



APPENDIX J

DRAINAGE REPORT



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STORMWATER MANAGEMENT PLAN

Granada Community Park
0 Obispo Road
El Granada, CA 94018
BKF Job No: 20210921-15

June 2026

ENGINEER'S CERTIFICATION

Approval and Certification of the Stormwater Management Plan

Project Name: Granada Community Park
0 Obispo Road
El Granada, CA

"The selection, sizing, and design of stormwater treatment and other control measures in this plan meet the requirements of Bay Area Municipal Regional Stormwater Permit (MRP) Order R2-2015-0049 and subsequent amendments."

Engineer's Signature

John Tang, PE

Engineer's Name

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1.0 INTRODUCTION

This Stormwater Management Plan (SWMP) is required per the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) NPDES Permit. The purpose of this SWMP is to address the water quality impacts from the proposed Granada Community Park project located at 0 Obispo Road (herein referred to as Project). Best Management Practices (BMP's), as recommended by the California Storm Water Quality Association (CASQA), and outlined in the NPDES Permit, will be used to improve storm water quality onsite. This SWMP is subject to revisions as needed by the project engineer.

1.1 Project Description

The Project includes onsite improvements on the Obispo Road property and offsite improvements in the adjacent Obispo Road Right-of-Way (ROW). See Figure 1: Vicinity Map.

The proposed project includes the construction of a community center with associated parking area and a park with walking paths, recreation equipment, playground, and native vegetated spaces. The new park is served by two small parking areas located on the subject property.

The offsite improvements include construction of new curb, gutter and crosswalks along Obispo Road adjacent to the project site.



Figure 1: Vicinity Map

1.2 Existing Site Conditions

1.2.1 Existing Land Use

The project site is bounded by an undeveloped parcel to the west, Obispo Road to the north, an undeveloped parcel to the east, and the Caltrans State Route 1 Right of Way to the south. Existing improvements on site include a building with associated parking lot, an unpaved parking lot used for public beach parking, and three drainage ditches flowing southwest to the Caltrans right of way. The remaining area of the site is generally undeveloped where the surface cover is comprised of gravel roads, grass, shrubs, and trees. The existing topography at the project site generally slopes southeast toward State Route 1.

1.2.2 Existing Tributary Area

Most of the project site lies at a lower elevation than the surrounding roadways, which have their own system comprised of a combination of gutters, catch basins, and drainage ditches. See Appendix 2: Existing Topographic Survey.

The existing stormwater improvements on the Obispo Road ROW fronting the project site primarily consist of concrete curb and gutter. The street is crowned and conveys runoff in the gutter to sag inlets or flows overland to the drainage ditches running through the site.

1.2.4 FEMA Information

The Project is in designated as being in Flood Zone X based on Flood Insurance Rate Map (FIRM) panel 06081C0138F. Flood Zone X is considered an area of minimal flood hazard. See Appendix 4: FEMA Firmette.

1.2.5 Soil Characteristics

Soil data has been obtained from the project Geotechnical Engineering Investigation prepared by Romig Engineers, dated October 2022. The following are excerpts from the report, the extended excerpt from the soils report can be found in Appendix 5: Excerpt from Project Soils Report.

“At the locations of CPT-1 and CPT-2, advanced near the community center parking lot, we generally encountered firm to very stiff clay and medium dense to very dense sand with interbedded silty sand, sandy silt, and clayey silt to silty clay throughout the subsurface profile to the maximum depth explored of about 45 feet.

At the locations of Borings EB-7 and EB-8, advanced near the planned community center and existing building, we encountered very stiff to hard lean clay and sandy lean clay of low to high plasticity with interbedded lenses of sand and silt to the maximum depth explored of 20 feet. In Boring EB-8, the upper 4 feet of surface soil appeared to be fill.

At Borings EB-4, EB-5 and EB-6, advanced near the planned park improvements, we generally encountered surface fill ranging from 2 to 6 feet thick. The fill consisted of hard sandy lean clay of low plasticity and medium dense to dense well graded and poorly graded sand. Below the fill, we encountered native soil consisting of about 2 feet to 3.5 feet of stiff to very stiff fat and lean clay of

high plasticity underlain by very stiff to hard sandy lean clay of low to moderate plasticity with interbedded sand and silts to maximum depth explored of about 20 feet.”

“Ground water was encountered at the site at depths of about 7.5 feet and 6.5 feet below the ground surface at Borings EB-1 and EB-2, respectively. We also understand ground water was encountered at a depth of 7 feet during percolation testing performed in May 2008. The project design high ground water at the site was estimated to be about 3 feet below the ground surface.”

“We also expect that the ground water table or extent of ground water seepage could be influenced by water seepage at and near the Pacifica Ocean, which is located about 200 feet south of the site.”

“Finished grades should be designed to prevent ponding and to drain surface water away from foundations and edges slabs and pavements, and toward suitable collection and discharge facilities. Slopes of at least 2 percent are recommended for flatwork and pavement areas with 5 percent preferred in landscape areas within 8 feet of the structures, where possible. Roof downspout water preferably should be collected in a closed pipe system that is routed to a storm drain system or other suitable location.

Infiltration basins or bioswales, if any, preferably should not be placed within about 10 feet of shallow foundation supported structures or slab or flatwork areas. Drains should be provided for infiltration basins that direct water to an appropriate outlet as required by the civil engineer.”

1.3 Proposed Site Conditions

1.3.1 Proposed Land Use

The proposed project is a park featuring paths, a community center, a sports court, a play structure, and recreation picnic areas.

1.3.2 Proposed Tributary Area

The proposed project's onsite tributary area boundary will remain unchanged with the drainage paths slightly altered by the proposed onsite improvements (see Appendix 3: Stormwater Control Plan). The walkways, new hardscape, and buildings will increase the onsite impervious area by 16,876 square feet (see below Table 1: Site Area Summary Table). The new impervious area will be treated by bioretention areas before discharging to the on-site drainage ditches.

Tributary Area Summary Table	
Total Tributary Area	215,053 sf
Existing Impervious Area	14,477 sf
Proposed Impervious Area	31,353 sf
Difference	16,876 sf
Impervious Area to be Created/Replaced	31,353 sf

Table 1: Site Area Summary Table

Runoff from the proposed improvements is to be conveyed to area drains and ultimately to bioretention areas. The treatment basins also provide detention volume to reduce the peak stormwater discharge to equal or less than the pre-development flow rate.

1.4 Project Requirements

1.4.1 Stormwater Quality

Per the SMCWPPP C.3 Stormwater Handbook, “Projects that create and/or replace 5,000 square feet or more of impervious surface must comply with Provision C.3”. Therefore, the Project is a Regulated Project and will comply with Provision C.3 of the Municipal Regional Stormwater Permit (MRP), see Appendix 1: San Mateo County NPDES Forms and Worksheets for C.3 requirements checklist. Stormwater quality requirements under the MRP include source control measures, site design measures and treatment measures. See “Section 2.0 Stormwater Quality” of this report for discussion of opportunities, constraints and proposed measures for the Project.

1.4.2 Stormwater Hydrology

Per the San Mateo County Drainage Manual, the project shall retain or detain runoff such that the post development peak flows are less than or equal to pre-development flows.

2.0 STORMWATER QUALITY

2.1 Opportunities and Constraints for Stormwater Quality Measures

As described in the SMCWPPP C.3 Stormwater Handbook, identification of the opportunities and constraints presented by a project site can assist in the selection and design of storm water treatment and flow control facilities. An opportunity for this project is to retain existing landscape areas by minimizing the addition of new structures.

Constraints presented by this project include:

- Proximity to biological resource areas.
- Relatively shallow groundwater.

2.2 Source Control Measures

2.2.1 Permanent Controls and Operational BMPs

Potential pollutant sources, which will be present onsite, include, landscape/outdoor pesticide use, refuse areas, and sidewalks. The following table, based on the SMCWPPP Model Source Control Measures List, details the permanent controls and operational BMPs for each of these pollutant sources.

Potential Sources of Runoff Pollutants	Permanent Controls	Operational BMPs
Illegal Dumping to Storm Drain Inlets and Waterways	• On-site storm drain inlets shall be clearly marked with the words "No Dumping! Flows to Bay", or equivalent, using methods approved by the co-permittee.	• Maintenance staff to inspect on-site storm drain inlets and report any observations of illegal dumping to the co-permittee. • All on-site storm drain inlets shall be cleaned at least once per year immediately prior to the rainy season
Refuse Areas	• Refuse shall be disposed of in designated collection areas. • Adequate numbers of refuse and recycling receptacles shall be placed in public areas. • Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar	• Adequate numbers of refuse and recycling receptacles shall be placed in public areas. • Receptacles shall be inspected regularly, and leaky receptacles shall be repaired or replaced. • Receptacles shall be covered. • Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. • Litter shall be picked up daily when the facility is in use and spills shall be cleaned up immediately. • Keep spill control materials available onsite.

		See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Landscape/Outdoor Pesticide Use	Final landscape plans for the project will: - Preserve existing native 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 landscape areas are used to retain or detain storm water, specify plants that are tolerant of saturated solid conditions. - Consider using pest-resistant plants, especially adjacent to hardscape. - To ensure successful establishment, select plans appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interaction.	- Maintain landscaping using minimum or no pesticides. - See applicable operation BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com - Distribute Integrated Pest Management (IPM) educational materials to maintenance staff. At a minimum, educational materials will address the following topics: - Keeping pests out of buildings and landscaping using barriers, screens and caulking - Physical pest elimination techniques, such as weeding, squashing, trapping, washing or pruning out pests - Relying on natural enemies to eat pests - Proper use of pesticides as a last line of defense.
Potential Sources of Runoff Pollutants	Permanent Controls	Operational BMPs
Paved sidewalks		- Podium and sidewalks, 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. - Wash water containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

Table 2: Source Control Measures

2.2.2 Construction Stormwater BMPs

Common sources of pollutants from construction sites include: sediments from soil erosion; construction materials and waste (e.g., paint, solvents, concrete, drywall); landscaping runoff containing fertilizers and pesticides; and spilled oil, fuel, and other fluids from construction vehicles and heavy equipment. See Worksheet A in Appendix 1: C.3 and C.6 Development Review Checklist for a list of construction stormwater BMPs to be implemented during construction.

2.3 Site Design Measures

Site design measures are used during project planning with the purpose of minimizing stormwater pollutants. The most effective way to reduce the impact on stormwater is to maximize landscaping and pervious areas and minimize impervious surfaces on the site.

Some examples of Site Design Measures include:

- Minimize land disturbed
- Minimize impervious surfaces
- Minimum-impact street or parking lot design
- Cluster structures/pavement
- Pervious pavement
- Microdetention in landscape
- Other self-treating area
- Rainwater harvesting and use (e.g. rain barrel, cistern connected to roof drains)
- Protected riparian and wetland areas, riparian buffers

The proposed project intends to incorporate the following Site Design Measures:

- Direct runoff from roof, sidewalks, walkways, patios, driveways, and/or parking areas onto vegetated areas – Runoff from sidewalk and road directed to landscape areas and bioretention planters.
- Limit disturbance of natural water bodies and drainage systems – Stormwater runoff from project site treated and discharged in locations to mimic existing conditions.
- Conserve natural areas, including existing trees, other vegetation and soils – Project is clustered and preserves the remainder of the parcel in its existing condition.
- Self-treating areas
- Minimize impervious surfaces – Impervious surface minimized through use of pervious pavement.

By implementing the above measures, the project will minimize runoff and the transport of pollutants in runoff by increasing infiltration of reducing impervious area meeting the intent of the C.3 requirements.

2.4 Stormwater Treatment Measures

2.4.1 Drainage Management Areas (DMAs)

The SMCWPPP C.3 Handbook states that the project site shall be divided into Drainage Management Areas (DMAs) and each DMA should be classified as one of the following: self-treating areas, self-

retaining areas, or areas draining to Best Management Practices (BMPs). Preliminary sizing of the BMPs has been provided for DMAs 1-8. This sizing has been calculated using the recommended flow technique using a 0.2 inch-per-hour intensity as outlined in the SMCWPPP C.3 Handbook (see Appendix 1: C3/C6 Checklist).

The DMAs for the project are described below and are delineated on the Stormwater Control Plan (see Appendix 3: Stormwater Control Plan).

2.4.2 LID Treated DMAs

Stormwater treatment for the proposed project will be comprised of 100% LID treatment methods in the form of bioretention areas. No mechanical treatment methods are proposed.

DMA 1 contains runoff from part of the proposed community center buildings and surrounding hardscape located on the western side of the site. The runoff will be collected via area drains, discharged to bioretention areas for treatment, then piped into the existing city storm drain main which discharges into one of the existing drainage ditches running through the site.

DMA 2 contains runoff from the remaining portion of the proposed buildings and the adjoining parking lot located on the western side of the site. The runoff will be collected via area drains, discharged to bioretention areas for treatment, then discharged via the outlet structure to a rock outfall in one of the existing drainage ditches.

DMA 3 is entirely pervious, consisting of pervious pedestrian walkways and landscape areas. The area is designated as self-treating. Runoff is generally directed to the existing drainage ditches via sheet flow.

DMA 4 is entirely pervious, consisting of pervious pedestrian walkways and landscape areas. The area is designated as self-treating. Runoff is generally directed to the existing drainage ditches via a proposed swale along the southern property line.

DMA 5 is entirely pervious, consisting of pervious pedestrian walkways and landscape areas. The area is designated as self-treating. Runoff is generally directed to the existing drainage ditches via sheet flow.

DMA 6 is entirely pervious, consisting of pervious pedestrian walkways and landscape areas. The area is designated as self-treating. Runoff is generally directed to the existing drainage ditches via a proposed swale along the southern property line.

DMA 7 contains runoff from part of the proposed sport court, pervious walkways and landscape in the middle of the site. The runoff will be collected via area drains, discharged to bioretention area for treatment, then discharged to a rock outfall in one of the existing drainage ditches.

DMA 8 contains runoff from part of the proposed parking area, walkways, restroom, skate area, and landscape on the eastern side of the site. The runoff will be directed to bioretention and landscape areas via sheet flow, then discharged to a rock outfall in one of the existing drainage ditches.

DMA	Type of LID Treatment	Contributing Impervious Area (sf)	Contributing Pervious Area ¹ (sf)	Required LID Treatment ² (sf)	Provided LID Treatment (sf)
1	Bioretention Area	9,410	9,889	416	450
2	Bioretention Area	9,361	9,537	401	515
3	Self-Treating	0	17,302	-	-
4	Self-Treating	0	16,382	-	-
5	Self-Treating	0	38,730	-	-
6	Self-Treating	0	39,753	-	-
7	Bioretention Area	2,546	27,222	211	215
8	Bioretention Area	10,036	24,883	501	615
Total	Bioretention Area	70,210	186,636	1,529	1,795

1. Pervious areas which drain to LID treatment are weighted as 10% equivalent impervious area for treatment sizing per the San Mateo County C.3 Manual.

2. The size of the bioretention area calculated using the combination flow and volume design basis as described in the San Mateo County C.3 Regulated Project Guide.

Table 3: Drainage Management Areas

3.0 STORMWATER HYDROLOGY

3.1 Peak Flows/Stormwater Detention

The rational method was used to calculate peak flows for a 10-year storm. Without mitigation, the project will increase peak flows from 1.44 cfs to 1.64 cfs. To mitigate the increase, the project is proposing bioretention areas to detain the increase in runoff for a 1-hour duration. The bioretention area will also meter flow out such that the post-development peak flows are less than the existing. See Appendix 9: Detention and Peak Flow Calculations.

4.0 MAINTENANCE

As established in the Owner's Certification, the operation and maintenance of the post-construction source control BMPs is the sole responsibility of the site owner.

4.1 Post-Construction BMPs

Post-construction BMPs are to be maintained in perpetuity. It will be the responsibility of the property owner to install, and then maintain the BMPs in accordance with this document. Maintenance requirements for LID Measures are shown below. For information regarding Source Control BMP maintenance, refer to the California Stormwater Quality Association (CASQA) Best Management Practice Handbook. It shall be noted that preventative maintenance such as removal of trash and debris from the site will help ensure proper function of the BMPs. See Appendix 6 for San Mateo County Technical Guidance on bioretention areas.

LID	Responsible Party	Minimum Maintenance Frequency	Unit/Annual Maintenance Costs
Bioretention Area	Owner	Semiannual inspection of plants and removal of sediment and debris. Plants to be irrigated during dry weather and replanted if necessary. If ponded water is observed 72 hours after a rainfall event, add soil to raise local low point; soils may need to be replaced after 5-10 years.	Included in Normal Landscape Maintenance

Table 5: Post Construction BMP Maintenance

4.2 Fiscal Resources

The funding and execution of BMP maintenance for the project will be the responsibility of the owner. The owner will be responsible for maintenance activities as follows: properly disposing of waste material within the Project site, maintaining landscaping in a manner that will prevent soil erosion and minimize sediment transport, maintaining drainage facilities in a clean manner and in a good repair, and properly maintaining all post-construction BMPs (both structural and non-structural) that exist within the project.

It should be noted that maintenance for any of the above-mentioned post-construction BMPs might be performed through third-party agreements; however, the ultimate responsibility of each facility rests on the owner.

