

August 7, 2017

Pillar Point Project Developers LLC
P.O. Box 158
Half Moon Bay, CA 94019

Subject: Drainage Analysis for Proposed Development: proposed RV Park:
280 Capistrano Road, Half Moon Bay.

Dear Sir/Madam:

We have performed a drainage analysis for the above-referenced property, using the San Mateo County Guidelines for Drainage Review as a guideline. Because San Mateo County does not have recommended procedures for all aspects of this type of analysis, Santa Cruz County's Design Criteria for detention systems was consulted. The only drainage issue that applies to this site is a detention system to maintain runoff at or below pre-construction levels.

The site is in a gently sloping area with no drainage channels. Any runoff that currently flows across the site occurs as dispersed sheet flow. The site is vegetated with grasses. The gradient of the property is about 4% to the southwest. There are no springs or shallow groundwater on the site. The gentle slope is very stable.

For our analyses, we used the Rational Method for both pre-construction and post-construction conditions, and for only the area that will be covered with impervious surfaces. The procedures are outlined in detail in the attached calculations. The equation for the Rational Method is:

$$Q=CIA$$

where:

Q=Quantity of Runoff (cubic feet per second)

C= Runoff Coefficient (unitless)

I= Rainfall Intensity for a 10-year storm (in/hour)

A= Area of land modified by construction (acres)

C and I are the only variables that change in this analysis. A pre-construction runoff coefficient, C, of 0.3 was used. For post-construction, C was increased to 0.9. For rainfall intensity, a 10-year event was used in the design of the detention system, as per the San Mateo County guidelines. (A 10-year storm is also recommended by Santa Cruz County.) Rainfall intensity is dependant on the time-



of-concentration. We used a pre-construction time-of-concentration of 600 minutes, and a post-construction time-of-concentration of 100 minutes. Using NOAA's Atlas 14 dataset, rainfall intensities of 0.37 in/hr and 0.65 in/hr were used for pre-construction and post-construction, respectively. The total volume of runoff was based on a 2-hour duration. For area, the design drawings were used to determine that a total of 100,080 square feet of land will be covered with impervious surfaces. Our analyses were made for three detention systems for the parking area and one small roof. The recommended drainage system is shown on Sheet C-1.

Overflow from the three detention basins will be directed to existing 15-inch diameter storm drains. Runoff from the property currently flows to the same storm drains. We performed an analysis to estimate the required size of storm drains from the new project, and arrived at pipe diameters of 7.5 inches and 8 inches. Since the existing pipes take in runoff from the existing parking lot adjacent to the proposed RV park, we estimated the required size of pipes for the entire project, once the RV park is paved. We arrived at required diameters of 15 inches for both pipes. Therefore, the existing storm drain system is adequate.

With the proposed detention system, the post-development runoff will be less than the pre-development runoff. No runoff is diverted from one drainage area to another. There will be no appreciable downstream impacts. Current drainage patterns indicate minimal runoff from adjacent impervious surfaces onto the subject property.

If there are any questions regarding the contents of this letter, please do not hesitate to call me at (650) 728-3590.

Yours,
Sigma Prime Geosciences, Inc.

Charles M. Kissick, P.E.



C.3 and C.6 Development Review Checklist

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

Applicants: This form should be filled out by the Project Civil Engineer, if one is associated with the project.
Office Use: Planners, please scan to Accela Case and email to Diana, Richard and Camille.

Project Information

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

Project Name: Capistrano RV Park Case Number: _____
Project Address & Cross St.: 280 Capsitrano Road, at Highway 1
Project APN: 047-081-430 Project Watershed: Ocean
Applicant Name: Pillar Point Project Developers LLC I.A.4 Slope on Site: 3.5%
Applicant Phone: 650-430-5740 Applicant Email Address: hmbron@comcast.net

Development type: (check all that apply)
 Single Family Residential: A stand-alone home that is not part of a larger project.
 Single Family Residential: Two or more lot residential development.¹ # of units: _____
 Multi-Family Residential # of units: _____
 Commercial
 Industrial, Manufacturing
 Mixed-Use # of units: _____
 Streets, Roads², etc.
 'Redevelopment' as defined by MRP: creating, adding and/or replacing exterior existing impervious surface on a site where past development has occurred.

