



Green Stormwater Infrastructure Plan

City of Oakland
September 30, 2019



City of
Oakland

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Acknowledgements

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List of Acronyms

Acronym	Definition
100RC	100 Resilient Cities
ABAG	Association of Bay Area Governments
ACCWP	Alameda Countywide Clean Water Program
AGOL	ArcGIS Online
BASMAA	Bay Area Stormwater Management Agencies Association
C.3	Provision C.3 New Development and Redevelopment of the MRP
CIP	Capital Improvement Program
DOT	Department of Transportation
DRE	Department of Race and Equity
FY	Fiscal Year
GI	Green infrastructure
GIS	Geographic Information System
GSDG	Great Streets Design Guidelines
GSI	Green Stormwater Infrastructure
GSI Plan	Green Stormwater Infrastructure Plan
Hg	Mercury
HM	Hydromodification management
ID	Identification number
MRP	Municipal Regional Stormwater Permit
MTC	Bay Area Metropolitan Transportation Commission
PCBs	Polychlorinated biphenyls
Water Board	San Francisco Bay Regional Water Quality Control Board
RAA	Reasonable Assurance Analysis
ROW	Right of way
SB	Senate Bill
SF	Square feet
SFEI	San Francisco Estuary Institute
SFEP	San Francisco Estuary Partnership
SWRP	Storm Water Resource Plan



Bishop Floyd L. Begin Plaza – Bioretention



1 Introduction

Statement of Purpose

The City of Oakland (City) Green Stormwater Infrastructure Plan (GSI Plan) describes how the City identifies, prioritizes, implements, tracks and reports green stormwater infrastructure (GSI) projects in Oakland. The GSI Plan also promotes the equitable geographic distribution of implemented GSI measures in Oakland to improve human and watershed health, Bay fisheries, wildlife habitat, and aesthetics, and to lessen the negative impacts of climate change by adding vegetation and reducing runoff from severe weather.¹

“Green stormwater infrastructure” (also known as “Green Infrastructure”) refers to a variety of practices and engineered facilities designed to detain and clean, capture and reuse, or infiltrate stormwater runoff to reduce the volume of runoff and improve water quality. Examples include rain gardens (also known as “bioretention”²), pervious pavements, green roofs, and stormwater treatment tree wells. This GSI Plan describes how the City will meet targets for shifting impervious surfaces and traditional storm drain infrastructure to GSI systems.

The City is a highly-urbanized area with a large percentage of impervious surfaces.³ When it rains on Oakland’s streets, buildings, and other hardened surfaces, runoff flows quickly to the City’s storm drain system before discharging to creeks and other waterways. Prior to development, rain fell on trees and plants before soaking into the soil. Now stormwater runoff carries urban pollutants, such as trash, pesticides, petroleum products, and small amounts of legacy pollutants like Polychlorinated biphenyls (PCBs) and mercury, directly into waterways, potentially contributing to creek bank erosion, water quality deterioration, and aquatic life impacts. The City and the development community are working to reverse these impacts in part by incorporating GSI facilities into new and redevelopment projects.



Rainbow Recreation Center - Bioretention

GSI Planning Requirements

This GSI Plan complies with Green Infrastructure Plan requirements in Provision C.3.j of the Municipal Regional Stormwater Permit (MRP) (San Francisco Regional Water Quality Control Board (Water Board) Order No. R2-2015-0049, adopted on November 15, 2015) which states in part:

... the [GSI] Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure, where runoff flows directly into the storm drain and then the receiving water, to green — that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff... The Plan is intended to serve as an implementation guide and reporting tool... to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

The City's policies, ordinances, Capital Improvement Program (CIP) planning process, and other legal and administrative mechanisms ensure implementation of the City's GSI Plan.⁴



Oakland Army Base Public Infrastructure - Green Street

Table 1-1 below links each section of this plan to the applicable MRP provision.

Table 1-1: Green Infrastructure Plan Sections and Applicable MRP Provisions

Section of Green Infrastructure Plan		Applicable MRP Provision
1.	Introduction	C.3.j
2.	Green Stormwater Infrastructure Project Identification	C.3.j.i.(2)(a) – (c), and C.3.j.i.(2)(j)
	Approach for Prioritizing and Mapping Projects	C.3.j.i.(2)(a) & (b), and C.3.j.i.(2)(j)
	Impervious Surface Retrofit Targets	C.3.j.i.(2)(c)
3.	Tracking and Mapping Completed Projects	C.3.j.i.(2)(d) & C.3.d.iv.(1)
4.	Summary of General Guidelines for GSI Projects	C.3.j.i.(2)(e) & (g)
5.	Relationship to Other Planning Documents	C.3.j.i.(2)(h) & (i)
6.	Evaluation of Funding Options	C.3.j.i.(2)(k)
Appendix A.	Maps of Completed Private and Public GSI Projects and Planned and Potential Public GSI Projects	C.3.j.i.(2)(b)
Appendix B.	CIP Project MRP C.3 Sign-off & GSI Potential Evaluation Worksheet	C.3.j.i.(2)(g)
Appendix C.	Public CIP Projects with GSI – Completed, Planned and Potential	C.3.j.i.(2)(j), C.3.j.i.(2)(b)
Appendix D.	Green Infrastructure Example Details, ACCWP	C.3.j.i.(2)(f)
Appendix E.	Green Stormwater Infrastructure in City of Oakland Planning Documents	C.3.j.i.(2)(h), C.3.j.i.(2)(i)
Appendix F.	Oakland 100RC Stormwater Program Financing Memo	C.3.j.i.(2)(k)

Green Stormwater Infrastructure in Oakland

The City began transforming Oakland’s storm drain network from grey to green about 15 years ago when it required large public and private development projects to install GSI and other stormwater treatment measures to retain and clean stormwater runoff onsite before discharging it to the City’s storm drain system.⁵ Then, from 2012–2018, the City developed and began implementing a grant-funded [Urban Greening Plan](#)⁶ with the goal of incorporating additional GSI into the City-owned storm drain system. Throughout the planning process, City staff worked collaboratively with partners to develop GSI technical and design guidance, compile lessons learned from early implementation (e.g., bioretention facilities in [Latham Square Plaza](#)⁷) on how to build more effective and successful GSI projects, educate Capital Improvement Program (CIP) project managers on GSI, and plan GSI implementation at the city and the

regional scales. The City embarked on the urban greening planning journey, in part, due to Oakland’s commitment to protect and restore its watersheds, which includes 15 main creeks, over 30 tributaries, Lake Merritt, and the Estuary.⁸ Finally, the Urban Greening Plan provided a platform from which this MRP-required GSI Plan was developed.⁹

The City’s storm drain network includes approximately 400 miles of storm drain pipes as well as pump stations, manholes, inlets, catch basins, culverts, trash racks, trash capture devices, weirs, and a growing number of GSI facilities. The storm drain system has suffered from inadequate resources to keep up with necessary repairs and improvements due to a lack of adequate dedicated funding, while at the same time, demand and burden on the system has increased by additional infill development and new development. Both



Snow Park Rain Garden - Lakeside Green Streets Project

normal and larger rain events have caused flooding, erosion, and property damage. GSI planning and implementation is embraced in Oakland, to the extent feasible, as an opportunity to integrate storm drain system improvements with sustainable stormwater management solutions.

Oakland's green stormwater infrastructure planning and implementation coincides with the City's current commitment to address racial inequities and to ensure urban greening for neighborhoods most in need. Excerpts from the [Resilient Oakland Playbook](#)¹⁰ document Oakland's commitment to use GSI to improve the City's existing storm drainage system and to help the City reach equity goals:

Oakland needs to rethink its traditional approach to infrastructure, especially given the City's strong commitment to renewable energy and efficiency goals, as well as green infrastructure projects.

Oakland will use green infrastructure to manage stormwater, so that while reducing flood risks, we are also providing urban greening benefits, such as improved air quality and reduced urban heat island effects, especially for neighborhoods that have limited access to parks and green space.

Green Infrastructure can bring many benefits to communities – beyond protecting and improving water quality... Oakland is eager to increase the use of green infrastructure to provide additional benefits, such as improved air quality, reduced urban heat island effect, creating habitat, and improving the experience of the public realm. These are especially important benefits for neighborhoods that have historically lacked access to parks, creeks, and street trees.

Although funding for public GSI projects is and will continue to be a challenge, Oakland has constructed a number of public GSI projects, such as a parking lot retrofit using bioretention and pervious pavers at a fire station in downtown Oakland; bioretention areas incorporated into several streetscape, park, and recreation center improvement projects; and stormwater capture tree wells in West Oakland. In 2018 and 2019, the City installed multiple bioretention facilities next to Lake Merritt, is extending the San Pablo Avenue Green Stormwater Spine Project with new bioretention between 16th and 17th Streets, and installed two bioretention facilities to treat roadway runoff as part of the High Street - Courtland Avenue - Ygnacio Avenue Intersection Improvements for Safe Routes to School. From 2003 to 2020, approximately 19 acres of City-owned impervious area has or will be retrofitted with green infrastructure measures.

To date, about 168 acres of privately-owned impervious surface is connected to GSI measures.¹¹ Due to its prevalence, private development in Oakland will play a critical role in the City's effort to shift impervious surfaces from grey to green. Appendix A provides a map of private and public GSI projects completed since 2003 and a map of planned and potential public projects with GSI.



Habitat for Humanity Housing - Lawn Infiltrates Parking Lot Runoff



2 Identifying GSI Projects



Approach to Prioritizing and Mapping GIS Projects

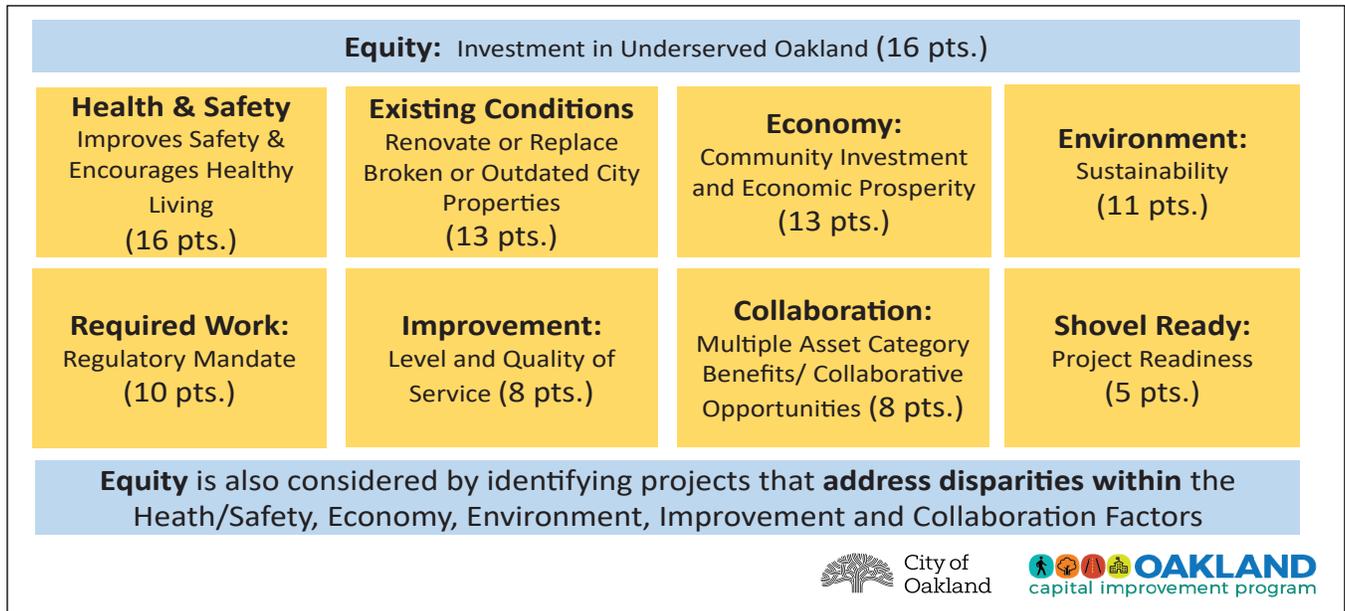
Most GSI in Oakland is implemented through private projects subject to MRP Provision C.3.b (also known as “Regulated Projects”). The City also incorporates GSI into public Regulated Projects and, where feasible, into other planned public projects with GSI potential, such as streetscape projects.

Current GSI Project Identification and Prioritization:

Provisions C.3.j.i.(2)(a) and (b) require the City to develop and use tools¹² to prioritize potential GSI projects and to map both planned and potential GSI projects (private and public). The tools must include prioritization criteria (e.g., logistical constraints and water quality drivers) and outputs, such as maps and project lists, that can guide long-term and CIP planning.

Currently, when the City implements voluntary, non-regulated (i.e., not required by MRP Provision C.3.b) GSI projects, GSI measures are typically incorporated into planned public CIP projects. The City’s CIP project list is updated every two years and projects are selected based on the City’s CIP Prioritization Policy, which was revised in 2018. The new policy “merges quantitative and qualitative criteria with a transparent, equitable and actionable approach to funding projects” and the City’s Department of Race and Equity (DRE) partnered with other City departments to help ensure that equity is incorporated into the policy and CIP project prioritization in a meaningful and measurable way. The process uses nine factors to prioritize projects: 1) equity, 2) health and safety, 3) economy, 4) environment, 5) improvement, 6) existing conditions, 7) shovel ready, 8) collaboration, and 9) required work. The graphic below describes the prioritization process used to prioritize the City Council adopted CIP for Fiscal Year (FY) 2019-2010.

Figure 1: Citywide Prioritization Factors and Proposed Weighting System



Once a CIP project is prioritized, funded, and included in an adopted CIP, and if the project does not already include GSI, the CIP project manager evaluates the project’s GSI potential during planning and design phases.¹³ To facilitate a thorough evaluation of GSI potential, the City’s Watershed and Stormwater Management Division (Watershed Division) interacts directly with project managers and provides them with tools, training, and technical guidance, such as the City’s CIP Project MRP C.3 Sign-off & GSI Potential Evaluation Worksheet (Appendix B), the City’s [Green Infrastructure Guide Version 1.0](#), and the [Green Infrastructure Chapter](#) of the City’s Great Streets (complete and green streets) Design Guidelines.¹⁴

Appendix C provides a list of completed, planned and potential public GSI projects and includes CIP projects that are being evaluated for GSI potential in FY 19-20.¹⁵ It also serves as the workplan for completing planned public projects that include GSI.¹⁶ Appendix A provides a map of all public CIP projects that are currently being evaluated for GSI potential (considered “potential” public GSI projects).

GSI Opportunity Sites

Three Geographic Information System (GIS) tools were developed for identifying and prioritizing GSI opportunities on City-owned properties and within the City right of way (ROW):

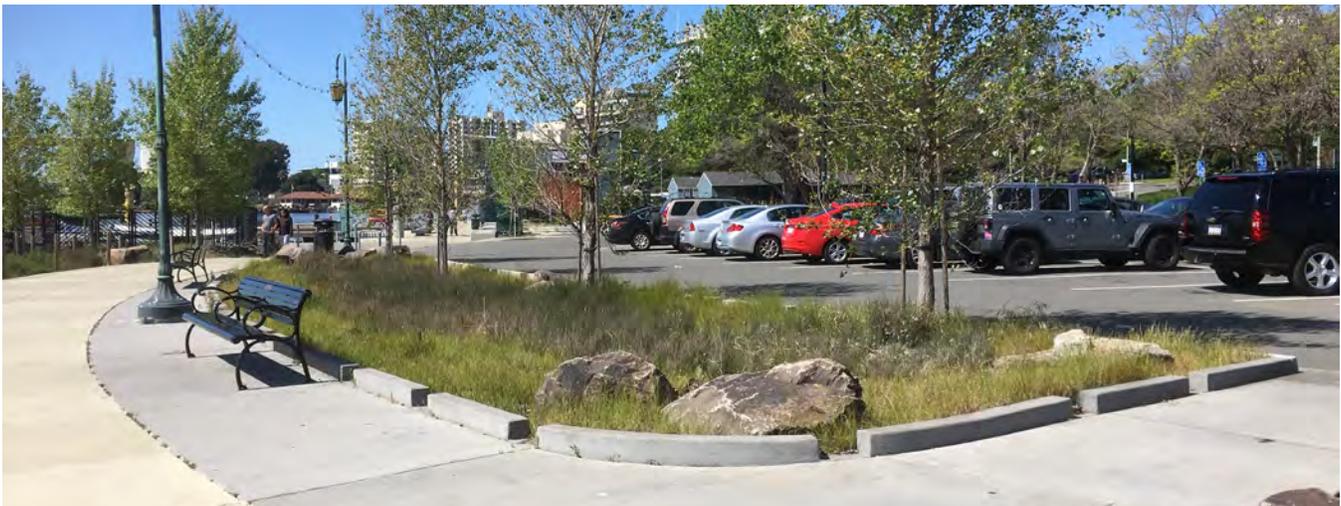
1. [Alameda Countywide Clean Water Program Storm Water Resource Plan \(ACCWP SWRP\)](#).¹⁷ The SWRP includes a [list of prioritized potential GSI projects](#)¹⁸ in Oakland that were identified and catalogued using a GIS-based opportunity analysis. These potential projects were scored and ranked using an automated metrics-based evaluation. Some of the metrics used to prioritize opportunity sites were: parcel area, slope, infiltration feasibility, PCBs/mercury yield classification in project drainage area, and project’s ability to remove pollutants from stormwater and provide flood control.

Pursuant to Senate Bill 985 (SB 985), a SWRP must be developed to receive grant funding for stormwater and dry weather runoff capture projects from any voter-approved bond after January 1, 2014. The SWRP must satisfy requirements in SB 985 and the State Water Resources Control Board’s (State Water Board’s) SWRP guidelines to be eligible for such grant funding. The ACCWP SWRP removed a barrier to obtaining future grant funding for GSI projects in Oakland.

2. City of Oakland Geographic Information System (GIS) Screening Application.¹⁹ This tool was developed to identify GSI opportunity sites on public property in Oakland. The screening application results are described in a GIS dataset which is depicted in a series of [maps](#) in the City's Green Infrastructure Guide (GI Guide), Version 1.0. Screening criteria, such as topography, hydrogeology, soil type, perviousness, space, contributing area, and distance to a City storm drain, were assigned to GIS layers for City-owned properties and ROW areas. The final GIS list of public GSI opportunity sites provides a planning tool for determining where GSI measures could be included. The screening application and outputs are part of Oakland's Urban Greening Retrofit Plan (Urban Greening Plan) which was funded with a \$250,000 grant from the State of California Natural Resources Agency, Proposition 84, Urban Greening Planning Grant Program (Urban Greening Grant). The City of Oakland sought these funds in 2011 to create a roadmap for future urban greening projects and to pursue innovative and synergistic ways to meet clean stormwater requirements.
3. San Francisco Estuary Institute (SFEI) [Green Plan-IT Toolkit](#). The San Francisco Estuary Institute (SFEI) developed the [Green Plan-IT Toolkit](#)²⁰ for planning GSI at the watershed

scale. One of the tools includes the GIS-based "Site Locator Tool... that combines the physical properties of different GSI measures with local and regional GIS information to identify and rank potential GSI locations." Their "Optimization Tool... identifies the best combinations of GSI types and numbers of sites within a study area for achieving flow and pollutant load reduction goals." SFEI used these tools to identify potential GSI project locations in Oakland. The Optimization Tool was applied only to the Ettie Street Watershed. The outputs of the GreenPlan-IT applications provided the City with a scientific basis for planning and prioritizing GSI implementation in relation to competing City needs.²¹

In Oakland, there is no property-based stormwater fee and the City lacks adequate other dedicated funding to maintain, improve, and enhance the storm drain system. Therefore, the City leverages funding for existing public CIP projects to implement GSI in the public right of way and on City-owned property. The outputs from the three abovementioned tools provide prioritized lists of potential GSI projects that could be implemented in the future should the City obtain dedicated stormwater funding. They also provide a reference for CIP project managers and can be used to help obtain grant funding for GSI projects in the future.



Lake Merritt Boat House Parking Lot - Rain Garden



27th Street Private Project - Bioretention Planter Box

Estimated Impervious Surface Retrofit Targets

With assistance from the ACCWP, the City has identified targets for the amount of impervious surface, from public and private projects within its jurisdiction (including redevelopment projects regulated under Provision C.3.b of the MRP), to be retrofitted by 2020, 2030, and 2040. The targets are presented in Table 2-1. The time schedules shown in this table are consistent with the timeframes for assessing load reductions for mercury and PCBs specified in Provisions C.11 and C.12 of the MRP. The City is currently participating in a regional effort to perform a GI Reasonable Assurance Analysis (RAA) that demonstrates how green stormwater infrastructure will be implemented to achieve PCBs and mercury load reductions designed to protect human and aquatic health by preventing trace amounts of legacy pollutants like PCBs and mercury from entering the Bay where they can bioaccumulate in fish. As part of the GI RAA process, the estimates of projected private development and the general and specific locations of public projects will be incorporated into a water-quality model that will develop projected pollutant load reductions for 2020, 2030, and 2040. Details of methods, inputs, and model outputs will be included in the GI RAA report.