5.0 APPENDICES

Appendix 1	San Mateo County NPDES Forms and Worksheets
Appendix 2	Existing Topographic Survey
Appendix 3	Stormwater Control Plan
Appendix 4	FEMA Firmette
Appendix 5	Excerpt from Soils Report
Appendix 6	LID Measure Technical Guides
Appendix 7	Project Treatment Measure Details
Appendix 8	NOAA Rainfall Intensity Chart
Appendix 9	Detention and Peak Flow Calculations

APPENDIX 1

San Mateo County NPDES Forms and Worksheets

C.3 and C.6 Development Review Checklist

Detailed Infiltration Feasibility Worksheet (NOT REQUIRED)

Detailed Rainwater Harvesting and Use Feasibility Worksheet (NOT REQUIRED)

C.3 and C.6 Development Review Checklist

Municipal Regional Stormwater Permit (MRP 3.0)
 Stormwater Controls for Development Projects

Project Information (Enter information only into blue-highlighted cells - other cells are locked.)

I.A Enter Project Data (For "C.3 Regulated Projects," data will be reported in the municipality's stormwater Annual Report.)

Project Name:	Granada Community Park		Case Number:	
Project Address:	0 Obispo Road	Cross Street:	Avenue Portola	
Project APN:	047-262-010	Project Watershed:	Santa Maria Avenue Drainage	
Applicant Name:	Granada Community Services District		Project Phase No.	
Applicant Phone:		Applicant Email Address:		

Development Type: ☐ Small Single-Family Home Project (<10,000 sq. ft. of created and/or replaced impervious surface¹)
☐ Large Single-Family Home Project (≥10,000 sq. ft. of created and/or replaced impervious surface¹)
☐ Subdivision - Residential: Two or more lot development² # of units:
☐ Multi-Family Residential # of units:
☐ Commercial
☐ Industrial, Manufacturing
☐ Mixed-Use # of units:
☐ New, widened or reconstructed roads related to parcel-based projects³
☐ Stand-alone pavement maintenance or construction work, or similar work related to parcel-based projects³
☐ Other redevelopment project as defined by MRP: creating, adding and/or replacing exterior existing impervious surface on a site where past development has occurred.
☐ Institutional: schools, libraries, jails, etc.
☒ Parks and trails, camp grounds, other recreational
☐ Kennels, Ranches
☐ Other, Please specify

Project Description (Don't include past or future phases)⁴ Construction of a community center with associated parking area and a park with walking paths, recreation equipment, sport court and landscaping. The new park is served but two small parking areas on the subject property.

I.A.1 Total Project Area: square feet (on and off-site)
 I.A.2 Total Area on-site: square feet (on the private property)
 I.A.3 Total Area off-site: square feet (frontage or area in Public Right of Way being improved)
 I.A.4 Total Area of land disturbed during construction: square feet
 (Include all project on-site and off-site areas of clearing, grading, excavating and stockpiling)
 I.A.5 Site slope: %

I.A.6 Certification:

I certify that the information provided on this form is correct and acknowledge that, should the project exceed the amount of new and/or replaced impervious surface provided in this form, the as-built project may be subject to additional improvements.

☒ Preliminary Calculations Attached ☐ Final Calculations Attached ☒ Stormwater Control Plan Attached

Name of person completing the form:	Corey Worthington	Title:	
Signature:		Date:	6/16/2026
Phone Number:	650-482-6300	E-mail:	cworthington@bkf.com

¹ Small and Large Detached Single-Family Homes that are not part of a common plan of development².

² Common Plans of Development (subdivisions or contiguous, commonly owned lots, for the construction of two or more homes developed within 1 year of each other), and/or constructed with shared utilities, are not considered single family home projects by the MRP.

³ Stand-alone roadway or pavement projects, or pavement work that is part of a project, creating or replacing 5,000 sq. ft. or more of impervious surface may be subject to C.3 requirements - both in public and private areas. See the Roads Factsheet at: www.flowstobay.org/newdevelopment

⁴ Project description examples: 5-story office building, industrial warehouse, residential with five 4-story buildings for 200 condominiums, etc. 7/1/24

I.B Is the project a “C.3 Regulated Project” per MRP Provision C.3.b? (Use table below to make determination.)**I.B.1** Enter the amount of Impervious surface Retained, Replaced or Created⁵ by the project (use DMA Table in Worksheet D):**Table I.B.1 Impervious^b and Pervious^b Surfaces (Match DMA Summary Table in Worksheet D, if applicable)**

	Pre-Project	Post-Project			
	I.B.1.a	I.B.1.b	I.B.1.c	I.B.1.d	I.B.1.e
Impervious Surfaces (IS) (e.g., sidewalks, driveways, parking areas, patios, roads, rooftops, pools, pathways, etc.)	Existing (Pre-Project) Impervious Surface (sq.ft.)	Existing Impervious Surface to be Retained ⁵ (sq.ft.)	Existing Impervious Surface to be Replaced ⁵ (sq.ft.)	New Impervious Surface to be Created ⁵ (sq.ft.)	Post-Project Impervious Surface (sq.ft.) (=b+c+d)
On-site area (within the parcel/private site boundaries)	14,477	-	14,477	16,876	31,353
Off-site area (e.g., frontage/other area in Public Right of Way)					-
Subtotal:	14,477	-	14,477	16,876	31,353
Total Impervious Surface Replaced and Created: (sum of totals for columns I.B.1.c and I.B.1.d):		I.B.1.f	31,353 sq. ft.		
Pervious Surfaces (PS) (e.g., landscaping, pervious pavement, bioretention areas, parking strips, street trees, etc. - both on-site and off-site)	Existing (Pre-Project) Pervious Surface (sq.ft.)				Post-project Pervious Surface (sq.ft.)
All pervious off-site area (e.g., frontage/Public Right of Way) ⁶					
Landscaping area on-site	200,576				138,630
Pervious Pavement area on-site					I.B.1.g 45,070
Green Roof area on-site					
Subtotal:	200,576				183,700
Total Project Area (should be equal to I.A.1)	215,053				215,053
		50% Rule Calculation⁷			
		I.B.1.h 100 %			

I.B.2 Please review and attach additional worksheets as required below using the Total Impervious Surface (IS) Replaced or Created in cell **I.B.1.f** from Table **I.B.1** above and other factors:

	Review Steps	Check One		Attach Worksheet
		Yes	No	
I.B.2.a	Does this project involve any earthwork and/or stockpiling of soil, aggregates etc? If YES, then Check Yes, and Complete Worksheet A. If NO, then Check No, and go to I.B.2.b	☒	☐	A
I.B.2.b	Is I.B.1.f greater than or equal to 2,500 sq.ft? If YES, then the Project is subject to Provision C.3.i. - complete Worksheets B, C and go to I.B.2.c. If NO, go to I.B.2.i	☒	☐	B, C
I.B.2.c	Does the 50% rule apply to the project? Is I.B.1.h 50% or more? If YES, site design, source control and treatment requirements apply to the entire on-site area. Continue to I.B.2.d If NO, these requirements apply only to the impervious surface created and/or replaced. Continue to I.B.2.d	☒	☐	
I.B.2.d	Is this project a Roadway Project and is I.B.1.f greater than or equal to 5,000 sq.ft? If YES, project may be C.3 Regulated Project. See the Roadways Fact Sheet at: www.flowstobay.org/newdevelopment If NO, go to I.B.2.e	☒	☐	
I.B.2.e	Is I.B.1.f greater than or equal to 5,000 sq.ft? Or 10,000 sq.ft. for a Large Single-Family Home? (Small Single-Family Homes are exempt) If YES, project is a C.3 Regulated Project - complete Worksheet D. Then continue to I.B.2.f. If NO, then skip to I.B.2.g.	☒	☐	D
I.B.2.f	Is I.B.1.f greater than or equal to 43,560 sq.ft. (i.e., one acre)? If YES, project may be subject to Hydromodification Management requirements - complete Worksheet E then go to I.B.2.g. If NO, then go to I.B.2.g.	☐	☒	E
I.B.2.g	Is I.A.4 greater than or equal to 43,560 sq.ft. (i.e., one acre)? [SWRS Site: Subject to monthly inspections from Oct 1 to April 30; weekly inspections if located in ASBS Watershed] For more information see: www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml If YES, check box, obtain coverage under CA Construction General Permit & submit Notice of Intent to municipality- go to I.B.2.h. If NO, then go to I.B.2.h.	☒	☐	
I.B.2.h	Is this a Special Project or does it have the potential to be a Special Project? If YES, complete Worksheet F - then continue to I.B.2.i. If NO, go to I.B.2.i.	☐	☒	F
I.B.2.i	Is this project a Hillside Site ? Or a High Priority Site ? A. Any site with land disturbance of 1-acre or more; OR B. "High priority sites" involve land disturbance of less than 1-acre on the following site types: 1. All sites where the scope of development or land alteration requires a Grading or Land Clearing Permit; 2. Project with land disturbance of: a) 1 sq. ft. or greater within the ASBS watershed*; b) 1,000 sq. ft. or greater for areas within 100 feet of a creek, wetland, or coastline; c) Hillside Projects (20% slope or greater); c-1) 1,000 sq. ft. if project area has average slope >50%; c-2) 5,000 sq. ft. if project area has slope between 20% - 50%; d) 10,000 sq. ft. if project area has average slope <20%; 3. Any public project involving work within a waterway or any private project involving work within a waterway that requires a permit issued by the Planning and Building Department. [SWRS Site: Subject to monthly inspections from Oct 1 to April 30; weekly inspections if located in ASBS Watershed] If YES, complete section G-2 on Worksheet G - then continue to I.B.2.j. and complete the Certification in Section I.A.6 If NO, then go to I.B.2.j and complete the Certification in Section I.A.6	☒	☐	G
I.B.2.j	For Municipal Staff Use Only: Are you using Alternative Certification for the project review? If YES, then fill out section G-1 on Worksheet G. Fill out other sections of Worksheet G as appropriate. See cell I.B.1.g above - Is the project installing 3,000 square feet or more of pervious pavement? If YES, then fill out section G-3 on Worksheet G. Add to Municipal Inspection Lists (C.3 and C.3.h)	☐ ☐	☐ ☐	G

⁵ "Retained" means to leave existing impervious surfaces in place; "Replaced" means to install new impervious surface where existing impervious surface is removed anywhere on the same site; and "Created" means the amount of new impervious surface being proposed which exceeds the total amount of existing impervious surface at the site.⁶ Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface: pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3. Gravel pavement is not pervious unless it is constructed using pervious pavement system designs or runoff flows to adjacent landscaping. Pervious off-site areas include landscaped areas such as parking strips and street trees; off-site pervious pavement includes pervious concrete gutters and interlocking permeable concrete paver sidewalks, etc.⁷ Per MRP 3, the 50% rule now applies to both the on-site and off-site areas (typically the frontage areas), so replacement of IS in the off-site area is included.

Worksheet A

C.6 – Construction Stormwater BMPs

Identify Plan sheet showing the appropriate construction Best Management Practices (BMPs) used on this project:

(Applies to all projects with earthwork)

Yes	Plan Sheet	Best Management Practice (BMP)
☒	C8.0	Control and prevent the discharge of all potential pollutants, including pavement cutting wastes, paints, concrete, petroleum products, chemicals, wash water or sediments, rinse water from architectural copper, and non-stormwater discharges to storm drains and watercourses.
☒	C8.0	Store, handle, and dispose of construction materials/wastes properly to prevent contact with stormwater.
☒	C8.0	Do not clean, fuel, or maintain vehicles on-site, except in a designated area where wash water is contained and treated.
☒	C8.0	Train and provide instruction to all employees/subcontractors re: construction BMPs.
☒	C8.0	Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber rolls, or filters.
☒	C8.0	Limit construction access routes and stabilize designated access points.
☒	C8.2	Attach the San Mateo Countywide Water Pollution Prevention Program's construction BMP plan sheet to project plans and require contractor to implement the applicable BMPs on the plan sheet.
☒	C8.0	Use temporary erosion controls to stabilize all denuded areas until permanent erosion controls are established.
☒	C8.0	Delineate with field markers clearing limits, easements, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.
☒	C8.0	Provide notes, specifications, or attachments describing the following: ■ Construction, operation and maintenance of erosion and sediment controls, include inspection frequency; ■ Methods and schedule for grading, excavation, filling, clearing of vegetation, and storage and disposal of excavated or cleared material; ■ Specifications for vegetative cover & mulch, include methods and schedules for planting and fertilization; ■ Provisions for temporary and/or permanent irrigation.
☒	C8.0	Perform clearing and earth moving activities only during dry weather.
☒	C8.0	Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.
☒	C8.0	Trap sediment on-site, using BMPs such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, soil blankets or mats, covers for soil stock piles, etc.
☒	C8.0	Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g., swales and dikes).
☒	C8.0	Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.

Worksheet B

C.3 – Source Controls

Select appropriate source controls and identify the detail/plan sheet where these elements are shown.

Yes	Detail/Plan Sheet No.	Features that require source control	Source Control Measures (Refer to Local Source Control List for detailed requirements)
☒		Storm Drain	Mark on-site inlets with the words “No Dumping! Flows to Bay” or equivalent.
☐		Floor Drains	Plumb interior floor drains to sanitary sewer [or prohibit].
☐		Parking garage	Plumb interior parking garage floor drains to sanitary sewer. ⁸
☒		Landscaping	■ Retain existing vegetation as practicable. ■ Follow ReScape (www.rescapeca.org) principles. Select diverse species appropriate to the site. Include plants that are pest- and/or disease-resistant, drought-tolerant, and/or attract beneficial insects. ■ Minimize use of pesticides and quick-release fertilizers. ■ Use efficient irrigation system; design to minimize runoff.
☐		Pool/Spa/Fountain	Provide connection to the sanitary sewer to facilitate draining. ⁸
☐		Food Service Equipment (non-residential)	Provide sink or other area for equipment cleaning, which is: ■ Connected to a grease interceptor prior to sanitary sewer discharge.⁸ ■ Large enough for the largest mat or piece of equipment to be cleaned. ■ Indoors or in an outdoor roofed area designed to prevent stormwater run-on and run-off, and signed to require equipment washing in this area.
☐		Refuse Areas	■ Provide a roofed and enclosed area for dumpsters, recycling containers, etc., designed to prevent stormwater run-on and runoff. ■ Connect any drains in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities to the sanitary sewer.⁸ ■ For more information, see the New Development Projects Litter Reduction Fact Sheet at: https://www.flowstobay.org/wp-content/uploads/2021/06/New-Dev-Litter-Reduction-Fact-Sheet-060421.pdf
☐		Outdoor Process Activities ⁹	Perform process activities either indoors or in roofed outdoor area, designed to prevent stormwater run-on and runoff, and to drain to the sanitary sewer. ⁸
☐		Outdoor Equipment/Materials Storage	■ Cover the area or design to avoid pollutant contact with stormwater runoff. ■ Locate area only on paved and contained areas. ■ Roof storage areas that will contain non-hazardous liquids, drain to sanitary sewer⁸, and contain by berms or similar.
☐		Vehicle/ Equipment Cleaning	■ Roofed, pave and berm wash area to prevent stormwater run-on and runoff, plumb to the sanitary sewer⁸, and sign as a designated wash area. ■ Commercial car wash facilities shall discharge to the sanitary sewer.⁸
☐		Vehicle/ Equipment Repair and Maintenance	■ Designate repair/maintenance area indoors, or an outdoors area designed to prevent stormwater run-on and runoff and provide secondary containment. Do not install drains in the secondary containment areas. ■ No floor drains unless pretreated prior to discharge to the sanitary sewer.⁸ ■ Connect containers or sinks used for parts cleaning to the sanitary sewer.⁸
☐		Fuel Dispensing Areas	■ Fueling areas shall have impermeable surface that is a) minimally graded to prevent ponding and b) separated from the rest of the site by a grade break. ■ Canopy shall extend at least 10 ft. in each direction from each pump and drain away from fueling area.
☐		Loading Docks	■ Cover and/or grade to minimize run-on to and runoff from the loading area. ■ Position downspouts to direct stormwater away from the loading area. ■ Drain water from loading dock areas to the sanitary sewer.⁸ ■ Install door skirts between the trailers and the building.
☐		Fire Sprinklers	Design for discharge of fire sprinkler test water to landscape or sanitary sewer. ⁸
☐		Miscellaneous Drain or Wash Water	■ Drain condensate of air conditioning units to landscaping. Large air conditioning units may connect to the sanitary sewer.⁸ ■ Roof drains from equipment drain to landscaped area where practicable. ■ Drain boiler drain lines, roof top equipment, all wash water to sanitary sewer.⁸
☐		Architectural Copper Rinse Water	■ Drain rinse water to landscaping, discharge to sanitary sewer⁸, or collect and dispose properly offsite. See flyer “Requirements for Architectural Copper.” ¹⁰

⁸ Any connection to the sanitary sewer system is subject to sanitary district approval.

⁹ Businesses that may have outdoor process activities/equipment include machine shops, auto repair, industries with pretreatment facilities.

