CITY OF PIEDMONT

Park Commission Agenda
Wednesday, October 2, 2019
5:30 p.m.

City Council Chambers, 120 Vista Avenue, Piedmont, CA

Call to Order Pledge of Allegiance

Public Forum This is an opportunity for members of the audience to speak on an item not on the agenda. The 10 minute period will be divided evenly between those wishing to address the Commission.

Regular Agenda

1. Approval of Park Commission Minutes for September 4, 2019
2. Consideration of a Recommendation to the City Council Regarding the Proposed Green Infrastructure Plan
3. Update on Recycling and Composting Efforts at the Harvest Festival
4. Update on Preliminary Design for the Heritage Tree Signage
5. Update on Lower Grand Median Landscaping Improvements
6. Monthly Maintenance Report: Park, Open Space, and Street Tree Update for the Month of September 2019

Announcements, old business and consideration of future agenda items

Adjourn

Materials related to an item on this agenda submitted to the Park Commission are available for public inspection in the Public Works Department during normal business hours.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the City Clerk at (510) 420-3040. Notification at least two business days preceding the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting. [28 CFR 35.102-35.104 ADA Title II]

In accordance with G.C. Sec. 54954.2(a) this notice and agenda were posted on the City Hall bulletin board and also in the Piedmont Police Department on September 27, 2019.

DRAFT

PIEDMONT PARK COMMISSION

Regular Meeting Minutes for Wednesday, September 4, 2019

A Regular Session of the Piedmont Park Commission was held September 4, 2019, in the City Hall Council Chambers at 120 Vista Avenue. In accordance with Government Code Section 54954.2(a) the agenda for this meeting was posted for public inspection on August 30, 2019.

CALL TO ORDER Chairperson Goodman called the meeting to order at 5:30 p.m.

PLEDGE OF ALLEGIANCE Chairperson Goodman led the Pledge of Allegiance.

ROLL CALL Present: Chairperson Betsy Goodman; Commissioners Amber Brumfiel, Patty Dunlap, Jim Horner, Brian Mahany, Eileen Ruby, and Robin Wu.

Staff Present: Parks and Project Manager Nancy Kent, Public Works Director Chester Nakahara and Public Works Supervisor Dave Frankel

PUBLIC FORUM There were no speakers for Public Forum.

REGULAR AGENDA

Minutes

Resolved, that the Park Commission approves the Park Commission Minutes for August 7, 2019, as submitted.

Moved by Mahany, Seconded by Horner
Ayes: Brumfiel, Horner, Mahany, Ruby and Goodman
Noes: None
Absent: Dunlap, Wu

Street Tree Removal 331 Magnolia Avenue

Parks and Project Manager Nancy Kent gave an overview of the request by Eric Schen and Laurie Lau to remove a street tree in front of their residence at 331 Magnolia Avenue. Mr. Schen and Ms. Lau have submitted the required application and petition requesting the removal and have support from their adjacent neighbors.

Ms. Kent noted that the property owners have filed a claim for damages against the City, alleging that the roots of the tree in question have damaged their private property. While not directly related to this application, Ms. Kent indicated she wished the Commission to be aware of this fact.

She also indicated that a review of the tree was prepared by consulting arborist Jim Clark from Hortscience/Barlett Consulting to better understand the issue and concerns regarding this tree. The review indicated that the removal of roots on private property will have a negative impact on the health and structural integrity of the tree and staff recommends removal of the street tree at 331 Magnolia Avenue.

Public Works Supervisor Dave Frankel indicated that this tree has been on the City's watch list due to its structural deficiencies, co-dominant leaders and poor branch attachments.

Public Testimony was received from:

Eric Schen and Laurie Lau described their reasoning for requesting the tree's removal as well as issues with the root system on their private property.

Commissioners discussed the arborist's report, the need to replace the sidewalk once the tree has been removed and that the replacement tree will be a red maple.

The Commission agreed there were extensive roots in the small front yard, that neighbors supported the tree's removal, and acknowledged there are negative impacts to the owners' private property.

Resolved, that the Park Commission approves the petition from the homeowners at 331 Magnolia Avenue and approve removal of the Magnolia Tree No. 23.

Moved by Ruby, Seconded by Wu
Ayes: Brumfiel, Dunlap, Goodman, Horner, Mahany, Ruby, and Wu
Noes: None

Annual Playground Inspection

Ms. Kent stated that staff consults with a certified playground inspector to evaluate all City owned playground equipment annually. She reported that additional testing was undertaken this year for two sites and that she will make a report to the Commission at a later meeting with a summary of the report.

There was no **Public Testimony** on this matter.

Lower Grand Ave. Landscape Improvements

Ms. Kent reported that the retrofit of the irrigation system in the Lower Grand Avenue median had been completed. She described upgrades to the system and reported on work undertaken by the City's landscape contractor to improve the median, including cleaning out accumulated dead materials, ivy, applying compost and installing infill plants. Most planting will be done by the end of the week, followed by mulching.

Director of Public Works Chester Nakahara discussed neighborhood outreach which has been undertaken and input received from each neighbor on the plan.

Public Testimony was received from:

Garrett Keating stated the City is party to a Consent Decree to install bio swales to take run-off from the streets as a way to reduce pollution to the Bay and he asked if this tract was being considered given it is a very large area and a natural location for a bio swale.

Ms. Kent gave a brief description of the development of the City's proposed Green Infrastructure Plan which will be considered by the Council at its September 16th meeting. She indicated that the Lower Grand Avenue median was not identified as one of the proposed projects in the plan.

Chairperson Goodman asked that this topic be brought back to the Commission. Ms. Kent agreed to place it on a future agenda.

Monthly Maintenance Report –August 2019

Public Works Supervisor Dave Frankel provided the monthly maintenance report for August. He detailed staff work on irrigation, tree plantings on Oakmont Avenue, and community outreach regarding watering of street trees. He also reported on the loss of a large Coast Live Oak at Blair Park which split in half and blocked Moraga Ave. He reported that two American Elm trees on Olive Avenue had been removed and would be replaced by London Plane trees. He also discussed the myriad other tree work which took place this month.

ANNOUNCEMENTS

Ms. Kent announced Mr. Frankel's retirement in October, indicating that next month's meeting would be his last.

Next Meeting: Wednesday, October 2, 2019.

ADJOURNMENT

There being no further business, Chairperson Goodman adjourned the meeting at 6:20 p.m.

City of Piedmont
PARK COMMISSION AGENDA REPORT

DATE: October 2, 2019

TO: Park Commissioners

FROM: Nancy B. Kent, Parks and Project Manager

SUBJECT: Consideration of a Recommendation to the City Council Regarding the Proposed Green Infrastructure Plan

RECOMMENDATION

Recommend to the City Council to approve the Green Infrastructure Plan

EXECUTIVE SUMMARY

The Green Infrastructure Plan (GI Plan) is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff total maximum daily load (TMDL) wasteload allocations of mercury and polychlorinated biphenyls (PCBs) for the San Francisco Bay will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

The current task is to develop and approve the GI Plan that is consistent with the MRP requirements. The GI Plan will help guide the identification, prioritization, implementation, tracking, and reporting and public outreach efforts with respect to green infrastructure projects in the City. If approved, the GI Plan will be submitted with the City's Stormwater Annual Report.

BACKGROUND

On September 16, 2019, the Green Infrastructure Plan was present to the City Council for review and approval. The City Council recommended that the Park Commission have the opportunity to review the GI Plan and make recommendations to the City Council. The staff report for the September 16, 2019 City Council meeting is attached as Exhibit A.

DISCUSSION

The GI Plan describes how the City identified and prioritized projects to include in the Plan, and includes a map and list of planned and potential projects, targets for impervious surface area to retrofit with green infrastructure, and an evaluation of funding options for these projects.

The goals of the City's GI Plan are to:

• Guide the identification, prioritization, implementation, tracking and reporting of green infrastructure projects in the City;

• Set targets for reducing water quality impacts of urbanization in the City's watersheds, including the San Francisco Bay; and

• Identify targets for retrofitting existing impervious surfaces with green infrastructure by benchmark years 2020, 2030, and 2040. See Exhibit B.

The Green Infrastructure Plan also includes the following tools and guidance :

- Standard specifications and typical details for GI components
- Hydraulic sizing Criteria and worksheet for calculating run-off and volume for GI projects
- Stormwater Compliance Sign off Form for Capital Improvement and Projects
- Guidance for sizing GI facilities in street projects

The City will use the GI Plan, along with other City master plans and planning documents to evaluate potential projects for implementation of green infrastructure.

City of Piedmont
COUNCIL AGENDA REPORT

DATE: September 16, 2019

TO: Mayor and Council

FROM: Sara Lillevand, City Administrator

SUBJECT: Consideration of the Green Infrastructure Plan for the City of Piedmont as prepared by Nichols Consulting Engineers dated August 22, 2019

RECOMMENDATION

Approve the Green Infrastructure Plan dated August 22, 2019 as prepared by Nichols Consulting Engineers in compliance with Provision C.3.j of the Municipal Regional Stormwater Permit of the Regional Water Quality Control Board Order No. R2-2015-0049

EXECUTIVE SUMMARY

The Green Infrastructure Plan (GI Plan) is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff total maximum daily load (TMDL) wasteload allocations of mercury and polychlorinated biphenyls (PCBs) for the San Francisco Bay will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. To achieve these goals, the Municipal Regional Stormwater Permit (MRP) required the City to first develop a Green Infrastructure Framework. The Council approved the Green Infrastructure Framework in July of 2017. The purpose of the Framework is to identify what tasks need to be done, who is responsible, and when the tasks need to be completed. The current task is to develop and approve the GI Plan that is consistent with the MRP requirements. The GI Plan will help guide the identification, prioritization, implementation, tracking, and reporting and public outreach efforts with respect to green infrastructure projects in the City. If approved, the GI Plan will be submitted with the City's Stormwater Annual Report by September 30, 2019.

BACKGROUND

The MRP, adopted by the San Francisco Bay Regional Quality Control Board (RWQCB) on November 15, 2015 (Order No. R2-2015-0049), requires the 76 permittees in the San Francisco Bay Region, including the City, to prepare and begin implementing Green Stormwater Infrastructure Plans by September 2019. "Green stormwater infrastructure" refers to a sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other low impact

development practices to help clean stormwater runoff. The goals of the City's GI Plan are to:

- Guide the identification, prioritization, implementation, tracking and reporting of green infrastructure projects in the City;
- Set targets for reducing water quality impacts of urbanization in the City's watersheds, including the San Francisco Bay; and
- Identify targets for retrofitting existing impervious surfaces with green infrastructure by benchmark years 2020, 2030, and 2040.

