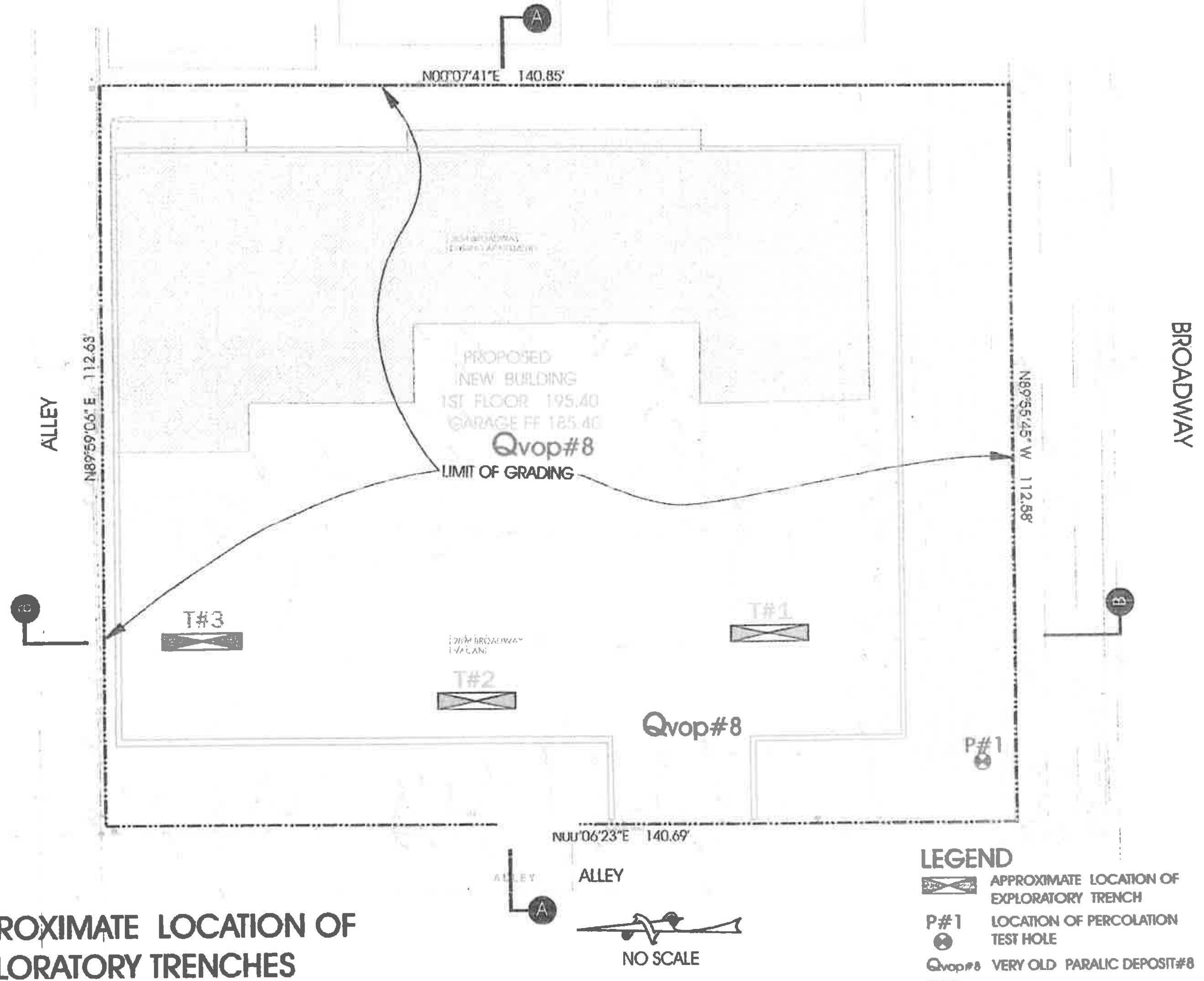
Upon further evaluation, infiltration can be allowed without increasing risk of geotechnical hazards.

25. *The current response to criterion #7 of worksheet C.4-1 indicates infiltration in any appreciable quantity cannot be allowed without posing significant risk to groundwater related concerns. Describe the groundwater related concerns as a result of infiltration into the very dense Old Paralic Deposits.*

Upon further evaluation, infiltration can be allowed without posing significant risks for groundwater related concerns

26. *The current response to criterion #8 of worksheet C.4-1 indicated infiltration in any appreciable quantity cannot be allowed without violating downstream water rights. Provide the downstream entitle or entities that own the rights to the water that would not be allowed to drain freely to downstream water bodies as a result of infiltration on the subject site.*

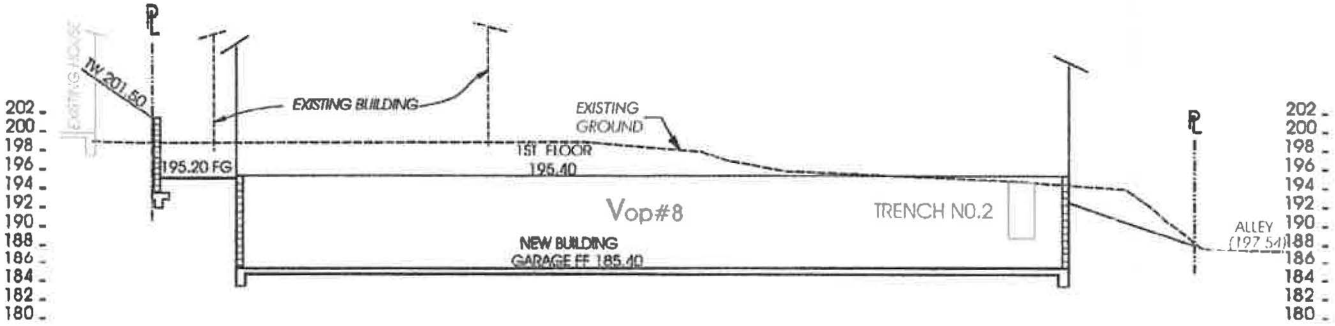
Upon further evaluation, storm water infiltration can be allowed without violating downstream water rights.



APPROXIMATE LOCATION OF EXPLORATORY TRENCHES

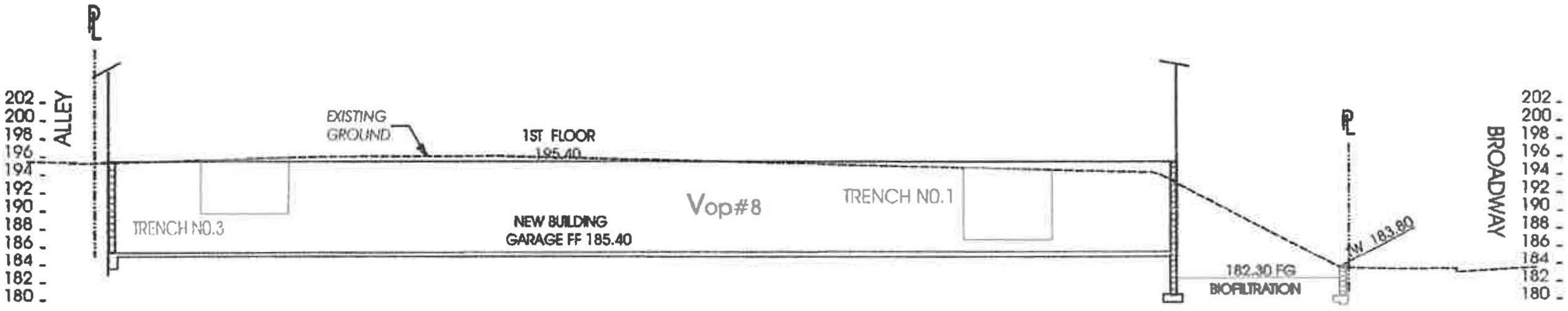
PROJECT NO. 16- 1289 E3

FIGURE NO.1



SECTION "AA"

SACLE 1"=20'



SECTION "BB"

SACLE 1"=20'

LEGEND

Vop#8 Very Old Paralic Deposit #8

PROJECT 16-1289 E3

FIGURE NO. 2

Percolation Test Data Sheet

Project:	BROADWAY	Project No:	16-128963	Date:	04/12/16
Test Hole No:	1	Tested By:	A.T.		
Depth of Test Hole, D_T:	36 IN	USCS Soil Classification:	SM		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6 IN	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:00	9:00	60	18.0	18.3	0.3	Y
2	9 25	10.25	60	19.0	19.2	0.2	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:00	13.00	60	18.0	18.3	0.3	200 m/in
2	13.00	17.00	240	19.0	20.0	1.0	240 m/in
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Table 5 – Sample Test Data Form for Percolation Test

Infiltration Rate

The infiltration rate was converted from the percolation rate using the "Porchet Method".

$$It = \frac{\Delta H \quad 60 \quad r}{\Delta t \, (r + 2 \, Havg)}$$

Where

It = Tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

$H\,avg$ = average head over the time interval, inches

For a percolation rate of 240 min/in, using the above formula, the infiltration rate obtained is 0.23 in/hr.

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	✓	
Provide basis: UNFACTORED INFILTRATION RATE OF 0.23 IN/HR. WAS OBTAINED Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1 Page 2 of 4

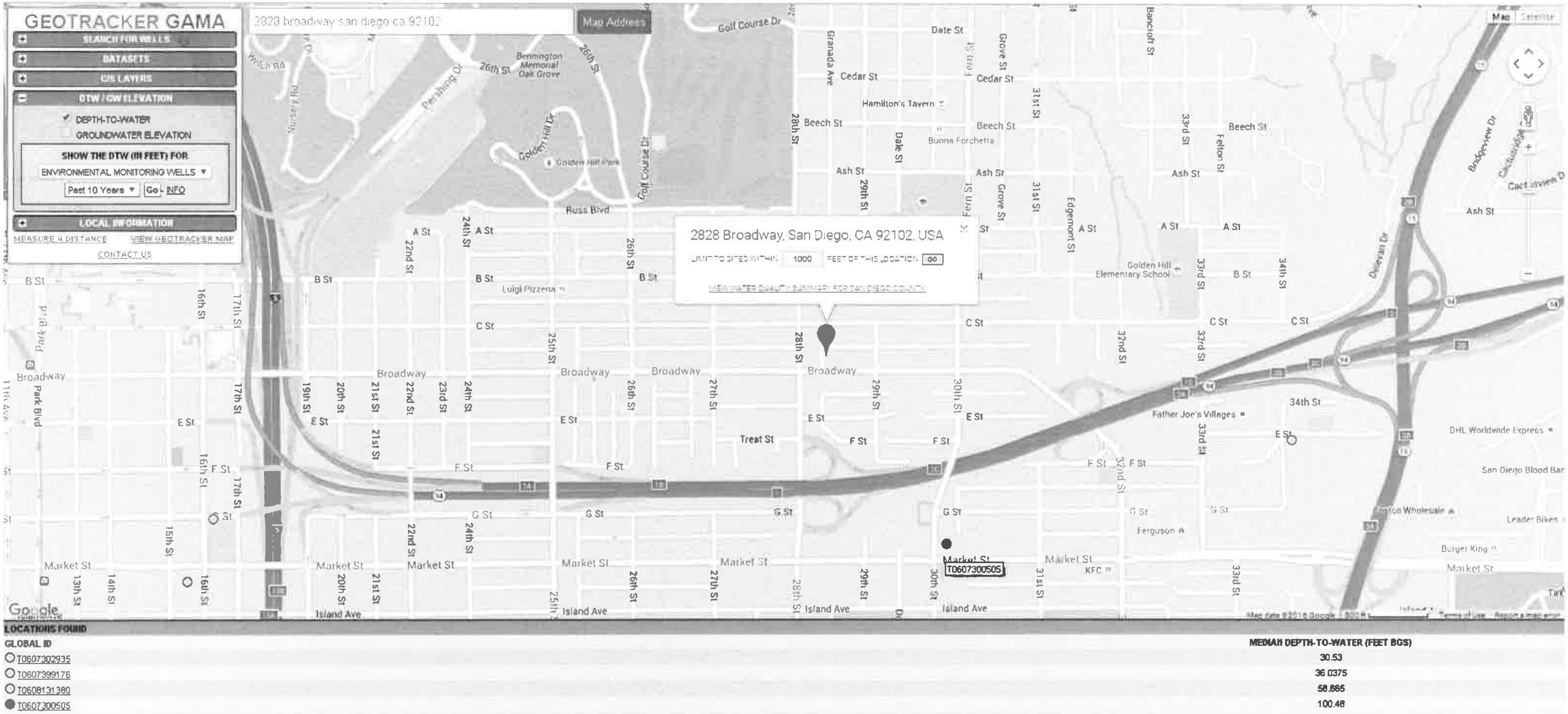
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.
If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings



2828 broadway san diego ca 92102

✓ DEPTH-TO-WATER
☐ GROUNDWATER ELEVATION

SHOW THE DTW (IN FEET) FOR
ENVIRONMENTAL MONITORING WELLS
Past 10 Years

2828 Broadway, San Diego, CA 92102, USA

LIMIT TO SITES WITHIN 1000 FEET OF THIS LOCATION. GO

VIEW WATER QUALITY SUMMARY FOR SAN DIEGO COUNTY

LOCATIONS FOUND

GLOBAL ID	MEDIAN DEPTH-TO-WATER (FEET BGS)
○ T0607302935	30.53
○ T0607399176	36.0375
○ T0608131380	58.865
● T0607300505	100.48

ALLIED EARTH TECHNOLOGY
7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
PH. (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

ROBERT CHAN, P.E.