¹⁰ See the Flowstobay website: <https://flowstobay.org/wp-content/uploads/2020/04/ArchitecturalcopperBMPs.pdf>

Worksheet C

Low Impact Development – Site Design Measures

Select Appropriate Site Design Measures (Required for C.3 Regulated Projects; all other projects are encouraged to implement site design measures, which may be required at municipality discretion.) Projects that create and/or replace between 2,500 and 5,000 sq. ft. of impervious surface, and detached single family homes that create/replace between 2,500 and 10,000 sq. ft. of impervious surface, must include **one of Site Design Measures a through f** (Provision C.3.i requirements). ¹¹ Larger (>=5,000 sq. ft.) projects must also include applicable Site Design Measures g through i. Consult with municipal staff about requirements for your project.

Select appropriate site design measures and Identify the Plan Sheet where these elements are shown.

Yes	Plan Sheet No.	Site Design Measures
☐		a. Direct roof runoff into cisterns or rain barrels and use rainwater for irrigation or other non-potable use.
☒		b. Direct roof runoff onto vegetated areas.
☒	C4.0-C4.2	c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
☒	C4.0-C4.2	d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
☒	C3.0	e. Construct sidewalks, walkways, and/or patios with pervious or permeable surfaces. Use the specifications in the C.3 Regulated Projects Guide downloadable at www.flowstobay.org/newdevelopment
☐		f. Construct bike lanes, driveways, and/or uncovered parking lots with pervious surfaces. Use the specifications in the C.3 Regulated Projects Guide downloadable at www.flowstobay.org/newdevelopment
☐		g. Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;
☐		h. Conserve natural areas, including existing trees, other vegetation and soils.
☐		i. Minimize impervious surfaces.

Regulated Projects can also consider the following site design measures to reduce treatment system sizing:

Yes	Plan Sheet No.	Site Design Measures
☒	C6.0	j. Self-treating area (see Section 4.2 of the C.3 Regulated Projects Guide)
☐		k. Self-retaining area (see Section 4.3 of the C.3 Regulated Projects Guide)

¹¹ See MRP Provision C.3.a.i.(6) for non-C.3 Regulated Projects, C.3.c.i.(2)(a) for Regulated Projects, C.3.i for projects that create/replace between 2,500 and 5,000 sq. ft. of impervious surface and detached single family homes that create/replace between 2,500 and 10,000 sq. ft. of impervious surface.

Worksheet D

C.3 Regulated Projects and Non-Regulated GI Projects

Stormwater Treatment Measures and Site Design Measures by Drainage Management Area (DMA)

Check all applicable boxes, answer questions and fill in cells related to the site design and treatment measure(s) included in the project.

Drainage Management Area Summary Table

Complete the information below at the Entitlement, Building Permit and Certificate of Occupancy stages for Regulated C.3 Projects and Non-Regulated Green Infrastructure Projects. (The first four cells are automatically filled in from the Project Info sheet.)

Project Name:	Granada Community Park					
Project Address:	0 Obispo Road					
Cross Streets:	Avenue Portola					
APN:	047-262-010					
Special Project¹²?	No		of C.3.d amount of runoff treated by Non-LID Systems on the Special Project site.			
C.3 Regulated?	Yes					
Public or Private Project?	Private	Public projects are those on public property or ROW; private projects are on privately-owned property but can include improvements in the public ROW required as part of the project.				
DMA Identification Number	Impervious Area¹³ (ft²)	Pervious Area¹⁴ (ft²)	Type of Site Design Measure or Treatment Measure¹⁵	Sizing Criteria Used¹⁶	Size Required¹⁷	Size Provided
Example DMA 1	5,000	2,000	Bioretention unlined with underdrain	2c: Flow	208 ft2	220 ft2
Example DMA 2	1,000	1,000	Self-retaining area	Other	< 2:1 ratio	1:1 ratio
Example DMA 3	1,000	-	Infiltration trench	1b: Volume	1,000 ft3	1,100 ft3
1	9,410	9,889	Bioretention lined with underdrain	2c: Flow	416	450
2	9,361	9,537	Bioretention lined with underdrain	2c: Flow	401	515
3	-	17,303	Self-treating area		-	-
4	-	16,383	Self-treating area		-	-
5	-	38,730	Self-treating area		-	-
6	-	39,753	Self-treating area		-	-
7	2,546	27,222	Bioretention lined with underdrain	2c: Flow	211	215
8	10,036	24,883	Bioretention lined with underdrain	2c: Flow	501	615
9						
10						
11						
12						
13						
14						
15						
add rows, if needed						
TOTALS	31,353	183,700	N/A	N/A	N/A	N/A
Totals from Project Info Sheet Cells	31,353	183,700				

Is the project harvesting and using rainwater? Yes ☐	Rainwater Harvesting/Use Measures: ☐ Rainwater Harvesting for indoor non-potable water use ☐ Rainwater Harvesting for landscape irrigation use
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A long term Operations and Maintenance (O&M) Agreement and Plan for this project will be required. Please contact the municipality for an agreement template and/or consult the C.3 Regulated Projects Guide and table of contents at www.flowstobay.org/newdevelopment for maintenance plan templates for specific facility types.

- 12 Special Projects are smart growth, high density, transit-oriented or affordable housing developments with the criteria defined in Provision C.3.e.ii.(2), (3) or (4) (see Worksheet F).
- 13 The sq.ft. of impervious area within the Drainage Management Area
- 14 The sq.ft. of pervious area within the Drainage Management Area
- 15 "Lined" refers to an impermeable liner placed on the bottom of a bioretention area, such that no infiltration into native soil occurs.
- 16 Select from the menu which of the following Provision C.3.d.i hydraulic sizing methods was used, if any. Volume based approaches: 1(a) Urban Runoff Quality Management approach, or 1(b) 80% capture approach (recommended volume-based approach). Flow-based approaches: 2(a) 10% of 50-year peak flow approach, 2(b) 2 times the 85th percentile rainfall intensity approach, 2(c) 0.2-Inch-per-hour intensity approach (recommended flow-based approach - also known as the 4% rule for bioretention), or 3 Combination flow and volume-based approach. "Other" is used for Site Design Measures such as Self-Retaining or Self-Treating Areas.
- 17 Each DMA should drain to one treatment area (unless it is self-treating or self-retaining). If multiple DMAs are draining to one treatment area, they should be combined into one DMA. If one DMA drains to multiple treatment areas, that DMA should be split up so there is one DMA per treatment area (which allows the treatment area to be properly sized).

Worksheet E
Hydromodification Management

E-1 Is the project a Hydromodification¹⁸ Management (HM) Project?

E-1.1 Is the total impervious area increased over the pre-project condition?

- ☐ Yes. Continue to E-1.2
☐ No. Go to Item E-1.3 and check "No."

E-1.2 Is the site located in an HM Control Area per the HM Control Areas map (Appendix H of the C.3 Regulated Projects Guide)?

- ☐ Yes. Go to E-1.3 and Check "Yes".
☐ No. Attach map, indicating project location. Go to Item E-1.3 and check "No."

E-1.3 Is the project a Hydromodification Management Project?

- ☐ Yes. The project is subject to HM requirements in Provision C.3.g of the Municipal Regional Stormwater Permit.
☐ No. The project is EXEMPT from HM requirements.

► If the project is subject to the HM requirements, incorporate in the project flow duration control measures designed such that post-project discharge rates and durations match pre-project discharge rates and durations.

► The Bay Area Hydrology Model (BAHM) has been developed to help size flow duration controls. See www.clearcreeksolutions.info/downloads. Guidance is provided in Chapter 7 of the C.3 Regulated Projects Guide.

E-2 Incorporate HM Controls (if required)

Are the applicable items provided with the Plans?

Yes	No	NA	
☐	☐	☐	Site plans with pre- and post-project impervious surface areas, surface flow directions of entire site, locations of flow duration controls and site design measures per HM site design requirement
☐	☐	☐	Soils report or other site-specific document showing soil type(s) on site
☐	☐	☐	If project uses the Bay Area Hydrology Model (BAHM), a list of model inputs and outputs.
☐	☐	☐	If project uses custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves), goodness of fit, and (allowable) low flow rate.
☐	☐	☐	If project uses the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance).
☐	☐	☐	If the project uses alternatives to the default BAHM approach or settings, a written description and rationale.

¹⁸ Hydromodification is the change in a site's runoff hydrograph, including increases in flows and durations that results when land is developed (made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion of receiving streams, loss of habitat, increased sediment transport and/or deposition, and increased flooding. Hydromodification control measures are designed to reduce these effects.

Worksheet F Special Projects

Complete this worksheet for projects that appear to meet the definition of "Special Project", per Provision C.3.e.ii of the Municipal Regional Stormwater Permit (MRP). The form assists in determining whether a project meets Special Project criteria, and the percentage of low impact development (LID) treatment reduction credit. Special Projects that implement less than 100% LID treatment must provide a narrative discussion of the feasibility or infeasibility of 100% LID treatment. See Appendix J of the C.3 Regulated Projects Guide (download at www.flowstobay.org/newdevelopment) for more information.

F-1 "Special Project" Determination (Check the boxes to determine if the project meets any of the following categories.)

Special Project Category "A"

Does the project have ALL of the following characteristics?

- ☐ Located in a municipality's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district;
 - ☐ Creates and/or replaces 0.5 acres or less of impervious surface - enter answer in F-2 table;
 - ☐ Includes no surface parking, except for incidental parking for emergency vehicle access, ADA access, and passenger or freight loading zones;
 - ☐ Has at least 85% coverage of the entire site by permanent structures. The remaining 15% portion of the site may be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping and stormwater treatment - enter answer in F-2 Table
- ☐ No (continue)
- ☐ Yes – Complete Section F-2 below

Special Project Category "B"

Does the project have ALL of the following characteristics?

- ☐ Located in a municipality's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district¹⁹;
 - ☐ Creates and/or replaces more than 0.5 acres of impervious area and less than 2.0 acres - enter answer in F-2 Table;
 - ☐ Includes no surface parking, except for incidental parking for emergency access, ADA access, and passenger or freight loading zones;
 - ☐ Has at least 85% coverage of the entire site by permanent structures. The remaining 15% portion of the site may be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping and stormwater treatment - enter answer in F-2 Table;
 - ☐ Minimum gross density of either 50 dwelling units per acre (for residential projects) or a Floor Area Ratio (FAR) of 2:1 (for commercial projects) - mixed use projects may use either criterion²⁰ - enter answer in F-2 Table;
- ☐ No (continue)
- ☐ Yes – Complete Section F-2 below

Special Project Category "C"

Complete the Special Project Category C - Affordable Housing Credit Calculator (AHCC) Worksheet.

Does the project meet ALL of the required characteristics for Category C?

- ☐ No
- ☐ Yes – Complete Section F-2 below

¹⁹ And built as part of a municipality's stated objective to preserve/enhance a pedestrian-oriented type of urban design.

²⁰ The MRP establishes definitions for "Gross Density"(GD) & FAR. GD is defined as, "the total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses." FAR is defined as, "the Ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area."

F-2 LID Treatment Reduction Credit Calculation

If more than one category applies, choose only one of the applicable categories and fill out the table for that category.
Fill in all cells with blue highlighting that pertain to the chosen Special Project Category.

Category	Impervious Area Created/Replaced (sq. ft.)	Site Coverage (%)	Project Density ²⁰ or FAR ²⁰	Density/Criteria	Allowable Credit (%)	Applied Credit (%)
A			N.A.	See above in F-1	100%	
B				Res ≥ 50 DU/ac or FAR ≥ 2:1	50%	
				Res ≥ 75 DU/ac or FAR ≥ 3:1	75%	
				Res ≥ 100 DU/ac or FAR ≥ 4:1	100%	
C	Affordable Housing Credit - from AHCC Worksheet):					
TOTAL CREDIT =						0%

F-3 Narrative Discussion of the Feasibility/Infeasibility of 100% LID Treatment:

If project will implement less than 100% LID, prepare a discussion of the feasibility or infeasibility of 100% LID treatment, as described in Appendix J of the C.3 Regulated Projects Guide.

F-4 Select Certified Non-LID Treatment Measures:

If the project will include non-LID treatment measures, select a treatment measure certified for “Basic” General Use Level Designation (GULD) by the Washington State Department of Ecology’s Technical Assessment Protocol – Ecology (TAPE²¹). See guidance in Appendix J of the C.3 Regulated Projects Guide (www.flowstobay.org/newdevelopment).

²¹ TAPE certification is used in order to satisfy Special Project’s reporting requirements in the MRP.

Worksheet G
(For municipal staff use only)

G-1 Alternative Certification: Were the treatment and/or HM control sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

☐ Yes ☐ No Name of Reviewer: _____

G-2 Is project a Construction Stormwater Regulated Site (SWRS Site)? SWRS Sites include:

- 1) Site that disturbs 1 acre or more of land (see I.B.2.f);
- 2) Hillside Site (see I.B.2.i); and
- 3) High Priority Site (see I.B.2.i).

These sites are subject to monthly inspections from Oct 1 to April 30. See MRP Provision C.6.e.ii.(2)(b) and C.6.e.ii.(2)(c). These sites in the Fitzgerald Marine Reserve ASBS Watershed are subject to weekly inspections per the State Ocean Plan.

☐ Yes ☐ No If yes, add site to Staff's SWRS Construction Site Inspection List

G-3 Inspections of Sites with Pervious Pavement: Regulated projects that are installing 3,000 sq.ft. or more of pervious pavement (see cell I.B.1.g) (excluding private-use patios in single family homes, townhomes, or condominiums) must have the pavement system inspected by the jurisdiction upon completion of the installation and the site must be added to the jurisdiction's list of sites needing inspections at least once every five years – see provision C.3.h. Pervious pavement systems include pervious concrete, pervious asphalt, pervious pavers and grid pavers etc. and are described in the C3 Regulated Projects Guide downloadable at: www.flowstobay.org/newdevelopment.

☐ Yes ☐ No If yes, add site to Staff's Lists for Construction and O&M inspections (C.3 and C.3.h)

Operations and Maintenance (O&M) Submittals

G-4 Stormwater Treatment Measure and/HM Control Owner or Operator's Information:

Name: _____

Address: _____

Phone: _____ Email: _____

► Applicant must call for inspection and receive inspection at completion of installation of treatment measures and/or hydromodification management controls including any pervious pavement areas of 3,000 sq.ft. or more.

The following questions apply to C.3 Regulated Projects and Hydromodification Management Projects.

		Yes	No	N/A
G-4.1	Was maintenance plan submitted?	☐	☐	☐
G-4.2	Was maintenance plan approved?	☐	☐	☐
G-4.3	Was maintenance agreement submitted?	☐	☐	☐
	(Date executed: _____)			

► Attach the executed maintenance agreement as an appendix to this checklist.