Since the July 17, 2017 meeting, when Council approved the required Green Infrastructure Framework, Staff has been working with Nichols Consulting Engineers (NCE), Coastland Engineers, City staff, and the Alameda Countywide Clean Water Program (ACCWP), to develop the Green Infrastructure Plan. A copy of the proposed Green Infrastructure Plan follows this report.

DISCUSSION

The GI Plan describes how the City identified and prioritized projects to include in the Plan, and includes a map and list of planned and potential projects, targets for impervious surface area to retrofit with green infrastructure, and an evaluation of funding options for these projects.

Additionally, the GI Plan documents existing efforts to implement green infrastructure, including a summary of planning document updates to promote green infrastructure, a workplan for completing the City's early implementation project, the Lower Grand Avenue Triangle project, and a mechanism to track and report on completed green infrastructure projects and make the information publicly available.

Finally, the GI Plan includes general design and hydraulic sizing guidelines for non-regulated green infrastructure projects. The GI Plan also includes standard specifications and typical details for green infrastructure components that were adopted by the ACCWP, which the City will consider when designing and implementing future non-regulated green infrastructure projects.

As discussed in the City's Green Infrastructure Framework, the MRP ties green infrastructure to Total Maximum Daily Load-related pollutant reductions. However, addressing how the green infrastructure projects in the City help to meet the required countywide load reductions in the MRP, is not a requirement of the GI Plan.

The City has identified targets for impervious surface to be retrofitted by public green infrastructure projects by benchmark years 2020, 2030, and 2040 (Table 2-2). The City has no impervious targets for private green infrastructure projects because there are no known private development projects projected in the City through 2040. 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 new countywide effort known as the "Reasonable Assurance Analysis" that demonstrates how green infrastructure will be implemented to achieve mercury and PCBs load reductions on a countywide basis. This analysis is due with ACCWP's Annual Report in September 2020. To the extent that the

implementation of the City of Piedmont's GI Plan may support load reductions for mercury and PCBs, as outputs from the Regional Assurance Analysis become available, the City may consider modifying the targets presented in Table 2-2. Due to uncertainties related to the funding of public green infrastructure projects, the City will track its progress toward achieving the targets presented in Table 2-2, identify any challenges that arise in achieving these targets, and propose alternate solutions in coordination with other MRP Permittees, to achieve countywide goals.

FISCAL CONSIDERATIONS

There are currently no specific fiscal considerations with respect to approving the Green Infrastructure Plan. Funding estimates for specific green infrastructure projects will be presented on a case-by-case basis to the Council as the prioritized projects move forward.

By: Nancy B. Kent, Parks & Projects Manager
Chester Nakahara, Public Works Director

EXHIBIT B

Piedmont

Green Infrastructure Plan

September 2019

Acknowledgments

The City of Piedmont gratefully acknowledges the following individuals and organizations that contributed to this Green Infrastructure Plan:

Mayor Bob McBain

Vice Mayor Teddy Gray King

Councilmember Tim Rood

Councilmember Betsy Andersen

Councilmember Jen Cavenaugh

City Administrator Sara Lillevand

Director of Public Works Chester Nakahara

Parks and Project Manager Nancy Kent

Alameda Countywide Clean Water Program

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Cover Photo: Pocket Park at Ramona and Ronada Avenues

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Acronyms

Acronym	Definition
ACCWP	Alameda Countywide Clean Water Program
AGOL	ArcGIS Online
BASMAA	Bay Area Stormwater Management Agencies Association
CIP	Capital Improvement Program
GHG	Greenhouse gas
GI	Green stormwater infrastructure
LID	Low impact development
MRP	Municipal Regional Stormwater Permit
MTC	Bay Area Metropolitan Transportation Commission
HM	Hydromodification management
RWQCB	San Francisco Bay Region Regional Water Quality Control Board
PCBs	Polychlorinated biphenyls
SWRP	ACCWP Stormwater Resources Plan
TMDL	Total maximum daily load

Executive Summary

The Municipal Regional Stormwater Permit adopted by the San Francisco Bay Regional Water Quality Control Board (RWQCB) on November 15, 2015 (Order No. R2-2015-0049) ("MRP"), requires the 76 permittees in the San Francisco Bay Region, including the City, to prepare and begin implementing Green Stormwater Infrastructure Plans by September 2019. "Green stormwater infrastructure" (GI) refers to a sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other low impact development practices to clean stormwater runoff. The goals of the City's GI Plan, which are consistent with the MRP requirements, are to:

- Guide the identification, prioritization, implementation, tracking and reporting of GI projects in the City; and
- Identify targets for retrofitting existing impervious surfaces with GI by benchmark years 2020, 2030, and 2040.

The GI Plan includes planning tools for the City to identify and prioritize GI projects, a map and list of planned and potential GI projects through 2040, targets for impervious surface area to retrofit with GI through 2040 (Table ES-1), and an evaluation of funding options for the projects included in this GI Plan.

The GI Plan documents existing efforts to implement GI including a description of the City's existing GI facilities, a summary of planning documents reviewed and planned updates to promote GI, a workplan for completing an early implementation[1] project, and a mechanism to track and report on completed GI projects and make the information publicly available.

The GI Plan includes general design and hydraulic sizing guidelines for non-C.3.b regulated GI projects. The GI Plan also includes GI standard specifications and typical details that were adopted by the Alameda County Clean Water Program, which the City will consider when designing and implementing future non-regulated GI projects.

The City has established targets for retrofitting impervious surfaces with GI as summarized in Table ES-1. The targets are associated with impervious area treated and/or replaced by the City's existing GI projects and eight (8) planned or potential projects to be completed by 2040.

The City currently has no approved budget line item specifically to fund public GI projects and will need to identify funding sources for the projects included in this GI Plan. The City may use internal resources to fund projects included in this GI Plan, which include the General Fund, Street Infrastructure Maintenance and Replacement Fund, Sewer Fund, and private donations.

[1] Early implementation projects are non-"Regulated Projects" planned for implementation during the MRP term (projects completed between January 1, 2015 and December 2020). Non-regulated projects are not subject to MRP Provision C.3.b.

The City may also pursue other funding options such as grant funding available for GI and complete streets projects.

Table ES-1: Target Public Project Acres of Existing Impervious Surface to be Retrofitted by 2020, 2030 and 2040

Future Year	GI Impervious Area Targets for Public Projects (Acres)
Cumulative by 2020	1.0
2030	0.5
Cumulative by 2030	1.5
2040	1.2
Cumulative by 2040	2.7

Notes:

1. Acres shown in the table represent areas of impervious surface existing within the City of Piedmont as of July 1, 2002, that are anticipated to be retrofitted by the target years as a result of public projects. There are no planned private development projects.
2. Projections of existing impervious surface to be retrofitted are based on anticipated results of actions described in Section 2.4, Prioritized Projects for Early Implementation; local knowledge of planned future development; anticipated availability of funding; and future development scenarios generated with the MTC UrbanSim model.

1. Introduction

1.1 Statement of Purpose

The purpose the City of Piedmont's Green Infrastructure Plan is to guide the identification, implementation, tracking, and reporting of green stormwater infrastructure projects within the City of Piedmont (the City), in accordance with the Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049, adopted by the San Francisco Bay Regional Water Quality Control Board (RWQCB) on November 15, 2015. "Green stormwater infrastructure" (GI) refers to a sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other low impact development (LID) practices to clean stormwater runoff and protect the City's watersheds.

1.2 MRP Requirements

This Green Infrastructure Plan (GI Plan) has been developed to comply with GI Plan requirements in Provision C.3.j of the MRP, which states in part:

> The GI Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff total maximum daily load (TMDL) wasteload allocations (e.g., for the San Francisco Bay mercury and polychlorinated [PCBs] TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the GI Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. It also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.
>
> Over the long term, the GI 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 GI practices to clean stormwater runoff.
>
> The GI Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of GI projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by GI controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans

required elsewhere within this Permit, and specifically plans required to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.

Table 1-1 links each section of this GI Plan to the applicable MRP provision.

Table 1-1: GI Plan Sections and Applicable MRP Provisions

Section of GI Plan	Applicable MRP Provision
1. Introduction	C.3.j
2. Prioritizing and Mapping Planned and Potential Projects	C.3.j.i.(2)(a) – (c), and C.3.j.i.(2)(j)
2.1 Approach for Prioritizing and Mapping Projects	C.3.j.i.(2)(a)
2.2 Summary of Prioritized Projects	C.3.j.i.(2)(b)
2.3 Impervious Surface Retrofit Targets	C.3.j.i.(2)(c)
2.4 Prioritized Projects for Alternative Compliance Program or Early Implementation	C.3.j.i.(2)(j)
3. Tracking and Mapping Completed Projects	C.3. j.i.(2)(d) & C.3.d.iv.(1)
4. Summary of General Guidelines for GI Projects	C.3.j.i.(2)(e), C.3.j.i.(2)(f), C.3.j.i.(2)(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 and Lists of Prioritized Projects	C.3.j.i.(2)(b)
Appendix B. Workplan for Completing Prioritized Projects	C.3.j.i.(2)(j)
Appendix C. General Guidelines for GI Projects	C.3.j.i.(2)(e), C.3.j.i.(2)(f), C.3.j.i.(2)(g)
Appendix D. Workplan to Incorporate GI Requirements in Planning Documents	C.3.j.i.(2)(i)

1.3 City Context

1.3.1 Municipal geography and demographics

As a charter city located in the beautiful Oakland Hills, overlooking the San Francisco Bay, the City has gained a reputation as being one of the most desirable communities in the Bay Area. With an area of 1.7 square miles (approximately 1,000 acres) and approximately 11,000 residents, the City is the smallest in Alameda County in terms of land area and population. One of the City's most unique geographic features is that it is surrounded by the city of Oakland.

The City is built on rolling hills cut by numerous canyons that slope to the southwest towards San Francisco Bay. Elevations range from 40 feet above mean sea level along Grand Avenue to 704 feet behind the City's Corporation Yard. Urbanized hills with creeks in the valleys between them characterize the natural geography of the City. There are about 80 acres of open space dispersed among five City parks (approximately 50 acres) and other open space associated Tyson Lake, landscaped traffic islands, and the EBMUD Reservoir on Blair Avenue. The City's parks and recreational areas and existing GI facilities are shown on Figure 1-1. Parks and open space represent about 7 percent of the City's area.