I.A.1
 'Special land use categories' as defined by MRP: (1) auto service facilities³, (2) retail gasoline outlets, (3) restaurants, (4) uncovered parking area (stand-alone or part of a larger project)
 Institutions: schools, libraries, jails, etc.
 Parks and trails, camp grounds, other recreational
 Agricultural, wineries
 Kennels, Ranches
 Other, Please specify _____

Project Description⁴: Convert vacant land to RV park.
(Also note any past or future phases of the project.)

I.A.2 Total Area of Site: 3.36 acres

I.A.3 Total Area of land disturbed during construction (include clearing, grading, excavating and stockpile area): 2.9 acres.

I.A.5 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.

Attach Preliminary Calculations Attach Final Calculations Attach copy of site plan showing areas

Name of person completing the form: Charles Kissick Title: Engineer

Signature:  Date: 8-7-17

Phone number: 650-728-3590 Email address: sigmaprm@pacbell.net

¹ 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) are not considered single family projects by the MRP.

² Roadway projects creating 10,000 sq.ft. or more of contiguous impervious surface are subject to C.3 requirements if the roadway is new or being widened with additional traffic lanes.

³ See Standard Industrial Classification (SIC) codes [here](#)

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

I.B Is the project a "C.3 Regulated Project" per MRP Provision C.3.b?

I.B.1 Enter the amount of impervious surface⁵ Retained, Replaced and/or Created by the project:

Table I.B.1 Impervious⁵ and Pervious Surfaces

Type of Impervious ⁵ Surface	I.B.1.a	I.B.1.b	I.B.1.c	I.B.1.d	I.B.1.e
	Pre-Project Impervious ⁵ Surface (sq.ft.)	Existing Impervious ⁵ Surface to be Retained ⁶ (sq.ft.)	Existing Impervious ⁵ Surface to be Replaced ⁶ (sq.ft.)	New Impervious ⁵ Surface to be Created ⁶ (sq.ft.)	Post-Project Impervious ⁵ Surface (sq.ft.) (=b+c+d)
Roof area(s)	0	0	0	833	833
Impervious ⁵ sidewalks, patios, paths, driveways, streets	16,270	0	16,270	82,977	99,247
Impervious ⁵ uncovered parking ⁷	0	0	0	0	0
Totals of Impervious Surfaces:	16,270	0	16,270	83,810	100,080
I.B.1.f - Total Impervious⁵ Surface Replaced and Created (sum of totals for columns I.B.1.c and I.B.1.d):					100,080
Type of Pervious Surface	Pre-Project Pervious Surface (sq.ft.)				Post-project Pervious Surface (sq.ft.)
Landscaping	129,932				46,122
Pervious Paving	0	I.B.1.e.1:			0
Green Roof	0				0
Totals of Pervious Surfaces:	129,932				46,122
Total Site Area (Total Impervious⁵+Total Pervious=I.A.2)	146,202				146,202

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

	Check all that apply:	Check One		Attach Worksheet
		Yes	No	
I.B.2.a	Does this project involve any earthwork? If YES, then Check Yes, and Complete Worksheet A. If NO, then go to I.B.2.b	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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 & go to I.B.2.c. If NO, then Stop here - go to I.A.5 and complete Certification or ask municipal staff for Small Project Checklist.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B, C
I.B.2.c	Is the total Existing IS to be Replaced (column I.B.1.c) 50 percent or more of the total Pre-Project IS (column I.B.1.a)? If YES, site design, source control and treatment requirements apply to the whole site. 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
I.B.2.d	Is this project a Special Land Use Category (I.A.1) and is I.B.1.f greater than or equal to 5,000 sq.ft? If YES, project is a Regulated Project. Fill out Worksheet D. Go to I.B.2.f. If NO, go to I.B.2.e	<input checked="" type="checkbox"/>	<input type="checkbox"/>	D
I.B.2.e	Is I.B.1.f greater than or equal to 10,000 sq.ft? 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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	D
I.B.2.f	Is I.B.1.f greater than or equal to 43,560 sq.ft? If YES, project may be subject to Hydromodification Management requirements - complete Worksheet E then continue to I.B.2.g. If NO, then go to I.B.2.g.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E
I.B.2.g	Is I.A.3 greater than or equal to 1 acre? If YES, check box, obtain coverage under the CA Const. General Permit & submit Notice of Intent to municipality - go to I.B.2.h. If NO, then go to I.B.2.h. For more information see: www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	F
I.B.2.i	Is project a High Priority Site ? 1) Sites where the project requires a Grading Permit; 2) Sites with a) Residential new construction or a 50% or greater remodel, or b) Commercial/ Industrial construction of a new building or additions of 3,000 sq. ft. or greater, and with one or both of the following: (1) Sites where development will occur on a slope greater than or equal to 5:1, and/or (2) Sites where development will occur within 100 feet of a creek, wetland, or coastline; 3) Any public or private project involving work within a waterway; and 4) Sites within the ASBS watershed that involve soil disturbance If NO, then go to I.B.2.j	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.e.1 above - Is the project installing 3,000 square feet or more of pervious paving? If YES, then fill out section G-3 on Worksheet G. Add to Municipal Inspection Lists (C.3.h)	<input type="checkbox"/>	<input type="checkbox"/>	G