G-5 Annual Operations and Maintenance (O&M) Submittals (for municipal staff use only):

For C.3 Regulated Projects and Hydromodification Management Projects, indicate the dates on which the Applicant submitted annual reports for project O&M:

G-6 Comments (for municipal staff use only):

G-7 NOTES (for municipal staff use only):

Project Info Notes: _____

Worksheet A Notes: _____

Worksheet B Notes: _____

Worksheet C Notes: _____

Worksheet D Notes: _____

Worksheet E Notes: _____

Worksheet F Notes: _____

G-8 Project Close-Out (for municipal staff use only):

	Yes	No	N/A
8.1 Were final Conditions of Approval met?	☐	☐	
8.2 Was initial inspection of the completed treatment/HM measure(s) conducted? (Date of inspection: _____)	☐	☐	☐
8.3 Was maintenance plan submitted? (Date executed: _____)	☐	☐	☐
8.4 Was project information provided to staff responsible for O&M verification inspections? (Date provided to inspection staff: _____)	☐	☐	☐

G-9 Project Close-Out (Continued -- for municipal staff use only):

Name of staff confirming project is closed out: _____

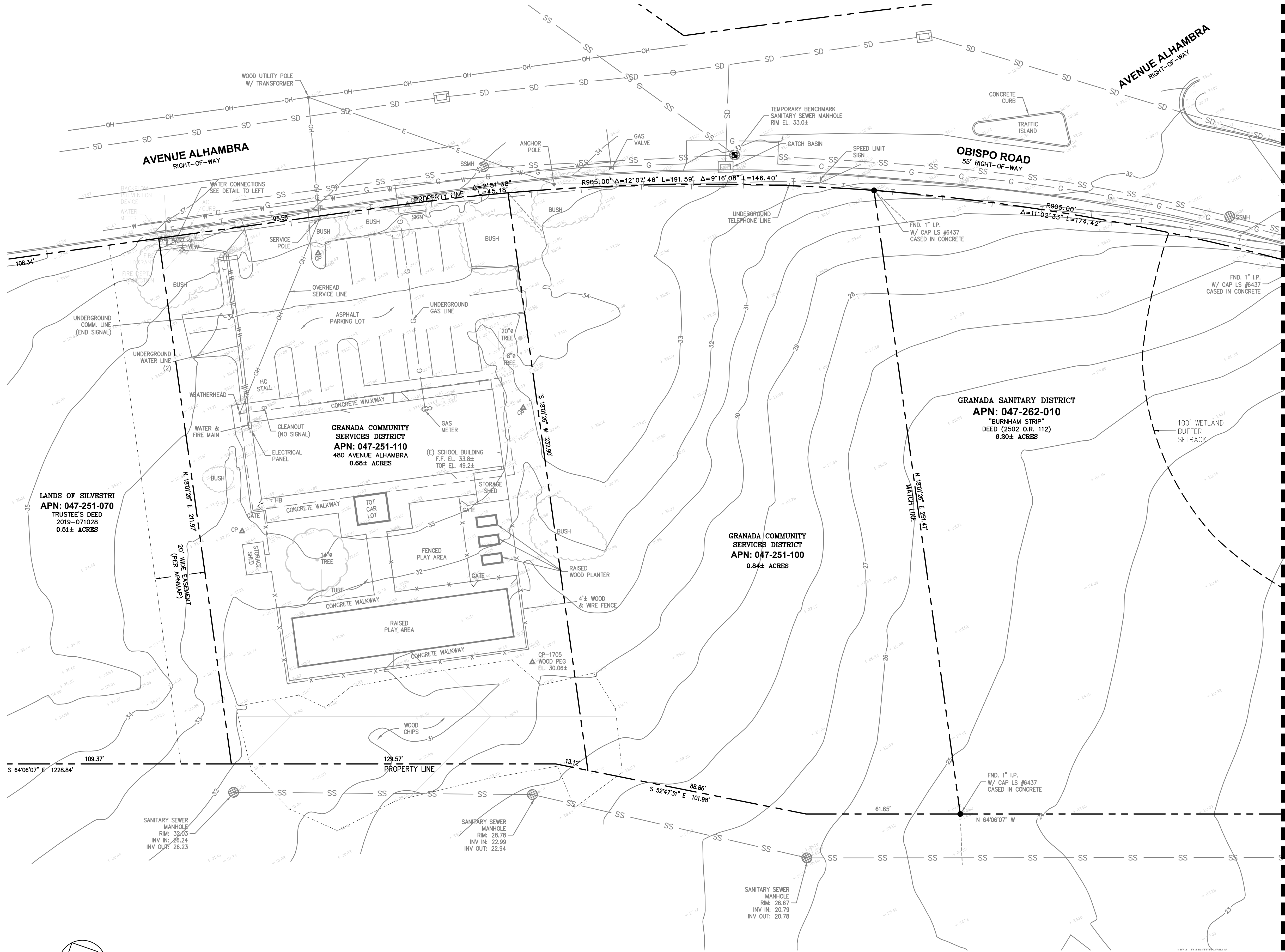
Signature: _____ Date: _____

Name of O&M staff receiving information: _____

Signature: _____ Date: _____

APPENDIX 2

Topographic Survey



LEGEND

- PROPERTY LINE
- EXISTING EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- OVERHEAD UTILITY LINE
- EXISTING FENCE LINE
- UNDERGROUND COMM. LINE
- UNDERGROUND WATER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND ELECTRICAL LINE
- UNDERGROUND SEWER LINE

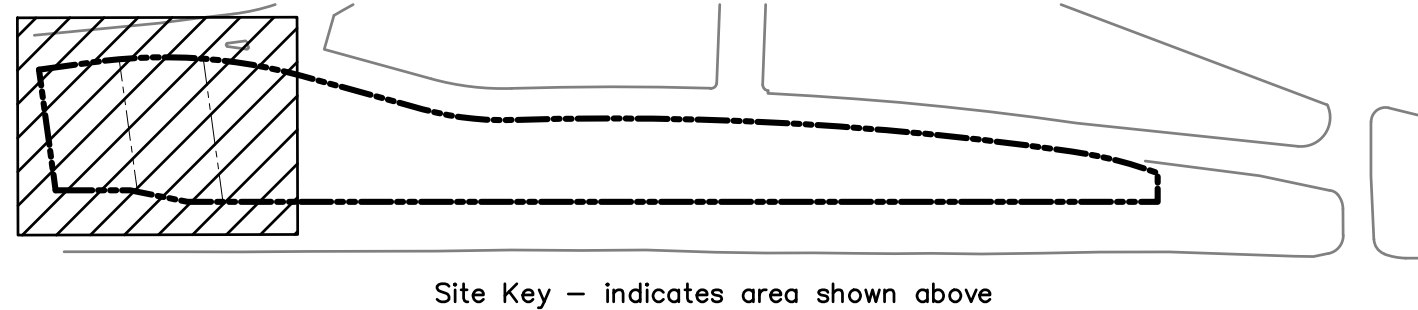
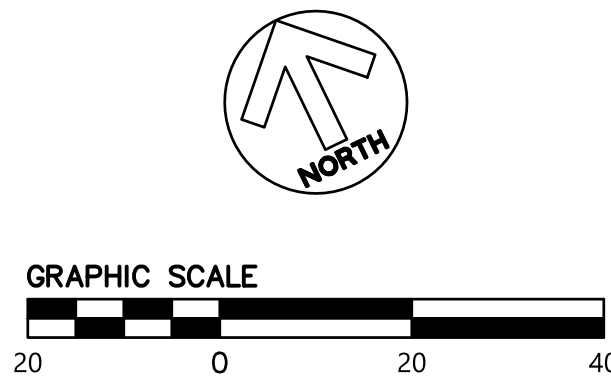
ABBREVIATIONS/SYMBOLS:

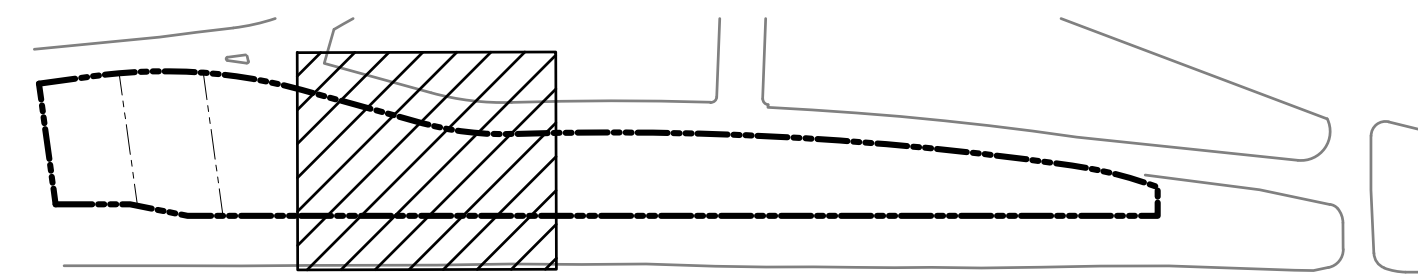
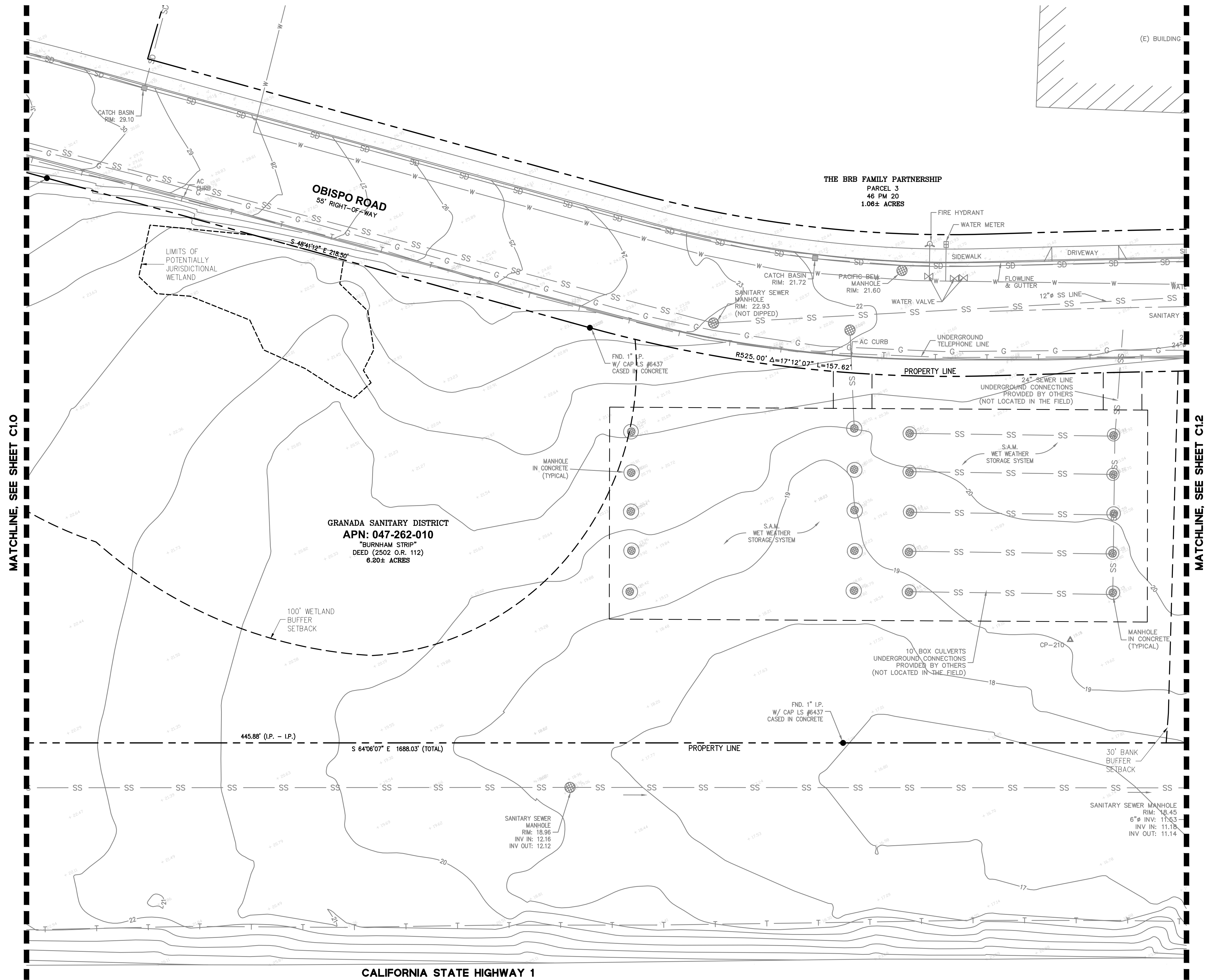
- | | | | |
|-------|--------------------------|---|----------------------------|
| AD | AREA DRAIN | ● | FOUND IRON PIPE (AS NOTED) |
| APN: | ASSESSOR'S PARCEL NUMBER | † | HOSE BIB |
| CP | CONTROL POINT | ⊗ | VALVE |
| CO. | CLEANOUT | ⊗ | MANHOLE |
| CONC. | CONCRETE | ⊗ | CATCH BASIN |
| EL. | ELEVATION | ⊗ | WATER METER |
| FND. | FOUND | ⊗ | GAS METER |
| HT. | HEIGHT | ⊗ | FIRE HYDRANT |
| ICV | IRRIGATION CONTROL VALVE | ⊗ | CLEANOUT |
| SSMH | SANITARY SEWER MANHOLE | | |
| | SPOT ELEVATION | | |
| ▲ | SURVEY CONTROL POINT | | |
| ■ | PROJECT BENCHMARK | | |

EXISTING CONDITIONS TOPOGRAPHIC NOTES:

- EXISTING BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN ON THESE PLANS ARE BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY QUIET RIVER LAND SERVICES INC. DATED FEBRUARY 2 & 3, 2022.
- BENCHMARK: THE ELEVATIONS SHOWN HEREON WERE DERIVED FROM L-1/L-2 DATA COLLECTED USING NAVSTAR GLOBAL POSITIONING SYSTEM (GPS) AND A CHCX90D-OPUS GPS RECEIVER AND POST-PROCESS USING THE CORS NETWORK. TEMPORARY BENCHMARK IS LOCATED ON THE RIM OF SANITARY SEWER MANHOLE LOCATED NEAR A CATCH BASIN DRAIN INLET ON THE SOUTH SIDE OF AVENUE ALHAMBRA AS IT TRANSITIONS TO OBISPO ROAD AS SHOWN IN PLAN. THE ELEVATIONS SHOWN HEREON ARE BASED ON THE ELEVATIONS ESTABLISHED BY QUIET RIVER LAND SERVICES INC., AS SHOWN ON THE "TOPOGRAPHIC SURVEY".

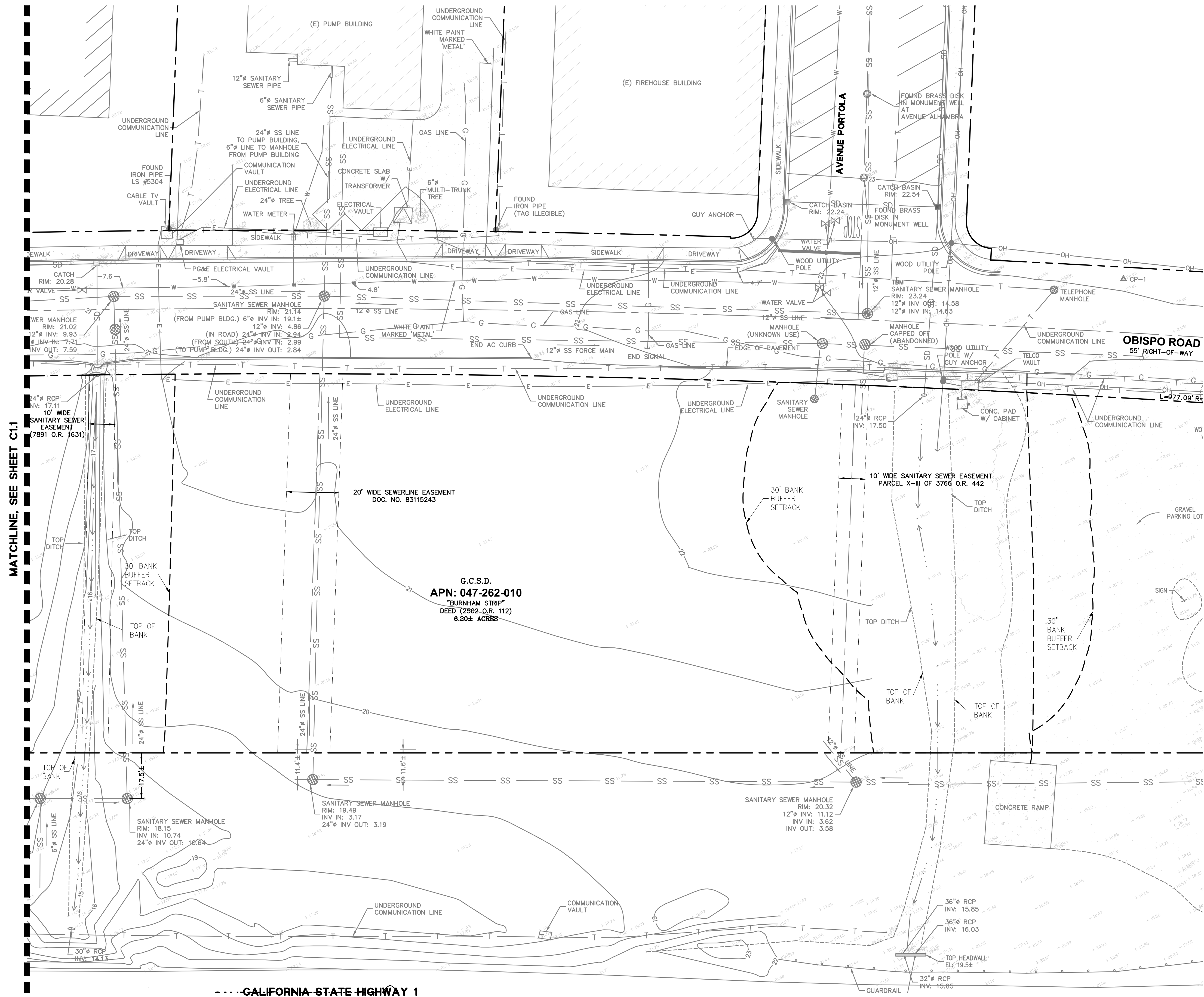
ELEVATION = 33.0 FEET (DATUM NAVD 1988)
- ALL UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE FROM FIELD SURVEY OF PAINT MARKINGS BY OTHERS, OR FROM AVAILABLE RECORD DOCUMENTS/BLOCK MAPS PROVIDED BY OTHERS. THE SURVEYOR/ENGINEER DOES NOT ASSUME RESPONSIBILITY FOR THEIR COMPLETENESS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES, STRUCTURES AND SERVICES BEFORE COMMENCING THE WORK. THE LOCATIONS OF UTILITIES, STRUCTURES AND SERVICES SHOWN SHALL BE DEEMED TO BE APPROXIMATE ONLY. ALL DISCREPANCIES BETWEEN WHAT IS SHOWN AND THE ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE OWNER PRIOR TO ANY WORK. CONTRACTOR SHALL RECORD ALL UTILITY MARKINGS ON A SEPARATE SET OF DRAWINGS.
- THE PROJECT SITE IS LOCATED WITHIN THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S (FEMA'S) FLOOD INSURANCE RATE MAP (FIRM) NUMBER 06041C0264E, EFFECTIVE DATE MARCH 16, 2016. THE FIRM SHOWS THAT A PORTION OF THE PROJECT SITE ALONG MILLER CREEK IS LOCATED IN ZONE AE, AREAS THAT PRESENT A 1% ANNUAL CHANCE OF FLOODING. THE REST OF THE PROJECT SITE IS LOCATED WITHIN FLOOD HAZARD ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.