The City is mainly comprised of established single-family homes located on tree-lined streets. The City is almost completely built out with few developable lots for either new residential or commercial opportunities. Other land uses in the City are schools, civic buildings and minor commercial uses, and open space. Commercial uses comprise less than one-third of one percent of City's land area and there are no industrial land uses. The greatest concentration of non-residential uses is the Civic Center area, which has a mix of small commercial, public, open space, religious, and residential uses. The only other area with a concentration of non-residential uses is along the northern end of Grand Avenue extending west to Beach School, Linda Park, and the former PG&E substation which was developed as a multi-family condominium project.

1.3.2 Economic and Social Trends

According to the US Census, the City's median household income is $203,000 (in 2017 dollars). Approximately 5 percent of the City's residents live at or below the poverty level. Of the residents aged 25 and older, approximately 99 percent have at least a high school education and approximately 85 percent have a bachelor's degree.[2]

1.3.3 Development and Redevelopment Trends

Much of Piedmont was developed as a residential community during the streetcar era, a time when neighborhoods were designed for walkability rather than auto convenience. This contributes to varying configurations for street right of ways throughout the City and challenging conditions to accommodate and create safe routes for automobile, bike and pedestrian traffic. Parts of the City are developed on a rectangular street grid, with lots more typical of a mature urban neighborhood than a post-war suburb. By 1960 Piedmont was essentially built out, with only scattered vacant lots remaining. The City's remaining buildable lots are projected to develop incrementally with single family residences, much as they have for the past 30 years.

There are approximately 70 privately owned vacant lots in the City, totaling 21 acres, all of which are zoned for single family residential development. Many of the vacant lots in the City are unlikely to be developed in the foreseeable future. Most are owned by adjacent homeowners (i.e., "double lots") and are actively used as landscaped backyards, side yards, or gardens. Some include accessory uses such as pools. Other lots are very steep and would require a significant amount of grading and excavation for new construction. Some are landlocked and would require access easements or lot line adjustments.

The Grand Avenue commercial district between Linda and Wildwood Avenues and the multi-family residential district just beyond the northern edge of the Grand Avenue commercial district have limited opportunities for future private redevelopment. There are no undeveloped parcels in commercially zoned districts and no known commercial projects submitted for City review. There are no C.3.b-regulated public or private projects completed to date within the City.

[2] US Census Bureau: https://www.census.gov/quickfacts/fact/table/piedmontcitycalifornia,US/IPE120217#IPE120217. Accessed August 11, 2019.

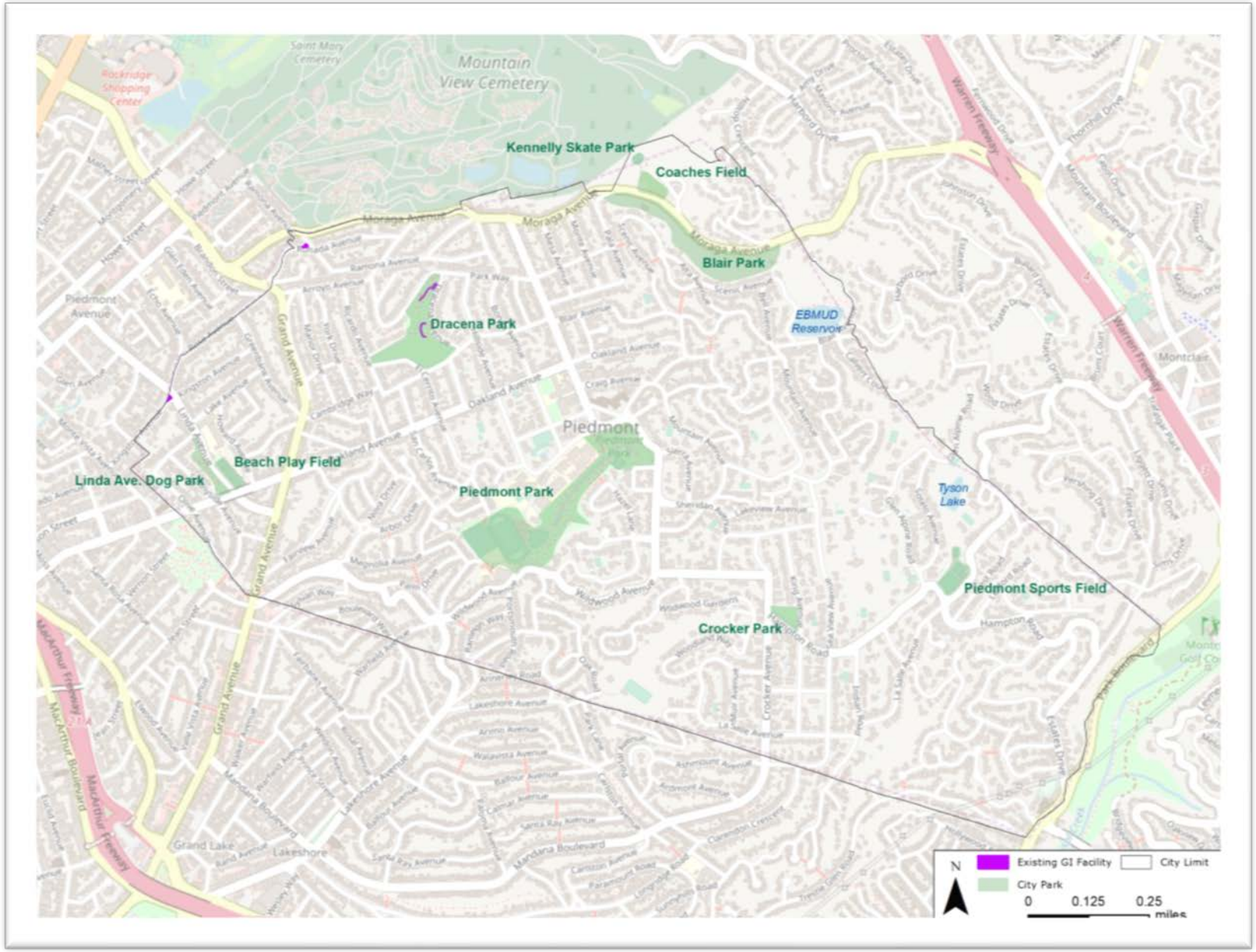


Figure 1-1: City Parks, Recreational Areas and Existing GI Facilities

1.3.4 Watersheds

The City is located within the South Bay Basin of San Francisco Bay, as identified by the RWQCB in its formal water quality protection plan-the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (RWQCB 2017). The City has three sub-watersheds. Except for a small area along Park Boulevard which is in the Sausal Creek watershed and a small area on the northern edge of the City in Glen Echo/Cemetery Creek watershed, the majority of the City is part of the Indian Gulch/Pleasant Valley watershed. Except for the portion in the Sausal Creek watershed, the entire City drains to Lake Merritt. Lake Merritt drains approximately 4,650 acres and the City represents about one-quarter of its watershed. Lake Merritt discharges to the Oakland Estuary and ultimately to San Francisco Bay (the Bay). The Basin Plan defines beneficial uses of Lake Merritt as follows:

- Water contact recreation
- Non-contact water recreation
- Wildlife habitat
- Estuarine habitat; and
- Fish spawning

The City's three sub-watersheds are shown on Figure 1-2 and described below.

The Indian Gulch/Pleasant Valley Creek Sub-Watershed

The Indian Gulch/Pleasant Valley Creek sub-watershed has an area of about 3 square miles, draining much of the City(approximately 90 percent) as well as portions of the City of Oakland Lower Hills District. Creeks include Pleasant Valley, Indian Gulch, Wildwood and Bushy Dell creeks. Pleasant Valley creek once originated in Dracena Park and now flows culverted through the City, connecting to Oakland's storm drain system that flows into Lake Merritt. Indian Gulch creek originates near the Sotelo-Glen Alpine loop and flows parallel to Sea View Avenue before flowing into Oakland through Crocker Highlands to the lake. Wildwood Creek flows from Wildwood Gardens to Oakmont Avenue, before it is culverted and continues into Oakland under Lakeshore Avenue and ultimately to the lake. The portions of Indian Gulch and Wildwood creeks that are open creek sections flow exclusively through private residential properties.

Bushy Dell Creek originates in Piedmont Park where its flowing cascading waters were once the site of Piedmont Springs Hotel and included a rock grotto and mineral springs. This is the only creek in the City that flows through public park land before it is culverted. In total, there are two miles of noncontiguous open channel that flow through public parks and private property. The light blue lines on Figure 1-2 show where above ground reaches can still be found.

Glen Echo/Cemetery Creek Sub-Watershed

The Glen Echo Creek sub-watershed has an area of about 2.6 square miles, which drains the City of Oakland Upper Rockridge and Piedmont Avenue areas in addition to a small portion of the City by Mountain View Cemetery. Glen Echo Creek, which is also referred to as Cemetery Creek where it approaches and flows through the cemetery, and the Rockridge/Broadway Branch, which is outside City limits, are the two main creeks that flow from the hills west of State Route 13.