September 26, 2016

No. C-24613
Exp. 12/31/17

TO : EA Renovations, Inc.

FROM : Robert Chan, P.E.

SUBJECT : Response to City Comments
Proposed Multi-Family Apartment Building Site
2828-2834 Broadway
San Diego, California

Gentlemen :

The following are response to City of San Diego comments :

4. *Provide a geologic/geotechnical map that shows the distribution of fill and geologic units, location of exploratory excavations; percolation tests and proposed development. Circumscribed the limits of anticipated remedial grading on the geologic/geotechnical map to delineate the proposed footprint of the project.*

   See Figure Nos. 1 and 2

5. *The project's geotechnical consultant should provide representative geologic/geotechnical cross sections that show the existing and proposed grades, distribution of fill and geologic units, and the anticipated area of the of the proposed basement excavation. The cross-sections should extend beyond the property lines and show the relation to adjacent properties.*

   See Figure Nos. 1 and 2.

6. *Provide the percolation field test data and clarify the actual percolation method used as per Appendix D of the Storm Water Standards. The data should include the starting date and time, and length of time the test borings were presoaked.*

   See attached percolation test

7. *Provide infiltration rates. Provide the method and calculations used to convert from percolation data.*

   See attached

8. *Provide a completed Worksheet C.4-1 (Appendix C of the San Diego Storm Water Standards) in the addendum report. Although it is not necessary to investigate each and every criterion in worksheet C.4-1, a brief summary of findings must be provided for each criteria. The yes/no response for Criteria #1 and 5 should be based on the infiltration rates.*

   See attached.

9. *The answers to the screening questions for Criteria #1 and 5 of worksheet C.4-1 should be based on the infiltration rates. Provide the infiltration rates and summary of findings for these criteria. The yes/no response for Criteria #1 and 5 shold be based on the infiltration rates.*

   See attached C.4-1.

10. *Currently, Criteria #2 and 6 includes a general statement of geotechnical hazards on the site. In order for the City to accept the current geotechnical hazard justification, the project's geotechnical consultant must address each specific geologic or geotechnical hazard associated with storm water infiltration that cannot be mitigated to an acceptable level. The analyses and supporting documentation should be submitted for review.*

    1. The on-site storm water infiltration rate is ¼ inch/hr. per the percolation test results.

    2. Soil-structure interaction - The storm water infiltration basin is located in the southwest corner of the property, adjacent to the proposed apartment structure. The foundation of the proposed structure will be subject to hydro-consolidation.

11. *Address the measures available to mitigate the identified geologic or geotechnical hazards to an acceptable le level in the summary for criteria #2 and 6 of worksheet C.4-1*

    No measures are available to mitigate the geologic or geotechnical hazards as listed in item nos. 1 and 2 under 10 above.

12. *The project geotechnical consultant could consider additional infiltration testing to allow a reasonably confident determination of infiltration feasibility. The project's geotechnical consultant should provide adequate number of infiltration testing per Appendix D of the Storm Water Standards.*

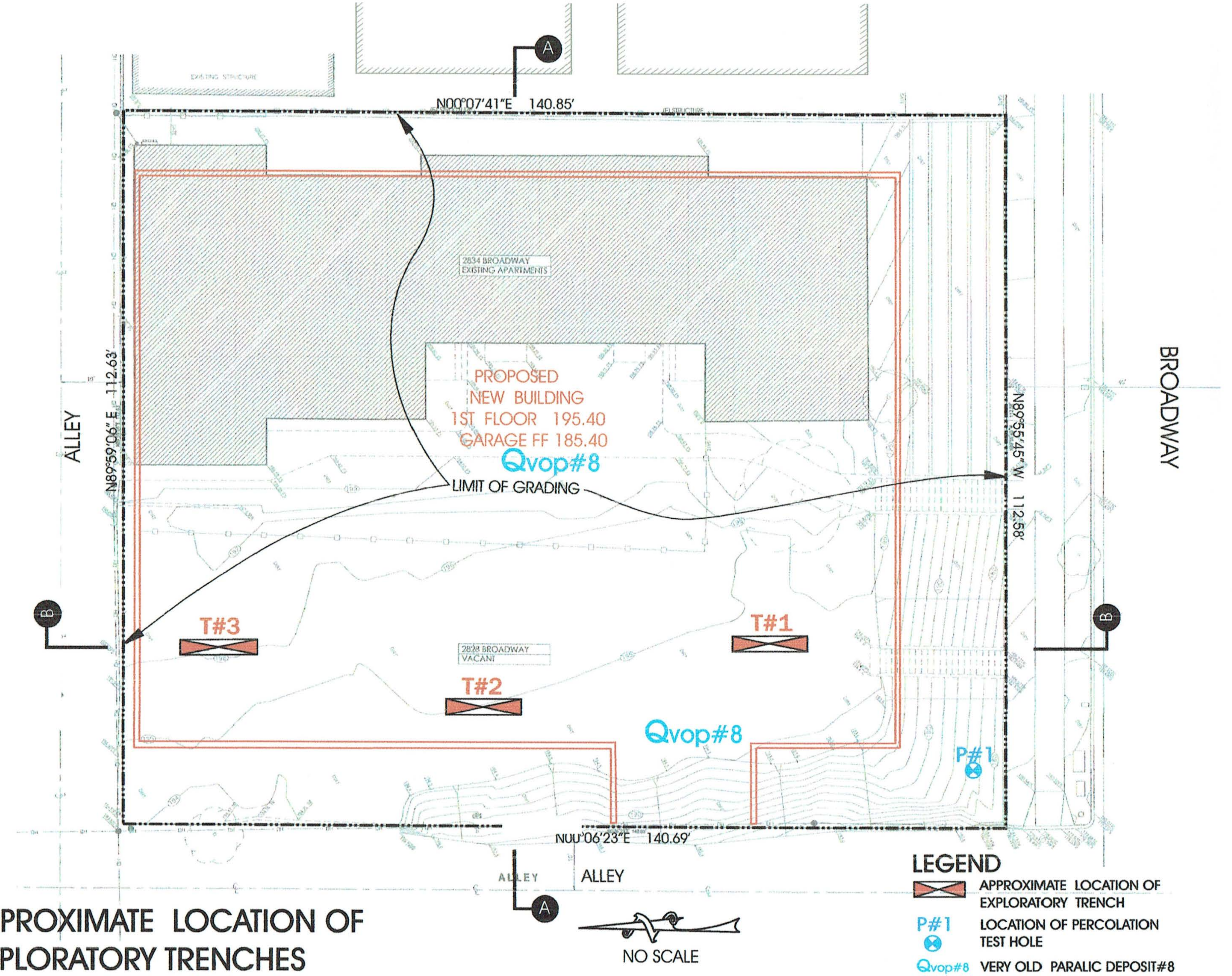
The bio-retention/infiltration basin, consisting of 600 square feet, is located in the front, southwest corner of the property. Remainder of the entire property will be occupied by the proposed structure. There is a small area along the front of the property where additional infiltration test can be conducted. however, the entire area is underlain by the very dese, cemented Very Old Paralic Deposit #8 (Lindavista Formation). There may be some isolated, local areas where better infiltration rates may be obtained. However, it is our opinion that the infiltrated water will flow a short distance both vertically and laterally, before encountering dense, impermeable soils.

13. *The project's geotechnical consultant should provide a conclusion regarding if the proposed development will destabilize or result in settlement of adjacent property or the right of way.*

The on-site soils do not permit proper infiltration of storm water. Even if the soils are permeable, the close proximity of the potential infiltration basin to the proposed structure will cause destabilization or result in settlement of the structure or right-of-way.

14. *The project's geotechnical consultant shold provide a statement as to whether or not the site is suitable for the intended use.*

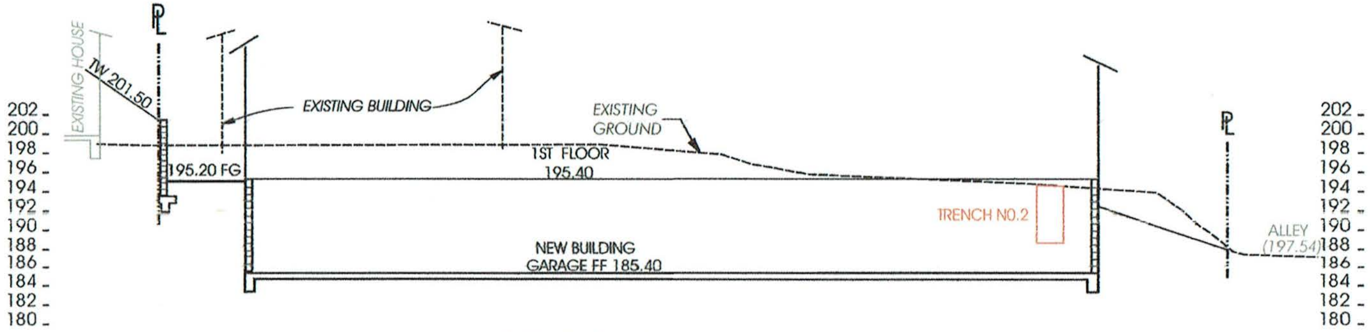
The site is suitable for the intended use.