Due to uncertainties related to the funding of public GSI projects and the reliability of projections for private new and redevelopment projects, the City of Oakland will annually track the progress toward achieving the targets presented in Table 2-1, identify any challenges that arise in achieving these targets, and propose solutions, in coordination with other MRP Permittees.

Acreage amounts provided in Table 2-1 represent areas of impervious surface existing within the City of Oakland as of July 1, 2002 that are anticipated to be retrofitted by 2020, 2030, and 2040 (target years) as a result of both private and public Regulated and non-regulated GSI projects. Acreage amounts for private and public projects completed between 2003 – 2018 were compiled from project information previously entered into the ACCWP ArcGIS online C.3 Project Tracking and Load Reduction Accounting Tool (AGOL Tool).²² Additional projections of existing impervious surface to be retrofitted with GSI by 2030 and by 2040 are based on planned public CIP projects that will incorporate GSI and future private development scenarios generated using the Bay Area UrbanSim model.²³

Table 2-1: Target Estimated Acres of Existing Impervious Surface to be Retrofitted by 2020, 2030, and 2040 with GSI.

Table 2-1: Green Infrastructure Plan Sections and Applicable MRP Provisions

2003-2020		2003-2030		2003-2040	
Completed and Planned Public Regulated and Non-regulated	Completed and Estimated Private Regulated	Completed and Planned Public Regulated and Non-Regulated	Completed and Estimated Private Regulated	Completed and Planned Public Regulated and Non-regulated	Completed and Estimated Private Regulated
19	168	19.8	397	19.8	877



Lake Chalet Parking - Vegetated Swale



3 Tracking and Mapping Completed GSI Projects



The MRP, in Provision C.3.j.i.(2)(d), requires the City to track, map, and make public information on completed GSI projects, both public and private, and Regulated and non-regulated. Similarly, MRP Provision C.3.j.iv.(1) requires the City to implement regionally-consistent methods to track and report implementation of GSI measures including treated area and connected and disconnected impervious area on both public and private parcels within the City's jurisdiction. The City meets these requirements by entering completed project information into the ACCWP AGOL Tool, described in the previous section of this plan.

Project attributes include jurisdiction, location description, type of project, project name, and additional optional fields. Facility attributes include hydraulic sizing criterion, project ID, stormwater treatment facility type, and percent of project area treated by the facility. The AGOL Tool includes a feature for calculating the amount of stormwater pollution that is cleaned by each project's GSI measures.

The City will coordinate with ACCWP to develop a publicly-viewable version of the AGOL tool, which is anticipated to be available through ACCWP's and the City of Oakland's websites. In addition, the City annually submits a report on MRP compliance to the Water Board and includes a list of GSI projects (public and private) that are planned for implementation during the permit term and a list of GSI projects that were completed in the prior fiscal year.



4 Design Guidelines and Specifications

MRP Requirements

MRP Provisions C.3.j.i.(2)(e), (f), and (g) require GSI Plans to include:

- General guidelines for overall design and construction of GSI projects so that projects have a unified, complete design. For example, the guidelines should encourage coordination of streetscape improvement projects so that GSI measures are constructed simultaneously with improvements to bicycle and pedestrian safety, vehicle movement, urban forestry, transit, etc.;
- Standard specifications and typical design details necessary for incorporating GSI into projects; and,
- Requirements that Regulated and non-regulated projects be designed to meet stormwater treatment and control sizing (hydraulic sizing) requirements in MRP Provisions C.3.c and C.3.d.²⁴

General Guidelines for GSI Projects

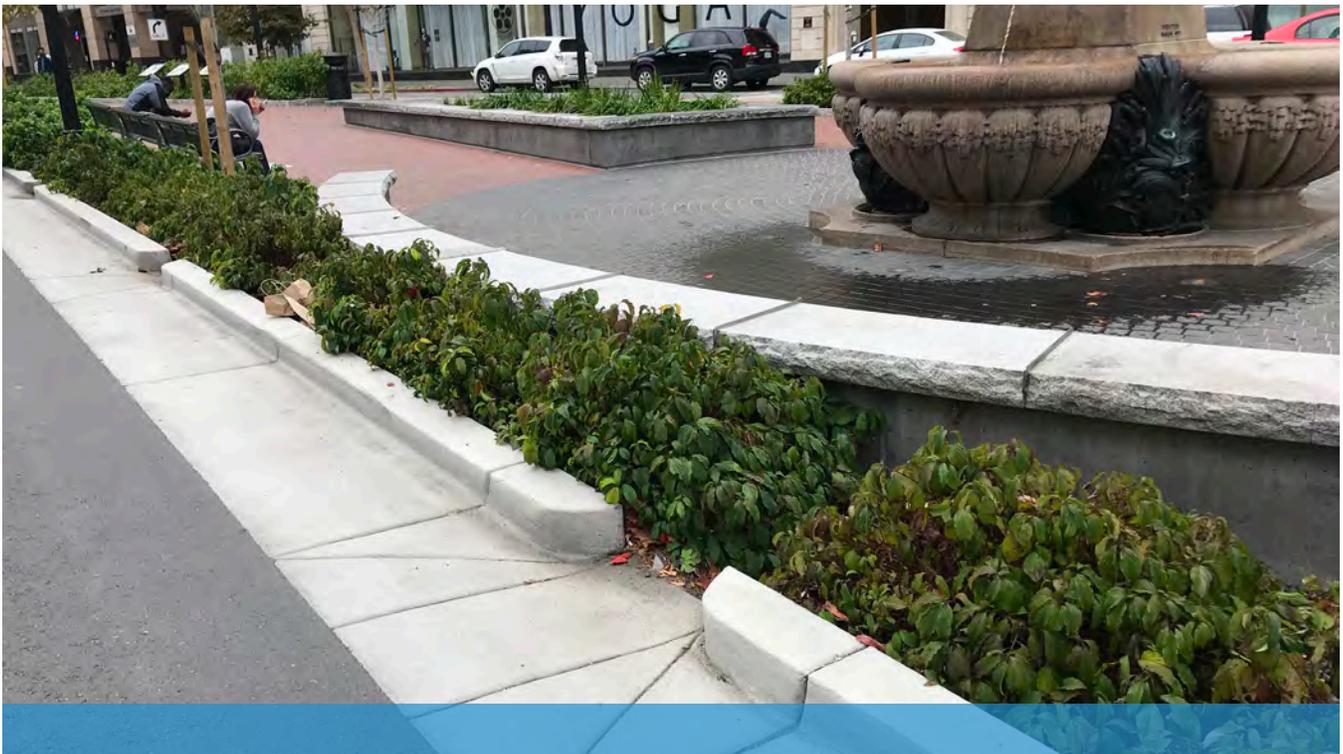
The City created the following two key guidance documents to encourage and facilitate the incorporation of GSI into non-regulated projects and to guide successful regulatory compliance:

1. The current version of the City's technical GSI design guidelines, Green Infrastructure Guide, Version 1.0 (GI Guide), is available on the City's website at <https://www.oaklandca.gov/resources/green-infrastructure-resources>. The GI Guide provides design and technical guidance for incorporating green stormwater infrastructure into public projects not subject to MRP Provision C.3.b (non-regulated projects).²⁵ The GI Guide also includes standard details for various GSI measures, hydraulic sizing requirements, and an Oakland Plant Palette that identifies suitable plants for the vegetative portion of the GSI design.

2. Additionally, in 2015, the City of Oakland initiated a project to develop guidelines for complete and green streets, titled Great Streets Design Guidelines (GSDG), to ensure that Oakland's streets provide safe and convenient travel options for all users while optimizing co-benefits that new transportation projects can deliver such as neighborhood beautification and reducing the impacts of urbanization and climate change. To ensure that GSI is considered and incorporated where possible into Department of Transportation (DOT) CIP streetscape improvement project planning efforts, a chapter on GSI design, Green Infrastructure, was included in the GSDG. This chapter is also available on the City's Green Infrastructure Resources webpage at <https://www.oaklandca.gov/resources/green-infrastructure-resources>, under "Green Streets Guide".

The City is currently updating the GI Guide to incorporate the following recently completed guidance:

1. Guidance for Sizing Green Infrastructure Facilities in Street Projects (with companion analysis: Green Infrastructure Facility Sizing for Non-Regulated Street Projects). This BASMAA guidance represents the "single approach" collectively proposed by MRP Permittees for how to proceed when constraints on non-regulated GSI projects affect facility sizing in street projects (BASMAA 2019). This document is available online: <https://drive.google.com/open?id=18D8IXqJtP2P71N6jBsU-AOH9ITSDzNXv>.
2. Green Infrastructure Example Details, Alameda Countywide Clean Water Program. This set of example details, completed in June 2019, was modified from original documents produced by the San Francisco Public Utilities Commission and by the City of Dublin, and are provided here as Appendix D. Access to both PDF and CAD formats is available on the ACCWP website under "Green Infrastructure (GI) Example Typical Details": <https://www.cleanwaterprogram.org/businesses/development/c3-popular-files.html>.



Latham Square Green Street

As a compilation of available resources, Table 4-1 below provides information on GSI technical guidance options for various project types.

Table 4-1: GSI and Hydraulic Sizing Guidance by Project Type

Project Type	Required and /or Recommended Technical GSI Design Guidance	Typical Details or Standard Specifications Documents
Non-Regulated Street Project that qualifies as a constrained site.	<p>Evaluate GSI potential and follow: Green Infrastructure chapter of the City's Great Streets Design Guide, AND City of Oakland Green (Stormwater) Infrastructure Guide: https://www.oaklandca.gov/resources/green-infrastructure-resources.</p> <p>BASMAA Guidance for Sizing Green Infrastructure Facilities in Street Projects: https://drive.google.com/open?id=1QjFEszC2S5BI7RtkDt6iDNmhw_U6HFDf.</p>	Green Infrastructure Example Details, ACCWP. See Appendix D or: https://www.cleanwaterprogram.org/businesses/development/c3-popular-files.html
Regulated Roads Project – creates ≥ 10,000 square feet (SF) of contiguous impervious surface.	<p>Required: Follow ACCWP C.3 Technical Guidance. Visit: https://www.cleanwaterprogram.org/c3-guidance-table.html.</p> <p>See Green Infrastructure chapter of the City's Great Streets Design Guide, AND City of Oakland Green (Stormwater) Infrastructure Guide: https://www.oaklandca.gov/resources/green-infrastructure-resources</p>	<p>ACCWP C.3 Technical Guidance: https://www.cleanwaterprogram.org/c3-guidance-table.html.</p> <p>Green Infrastructure Example Details, ACCWP. See Appendix D or: https://www.cleanwaterprogram.org/businesses/development/c3-popular-files.html</p>
Project creates or replaces < 2,500 SF of impervious surface	Public projects: Evaluate GSI potential and follow most recent version of the City of Oakland Green (Stormwater) Infrastructure Guide: https://www.oaklandca.gov/resources/green-infrastructure-resources .	See typical details provided as an appendix to the City's Green (Stormwater) Infrastructure Guide: https://www.oaklandca.gov/resources/green-infrastructure-resources .
Single-Family Home Project creates or replaces ≥ 2,500 SF of impervious surface.	Private projects: Implement one site design. Follow Site Design Measure Requirements for Small Projects from ACCWP C.3 Technical Guidance (ACCWP C.3 Appendix L). https://www.cleanwaterprogram.org/c3-guidance-table.html .	See ACCWP's Detain the Rain: https://cleanwaterprogram.org/images/uploads/Detain%20the%20Rain%207%20MB.pdf .

Project Type	Required and /or Recommended Technical GSI Design Guidance	Typical Details or Standard Specifications Documents
<p>Project creates or replaces between 2,500 and 10,000 SF of impervious surface and is not an auto service, maintenance, or food facility, or an uncovered parking area (includes rooftop areas).</p>	<p>Public projects:</p> <ul style="list-style-type: none"> Evaluate GSI potential and follow most recent version of the City of Oakland Green (Stormwater) Infrastructure Guide: https://www.oaklandca.gov/resources/green-infrastructure-resources. Required: Implement at least one site design measure from ACCWP C.3 Appendix L. https://www.cleanwaterprogram.org/c3-guidance-table.html. <p>Private projects:</p> <ul style="list-style-type: none"> Required: Implement at least one site design measure from ACCWP C.3 Appendix L. https://www.cleanwaterprogram.org/c3-guidance-table.html. 	<p>ACCWP C.3 Technical Guide: https://www.cleanwaterprogram.org/c3-guidance-table.html.</p> <p>See typical details provided as an appendix to the City's GI Guide.</p>
<p>Regulated Project (Not Hydromodification Management)</p>	<p>Private and public projects: Must follow ACCWP C.3 Technical Guidance. Visit: https://www.cleanwaterprogram.org/c3-guidance-table.html</p>	<p>ACCWP C.3 Technical Guidance (See Chapters 5 and 6):</p> <p>https://www.cleanwaterprogram.org/c3-guidance-table.html</p>
<p>Regulated Hydromodification Management (HM) Project</p>	<p>Private and public projects: ACCWP C.3 Technical Guidance, Chapter 7, Hydromodification Management Measures. Visit: https://www.cleanwaterprogram.org/c3-guidance-table.html.</p>	<p>ACCWP C.3 Technical Guidance (See Chapters 5 and 6):</p> <p>https://www.cleanwaterprogram.org/c3-guidance-table.html</p>

5 GSI Requirements in Other Planning Documents



In conformance with Provision C.3.j.i.(2)(h), the City updates relevant planning documents²⁶ where necessary that affect and/or guide future alignment, configuration, or design of impervious surfaces within the Permittee's (Oakland's) jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. The updated documents are listed and summarized in Appendix E. Appendix E also serves as the City's workplan to ensure that GSI measures are appropriately included in future planning document updates. Certain planning documents, such as the General Plan, are updated infrequently and cannot be updated prior to the end of the MRP 2.0 permit term. This will not inhibit the City's ability to implement this GSI Plan and as the City updates planning documents listed in Appendix E, GSI requirements will be appropriately incorporated in the future.





6 Funding Options Evaluation

Oakland Stormwater Financing Memo

The City of Oakland was selected by the Rockefeller Foundation as one of the cities in the 100 Resilient Cities project (100RC).²⁷ The 100RC project leads developed the [Resilient Oakland Playbook](#) (Playbook) that calls for green infrastructure to provide sustainable urban greening benefits, especially in neighborhoods with limited access to parks and green space, as one of its flagship actions. The Playbook was adopted by the Oakland City Council. However, due to the lack of a stormwater fee, the City has no dedicated funding for independent GSI implementation apart from the strategies that have already been discussed.

The 100RC project also developed the City of Oakland 100RC Stormwater Program Financing Memo (see Appendix F). The purpose of the memo was to explore and identify potential funding options for the City's Watershed and Stormwater Division. The City is referring to this memo for guidance as it explores options for potential sustainable stormwater program funding such as a stormwater fee.



Oakland Fire Station #1 - Pervious Pavers

Regional Roundtable Evaluation of Funding Options

The Regional Roundtable on Sustainable Streets convened meetings with local, regional, state, and federal agencies; private sector; and non-profit partners in 2017 to identify solutions for obstacles to funding GSI in transportation improvement projects. City of Oakland staff contributed to this effort by serving on the Roundtable Task Team.²⁸ The final report of the Roundtable process is the [Roadmap of Funding Solutions for Sustainable Streets \(Roadmap, BASMAA 2018\)](#)²⁹, which identifies specific actions to improve the capacity – both statewide and in the San Francisco Bay Area – to fund sustainable streets projects that support compliance with regional permit requirements to reduce pollutant loading to San Francisco Bay, while also helping to achieve the region’s greenhouse gas reduction targets.

The Roadmap includes an evaluation of funding options, such as grant and loan monies, that may be used to fund projects that include both GSI and transportation improvements. Two tables summarizing the findings were prepared and can

be accessed online at http://www.sfestuary.org/wp-content/uploads/2018/05/Roadmap_Funding_Solutions_Sustainable_Streets_FINAL_reduced.pdf:

- Table B-1 Transportation Funding Sources that May Potentially Fund Sustainable Streets, identifies nine transportation grants and provides an evaluation of the conditions under which green stormwater infrastructure is eligible for funding.
- Table B-2 Resource-Based Grant and Loan Programs that May Potentially Fund Sustainable Streets, identifies nine resource-based grant and loan programs and provides an evaluation of the conditions under which transportation is eligible for funding.

These resources will be consulted as the City evaluates funding options for high priority potential GSI projects as they are advanced to the Public Works Department and DOT CIP.

7 Summary



The City of Oakland developed this Green Stormwater Infrastructure (GSI) Plan to comply with MRP Provision C.3.j.i.(2) and to promote the equitable geographic distribution of implemented GSI measures in Oakland to improve human and watershed health, Bay fisheries, wildlife habitat, and aesthetics, and to lessen the negative impacts of climate change by adding vegetation and reducing runoff from severe weather. The City and the development community are working to reverse negative impacts in part by incorporating GSI facilities into projects.

The GSI Plan sets impervious surface GSI retrofit targets for 2020, 2030, and 2040 that will contribute to a sustainable storm drain system that slows runoff by dispersing it to vegetated areas, captures runoff for reuse, promotes infiltration and evapotranspiration, and uses bioretention and other practices to clean stormwater runoff. An estimated 877 acres of impervious surface GSI retrofits will be implemented between 2003 and 2040 by requiring private development projects to comply with MRP Provision C.3. Additionally, the City will continue installing GSI measures on public Regulated Projects, and where technically and financially feasible, on non-regulated public projects. Currently, the City has either completed or plans GSI public project retrofits to treat 19.8 acres of impervious surface by 2040. The City provides CIP project managers with effective tools and protocols for evaluating GSI potential on non-regulated projects, such as the City's Green Infrastructure Guide, Version 1.0 and the Green Infrastructure Chapter of the City's Great Streets Design Guide. To date, 10 non-regulated public projects with GSI have been completed and about seven are planned for completion by 2030. The City's new equity-focused CIP project prioritization approach will increase the number of GSI projects on public property and in the City's rights of way that are implemented in neighborhoods, such as East and West Oakland, that have historically lacked access to the multiple benefits provided by vegetation such as improved air quality and aesthetics, and reduced urban heat island effects. The City has and will continue to appropriately incorporate GSI into planning documents where necessary to support the City's goal to include GSI in public and private projects.



Tassafaronga Village - Pervious Area with Trees

Completed private Regulated and public Regulated and non-regulated projects with GSI and other stormwater treatment measures are tracked and mapped in the ACCWP AGOL Tool. The City will coordinate with ACCWP to develop a viewable version of the AGOL tool, which is anticipated to be available on ACCWP's public website.

The City worked collaboratively to identify and prioritize lists of GSI opportunity sites on City-owned properties and within the City rights of way using GIS tools, including the ACCWP SWRP, the City of Oakland GIS Screening Application, and the SFEI Green Plan-IT Toolkit. Due to a lack of dedicated funding to maintain, improve, and enhance the storm drain system, standalone public GSI projects cannot be planned and built at this time. Instead, the City evaluates funding options for high priority potential GSI projects as they are advanced to the Public Works Department and Department of Transportation Capital Improvement Program and is referring to the City of Oakland 100RC Stormwater Program Financing Memo for guidance as it explores options for potential sustainable stormwater program funding such as a stormwater fee.

End Notes

¹ The GSI Plan supports the City's goal to become more resilient to current and future environmental challenges, such as climate change.

² Bioretention is a landscaped area designed to accept stormwater runoff. Bioretention areas use a sand and compost soil mix and drought tolerant, pest resistant plants. The soil and plants help remove pollutants from stormwater and microbial action in the soil can break down typical urban pollutants.

³ The City of Oakland is the Bay Area's third largest city with a population of about 428,000.

⁴ Oakland Municipal Code (O.M.C.) Chapter 13.16 - Creek Protection, Storm Water Management and Discharge Control Ordinance documents one of the City's legal mechanisms to ensure implementation of this GSI Plan. This ordinance provides the authority to require controls on the volume and rate of stormwater runoff from public and private new and redevelopments as may be appropriate to minimize the discharge and transport of pollutants.

⁵ This has been accomplished through the City's compliance program with MRP Provision C.3. Generally, projects adding or replacing 10,000 square feet of impervious area must use GSI facilities to manage stormwater.

⁶ The Oakland Urban Greening Retrofit Plan (Urban Greening Plan) Project was funded with a \$250,000 grant from the State of California Natural Resources Agency, Proposition 84, Urban Greening Planning Grant Program (Urban Greening Grant). See <https://www.oaklandca.gov/news/2018/the-city-completes-oaklands-urban-greening-plan-with-a-prop-84-grant-from-the-california-natural-resources-agency>.

⁷ See: <https://www.acfloodcontrol.org/wp-content/uploads/2018/12/Infiltrating-the-Conversation-Oakland.pdf>.

⁸ The City of Oakland prioritizes environmental protection of its creeks and waterways, which provide numerous functions, including recreational, aesthetic, ecological, and hydrological. Oakland's voters passed the Oakland Trust for Clean Water and Safe Parks bond measure (Measure DD) that provides funding to restore creeks, preserve watersheds, acquire land, and improve water quality. Using a combination of Measure DD and grant funding, the City's Watershed and Stormwater Management Division has completed 10 restoration projects: four at Sausal Creek, two at Arroyo Viejo Creek, one at Lion Creek, one at Peralta Creek, one at Garber Park/Temescal Creek, and one at Glen Echo Creek in Glen Echo Park. Engineering design is underway for a Courtland Creek restoration project in Courtland Creek Park. Additionally, the City partners with the Alameda County Flood Control and Water Conservation District on creek protection and enhancement projects and programs. Finally, the Open Space, Conservation, and Recreation (OSCAR) Element of the General Plan supports watershed protection.