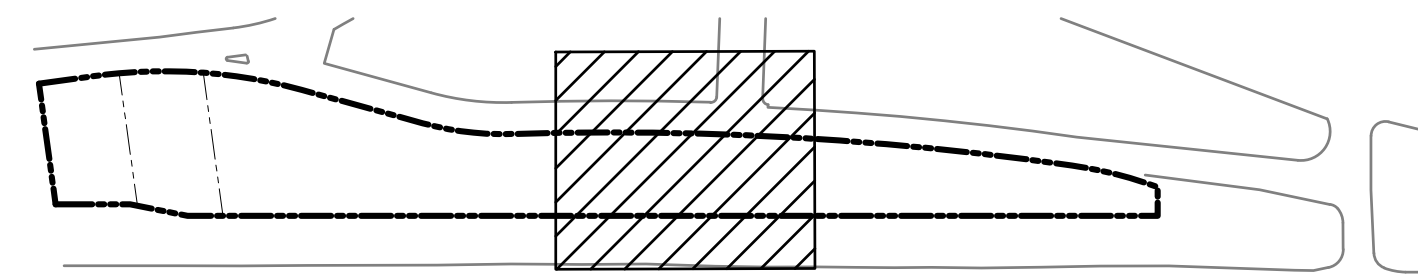


Site Key - indicates area shown above





MATCHLINE, SEE SHEET C11



Site Key - indicates area shown above



APPENDIX 3

Stormwater Control Plan

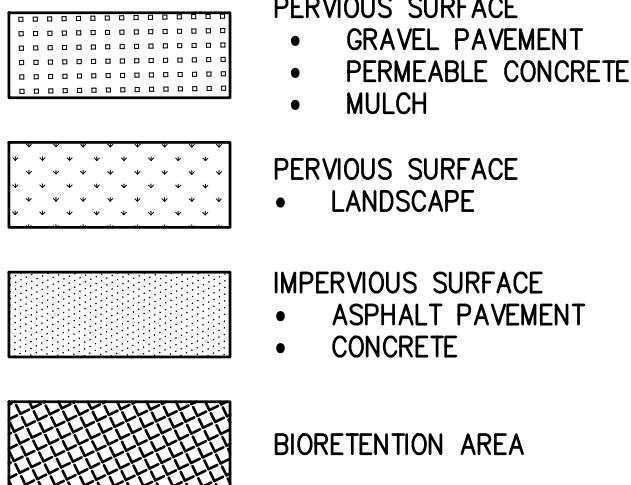
PROJECT AREA SUMMARY

	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	TOTAL ONSITE AREA (SF)
EXISTING CONDITIONS	200,576	14,477	215,053
PROPOSED CONDITIONS	183,700	31,353	215,053

STORMWATER MANAGEMENT SUMMARY:

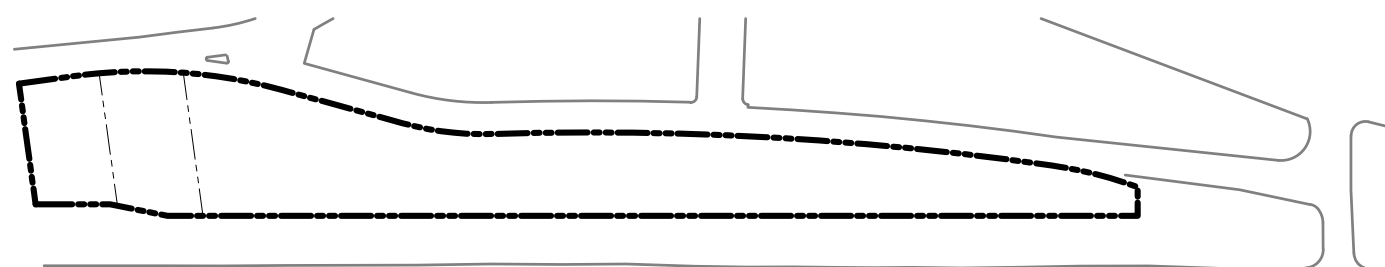
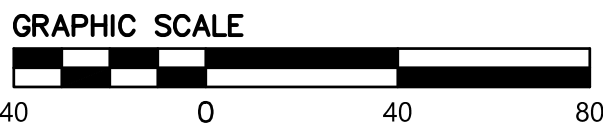
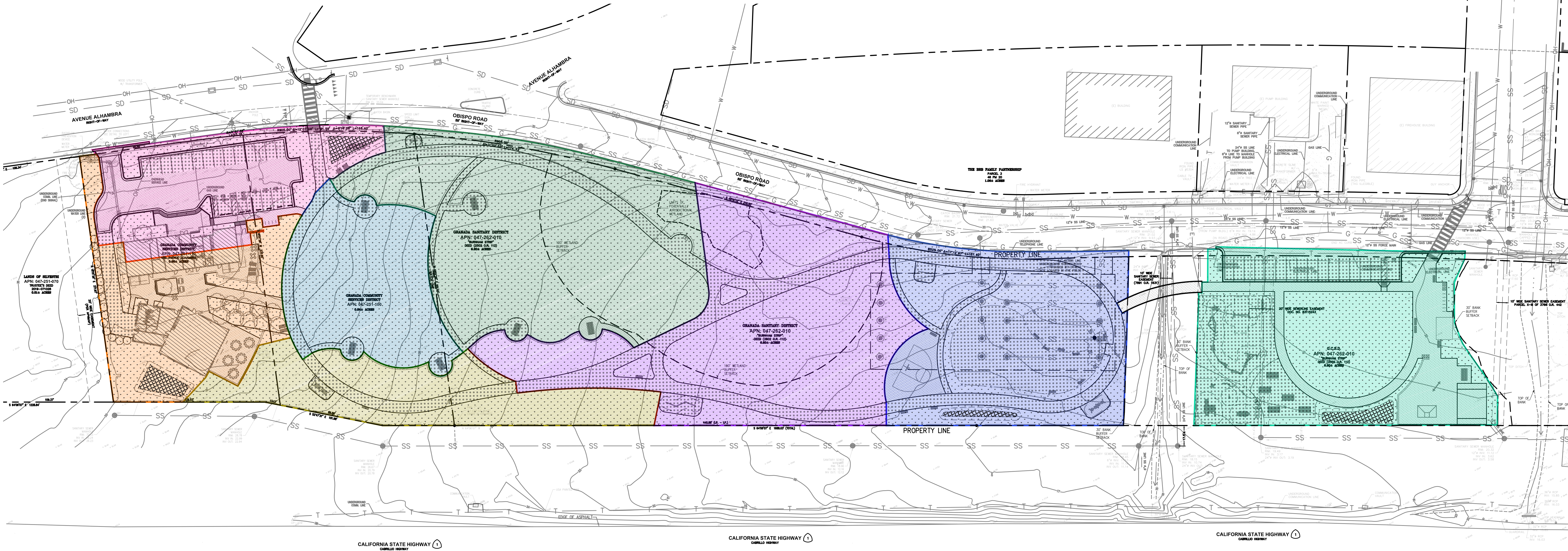
DMA I.D.	DRAINAGE AREA (SF)	PERVIOUS AREA (SF) ¹	IMPERVIOUS AREA (SF)	TREATMENT MEASURE	REQUIRED TREATMENT AREA (SF)	PROVIDED TREATMENT AREA (SF)
1	19,299	9,889	9,410	BIORETENTION AREA ^{1,2}	416	450
2	18,898	9,537	9,361	BIORETENTION AREA ^{1,2}	401	515
3	17,302	17,302	0	SELF TREATING	—	—
4	16,382	16,382	0	SELF TREATING	—	—
5	38,730	38,730	0	SELF TREATING	—	—
6	39,753	39,753	0	SELF TREATING	—	—
7	29,769	27,222	2,546	BIORETENTION AREA ^{1,2}	211	215
8	34,920	24,883	10,036	BIORETENTION AREA ^{1,2}	501	615

PAVEMENT LEGEND:



NOTES:

1. THE SIZE OF THE BIORETENTION AREA CALCULATED USING THE "4% RULE" AS DESCRIBED IN THE SAN MATEO COUNTY C.3 REGULATED PROJECT GUIDE. SEE THE STORMWATER MANAGEMENT PLAN FOR CALCULATION WORKSHEETS.
2. EFFECTIVE IMPERVIOUS AREA IS EQUAL TO THE TOTAL IMPERVIOUS AREA PLUS 0.1 TIMES THE TOTAL PERVIOUS AREA PER THE SAN MATEO COUNTY C.3 REGULATED PROJECTS GUIDE.

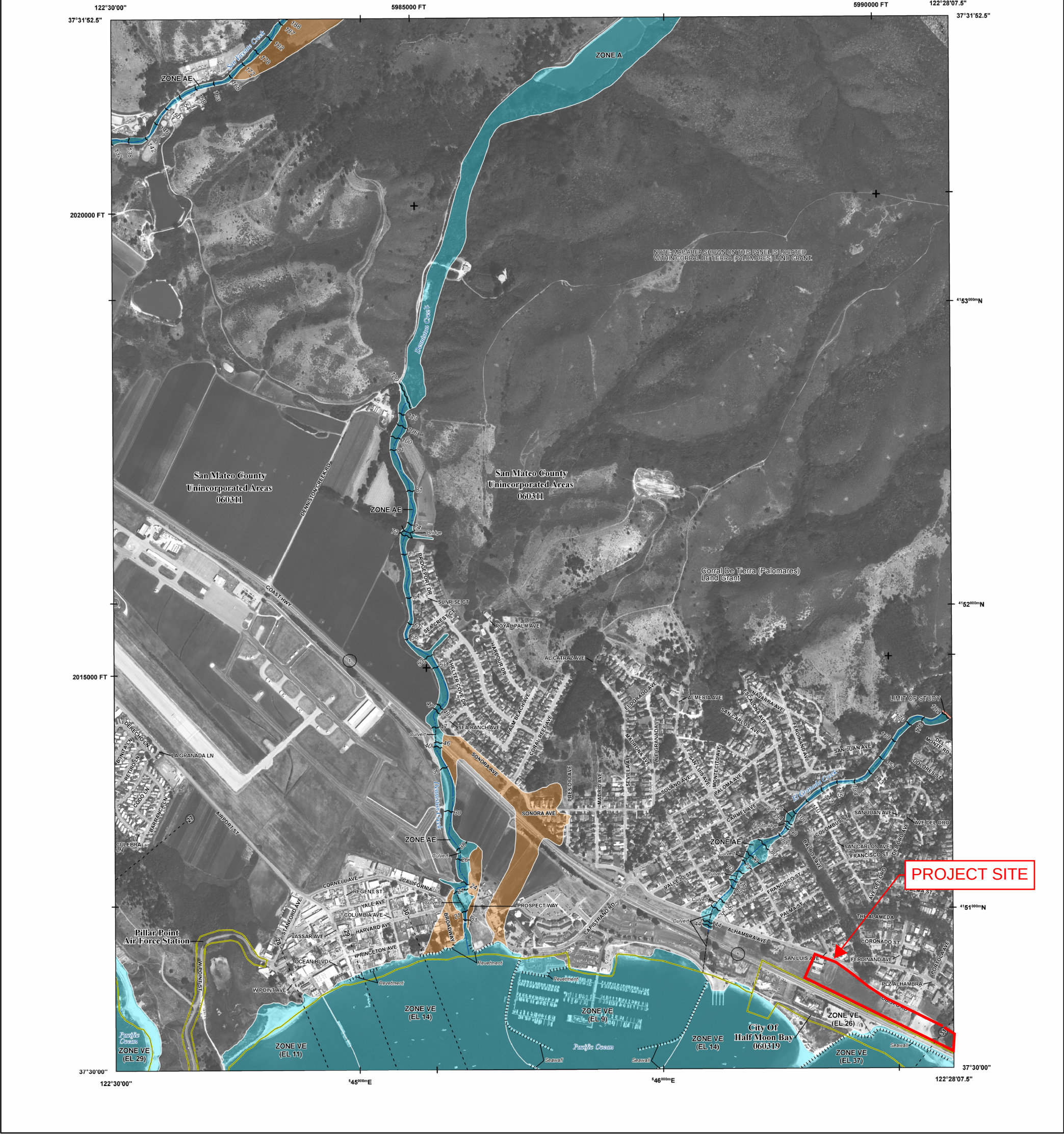


Site Key - indicates area shown above



APPENDIX 4

FEMA Firmette



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A.V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes. Zone X
OTHER AREAS		Area with Flood Risk due to Levee Zone D
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic version, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

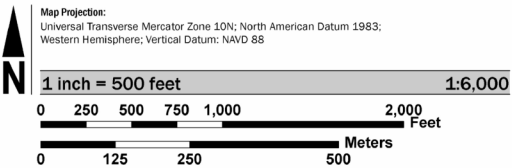
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

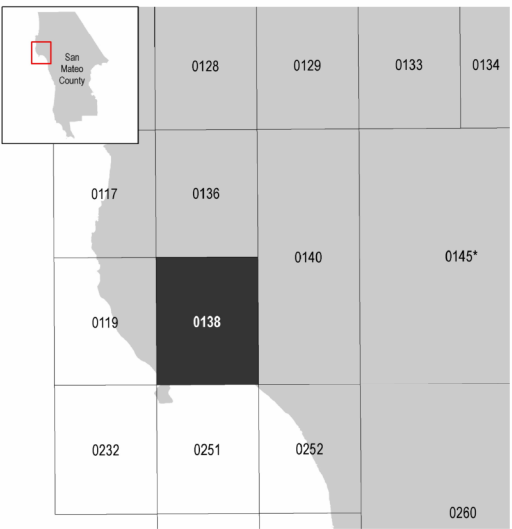
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base Map information shown on this FIRM was derived from Coastal California LIDAR and digital imagery dated 2011. USDA NAIP imagery dated 2010 is used in areas not covered by the Coastal California digital imagery.

SCALE



PANEL LOCATOR



FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

SAN MATEO COUNTY, CALIFORNIA
and Incorporated Areas
PANEL 138 of 510

Panel Contains:
COMMUNITY
HALF MOON BAY, CITY OF
SAN MATEO COUNTY

NUMBER
060319 0138
060311 0138

PANEL
0138

SUFFIX
F

VERSION NUMBER
2.3.2.1

MAP NUMBER
06081C0138F

MAP REVISED
August 2, 2017

APPENDIX 5

Excerpt from Project Soil Report

REVIEW OF PREVIOUS INVESTIGATION

Romig Engineers prepared a geotechnical report, dated September 2009 for construction of an underground storm water storage facility at the southeast lot (APN: 047-262-010) of the subject site. This previous investigation included three exploratory borings to a maximum depth of 20 feet. The borings were located near the planned park improvements and are shown on the Site Plan, Figure 2, and the boring logs are attached in Appendix D.

At the location of Boring EB-1, we encountered approximately 3 feet of hard sandy lean clay of low plasticity underlain by approximately 4 feet of medium dense clayey sand. The upper 7 feet of soil appeared to be fill in Boring EB-1. We then encountered about 2.5 feet of stiff sandy fat clay of high plasticity underlain by medium dense to very dense poorly graded sand and clayey sand, which extended to the maximum depth explored of approximately 18 feet. At Borings EB-2 and EB-3, we generally encountered about 4 to 6 feet of stiff to very stiff sandy fat clay of high plasticity underlain by approximately 4 to 5.5 feet of sandy lean clay of low to moderate plasticity. We then encountered medium dense to very dense clayey sand, which extended to the maximum depth explored of about 10 feet and 20 feet for Borings EB-2 and EB-3, respectively.

A Liquid Limit of 59 and a Plasticity Index of 40 were measured on a sample of near-surface native soil obtained from Boring EB-2. These test results indicate that the near-surface native soils at the site have high plasticity and a high potential for expansion.

Ground water was encountered at the site at depths of about 7.5 feet and 6.5 feet below the ground surface at Borings EB-1 and EB-2, respectively. We also understand ground water was encountered at a depth of 7 feet during percolation testing performed in May 2008. The project design high ground water at the site was estimated to be about 3 feet below the ground surface.

Total liquefaction settlement from the design-level earthquake within the medium dense sands encountered in Boring EB-1 was estimated to be approximately 2 inches. We recommended that the concrete connection vault be supported on a mat foundation.

SITE EXPLORATION AND RECONNAISSANCE

Site reconnaissance and subsurface exploration were performed on September 12, 2022. The subsurface exploration consisted of drilling and sampling five exploratory boring to depths ranging from 6 to 20 feet and advancing two cone penetration tests (CPTs) to

depths of about 43 and 45 feet. The exploratory borings were performed using portable drilling and sampling equipment, and the CPTs were advanced using an electronic cone penetration test system, which was truck-mounted, having a downward pressure capacity of 20 tons. The approximate locations of the borings and CPTs are shown on the Site Plan, Figure 2. The boring and CPT logs, and the results of our laboratory tests are attached in Appendices A and B, respectively.