APPROXIMATE LOCATION OF EXPLORATORY TRENCHES

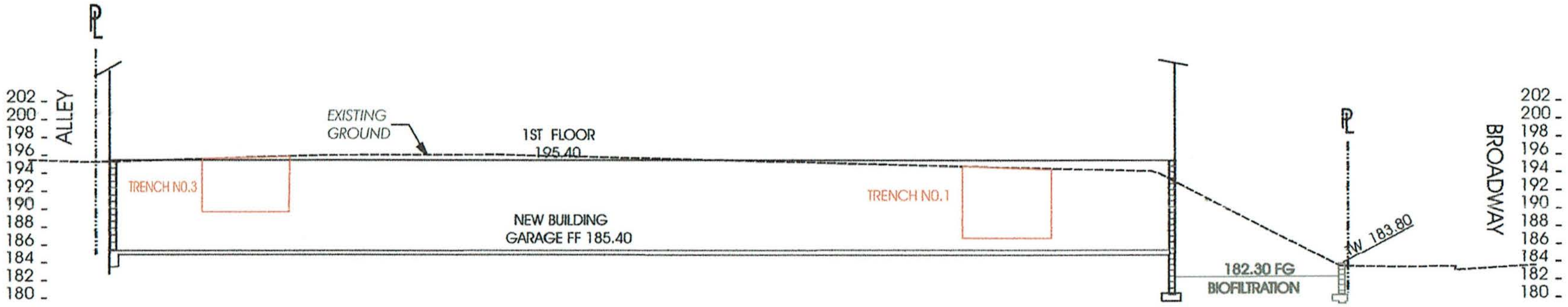
PROJECT NO. 16- 1289 E3

FIGURE NO.1



SECTION "AA"

SACLE 1"=20'



SECTION "BB"

SACLE 1"=20'

PROJECT 16-1289 E3

FIGURE NO. 2

Percolation Test Data Sheet

Project:	BROADWAY		Project No:	16-1289E 3		Date:	04/12/16
Test Hole No:		1	Tested By:	A.T.			
Depth of Test Hole, D_T:		36 IN	USCS Soil Classification:		SM		
Test Hole Dimensions (inches)					Length	Width	
Diameter (if round)=		6 IN	Sides (if rectangangular)=				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:00	9:00	60	18.0	18.3	0.3	Y
2	9:25	10.25	60	19.0	19.2	0.2	Y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:00	13.00	60	18.0	18.3	0.3	200m/in
2	13.00	17:00	240	19.0	20.0	1.0	240m/in
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Table 5 – Sample Test Data Form for Percolation Test

Infiltration Rate

The infiltration rate was converted from the percolation rate using the “Porchet Method”.

$$It = \frac{\Delta H \quad 60 \quad r}{\Delta t \; (r + 2 \; Havg)}$$

Where

It = Tested infiltration rate, inches/hour

ΔH = change in head over the time interval, inches

Δt = time interval, minutes

r = effective radius of test hole

$H\ avg$ = average head over the time interval, inches

For a percolation rate of 240 min/in, using the above formula, the infiltration rate obtained is

0.23 in/hr.

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="3">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Worksheet C.4-1</th></tr>
<tr><td colspan="5">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?</td></tr>
<tr><td>Criteria</td><td colspan="2">Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td colspan="2">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.</td><td></td><td>✓</td></tr>
<tr><td colspan="5">Provide basis:
The site is underlain by the Very Old Paralic Deposit #8, formerly known as the Lindavista Formation. The Lindavista Formation consists of very dense, cemented reddish brown silty sands which are practically impermeable. Low infiltration rate of 0.23 in/hr. was obtained.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>2</td><td colspan="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.</td><td></td><td>✓</td></tr>
<tr><td colspan="5">Provide basis:
Infiltration greater than 0.5 inches per hour cannot be allowed without increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

Worksheet C.4-1 Page 2 of 4

Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		

Provide basis:

No shallow groundwater was encountered on site. Groundwater level is in excess of 10 feet below existing ground surface.

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

Criteria	Screening Question	Yes	No
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		

Provide basis:

Infiltration greater than 0.5 inches per hour cannot 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.

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

Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

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

Provide basis:

The site is underlain by the Very Old Paralic Deposit #8, formerly known as the Lindavista Formation. The Lindavista Formation consists of very dense, cemented reddish brown silty sands which are practically impermeable. Low infiltration rate of 0.23 in/hr. was obtained.

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

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

Provide basis:

Even if acceptable infiltration rates are obtained, the close proximity of the bio-infiltration basin to the proposed structure will cause hydro-consolidation of the foundation.

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

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
Infiltration in any appreciably quantity cannot be allowed without posing significant risk For groundwater related concerns.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
Infiltration in any appreciably quantity cannot be allowed without violating downstream water rights
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.
If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

November 1, 2016

CLIMATE ACTION PLAN (CAP)

Consistency Checklist Introduction
2828-2834 Broadway, San Diego CA 92101

Step 1: Land Use Consistency.

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

The project site is located at 2828-2834 Broadway within the GHPD-GH-600 zone, the Residential Tandem Parking Overlay Zone, the Transit Area Overlay Zone and is within the Greater Golden Hill Community Plan (GGHCP) Area. The zoning designation is a multi-family residential zone that requires 600 square feet of lot area per dwelling unit. The GGHCP designates the project site as High Residential Land Use at 44-73 dwelling units per acre (DU/AC). The project site, occupying 0.361-acres could accommodate 26 DU on the underlying zone and between 16 to 26 DU based on the community plan. The project proposes 26 base density dwelling units and an Affordable Housing Density Bonus of 8 dwelling units which is consistent with the land use designation and density with additional density allowed under the affordable Housing Density Bonus provision in SDMC Chapter 14, Article 3, Division 7.

The project proposes the demolition of an existing 4-unit apartment building and together with the adjacent vacant site, the construction of a three-story, 22,487 square foot, 34-unit residential apartment complex totalling 15,750 square feet with parking for 32 cars, 1 electric vehicle charging station 2 motorcycles, 14 bicycle spaces and associated site improvements, including improvements to the adjacent alleys. The 34 multi-family dwellings will consist of 20 one-bedroom apartments and 14-studio apartments located over 3 floors with underground enclosed parking. As a component of the proposed project, the structure incorporates a roof-mounted photovoltaic system consisting of solar panels to generate at least 50% of the projects' projected energy consumption, in conformance with the criteria of the Affordable/In-Fill Housing and Sustainable Expedite Program.

The project is consistent with the recommended land use, design guidelines, and development standards in effect for this site per the adopted GGHCP, the GHPD, SDMC and the TPA.

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

The proposed development is compatible with existing and planned land uses on adjoining properties, per the GHPD and the adopted GGHCP which recommends "High intensity residential development is recommended along the Broadway corridor and in adjacent areas already experiencing density increases. Higher density is appropriate along transit corridors because it permits greater numbers of residents to live near routes which provide direct access from their community to other communities, thus reducing through traffic on local neighborhood streets."

The project proposes the demolition of an existing 4-unit apartment building and together with the adjacent vacant site, the construction of a three-story, 22,487 square foot, 34-unit residential apartment complex totaling 15,750 square feet with parking for 32 cars, 1 electric vehicle charging station, 2 motorcycles, 14 bicycle spaces.

The site is located on the adjacent block of a high frequency bus route along C Street and is located 3 miles from the center of Downtown San Diego, and 1 mile from Balboa Park. Numerous cultural, community, shopping and sporting facilities and schools are all located within walking distance from the proposed project. The site is part of an Urbanized Community and the project is consistent with the recommended land use, design guidelines, and development standards

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in effect for this site per the adopted GGHCP, the GHPD, SDMC and the General Plan Mobility Element in Transit Priority Areas.

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

The design of the proposed buildings provides an improved pedestrian connection between the building and the street. Visible pedestrian access is provided from the building to the main street – Broadway, and pedestrian access is also provided to the rear alley. Improvements are proposed to the alleys to provide secure pathways for additional pedestrian connections.

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

The project is located an Urbanized community with an established network of bicycle lanes. The project will provide safe, convenient, and adequate short- and long-term bicycle parking facilities. A secured area measuring 9' by 24', accessed directly of the existing alley will provide for 14 bicycle spaces to meet the City's minimum requirement, with room to double the bicycle spaces should the demand increases.

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

The proposed development is compatible with existing and planned land uses on adjoining properties, per the GHPD and the adopted GGHCP which recommends "High intensity residential development is recommended along the Broadway corridor and in adjacent areas already experiencing density increases. Higher density is appropriate along transit corridors because it permits greater numbers of residents to live near routes which provide direct access from their community to other communities, thus reducing through traffic on local neighborhood streets."

The project proposes the demolition of an existing 4-unit apartment building and together with the adjacent vacant site, the construction of a three-story, 22,487 square foot, 34-unit residential apartment complex totaling 15,750 square feet with parking for 32 cars, 1 electric vehicle charging station, 2 motorcycles, 14 bicycle spaces.

The site is located on the adjacent block of a high frequency bus route along C Street and is located 3 miles from the center of Downtown San Diego, and 1 mile from Balboa Park. Numerous cultural, community, shopping and sporting facilities and schools are all located within walking distance from the proposed project. The site is part of an Urbanized Community and the project is consistent with the recommended land use, design guidelines, and development standards in effect for this site per the adopted GGHCP, the GHPD, SDMC and the General Plan Mobility Element in Transit Priority Areas.

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

The project proposes new Jacaranda Mimosifolia street trees providing generous 25-40 canopies as well as similar generous canopied trees on the site itself. The proposed project will therefore incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal.

Step 2.:CAP Strategies Consistency.

1. Cool/Green Roofs. (Sheet A1.08)

The project will propose roof materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index as per Attachment A:

Roof Slope: 0.55 Min. 3-year aged solar reflectance
0.75 Thermal emittance
64 Solar Reflective index.

2. Plumbing Fixtures and Fittings.

The following low-flow fixtures/appliances will be provided:

- 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.

3. Energy Performance Standard/Renewable Energy.

The project will propose roof mounted photo-voltaic solar panels which is intended to provide a min. 15% improvement in performance standard when compared to Title 24, Part 6 Energy Budget for the Proposed Design Building as calculated by Compliance Software certified by the California Energy Commission.

4. Electric Vehicle Charging.

The project will propose 1 parking space (equivalent to 3% of total parking spaces) will be provided to support future Electric Vehicle Charging Station (EVCS). The proposed EVCS will be provided in the basement (see Sheet A1.04) The EVCS will have the necessary electric vehicle supply equipment installed to provide active electric charging station ready for use by residents.

5. Bicycle Parking Spaces.

The project will provide more short and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5).
In accordance with Table 142-05C, the bicycle spaces required is 13.6 spaces, based on 0.4 spaces per 1bed/studio. The bicycle spaces are provided in a dedicated room measuring 9-feet by 24-feet (see Sheet A1.05), which leaves for ample room to double the bicycle storage capacity in the future.

6. Shower Facilities:

This section is not applicable, as the project does not propose non-residential uses.

7. Designated Parking Spaces:

This section is not applicable, as the project does not propose non-residential uses.

8. Transportation Demand Management Program

This section is not applicable, as the project does not propose non-residential uses.

Kind regards,

Pauly De Bartolo & Ivan Rimanic
partners

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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.

Questions pertaining to the Checklist should be directed to Development Services Department at 619-446-5000.

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[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.

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: 456328 / TWENTY-EIGHT.
Property Address: 2828 – 2834 BROADWAY, SAN DIEGO CA 92102.
Applicant Name/Co.: DBRDS (PAUL DE BARTOLO)
Contact Phone: 858 220-5262. Contact Email: pauly@dbrds.com
Was a consultant retained to complete this checklist? ☐ Yes ☑ No If Yes, complete the following
Consultant Name: Contact Phone:
Company Name: Contact Email:

Project Information

1. What is the size of the project (acres)? 0.36 AC (15,750 sf.)
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units):
   - ☑ Residential (indicate # of multi-family units):
   - ☐ Commercial (total square footage):
   - ☐ Industrial (total square footage):
   - ☐ Other (describe):
3. Is the project located in a Transit Priority Area? ☑ Yes ☐ No
4. Provide a brief description of the project proposed:

34 MULTI-FAMILY APARTMENTS, OF WHICH 3 WILL BE AFFORDABLE (VERY LOW INCOME) HOUSING OVER BASEMENT (30 PARKING SPACES) AND 3 LEVELS WITH 32 TOTAL PARKING SPACES PROVIDED.

---

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

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

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

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

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

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

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

Step 2: CAP Strategies Consistency

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

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.	☑	☐	☐
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.	☑	☐	☐

---

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

Step 2: CAP Strategies Consistency

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

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

Step 2: CAP Strategies Consistency

Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A

- Non-residential projects: If the project includes new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A, would 3% of the total parking spaces required, or a minimum of one space, 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? Of the total listed cabinets, boxes or enclosures provided, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use?