⁹ The requirement for Bay Area municipalities to develop Green Infrastructure Plans was developed in 2013 and 2014 following a collaborative approach by regulators and MRP permittees.

¹⁰ The Resilient Oakland Playbook is a strategy document that outlines ways to keep the City's communities rooted and to ensure equitable access to quality education, jobs, housing, community safety, and vibrant infrastructure. See <https://www.oaklandca.gov/documents/resilient-oakland-strategy>.

¹¹ In accordance with MRP Provision C.3.b., the City has required certain private development projects (known as "Regulated Projects") to install GSI onsite since 2003.

¹² This GSI Plan uses the term "tool" to mean "mechanism". The MRP uses the term "mechanism".

¹³ Certain CIP project categories are not evaluated for GSI potential such as standalone sewer rehabilitation projects and emergency storm drain repair projects.

¹⁴ The City of Oakland's Green Infrastructure Guide Version 1.0 and the first version of the Green Infrastructure Chapter of the City's Great Streets Design Guidelines were completed in 2018 with a grant from the State of California Natural Resources Agency, Urban Greening Planning Grant Program (Urban Greening Grant). To review the documents in their entirety, see: <https://www.oaklandca.gov/resources/green-infrastructure-resources>.

¹⁵ The Watershed Division annually updates a comprehensive list of CIP projects and requires project managers to document their GSI evaluation process and to either describe their project's planned GSI measures or to describe why GSI measures were impracticable to implement. The GSI evaluation results are then compiled and submitted to the Water Board as part of the MRP Annual Report.

¹⁶ The workplan must be included with the City's GSI Plan in accordance with MRP Provision C.3.j.i.(2)(i).

¹⁷ The January 2019 Final Alameda Countywide SWRP and list of prioritized GSI opportunity project is included with this GSI Plan via an online link (URL): <https://www.cleanwaterprogram.org/index.php/programs/green-infrastructure.html>.

¹⁸ See: <https://static1.squarespace.com/static/528fd58de4b07735ce1807b2/t/5babbb08ec212dee25527883/1537981237397/Vol+III+Design+August+2018+with+Appendices.pdf>

¹⁹ The City's GIS Screening Application is described in Attachment C of the City's GI Guide. The GI Guide is included as Appendix B in the City's Urban Greening Plan and Grant Report. These documents are incorporated into this GSI Plan via an online link (URL): <https://cao-94612.s3.us-west-2.amazonaws.com/news/UGPGR-4-30-18-FINAL.pdf>.

²⁰ See: https://www.sfei.org/sites/default/files/biblio_files/Oakland%20GreenPlan%20Application%20Report.pdf.

²¹ This project was funded by a grant from the U.S. Environmental Protection Agency, Region 9 through a regional Urban Greening Bay Area project implemented by the San Francisco Estuary Partnership. The project report is included with this GSI Plan via an online link (URL): https://www.sfei.org/sites/default/files/biblio_files/Oakland%20GreenPlan%20Application%20Report.pdf.

²² This tool was developed by ACCWP in cooperation with the Contra Costa Clean Water Program to assist member agencies in tracking completed C.3 Regulated and non-regulated GSI projects and in calculating PCBs and Hg load reductions achieved through stormwater treatment measures installed as part of development and redevelopment projects. The City enters completed projects information into this system annually. Detailed information and instructions on the tool can be found in the C.3 Project Tracking and Load Reduction Accounting Tool Guidance Document (ACCWP 2017).

²³ UrbanSim is a model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). The Bay Area's application of the UrbanSim model was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. MTC forecasts growth in households and jobs and uses the UrbanSim model to identify development and redevelopment sites to satisfy future demand. This model was applied to Alameda County to project new and redevelopment for the GI RAA model timeframes. BASMAA provided the 2040 regional projections for future development at the parcel level and ACCWP reviewed the UrbanSim results for each jurisdiction within Alameda County. UrbanSim model outputs provide Bay Area MRP Permittees with a common basis for projections of impervious area to be retrofitted with GSI when land development occurs.

²⁴ An exception to this requirement is provided in MRP Provision C.3.j.i.(2)(g) for non-regulated street projects with specific design constraints. The City will follow BASMAA's approach, Guidance for Sizing Green Infrastructure Facilities in Street Projects, for identifying street projects that are too constrained to meet the C.3.d sizing requirements and for sizing GSI measures for those constrained projects. Regulated Projects must also meet the MRP's C.3.c. and C.3.d. treatment and hydromodification management (HM) sizing requirements, however, they must follow the ACCWP C.3 Technical Guidance Manual. The manual can be downloaded from the ACCWP website: <https://www.cleanwaterprogram.org/index.php/c3-guidance-table.html>.

²⁵ Provision C.3.b. of the permit defines "Regulated Projects".

²⁶ Relevant planning documents include General Plan Elements, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, and other documents described in Appendix E.

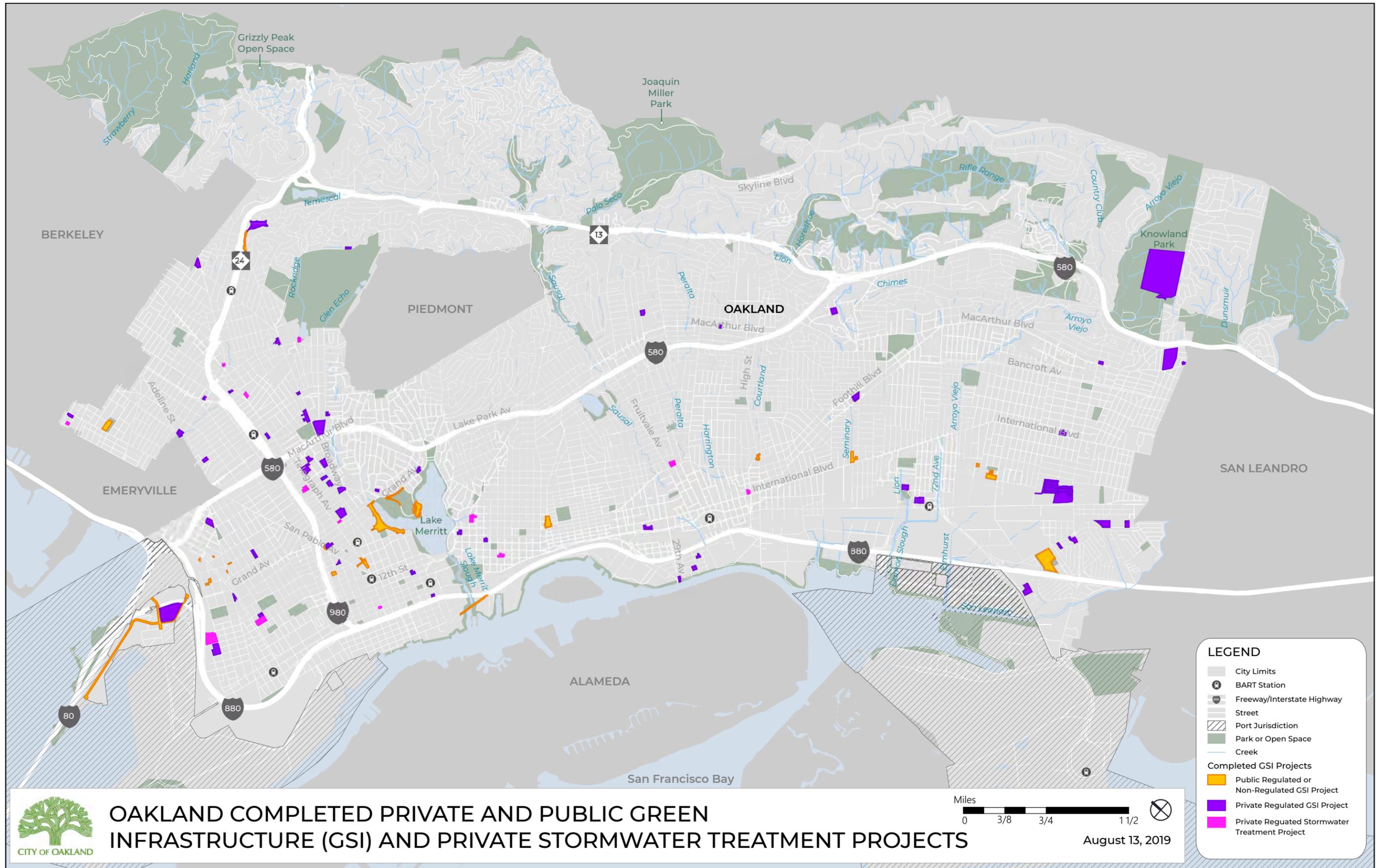
²⁷ The 100RC is dedicated to helping cities around the world become more resilient to the physical, social, and economic challenges that are a growing part of the 21st century. The Resilient Oakland Playbook can be accessed online: <https://www.oaklandca.gov/documents/resilient-oakland-strategy>.

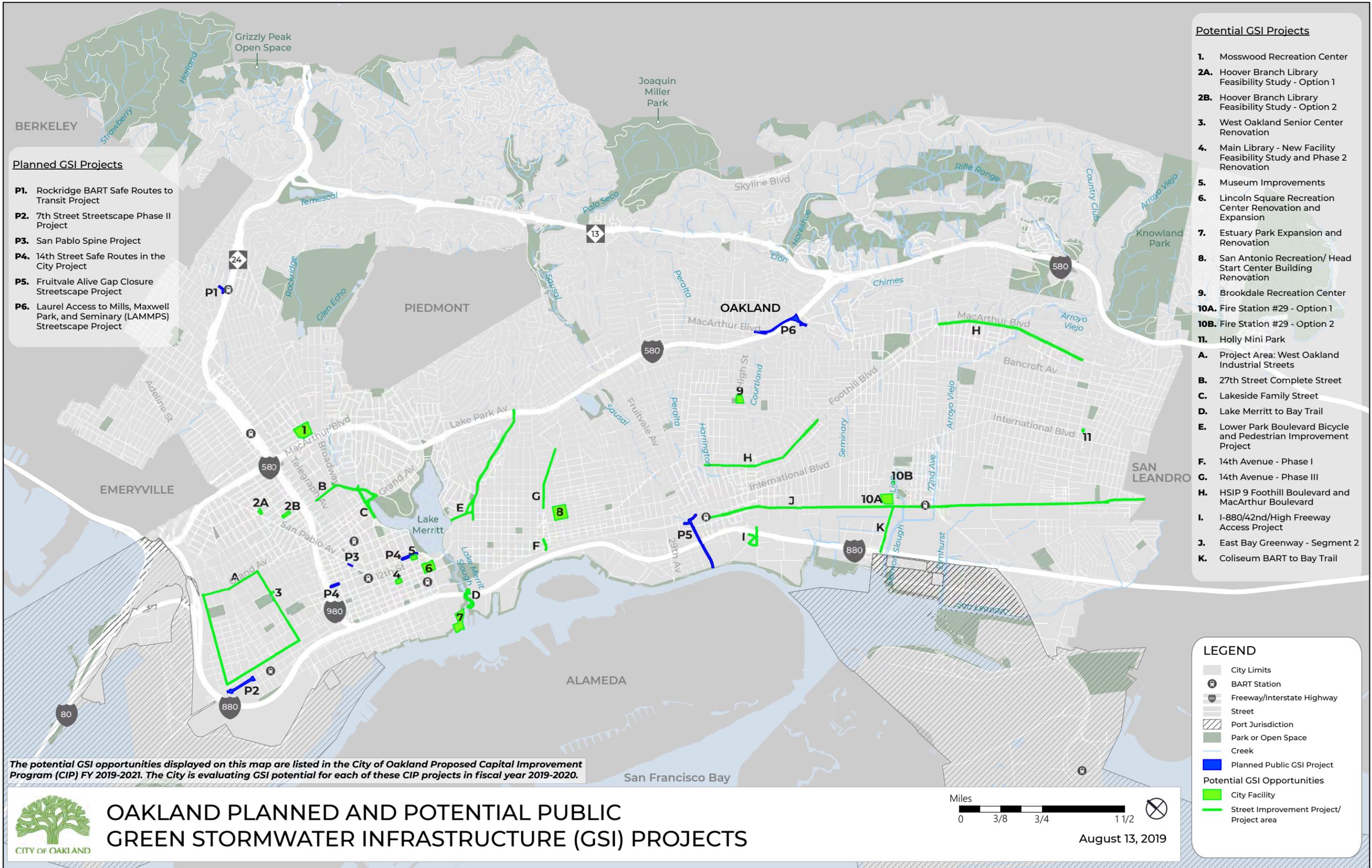
²⁸ The Roundtable Task Team included representatives from US Environmental Protection Agency (USEPA), San Francisco Estuary Partnership (SFEP), the Regional Water Board, BASMAA, and the City of Oakland. This team guided development of the Roundtable and the Roadmap of Funding Solutions for Sustainable Streets. Horizon Water and Environment (Horizon) provided project support.

²⁹ The Roundtable Strategy (https://www.sfestuary.org/wp-content/uploads/2017/07/Resilient_Infrastructure_Roundtable_Strategy_FINAL_Oct_24-1.pdf) was prepared as part of the Urban Greening Bay Area grant project, which was funded by Region 9 of the USEPA Water Quality Improvement Funds, awarded to the Association of Bay Area Governments (ABAG), a joint powers agency acting on behalf of the San Francisco Estuary Partnership (SFEP), a program of ABAG. BASMAA was a grant partner and developed and led the collaborative Regional Roundtable project. The Roadmap can be downloaded from the SFEP website: http://www.sfestuary.org/wp-content/uploads/2018/05/Roadmap_Funding_Solutions_Sustainable_Streets_FINAL_reduced.pdf.

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**City of Oakland Capital Improvement Program (CIP) Project
MRP C.3 Sign-off & Green Stormwater Infrastructure Potential Evaluation Worksheet**

USE THIS WORKSHEET TO DOCUMENT COMPLIANCE WITH OAKLAND'S STORMWATER PERMIT

- **Is the project a "Regulated Project" subject to the state's Municipal Regional Stormwater Permit (MRP) C.3.b. requirements? Use checklist below to find out.**
- **If not, it is mandatory to evaluate the project's Green Stormwater Infrastructure (GSI) Potential: Use checklist on Page 2 of this Worksheet.**

Project Name:

Project Address:

APN:

Contact Person:

Contact Phone:

Contact Email:

C.3 "Regulated Project" Review - Please check the applicable box(es):

- Project would create and/or replace less than 5,000 square feet of impervious area.¹
- Project would create and/or replace less than 10,000 square feet of impervious area **AND** project does not include auto service/maintenance facilities, restaurants, uncovered parking areas (stand-alone or as part of a larger project), or structures with rooftop parking.
- Project is a Road Project **AND** project would construct less than 10,000 square feet of new contiguous impervious area when the following are excluded from the calculation:²
 - Sidewalks built as part of new streets or roads that direct stormwater runoff to adjacent vegetated areas.
 - Bicycle lanes built as part of new streets or roads that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent impervious areas.
 - Impervious trails that are:
 - A. less than 10 feet wide and more than 50 feet away from the top of a creek bank, **OR**,
 - B. designed to direct stormwater runoff to adjacent vegetated areas or other non-erodible permeable areas (preferably away from creeks or towards the outboard side of levees).
 - Sidewalks, bicycle lanes, or trails constructed with permeable surfaces (pervious concrete, porous asphalt, unit pavers, or granular materials).
 - Caltrans highway projects and associated facilities.
- Project consists of interior remodel.
- Project consists of routine maintenance and repairs (e.g., roof replacement, replacement of exterior wall surface, and/or pavement resurfacing) within the existing footprint.
- Project IS a C.3 "Regulated Project" because none of the boxes above were checked. The Project will be designed and built to comply with MRP Section C.3 and will follow [ACCWP C.3 Technical Guide](#).**
- Project is NOT a C.3 "Regulated Project" as indicated above. Use Page 2 of the worksheet.**

¹ Count as "replaced" if existing impervious surface is removed to underlying soil (subgrade).

² To calculate Road Project impervious area, include: new lane(s) of traffic created by widening existing street (include new passing lanes and turning pockets, exclude shoulders and widened portions(s) of existing lanes), and new streets and connected new paved sidewalks/paths. Compare roadway project's "counted" impervious to "excluded" impervious areas. If "counted" area is >50% of existing "excluded" roadway, the entire road project must comply with MRP Provision C.3



**City of Oakland Capital Improvement Program (CIP) Project
MRP C.3 Sign-off & Green Stormwater Infrastructure Potential Evaluation Worksheet**

If Project is not a C.3 Regulated Project, use this worksheet to evaluate GSI potential.³

The City must 1) Evaluate “non-regulated” infrastructure projects (CIP projects) to determine GSI potential; 2) If no GSI, briefly describe why GSI measures were not practicable; and, 3) Maintain a list of planned and completed GSI projects and CIP projects with GSI potential.

YES, the project has GSI potential. The project’s GSI design is/will be consistent with the *City of Oakland Green Infrastructure Guide* or the *Alameda County C.3 Technical Guidelines*. **Stop here and sign below.**

No, the project does not have GSI potential based on the following (check applicable box(es)):

- Not scheduled to begin design before December 2020
- Planned and designed before January 2016
- To be determined: GSI potential is being or will be evaluated
- No exterior work (for example, it is an interior remodel)
- Exterior building upgrades/equipment (HVAC, solar panels, window replacement, roof repairs...)
- Construction limited to new streetlights, traffic signals or communication facilities
- Minor bridge and culvert repairs/replacement
- Non-stormwater utility project (e.g., sewer or water main repairs/replacement, utility undergrounding, treatment plant upgrades)
- Irrigation system installation, upgrades or repairs
- Maintenance/minor construction
- The project does not include alterations to building or roadway drainage
- Roof leaders and downspouts are up gradient from landscaped areas and paved surfaces, however, pervious pavement and or landscaped GSI facilities cannot be incorporated due to _____.
- The project is a landscape or street project but after locating drainage pathways and structures, it was determined that there is no potential to substitute pervious or grid pavements for impervious paving because _____.
- Reviewed [City of Oakland Green Infrastructure Guide](#), [Green Infrastructure Chapter of the City’s Great Streets Guide](#), and [Guidance for Sizing GI Facilities in Streets Projects](#) and determined the Project has no GSI potential because of confirmed and problematic conflicts with subsurface utilities, very constrained site, property ownership issues, lack of water supply for irrigation, severe budget constraints (including for ongoing maintenance) project schedule or funding constraints due to mandates or grant requirements, or: _____

Signature

Date

Name

Title

³ Based on the [Alameda County Clean Water Program \(ACCWP\) Worksheet for Identifying Green Infrastructure \(GI\) Potential in Municipal Capital Improvement Program Projects](#).