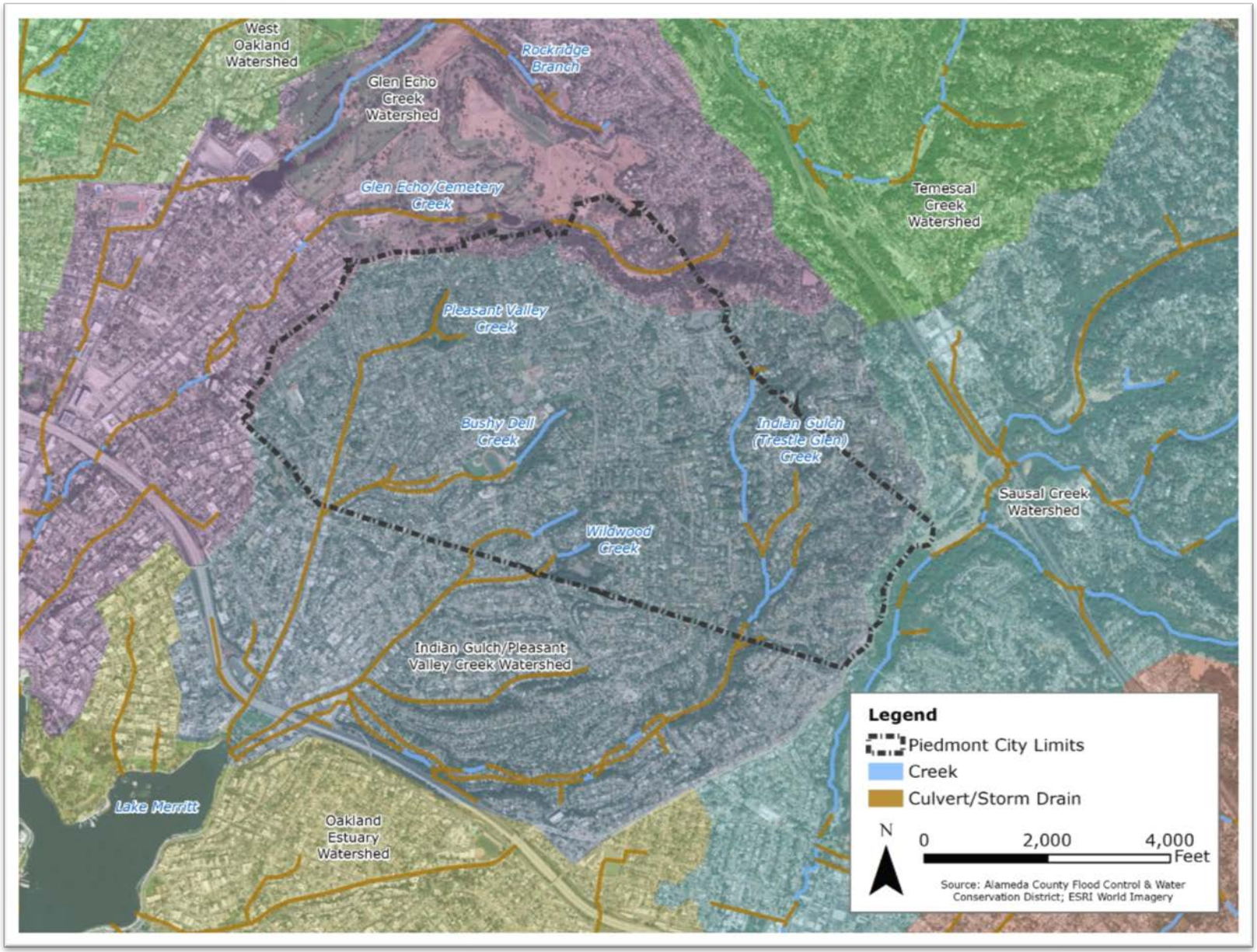


Figure 1-2: Piedmont Watersheds

Sausal Creek Sub-Watershed

The Sausal Creek watershed begins as a series of ephemeral creeks in the Oakland Hills near Joaquin Miller Park and Montclair, 1,300-1,500 feet above mean sea level. Its three main tributaries drain the western slope of the East Bay hills and are bounded by Snake Road and Montclair Village to the north, Skyline Boulevard to the east, and Joaquin Miller Road, Lincoln Avenue, and Fruitvale Boulevard to the south. Its open natural channels flow through Dimond Canyon and Dimond Park and then under I-580. In the Oakland flatlands, culverted sections of the creek channel alternate with above ground segments before discharging into the last culvert at East 22nd Street. There is a small section of the City's eastern boundary that drains into the watershed, although there are no sections of the creek tributaries that flow within the City's boundary. Sausal Creek discharges into Oakland Estuary at the tidal channel next to the Fruitvale bridge, which separates Oakland and Alameda.

1.3.5 Commitments and Actions for Sustainability

The City is committed to implementing GI projects and related sustainability actions. This section describes the City's existing GI facilities, urban forest policies, stormwater program resources, and other policies that complement GI.

Exiting GI Facilities

The City has three locations with existing GI features that replace and/or treat approximately one acre of impervious area: (1) Dracena Park, (2) the pocket park at the intersection of Ramona and Ronada Avenues, and (3) the pocket park at the Linda Kingston Triangle. These locations are shown on Figure 1-1 and the figures in Appendix A and are described below.

(1) Dracena Park has three GI features. There is a bioswale, which was constructed in October 2018 as part of a park upgrade to improve the lawn area drainage. A new stone wall was constructed, which enabled the City to change the grade to route lawn runoff to the bioswale. The bioswale which has an area of approximately 700 square feet receives run-off from the planting areas and sloping lawn and is planted with native grasses and shrubs.

Dracena Park has the first installation of permeable paving within the City's parks (approximately 700 square feet), completed in June 2019. Permeable asphalt replaced a damaged and crumbling park path.

The third GI feature is a bioretention project, which was completed in April 2015 and began as a landscape project to address a boggy area of a park created by natural springs. The bioretention area captures runoff from the upper park area and helps to infiltrate the spring water that creates muddy areas in the park. The bioretention area and

its impervious drainage area are approximately 2,600 square feet. Dracena Park GI improvements were funded through the park maintenance and paving budgets and are maintained by Public Works Park maintenance crews.

(2) Linda Kingston Triangle was completed in March 2017. The project was implemented to slow traffic, improve pedestrian safety and beautify an entrance to the City. Prior to this project, there was a wide expanse of asphalt in the intersection where the three roads converged. The GI project removed 3,600 square feet of impervious surface and replaced it with a landscape triangle with 3,100 square feet of new planting area. Although this pocket park does not treat street runoff, the project removed a large expanse of paving and replaced it with a permeable landscape area. This GI project was funded by private funding, Gas Tax and County Measure B funding for bicycle and pedestrian paths and safety improvements. The pocket park is maintained by City contract landscape maintenance crews.

(3) Ramona and Ronada Avenue Pocket Park was completed in April 2014. The project located in the intersection of Ramona and Ronada Avenues entailed replacing asphalt with a landscape triangle that included new planting areas and a bioswale that treats street runoff. The impervious area replaced/treated by this GI facility is approximately 0.6 acres. The project, funded by private donations and the General Fund, is maintained by City contract landscape maintenance crews.

City's Urban Forrest

Mature trees are a fundamental part of the character of the City's residential streets and parks. The City has over 7,000 street trees planted in the "parking strip", the planting area between the curb and gutter. It is estimated that 90% of the parking strips in the City have street trees planted in the parking strips. Street trees are maintained by the City's arborists or outside contractors. Each year the City contracts with a certified tree company to prune over 1,000 street trees. Each year Public Works and its contractor's plant between 50-100 new street trees. The trees

are 24-inch box trees, purchased and planted by the City at no cost to residents. Residents are given watering bags to keep their new street trees well-watered until they are established.

The City also has approximately 50 acres of parks that are maintained as an urban forest (Figure 1-1). The City's parks will continue to be key areas for retrofit projects that can incorporate GI components. The City is committed to reviewing all recreation projects for GI implementation feasibility and incorporating GI components to the extent feasible.

The City has adopted urban forestry practices and policies. The City's General Plan Natural Resources and Sustainability Element Goal 14 relates to the urban forest as follows:

> *Conserve and expand Piedmont's tree canopy to create visual beauty, provide shade, prevent erosion and absorb runoff, reduce noise and air pollution, and provide habitat for birds and other wildlife.*

The General Plan includes the following Urban Forest Policies:

- *Policy 14.1: Street Tree Maintenance. Maintain the City's street trees and recognize their essential contribution to the character and environmental health of Piedmont. The City should continue to perform pruning and tree care on a regular basis to ensure the long-term health of trees and to address conflicts with views, utilities, and public safety.*
- *Policy 14.4: Retention of Healthy Native Trees. Encourage the retention of healthy native trees as new construction takes place, including home additions and landscaping projects. Existing significant trees should be conserved where feasible when development takes place.*
- *Policy 14.5: Landscaping. Encourage the use of landscaping to beautify the City, enhance streets and public spaces, reduce stormwater runoff, and enhance community character. To the extent possible, landscaping practices should minimize the use of pesticides and herbicides, reduce the need for pruning, and incorporate native, drought-tolerant species rather than exotic or invasive species. Landscaping and tree planting should also reinforce Piedmont's fire prevention and vegetation management goals.*

The City's Municipal Code Chapter 3, Article IV Trees on Public Property Sec. 3.13, states:

> *The street trees of Piedmont provide multiple benefits to the residents and to the public at large. The trees are a verdant urban canopy, providing beauty, shade and privacy. The uniformity and maturity of the street trees in Piedmont distinguish the city from vacant suburban subdivisions and add significant aesthetic and economic value to the city's residential housing stock. As a matter of public policy, the overwhelming benefit of the city's urban forest to the city's residents and to the general public outweighs the occasional regulatory limitations on individual properties, taking into consideration that there is an established process in Section 3.213(b) for individuals to obtain city review of view claims relating to city street trees. It is therefore in the public interest to regulate street trees and to provide penalties for noncompliance.*

Finally, Appendix C of this GI Plan (General Guidelines for GI Projects) includes guidelines for addressing urban forestry in the public right-of-way.

Landscaped Medians, Traffic Islands and Parking Strips

The City's General Plan has the following policy supporting the landscaping of medians and parking strips:

- *Policy 23.8: Landscaped Medians, Traffic Islands, and Parking Strips. Recognize the importance of landscaped medians and roadsides, traffic "islands", parking strips, and other planted public open spaces to Piedmont's character and beauty. Encourage and support the planting and care of such areas by community groups and volunteers.*

Green Building and Bay Friendly Landscaping Regulations

The City adopted Ordinance No. 687 N. S. in 2009, to amend Municipal Code Section 17.11.10 to adopt Green Building and Bay-Friendly Landscaping Regulations for City Facilities. The Ordinance requires public projects to meet the most recent minimum Bay Friendly Landscape Scorecard points as recommended by StopWaste.Org or its designee.

Stormwater Management Program Website

The City maintains its Clean Water Program website under Community Links:

http://www.ci.piedmont.ca.us/publicworks/storm_water.shtml#bayfriendly

The website includes information about C.3 regulations for development projects, requirements for developers and builders including a link to the Alameda Countywide Clean Water Program (ACCWP) C.3 Technical Guidance Manual, and a Stormwater Requirements Checklist for small projects and single-family homes required to implement site design LID practices, which is part of the Planning Commission Application for Design Permit Review.