Check "N/A" only if the project is does not include new commercial, industrial, or other uses with the building or land area, capacity, or numbers of employees listed in Attachment A.

Strategy 3: Bicycling, Walking, Transit & Land Use
(Complete this section if project includes non-residential or mixed uses)

5. *Bicycle Parking Spaces*

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

Check "N/A" only if the project is a residential project.

Yes ☑ No ☐ N/A ☐

6. *Shower facilities*

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

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).

Yes ☐ No ☐ N/A ☑

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

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

7. *Designated Parking Spaces*

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

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

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

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

Check "N/A" only if the project is a residential project, or if it does not include an employment use in a TPA.

</td><td>☐</td><td>☐</td><td>☑</td></tr>
<tr><td>

8. *Transportation Demand Management Program*

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

At least one of the following components:

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

And at least three of the following components:

- Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees
- On-site carsharing vehicle(s) or bikesharing
- Flexible or alternative work hours
- Telework program
- Transit, carpool, and vanpool subsidies

</td><td>☐</td><td>☐</td><td>☑</td></tr>
</table>

Step 2: CAP Strategies Consistency

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

Step 3: Project CAP Conformance Evaluation (if applicable)

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

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

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

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

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

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

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

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

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

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

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

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

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

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)

Table 4 Size-based Trigger Levels for Electric Vehicle Charging Requirements for Non-Residential Buildings related to Question 10: Electric Vehicle Charging supporting Strategy 3: Bicycling, Walking, Transit & Land Use of the Climate Action Plan.

Land Use Type	Size-based Trigger Level
Hospital	500 or more beds OR Expansion of a 500+ bed hospital by 20%
College	3,000 or more students OR Expansion of a 3,000+ student college by 20%
Hotels/Motels	500 or more rooms
Industrial, Manufacturing or Processing Plants or Industrial Parks	1,000 or more employees OR 40 acres or more of land area OR 650,000 square feet or more of gross floor area
Office buildings or Office Parks	1,000 or more employees OR 250,000 square feet or more of gross floor area
Shopping centers or Trade Centers	1,000 or more employees OR 500,000 square feet or more of gross floor area
Sports, Entertainment or Recreation Facilities	Accommodate at least 4,000 persons per performance OR Contain 1,500 or more fixed seats
Transit Projects (including, but not limited to, transit stations and park and ride lots).	All

Source: Adapted from the Governor's Office of Planning and Research's (OPR's) Model Building Code for Plug-In Electric Vehicle Charging

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition — **Worksheet C.4-1**

Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

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

Provide basis:

Reliable infiltration rate of 0.12 in/hr. was obtained. Based on this rate, full infiltration is not feasible.

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

Criteria	Screening Question	Yes	No
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		

Provide basis:

Geologic hazard associated with full infiltration has not been investigated as Per Appendix C, Sec. C.1

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

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
Geologic hazard associated with groundwater contamination has not been Investigated as per Appendix C, Sec. C.1
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
Geologic hazard associated with potential water balance issues has not been Investigated as per Appendix C, Sec. C.1
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td>If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration
If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2</td><td colspan="2"></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

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

Provide basis:

Reliable infiltration rate of 0.12 in/hr. was obtained. Based on this rate, 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.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	

Provide basis:

Partial infiltration can be allowed without increasing risk of geotechnical hazards. Lining of basin side adjacent to building foundation is recommended to minimize potential migration of water from infiltration basin beneath the building foundation.

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

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:
Partial infiltration can be allowed without posing significant risk for groundwater related concerns.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:
Partial infiltration can be allowed with no downstream water rights violated.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.
If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td></td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

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ROBERT CHAN, P.E.

GEOTECHNICAL INVESTIGATION

PROPOSED MULTI-FAMILY BUILDING SITE

2828/2834 BROADWAY

SAN DIEGO, CALIFORNIA

FOR

EA RENOVATION, INC.

PROJECT NO. 16-1289E3

MARCH 22, 2016

ALLIED EARTH TECHNOLOGY
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ROBERT CHAN, P.E.

March 21, 2106

EA Renovations, Inc.
5841 Mission Gorge Road
San Diego, CA. 92120

Subject : Project No. 16-1268E3
Geotechnical Investigation
Proposed Multi-Family Apartmentt Building Site
2828/2834 Broadway
San Diego, California

Gentlemen :

In accordance with your request, we have completed the geotechnical investigation for the proposed multi-family building site on subject property, more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547 (APN 539-522-25 and 26-00), in the City and County of San Diego, State of California.

We are pleased to submit the accompanying geotechnical investigation report to present our findings, conclusions and recommendations relative to the proposed development of the site.

The geotechnical investigation was conducted under the supervision of the undersigned. The scope of our investigation included field exploration, laboratory testing and soil engineering analysis.

No major adverse geotechnical conditions were encountered which would prohibit the currently proposed development of the site.

This opportunity to be of service is sincerely appreciated. Should you have any questions, please do not hesitate to contact our office.

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

ROBERT CHAN
No. C-24613
Exp. 12/31/17

ROBERT CHAN
No. G-00198
Exp. 12/31/17

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ROBERT CHAN, P.E.

March 21, 2016

GEOTECHNICAL INVESTIGATION

INTRODUCTION

This report presents the findings and conclusions of a geotechnical investigation conducted at the site of a proposed 34 multi-family apartment building on subject property, located at 2828 and 2834 Broadway, in the City and County of San Diego, State of California.

Subject property is more specifically referred to as being Lot Nos. 33 to 36, inclusive, and the W ½ of Lot No. 37, in Block No. 64, of E.W. Morse's Subdivision of Pueblo Lot No. 1150, according to Map thereof No. 547, filed in the Office of the County Recorder of San Diego County on December 30, 1871 (APN 539-522-25, and 26-00).

The location of the property is shown on Figure No. 1, entitled, "Site Location Map".

DESCRIPTION OF PROJECT

It is our understanding that the existing residential structures on the east half of the property are to be demolished to accommodate a 34-unit multi-family apartment building. The proposed structure will be three stories over parking garages; of wood-frame/stucco and slab-on-grade construction.

SCOPE OF WORK

The objectives of the investigation were to inspect and determine the subsurface geotechnical conditions and certain physical engineering properties of the soils beneath the site, and to evaluate any potential adverse geotechnical conditions that could affect the proposed project, in order that engineering recommendations could be presented relative to the safe and economical development of the site; and checking and design of foundation for the proposed structure.

In order to accomplish these objectives, three exploratory trenches were excavated and inspected, and representative samples of the subsurface soils were collected for laboratory testing and analysis.

The data derived from the field observations and laboratory test results were reviewed and analyzed, and a summary of our preliminary findings, opinions and recommendations is presented in this report.

FIELD INVESTIGATION

The field exploratory phase of our investigation was performed on March 3, 2016. and involved a reconnaissance of the site, and the excavation of three exploratory trenches with a tractor-mounted backhoe equipped with a 24-inch bucket.

The exploratory trenches were excavated at accessible locations on the vacant west half of the property (2828 Broadway) where the most useful information relative to subsurface soil conditions may be obtained. The exploratory trenches were excavated to depths varying from 6 to 9 feet below existing ground surface.

The location of the exploratory trenches is shown on Figure No. 2, entitled, "Approximate Location of Exploratory Trenches".

The trenching operation was performed under the direction of our field personnel, and a continuous log of the soil types encountered in the trenches was recorded at the time of excavation, and is shown on Figure Nos. 3 to 5, inclusive, each entitled, "Trench Log Sheet".

The soils were visually and texturally classified by the field identification procedures set forth on the Unified Soil Classification Chart. Representative samples were obtained and the in-situ densities of the soils encountered were determined at various depths in the trenches.

LABORATORY TESTS

The samples collected during our field investigation were subjected to various tests in the laboratory to evaluate their engineering characteristics. The tests were performed in accordance with current A.S.T.M. testing standards or other regulatory agency testing procedures. A summary of the tests that were performed and the final test results are presented in Appendix II hereto.

The tests that were performed included determinations of the maximum dry densities and optimum moisture contents; the sulfate contents and Expansion Indices of the soils encountered.

SITE DESCRIPTION

Subject property is a rectangular-shaped property of 0.36 acres, situated on the north side of Broadway, between 28th and 29th Streets. The property consists of two level building pads at the same elevation as the adjacent alley to the north. Along Broadway, a 10-foot high cut slope ascends up to the building pads. Along the west side the cut slope tapers down in a northerly direction. An apartment complex occupies the adjacent property to the east, at approximately the same elevation as the on-site building pads.

On subject property, an apartment building (2834 Broadway) currently occupies the east half of the site. A small apartment building (2828 Broadway) previously occupy the north end of the west half of the property. At the time of our site investigation, this structure had been demolished, and the debris hauled away off-site. Currently the west half of the property is vacant.

This Golden Hill area of the City of San Diego in which the property is situated is fully developed. The property is bordered on the north and west by alleys; on the south by Broadway; and on the east existing apartment buildings.

PROPOSED SITE DEVELOPMENT

Site development will consist of the demolition of the existing structure at 2834 Broadway, and the construction of a 3-story apartment building over a subterranean garage, with access from the alley to the west. The proposed structure will be of wood-frame/stucco and slab-on-grade construction.

GENERAL GEOLOGY AND SUBSURFACE SOIL CONDITIONS

Regional Geology

The subject property is located within the southern coastal strip region of the Peninsular Range Geomorphic Province of California. This geomorphic province is characterized by mountainous terrain to the east composed mostly of Mesozoic igneous and metamorphic rocks and relatively low-lying coastal terraces to the west underlain by late Cretaceous, Tertiary and Quaternary sedimentary rocks. The Golden Hill area of the City of San Diego, including the site, occurs within the westerly region, and is underlain by Quaternary sedimentary rocks.

Site Geology and Subsurface Soil Conditions

A review of geologic maps as well as observations made during our subsurface exploration indicated that the general area is underlain by the Quaternary Very Old Paralic Deposits Unit No. 8 (formerly Lindavista Formation). On subject property, these Very Old Paralic Deposits were encountered in the form of dense to very dense, cemented reddish brown silty sands with abundant cobbles to 4 inches in diameter. Refusal in these very dense very old paralic deposits were encountered at depths of 6 to 8 feet below existing ground surface. The Very Old Paralic Deposits were overlain by a 2 to 3 feet residual/topsoil cap of silty sands and sandy clays.

Tectonic Setting

No evidence of faulting was noted during our surface reconnaissance or in our exploratory trenches. A review of available geologic literature did not reveal any major faulting in the area. It should be noted that much of southern California, including the City of San Diego, is characterized by a series of Quaternary-age fault zones which typically strike in a northerly to northwesterly direction. Some of these fault zones (and the individual faults within the zone) are classified as active while others are classified as only potentially active according to the criteria of of the California Division of Mines and Geology.

A review of available geologic maps indicate that the subject property is not within an Alquist-Priolo Special Studies Zone. No known or previously mapped fault cross the site or projects toward the site, and no evidence of active or potentially active faulting were encountered in the exploratory trenches.

A review of available geologic maps indicate that the subject property is approximately 9.6 km (6.0 miles) from the Rose Canyon Fault zone, and 70 km (43.8 miles) from the Elsinore-Julian Fault zone.

GROUNDWATER

No groundwater was encountered in the exploratory trenches to the maximum depth of exploration at 8 feet, and no seepage was observed on the 10-foot high cut slope along Broadway. No major groundwater related problems, either during or after construction, are anticipated. However, it should be recognized that minor seepage problems may occur after development of a site even where none were present before development. These are usually minor phenomena and are often the results of an alteration of the permeability characteristics of the soils; an alteration in drainage patterns due to grading; and an increase in the use of irrigation water. Based on the permeability characteristics of the soils and anticipated usage of the development, it is our opinion that any seepage problems which may occur will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they develop.

GEOLOGIC HAZARDS

Ground shaking – The most likely geologic hazard to affect the site is ground shaking as a result of movement along one of the active fault zones mentioned above.