Appendix C. List of Public CIP Projects with GSI - Completed, Planned, and Potential

Public Project Name	Project Location	Project Description	Department: Public Works (OPW), Transportation (DOT), or Other	GSI Included?	Regulated Project?	WORKPLAN: Estimated Green Stormwater Infrastructure (GSI) Project Completion Year	August 2019 Status
12th Street Reconstruction Project	Lake Merritt Blvd at Lake Merritt Channel adjacent Peralta Park	Replaced 12th Street Bridget at Lake Merritt Channel (now Lake Merritt Blvd). Bioretention areas treat parking lot and road runoff.	OPW	Yes	Yes	Completed	Completed
14th Avenue Phase II	14th Ave between E 12th St. and E 19th St.	Streetscape Improvements - Bulbouts, Green Space, and Trees.	OPW	Yes	No	Completed	Completed
Begin Plaza	San Pablo Avenue and Martin Luther King Jr. Way	Small plaza renovation includes a few bioretention areas.	OPW	Yes	No	Completed	Completed
Broadway between Keith Ave and Brookside Ave	Broadway from Keith Ave to Brookside Ave	Streetscape improvements. Three bioretention facilities built.	DOT	Yes	No	Completed	Completed
City of Oakland Fire Station No. 1 Biotreatment Retrofit Project	1605 Martin Luther King Jr. Way, Oakland, CA	Retrofit an asphalt parking lot with green stormwater infrastructure features including permeable pavers, a bioretention rain garden, landscaped planter strips, stormwater-beneficial trees, and a planted trellis.	OPW	Yes	No	Completed	Completed
East Oakland Sports Center	9161 Edes Ave	Sports center renovation includes bioretention areas and bioswales.	OPW	Yes	Yes	Completed	Completed
Embarcadero Bridge	Embarcadero Bridge at Lake Merritt Channel	Replacement of bridge over Lake Merritt Channel. Bioretention facilities are being installed on both sides of the bridge.	DOT	Yes	No	Completed	Completed
Golden Gate Recreation Center	1075 62nd Street	Recreation center renovation. Regulated Project includes bioretention stormwater treatment facilities.	OPW	Yes	Yes	Completed	Completed
High Street, Courtland Avenue, & Ygnacio Ave Intersection Improvements	High St and Courtland Ave	Streetscape improvements include two bioretention facilities. One is in the median in the middle of the large intersection, the other is at the SE corner of High St. and Courtland Ave.	DOT	Yes	No	Completed	Completed
Lake Merritt Bellevue Avenue and pathways in Lakeside Park	Bellevue Avenue between Grand Avenue and Perkins	Installation of new pervious parking area, road maintenance, and garden outer entrance. Pervious parking used "True Grid".	OPW	Yes	No	Completed	Completed
Lake Merritt Boat House - Lake Chalet	1520 Lakeside Drive	Boat house site improvements, bioswale treats parking lot. Regulated Project.	OPW	Yes	Yes	Completed	Completed
Lake Merritt Improvement Project (C394010)	Lakeside Park Entrances. Bellevue and Grand Ave.	Pedestrian safety, accessibility, landscaping and pathways. Three bioretention areas (flow through no underdrain)	OPW	Yes	No	Completed	Completed
Lakeside Green Streets Project	Lakeside Drive from 19th Street to Grand Avenue	Park expansion and retrofit, road diet rehabilitation, and rain gardens (bioretention).	OPW	Yes	No	Completed	Completed
Latham Square Streetscape Improvements	Latham Square	Reconstructed wide pedestrian area between Broadway and Telegraph Avenue (and 14th and 16th Streets). Bioretention areas accept runoff from Broadway and paved plaza areas.	DOT	Yes	No	Completed	Completed
Oakland Army Base Public Infrastructure Portion	Maritime Street and West Grand Avenue	29 bioretention areas in the City's right-of-way.	Other	Yes	Yes	Completed	Completed
Rainbow Recreation Center	5800 International Blvd.	Recreation center renovation. Regulated Project uses bioretention areas to treat stormwater.	OPW	Yes	Yes	Completed	Completed
Sailboat House Shoreline Improvement	568 Bellevue	Sailboat House site improvements, bioretention treats parking lot	OPW	Yes	Yes	Completed	Completed
Stormwater Treatment Units (Tree Wells)	26th & Poplar 26th & 24th Willow & 24th Willow and Wood 32nd & Mandela 32nd & 28th	Install six tree well units designed to remove PCBs from stormwater	OPW	Yes	No	Completed	Completed
Tassafaronga Village	970-998 81st Ave, Oakland	Oakland Housing Authority affordable housing development. Includes bioretention areas.	Other	Yes	Yes	Completed	Completed
Tassafaronga Village	84th Ave at G St, Oakland	Oakland Housing Authority affordable housing development. Includes bioretention areas.	Other	Yes	Yes	Completed	Completed
Tassafaronga Village	84th Ave at F St, Oakland	Oakland Housing Authority affordable housing development. Includes bioretention areas.	Other	Yes	Yes	Completed	Completed
14th Street Safe Routes in the City (ATP)	14th St. Brush St. to Lakeside Drive	Streetscape improvements. GSI will be included.	DOT	Yes	No	Planned: 2021-2025	Design
7th Street Streetscape Phase II (7th Street West Oakland Transit Village Streetscape)	7th Street from Wood Street to Peralta Street	Streetscape improvements on 7th Street between Peralta and Wood Roadway diet and reduced number of travel lanes on 7th Street in each direction. ADA and bike lanes. Several bioretention facilities included in project design.	DOT	Yes	No	Planned: 2019 - 2020	Construction
Fruitvale Alive Gap Closure	Fruitvale Bridge to International Ave	Complete street improvements consisting of a raised cycle track (Class 4), widen sidewalks, improve ped crossings, add ped lights, landscape buffers, and restriping to increase safety	DOT	Yes	No	Planned: 2021 - 2025	Design
LAMMPS Streetscape Project - Laurel Access to Mills, Maxwell Park & Seminary	Laurel Access to Mills, Maxwell Park & Seminary	Installation of Class I bike/pedestrian path along Macarthur Blvd from High Street to Richards Road. Several Bioretention areas included in the project.	DOT	Yes	No	Planned: 2019 - 2020	Construction

Appendix C. List of Public CIP Projects with GSI - Completed, Planned, and Potential

Public Project Name	Project Location	Project Description	Department: Public Works (OPW), Transportation (DOT), or Other	GSI Included?	Regulated Project?	WORKPLAN: Estimated Green Stormwater Infrastructure (GSI) Project Completion Year	August 2019 Status
Rockridge BART Safe Route to Transit	College & Miles. Project extends to Shafter/Keith.	Add bike lane on College and intersection improvements on College at Shafter/Keith and at Miles. One bioretention facility incorporated into curb extension at College and Miles will treat runoff from College Ave and from adjacent buildings.	DOT	Yes	No	Planned: 2020	Pre-Bid
West Oakland Branch Library Improvement	1801 Adeline	Garage remodel to fit the City's Mobile Outreach Vehicle (MOVE) vehicle and modify parking lot	OPW	Yes	No	Planned: 2021	Planning
Mosswood Recreation Center	3612 Webster St.	Construct new 12,000 sf Community/Recreation Center	OPW	TBD	Probably	Not applicable Potential GSI	Planning
Hoover Branch Library Feasibility Study	West Oakland (MLK/28th/West St or 3000 Market St.)	Feasibility study. New 10,000 sf facility	OPW	TBD	Yes if built	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
West Oakland Senior Center Renovation	1724 Adeline St	Renovate and update existing Senior Center	OPW	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Main Library - New Facility Feasibility Study & Phase 2 Renovation	125 14th St	Feasibility Study for new 160,000 sf facility for main library	OPW	TBD	Yes if built	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Oakland Museum Improvements	1000 Oak St.	Fund allocation to perform improvements per Museum's discretion	OPW	TBD	Unknown	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Lincoln Square Recreation Center Renovation and Expansion	261 11th St	Expand and renovate existing 6,910sf building. Add additional 6,400sf	OPW	TBD	Probably not	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Estuary Park (R12 #100085)	115 Embarcadero	Park and Bay trail	OPW	TBD	No	Not applicable Potential GSI	Planning
San Antonio Recreation Center and Head Start CIP Request	1701 East 19th St	Renovate existing 1,764 sf recreation center	OPW	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Brookdale Recreation Center	2535 High St	Renovation and expansion of recreation center building and discovery center	OPW	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Fire Station #29	1016 or 905 66th Ave, to be determined	New fire station, training facility, US&R and fire services facilities on new site. Adding about 10,000 sf.	OPW	TBD	Close, to be determined	Not applicable Potential GSI	Planning
Holly Mini Park	9830 Holly Street	Replace outdated broken play equipment and picnic tables & benches. Update safety surface, ADA accessibility, lighting, irrigation improvements, perimeter planting, fencing, basketball court.	OPW	TBD	No	Not applicable Potential GSI	Design
West Oakland Industrial Streets	To be determined	Upgrade streets in West Oakland's industrial/mixed use areas to complete streets.	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
27th St Complete Streets	27th and Bay Pl from Telegraph to Grand	Complete street improvements consisting of protected bike lanes, crosswalk enhancements, curb extensions, signal modifications, ADA curb ramps, and road diet.	DOT	TBD	No	Not applicable Potential GSI	Planning
Lakeside Family Streets	Harrison St. from Lakeside to 27th; Grand from Harrison to Bay Pl.	Complete street improvements. Will seek opportunities to build or expand GI components of Lakeside Green Streets project	DOT	TBD	No	Not applicable Potential GSI	Planning
Lake Merritt to Bay Trail	Lake Merritt to Bay Trail	Spanning from Lake Merritt Channel to the Oakland Waterfront Bay Trail	OPW	TBD	No	Not applicable Potential GSI	Design
Lower Park Blvd. Bicycle & Pedestrian Improvement Project	Park Blvd/4th Ave from E 17th St to Chatham Rd, E 18th St from Park Blvd to Lakeshore Ave, and 3rd Ave from Park Blvd to E 18th St.	Pedestrian safety improvements and buffered bike lanes from Lake Merritt to Oakland High School	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
14th Avenue Phase I	E 8th St to International	Streetscape Improvements. Tree well(s) and potential for medians with landscaping components	DOT	TBD	No	Not applicable Potential GSI	Design
14th Avenue Phase III	E19th St to E27th St	Streetscape Improvements	DOT	TBD	No	Not applicable Potential GSI	Design
HSIP 9 Foothill Blvd & MacArthur Blvd	Foothill Boulevard (Harrington Avenue to Cole Street), MacArthur Boulevard (69th to 96th Avenue). Foothill Boulevard distance 1.3 miles. MacArthur Boulevard distance 1.7 miles.	Bulbouts, pedestrian median refuge islands, crosswalk enhancements, flashing beacons, signs, striping.	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
I-880/42nd/High Freeway Access Project	42nd Street and High Street 880 on-ramp	Reconstruct surface street at 42nd/High I-880 entrance	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
East Bay Greenway	Adjacent to BART tracks, Fruitvale to San Leandro Border	Complete multi-use pathway under or alongside BART tracks	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated
Coliseum BART to Bay Trail	Zhone Way/66th Avenue between Oakport Street and San Leandro Street	Class I Bike Path with intersection safety improvements.	DOT	TBD	No	Not applicable Potential GSI	New FY 19-21 CIP Project GSI potential to be evaluated

PURPOSE:

PROVISION C.3 OF THE MUNICIPAL REGIONAL STORMWATER NPDES PERMIT (MRP) REQUIRES TREATMENT OF IMPERVIOUS SURFACES USING GREEN INFRASTRUCTURE FOR BOTH PUBLIC AND PRIVATE DEVELOPMENT PROJECTS. BIORETENTION AREAS ARE EXPECTED TO BE THE MOST COMMON GREEN INFRASTRUCTURE APPLICATION IN PUBLIC RIGHT-OF-WAY (ROW). THE PURPOSE OF THE BIORETENTION AREA IS TO IMPROVE WATER QUALITY BY FILTRATION THROUGH THE BIOTREATMENT SOIL AND TO CONTROL RUNOFF PEAK FLOW RATES AND VOLUMES THROUGH STORAGE AND INFILTRATION.

NOTES & GUIDELINES:

1. THE ENGINEER SHALL ADAPT PLAN AND SECTION DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. BIORETENTION AREA SHALL BE SIZED TO MEET THE REQUIREMENTS OF MRP PROVISION C.3 SIZING.
3. 48 HOUR MAXIMUM FACILITY DRAWDOWN TIME (TIME FOR MAXIMUM SURFACE PONDING TO DRAIN THROUGH THE BIOTREATMENT SOIL AFTER THE END OF A STORM). REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR DRAINAGE CONSIDERATIONS.
4. A STORAGE LAYER OF CALTRANS STANDARD CLASS II PERMEABLE MATERIAL IS REQUIRED UNDER THE BIOTREATMENT SOIL. REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR SPECIFICATIONS.
5. CHECK DAMS SHALL BE USED TO TERRACE FACILITIES TO PROVIDE SUFFICIENT PONDING FOR SLOPED INSTALLATIONS. ENGINEER SHALL SPECIFY CHECK DAM HEIGHT AND SPACING. REFER TO DETAIL **GI-7** FOR GUIDANCE ON CHECK DAM DESIGN.
6. DEPENDING ON THE DEPTH OF THE BIORETENTION AREA, ADDITIONAL STRUCTURAL CONSIDERATIONS MAY BE REQUIRED TO ADDRESS HORIZONTAL LOADING. REFER TO DETAIL **GI-5** FOR GUIDANCE ON EDGE TREATMENTS.
7. WHEN FACILITY CONSTRUCTION IMPACTS EXISTING SIDEWALK, ALL SAW CUTS SHALL ADHERE TO LOCAL JURISDICTION STANDARDS. SAW CUTS SHALL BE ALONG SCORE LINES OR ALONG CONSTRUCTION JOINTS, AS DETERMINED BY THE CITY ENGINEER, AND ANY DISTURBED SIDEWALK FLAGS SHALL BE REPLACED IN THEIR ENTIRETY.
8. BIORETENTION AREAS IN PUBLIC RIGHT OF WAY SHALL BE DESIGNED WITH AN EMERGENCY OVERFLOW. IN THE EVENT THE BIORETENTION AREA OVERFLOW DRAIN IS OBSTRUCTED OR CLOGGED, THE INUNDATION AREA SHALL BE CONTAINED WITHIN THE STREET AND SHALL NOT BE WITHIN ADJACENT PRIVATE PROPERTIES.
9. BIORETENTION AREA VEGETATION SHALL BE SPECIFIED BY LANDSCAPE DESIGN PROFESSIONAL. SEE C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR PLANT LIST AND VEGETATION GUIDANCE.
10. THE ENGINEER SHALL EVALUATE THE NEED FOR EROSION PROTECTION AT ALL INLET LOCATIONS. ALL COBBLES USED FOR ENERGY DISSIPATION SHALL BE GROUTED. ENGINEER TO CONSIDER MAINTENANCE REQUIREMENTS TO FACILITATE EASY SEDIMENT REMOVAL AND ADEQUATE VECTOR CONTROL.
11. THE PROJECT PLANS SHALL SHOW ALL EXISTING UTILITIES AND INDICATE POTENTIAL UTILITY CROSSINGS OR CONFLICTS.
12. CHECK WITH LOCAL JURISDICTION FOR UTILITY CROSSING PROVISIONS.
13. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES SHALL CONFORM TO CURRENT LOCAL JURISDICTION STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS.
14. VERTICAL SIDEWALLS EXTENDING INTO EXISTING STORM DRAIN PIPE TRENCH BACKFILL SHALL BE DESIGNED WITH A CONCRETE BACKFILL ACCEPTABLE TO THE CITY ENGINEER.
15. OVERFLOW RISER MUST BE FORMED SUCH THAT IT IS A MINIMUM OF 6" ABOVE THE BOTTOM OF THE SYSTEM INLET, OR AS DESIGNED. PLACE STRUCTURE ADJACENT TO PEDESTRIAN EDGE TO ALLOW FOR MONITORING ACCESS.
16. DETAILS WERE ADAPTED FROM SFPUC GREEN INFRASTRUCTURE TYPICAL DETAILS AND SPECIFICATIONS.
17. DETAILS WERE DEVELOPED BY GEOSYNTEC CONSULTANTS.

ENGINEER CHECKLIST (SHALL SPECIFY, AS APPLICABLE):

- BIORETENTION AREA WIDTH AND LENGTH
- DEPTH OF PONDING
- AMOUNT OF FREEBOARD PROVIDED
- DEPTH OF BIOTREATMENT SOIL (18" MIN)
- UNDERDRAIN SPECIFICATIONS AND LOCATION (IF FACILITY IS LINED PLACE UNDERDRAIN AT BOTTOM OF FACILITY)
- BIORETENTION SURFACE ELEVATION (TOP OF BIOTREATMENT SOIL) AT UPSLOPE AND DOWNSLOPE ENDS OF FACILITY
- CONTROL POINTS AT EVERY BIORETENTION WALL CORNER AND POINT OF TANGENCY
- DIMENSIONS AND DISTANCE TO EVERY INLET, OUTLET, CHECK DAM, SIDEWALK NOTCH, ETC.
- ELEVATIONS OF EVERY INLET, OVERFLOW RISER, STRUCTURE RIM AND INVERT CHECK DAM, BIORETENTION AREA WALL CORNER, AND SIDEWALK NOTCH
- TYPE AND DESIGN OF BIORETENTION AREA COMPONENTS (E.G., EDGE TREATMENTS, INLETS/GUTTER MODIFICATIONS, UTILITY CROSSINGS, LINER, AND PLANTING DETAILS)
- DEPTH AND TYPE OF MULCH (NON-FLOATING; ORGANICALLY-DERIVED; NOT BARK OR GORILLA HAIR; 3" MIN)

RELATED TECHNICAL GUIDANCE	SOURCE
BIORETENTION: - BIOTREATMENT SOIL MIX - CALTRANS CLASS II PERM LAYER STORAGE - PERFORATED UNDERDRAIN - NON-FLOATING MULCH	C.3 TECHNICAL GUIDANCE MANUAL (ACCWP)

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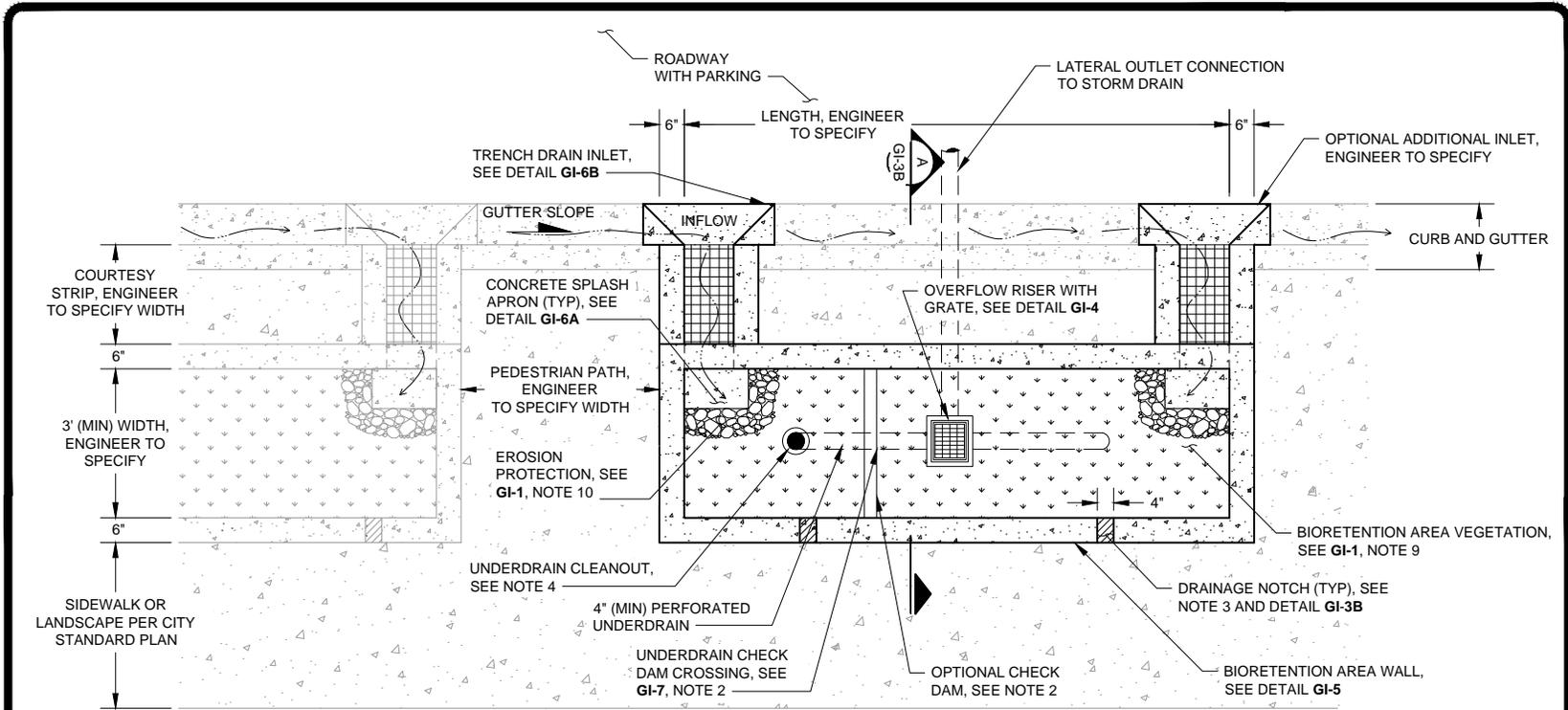


**GREEN INFRASTRUCTURE
EXAMPLE DETAILS**
ALAMEDA COUNTYWIDE CLEAN
WATER PROGRAM

SCALE: NOT TO SCALE
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 DRAWN BY: K. K. REVISED BY: E. F.
 CHECKED BY: A. R.

GI-1

BIORETENTION AREA: NOTES



NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN (SEE DETAIL GI-7).
3. LAY OUT DRAINAGE NOTCHES AS APPLICABLE TO PREVENT PONDING BEHIND BIORETENTION AREA WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
4. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN).