Surface Conditions

The site is located in a rural/residential area and includes three lots (APN: 047-251-110, 047-251-100, and 047-262-010), which are border by Coronado Street at the southeast side, California State Highway 1 (Cabrillo Highway) along the south side, and Obispo Road and Avenue Alhambra along the north side of the site.

At the time of our investigation, the northwest lot (APN: 047-251-110) was occupied by a single-story pre-school building which had a wood siding exterior. An asphalt paved parking lot was located at the front of the building and provided access to Avenue Alhambra. Playground structures and two storage sheds were located at the rear of the building. Concrete walkways and patios were generally located at the building at the front and rear. We expect the building is supported on a shallow foundation; however, the depth and width of the existing foundations are unknown. The exterior perimeter stem wall was generally covered and not visible. The parking lot had alligator cracking with up to about 1/4-inch wide cracks observed throughout. The exterior concrete flatwork was observed with some cracks up to about 1/4-inch wide. Roof downspouts appeared to discharge into a closed pipe system.

The southwest lot (APN: 047-262-010) had a half pipe skate ramp and an undeveloped parking lot located at the southeast portion of the lot and an underground storm water storage facility at the northwest portion. Two drainage ditches were located at the southwest lot and extended from Obispo Road across the lot to concrete culverts at Highway 1. The middle lot (APN: 047-251-100) was currently vacant and undeveloped. The site was landscaped with native grasses, small to large shrubs, and small trees. The site generally sloped down gently towards the southeast towards the drainage ditches.

Subsurface Conditions

At the locations of CPT-1 and CPT-2, advanced near the community center parking lot, we generally encountered firm to very stiff clay and medium dense to very dense sand with interbedded silty sand, sandy silt, and clayey silt to silty clay throughout the subsurface profile to the maximum depth explored of about 45 feet.

At the locations of Borings EB-7 and EB-8, advanced near the planned community center and existing building, we encountered very stiff to hard lean clay and sandy lean clay of low to high plasticity with interbedded lenses of sand and silt to the maximum depth explored of 20 feet. In Boring EB-8, the upper 4 feet of surface soil appeared to be fill.

At Borings EB-4, EB-5 and EB-6, advanced near the planned park improvements, we generally encountered surface fill ranging from 2 to 6 feet thick. The fill consisted of hard sandy lean clay of low plasticity and medium dense to dense well graded and poorly graded sand. Below the fill, we encountered native soil consisting of about 2 feet to 3.5 feet of stiff to very stiff fat and lean clay of high plasticity underlain by very stiff to hard sandy lean clay of low to moderate plasticity with interbedded sand and silts to maximum depth explored of about 20 feet.

A Liquid Limit of 48 and a Plasticity Index of 28 were measured on a sample of near-surface native soil obtained from Boring EB-7. These test results indicate that the near-surface native soils at the site have high plasticity and high potential for expansion.

Based on our experience, surface fills such as were encountered were typically not placed and compacted to today's standards as engineered fill, and these fills often settle over the years, particularly during times of seasonally heavy rainfall or irrigation when the fill becomes wet, or during strong seismic shaking.

We note that portions of the sandy and silty soil strata encountered at the site may be susceptible to liquefaction during strong seismic shaking. Details of our liquefaction evaluations are included in the section below titled "Liquefaction Evaluation".

Ground Water

Ground water was not encountered in Borings EB-4 through EB-8 during our subsurface exploration. Pore pressure dissipation tests conducted in the CPTs indicated that the ground water table was inferred to be located at a depth of about 16 feet below the ground surface. The borings and CPTs were backfilled immediately after drilling and sampling were completed; therefore, a stabilized ground water level may not have been obtained. We also expect that the ground water table or extent of ground water seepage could be influenced by water seepage at and near the Pacifica Ocean, which is located about 200 feet south of the site. Ground water was encountered at depths of about 7.5 and 6.5 feet in Borings EB-1 and EB-2, respectively, during our subsurface investigation in 2009. We also understand ground water was encountered at a depth of 7 feet during percolation testing performed in May 2008.

Please be cautioned that fluctuations in the level of ground water can occur due to variations in rainfall, landscaping, underground drainage patterns, and other factors. It is also possible and perhaps even likely that a relatively shallow ground water table could develop seasonally in the soil during and after significant rainfall in combination with landscape watering at the property and the upslope areas, or during wet years, or a series of wet years.

GEOLOGIC SETTING

As part of our investigation, we briefly reviewed our local experience and geologic information in our files pertinent to the general area of the site. The information reviewed indicates that the site is mapped in an area underlain by Pleistocene age Marine terrace deposits, Qmt (Pampeyan, 1994). The Marine terrace deposits are expected to consist of poorly to moderately consolidated deposits of marine, eolian, and alluvial sand, silt, gravel, and clay in various proportions and combinations, in indistinct to distinct lenses and beds. The geology of the site vicinity is shown on the Vicinity Geologic Map, Figure 3.

The State Seismic Hazard Zones Map of the Montara Mountain Quadrangle (CGS, 2018), Figure 4, indicates that the site is mapped in a liquefaction hazard zone. A site-specific liquefaction discussion is presented later in this report.

The Tsunami Inundation Map for Emergency Planning (CGS, 2009), Figure 5, indicates that a majority of the site is mapped in a tsunami hazard zone. A site-specific tsunami discussion is presented later in this report.

The site and the immediate vicinity are located in an area that slopes gently to the southwest towards the Pacific Ocean at elevations ranging from about 17 to 35 feet above sea level.

Faulting and Seismicity

There are no mapped through-going faults within or adjacent to the site and the site is not located within a State of California Earthquake Fault Zone (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable. The closest active fault is the San Gregorio fault, located approximately 0.9 mile southwest of the property. Thus, the likelihood of surface rupture occurring from active faulting at the site is low.

APPENDIX 6

LID Measure Technical Guides

- Bioretention Areas

6.1 Bioretention Area

Overview



Figure 6-2: Bioretention area (Credit: City of Brisbane)

Description

Bioretention areas (also known as “rain gardens”) are concave or low and flat landscaped areas that function as soil and plant-based filtration devices that remove pollutants through physical and biological treatment processes. Bioretention areas can be any shape, including linear. Linear bioretention areas are sometimes referred to as stormwater planters. The GI Design Guide alternatively refers to bioretention areas as stormwater planters, stormwater curb extensions or rain gardens depending on the setting/location. Rain gardens in residential settings are sometimes simple bowl-shaped landscapes.

Bioretention areas consist of the following layers, starting from the top: a surface ponding area, plants, a layer of mulch, Biotreatment Soil Media (BSM), and an underlying layer of Class 2 Permeable material (Class 2 Perm) with an underdrain (if needed) that connects to the municipal storm drain system.

Bioretention areas should be designed to distribute stormwater runoff evenly within the surface ponding area. The water is temporarily stored in the ponding area and infiltrates through the BSM, which is engineered to have a high rate of permeability. From there, the water filters down into the underlying Class 2 Perm layer.

The Class 2 Perm layer of the bioretention area may be designed to either maximize infiltration or prevent infiltration to the underlying soils. In bioretention areas that maximize infiltration, the underdrain should be raised at least 6 inches above the bottom of the Class 2 Perm layer, and there should be no liner between the bottom of the Class 2 Perm layer and the surrounding soils. Maximizing infiltration is encouraged where conditions are suitable for infiltration – check with the geotechnical engineer. Where infiltration is precluded, the bioretention area should be fully lined with waterproof material, and the underdrain placed at the bottom of the Class 2 Perm layer.

Best uses

- Any type of development
- Drainage area up to two acres
- Landscape design element

Advantages

- Detains low flows
- Landscape feature
- Low maintenance
- Reliable once established

Limitations

- Not appropriate where soil is unstable
- Typically requires irrigation
- Susceptible to clogging if installed without protection from construction site soils

6.1 Bioretention Area

For strategies and examples of how to retrofit sites and parcels to include bioretention areas, see Sections 3.2 and 3.3 of the GI Design Guide.

Remember that stormwater control measures should be located in areas that can be accessible at any given time for the purpose of operation and maintenance and inspections. Bioretention units should not be located on inaccessible private property such as residential backyards. See Table 6-3 below for recommended bioretention area locations.

Siting

Table 6-3: Recommended locations for bioretention areas (rain gardens)

Recommended Locations	Bioretention
Parking Lot	●
Roof	
Driveway	●
Podium-level	
Close to building	
Away from Buildings	●
Underground	



Figure 6-3: Bioretention area in a multi-family residential property in Redwood City (top; Credit: EOA, Inc.) and in a parking lot in Burlingame (bottom; Credit: SMCWPPP)

Design and Sizing Guidelines

Drainage Area and Setback Requirements

- Setback from structures 10' or as required by structural or geotechnical engineer, or local jurisdiction.
- Follow property line set-back requirements per local jurisdiction zoning. If the bioretention area is on or near the property line, consider if flow from adjacent properties that may cross the property line will affect the sizing of the system.
- Area draining to the bioretention area should not exceed 2 acres.
- Area draining to the bioretention area should not contain a significant source of soil erosion, such as high velocity flows along slopes not stabilized with vegetation or hardscape.
- Areas immediately adjacent to bioretention area should have slopes more than 0.5% for pavement and more than 1% for vegetated areas.

Treatment Dimensions, Grading and Sizing

- It is recommended that bioretention areas be sized to 4% of the impervious surface area on the project site which corresponds to a surface loading rate of 5 inches per hour and a rainfall intensity of 0.2 inches per hour. The area of impervious surface multiplied by 0.04 sizing factor will equal the footprint of the bioretention area. Alternatively, if there are site or infiltration constraints, bioretention sizing may be calculated using the flow-based treatment standard, or the combination flow- and volume-based treatment standard described in Section 5.1 based on the flow entering the basin at the treatment flow rate over the initial hours of the storm until the treatment volume is attained. See Appendix E for more guidance on infiltration issues.
- Where there is a positive surface overflow, bioretention areas should have freeboard of at least 0.2 feet to the lowest structural member versus the 100-year storm water level in the bioretention area, unless local jurisdiction has other requirements.
- Where the bioretention area is in a sump that depends on outflow through a catch basin, the bioretention area should have a freeboard of at least 0.5 feet to the lowest building finished floor elevation (including garage and excluding crawl space) for conditions with the outlet 50 percent clogged, unless local jurisdiction has other requirements. Where the freeboard cannot be provided, an emergency pump may be allowed on a case-by-case basis.
- Allow 2 inches of freeboard between the rim elevation of the outfall grate and elevation of the emergency overflow above the overflow grate such as the top of a flow-through planter wall.
- Side slopes should not exceed 3:1; downstream slope for overflow should not exceed 3:1.
- Bioretention areas, including linear treatment measures, should not be constructed on slopes greater than 4%, unless constructed as a series of relatively horizontal bioretention cells. A bioretention facility should be one level (maximum 2% inner cell slope), shallow basin or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil. In a linear bioretention area, check dams should be placed for every 4 to 6 inches of elevation change and so that the top of each dam is at least as high as the toe of the next upstream

dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders³¹. The slope within cells should not exceed 2% and check dams should be used to hold flow above the 2% level before allowing flow to enter the next cell. Bioretention cells are not recommended if overall slope exceeds 8%. If designing a sloped bioretention area with a surface reservoir (volume method or combined flow and volume method), the slope will have to be factored in the calculation of the surface reservoir height. See Appendix E for more guidance on infiltration measures. **See Section 4.3 of the GI Design Guide for guidance on how to deal with steep topography** using check dams and weirs.

- Surface ponding depths may vary, with a recommended depth of 6 inches (measured from the top of the BSM layer – not the mulch layer - to the overflow rim elevation) and a maximum depth of 12 inches. If ponding depths exceed 6 inches, the landscape architect may want to consider effects on the planting palette. The 3" mulch layer can be within the 6" ponding depth.

Inlets to Treatment Measure

- Flow may enter the treatment measure in the following ways (see example drawings in Section 5.13):
 - As overland flow from landscaping (no special requirements);
 - As overland flow from pavement (cutoff wall required);
 - Through a curb opening;
 - Through a curb drain;
 - Within a drop structure through a stepped manhole (refer to Figure 5-1 in Section 5.6);
 - Through a bubble-up emitter; and/or
 - Through a roof leader or other conveyance from a building roof.
- Where flows enter the biotreatment area, allow a change in elevation of 4-6 inches between the paved surface and the biotreatment soil media elevation (i.e. a recommended 2" drop from the inlet to the mulch or splash block), so that vegetation or mulch build-up does not obstruct flow.
- Splash blocks or splash aprons with or without grouted cobble, pea gravel, plants or mulch should be installed to dissipate flow energy and velocity where runoff enters the treatment measure, and at the downstream side of tiers, weirs and check dams to prevent erosion.

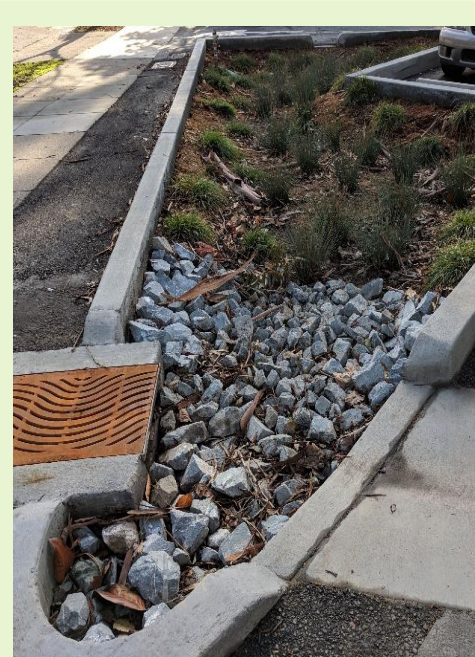


Figure 6-4: Examples of curb cut inlets at a bioretention area in Burlingame (Credit: City of Burlingame)

³¹ Contra Costa Clean Water Program. February 2012. C.3 Stormwater Guidebook, 6th Edition and Stormwater Management Handbook: Implementing Green Infrastructure in Northern Kentucky Communities, 2009. www.epa.gov/smartgrowth/publications.htm

- Curb openings should be a minimum of 18 inches wide (or 12" if allowed by the municipality), with the number and locations designed so that runoff is dispersed throughout the bioretention area or through the use of a flow spreading system.
- Bubble-up emitters and pipes to bubble-up emitters should have weep holes to avoid standing water inside after storm events.

Vegetation



Figure 6-5: Bioretention area featuring several plant types (Credit: City of Burlingame)

- Plant species should be suitable to well-drained soil and occasional inundation. See planting guidance in Appendix A.
- Shrubs and small trees should be placed to anchor the bioretention area cover.
- Tree planting should be as required by the municipality. If larger trees are selected, plant them at the periphery of the bioretention area, where roots can access non-BSM soils outside the area.
- Underdrain trenches can be placed at the edge of tree planting zones, as needed, to maximize distance between tree roots and the underdrain, but the underdrain trench must still be located somewhere under the BSM section and within the Class 2 Perm material layer.
- Use integrated pest management (IPM) and/or Bay-Friendly principles in the landscape design to help avoid or minimize any use of synthetic pesticides and quick-release fertilizer. Check with the local jurisdiction for any local policies regarding the use of pesticides and fertilizers.
- Irrigation should be provided as needed to maintain plant health. If irrigation cannot be provided, then watering by hand should be accommodated weekly through plant establishment – typically through the first six months depending on the season and levels of precipitation.
- Trees and vegetation should not block inflow, create traffic or safety issues, or obstruct utilities.

Soil and Drainage Considerations Specific to Bioretention Areas

- Consideration of groundwater level and placement of the underdrain:
 1. If there is less than a 5-foot separation between the bottom of the facility and the seasonal high groundwater level, or infiltration is not allowed due to other site constraints, an impermeable liner should be placed between the Class 2 Perm and the bottom of the facility and the underdrain placed on top of that liner.
 2. If there is at least a 5-foot separation between the bottom of the facility and the seasonal high groundwater level, and geotechnical conditions allow infiltration, the facility should be unlined and the underdrain should be raised at least 6 inches above the bottom of the Class 2 Perm to allow storage and infiltration of treated water.

Soil and Drainage Considerations for All Biotreatment Systems

- Soil used in the bioretention area must meet the biotreatment soil media (BSM) specification included in Appendix K. Check with municipality for any additional requirements.
- Bioretention areas should have a minimum BSM depth of 18 inches.
- Install and maintain a 3-inch layer of composted arbor mulch (also called “aged mulch”) in areas between plantings. Rock mulches such as river cobble or pea gravel, or other mulches that resist floating may be used, but large rock mulch, such as cobble, should be used sparingly and only where absolutely necessary. Dyed, “micro-bark”, or “gorilla hair” mulches, as well as chipped wood mulch from recycled pallets and dimensional lumber, are not recommended. **See Sections 4.9 and 6.3 of the GI Design Guide** for more information on mulch.
- An underdrain system is generally required. Depending on the permeability of in situ soils, the local jurisdiction may allow installation without an underdrain on a case-by-case basis.
- Filter fabric should not be used around the underdrain or between the BSM and Class 2 Perm layer. Class 2 Perm performs the function of filter fabric (keeping the BSM from exiting the system through the underdrain) but is less prone to clogging.
- The underdrain should consist of a solid perforated or slotted HDPE or PVC pipe connected to a cleanout pipe(s) and to a storm drain or discharge point. Solid HDPE or triple-walled HDPE pipe, with smooth inner and outer layers and a corrugated middle layer, are recommended. The cleanout should consist of a vertical, rigid, non-perforated, non-corrugated PVC or HDPE pipe, with a minimum diameter of 4 inches and a watertight cap fit, raised or flush with the ground, or as required by municipality. There should be adequate fall (min. 0.5% slope) from the underdrain to the storm drain or discharge point. See Section 5.14 for more information on underdrains.
- The underdrain should be placed in a 12-inch thick layer of Caltrans Class 2 permeable material, or similar municipality-approved material. See Section 5.14 for more information on Class 2 permeable material.