For seismic design purposes, soil parameters in accordance with the 2013 edition of the California Building Code were determined, and presented hereinafter.

Surface Rupture - Surface rupture is the result of movement of an active fault reaching the surface. No faults were observed during our investigation of the site.

Based on our observations, experience and review of the referenced geotechnical and geologic literature, it is our opinion that there is little probability of surface rupture due to faulting beneath the site. However, lurching and ground cracking are a possibility as a result of a significant seismic event on a regional active fault.

Liquefaction Potential - In consideration of the competent formational soils underlying the site; the soil types encountered; depth to groundwater and the distance from an active fault zone, it is our opinion that soil liquefaction does not present a significant geotechnical hazard to the proposed site development.

Landslides – Subject property is located in an area of relatively level terrain. A review of available geologic maps did not reveal the presence of any ancient landslides on subject or adjacent properties. The potential for landslides on subject and adjacent properties is considered minimal.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

General

1. Based on the results of the investigation, it is our opinion that the currently

proposed site development is feasible from a geotechnical engineering standpoint, provided that the recommendations presented in this report are incorporated into the design plan(s) and are properly implemented during the construction phase.

2. It is noted that some of the recommendations may have to be modified and supplemental recommendations may have to be presented, depending on the actual subsurface conditions encountered during construction.

3. Site grading and earthwork constructions will not impact the adjacent properties provided our recommendations are incorporated into the final designs and implemented during the construction phase. Additional field recommendations, however, may also be necessary and should be given by the project geotechnical consultant for the protection of adjacent properties and should be anticipated.

4. Prior to commencement of construction, a preconstruction conference should be held at the site with the owner, grading contractor, civil engineer and geotechnical engineer in attendance. Special soil handling and/or grading/improvement plans requirements can be discussed at that time.

Expansion Index of On-Site Soils

5. The clayey residual soils encountered on the site possess high expansion potential (Expansion Index = 95); while the silty sands of the Very Old Paralic Deposits possess Low expansion potential (Expansion Index = 25).

Sulfate Content of On-Site Soils

6. The soils encountered on the site are subject to negligible sulfate exposure (sulfate content of 75 ppm).

Grading

7. Site grading will consist primarily of excavation for the proposed basement garage. Existing on-site grades vary from 195 to 199 feet above mean seal level. The elevation of the proposed basement garage will be at 185.40, with excavation depths vary from 10 to 14 feet.

8. It is recommended that all earthwork be accomplished in accordance with the Grading Ordinance of the City of San Diego, current edition of the California Building Code, Appendix I attached hereto, entitled, "General Grading and Earthwork Specifications", and recommendations as presented in this Section.

9. Where the recommendations of this Section of the report conflict with those of Appendix I, this Section of the report takes precedence.

10. Grading should commence with the demolition of the existing structure and other improvements, including the asphaltic concrete pavement, and clearing and grubbing of the project site. All debris should be hauled away and disposed of offsite.

11. Approximately 5,000 cubic yards will be generated when excavation for the basement garage is completed. It is recommended that excess soils be exported from the site to a City approved dump site.

12. Any areas to receive fill soils should be properly prepared. The fill soils should be moistened, and uniformly compacted in lifts on the order of 6 to 8 inches until finished grade is achieved

13. All fill soils should be compacted to at least 90 percent of maximum dry density in accordance with ASTM D1557.

Foundation and Slab Design

14. It is recommended that a safe allowable soil bearing value of 3,000 pounds per square foot be used for the design and checking of continuous footings that are 12 inches in minimum horizontal dimension, and isolated pier footings that are 15 inches in minimum horizontal dimension; and are embedded at least 24 inches (for one to three stories) below the lowest adjacent exterior ground surface.

15. The above safe allowable soil bearing value may be increased 600 pounds per square feet for each additional foot of depth and width, to a maximum of 4,200 pounds per square foot.

16. The above safe allowable soil bearing value may be further increased by one-third when considering wind and/or seismic forces.

17. The settlements of foundation, when designed and loaded as outlined above, are expected to be less than 1 inch total and ¾ inch differential over a span of 40 feet.

18. It is recommended that our firm inspect the foundation trench excavations for the proposed structure to ensure proper embedment into competent formational soils. Any lenses or localize areas of clayey soils encountered in the foundation trench excavations should be removed.

19. It is recommended that all continuous footings be reinforced with a minimum of 4 #5 rebars; two rebars located near the top, and the other two rebars near the bottom of the footings. All isolated pier footings should be reinforced with a minimum of 2 #5 rebars in both directions, placed near the bottom of the footings.

20. The concrete slab-on-grade should be 5 ½ inches net in thickness, and be reinforced with #3 rebars @ 18 inches on center, placed at mid-height of concrete slab. The concrete slab should be underlain by 4 inches of clean sand. In areas to be tiled or carpeted, a 10-mil moisture barrier should be placed at grade and be overlain by one-inch of protective sand cover. This moisture barrier should be heavily overlapped or sealed at splices. Please note that the above foundation and slab reinforcement recommendations are based on soil characteristics, and should be superseded by the requirements of the project architect or structural engineer. architect.

21. The concrete compressive strength should be at least 3,000 psi.

22. 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 recommended slab thickness, with a maximum spacing of 15 feet, and should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials

23. To provide load transfer between adjacent pavement slab sections, a trapezoidal-keyed construction joint is recommended. As an alternative to the keyed joint, dowelling is recommended between construction joints. 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.

Temporary Excavation/Shoring

24. Temporary excavation varying from 10 to 15 feet will be required during the excavation for the basement garage. The temporary excavation may be excavated vertically for a height up to 5 feet. Above 5 feet, the temporary excavation may be flattened to a slope ratio of 1 : 1 (horizontal : vertical) or flatter.

25. The above recommendation assumes that there are no surcharge loads (such as existing buildings) within a distance behind the temporary excavation at least equal to the height of the excavation.

26. Due to the close proximity to the property line or existing building, temporary shoring will be required along the north side of the proposed building excavation; and along the east side at the north end where there is an existing structure close to the property line.

27. The temporary shoring should be designed by a licensed civil engineer and installed by specialty contractors with knowledge of the specific area soil conditions. It is recommended that the following lateral earth pressures be used for designing the shoring. It should be noted that in general, cantilever shoring is not recommended for excavations deeper than 15 to 20 feet, based on shoring deflection tolerances.

Cantilever Shoring System
Active pressure = 35 H (pcf)
Passive Pressure = 200h (psf)
H = wall height (active case) or h = embedment (passive case)

Retaining Wall Design

28. It is recommended that retaining walls be designed to withstand the pressure exerted by equivalent fluid weights given below :

Backfill Surface (horizontal : vertical)	Equivalent Fluid Pressure (pcf)
Level	35
2 : 1	50
1 ½ : 1	58

The above values assume that the retaining walls are unrestrained from movement, and have a granular backfill. For retaining walls restrained from movement at the top, such as basement retaining walls, an uniform horizontal pressure of 7H (where H is the height of the retaining wall in feet) should be applied in addition to the active pressures recommended above.

29. All retaining walls should be supplied with a backfill drainage system adequate to prevent the buildup of hydrostatic pressure. The subdrain should consist of one-inch gravel and a perforated pipe near the bottom of the retaining wall. The width of this subdrain should be at least 12 inches, and extend at least 2/3 height of the retaining wall. The subdrain should be enclosed in a geotextile fabric such as Mirafi 140N or equal.

30. All backfill soils behind the retaining wall should consist of soils having low expansion potential (Expansion Index < 50), and be compacted to at least 90 percent of maximum dry density in accordance with ASTM D1557.

Seismic Earth Pressure

31. Seismic earth pressure cn be taken as an inverted triangular distribution with Kh equal to 12h. This pressure is in addition to the static design wall load. The allowable passive pressure and bearing capacity can be increased by one-third in determining the stability of the retaining wall. A factor-of-safety of 1.2 can be used in determining the stability of the retaining wall under seismic conditions.

Lateral Loading

32. To resist lateral loads, it is recommended that the pressure exerted by an equivalent fluid weight of 320 pcf be used for footings or shear keys poured neat against competent natural or compacted fill soils. The upper 12 inches of material in areas not protected by floor slabs or pavements should not be included in the design for passive resistance. This value assumes that the horizontal distance of the soil mass extends at least 10 feet or three times the height of the surface generating the passive pressure, whichever is greater.

33. A coefficient of sliding friction of 0.35 may be used for cast-in-place concrete on competent natural or compacted fill soils. Footings can be designed to resist lateral loads by using a combination of sliding friction and passive resistance. The coefficient of friction should be applied to dead load forces only.

Seismic Coefficients

34. The seismic design factors were determined in accordance with the 2013 California Building Code, and presented below :

Site Coordinates : Latitude = 32.7161
Longitude = -117.1330
Site Class : = C
Spectral Response Acceleration
At Short Periods Ss = 1.157
Spectral Response Acceleration
At 1-second Period S1 = 0.445
Sms = FaSs = 1.157
Sm1 = FvS1 = 0.603
Sds = 2/3*Sms = 0.771
Sd1 = 2/3*Sm1 = 0.402

Concrete Flatwork

35. In consideration of the on-site soil conditions, it is recommended that concrete flatwork be a minimum of 3 ½ inches in thickness, and be reinforced with 6x6-W1.4xW1.4 (6x6-10/10) welded wire mesh, placed at mid-height of concrete slab. One inch expansion joints should be provided at 15-foot intervals, with ¼ inch weakened plane contraction joints at 5-foot intervals

Surface Drainage and Maintenance

36. Adequate drainage control and proper maintenance of all drainage facilities are imperative to minimize infiltration of surface water into the underlying soil mass in order to reduce settlement potential and to minimize erosion. The building pad should have drainage swales which direct storm and excess irrigation water away from the structures and into the street gutters or other drainage facilities. No surface runoff should be allowed to pond adjacent to the foundation of structures.

Grading and Foundation Plans Review

37. It is recommended that our firm review the final grading and foundation plans for the proposed site development to verify their compliance with our recommendations.

LIMITATION AND UNIFORMITY OF CONDITIONS

1. The preliminary findings and recommendations contained in this report pertain only to the site investigated and are based on the assumption that the soil conditions beneath the entire site do not deviate substantially from those disclosed in the exploratory trenches. If any variations or undesirable conditions are encountered during grading, or if the scope of the project differs from that

planned at the present time, our firm should be notified in order that supplemental recommendations can be presented, if necessary.

2. 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 presented herein are brought to the attention of the Project Architect and Engineer and are incorporated into the plans and specifications for the project. Furthermore, the Owner, or his representative, will also be responsible for taking the necessary measures to ensure that the Contractor and subcontractors properly carry out the recommendations in the field.

3. Professional opinions and recommendations presented in this report are based partly on our evaluation and analysis of the technical information gather during the study, partly on the currently available information regarding the proposed project, and partly on our previous experience with similar soil conditions and projects of similar scope. Our study has been performed in accordance with the minimum standards of car exercised by other professional geotechnical consultants currently practicing in the same locality. We do not, however, guarantee the performance of the proposed project in any respect, and no warranties of any kind, expressed or implied, are made or intended in connection with the study performed by our firm.

4. The findings and recommendations contained in this report are valid as of the

present date. However, changes in the conditions of the property could occur with the passage of time, whether they be due to natural processes or due to man-made actions on the subject and/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 of our control. Therefore, this report is subject to review by our firm and should not be relied upon after a period of two years.