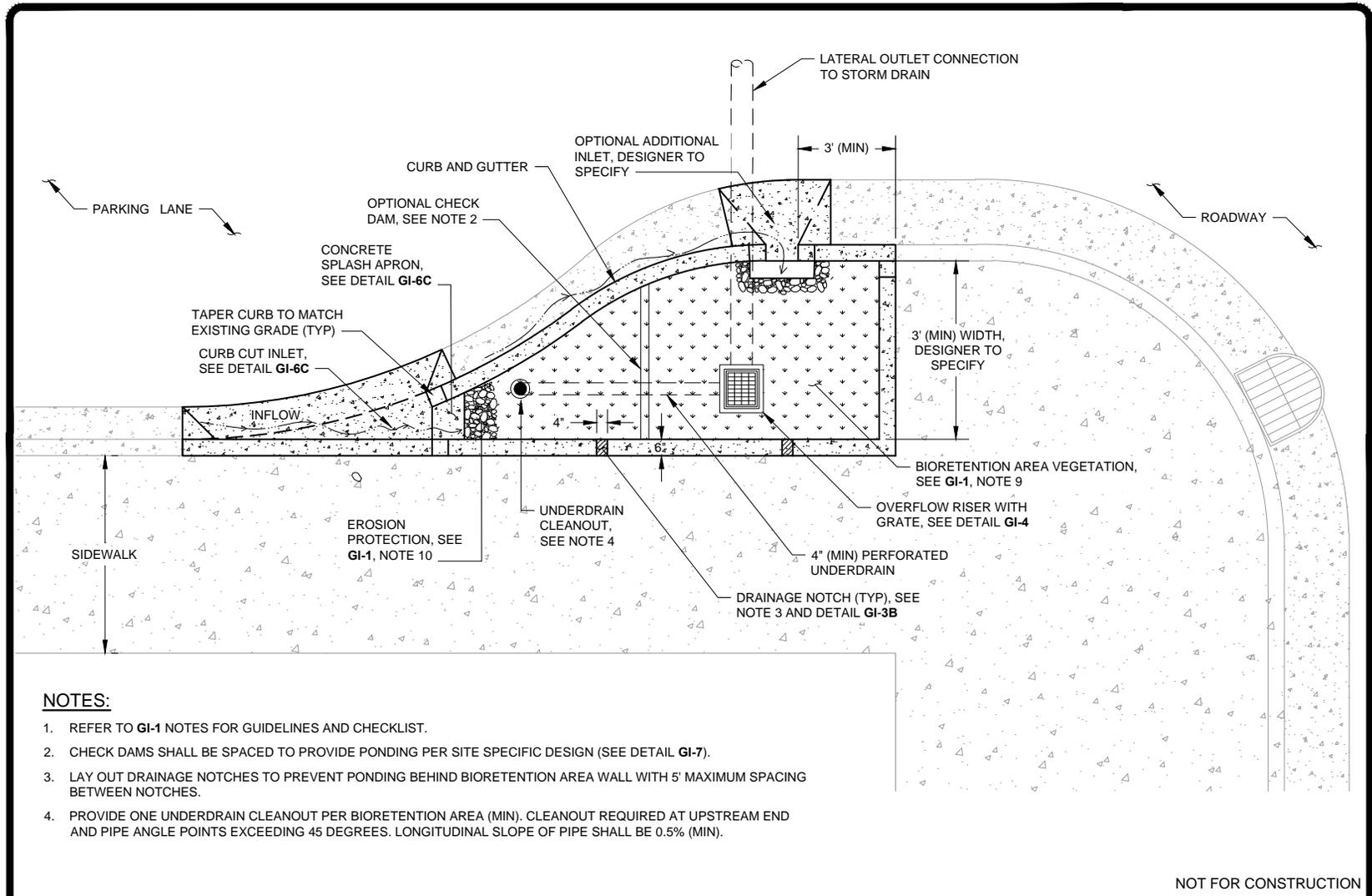
NOT FOR CONSTRUCTION



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GI-2A



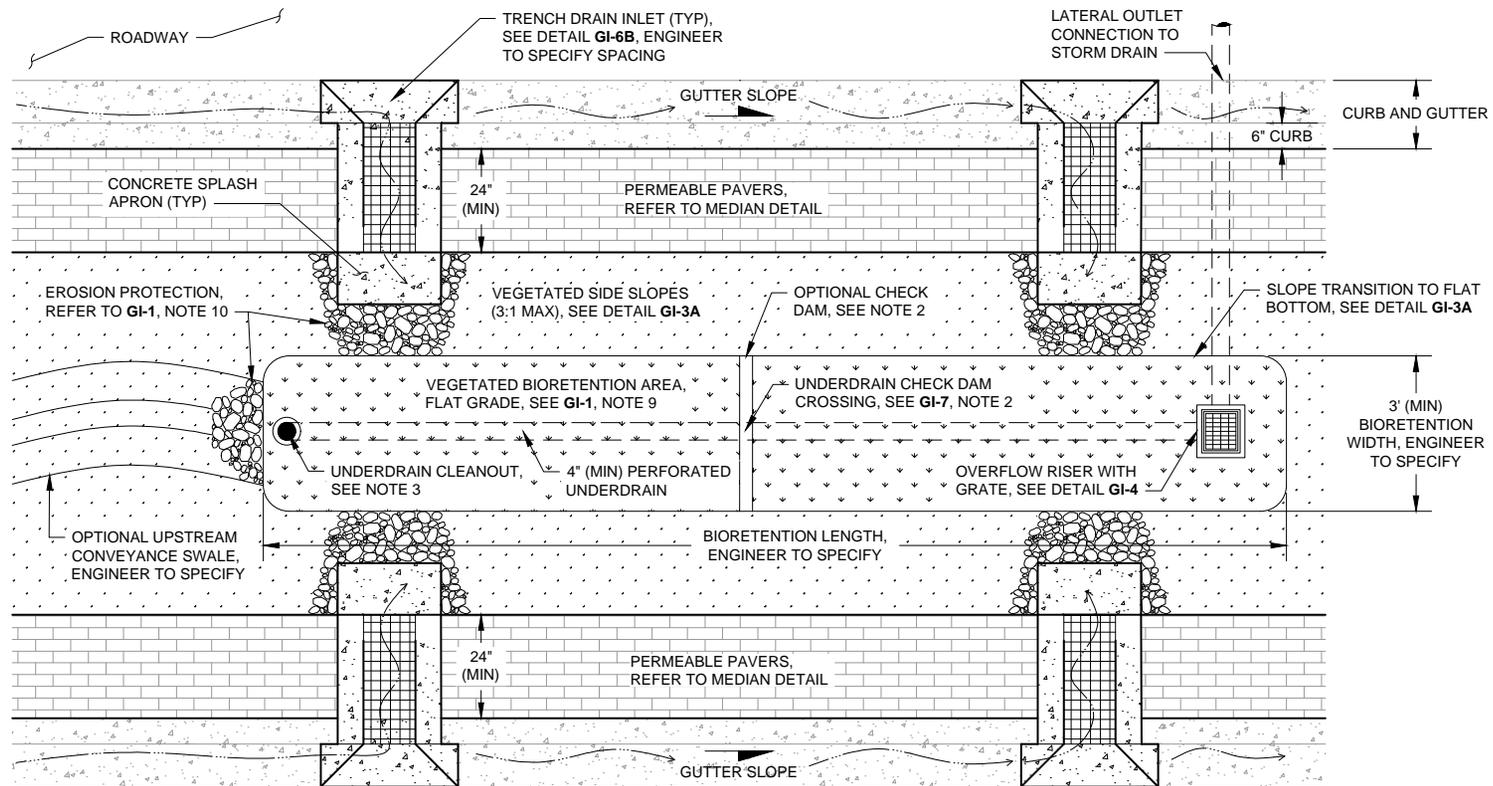
BIORETENTION AREA: BULBOUT PLAN VIEW



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GI-2B



NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN (SEE DETAIL GI-7).
3. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN).
4. DESIGNERS TO REFERENCE AASHTO ROADSIDE SAFETY DESIGN REQUIREMENTS AND CONSIDER USE OF MEDIAN BIORETENTION AREAS IN RELATION TO STREET CLASSIFICATION AND STREET SPEEDS.
5. A STORAGE VOLUME SAFETY FACTOR OF 1.5 SHALL BE INCLUDED IN THE DESIGN OF MEDIAN BIORETENTION AREAS TO PREVENT FLOODING.
6. SLOPED SIDES (GI-3A) DEPICTED IN PLAN VIEW ABOVE, REFER TO GI-3B IF VERTICAL SIDE WALLS ARE USED.

NOT FOR CONSTRUCTION

BIORETENTION AREA: STREET MEDIAN



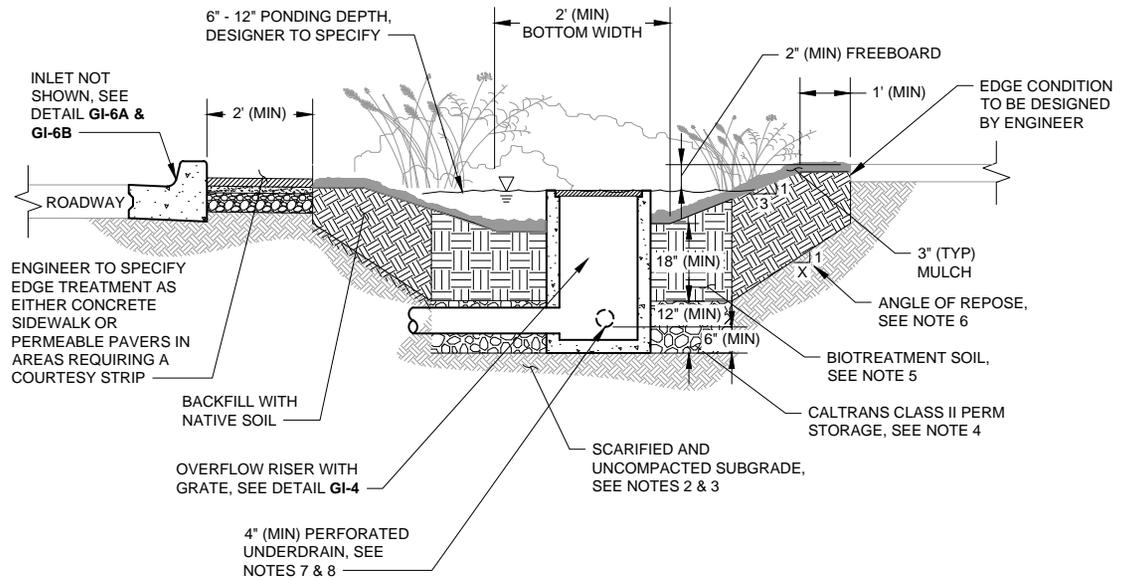
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GI-2C

NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. AVOID UNNECESSARY COMPACTION OF EXISTING SUBGRADE BELOW AREA.
3. SCARIFY SUBGRADE TO A DEPTH OF 3" (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER AND BIOTREATMENT SOIL MATERIALS.
4. AGGREGATE STORAGE LAYER COMPRISED OF 12" MIN CALTRANS CLASS 2 PERMEABLE MATERIAL.
5. REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR BIOTREATMENT SOIL MIX SPECIFICATIONS. INSTALL BIOTREATMENT SOIL AT 85% COMPACTION FOLLOWING BASMAA INSTALLATION GUIDANCE.
6. ANGLE OF REPOSE VARIES PER GEOTECHNICAL ENGINEER RECOMMENDATIONS.
7. UNDERDRAIN AND CLEAN OUT PIPE (1 MIN PER FACILITY) REQUIRED. REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR DESIGN CONSIDERATIONS. UNDERDRAINS SHOULD BE ELEVATED 6" (MIN) WITHIN THE CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER TO PROMOTE INFILTRATION. IN FACILITIES WITH AN IMPERMEABLE LINER, THE UNDERDRAIN SHOULD BE PLACED AT THE BOTTOM OF THE CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER. PERFORATED/SLOT DRAINS SHOULD BE DOWNWARD FACING TO FACILITATE BETTER STORAGE IN THE GRAVEL LAYER.
8. THE UNDERDRAIN IN ALL FACILITIES LOCATED IN THE PUBLIC RIGHT-OF-WAY SHALL BE VIDEO RECORDED AND PROVIDED TO THE CITY FOR REVIEW PRIOR TO PROJECT ACCEPTANCE.
9. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.



NOT FOR CONSTRUCTION

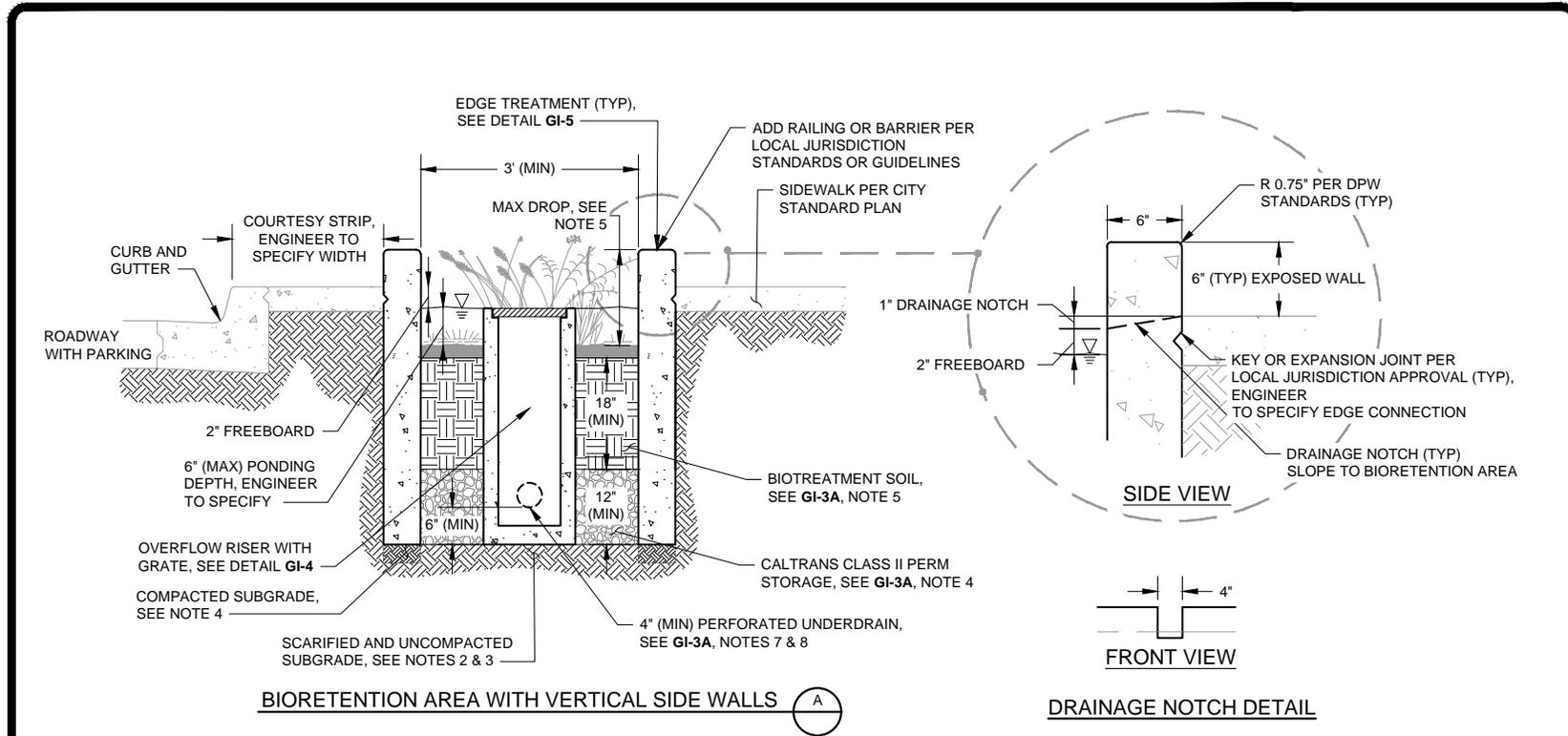
BIORETENTION AREA: SLOPED SIDES CROSS SECTION



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GI-3A



NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. AVOID UNNECESSARY COMPACTION OF EXISTING SUBGRADE BELOW BIORETENTION AREA.
3. SCARIFY SUBGRADE TO A DEPTH OF 3" (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIOTREATMENT SOIL MATERIAL.
4. FOR STRUCTURAL SUPPORT, SUBGRADE UNDER WALLS ONLY COMPACTED PER ENGINEER SPECIFICATIONS.
5. MAXIMUM DROP, PER LOCAL BUILDING CODE, FROM TOP OF CURB TO TOP OF BIOTREATMENT SOIL SHALL INCLUDE CONSIDERATIONS FOR BIOTREATMENT SOIL SETTLEMENT. THE DROP IS THE SUM OF PONDING DEPTH (6" TYP), FREEBOARD (2" TYP), AND CURB HEIGHT (6" TYP).
6. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.

NOT FOR CONSTRUCTION

BIORETENTION AREA: VERTICAL SIDE WALL CROSS SECTION



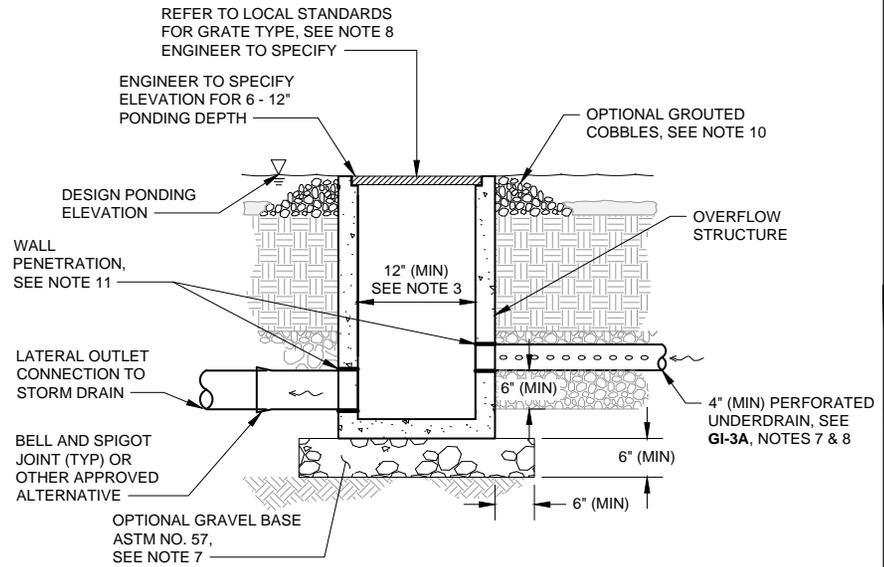
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GI-3B

NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR OVERFLOW STRUCTURES SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. DESIGN OVERFLOW WEIR AND OUTLET PIPE TO CONVEY 10-YR, 24-HR STORM FLOW OR DESIGN INLET TO DIVERT FLOWS LARGER THAN THE DESIGN STORM DIRECTLY TO THE STORM DRAIN. LOCATE ALL OVERFLOW PIPES AT AN ELEVATION HIGHER THAN THE STORM SEWER HYDRAULIC GRADE LINE TO PREVENT BACKFLOW INTO THE BIORETENTION FACILITY.
4. STORM DRAIN OUTLET PIPES SHALL BE SIZED TO MEET HYDRAULIC REQUIREMENTS WITH APPROPRIATE COVER DEPTH AND PIPE MATERIAL.
5. PERFORATED UNDERDRAINS WITH CLEANOUT PIPES ARE REQUIRED. PERFORATED/SLOT DRAINS SHOULD BE DOWNWARD FACING TO FACILITATE BETTER STORAGE IN THE GRAVEL LAYER.
6. MAINTENANCE ACCESS IS REQUIRED FOR ALL OUTLET STRUCTURES AND CLEANOUT FACILITIES. 12" (MIN) CLEARANCE WITHIN OVERFLOW STRUCTURE SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
7. ENGINEER SHALL REFER TO LOCAL JURISDICTION STANDARDS AND/OR ASSESS NEED FOR GRAVEL BASE. ENGINEER SHALL EVALUATE BUOYANCY OF STRUCTURES FOR SITE SPECIFIC APPLICATION AND SPECIFY THICKENED OR EXTENDED BASE / ANTI-FLOATATION COLLAR, AS NECESSARY.
8. SIZE OF GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM. MAXIMUM GRATE OPENING SHALL BE 2".
9. IF INTERIOR DEPTH OF OVERFLOW STRUCTURE EXCEEDS 5', A PERMANENT BOLTED LADDER AND MINIMUM CLEAR SPACE OF 30" BY 30" SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
10. MINIMUM DIAMETER OF OPTIONAL GROUTED COBBLES SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
11. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.



NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: OUTLET DETAIL



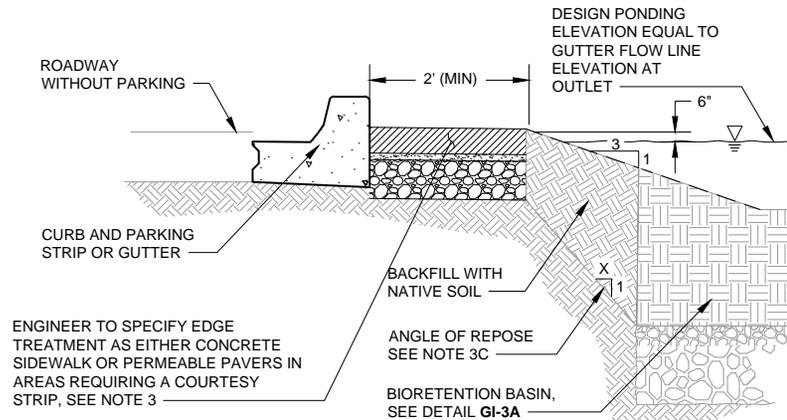
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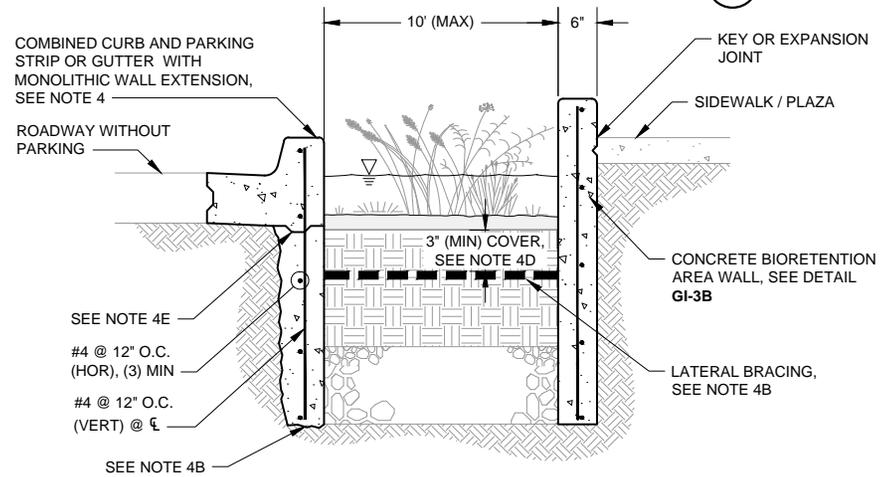
GI-4

NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. THE ENGINEER SHALL ADAPT EDGE TREATMENT DESIGN TO ADDRESS SITE SPECIFIC CONSTRAINTS TO EFFECTIVELY STABILIZE ADJACENT PAVEMENT AND MINIMIZE LATERAL MOVEMENT OF WATER.
3. STANDARD CURB EDGE (WHEN SPACE AVAILABLE):
 - A. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.
 - B. ANGLE OF REPOSE VARIES PER GEOTECHNICAL ENGINEERS RECOMMENDATIONS.
4. VERTICAL SIDE WALLS (WHEN SPACE LIMITED):
 - A. ALL BIORETENTION AREA WALLS SHALL EXTEND TO BOTTOM OF AGGREGATE STORAGE LAYER OR DEEPER. MINIMUM DEPTHS SHALL BE DESIGNED TO PREVENT LATERAL SEEPAGE INTO THE ADJACENT PAVEMENT SECTION.
 - B. FOOTING AND/OR LATERAL BRACING SHALL BE DESIGNED BY THE ENGINEER TO WITHSTAND ANTICIPATED LOADING ASSUMING NO REACTIVE FORCES FROM THE UNCOMPACTED BIOTREATMENT SOIL.
 - C. BIORETENTION AREA WALLS EXTENDING MORE THAN 36" BELOW ADJACENT LOAD-BEARING SURFACE, OR WHEN LOCATED ADJACENT TO PAVERS, SHALL HAVE FOOTING OR LATERAL BRACING. FOOTING OR LATERAL BRACING MAY BE EXCLUDED ONLY IF THE ENGINEER DEMONSTRATES THAT THE PROPOSED WALL DESIGN MEETS LOADING REQUIREMENTS. WALL SHALL NOT ENCROACH INTO TREATMENT AREA.
 - D. CONTRACTOR TO PROVIDE 3" MINIMUM COVER OVER ALL LATERAL BRACING FOR PLANT ESTABLISHMENT.
 - E. ALL CONSTRUCTION COLD JOINTS SHALL INCORPORATE EPOXY, DOWEL/TIE BAR, KEYWAY, OR WATER STOP.



STANDARD CURB EDGE AT BIORETENTION BASIN ①



EXTENDED BIORETENTION AREA WALL WITH LATERAL BRACING ②

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: EDGE TREATMENT DETAIL



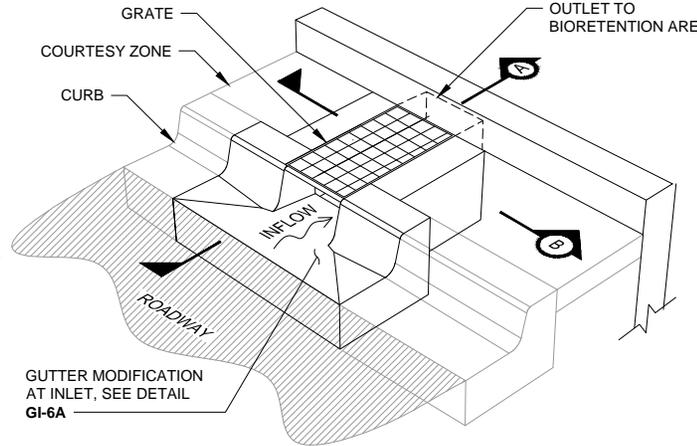
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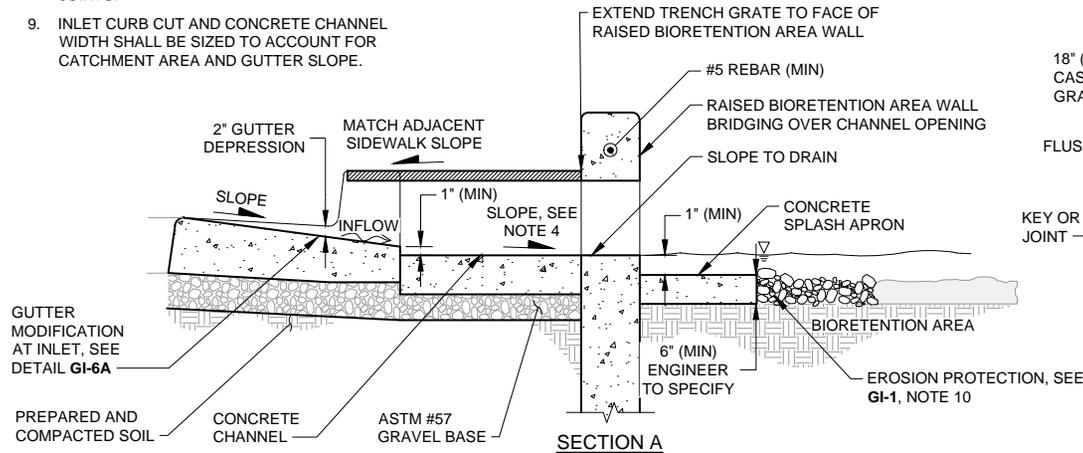
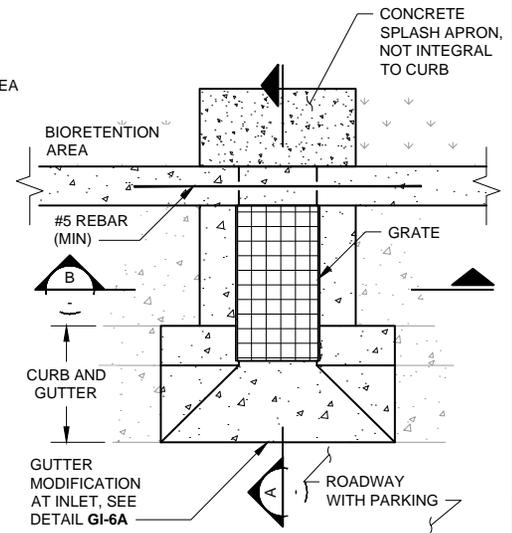
GI-5

NOTES:

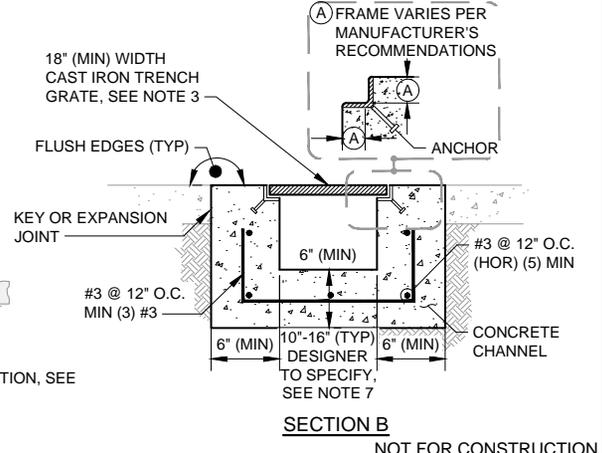
1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR TRENCH DRAIN ASSEMBLY SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. TRENCH DRAIN INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. SEE NOTE 2 DETAIL GI-6A FOR REFERENCE.
4. SLOPE TO PROVIDE AT LEAST 1" DROP OVER LENGTH OF CHANNEL OR A MINIMUM OF 2%, WHICHEVER IS LARGER.
5. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.
6. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
7. HORIZONTAL CONTROL JOINTS SHALL BE PROVIDED EVERY 10' (LINEAR), OR PER MANUFACTURER'S RECOMMENDATIONS.
8. APPLY EPOXY BONDING AGENT AT ALL TRENCH DRAIN CONSTRUCTION COLD JOINTS.
9. INLET CURB CUT AND CONCRETE CHANNEL WIDTH SHALL BE SIZED TO ACCOUNT FOR CATCHMENT AREA AND GUTTER SLOPE.



ISOMETRIC



SECTION A



SECTION B

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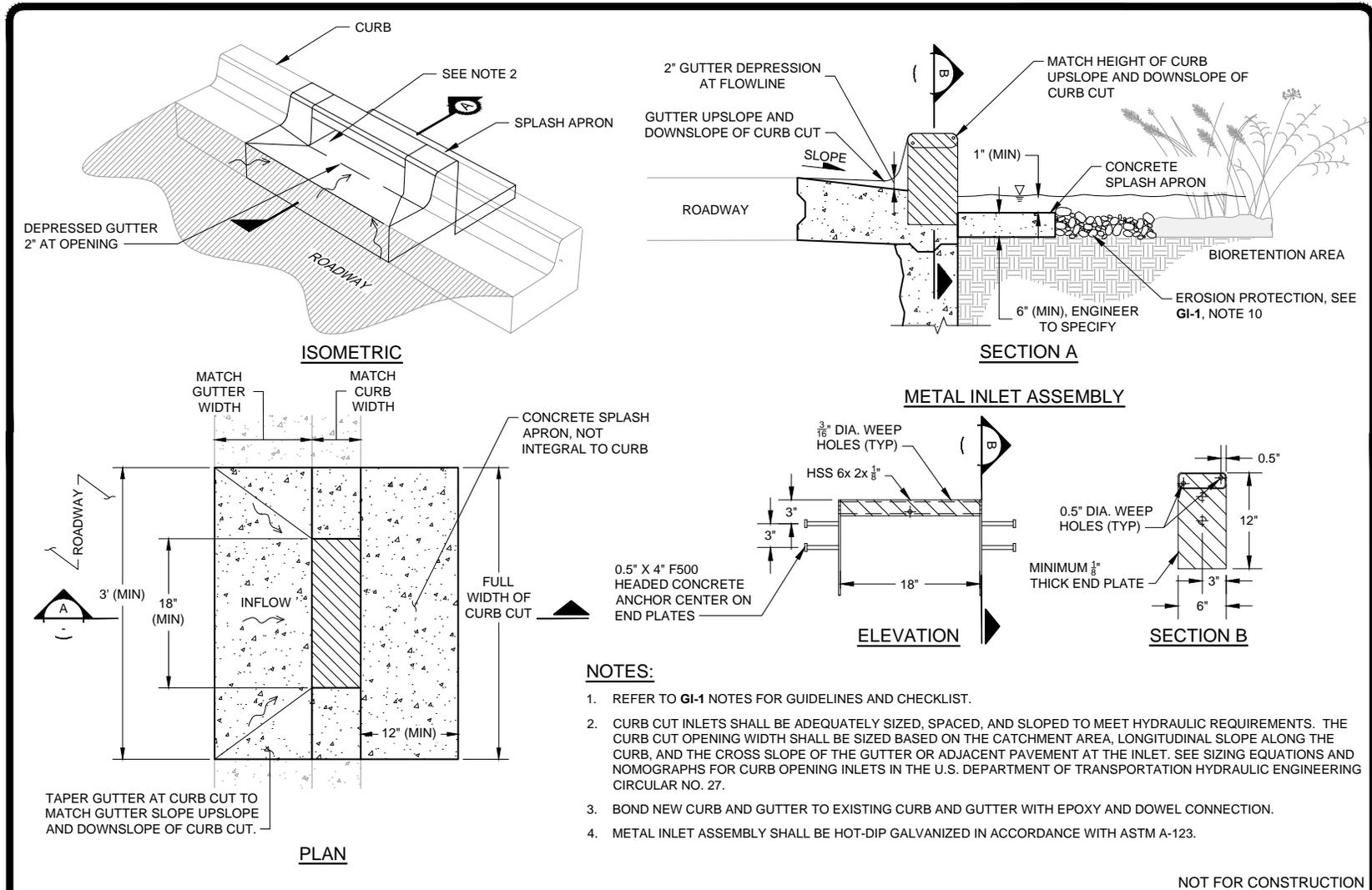
BIORETENTION COMPONENTS: TRENCH DRAIN CURB CUT INLET DETAIL



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GI-6B



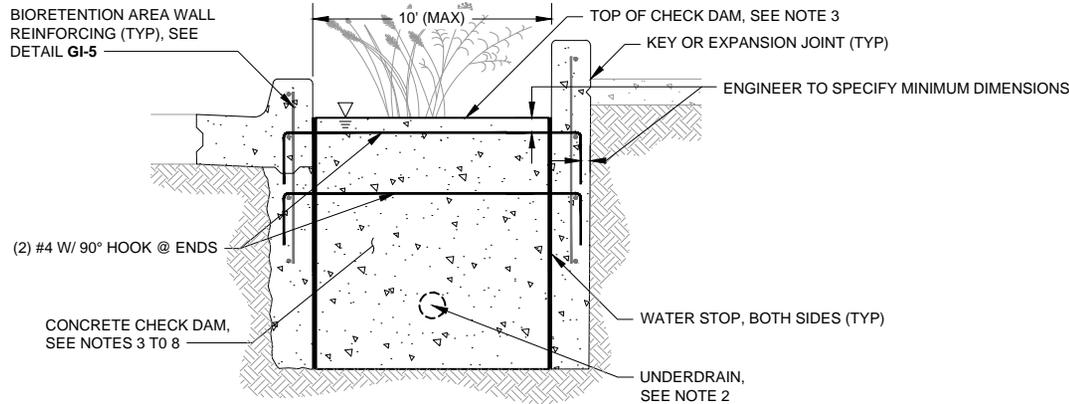
BIORETENTION COMPONENTS: GUTTER CURB CUT INLET DETAIL



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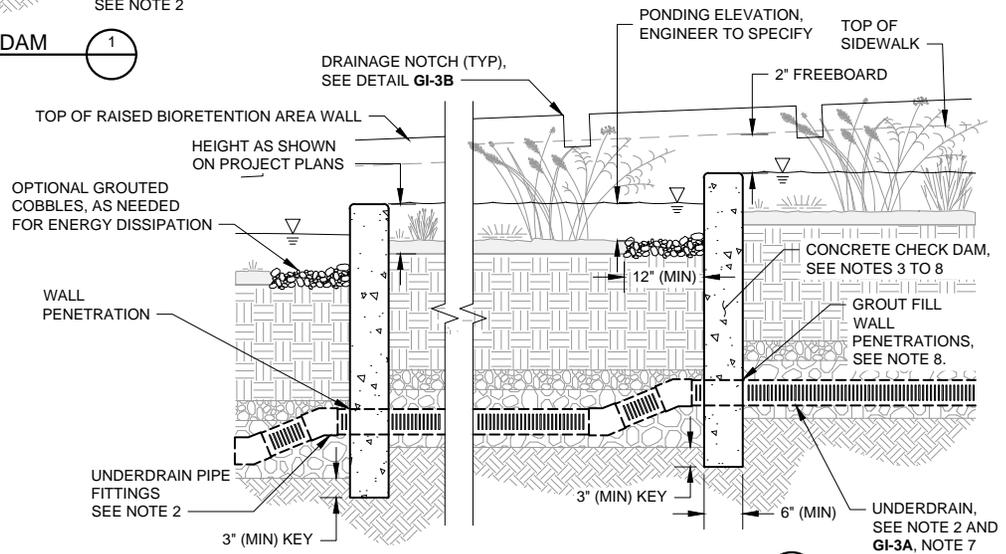
GI-6A



SECTION - CONCRETE CHECK DAM (1)

NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. UNDERDRAIN TO PASS THROUGH CHECK DAM IN NON-PERFORATED PIPE. PIPE FITTINGS SHALL BE USED TO ACCOMMODATE CHANGES IN GRADE, AS NEEDED.
3. HEIGHT AND SPACING OF CHECK DAMS SHALL BE ESTABLISHED BASED ON THE PONDING DEPTH REQUIRED TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS AND THE MAXIMUM DESIRED DROP FROM THE SURROUNDING GRADE TO THE FACILITY BOTTOM.
4. ALL MATERIAL AND WORKMANSHIP FOR CHECK DAM ASSEMBLY SHALL CONFORM TO LOCAL JURISDICTION STANDARD SPECIFICATIONS.
5. CONCRETE CHECK DAM SHALL BE CONTINUOUS (NO JOINTS) AND REINFORCED WITH #4 BAR, PLACED AT 18" ON CENTER, EACH WAY.
6. CONCRETE CHECK DAM SHALL BE DESIGNED BY THE ENGINEER AND MEET STRUCTURAL REQUIREMENTS FOR LATERAL BRACING WHEN USED AS LATERAL BRACING.
7. TOP OF CHECK DAM TO BE LEVEL WITH CREST ELEVATION MATCHING PONDING ELEVATION UNLESS NOTCH SIZED TO CONVEY DESIGN FLOWS PROVIDED.
8. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.



PROFILE - CONCRETE CHECK DAM (2)

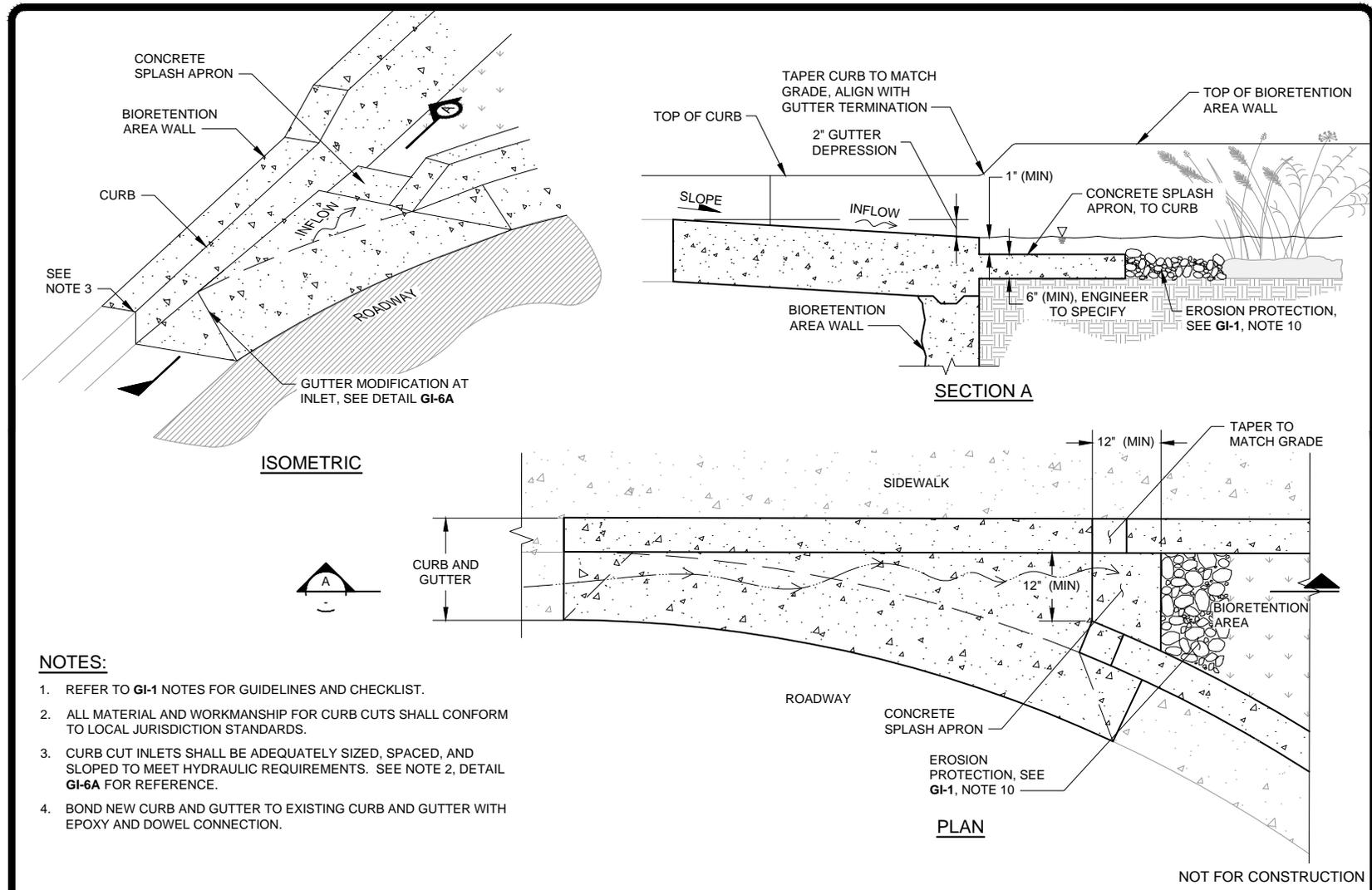
NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: CHECK DAM DETAIL

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DATE: MAY 11, 2018 REVISED: JUNE 11, 2019
DRAWN BY: K. K. REVISED BY: E. F.
CHECKED BY: A. R.