⁵ Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as 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.

⁶ "Retained" means to leave existing impervious surfaces in place, unchanged; "Replaced" means to install new impervious surface where existing impervious surface is removed anywhere on the same property; and "Created" means the amount of new impervious surface being proposed which exceeds the total existing amount of impervious surface at the property.

⁷ Uncovered parking includes the top level of a parking structure.

Worksheet A

C6 – Construction Stormwater BMPs
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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)
<input checked="" type="checkbox"/>	BMP Sheet	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.
<input checked="" type="checkbox"/>	BMP Sheet	Store, handle, and dispose of construction materials/wastes properly to prevent contact with stormwater.
<input checked="" type="checkbox"/>	BMP Sheet	Do not clean, fuel, or maintain vehicles on-site, except in a designated area where wash water is contained and treated.
<input checked="" type="checkbox"/>	BMP Sheet	Train and provide instruction to all employees/subcontractors re: construction BMPs.
<input checked="" type="checkbox"/>	C-3	Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber rolls, or filters.
<input checked="" type="checkbox"/>	C-3	Limit construction access routes and stabilize designated access points.
<input checked="" type="checkbox"/>	BMP Sheet	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.
<input checked="" type="checkbox"/>	C-3	Use temporary erosion controls to stabilize all denuded areas until permanent erosion controls are established.
<input checked="" type="checkbox"/>	C-3	Delineate with field markers clearing limits, easements, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.
<input checked="" type="checkbox"/>	SWPPP	Provide notes, specifications, or attachments describing the following: <ul style="list-style-type: none"> ▪ 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.
<input checked="" type="checkbox"/>	C-3	Perform clearing and earth moving activities only during dry weather.
<input type="checkbox"/>		Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.
<input checked="" type="checkbox"/>	C-3	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.
<input checked="" type="checkbox"/>	C-3	Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g., swales and dikes).
<input checked="" type="checkbox"/>	C-3	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

C3 - 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 measures	Source Control Measures (Refer to Local Source Control List for detailed requirements)
<input type="checkbox"/>		Storm Drain	Mark on-site inlets with the words "No Dumping! Flows to Bay" or equivalent.
<input type="checkbox"/>		Floor Drains	Plumb interior floor drains to sanitary sewer ⁸ [or prohibit].
<input type="checkbox"/>		Parking garage	Plumb interior parking garage floor drains to sanitary sewer. ⁸
<input checked="" type="checkbox"/>	C-1	Landscaping	<ul style="list-style-type: none"> ▪ Retain existing vegetation as practicable. ▪ 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.
<input type="checkbox"/>		Pool/Spa/Fountain	Provide connection to the sanitary sewer to facilitate draining. ⁸
<input type="checkbox"/>		Food Service Equipment (non-residential)	<p>Provide sink or other area for equipment cleaning, which is:</p> <ul style="list-style-type: none"> ▪ 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.
<input checked="" type="checkbox"/>	C-1	Refuse Areas	<ul style="list-style-type: none"> ▪ 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
<input type="checkbox"/>		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
<input type="checkbox"/>		Outdoor Equipment/ Materials Storage	<ul style="list-style-type: none"> ▪ 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.
<input type="checkbox"/>		Vehicle/ Equipment Cleaning	<ul style="list-style-type: none"> ▪ 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
<input type="checkbox"/>		Vehicle/ Equipment Repair and Maintenance	<ul style="list-style-type: none"> ▪ 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
<input type="checkbox"/>		Fuel Dispensing Areas	<ul style="list-style-type: none"> ▪ 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.
<input type="checkbox"/>		Loading Docks	<ul style="list-style-type: none"> ▪ 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.
<input type="checkbox"/>		Fire Sprinklers	Design for discharge of fire sprinkler test water to landscape or sanitary sewer. ⁸
<input type="checkbox"/>		Miscellaneous Drain or Wash Water	<ul style="list-style-type: none"> ▪ 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
<input type="checkbox"/>		Architectural Copper Rinse Water	Drain rinse water to landscaping, discharge to sanitary sewer ⁸ , or collect and dispose properly offsite. See flyer "Requirements for Architectural Copper."