The website includes links to BASMAA fact sheets developed for:

- Landscape Designs for Stormwater Management;
- Pervious Pavement;
- Rain Gardens; and
- Rain Barrels and Cisterns

The City's website has a link to the ACCWP brochure Detain the Rain. Other key public resources include:

- Links to maps of the City's creeks and watersheds;

- Bay-Friendly landscaping tips;
- Guidance on safeguarding and maintaining creeks including protecting riparian areas by planning native vegetation; and
- Information about selecting climate-appropriate appropriate plants for our region.

Climate Action Plan CAP 2.0

The City adopted the Climate Action Plan 2.0 (CAP 2.0) in March 2018, which replaced the Climate Action Plan adopted in 2010. The CAP 2.0 sets greenhouse gas (GHG) emissions reduction targets consistent with State targets of 40 percent below 2005 levels by 2030 and 80 percent below 2005 levels by 2050. These goals reflect the City's ongoing commitment to addressing climate change, building on past success and supporting state efforts. The CAP 2.0 was developed by City staff, CivicSpark Fellows, and a CAP Task Force of local residents with expertise in climate solutions, appointed by the City Council. The CAP includes five major strategies intended to reduce GHG emissions as follows:

- Buildings and Energy: Minimize energy consumption; create high-performance buildings, and transition to clean, renewable energy sources.
- Municipal (MUN): Minimize the carbon footprint of all city operations and activities and work to educate the community in concrete actions they can take part of to reduce the overall city's GHG emissions.
- Water and Wastewater: Minimize waste and celebrate water as an essential community resource. The water and wastewater strategy builds on past City successes by increasing waste diversion rates and recommending water conservation measures applicable to both indoor and outdoor water use.
- Transportation: Create an interconnected transportation system and pattern that shifts travel from personal automobiles to walking, biking, and public transit. The transportation and land use strategy identifies ways to reduce automobile emissions, including improving pedestrian and bicycle infrastructure, enhancing public transit service, and improving the City's vehicle fleet.
- Consumption: Increase awareness on consumption choices that will generate less or zero greenhouse gas emissions.

The City's GI Plan is mentioned under the CAP 2.0 Water and Wastewater Objectives and Measures, which states:

> Water conservation and storm water management are important to both CAP 2.0 and to Piedmont's Green Infrastructure plan, which mandates storm water practices such as bioswales and rain gardens in certain development projects. Capturing and treating storm water runoff on-site through green infrastructure helps to reduce flow volumes and pollutant loads to downstream surface waters.

CAP 2.0 Action MUN-5.2C is to implement the City's GI Plan. CAP 2.0 Adaptation Measure A-1.2 encourages GI for natural management or stormwater and storm inducted flood, and for

preserving and restoring natural features to the watershed. Adaptation Measure Action Items include the following:

- Action A-1.2F calls for the City to plant trees to intercept rain and build rain gardens, green roofs, and other vegetative stormwater treatment features; grade surfaces and direct downspouts so that stormwater flows toward vegetated areas.
- Action A-1.2G encourages the use of pervious pavement in new and existing development. It encourages installation of rain gardens, bioswales, porous pavement and disconnected downspouts to reduce runoff.
- Action A-2.1B requires identification of priority areas to expand urban tree and vegetation planting.
- Action A-2.1E encourages the preservation of mature trees and vegetation.
- Action A-2.1F encourages services, education, and incentives to encourage the planting and preservation of trees and vegetation on private property and considers a tree protection ordinance.

1.3.6 Other Policies

In addition to the Cities policies and actions summarized above, the General Plan Natural Resources and Sustainability Elements states:

> Piedmont implements LID practices in two ways. First, the city maintains impervious surface standards in most zoning districts. On single family lots, 30 percent of the surface area must be vegetated (not covered by pavement or a structure). On estate lots, the requirement is 40 percent. Second, the city participates in the ACCWP, which requires stormwater containment and treatment measures for new construction.

2. Prioritizing and Mapping Planned and Potential Projects

This section describes the following MRP requirements:

- A mechanism for prioritizing and mapping GI projects (C.3.j.i.(2)(a)); and
- A list of prioritized GI projects and other outputs of the mechanism (C.3.j.i.(2)(b))

This section also:

- Presents targets for areas of impervious surface to be retrofitted (C.3.j.i.(2)(c)); and
- Discusses prioritized projects for early implementation. The discussion of early implementation references a workplan per Provision C.3.j.i.(2)(j)., which is included in Appendix B.

2.1 Approach for Prioritizing and Mapping Projects (GI Mechanism)

This section describes the Alameda Countywide Green Infrastructure Mechanism ("GI Mechanism") used to prioritize and map areas for planned and potential GI projects. The mechanism consists of the following components:

- ACCWP Multi-Benefit Metrics Prioritization Protocol for the Stormwater Resource Plan (SWRP). The SWRP project prioritization process is described in more detail below.
- ACCWP/Contra Costa Project Tracking and Load Reduction Accounting Tool ArcGIS Online web application. The ACCWP in cooperation with the Contra Costa Clean Water Program developed the ArcGIS online (AGOL) web application based C3 Project Tracking and Load Reduction Accounting Tool ("AGOL Tool"), to assist Permittees with tracking completed C3 projects. Although the AGOL Tool was part of the County process for calculating impervious area treated for completed C3 projects, the City has no completed C3 projects and therefore did not use the AGOL Tool as part of its GI Mechanism.
- UrbanSim analysis. The UrbanSim analysis to identify potential private parcels for development is described in more detail below.
- In addition, the City screened its CIP list to identify additional projects not included in the above sources as part of the GI Mechanism. The City screening is discussed in more detail below.

SWRP Prioritization to Identify GI Projects

The SWRP GI project prioritization protocol used to identify projects included in this GI Plan was a stepwise GIS analysis documented in the Alameda Countywide Stormwater Resource Plan

Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum[3] and summarized below.

Step 1. Identify planned projects – Planned future GI projects within Alameda County were identified and entered into a GIS layer, based on project information provided by local agencies within the County.

Step 2. Identify opportunity sites – Additional potential project locations were identified and catalogued by the ACCWP consultant Geosyntec using a GIS-based opportunity analysis. The project opportunity analysis followed the steps listed below:

a. Identify publicly owned parcels.
b. Screen identified public parcels to include only those that are at least 0.1 acre in size and with an average slope of less than 10 percent. Parcels that met these criteria were screened for physical feasibility.
c. Identify non-interstate highway public right-of-way (ROW) within urban areas. Roadways considered included state and county highways and connecting roads and local, neighborhood, and rural roads.
d. Identify land uses or adjacent land uses of the sites resulting from steps b and c.
e. Screen sites identified in steps b and c to remove sites with the following physical constraints:
    i. Regional facilities were not considered for sites that were greater than 500 feet from a storm drain due to limited feasibility in treating runoff from a larger drainage area;
    ii. Parcel-based facilities were not considered for sites that were more than 50% undeveloped due to the limited potential for pollutant reduction of concern load reduction;
    iii. Sites with more than 50% of their drainage area outside of the urbanized area, as these sites would not provide opportunity for significant pollutant of concern load reduction;
    iv. Sites with more than 50% overlying landslide hazard zones to avoid the potential for increasing landslide risk.

Step 3. Classify planned projects and opportunity sites in preparation for metrics-based evaluation – A GIS analysis was performed to classify the planned projects identified in step 1 and the opportunity sites identified in step 2 according to four parameters listed below:

a. GI project type – Each project received one of the following classifications: parcel-based, regional[4], or ROW/green street project.

[3] Geosyntec Consultants. 2017. Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum. December 13, 2017.
[4] A "Regional" project is (1) a parcel with at least 0.5 acre of undeveloped or pervious area (as identified through the land use class); (2) the drainage area is larger than the parcel itself; (3) the location is sufficiently close to a storm drain.

b. Infiltration feasibility - Each project location received one of the following classifications for infiltration: infeasible, partially feasible, or feasible.
c. Facility type – Each project received one of the following classifications: GI[5], non-GI treatment control facility, water supply augmentation, flood control facility, hydromodification control, public use area or public education area, programmatic stormwater management opportunity.
d. Drainage area information – A drainage area was identified for each project.

Step 4. Score projects using an automated metrics-based evaluation – A quantitative metrics-based multiple benefit evaluation was performed using an automated process. Projects or opportunity sites received a score of 0, 1, or 2 for each of the 14 metrics listed in Table 2-1. The automated scores were used to preliminarily rank the projects by watershed, jurisdiction, project type, and/or project stakeholder(s). Geosyntec provided a jurisdiction-specific list of planned projects and opportunity sites located in the City, including an automated score for each project. Spatial data for the projects included in the list were provided in both GIS shape file and Google Earth KMZ file formats.

Step 5.Rank the projects based on local considerations – The City reviewed the jurisdiction-specific list of planned projects and opportunity sites provided in step 4 as part of preparing the List of Planned and Potential Projects included in Appendix A. The City prepared the List, which provides a final ranking and prioritizing of planned and potential projects, based on the automated scores derived in step 4 and the additional considerations listed below. Approximately 230 SWRP projects were identified in the City with scores ranging from 7 to 15 (scoring criteria in Table 2-1). The City selected five (5) SWRP projects for inclusion in this GI Plan, primarily based on the following criteria:

a. Opportunity Considerations:
    i. Synergies with other municipal or public works projects
b. Multiple Benefits:
    i. Consideration of achieving multiple benefits
    ii. Potential for aesthetic, community, or other benefits not previously identified

[5] *All opportunity sites identified in step 2 were classified as GI projects. Based on information provided by local agencies in step 1, other classifications were assigned, where appropriate, to planned projects. Projects that were not classified as GI have co-benefits that may include GI.*

Table 2-1: Alameda Countywide SWRP Project Metrics-Based Multi-Benefit Scoring Criteria

Project Component	Benefit Addressed	Points		
		0	1	2
General Stormwater Management Performance/Implementation Feasibility				
Parcel area (for regional and parcel-based projects only)	All	<1 acre	1-<4 acres	>4 acres
Location slope	All	7-10%	3-7%	0-3%
Infiltration feasibility	All	No	Partial	Yes
Individual Benefit Performance				
PCBs/Mercury yield classification in project drainage area[1]	Water Quality	New Urban, Agriculture/Open Space, or Other	Old Urban	Old Industrial or Source Property (+1)
Regional Facility	Water Quality	--	Yes	--
Removes pollutant loads from stormwater	Water Quality	Trash Capture Devices	Non-GI and Non-Infiltrating Green Infrastructure Treatment Control	Partially and Fully Infiltrating GI Project or Regional Project (+1)
Augments Water Supply	Water Supply	--	Infiltrating GI of Infiltrating Flood Control Project over Potential Water Supply Aquifer	Harvest/Use of Other Water Augmentation Project[2]
Provides Flood Control Benefits	Flood	--	Fully and Partially Infiltrating GI Project	Flood Control Project[2]
Re-establishes Natural Water drainage systems	Environmental	--	Fully and Partially Infiltrating GI Project	Stream Restoration or Hydromodification on Control[2]
Develops, restores of enhances habitat and open space	Environmental	--	GI Project	Habitat Restoration Project[2]
Provides enhanced or created recreational and public use areas with potential opportunities for community involvement and education	Community	--	GI Project	Public Use Area or Public Education Project Component[3]

1. Includes parcel yield classification for parcel-based projects; drainage area yield classification for regional projects; and adjacent parcel yield classification for ROW projects. Scores will be weighted on the portion of the drainage area in each yield classification.
2. As identified by the project proponent.
3. Defined as providing "enhanced or created recreational and public use areas, community involvement, or employment opportunities" per the State Storm Water Resource Plan Guidelines (SWRCB, 2015) per Permittee/Stakeholder project information. Typically, and added project feature.