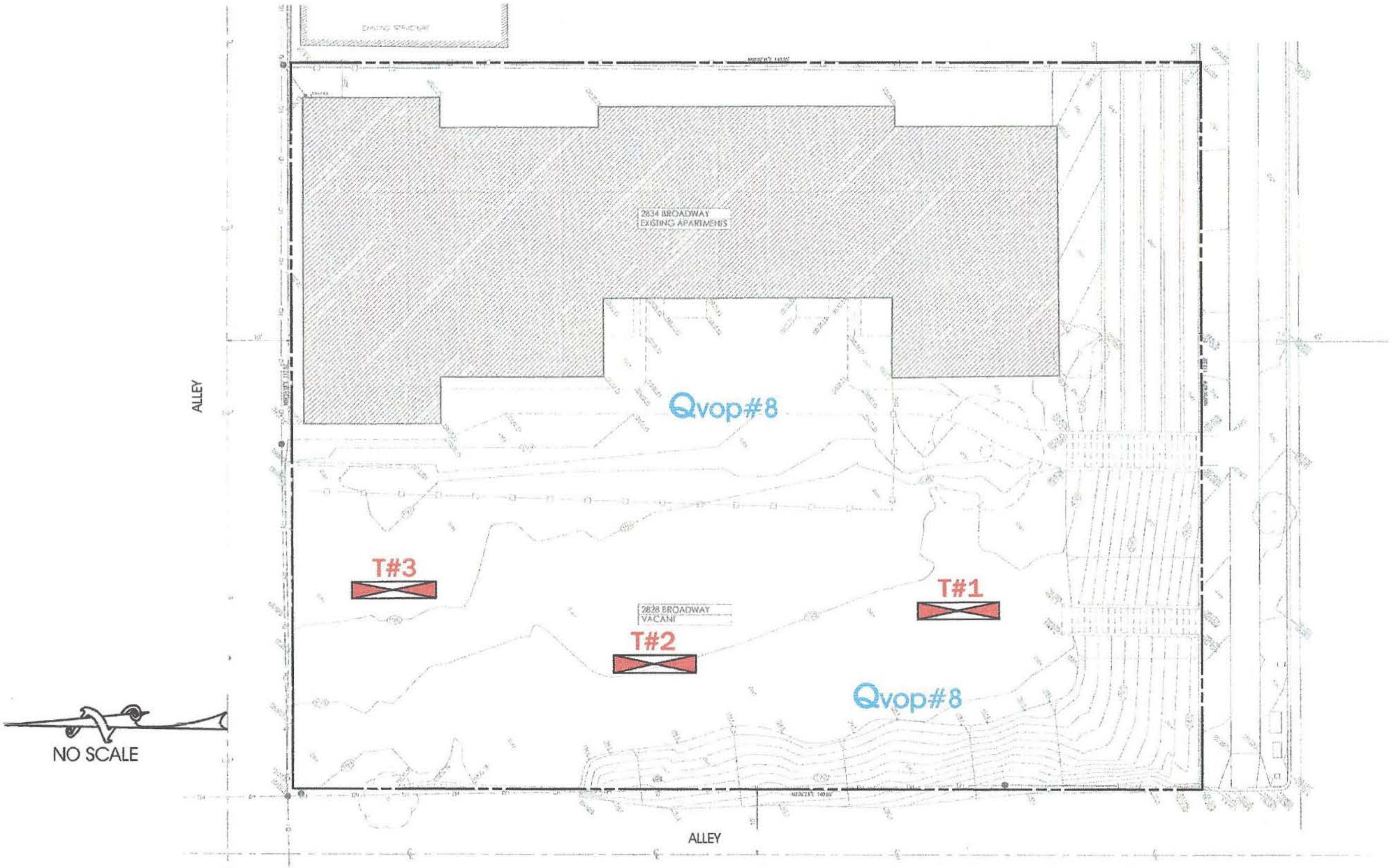
Figure Nos. 1 to 5, inclusive, and Appendix I, II and III are parts of this report.

SITE LOCATON MAP

NOT TO SCALE

PROJECT N0. 16-1289 E3

FIGURE N0.1



APPROXIMATE LOCATION OF EXPLORATORY TRENCHES

LEGEND

☒ APPROXIMATE LOCATION OF EXPLORATORY TRENCH

Qvop#8 VERY OLD PARALIC DEPOSIT#8

PROJECT N0. 16- 1289 E3

FIGURE N0.2

TRENCH LOG SHEET

TRENCH NO. 1
ELEV. 194'' msl

FT.	DESCRIPTION	SOIL TYPE
0	Light brown, damp, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
1		
2	①	
3		
4	Reddish brown, moist, dense, cemented (Very Old Paralic Deposit)	SILTY FINE SANDS (SM)
5	②	8.4*118.1*94.5%*
6		
7	Abundant cobbles to 4" dia. (30 to 45%)	
8		
9		

Bottom of Trench (Refusal in cementeded formational soils))

LEGEND

○ – Indicates representative sample
* – Indicates in-situ density test

TRENCH LOG SHEET

TRENCH NO. 2
ELEV. 195'' msl

FT.	DESCRIPTION	SOIL TYPE
0	Dark brown, moist, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
1		
2		
	Light brown/tan, moist, stiff	SANDY CLAY (CH)
3	①	
4		
	Reddish brown, most, dense, cemented	SILTY FINE SANDS (SM)
5	(Old Paralic Deposit)	
6	Very dense	

Bottom of Trench (Refusal in dense formational soils)

TRENCH LOG SHEET

TRENCH NO. 3
ELEV. 196’’ msl

	FT.	DESCRIPTION	SOIL TYPE
	0 1 2	Dark brown, moist, loose (Residual/topsoils)	SILTY FINE SANDS (SM)
	3 4	Light brown/tan, moist, stiff ①	SANDY CLAY (CH)
	5 6	Reddish brown, most, dense, cemented Abundant cobbles to 4 “ dia. (30%) (Old Paralic Deposit) ② Very dense	SILTY FINE SANDS (SM)

Bottom of Trench (Refusal in dense formational soils)

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ROBERT CHAN, P.E.

APPENDIX I

GENERAL GRADING AND EARTHWORK SPECIFICATIONS

1.0 General

1.1 All earthwork shall be accomplished in accordance with the Grading Ordinance of the City of San Diego; Chapter 18 and 18A, and Appendix J of the 2010 edition of the California Building Code; Appendix I hereinafter, and recommendations as presented in the Geotechnical Report.

1.2 These recommended grading and earthwork specifications are intended to be a part of and to supplement the Geotechnical Report(s). In the event of a conflict, the recommendations of the Geotechnical Report(s) will supercede these specifications. Observations during the course of earthwork operations may result in addition, new or revised recommendations that could supercede these specifications and/or the recommendations in the Geotechnical Report(s).

1.3 The Owner or his authorized representative shall procure the services of a qualified Geotechnical Consulting Firm, hereinafter to be referred to as the "Geotechnical Consultant" (often the same entity that produced the Geotechnical Report(s).

1.4 The Geotechnical Consultant shall be given a schedule of work by the Earthwork contractor for the subject project, so as to be able to perform required observations; testing and mapping of work in progress in a timely manner.

1.5 The work herein includes all activities from clearing and grubbing through fine grading. Included are trenching, excavating, backfilling compacting and grading. All work shall be as shown on the approved project drawings.

1.6 The Geotechnical Consultant or a qualified representative shall be present on the site as required, to observe, map and document the subsurface exposures so as to verify the geotechnical design suppositions. In the event that observed conditions are found to be significantly different from the interpreted conditions during the design phase, the Geotechnical

Consultant shall notify the Owner, recommend appropriate changes in the design to suit the observed conditions and notify the agenc(ies) having jurisdiction, where required. Subsurface areas to be geotechnically observed, mapped, record elevations or tested included cleared natural ground for receiving fill or structures, "remedial removal" areas, key bottoms and benches.

1.7 The guidelines contained herein and any standard details attached herewith represent this firm's recommendations for the grading and all associated operations on the subject project. These guidelines shall be considered to be a part of these Specifications.

1.8 If interpretation of these guidelines or standard details result in a dispute(s), the Geotechnical Consultant shall conclude the appropriate interpretation.

1.9 The Geotechnical Consultant shall observe the processing of subgrade and fill materials and perform the necessary compaction testing. The test results shall be provided to the Owner and the Contractor and if so required, to the agenc(ies) having jurisdiction.

1.10 The Geotechnical Consultant shall not provide "supervision" or any "direction" of work in progress to the Earthwork Contractor, or to any of the Contractor's employees or to any of the Contractor's agent.

1.11 The Earthwork Contractor : The Earthwork Contractor (contractor) shall be qualified, experienced and knowledgeable in earthwork logistics; preparation and processing of ground to receive fill, moisture conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the Owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the Owner and the Geotechnical Consultant of change in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The

Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications and the recommendations in the approved geotechnical report (s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soils, improper moisture conditions, inadequate compaction, insufficient buttress key size, adverse weather, etc. are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the Owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and grubbing : vegetation, such as brush, grass, roots, and other deleterious materials shall be sufficiently removed and properly disposed of in a method acceptable to the Owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lifts shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fine and/or imprisonment and shall not be allowed.

Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 9 and 10; 40 CRF; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

2.2 Any asphaltic pavement material removed during clearing operations should be properly disposed of at an approved off-site facility. Concrete fragments which are free of reinforcing steel may be placed in fills, provided that they are placed in accordance with Section 3.1 of this document.

2.3 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated conditions.

2.4 Processing : Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay humps or clods and the working surface is reasonable uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.5 Over-excavation : In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, Soft, loose, dry, saturated, spongy, organic-rich highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.6 Benching : Where fills are to be placed on ground with slopes steeper than 5 : 1 (horizontal : vertical), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5 :1 (horizontal :

vertical) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.7 Evaluation/Acceptance of Fill Areas : All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

3.0 **Fill Material**

3.1 General : Materials to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill materials.

3.2 Oversized Material : Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import : If importing of fill materials is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant as least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 **Fill Placement and Compaction**

4.1 Fill Layer : Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near vertical layers generally not exceeding

8 inches in thickness when compacted. The Geotechnical Consultant may accept thicker layers if testing indicates that the grading procedure can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning : Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill : After each layer has been moisture-conditioned, mixed and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes : In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increment of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum dry density per ASTM Test Method D1557.

4.5 Compaction Testing : Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing : Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the

Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations : The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 **Subdrain Installation**

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 **Excavation**

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechincal Consultant based on the field evaluation of exposed conditions during grading. Where fill-overcut slopes are to be graded, the cut portion of the slopes shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 **Trench Backfill**