GI-7



NOTES:

1. REFER TO GI-1 NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. CURB CUT INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. SEE NOTE 2, DETAIL GI-6A FOR REFERENCE.
4. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.

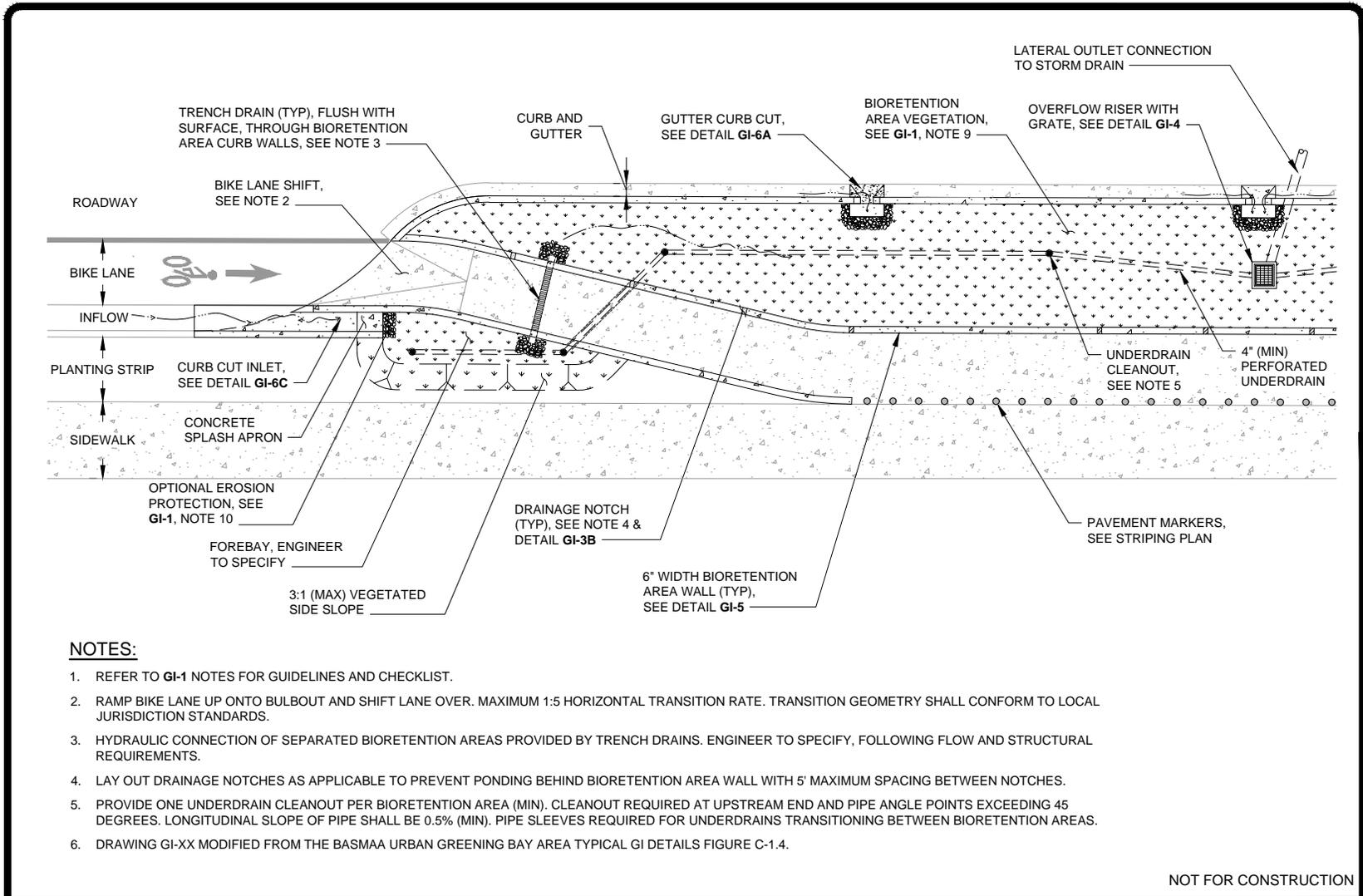
BIORETENTION COMPONENTS: CURB CUT AT BULBOUT INLET DETAIL



GREEN INFRASTRUCTURE
 EXAMPLE DETAILS
 ALAMEDA COUNTYWIDE CLEAN
 WATER PROGRAM

SCALE: NOT TO SCALE
 DATE: MAY 11, 2018 REVISED: JUNE 11, 2019
 DRAWN BY: K. K. REVISED BY: E. F.
 CHECKED BY: A. R.

GI-6C



BIORETENTION AREA: WITH BIKE LANE PLAN VIEW



**GREEN INFRASTRUCTURE
EXAMPLE DETAILS**
ALAMEDA COUNTYWIDE CLEAN
WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-8

Appendix E. Green Stormwater Infrastructure in City of Oakland Planning Documents

Document or Program Type	City has this plan or program?		Document Name	Department Responsible for Document	Department Contact	Do Policies, Guidance, or Requirements in Document Create...		Describe Green Stormwater Infrastructure Opportunities and/or Conflicts	If the document or program does not create GSI opportunities, describe when an update will occur.
	Yes	TBD or Future				Opportunities to Install GI? (Y/N)	Conflicts with GI? (Y/N)		
General Plan	X	<input type="checkbox"/>	1. Housing Element 2015-2023 2. Open Space Conservation and Recreation Element-1996 3. Oakland Walks! Pedestrian Plan Element Update – DOT 2017 4. Let's Bike Oakland - DOT 2019 5. Estuary Policy Plan 2000	1. Planning and Building 2. Department of Transportation (DOT)	1. William Gilchrist (Director of Planning and Building) 2. Ryan Russo (Director of DOT)	Yes	No	1. Mentions urban runoff treatment and MRP Provision C.3. New Development & Redevelopment 2. Encourages/requires low impact development (LID) measures, limits on impervious surfaces, and urban runoff control and treatment 3. Promotes street trees and curb extensions. Promotes water runoff treatments benefits of street trees. 4. Associated CEQA document requires post-construction bicycle path design measures such as minimizing impervious surfaces; utilizing permeable paving; preserving quality open space; and establishing vegetated buffer areas. 5. Calls for system of open spaces and shoreline access that provides environmental enhancement	1. Creates GSI opportunities now 2. Creates GSI opportunities now 3. Creates GSI opportunities now 4. Plan updated in 2019. Future updates will point to GSI design guidelines for bike lanes/paths. 5. No scheduled update. Plan does not create GSI conflicts. If updated in the future, Plan will more explicitly create GSI opportunities.
Climate Plan	X	<input type="checkbox"/>	Energy and Climate Action Plan (ECAP 2020) 2018 Update	Public Works Environmental Services Division	Daniel Hamilton	Yes	No	GSI Actions: 1) Develop a comprehensive infrastructure plan to support planned infill development capacity and to enable green infrastructure improvement; 2) Seek resources for GSI to minimize sea level rise and flooding impacts.	Creates GSI opportunities now. The City is developing the Equitable Climate Action Plan (2030 ECAP) which will establish a roadmap to reduce climate emissions, adapt to a changing climate, and to root the City's sustainability and resilience work in equity and a commitment to deep community engagement. The City is conducting an extensive public engagement process throughout 2019, and plans to bring the draft 2030 ECAP to City Council for adoption by April 2020.
Active Transportation Plan and Complete Street Plan	X	<input type="checkbox"/>	City of Oakland Department of Transportation Strategic Plan - 2016	Transportation	Ryan Russo Wlad Wlassowsky Mohamed Alaoui	Yes	No	Plan Goal #12: Incorporate green stormwater infrastructure into capital projects, support GSI Planning, and obtain funding to implement green infrastructure.	Creates GSI opportunities now
Storm Drain Master Plan(s)	X	<input type="checkbox"/>	Storm Drainage Master Plan 2006	Public Works Watershed Division	Kristin Hathaway	Yes	No	Assist with controlling stormwater pollutants to help meet TMDL waste load allocations. Promotes Low Impact Development (LID) measures.	The City will update Oakland's SDMP when funding is available.
Urban Forestry Plan(s)	<input type="checkbox"/>	X	Urban Forestry Master Plan	Public Works Parks & Tree Services	David Moore	Future	No	The City received a grant in 2018 to develop the plan which will create opportunities to install GI.	This planning effort is underway 8/12/19. City staff will coordinate urban forestry goals with GSI opportunities.
Flood Control or Flood Management Plan(s)	X	<input type="checkbox"/>	City of Oakland 2016-2021 Local Hazard Mitigation Plan	Planning	William Gilchrist	Yes	No	Green infrastructure planning to detain stormwater runoff during storm events to achieve a reduction in downstream flows to reduce flooding, erosion, landslides and sedimentation is included as a high priority strategy in the document.	The document includes green infrastructure as a high priority strategy. When it is updated in the future this strategy will be maintained.
Vegetation Management	X	<input type="checkbox"/>	Draft Vegetation Management Plan May 2018	Oakland Fire Department	Angela Robinson-Piñon	Not directly, stormwater, management is addressed	No	Appropriate stormwater and creek management and protection language is incorporated into this plan.	Appropriate stormwater and creek management and protection language incorporated.
Specific Plan	X	<input type="checkbox"/>	Downtown Oakland Preliminary Draft Plan	Planning Bureau	Alicia Parker - plandowntownoakland@oaklandca.gov	Yes	No	Calls for planning, standards and guidelines to promote GSI in all public realm and CIP projects downtown. Promotes investment in GSI for improved water quality, air quality, and mental health and reduced urban heat island effect and noise.	Creates GSI opportunities now

Appendix E. Green Stormwater Infrastructure in City of Oakland Planning Documents

Document or Program Type	City has this plan or program?		Document Name	Department Responsible for Document	Department Contact	Do Policies, Guidance, or Requirements in Document Create...		Describe Green Stormwater Infrastructure Opportunities and/or Conflicts	If the document or program does not create GSI opportunities, describe when an update will occur.
	Yes	TBD or Future				Opportunities to Install GI? (Y/N)	Conflicts with GI? (Y/N)		
Community Plan	X	<input type="checkbox"/>	East Oakland Neighborhoods Initiative (EONI) Community Plan	Planning Bureau	William Gilchrist	Yes	No	HOPE Collaborative, East Oakland Building Healthy Communities, Oakland Climate Action Community (OCAC), and East Oakland Collective led network of 12 community organizations to develop the EONI Community Plan, in partnership with the City. The EONI equity- and community-based plan for deep East Oakland covers transportation, housing, resilience, economic development, parks, etc. Street trees and sidewalk planter strips are promoted and other projects outlined in the EONI include GSI opportunities. Most of the six East Oakland communities involved in the EONI include urban greening or green infrastructure as a community priority. The plan includes neighborhood-specific projects that include greening elements.	7/3/19 public draft EONI Community Plan creates GSI opportunities. The Plan will be finalized after comment period.
Specific Plan	X	<input type="checkbox"/>	Broadway Valdez District Specific Plan	Planning Bureau	William Gilchrist	Yes	No	Includes policy to support implementation of GSI along 29th and 30th Streets to improve quality of runoff flowing to Lake Merritt. Implements a "green, transit-first" strategy. Plan calls for street trees, greenways and streetscape improvements that will include GSI whenever feasible. Includes public plaza with green infrastructure.	Creates GSI opportunities now
Specific Plan	X	<input type="checkbox"/>	Lake Merritt Station Area Plan	Planning Bureau	Christina Ferracane Alicia Parker	Yes	No	Calls for green design standards for private development and public infrastructure, including street design and improved greenways. Includes recommendations for rain gardens (bioretention areas) in specific locations in the plan area.	Creates GSI opportunities now
Specific Plan	X	<input type="checkbox"/>	West Oakland Specific Plan	Planning Bureau	William Gilchrist	Yes	No	This plan indicated that water quality will be improved over time through implementation of the City's NPDES Municipal Regional Stormwater permit, Provision C.3, which requires stormwater treatment as part of certain new and redevelopment projects. Also calls for green building and incorporation of new urban green spaces, green streets, and street trees.	Creates GSI opportunities now
Specific Plan	X	<input type="checkbox"/>	Coliseum Specific Plan	Planning Bureau	William Gilchrist	Yes	No	Calls for green building and promotes sustainable design and development by providing incentives to developers that offer green, environmentally sensitive projects. Includes goal to ensure that the Plan Area's storm drainage system complies with City standards to reduce peak runoff by 25 percent as identified in the City of Oakland Storm Drainage Design Standards, and incorporates Low Impact Development (LID) elements to meet state and regional goals of post construction stormwater management.	Creates GSI opportunities now
Specific Plan	X	<input type="checkbox"/>	Central Estuary Area Plan	Planning Bureau	William Gilchrist	Yes	No	New development will provide opportunities for improving the quality of stormwater run-off from the plan area discharging into the Oakland Estuary, e.g. installing trash screens, green roofs, creating wetlands, ponds, biofiltration planters, raingardens, swales, etc.	
Community-Based Transportation Planning	<input type="checkbox"/>	X	Parent document is the FY 19-21 Capital Improvement Plan. Active priority planning efforts from the CIP Plan are: 1. Community Based Transportation Plan for East Oakland 2. Grand Avenue Mobility Plan Improvement 3. Walk this Way - Broadway/Webster I-880 Underpass	Transportation	1. Brytanee Brown 2. Hank Phan 3. Nicole Ferrara	Yes	No	1. & 2. Plan is in early development stage and will appropriately incorporate GSI. A technical advisory committee will be created and will include someone with GSI expertise. 3. This may only be a lighting project. If a plan is developed, GSI will be appropriately incorporated if feasible.	Planning efforts 1 & 2 are underway as of 8/12/19.



To:	Kristin Hathaway, Terri Fashing City of Oakland Watershed and Stormwater Management Division	From:	Matthew Freiberg Walnut Creek, CA
File:	Oakland 100RC Stormwater Program Financing Memo	Date:	September 11, 2019

City of Oakland: 100RC Stormwater Program Financing Memo

1. INTRODUCTION

In 2015 Stantec Consulting LLC (Stantec) formed a platform partnership with the 100 Resilient Cities Initiative (100RC), sponsored by the Rockefeller Foundation. As part of this partnership, Stantec is assisting the City of Oakland (City) with developing resilience around its Watershed & Stormwater Program. A portion of this work involves the identification of funding options for the City's Watershed & Stormwater Program.

Problem Statement – The City of Oakland owns and operates a Municipal Separate Storm Sewer System (MS4) that is regulated by the San Francisco Bay Regional Water Quality Control under the 2015 Municipal Regional Stormwater Permit (MRP). MRP compliance is currently achieved by the Oakland Public Works (OPW) Watershed and Stormwater Management Division's (Watershed Division) implementation and coordination with other City Divisions and Departments as well as the Alameda County Clean Water Program. The City's storm drain system is maintained by the OPW Storm Drainage Division. The Watershed Division provides engineering support, technical guidance, and project management on major storm drain system repair/replacement, creek restoration projects, green stormwater infrastructure projects, and large trash capture device installation projects.

Oakland's Stormwater compliance, like many such programs in California, has become increasingly expensive as NPDES permits impose more restrictive pollutant discharge limits and require cities to implement more costly programs, such as prescriptive trash management and green stormwater infrastructure planning. These expanding requirements make it necessary for cities to invest greater resources in storm drainage infrastructure and to provide higher service levels. The City's ability to satisfy these new regulatory requirements is undermined by extremely limited dedicated funding to pay for permit compliance or for the maintenance, repair, and replacement of the storm drain system. Storm drain system repair and replacement has been limited to only responding to infrastructure that has failed. Without adequate dedicated funding, it is challenging for the City to meet MRP requirements and impossible to meet the deferred maintenance needs and resiliency goals of the City's stormwater conveyance infrastructure.

As such, the City is faced with the challenge of either continuing to defer maintenance and risk noncompliance with new regulations, creating a new source of funding, or "doing more with less." This memorandum outlines the benefits of establishing a sustainable stormwater funding source, available options for securing additional funding in the future, and the data requirements the City would need to collect to implement such a Stormwater Program fee.

2. STORMWATER ENTERPRISE FUND BENEFITS

Many communities have determined that their historical approach to stormwater management will not provide them with adequate resources to meet current regulatory requirement and urban resilience objectives. To address these needs, some of those communities have adopted stormwater fees, which have generally proven to be an effective approach to enhancing organizational effectiveness and strategic stormwater management.



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The potential creation of a stormwater fee for the City of Oakland provides an opportunity to address the described challenges in current operations, as well as providing for numerous additional benefits to City residents and rate payers, including the following:

- **Dedicated and Stable Revenue Stream** - The certainty in the annual funding would allow the City to make certain programmatic changes in the way it manages the system, ultimately allowing each dollar of investment in the system to go further.
 - **Proactive System Maintenance** - A dedicated funding stream allows for proactive management of the stormwater system as compared to reactive problem solving. The ability to proactively maintain an asset is usually less costly than making reactive repairs. This proactive approach results in lower system costs and reduced costs to property owners. It also results in a better performing system which minimizes stormwater issues within the community.
 - **Long-Term Perspective** - Stormwater managers are empowered to adopt a longer view in planning for capital investments, undertaking maintenance enhancement, and developing staff since they are not operating in a year-to-year funding environment with no certainty of follow-on funding in successive years. This long-term perspective reduces the costs of management of the system over time as a result of coordinated planning and consistency of staffing.
- **Increased Parity** - The stormwater bill for a property is based on the estimated stormwater generated on the parcel as result of the specific characteristics of the property (i.e. pavement vs. grass). This approach much more closely aligns the properties use of the stormwater system and the resulting stormwater bill as compared to amount of water used and sewerage generated on the property.
- **Resiliency** – If the City’s storm drain system maintenance, replacement and improvement, as well as permit compliance, were funded by a stormwater fee, the City could deliver a resilient system to Oakland’s residents. The Watershed Division would maintain emergency reserve funds that could be used to fund unexpected system repairs and replacement. A resilient funding source is becoming an increasingly important aspect of stormwater operations due to aging infrastructure and the increased frequency of extreme weather events.
- **Onsite Stormwater Management Credits** - Communities with stormwater fees will typically offer mitigation credits (reductions in the fee) for properties that take steps to manage stormwater on their property. This provides value to the property owner as they have the ability to reduce their stormwater bill and it benefits the entire community by reducing stormwater contributions to the system.
- **Transparency** - Property owners within communities with stormwater fees benefit from the fact that every single dollar of their stormwater bill is used specifically and exclusively for the stormwater system. This provides transparency and accountability within the management of the stormwater system.

3. STORMWATER FUNDING OPTIONS

Funding stormwater programs is a challenge throughout the US, but in California the challenge is further complicated by Prop. 218, a constitutional amendment adopted in 1996 that has procedural and substantive requirements for property-related fees, such as stormwater management fees. The procedural element requires that new or increased property-related fees for services (other than water, sanitary sewer, and trash services) be approved by a majority of property owners (or 2/3 of registered participating voters). Prior to the election, a majority protest hearing, after 45 days’ mailed notice to affected property owners, is also required.

Obtaining voter approval for fee increases poses a challenge to stormwater utilities because, unlike many other utility services, it cannot be metered, and the service often goes unseen to the majority of the public.



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Since customers often do not understand the need for this service and may even view it as a “rain tax,” it is often a challenge to get voter support for new or increased stormwater fees.

There is no “silver bullet” to obtaining stormwater funding. However, the following sections provide a list of rate, grant, and debt financing mechanisms that if used alone or in combination may fund Stormwater related activities for the City of Oakland.

3.1. FUNDING SOURCES

The following sections provide a list of funding mechanisms for the City to consider. While not all of these options are necessarily recommended, they have been included to demonstrate the breadth of the options that were considered, as well as to give context to the final recommendation.

3.1.1. PROPOSITION 218 PROPERTY RELATED FEE

A new stormwater fee, adopted within the requirements of Prop. 218, could be developed to meet the revenue requirements to fund the operational and capital expenses needed to manage the City’s storm drain system and NPDES compliance. The new rate structure would be supported by an Engineers Report, which would demonstrate that the charge complies with Prop. 218 proportionality requirements, such as assigning the stormwater charges based on the impervious surface of each parcel.

There are multiple approaches to designing stormwater fees that are consistent with Prop. 218 requirements. One example is to allocate costs based on the type and concentration of pollutants that is typically found in the runoff from certain types of land use. This approach would require a complex cost-of service analysis that would consider specific costs, including the costs associated with remediating each of the NPDES’ pollutants of concern. Less complex approaches could include allocating costs based on impervious surface, property size, or simply by parcel.

The property-related fee approval process would be subject to Proposition 218 requirements:

- Council votes to issue notification of the proposed fee schedule, followed by a 45-day comment period;
- Public must submit public comments before the conclusion of the public hearing which occurs after the 45-day comment period
- City council then considers the public comments and votes on whether to advance the fees to one of two voting procedures:
 - The fees may be voted on by the general public, requiring a 2/3 majority approval for adoption.
 - The fees may be voted on by property owners subject to the fee, requiring a simple majority approval by affected property owners for adoption.