UrbanSim Analysis for Private Development Projections

The City participated in a regional process to forecast private development, coordinated through the ACCWP. The process used the outputs of the UrbanSim[6] model developed by the Bay Area Metropolitan Transportation Commission (MTC). MTC forecasts growth in households and jobs and uses UrbanSim to identify development and redevelopment sites to satisfy future demand. The ACCWP process used outputs from UrbanSim to map parcels predicted to undergo development or redevelopment in each Alameda County jurisdiction for the benchmark years 2020, 2030, and 2040. Consistent with the City being built out, the UrbanSim analysis only identified one private parcel in the City planned for development by 2040. The City removed the project from the UrbanSim analysis because there are no known plans to develop the parcel by 2040; the parcel is part of a residential double lot. In summary, the City participated in forecasting private development and the result was no parcels were identified for future development.

CIP Review

The City reviewed its CIP list in addition to projects referred to Public Works as repair and maintenance projects using BASMAA's *Worksheet for Identifying Green Infrastructure Potential in Municipal Capital Improvement Program Projects*. Public projects were screened out where GI was not deemed relevant (e.g., projects with exterior work, technical studies, construction of new streetlights, etc.) or feasible. Based on this review, the City selected three (3) additional projects to include in the GI Plan. One of the three projects includes the Crocker Park and Dracena Park pathways improvements listed in the City's FY 2017-2018 Annual Report, Public Projects Reviewed for GI.

2.2 Summary of Prioritized Projects (Outputs of the GI Mechanism)

The List of Prioritized Planned and Potential Projects included in Appendix A, Maps and Lists of Prioritized Projects, is an output of the GI Mechanism described in above in Section 2.1.

The list includes eight (8) planned and potential public projects and presents the following project information:

- SWRP ID
- Total score from the SWRP metrics-based evaluation (for SWRP projects)
- Project name
- Project location
- Project type (the classification assigned in preparation for metric-based evaluation; parcel-based or ROW)
- Development timeframe (2020, 2030, 2040)

[6] 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). UrbanSim was developed to support the need for analyzing the potential effects of land use policies and infrastructure investments on the development and character of cities and regions. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Government Committees for use in transportation projections and the regional Plan Bay Area development process.

- Total area (acres)
- Impervious area treated (acres)

Maps of planned and potential projects may be updated, as needed, to provide necessary information relative to the identification of funding options and consideration for potential inclusion in the City's CIP list.

2.3 Impervious Surface Retrofit Targets

The City has identified targets for impervious surface to be retrofitted by public GI projects by benchmark years 2020, 2030, and 2040 (Table 2-2). The City has no impervious targets for private GI projects because there are no known private development projects projected in the City through 2040. 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 countywide effort to perform a Reasonable Assurance Analysis, that demonstrates how GI will be implemented to achieve PCBs and mercury load reductions. This analysis is due with ACCWP's Annual Report in September 2020. To the extent that the implementation of this GI Plan may support load reductions for mercury and PCBs, as outputs from the Regional Assurance Analysis become available, the City may consider modifying the targets presented in Table 2-2. Due to uncertainties related to the funding of public GI projects, the City will track its progress toward achieving the targets presented in Table 2-2, identify any challenges that arise in achieving these targets, and propose solutions, in coordination with other MRP Permittees.

Table 2-2: Target Public Project Acres of Existing Impervious Surface to be Retrofitted by 2020, 2030 and 2040

Future Year	GI Impervious Area Targets for Public Projects (Acres)
Cumulative by 2020	1.0
2030	0.5
Cumulative by 2030	1.5
2040	1.2
Cumulative by 2040	2.7

Notes:

3. Acres shown in the table represent areas of impervious surface existing within the City of Piedmont as of July 1, 2002, that are anticipated to be retrofitted by the target years as a result of public projects. There are no planned private development projects.
4. Projections of existing impervious surface to be retrofitted are based on anticipated results of actions described in Section 2.4, Prioritized Projects for Early Implementation; local knowledge of planned future development; anticipated availability of funding; and future development scenarios generated with the MTC UrbanSim model.

2.4 Prioritized Projects for Alternative Compliance Program or Early Implementation

The following prioritized projects have been identified as part of early implementation in accordance with MRP Provision C.3.j.ii:

- The existing GI facilities in Dracena Park (three facilities constructed between April 2015 and June 2019) and the Linda Kingston Triangle (completed March 2017), as discussed in Section 1.3.5.
- The SWRP ROW project called the Lower Grand Triangle, located at Lower Grand Avenue and Holly Place. The project will treat approximately 0.2 acres of imperious area and is expected to be completed by December 2020. Additional details about the Lower Grand Triangle project are provided in Appendix B, Workplan for Completing Prioritized Projects.

The City has no Alternative Compliance program due to the lack of development opportunities.

3. Tracking and Mapping Completed GI Projects

The process for tracking and mapping completed GI projects and making the information publicly available, as required by MRP Provision C.3.j.i.(2)(d), is described below. This process was developed by the ACCWP, which participated in regional coordination with BASMAA to comply with the requirement in Provision C.3.j.iv.(1) that "Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of GI measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions."

3.1 Project Tracking and Load Reduction Accounting Tool

As a member agency of the ACCWP, the City is aware of the ArcGIS online (AGOL) web application-based tool C.3 Project Tracking and Load Reduction Accounting Tool ("AGOL Tool"), which ACCWP developed in cooperation with the Contra Costa Clean Water Program to assist its member agencies in meeting the MRP requirements stated above. 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).

The general process for entering GI projects into the AGOL Tool involves logging into the ArcGIS online web application, opening the tool, and entering data. There are two methods for entering data, but, in general both involve: locating the project area, drawing the project boundary, entering project attributes, drawing the stormwater treatment facilities, and entering facility attributes. Project attributes include fields such as jurisdiction, location description, type of project, project name, and additional optional fields that can be populated if the information is known. Facility attributes include hydraulic sizing criterion, project ID, facility type, treatment, and percent of project area treated by the facility.

The City has no C.3.-Regulated Projects constructed to date. The City's existing non-C.3 Regulated GI Projects are not currently in the AGOL Tool.

3.2 Making Information Publicly Available

As required by the MRP, the process for tracking and mapping completed GI projects (public and private) includes making the information generated by the tool publicly available. Information from the tool will be made publicly available as follows:

- The City will begin using AGOL Tool as part of it processes for reviewing, approving and reporting on non-C.3 Regulated projects that include GI, as well as C.3 Regulated Projects when they occur. The AGOL Tool includes a feature for generating tables of C.3 Regulated Projects and GI projects that include MRP-required project data for annual reporting purposes.

- On an annual basis, include in the Annual Report for the City's Stormwater Program information from the AGOL Tool in the form of (1) a list of GI projects that are planned for implementation during the permit term as required in Provision C.3.j.ii, and (2) a list of Regulated Projects approved during the fiscal year reporting period as required in MRP Provision C.3.b.iv.

- Coordinate with ACCWP to develop a viewable version of the AGOL Tool, which is anticipated to be embedded on ACCWP's public website and may also be accessible via the City's Clean Water Program website.

4. Summary of General Guidelines for GI Projects

General GI Guidelines are presented in Appendix C to guide the City in designing a project that has a unified, complete design that implements the range of functions associated with GI, and in providing for appropriate coordination of projects and project elements. The General GI Guidelines include hydraulic sizing guidance, standard specifications, and typical designs for GI projects that the City will consider when implementing non-C.3 Regulated Projects. Additional information about the General GI Guidelines is summarized below.

4.1 Implementing Projects with a Unified, Complete Design

The General GI Guidelines presented in Appendix C focus on designing and coordinating projects that implement a range of functions appropriate to the type of project. For example, the guidelines for designing street projects address a range of functions including pedestrian travel, use as public space, for bicycle, transit, vehicle movement, and as locations for urban forestry. The guidelines for coordination identify measures for implementation during construction to minimize conflicts that may impact GI.

4.2 Hydraulic Sizing Requirements

Provision C.3.j.i.(2)(g) of the MRP states that GI projects are required to meet the treatment and hydromodification management (HM) sizing requirements included in Provisions C.3.c and C.3.d of the MRP. However, an exception to this requirement is provided in Provision C.3.j.i.(2)(g) for street projects that are not Regulated Projects under Provision C.3.b ("non-Regulated Projects").

The General Guidelines in Appendix C provide hydraulic sizing guidance for GI projects, addressing the hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d, as well as the alternate sizing approach for constrained street projects developed by BASMAA. The guidelines do not address Regulated Projects as defined in MRP Provision C.3.b.

Some non-Regulated Projects are required to implement site design measures in accordance with Provision C.3.i of the MRP. Appendix L of the ACCWP C.3 Technical Guidance Manual explains how to determine whether Provision C.3.i applies to a project and how to incorporate applicable site design measures, if required.

Table 4-1 presents a summary of where to find hydraulic sizing guidance, and other applicable guidance, for different types of projects.