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.

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 2,500 – 10,000 sq.ft. of impervious surface, and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface, must include **one of Site Design Measures a through f** (Provision C.3.i requirements).¹⁰ Larger 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 Number	
<input type="checkbox"/>		a. Direct roof runoff into cisterns or rain barrels and use rainwater for irrigation or other non-potable use.
<input type="checkbox"/>		b. Direct roof runoff onto vegetated areas.
<input type="checkbox"/>		c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
<input type="checkbox"/>		d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
<input type="checkbox"/>		e. Construct sidewalks, walkways, and/or patios with pervious or permeable surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) downloadable at www.flowstobay.org/newdevelopment .
<input type="checkbox"/>		f. Construct bike lanes, driveways, and/or uncovered parking lots with pervious surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) downloadable at www.flowstobay.org/newdevelopment .
<input type="checkbox"/>		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.
<input type="checkbox"/>		h. Conserve natural areas, including existing trees, other vegetation and soils.
<input type="checkbox"/>		i. Minimize impervious surfaces.

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

Yes	Plan Sheet Number	
<input type="checkbox"/>		j. Self-treating area (see Section 4.2 of the C.3 Technical Guidance)
<input checked="" type="checkbox"/>	C-1	k. Self-retaining area (see Section 4.3 of the C.3 Technical Guidance)
<input type="checkbox"/>		l. Plant or preserve interceptor trees (Section 4.1, C.3 Technical Guidance)

¹⁰ 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 2,500 to 10,000 sq.ft. of impervious surface and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface.

Worksheet D

C3 Regulated Project - Stormwater Treatment Measures

Check all applicable boxes and indicate the treatment measure(s) included in the project.