Pro & Cons – A new stormwater fee, vetted through the Prop. 218 process, would establish a charge that has a clear nexus with the cost of providing stormwater service to each respective property owner. If adopted, the new fee could include automatic annual rate adjustments based on cost indices for up to 5 years. The drawback to this option, and any option where a new fee is created, under the historic interpretation of Prop. 218, is the requirement for voter approval, the cost of designing the new rates, the cost carrying out the election process, and the risk of the expenses if voters do not approve the proposed rates.

Examples – City of Berkeley 2018 Clean Stormwater Fee Initiative, and Santa Monica 2006 Clean Beaches and Ocean Parcel Tax (Measure V). California’s cities and counties have successfully used the Prop. 218 process to generate new revenue to fund their Stormwater Programs. These two examples levied property



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related water quality fees to finance water quality improvement projects and programs. In Southern California the core messaging has linked stormwater programs to shoreline protection. The City of Berkeley's new fee messaging centered on the major deficits in capital improvement needs, including \$208 million identified in their Watershed Management Plan. The City of Oakland could use a similar approach to promote the multiple benefits of their Stormwater Program¹.

3.1.2. DEVELOP A STORMWATER FUND FEE USING SB231

In September 2017, Governor Brown signed SB 231, which amended the definition of "sewer" under Article XIII C and XIII D of the California Constitution to include both sanitary and storm sewers. This legislation was intended to allow cities to establish stormwater fees as a property-related fee with a simple majority vote under the same requirements applied to water, sanitation, and solid waste utilities. These fees can be structured to meet all, or a portion of the City's revenue requirements associated with providing stormwater infrastructure and services. An adopted fee schedule may include a set schedule of fee increases over a defined period (typically 3-5 years), or a formula to calculate automatic fee adjustments for inflation, provided the adjustment method is specific and clearly justified. Establishing a property-related fee requires a cost-of-service analysis to demonstrate that the fee charged does not exceed the cost of serving rate payers. Similarly, the fee charged to a parcel or person may not exceed the proportional cost of service attributable to the parcel.

The property-related fee approval process would be subject to Proposition 218 requirements:

- Council votes to issue notification of the proposed fee schedule, followed by a 45-day comment period;
- Public must submit written protest votes before the conclusion of the public hearing which occurs after the 45-day comment period;
 - The proposed fee schedule will be rejected if the majority of voters issue written protest votes;
- Assuming no majority protest, City Council then votes to adopt or reject the proposed fee schedule.

Pro & Cons – Similar to the stormwater fee described in Section 2.1.1, any stormwater fees assessed in the class of utilities exempted from the ballot initiative, would establish a charge that has a clear nexus with the cost of providing stormwater service to each respective property owner. If adopted, the new fee could be updated annually based on the results of a Cost of Service Rate Study. However, at the time of the development of this memo, there are not any communities that have sought to create new stormwater rates using this approach. The Howard Jarvis Tax Association has indicated that they intend to challenge any community that attempts to institute a stormwater fee using this approach. California State Senator Hertzberg, who authored SB 231, has encouraged communities who seek to use this new funding mechanism to only do so when they can demonstrate a nexus between stormwater activities supporting the improvement water supply and wastewater activities. It is assumed that these edge cases will have a stronger case when they are inevitably challenged in a law suit.

3.1.3. SPECIAL ASSESSMENT

A special assessment is a charge to property owners that receive a "special benefit" from public programs over and above that received by the general public. Special assessments apportion the costs associated with public improvements to properties based on each property's proportional benefit received. A special assessment may be a perpetual funding source that can be calculated to recover the full costs associated with the Watershed Program. Assessments may also include a formula to calculate automatic fee adjustments for inflation, provided the adjustment method is clearly defined and justified. For purposes of

¹ Stormwater Funding Options, Providing Sustainable Water Quality Funding in Los Angeles County. May 21, 2014. Ken Farthing, City of Signal Hill and Richard Watson, Richard Watson & Associates, Inc.



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stormwater funding, development of a special assessment could potentially require the creation of separate assessments for individual watersheds based on the distinct costs of the stormwater management program within each watershed.

A comprehensive engineer's report, completed by a professional engineer licensed in California, is required as the legal basis for the assessment. Establishing the special assessment as a perpetual revenue source would likely require regular updates to the engineer's report to maintain adherence to Proposition 218's special assessment requirements over time. The engineer's report must include the following:

- Estimate of costs to be recovered by the special assessment and the period they are to be collected;
- Identification of parcels receiving a special benefit from the capital improvements or services;
 - Increases to property values do not constitute a special benefit;
- Calculation and method of apportionment of special benefit to property owners within the district; and
 - The "cost to serve" is not itself a sufficient basis for apportioning benefits.

Special assessments require a vote of affected property owners by mail-in ballot. The ballots must be preceded by a mailed notice 45 days before ballots are due. Approval of the assessment is achieved by a majority vote of mailed ballots. Votes are weighted by financial obligation of the property owners.

Pro & Cons – The advantage of a Benefit Assessment is the fact that property owners would pay based on the benefit received. This, however, may not be significantly different from the rate structure of a property-related fee, which charges based on the cost of providing service. It is not clear which is more likely to obtain voter approval: a Benefit Assessment or a Prop. 218 vote. With a Benefit Assessment, the commercial, industrial and institutional (CII) customers would generally pay more and therefore receive a more heavily weighted vote. CII customers would represent a considerable hurdle if they decided to oppose the fee.

3.1.4.SPECIAL TAX

The City could opt to create a special tax that would specifically be used to finance the Watershed and the Storm Drainage Divisions. Special taxes require a 2/3 majority approval by registered voters. Because special taxes are voted on by the public, they do not have the same cost-of-service requirements of Special Assessments or Property Related Fees. Due to Proposition 13, special taxes cannot be imposed based on property value; in this case, it would be a "per parcel" tax, apportioned according to property square footage, estimated impervious surface, or as a flat charge.

Pro & Cons – While implementing a special tax to fund a Stormwater Program is viable, the conditions of approval are not as favorable as Prop. 218 requirements. While the voting dynamics in the City may be unique, it is likely that it would be easier to obtain a simple majority (i.e., 50%) approval from property-owners than 2/3 majority approval of all registered voters. In addition, the proceeds of a special tax count toward a local government's Gann appropriations limit².

Example –

In 2018, Los Angeles County voters approved Measure W, to authorize a special tax of 2.5 cent per 100 square feet of impervious area fee to fund the Safe Clean Water Program. The goal of the program is to improve water supply by capturing stormwater, improve local water quality, and to invest in green

² The Gann Limit, which establishes a maximum amount for tax-funded government services, was approved by California Voters in November 1979.



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infrastructure around the County. The tax was passed with an approval rate of 69.45%. This new tax went into effect July 2019. In advance of the vote, the City created a high-end website to communicate the need for the fee and how the money will be distributed to communities within the county, garnered support from major environmental groups, and successfully rolled out a major media campaign to promote the tax initiative.

3.1.5. GENERAL TAX WITH SPECIAL ADVISORY

The City could opt to seek approval for a general tax (requiring simple majority approval from registered voters) along with an “advisory measure” (a so called “Measure A-Measure B Strategy”). This involves accompanying the tax measure with an additional measure that provides guidance on how the public feels the funds should be spent. The advisory measure would be non-binding since a general tax, by definition, cannot be legally earmarked for a particular purpose. The idea is that adoption of the advisory measure would hopefully create sufficient political pressure to guarantee that the tax increase will always be used for stormwater management purposes despite being deposited into the general fund.

Pro & Cons – It is not clear whether the terms for voter approval of a general tax are more favorable than enacting a new stormwater fee (a Prop. 218 vote). Distinguishing between the two would require a clear understanding of the opinion of all registered voters versus the opinion of all property owners, which requires a comprehensive survey. In the event that no such survey is conducted, enacting a new standalone Prop. 218 compliant user fee is preferable since the revenue would be guaranteed to benefit the Stormwater Program. Like the Special Tax above, the proceeds of a general tax would count toward the City’s Gann appropriations limit.

Example – Orange County, California has instituted a half-cent sales tax to fund the Orange County Transportation Authority’s transportation improvements funding measure. The funds from this sales tax are set aside to fund water quality and environmental clean-up projects with a transportation nexus. This funding allows for both capital and operations improvements.

3.1.6. TRANSFERS FROM THE GENERAL FUND

The City has the option to fund any stormwater program with money from the City’s General Fund. The General Fund’s source of revenue includes property taxes, local income tax, general sales tax, franchise fees and other miscellaneous sources.

Pro & Cons – It is assumed that relying on additional General Fund monies is not feasible. The City’s priorities may evolve over time, resulting in future transfers away from the Stormwater Program. In addition, General Fund allocations are often subject to an annual budgetary process, and are therefore not a secure source of revenue.

3.1.7. TRANSFERS FROM OTHER CITY UTILITIES AND FUNDS

Fund transfers from other utilities are lawful to the extent that it can be shown that the operations of a utility impose costs on, or receive benefits from, related Stormwater Program services. The transfers cannot exceed those designated costs/benefits. In theory, such utilities may include potable water, solid waste (trash), sewer, and others. For example, it could be argued that the solid waste utility bears responsibility, at least in part, for the litter that needs to be cleared from storm drains. This can be justified because activities such as street sweeping provide a dual benefit for streets and storm drain maintenance. Similarly, the sewer system benefits from repairs to the storm drains since stormwater infiltration can increase the cost of operating and maintaining both the collection system and the sewer treatment plant.



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Pro & Cons – While passing-through the cost of storm drain maintenance to the sewer utility may be feasible, transfers between programs inherently may limit the City’s ability to perform other essential functions.

Example – Currently, the City of Berkeley uses a gas tax to partially fund road improvements. A small percentage of this tax (approximately \$300,000 annually) is transferred to their Stormwater Program.

3.1.8. STORMWATER IMPACT FEE

Stormwater Impact Fees are assessments on new development and redevelopment projects. They are one-time fees whereby developers “buy into” the existing stormwater infrastructure or pay for the costs of any new infrastructure that is required to accommodate the addition of the development project. California Government Code Sections 66000 through 66009 requires that impact fee revenue only fund capacity-related capital projects. As such, the revenue from the Stormwater Impact Fees could not be used to fund O&M or repair and rehabilitation (R&R) activities. In California, impact fees need to be related to the impact created by the development project, otherwise the fee may fall under a different category, such as a special tax (and thereby require a two-thirds majority voter approval).

Cities and municipalities that assess stormwater impact fees may provide fee reductions or waivers for developers that incorporate stormwater capture and treatment systems onsite³.

Pros and Cons – Creating a Stormwater Impact Fee would provide some funding, albeit not reliable, for growth-related CIP projects and allow a larger portion of other stormwater revenue sources to be used for O&M and R&R of existing infrastructure. While impact fees are subject to the provisions and limitation of CA Government Code Sections 66000 et. seq., they are not taxes or special assessments and therefore do not require voter approval to be enacted⁴. That being said, the revenues from these fees are unpredictable since the rate of development depends on the economy or the availability of land for growth or redevelopment. At the current rate of development, an impact fee could make a material contribution to funding growth-related capital projects.

Example – The Fresno Metropolitan Flood Control District has installed stormwater retention basins throughout their service area to reduce flooding and mitigate water quality impacts of urban runoff. To expand flood control infrastructure as development continues within their service area, the District has assessed a onetime fee to developers to cover the construction and land acquisition costs for new basins⁵.

3.1.9. IN-LIEU FEE

In-Lieu Fees⁶ are an alternative compliance option for Provision C.3 stormwater capture/treatment requirements for regulated projects, whereby developers can opt out of installing the required on-site stormwater retention BMPs by paying an “in-lieu” fee that is used to construct an equivalent stormwater project offsite⁷.

³ Stormwater Funding Options, Providing Sustainable Water Quality Funding in Los Angeles County. May 21, 2014. Ken Farsing, City of Signal Hill and Richard Watson, Richard Watson & Associates, Inc.

⁴ San Francisco Estuary Partnership. August 2015. Green Infrastructure Funding Mechanisms.

⁵ Stormwater Capture in California: Innovative Policies and Funding Opportunities. June 2018. Pacific Institute.

⁶ In-Lieu Fees are described in the latest draft of the Municipal Regional Stormwater Permit under Provision C.3.e, Alternative or In-Lieu Compliance with Provision C.3.b.

⁷ California Regional Water Quality Control Board, San Francisco Bay Region, Municipal Regional Stormwater NPDES Permit.



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Pros and Cons – In-lieu fees present another opportunity to fund growth-related capital projects, thereby allowing a larger portion of other stormwater revenue to be used for expenses such as O&M and R&R. In-lieu fees are not classified as a tax or special assessment, and therefore do not require voter approval to be enacted. Additionally, in-lieu fees confer developers with the flexibility to build on parcels that are not well suited for onsite stormwater treatment as required by C.3, thus creating more opportunities for development and redevelopment.

Creating an in-lieu fee system will require a study to determine the appropriate fee structure and mitigation criteria. There is also an on-going effort that will be needed to administer and oversee the program. Additionally, the MRP has included a 2019 deadline for establishing such Alternative Compliance systems⁸ although this may be modified with the new MRP permit anticipated for release in late 2020 or early 2021. As with impact fees, the revenues from in-lieu fees are highly dependent on the rate of development, which is a function of the economy and the availability of land for development.

3.1.10. GRANTS

There are some grants available to stormwater utilities; however, they are highly competitive. In addition, the application process can be lengthy and there is no guarantee that funding will be granted upon the submission of an application package. Grants that are currently available tend to favor large-scale, multi-benefit projects. Two grant program examples are provided below.

- **California Proposition 1 State Water Resources Control Board Stormwater Grant Program** - In 2014 voters passed California Proposition 1⁹, enacting the Water Quality, Supply, and Infrastructure Improvement Act of 2014, authorizing over \$7 billion of grants, among which are \$1.495 billion for multi-benefit ecosystem and watershed protection and restoration projects and \$395 million for statewide flood management projects and activities. \$200 million were set aside for matching grants to fund multiple benefit stormwater management projects. This program offers both Planning Grants (to establish Stormwater Resource Plans), and Implementation Grants. Round 2 applications are tentatively due in later 2019.
- **Clean Water Act Section 319**¹⁰ - The Clean Water Act has a section that provides funds to “designated state and tribal agencies” to implement their approved “nonpoint source management programs”. While the City is ineligible to apply directly for these funds. Increased coordination with the Bay Area Integrated Regional Water Management Plan (IRWMP) may yield opportunities to benefit from regional grant-funded projects.

Pros and Cons – Grants make sense as a piece of any city’s stormwater funding portfolio, but do not represent a sustainable source of funding for long term planning. Grants represent an excellent opportunity to advance the City’s Stormwater Program with a large infusion of funds for Capital Improvement projects. However, grants can often come with limitations for how funds can be spent, involve a substantial amount of staff time to win, may involve more staff time for continual reporting to the funder, require significant matching funding, and due to the competitive nature of grant procurement, are not a reliable source of funding.

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/TO_Order_Only.pdf

⁸ San Francisco Estuary Partnership. August 2015. Green Infrastructure Funding Mechanisms.

⁹ http://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/

¹⁰ <http://water.epa.gov/polwaste/nps/cwact.cfm#apply>



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3.2. DEBT

The following discusses debt as a mechanism to secure financing for large capital investments. While this strategy can be effective in avoiding the need for a one-time spike in revenue (by spreading those capital costs over a longer duration), it is important to point out that debt is a tool for managing money but not a *source* of money. The City will only be able to secure debt if a reliable (and adequate) source of long-term revenue is established.

3.2.1. GENERAL OBLIGATION DEBT FINANCING

General Obligation bonds are repaid and back by a City's full financial resources, which are different from revenue bonds, which are repaid using the revenue generated by a specific project that the specific bond is issued to fund. With a current bond rating of Aa3, the City is well positioned to receive favorable rates on any bonds issued to fund the Watershed Program. New bonds however need to be approved by voters.

It is worth noting that any increase in annual revenues will result in the increased ability for the city to secure future debt financing.

3.2.2. CLEAN WATER STATE REVOLVING FUND¹¹

A portion of the Clean Water State Revolving Fund (SRF) is allocated for financing stormwater projects. The interest rate is 50% of the most recent General Obligation Bond Rate at the time of funding approval and the financing term is up to 30 years or the useful life of the project. SRF funds are commonly used to finance large water and wastewater infrastructure projects and can be pursued if a large stormwater project is identified. The application process is complicated and subject to various restrictions, so projects pursuing SRF funding should allocate additional time and up-front resources to secure the funding. The application process will require the applicant to demonstrate the ability to repay the loan, therefore it needs to be coupled with a rate financing mechanism to be successful.

4. FUNDING RECOMMENDATIONS AND DATA REQUIREMENTS

4.1.1. FUNDING MECHANISM¹²

There is no silver bullet to stormwater financing, often stormwater programs remain overlooked and underfunded as communities struggle to allocate limited resources. As an "end game" strategy, we recommend that the City work towards creating dedicated revenue for the Watershed Program through the Prop. 218 ballot initiative process, using the historic interpretation of stormwater. This would be the most reliable source of long-term funding. We do not recommend using the Prop. 218 process with the SB 231 interpretation of a storm sewer until case law has been established to validate the approach. This process will require the development of a financial plan, a cost of service rate study, a period of public outreach, and then the 218 voting process, all of which will take time (1 – 2 years).

4.1.2. FINANCIAL PLANNING AND THE PROP. 218 PROCESS

As a next step, we recommend the City develop a Stormwater Financial Plan and Cost of Service Rate Study that comprehensively evaluates the City's revenue building and cost sharing options. Such a plan would evaluate the City's operating, possible debt service, and capital needs, as identified by the City's CIP and the updated Stormwater Management and Green Infrastructure Plans identified in the City's Resilience Strategy.

¹¹ http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/

¹² http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/



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The final plan will identify the revenue requirements to meet the programmatic demand, all regulatory requirements, as well as identify opportunities for multi-benefit projects that reduce the marginal costs of project implementation for the Watershed Program and other Divisions of the Public Works Department.

Upon the completion of the Financial Plan, the City should conduct a Cost of Service Rate study to determine the stormwater rates that will be charged to the City's customers, this study will determine the cost basis of the rates charged to each customer required by Prop. 218.

The final step is the Prop. 218 process. Obtaining Prop. 218 approval from voters will require a strong public outreach campaign as well as internal support from City Staff. We recommend building a foundation of public support by first establishing an integrated planning approach for other Public Works programs that allows the City to develop and demonstrate multi-benefit projects that efficiently meet city transportation, waste management, and stormwater demands while reducing flooding impacts, improving water quality, and local environmental health of streams and waterways.

Concurrent with the rate study, the City could conduct a survey of the community to determine the community's level of support for a stormwater fee and understanding of the citywide need for infrastructure improvements. Understanding what polls well within the city will help direct the rate design process to align the community's interest and the City's proposed level of service. This will also serve as the City's first touch point with community outreach, regarding the need for a new stormwater fee.

4.1.3. DATA REQUIREMENTS

To commence a stormwater rate study, the City will require the following data pertaining to the financial, management, and property related aspects of the City's stormwater operations.

FINANCIAL AND OPERATIONAL DATA

To establish a stormwater fee, it is necessary to gain an understanding of the operational activities that would be accounted for within the Watershed Division and the cost of providing these services. Financial and operation data needed to conduct a Financial Plan should include the following:

- Historical and current budgets for the operations of the storm drain system including but not limited to:
 - Personnel costs
 - Material expenses
 - Contractors
 - Capital Outlays
- Historic and planned capital improvements.
- An update to the 2006 Storm Drain Master Plan.
- The Watershed Division's and the Storm Drainage Division's portions of any existing debt payments
- Transfers in and out of the City's Watershed and Storm Drainage Divisions.

PROPERTY RELATED DATA

One of the key data requirements for the establishment of a stormwater fee, is data on individual parcels within the City. For example, parcel-level impervious area is often used to establish a stormwater permit fee. This is because most properties in a city generate stormwater runoff that flows into the city-maintained storm drain. Therefore, some amount of storm drain system use can be attributed to each parcel, and that use is proportional



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to the amount of stormwater runoff contributed by each parcel. This, in turn, is proportional to the amount impervious surface area on a parcel.

The City of Oakland stores spatial and other data on individual parcels in a geographic information system (GIS) database. The GIS database includes parcel boundaries, roads, existing stormwater infrastructure, existing land cover, and some parcel-level data on impervious surface type, such as building footprints. One way to obtain scientifically defensible information on impervious surface is to establish a basic unit of measure for impervious surface based on land use category. For each land use area, a sample of parcels could be analyzed using aerial photography and other data to determine an average amount of impervious area.¹³

UTILITY BILLING DATA

The final component of the establishment of a stormwater fee is the ability to charge and collect the revenues from your customers. Most communities use one of three primary methods for assessing and collecting stormwater fees, either the property tax bill, the utility bill, or a separate issued bill. Each system comes with its own pro's and con's and should be decided early in the rate study process to ensure efficient roll out of the new rate system.

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¹³ See Appendix B – Results of Percentage of Impervious area Sampling in the City of Berkeley's Agenda Report titled "Ballot Tabulation Hearing, Ordering Levies of 2018 Clean Stormwater Proposition 218 Fee Initiative. Accessible online: https://www.cityofberkeley.info/Clerk/City_Council/2018/05_May/City_Council_05-29-2018_-_Regular_Meeting_Agenda.aspx.