4.3 Standard Specifications and Typical Designs

ACCWP has adopted the City of Dublin's standard specifications and details, which are included in Appendix C, Attachment C-4 of this GI Plan. These include typical design drawings and standard specifications for GI projects that address various types of land use, transportation, and site characteristics. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance Manual (ACCWP 2017b) for other types of LID stormwater treatment facilities, subject to municipal staff approval.

Table 4-1: Where to Find Hydraulic Sizing Guidance and Other Guidance - by Project Type

Type of Project	Where to Find Guidance	
	Provision C.3.i or HM Guidance, if Applicable	**Hydraulic Sizing Guidance**
Non-Regulated GI Project (public or private project) that is NOT subject to Provision C.3.i[7]	Not applicable	Appendix C – General Guidelines for GI Projects
Non-Regulated GI Project (public or private project) that IS subject to Provision C.3.i	ACCWP C.3 Technical Guidance (Appendix L, Site Design Requirements for Small Projects)	
Regulated Project that is NOT a Hydromodification Management (HM) Project[8]	Not applicable	ACCWP C.3 Technical Guidance (Section 5.1, Hydraulic Sizing Criteria)
Regulated Project that IS an HM Project	ACCWP C.3 Technical Guidance (Chapter 7, Hydromodification Management Measures)	

[7] MRP Provision C.3.i applies to projects that create and/or replace at least 2,500 but less than 10,000 square feet of impervious surface; and Individual single-family home projects that create and/or replace 2,500 square feet or more of impervious surface.

[8] An HM Project is a Regulated Project that creates and/or replaces one acre or more of impervious surface, will increase impervious surface over pre-project conditions, and is located in a susceptible area, as shown on the ACCWP default susceptibility map.

5. GI Requirements in Other Planning Documents

In compliance with Provision C.3.j.i.(2)(h), the City has reviewed and made a plan to update planning documents that may affect the future alignment, configuration, or design of impervious surfaces within the City, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. The City's approach for reviewing planning documents was informed by ACCWP's Guidance for Planning Document Updates, dated December 12, 2017.

The following City planning documents were reviewed:

- Piedmont General Plan (Elements: Natural Resources and Sustainability; Parks, Recreation, and Open Space; Community Services and Facilities; Environmental Hazards; Transportation; and Design and Preservation);
- Piedmont General Plan 2015-2023 Housing Element;
- Piedmont Complete Streets Policy;
- Piedmont Pedestrian and Bicycle Master Plan 2015-2024; and
- The City of Piedmont Climate Action Plan 2.0 (CAP 2.0, also discussed in Section 1.3.5).

None of the plans reviewed contain language that inhibits or discourages GI implementation. In fact, several existing plans contain language that support GI: Piedmont General Plan Natural Resources and Sustainability and Community Services and Facilities elements, the Piedmont Complete Streets Policy, Piedmont Pedestrian and Bicycle Master Plan 2015-2024 and the CAP 2.0. The ACCWP Guidance recommends reviewing references to impervious cover. Where references to impervious surfaces were found, they coincide with supporting language to use GI to address runoff (Piedmont General Plan, 2009, Page 5-9 and 5-25). Examples of supporting language include use of permeable pavements and landscaping to reduce pollutants in stormwater, and language that encourages percolation and groundwater recharge efforts via permeable paving.

Appendix D, Table D-1 of this GI Plan summarizes the planning document review. Table D-1 provides the supporting GI language, where the GI language can be found, recommendations for GI language, and the party or individual responsible for each planning document. Table D-1 identifies where GI already exists within each plan and where GI language is needed or lacking. None of the planning documents that were reviewed contained language that barred or discouraged GI. Table D-1 also summarizes documents such as General Plan elements which will be updated in the future (e.g., General Plan updates by 2025). The City will consider GI-related language for the future planning document updates listed in Table D-1.

6. Evaluation of Funding Options

6.1 Local Funding Strategies

The City currently has no approved budget line item specifically to fund public GI projects. The City may use the following resources to fund GI projects included in this GI Plan.

General Fund

The General Fund includes:

- Property-related taxes, which are the City's primary revenue source and account for approximately 70 percent of General Fund revenues;
- Other taxes and franchises include business license, sales and utility users taxes, and franchise fees;
- Revenues from state and regional agencies;
- Revenues generated from service fees such as recreation, ambulance service, planning and plan check fees; and
- Other revenue from licenses and permitting, and other sources.

Street Infrastructure Maintenance and Replacement

Funding sources include Alameda County Measures B (transportation sales tax), BB (extension and augmentation of Measure B), and F (sales tax), and the state gas tax including SB-1[9] funds approved by the state legislature in 2017. Most available funding is dedicated to street resurfacing and sidewalk repair work, with the balance dedicated to important sub-categories such as the implementation of projects prioritized by the approved Pedestrian & Bicycle Master Plan and Complete Streets program.

Sewer Fund

The Sewer Fund covers costs related to the inspection, maintenance, repair, and replacement of the sanitary sewer and storm sewer system in the City.

Capital Improvement Projects

The CIP Fund is used to account for resources that are restricted and committed to expenditures for capital outlays, including the acquisition or construction of capital facilities and other capital assets. The Capital Improvement Projects Review Committee evaluates projects to be presented to City Council for consideration. Based on City Council direction, the CIP fund is adjusted to incorporate new projects and initiatives.

Private Donations

This includes private fundraising efforts such as those undertaken by the Piedmont Recreational Facilities Organization and the Piedmont Beautification Foundation.

[9] *Projects funded with SB-1 monies need to be specifically assigned and approved by the City Council. Once approved, paperwork must be submitted to the state for approval.*

6.2 Other Funding Options

In addition to the local funding strategies discussed above, the City will evaluate other potential funding options to implement the projects included in this GI Plan, as follows:

- Funding options listed in Appendix A, Funding Matrix, of the San Mateo Countywide Water Pollution Prevention Program's GI Funding Nexus Evaluation (SMCWPPP 2019). This includes potentially pursuing State Water Resources Control Board Proposition 1 implementation funding for the SWRP projects included in this GI Plan.[10] Considerable resources may be required to apply for a grant with no guarantee of success; therefore, the City is not obligated to pursue any grant funds.
- BASMAA (2018) developed the Roadmap of Funding Solutions for Sustainable Streets, which addresses the need to identify and remedy obstacles for funding projects that include both complete street improvements and GI. The roadmap includes strategic collaboration actions for public agencies that fund transportation, water, and climate change mitigation and adaptation investments.

[10] The application solicitation period for SWRP Implementation projects is anticipated for late 2019.

7. References

Alameda Countywide Clean Water Program. 2017. C3 Project Tracking and Load Reduction Accounting Tool Guidance Document.

Alameda Countywide Clean Water Program. 2017b. C.3 Technical Guidance Manual, Version 6.

Bay Area Stormwater Management Agencies Association (BASMAA). 2018. Roadmap of Funding Solutions for Sustainable Streets. April 26, 2018.

City of Dublin, California. 2018. Typical Green Infrastructure Designs and Standard Specifications.

Geosyntec. 2017. Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum. December 13.

National Association of City Transportation Officials. 2017. Urban Street Stormwater Guide.

San Francisco Bay Regional Water Quality Control Board (RWQCB). 2017. San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan). Incorporating all amendments approved by the Office of Administrative Law as of May 4, 2017.

San Francisco Bay Regional Water Quality Control Board (RWQCB). 2015. Order No. R2-2015-0049, Municipal Regional Stormwater Permit (MRP).

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). 2009. San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook.

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). 2019. Green Infrastructure Funding Nexus Evaluation. January 2019.

Appendix A. Maps and List of Planned and Potential Projects

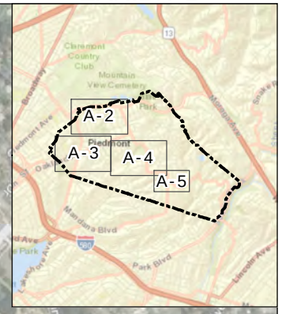
EXHIBIT B

Table A-1
City of Piedmont GI Project List

Project No.	SWRP ID	SWRP Total Score	Project Name	Project Location	Project Type	Development Timeframe	Total Area (Acres)	Impervious Area Treated (Acres)
4	ROW_72519	12.5	Lower Grand Triangle	Lower Grand Ave and Holly Pl	ROW Opportunity	2020	0.6	0.23
5	ROW_62285	12.5	Fairview Triangle @ Arbor Dr	Fairview Ave and Arbor Dr	ROW Opportunity	2030	0.89	0.35
6	PARCEL_400419	12	Highland Strip	Highland and Sheridan Ave	ROW Opportunity	2030	0.37	0.09
7	N/A	N/A	Moraga and Monticello	Moraga and Monticello Ave	ROW Opportunity	2030	0.08	0.03
8	N/A	N/A	Nova and Magnolia	Magnolia Ave and Nova Dr	ROW Opportunity	2030	0.03	0.01
9	ROW_59557	13.5	Cemetery Wall P.A.	Moraga and Estrella Ave	ROW Opportunity	2040	0.65	0.25
10	ROW_80375	11	Cemetery Wall @ Ramona	Moraga and Ramona Ave	ROW Opportunity	2040	0.75	0.32
11	N/A	N/A	City Park Permeable Pathways	Various City parks	Parcel-based	2040	0.62	0.62

Note: The Project No. corresponds to the number on Figures A-1 through A-5.

EXHIBIT B



Project 11 is a permeable pavement project for City Parks.