Yes													
<input type="checkbox"/>	<p>Is the project a Special Project?¹¹</p> <p>If yes, consult with municipal staff about the need to evaluate the feasibility and infeasibility of 100% LID treatment. Indicate the type of non-LID treatment to be used, the hydraulic sizing method¹², and percentage of the amount of runoff specified in Provision C.3.d that is treated:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;"><u>Non-LID Treatment Measures:</u></td> <td style="width: 30%;"><u>Hydraulic sizing method</u>¹²</td> <td style="width: 25%; text-align: right;"><u>% of C.3.d amount of runoff treated</u></td> </tr> <tr> <td><input type="checkbox"/> Media filter</td> <td><input type="checkbox"/>2.a <input type="checkbox"/>2.b <input type="checkbox"/>2.c</td> <td style="text-align: right;">____%</td> </tr> <tr> <td><input type="checkbox"/> Tree well filter</td> <td><input type="checkbox"/>2.a <input type="checkbox"/>2.b <input type="checkbox"/>2.c</td> <td style="text-align: right;">____%</td> </tr> </table>	<u>Non-LID Treatment Measures:</u>	<u>Hydraulic sizing method</u> ¹²	<u>% of C.3.d amount of runoff treated</u>	<input type="checkbox"/> Media filter	<input type="checkbox"/> 2.a <input type="checkbox"/> 2.b <input type="checkbox"/> 2.c	____%	<input type="checkbox"/> Tree well filter	<input type="checkbox"/> 2.a <input type="checkbox"/> 2.b <input type="checkbox"/> 2.c	____%			
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<input checked="" type="checkbox"/>	<p>Is the project using infiltration systems?</p> <p>The MRP no longer requires the use or analysis of the feasibility of infiltration, but infiltration systems are encouraged and may be beneficial depending on the project.</p> <p>Indicate the infiltration measures to be used, and hydraulic sizing method:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;"><u>Infiltration Measures:</u></td> <td style="width: 30%;"><u>Hydraulic sizing method</u>¹²</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Bioinfiltration¹³</td> <td><input type="checkbox"/>1.a <input type="checkbox"/>1.b <input type="checkbox"/>2.c <input type="checkbox"/>3</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Infiltration trench</td> <td><input checked="" type="checkbox"/>1.a <input type="checkbox"/>1.b</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (specify): _____</td> <td></td> <td></td> </tr> </table>	<u>Infiltration Measures:</u>	<u>Hydraulic sizing method</u> ¹²		<input type="checkbox"/> Bioinfiltration ¹³	<input type="checkbox"/> 1.a <input type="checkbox"/> 1.b <input type="checkbox"/> 2.c <input type="checkbox"/> 3		<input checked="" type="checkbox"/> Infiltration trench	<input checked="" type="checkbox"/> 1.a <input type="checkbox"/> 1.b		<input type="checkbox"/> Other (specify): _____		
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<input type="checkbox"/>	<p>Is the project harvesting and using rainwater?</p> <p>The MRP no longer requires the use or analysis of the feasibility of rainwater harvesting, but it rainwater harvesting and use is encouraged and may be beneficial depending on the project."</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;"><u>Rainwater Harvesting/Use Measures:</u></td> <td style="width: 30%;"><u>Hydraulic sizing method</u>¹²</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Rainwater Harvesting for indoor non-potable water use</td> <td><input type="checkbox"/>1.a <input type="checkbox"/>1.b</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Rainwater Harvesting for landscape irrigation use</td> <td><input type="checkbox"/>1.a <input type="checkbox"/>1.b</td> <td></td> </tr> </table>	<u>Rainwater Harvesting/Use Measures:</u>	<u>Hydraulic sizing method</u> ¹²		<input type="checkbox"/> Rainwater Harvesting for indoor non-potable water use	<input type="checkbox"/> 1.a <input type="checkbox"/> 1.b		<input type="checkbox"/> Rainwater Harvesting for landscape irrigation use	<input type="checkbox"/> 1.a <input type="checkbox"/> 1.b				
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<input type="checkbox"/> Rainwater Harvesting for indoor non-potable water use	<input type="checkbox"/> 1.a <input type="checkbox"/> 1.b												
<input type="checkbox"/> Rainwater Harvesting for landscape irrigation use	<input type="checkbox"/> 1.a <input type="checkbox"/> 1.b												
<input type="checkbox"/>	<p>Is the project installing biotreatment measures?</p> <p>Indicate the biotreatment measures to be used, and the hydraulic sizing method:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 45%;"><u>Biotreatment Measures:</u></td> <td style="width: 30%;"><u>Hydraulic sizing method</u>¹²</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Bioretention area</td> <td><input type="checkbox"/>2.c <input type="checkbox"/>3</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Flow-through planter</td> <td><input type="checkbox"/>2.c <input type="checkbox"/>3</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (specify): _____</td> <td></td> <td></td> </tr> </table>	<u>Biotreatment Measures:</u>	<u>Hydraulic sizing method</u> ¹²		<input type="checkbox"/> Bioretention area	<input type="checkbox"/> 2.c <input type="checkbox"/> 3		<input type="checkbox"/> Flow-through planter	<input type="checkbox"/> 2.c <input type="checkbox"/> 3		<input type="checkbox"/> Other (specify): _____		
<u>Biotreatment Measures:</u>	<u>Hydraulic sizing method</u> ¹²												
<input type="checkbox"/> Bioretention area	<input type="checkbox"/> 2.c <input type="checkbox"/> 3												
<input type="checkbox"/> Flow-through planter	<input type="checkbox"/> 2.c <input type="checkbox"/> 3												
<input type="checkbox"/> Other (specify): _____													

A copy of the long term Operations and Maintenance (O&M) Agreement and Plan for this project will be required. Please contact the NPDES Representative of the applicable municipality for an agreement template and consult the C.3 Technical Guidance at www.flowstobay.org for maintenance plan templates for specific facility types.

¹¹ Special Projects are smart growth, high density, or transit-oriented developments with the criteria defined in Provision C.3.e.ii.(2), (3) or (4) (see Worksheet F).

¹² Indicate which of the following Provision C.3.d.i hydraulic sizing methods were used. 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, or 2(c) 0.2-Inch-per-hour intensity approach (recommended flow-based approach – also known as the 4% rule). Combination flow and volume-based approach: 3.