Construction Requirements and Maintenance Plans

Construction Requirements for All Biotreatment Systems

- When excavating, avoid spreading fines of the soils on bottom and side slopes. Remove any smeared soiled surfaces and provide a natural soil interface into which water may percolate.
- Minimize compaction of existing soils. Protect from construction traffic.
- Protect the area from construction site runoff. Runoff from unstabilized areas should be diverted away from biotreatment facility.
- ***For additional construction guidelines, see Chapters 2, 4 and 5 of the GI Design Guide.*** Specifically, see Sections 4.3 through 4.9 for construction strategies for dealing with slopes, overflows, poor soils, utilities, runoff capture, etc.

Remember

Maintenance Considerations for All Treatment Measures

- See Chapter 8 of this Guide for specific maintenance guidance. Specifically, see Section 8.3.1 for common maintenance concerns encountered for bioretention areas.
- ***See Chapter 6 of the GI Design Guide*** for landscape maintenance recommendations and information.
- A Maintenance Agreement should be provided and should state the parties' responsibility for maintenance and upkeep.
- Prepare a maintenance plan and submit with Maintenance Agreement. Maintenance plan templates are in Appendix G

Typical Design Details

Note that even though not shown in the details below, 3" of mulch will need to be added on top of the bioretention soil media for all bioretention area measures - 2" of freeboard is also recommended.

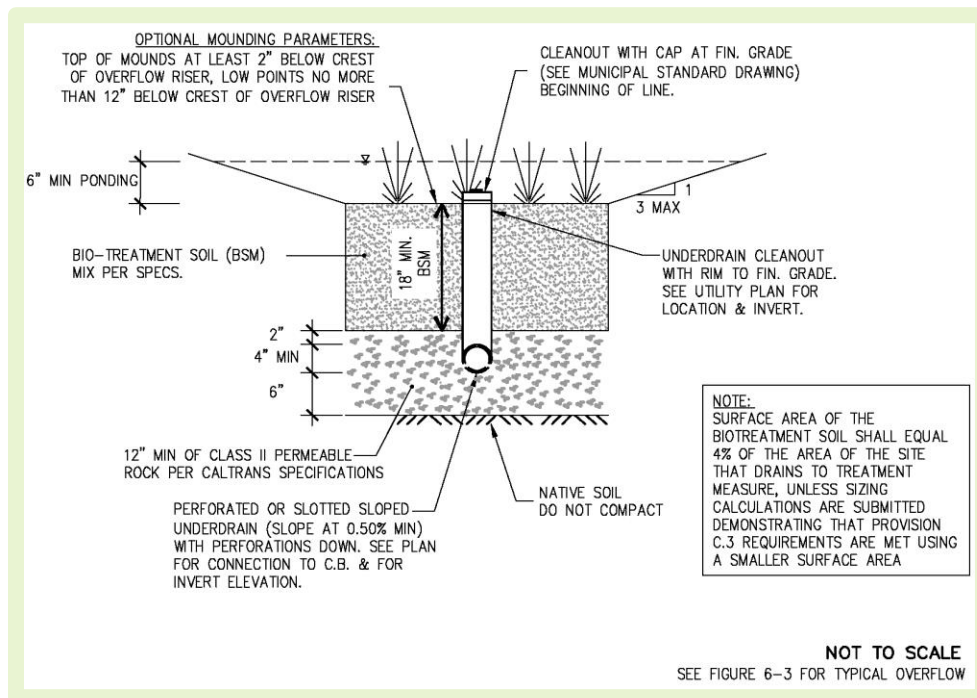


Figure 6-6: Cross Section, Bioretention Area with Infiltration

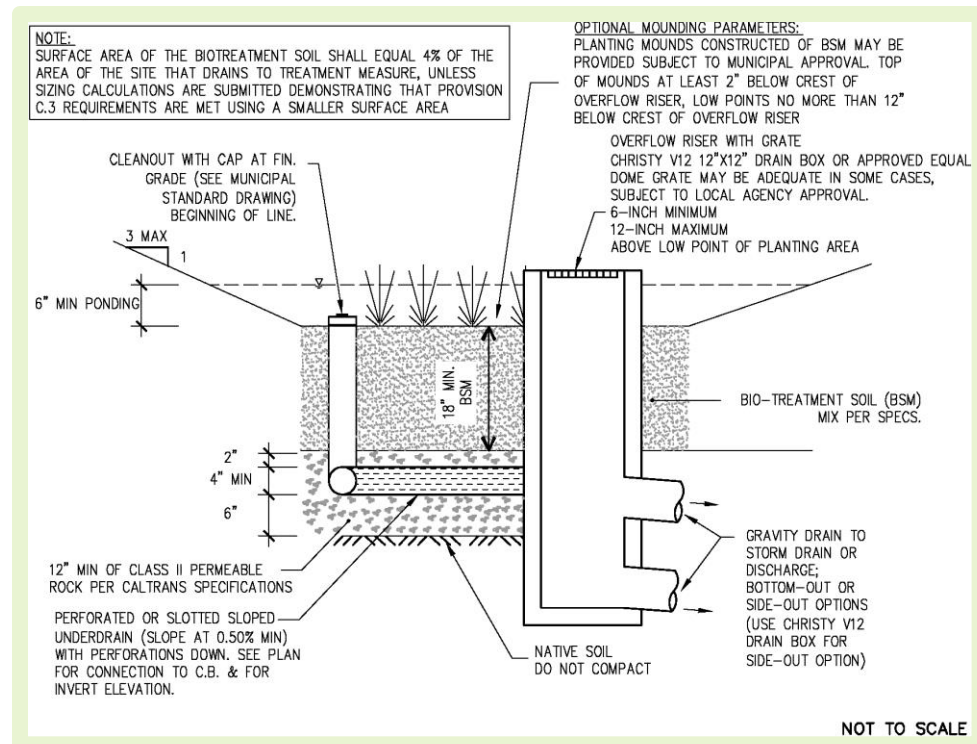


Figure 6-7: Cross Section, Bioretention Area (side view) with Infiltration

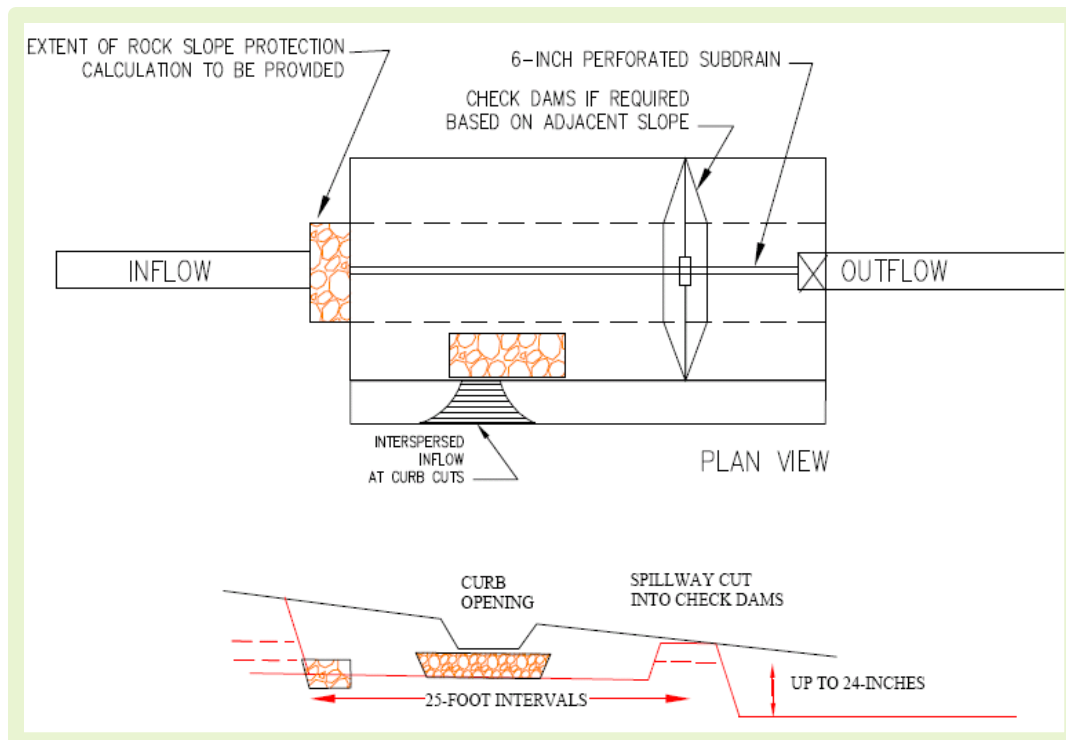


Figure 6-8: Check dam (plan view and profile) for installing a series of linear bioretention cells in sloped area

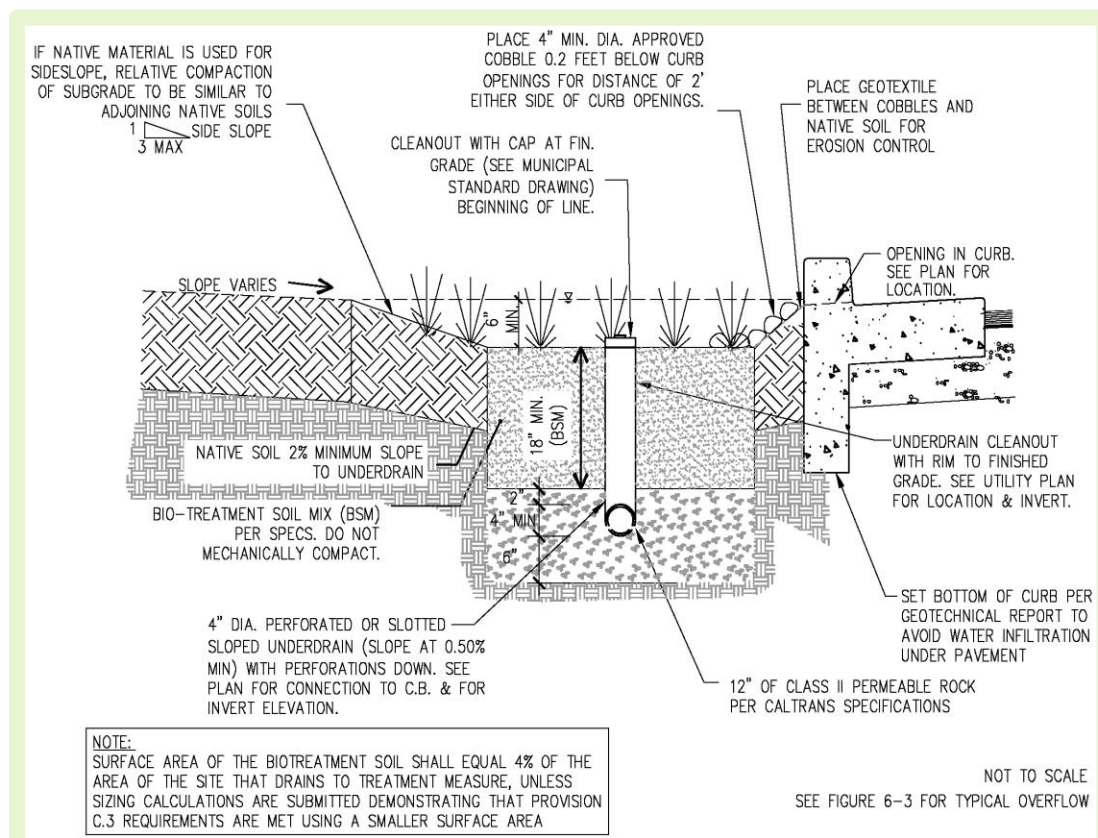


Figure 6-9: Cross section of bioretention area with infiltration showing inlet from pavement.

6.1 Bioretention Area

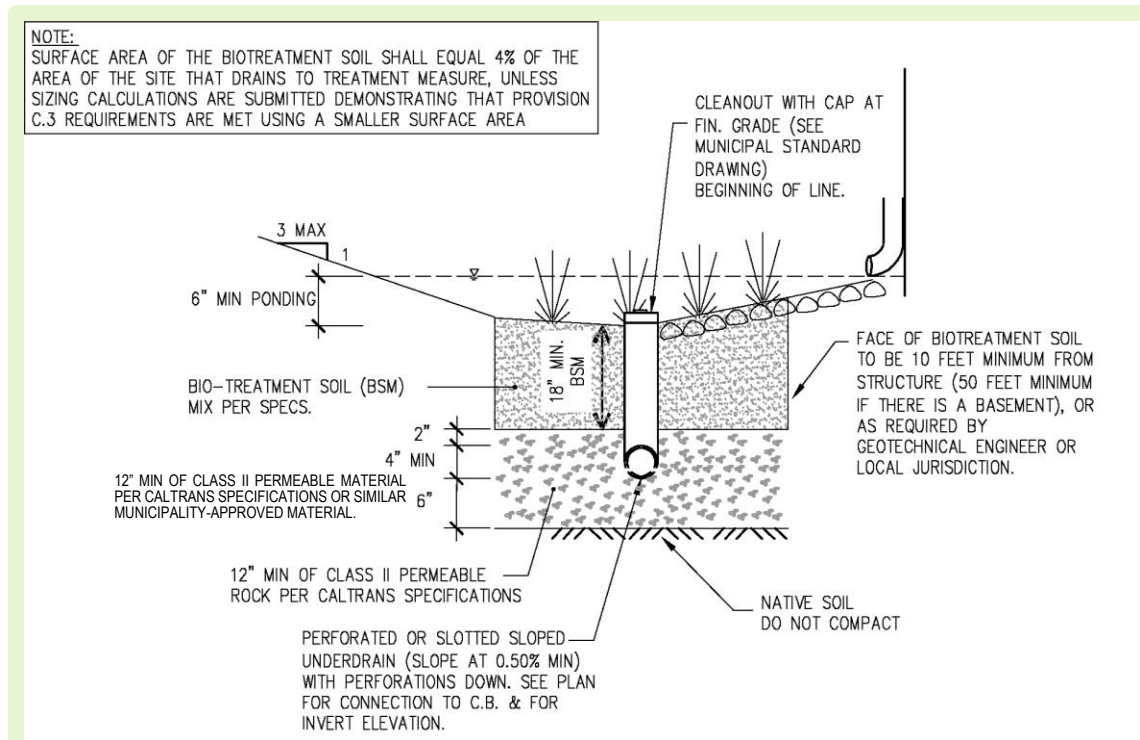


Figure 6-10: Bioretention area in landscaping to treat runoff from rainwater leaders (Not to Scale)