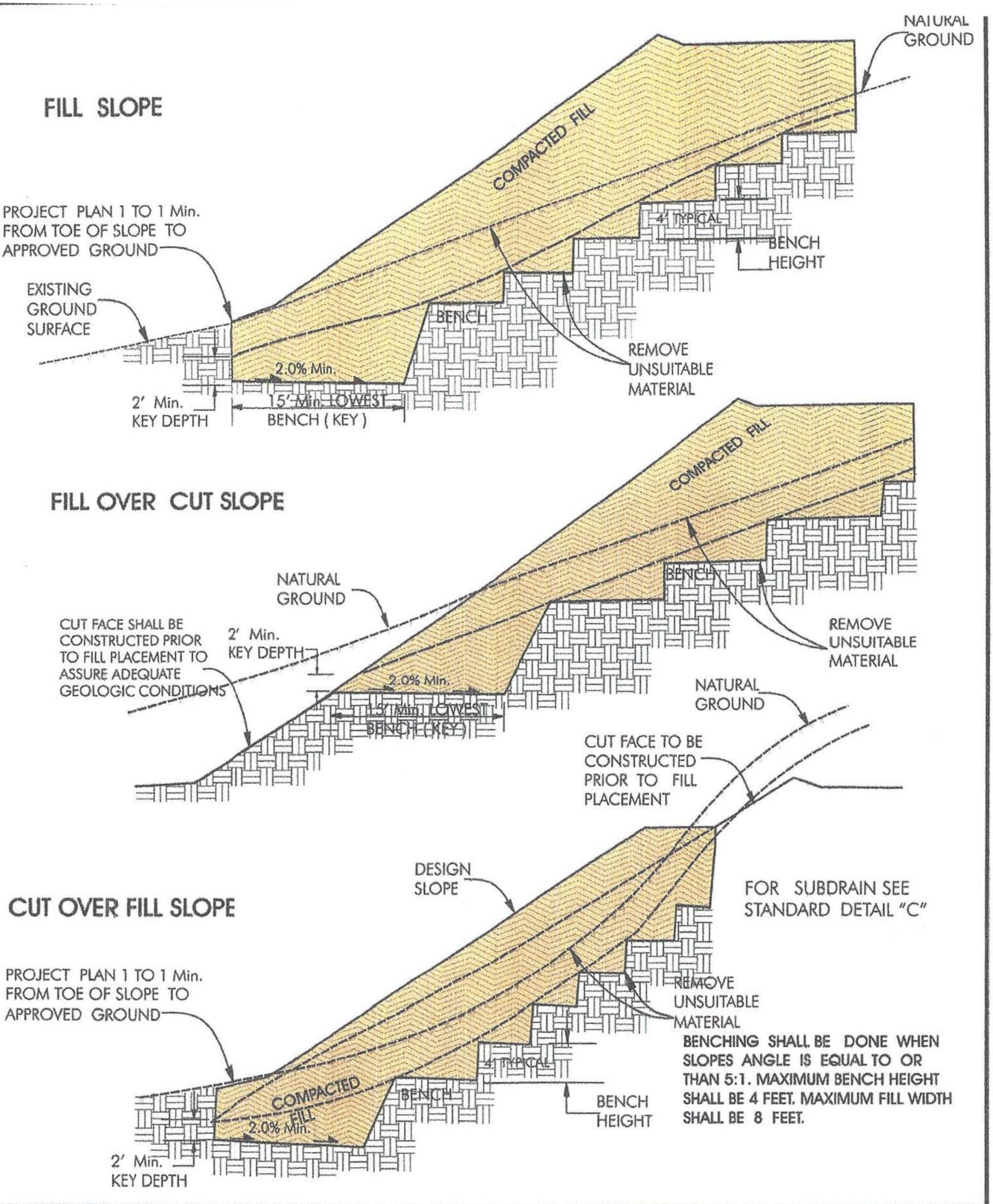
7.1 The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed and compacted to a minimum of 90 percent of maximum dry density from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.



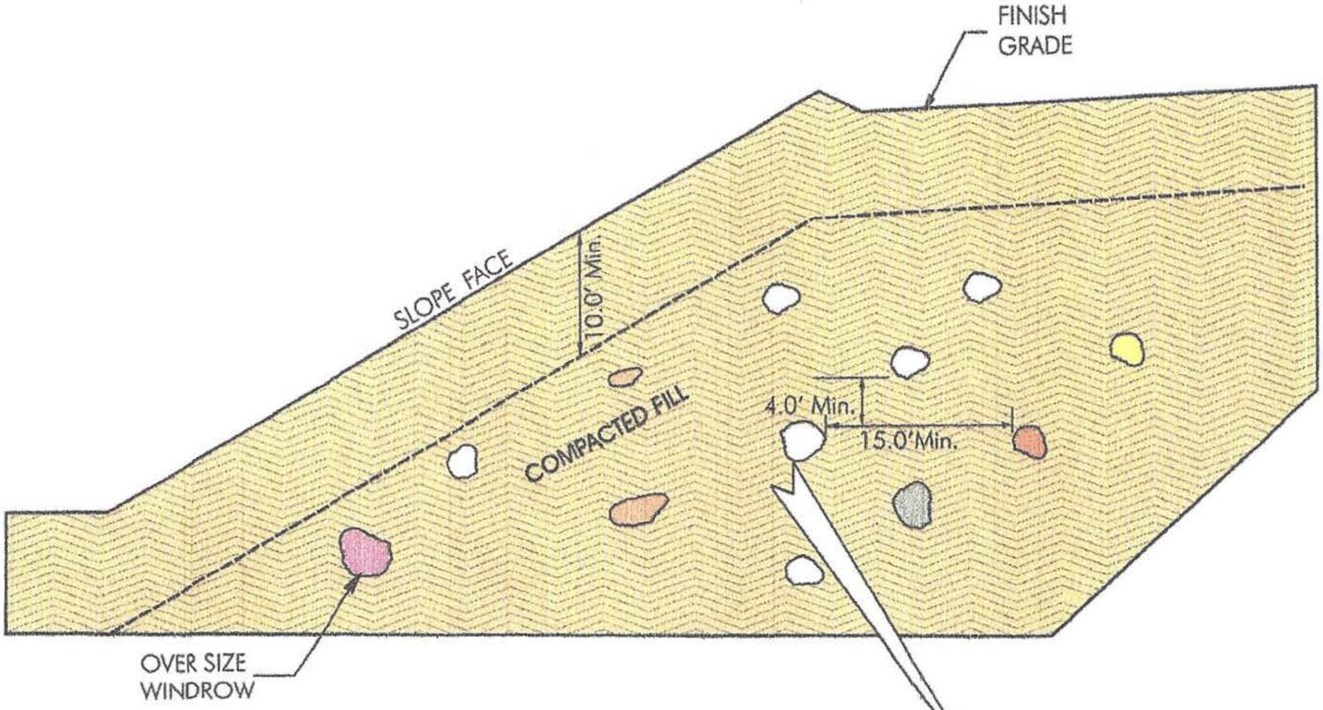
FOR SUBDRAIN SEE STANDARD DETAIL "C"

BENCHING SHALL BE DONE WHEN SLOPES ANGLE IS EQUAL TO OR THAN 5:1. MAXIMUM BENCH HEIGHT SHALL BE 4 FEET. MAXIMUM FILL WIDTH SHALL BE 8 FEET.

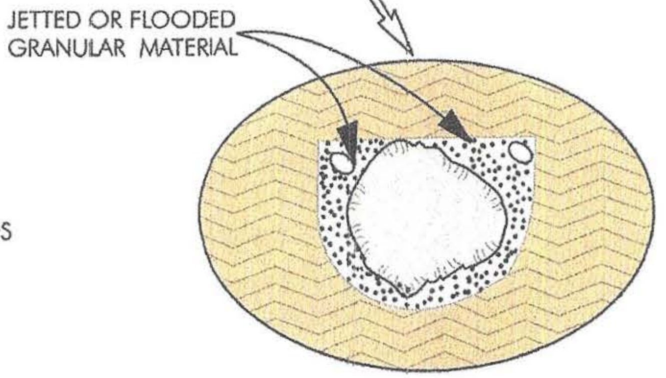
KEYING AND BENCHING

DETAIL A

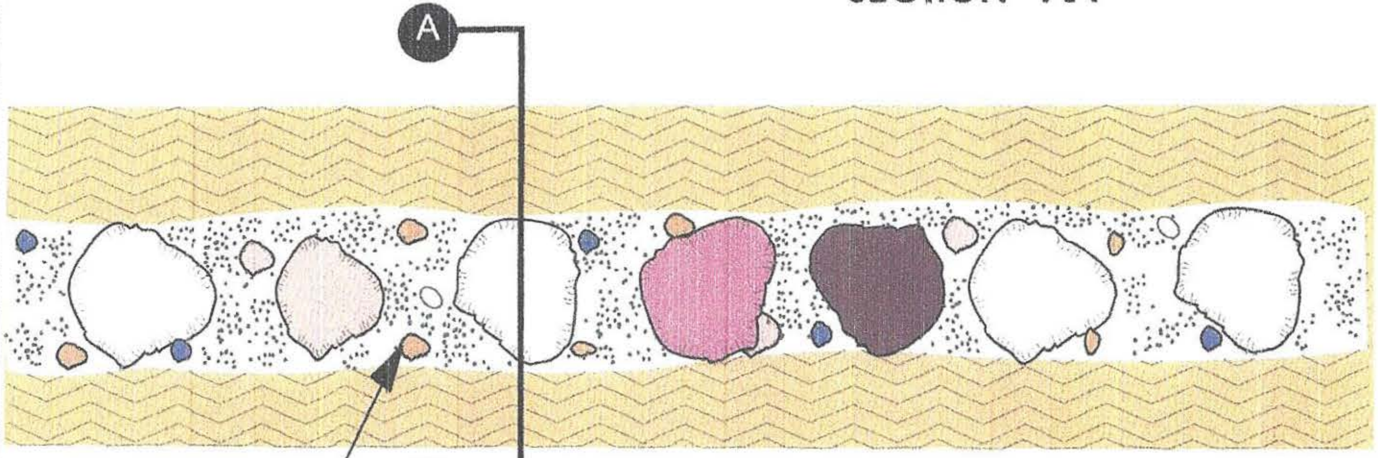
ALLIED EARTH TECHNOLOGY



- OVER SIZE ROCK IS LARGER THAN INCHES IN LARGEST DIMENSION
- EXCAVATE A TRENCH IN THE COMPACTED FILL DEEP ENOUGH TO BURY ALL THE ROCK
- BACKFILL WITH GRANULAR SOIL JETTED OR FLOODED IN PLACE TO FILL ALL THE ROCK VOIDS
- DO NOT BURY ROCK WITHIN 10 FEET OF FINISH GRADED.
- WINDROW OF BURIED ROCK SHALL BE PARALLEL TO THE FINISH SLOPE FILL.



SECTION "AA"