¹³ See Section 6.1 of the C.3 Technical Guidance for conditions in which bioretention areas provide bioinfiltration.

Worksheet E

Hydromodification Management

E-1 Is the project a Hydromodification Management¹⁴ (HM) Project?

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

- Yes. Continue to E-1.2
- No. The project is NOT required to incorporate HM Measures.
Go to Item E-1.4 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 Technical Guidance)?

- Yes. Continue to E-1.3
- No. Attach map, indicating project location. The project is NOT required to incorporate HM Measures.
Skip to Item E-1.4 and check "No."

E-1.3 Has an engineer or qualified environmental professional determined that runoff from the project flows only through a hardened channel or enclosed pipe along its entire length before emptying into a waterway in the exempt area?

- Yes. Attach map of facility. Go to Item E-1.4 and check "Yes."
- No. Attach map, indicating project location. The project is NOT required to incorporate HM Measures.
Skip to Item E-1.4 and check "No."

E-1.4 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.bayareahydrologymodel.org. Guidance is provided in Chapter 7 of the C.3 Technical Guidance.

E-2 Incorporate HM Controls (if required)

Are the applicable items provided with the Plans?

Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Soils report or other site-specific document showing soil type(s) on site
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If project uses the Bay Area Hydrology Model (BAHM), a list of model inputs and outputs.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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, and entity responsible for maintenance).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If the project uses alternatives to the default BAHM approach or settings, a written description and rationale.

¹⁴ 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 Technical Guidance Handbook (download at www.flowstobay.org) 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 district¹⁵;
- Creates and/or replaces 0.5 acres or less of impervious surface;
- 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.

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 district²⁰;
- Creates and/or replaces more than 0.5 acres of impervious area and less than 2.0 acres;
- 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;
- Minimum 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 criterion. **Note Change on 7/1/16¹⁶**

No (continue) Yes – Complete Section F-2 below

Special Project Category "C"

Does the project have ALL of the following characteristics?

- At least 50% of the project area is within 1/2 mile of an existing or planned transit hub¹⁷ or 100% within a planned Priority Development Area¹⁸;
- The project is characterized as a non-auto-related use¹⁹; and
- Minimum density of either 25 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 criterion. **Note Change on 7/1/16¹⁶**

No (continue) Yes – Complete Section F-2 below

¹⁵ And built as part of a municipality's stated objective to preserve/enhance a pedestrian-oriented type of urban design.

¹⁶ **Effective 7/1/16**, 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.

¹⁷ "Transit hub" is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes. (A bus stop with no supporting services does not qualify.)

¹⁸ A "planned Priority Development Area" is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program.

¹⁹ Category C specifically excludes stand-alone surface parking lots; car dealerships; auto and truck rental facilities with onsite surface storage; fast-food restaurants, banks or pharmacies with drive-through lanes; gas stations; car washes; auto repair and service facilities; or other auto-related project unrelated to the concept of transit oriented development.

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.)

Category	Impervious Area Created/Replaced (sq. ft.)	Site Coverage (%)	Project Density ¹⁶ or FAR ¹⁶	Density/Criteria	Allowable Credit (%)	Applied Credit (%)
A			N.A.	N.A.	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				Location credit (select one)²⁰:		
				Within ¼ mile of transit hub	50%	
				Within ½ mile of transit hub	25%	
				Within a planned PDA	25%	
				Density credit (select one):		
				Res ≥ 30 DU/ac or FAR ≥ 2:1	10%	
				Res ≥ 60 DU/ac or FAR ≥ 4:1	20%	
				Res ≥ 100 DU/ac or FAR ≥ 6:1	30%	
				Parking credit (select one):		
				≤ 10% at-grade surface parking ²¹	10%	
				No surface parking	20%	
TOTAL TOD CREDIT =						

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 K of the C.3 Technical Guidance.

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 (TAPE). Guidance is provided in Appendix K of the C.3 Technical Guidance (download at www.flowstobay.org).²²

²⁰ To qualify for the location credit, at least 50% of the project's site must be located within the ¼ mile or ½ mile radius of an existing or planned transit hub, as defined on page 1, footnote 2. A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area. To qualify for the PDA location credit, 100% of the project site must be located within a PDA, as defined on page 1, footnote 3.

²¹ The at-grade surface parking must be treated with LID treatment measures.