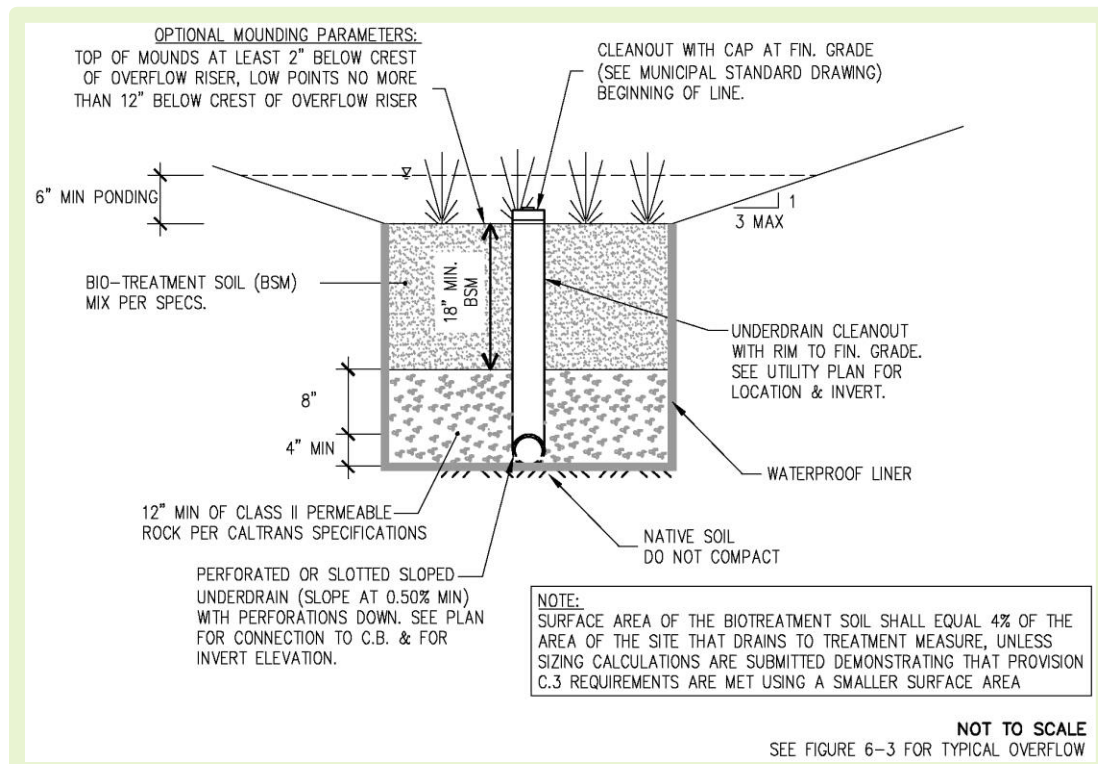
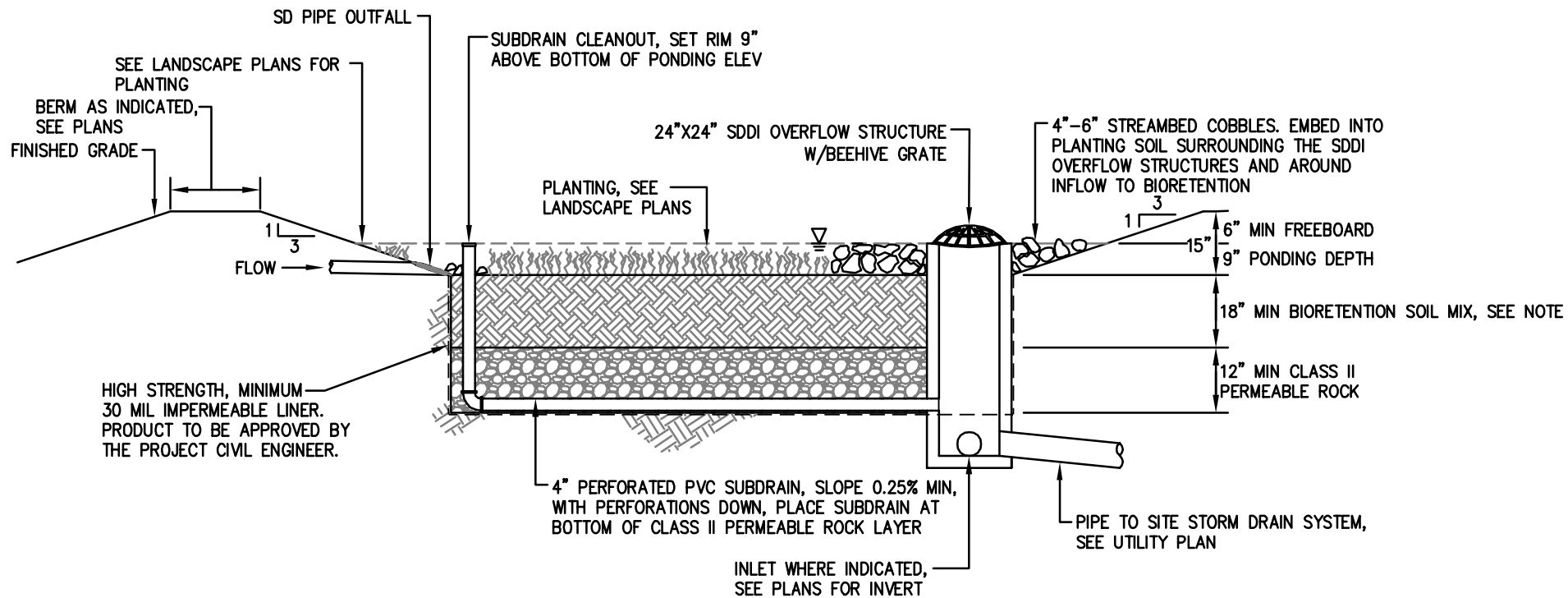


Figure 6-11: Cross section of lined bioretention area, for locations where infiltration is precluded.

APPENDIX 7

Project Treatment Measure Details

- Bioretention Areas



NOTES:

1. COMPLETELY SURROUND SIDES AND BOTTOM OF BIORETENTION AREA WITH IMPERMEABLE LINER. NO INFILTRATION INTO SURROUNDING SOIL IS PERMITTED.
2. SEAL ALL LINER SEAMS WITH WATERPROOF TAPE AS RECOMMENDED BY LINER MANUFACTURER.
3. SEE PROJECT SPECIFICATIONS FOR BIOTREATMENT SOIL MIX.
4. SEE LANDSCAPE PLANTING PLAN FOR TREE LOCATIONS AND OTHER PLANT SPECIES IN BIORETENTION AREA.
5. BASE OF TRENCH SHALL SLOPE AT 0.25% TO PARALLEL UNDERDRAIN.
6. FILTER FABRIC SHOULD NOT BE USED IN OR AROUND THE UNDERDRAIN OR BETWEEN THE BSM AND CLASS II PERM.

BIORETENTION AREA

NTS

APPENDIX 8

NOAA Rainfall Intensity Chart



NOAA Atlas 14, Volume 6, Version 2
 Location name: Half Moon Bay, California, USA*
 Latitude: 37.5018°, Longitude: -122.4717°
 Elevation: 18 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.149 (0.131-0.171)	0.179 (0.157-0.206)	0.219 (0.191-0.252)	0.252 (0.218-0.293)	0.298 (0.247-0.362)	0.334 (0.270-0.418)	0.372 (0.291-0.480)	0.411 (0.310-0.550)	0.467 (0.334-0.659)	0.511 (0.351-0.753)
10-min	0.214 (0.188-0.245)	0.256 (0.225-0.295)	0.313 (0.274-0.361)	0.361 (0.313-0.420)	0.427 (0.354-0.519)	0.479 (0.386-0.599)	0.533 (0.417-0.688)	0.590 (0.445-0.789)	0.669 (0.479-0.944)	0.733 (0.503-1.08)
15-min	0.259 (0.228-0.297)	0.310 (0.273-0.356)	0.379 (0.332-0.437)	0.436 (0.378-0.508)	0.516 (0.428-0.628)	0.579 (0.467-0.724)	0.644 (0.504-0.831)	0.713 (0.538-0.954)	0.809 (0.579-1.14)	0.887 (0.608-1.31)
30-min	0.359 (0.316-0.412)	0.430 (0.378-0.495)	0.526 (0.461-0.606)	0.606 (0.525-0.706)	0.716 (0.594-0.872)	0.803 (0.649-1.00)	0.894 (0.699-1.15)	0.990 (0.747-1.32)	1.12 (0.805-1.58)	1.23 (0.844-1.81)
60-min	0.508 (0.447-0.583)	0.609 (0.535-0.700)	0.744 (0.652-0.858)	0.857 (0.742-0.998)	1.01 (0.840-1.23)	1.14 (0.918-1.42)	1.26 (0.989-1.63)	1.40 (1.06-1.87)	1.59 (1.14-2.24)	1.74 (1.19-2.56)
2-hr	0.746 (0.657-0.856)	0.878 (0.772-1.01)	1.06 (0.928-1.22)	1.21 (1.05-1.42)	1.43 (1.19-1.74)	1.61 (1.30-2.01)	1.80 (1.40-2.32)	2.00 (1.51-2.67)	2.28 (1.64-3.22)	2.52 (1.73-3.71)
3-hr	0.935 (0.823-1.07)	1.10 (0.965-1.26)	1.32 (1.16-1.52)	1.51 (1.31-1.76)	1.79 (1.48-2.18)	2.01 (1.62-2.52)	2.25 (1.76-2.91)	2.51 (1.89-3.36)	2.88 (2.06-4.06)	3.19 (2.19-4.70)
6-hr	1.32 (1.16-1.51)	1.55 (1.36-1.78)	1.88 (1.65-2.17)	2.16 (1.87-2.52)	2.57 (2.13-3.13)	2.90 (2.34-3.63)	3.26 (2.55-4.21)	3.65 (2.76-4.88)	4.21 (3.02-5.94)	4.68 (3.21-6.89)
12-hr	1.71 (1.51-1.96)	2.08 (1.83-2.39)	2.59 (2.27-2.98)	3.02 (2.62-3.52)	3.63 (3.01-4.42)	4.12 (3.33-5.16)	4.65 (3.64-6.00)	5.21 (3.93-6.98)	6.02 (4.31-8.48)	6.67 (4.57-9.83)
24-hr	2.17 (1.98-2.44)	2.74 (2.48-3.07)	3.50 (3.16-3.94)	4.13 (3.71-4.69)	5.02 (4.35-5.90)	5.72 (4.86-6.88)	6.46 (5.34-7.96)	7.23 (5.81-9.18)	8.32 (6.40-11.0)	9.18 (6.82-12.6)
2-day	2.79 (2.53-3.13)	3.49 (3.17-3.92)	4.45 (4.03-5.01)	5.25 (4.71-5.96)	6.38 (5.53-7.50)	7.27 (6.17-8.75)	8.21 (6.79-10.1)	9.21 (7.40-11.7)	10.6 (8.16-14.1)	11.7 (8.71-16.1)
3-day	3.25 (2.96-3.65)	4.06 (3.68-4.56)	5.14 (4.65-5.79)	6.04 (5.43-6.87)	7.32 (6.35-8.61)	8.33 (7.07-10.0)	9.39 (7.77-11.6)	10.5 (8.45-13.4)	12.1 (9.30-16.0)	13.4 (9.92-18.4)
4-day	3.64 (3.31-4.08)	4.53 (4.11-5.09)	5.72 (5.18-6.45)	6.72 (6.03-7.63)	8.10 (7.02-9.53)	9.18 (7.79-11.0)	10.3 (8.53-12.7)	11.5 (9.23-14.6)	13.1 (10.1-17.4)	14.4 (10.7-19.8)
7-day	4.53 (4.12-5.08)	5.69 (5.16-6.39)	7.18 (6.50-8.09)	8.38 (7.52-9.52)	9.99 (8.66-11.8)	11.2 (9.52-13.5)	12.5 (10.3-15.4)	13.7 (11.0-17.4)	15.4 (11.9-20.4)	16.7 (12.4-23.0)
10-day	5.10 (4.63-5.72)	6.44 (5.85-7.24)	8.14 (7.37-9.17)	9.47 (8.50-10.8)	11.2 (9.73-13.2)	12.5 (10.6-15.1)	13.8 (11.4-17.0)	15.1 (12.1-19.2)	16.8 (12.9-22.3)	18.1 (13.4-24.9)
20-day	6.74 (6.13-7.56)	8.62 (7.82-9.68)	10.9 (9.86-12.3)	12.6 (11.3-14.3)	14.8 (12.8-17.4)	16.4 (13.9-19.7)	17.9 (14.8-22.1)	19.4 (15.5-24.6)	21.2 (16.3-28.1)	22.6 (16.8-31.0)
30-day	8.28 (7.53-9.29)	10.6 (9.65-11.9)	13.4 (12.2-15.1)	15.5 (13.9-17.6)	18.1 (15.7-21.3)	19.9 (16.9-24.0)	21.6 (17.9-26.7)	23.3 (18.7-29.6)	25.3 (19.5-33.6)	26.8 (19.9-36.9)
45-day	10.3 (9.39-11.6)	13.2 (12.0-14.9)	16.7 (15.1-18.8)	19.2 (17.2-21.8)	22.2 (19.3-26.1)	24.3 (20.6-29.2)	26.3 (21.7-32.4)	28.1 (22.6-35.7)	30.4 (23.4-40.3)	32.0 (23.8-44.0)
60-day	12.5 (11.3-14.0)	15.9 (14.5-17.9)	19.9 (18.1-22.5)	22.9 (20.5-26.0)	26.3 (22.8-31.0)	28.7 (24.4-34.5)	30.9 (25.6-38.1)	33.0 (26.5-41.9)	35.4 (27.3-47.0)	37.2 (27.6-51.1)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

APPENDIX 9

Detention and Peak Flow Calculations



Redwood City Office
255 Shoreline Drive, Suite 200
Redwood City, CA, 94065
Tel 650.482.6300
Fax 650.482.6399

Discharge Calculations for 10-year Event Existing Conditions

Project Address: Granada Community Park
BKF Job No: 20210921-15
Date: 6/16/2026
Calcs By: CW

Intensity (I):

I [in/hr] = 0.86

NOAA Rainfall Intensity
10-yr 60 min-duration

Existing Areas:

Impervious Area [ft²] = 14477
Pervious Area [ft²] = 200576
Total Area [ft²] = 215053
Total Area [Ac] = 4.94

C = 0.9
C = 0.3

Runoff Coefficient (C) = 0.34

Existing Discharge (Q_E):

Q = C/A Q_E [cfs] = 1.44



Redwood City Office
255 Shoreline Drive, Suite 200
Redwood City, CA, 94065
Tel 650.482.6300
Fax 650.482.6399

Discharge Calculations for 10-year Event Proposed Conditions

Project Address: Granada Community Park

BKF Job No: 20210921-15

Date: 6/16/2026

Calcs By: CW

Intensity (I):

I [in/hr] = 0.86

NOAA Rainfall Intensity
10-yr 60 min-duration

Proposed Areas:

	DMA 1	DMA 2	DMA 3	DMA 4	DMA 5	DMA 6	DMA 7	DMA 8	
Impervious Area [ft ²] =	9410	9361	0	0	0	0	2546	10036	C = 0.9
Pervious Area [ft ²] =	9889	9537	17302	16382	38730	39753	27222	24883	C = 0.3
Total Area [ft ²] =	19299	18898	17302	16382	38730	39753	29768	34919	
Total Area [Ac] =	0.44	0.43	0.40	0.38	0.89	0.91	0.68	0.80	
Runoff Coefficient (C) =	0.59	0.60	0.30	0.30	0.30	0.30	0.35	0.47	

Proposed Discharge (Q_p):

Q = CIA Q_p [cfs] = 0.22 0.22 0.10 0.10 0.23 0.23 0.21 0.32

Total Q_p [cfs] = 1.64



Detention System Volume Calculations

Proposed Design Discharge (Q_D):

$$Q_D = Q_{P(10\text{ YR})} - Q_{E(10\text{ YR})}$$

SMC Drainage Manual

Q_E [cfs] =	1.44
Q_P [cfs] =	1.64
Q_D [cfs] =	0.20

Required Design Volume (V_D):

$$V_D = Q_D \times \text{duration [sec]} \times FS$$

SMC Drainage Manual

duration [min] =	60
FS [safety factor] =	1.2
V_D [ft ³] =	861

Volume of Detention Provided (V_{PROVIDED}):

$$V_{\text{PROVIDED}} = V_{\text{PONDING}} + V_{\text{GRAVEL}} = h \times A_{\text{BIO}_-} + 0.35 \times d \times A_{\text{BIO}}$$

A_{BIO} [ft ²] =	1795
h [ft] =	0.75
V_{PONDING} [ft ³] =	1346
V_{GRAVEL} [ft ³] =	628
V_{BIO} [ft ³] =	1975

Total Bioretention Area
Bioretention Ponding Depth
Bioretention Ponding Volume
Bioretention Gravel Volume ($A_{\text{BIO}_-1} \times 1' \text{ depth} \times 0.35 \text{ void ratio}$)
Total Bioretention Volume

$$V_{\text{PROVIDED}} [\text{ft}^3] = 1975$$

Total Volume of Detention Provided

Check if $V_{\text{PROVIDED}} > V_D$:

TRUE

Detention met

Four (4) Bioretention Areas totaling 1795 sf are proposed.



Post Development Peak Discharge and Bioretention Dewatering Calculations

Existing Peak Flow (Q_{PRE}):

$$Q = CIA$$

$$C = 0.34$$

$$I [\text{in/hr}] = 0.86$$

$$A [\text{Ac}] = 4.94$$

$$Q_{PRE} [\text{cfs}] = 1.44$$

From (E) 10-year Discharge Calculations

10-yr 60 min duration

From (E) 10-year Discharge Calculations

Post-development Peak Flow (Q_{POST}):

$$Q_{POST} = Q_{BYPASS} + Q_{BIO} = Q_{P(\text{DMA } 3,4,5 \text{ \& } 6)} + A_{BIO} * i$$

$$A_{BIO} [\text{ft}^2] = 1795$$

$$i [\text{in/hr}] = 5$$

$$Q_{BIO} [\text{cfs}] = 0.21$$

$$Q_{BYPASS} [\text{cfs}] = 0.66$$

$$Q_{POST} [\text{cfs}] = 0.87$$

Bioretention Area provided onsite

Bioretention Infiltration Rate

Flow out of Bioretention Areas

(P) 10-year Discharge for DMA 3, 4, 5, & 6

Post Development Peak Flow

Check $Q_{PRE} > Q_{POST}$:

Check that the flow exiting the project is less than the existing flow rate(10-yr design storm)

TRUE

Detention Dewatering Rate

Detention Volume Provided

Bioretention Infiltration Rate

Time to dewater

$$1975 \text{ ft}^3$$

$$0.21 \text{ cfs}$$

$$2.6 \text{ hours}$$

From Detention System Volume Calculations

From operating flowrate above

Detention volume will be completely dewatered in 4.1 hours