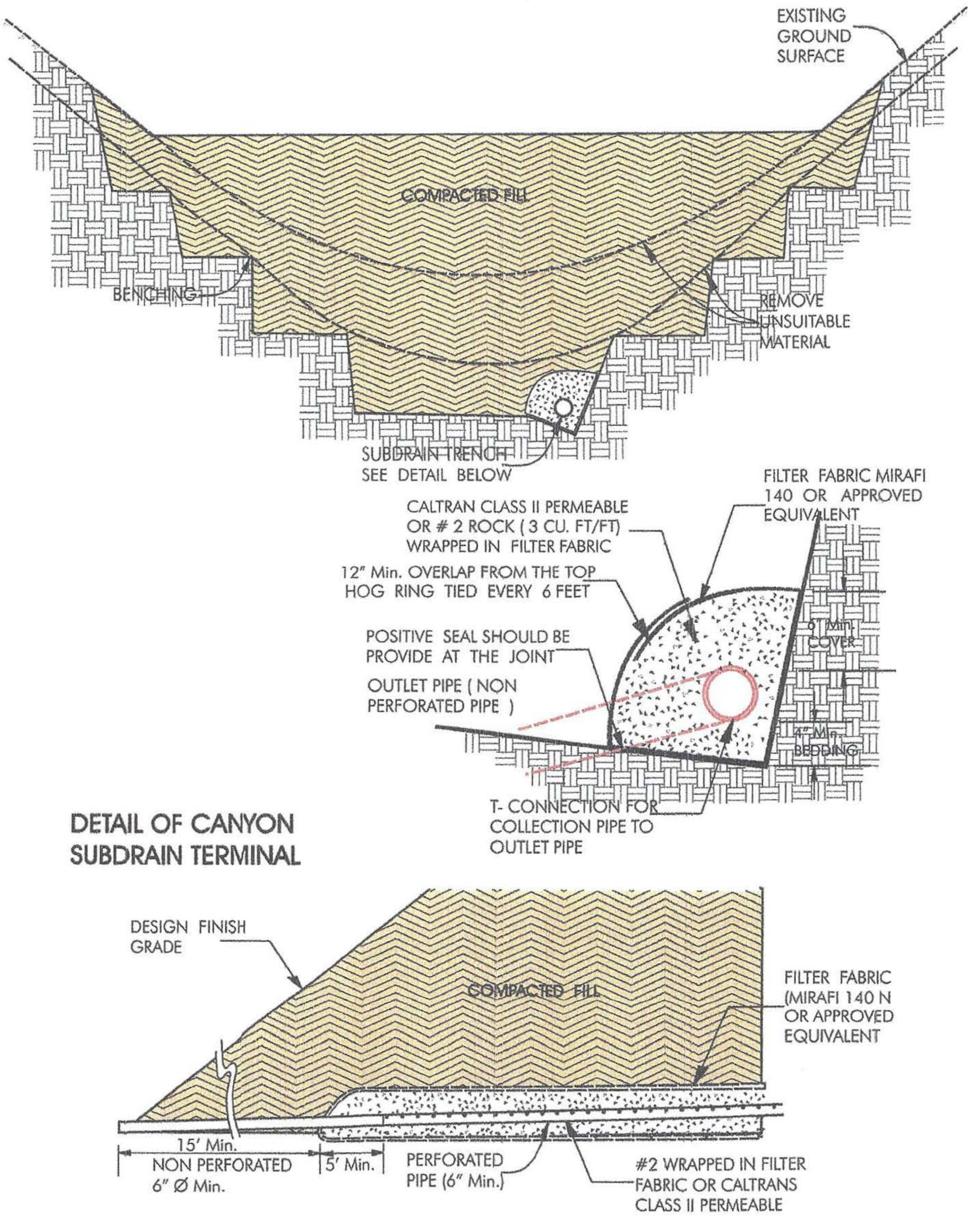


PROFILE ALONG WINDROW

OVER SIZE ROCK DISPOSAL

DETAIL B

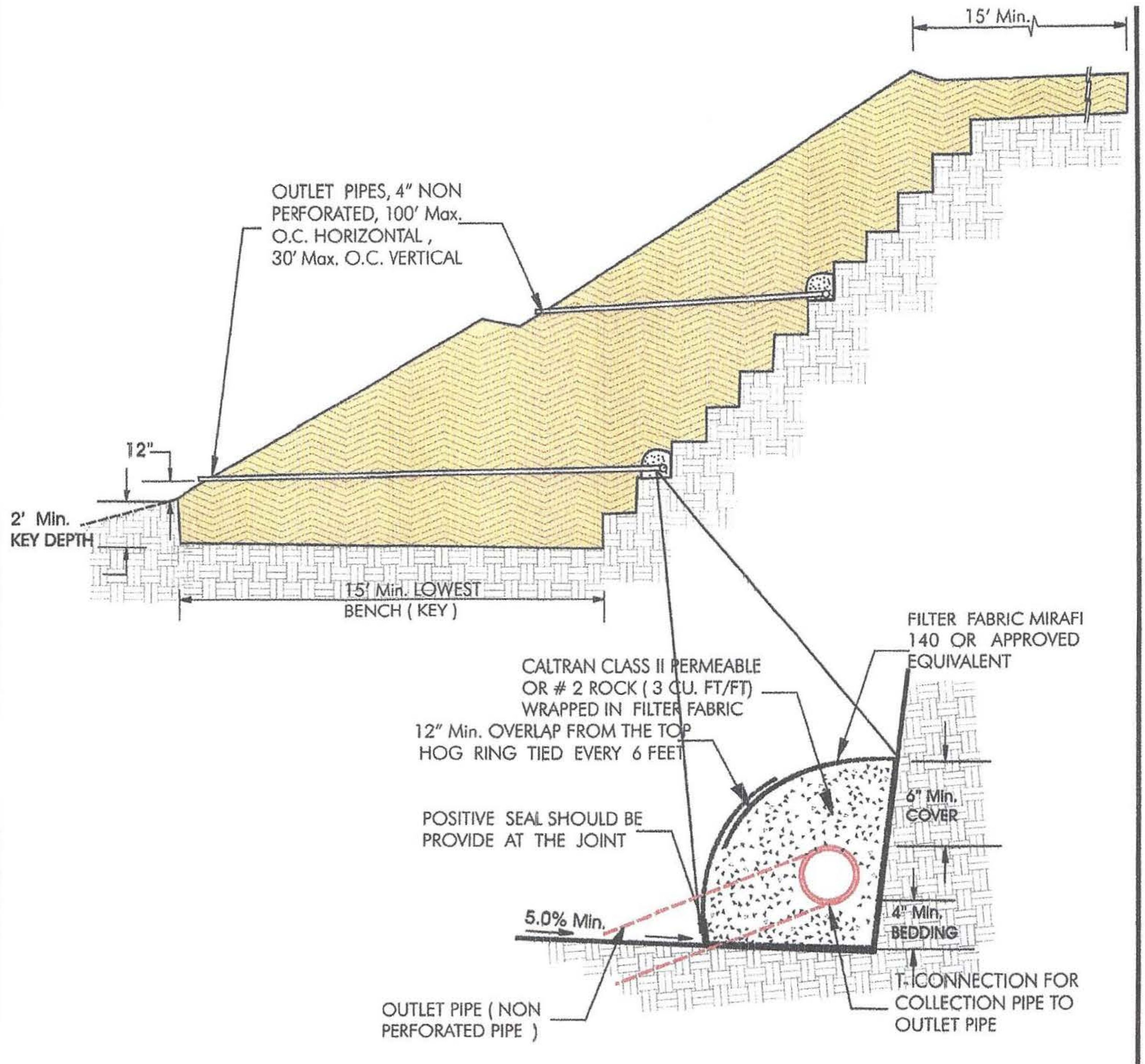
ALLIED EARTH TECHNOLOGY



CANYON SUBDRAIN DETALS

DETAIL C

ALLIED EARTH
TECHNOLOGY



SUBDRAIN INSTALLATION- SUBDRAIN COLLECTOR PIPE SHALL BE INSTALLED WITH PERFORATIONS DOWN OR UNLESS OTHERWISE DESIGNED BY THE GEOTECHNICAL CONSULTAN. OUTLET SHALL BE NON-PERFORATED PIPE. THE S UBDRAIN PIPE SHALL HAVE AT LEAST 8 PERFORATIONS UNIFORMLY SPACED PER FOOT. PERFORATION SHALL BE 1/4" TO 1/2" IF DRILLED HOLES ARE USED. ALL SUBDRAIN PIPES SHALL HAVE A GRADIENT AT LEAST 2% TOWARD THE OUTLET.

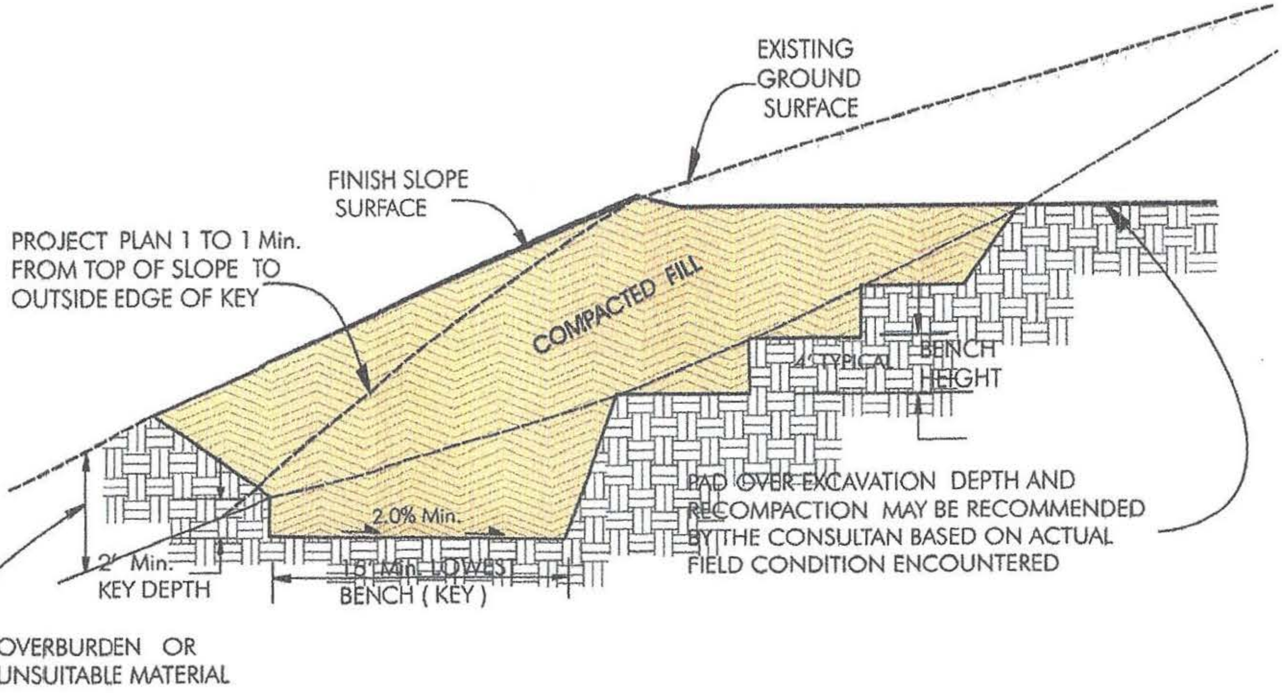
SUBDRAIN PIPES- SUBDRAIN PIPE SHALL BE ASTMD 2751, SDR 23.5 OR ASTMD 1527, SCHEDULE 40, OR ASTMD 3034, SDR 23.5, SCHEDULE 40 POLYVINYL CHORIDE PLASTIC (PVC) PIPE.

ALL OUTLET PIPE SHALL BE PLACED IN A TRENCH NO WIDER THAN TWICE THE SUBDRAIN PIPE, PIE SHALL BE IN SOIL OF SE>30 JETTED OR FLOODED IN PLACED EXCEPT FOR THE OUTSIDE 5 FEET WHICH BE NATIVE SOIL BACKFILL

BUTRESS OR REPLACEMENT
SUBDRAIN

DETAIL D

ALLIED EARTH
TECHNOLOGY



NOTE: SUBDRAIN DETAILS AND KEY WIDTH RECOMMENDATIONS TO BE PROVIDED BASED ON EXPOSED SURFACE CONDITIONS

HILLSIDE STABILITY FILL

DETAIL E

ALLIED EARTH
TECHNOLOGY

APPENDIX II

LABORATORY TEST RESULTS

1. The maximum dry density and optimum moisture content of the fill soils encountered were determined in accordance with A.S.T.M. D1557, Method A. The results of the tests are presented as follows :

	Soil Description	Maximum Dry Density (lbs./cu.ft.)	Optimum Moisture Content (% Dry Wt.)
Trench #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	125.0	9.5

2. The Expansion Index of the most clayey soils was determined in accordance with A.S.T.M. D4929-08. The results of the test are presented as follows :

	Soil Description	Expansion Index
Trench #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	25*
Trench #2 Sample #1 Depth 3.0'	Light brown/tan sandy clay (CH)	95**

*Considered to possess LOW expansion potential
** " HIGH "

APPENDIX II

LABORATORY TEST RESULTS (Cont'nd)

3. The sulfate content of the soils were determined in accordance with A.S.T.M. D516. The results are presented below :

	Soil Description	Sulfate Content (ppm)	
Boring #1 Sample #2 Depth 5.0'	Reddish brown silty fine sand (SM)	75	Negligible

APPENDIX III

REFERENCES

- California Building Code, Volumes 1 & 2, International Conference of Building Officials, 2013
- California Department of Conservation, Division of Mines and Geology (California Geological Survey), 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California, DMG Special Publication 117, 71p.
- De Bartolo Rimanic Design Studio - Building Plans – Proposed Multi-Family Apartments, 2828/2834 Broadway, San Diego, California.
- "Foundations and Earth Structures", Naval Facilities Engineering Command, DM 7.02
- "Green Book" Standard Specifications for Public Works Construction, Public Works Standards, Inc. 2003 Edition.
- Kennedy, Michael P. – Geology of the San Diego Quadrangle, San Diego County, California, California Department of Conservation, Division of Mines and Geology
- San Diego Association of Geologists- Geotechnical Engineering Case Histories in San Diego County
- "Soil Mechanics", Naval Facilities Engineering Command, DM 7.01
- United States Geologic Survey. Seismic Hazard Curves, Response Parameters and Design Parameters.