²² 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 High Priority Site: High Priority Sites can include those located in or within 100 feet of a sensitive habitat, an Area of Special Biological Significance (ASBS), a body of water, or **starting 7/1/16** on "hillside projects" disturbing $\geq 5,000$ sq.ft. of land and with steep slopes (of $\geq 15\%$ - see cell I.A.4 - or as identified by municipal criteria or map). These sites are subject to monthly inspections from Oct 1 to April 30. See MRP Provision C.6.e.ii.(2).

Yes No If yes, then add site to Staff's Monthly Rainy Season Construction Site Inspection List

G-3 Inspections of Sites with Pervious Paving: Starting 7/1/16, Regulated projects that are installing 3,000 sq.ft. or more of pervious paving (see cell I.B.1.e.1) (excluding private-use patios in single family homes, townhomes, or condominiums) must have the paving 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 Technical Guidance (Version 4.1) downloadable at: www.flowstobay.org/newdevelopment.

Yes No If yes, then add site to Staff's Lists for Inspections at the end of Construction and O&M.

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 within 45 days of installation of treatment measures and/or hydromodification management controls.

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

	Yes	No	N/A
G-4.1 Was maintenance plan submitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G-4.2 Was maintenance plan approved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G-4.3 Was maintenance agreement submitted? (Date executed: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

> 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):

Section I 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	NA
8.1 Were final Conditions of Approval met?	<input type="checkbox"/>	<input type="checkbox"/>	
8.2 Was initial inspection of the completed treatment/HM measure(s) conducted? (Date of inspection: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.3 Was maintenance plan submitted? (Date executed: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.4 Was project information provided to staff responsible for O&M verification inspections? (Date provided to inspection staff: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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: _____



Sigma Prime Geosciences, Inc.

Rational Method / Culvert Sizing

Job: RV PARK

No.: 14-158

Date 8/3/2017

by: CMK

Rational Method to Estimate Storm Runoff

$Q_p = CIA_d$

DMA 1	Area, A_d (sf):	49400
	Area, A_d (acres):	1.13407
	C_{10} :	0.3
		pre-project <input type="text" value="0.9"/> post-project

I (rainfall intensity): from NOAA ATLAS-14 dataset

$I_{600} =$	<input type="text" value="0.37"/>	in/hr (pre-project, 300 minute time of concentration)
$I_{100} =$	<input type="text" value="0.65"/>	in/hr (post-project, 100 minute time of concentration)

Pre-Project:

$Q = CIA:$ CFS

Post-Project:

$Q = CIA:$ CFS

$\Delta Q =$ CFS

Detention Size (for 2-hr duration):

10-yr Storm: CF

Area:

One 4' diam. Pipe:

(Area of one 4' diameter pipe in gravel bed, per detail)

Size Pipes for 10-year event:

One 4' diam. Pipe: LF Required



DMA 2

Area, A_d (sf):	34880
Area, A_d (acres):	0.80073
C_{10} :	0.3
pre-project	0.9
post-project	

I (rainfall intensity): from NOAA ATLAS-14 dataset

I_{600} =	0.37	in/hr (pre-project, 300 minute time of concentration)
I_{100} =	0.65	in/hr (post-project, 100 minute time of concentration)

Pre-Project:

$Q=CIA:$ CFS

Post-Project:

$Q=CIA:$ CFS

$\Delta Q =$ CFS

Detention Size (for 2-hr duration):

10-yr Storm: CF

Area:

One 4' diam. Pipe: 41.54 (Area of one 4' diameter pipe in gravel bed, per detail)

Size Pipes for 10-year event:

One 4' diam. Pipe: LF Required

DMA 3

Area, A_d (sf):	15800
Area, A_d (acres):	0.36272
C_{10} :	0.3
	pre-project
	0.9
	post-project

I (rainfall intensity): from NOAA ATLAS-14 dataset

I_{600} =	0.37	in/hr (pre-project, 300 minute time of concentration)
I_{100} =	0.65	in/hr (post-project, 100 minute time of concentration)

Pre-Project:

Q=CIA: CFS

Post-Project:

Q=CIA: CFS

ΔQ = CFS

Detention Size (for 2-hr duration):

10-yr Storm: CF

Area:
One 4' diam. Pipe: 41.54 (Area of one 4' diameter pipe in gravel bed, per detail)

Size Pipes for 10-year event:
One 4' diam. Pipe: LF Required