- Existing GI Facility (Projects 1-3)
- Public by 2020 (Project 4)
- Public by 2030 (Projects 5-8)
- Public by 2040 (Projects 9-11)
- City Boundary

City of Piedmont, California
Existing, Planned and Potential Green Infrastructure Projects

N

1 in. = 0.16 miles

0 0.08 0.16 miles

FIGURE A-1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Esri Streets Basemap, City, Coastland	932.03.55	kando	8/14/2019	8/30/2019	DB

Document Path: P:\Active Projects\Piedmont - 932\932.03.55 - Piedmont GI Plan Development\GIS\Mxd\A-1 GI Plan.mxd

EXHIBIT B

City of Piedmont, California
Existing, Planned and Potential Green Infrastructure Projects

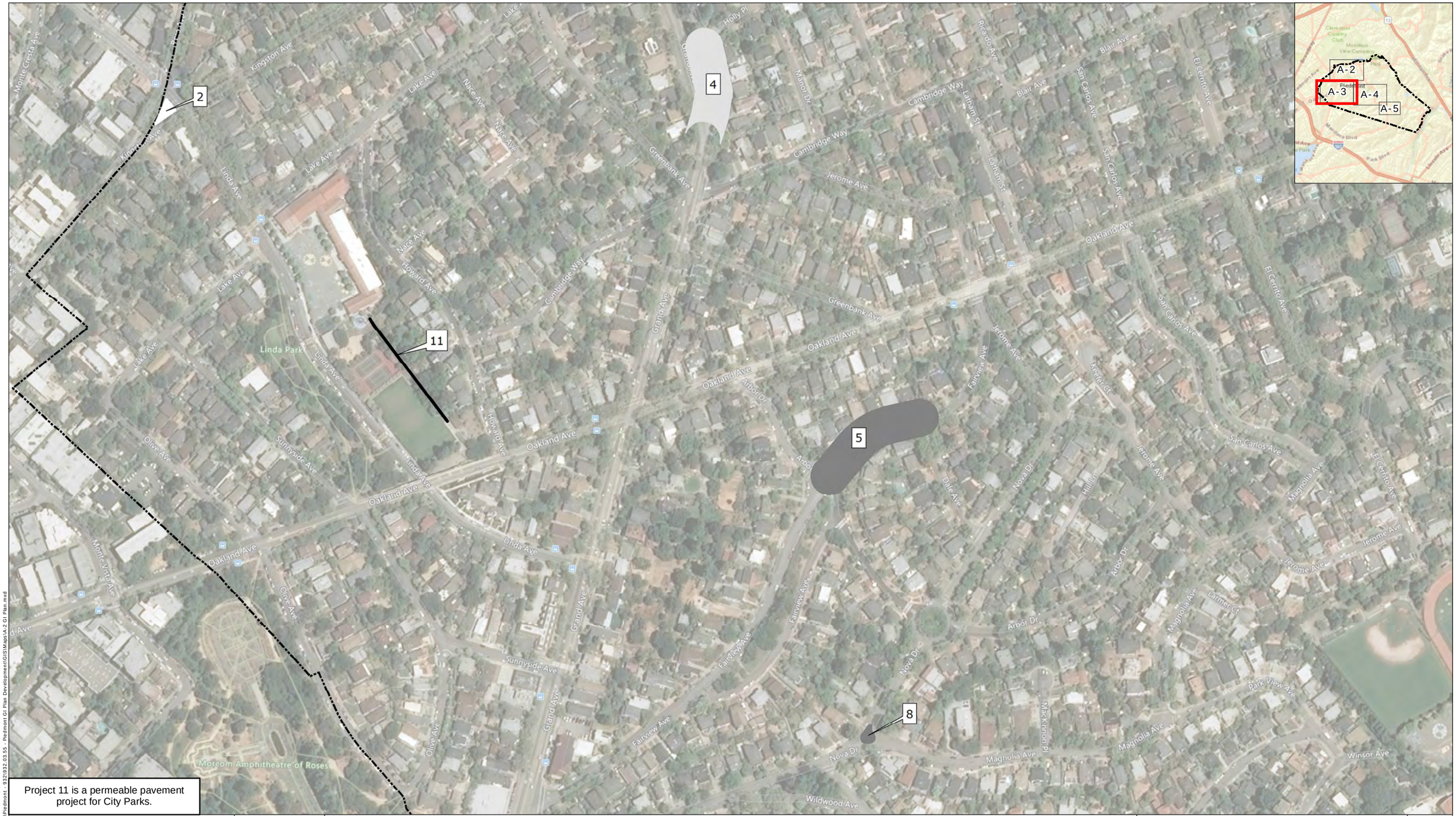
N
1 in. = 250 feet
0 125 250 Feet

FIGURE
A-2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Esri Streets Basemap, City, Coastland	932.03.55	kando	8/14/2019	8/15/2019	DB

Document Path: P:\Active Projects\Piedmont - 932\932.03.55 - Piedmont GI Plan Development\GIS\Maps\A-2 GI Plan.mxd

EXHIBIT B



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- Public by 2030 (Projects 5-8)
- Public by 2040 (Projects 9-11)
- City Boundary

City of Piedmont, California
Existing, Planned and Potential Green Infrastructure Projects

N

1 in. = 250 feet

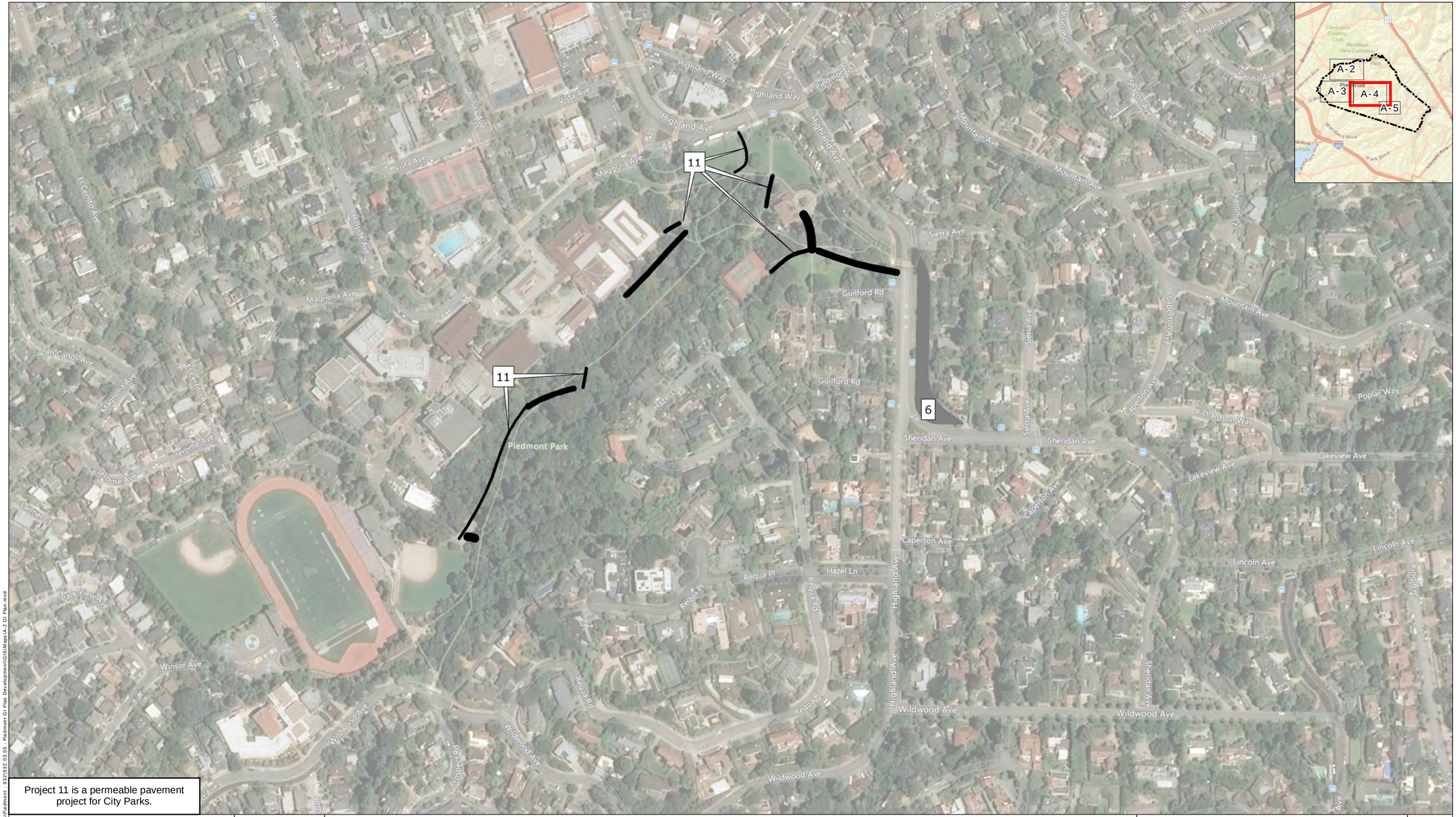
0 125 250 Feet

FIGURE A-3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Esri Streets Basemap, City, Coastland	932.03.55	kando	8/14/2019	8/15/2019	DB

Document Path: P:\Active Projects\Piedmont - 932\932.03.55 - Piedmont GI Plan Development\GIS\Maps\A-2 GI Plan.mxd

EXHIBIT B



Project 11 is a permeable pavement project for City Parks.

- Existing GI Facility (Projects 1-3)
- Public by 2020 (Project 4)
- Public by 2030 (Projects 5-8)
- Public by 2040 (Projects 9-11)
- City Boundary

City of Piedmont, California
Existing, Planned and Potential Green Infrastructure Projects

N

1 in. = 250 feet

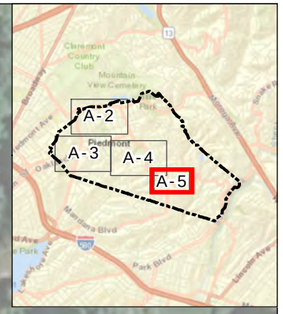
0 125 250 Feet

FIGURE A-4

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Esri Streets Basemap, City, Coastland	932.03.55	kando	8/14/2019	8/15/2019	DB

Document Path: P:\Active Projects\Piedmont - 932\932.03.55 - Piedmont GI Plan Development\GIS\Maps\A-2 GI Plan.mxd

EXHIBIT B



Sheridan Ave
Wildwood Ave
Wildwood Garden
Crocker Ave
King Ave
Sea View Ave
Wistaria Way
Crocker Park
11
Hampton Rd
Woodland Way
Lafayette Ave
Indian Rd
St James Dr

Project 11 is a permeable pavement project for City Parks.

- Existing GI Facility (Projects 1-3)
- Public by 2020 (Project 4)
- Public by 2030 (Projects 5-8)
- Public by 2040 (Projects 9-11)
- City Boundary

NCE

City of Piedmont, California
Existing, Planned and Potential Green Infrastructure Projects

N

1 in. = 150 feet

0 75 150 Feet

FIGURE A-5

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Esri Streets Basemap, City, Coastland	932.03.55	kando	8/14/2019	8/15/2019	DB

Document Path: P:\Active Projects\Piedmont - 932\932.03.55 - Piedmont GI Plan Development\GIS\Maps\A-2 GI Plan.mxd

Appendix B. Workplan for Completing Prioritized Projects

EXHIBIT B

Workplan for Completing Prioritized GI Projects
City of Piedmont

1. Statement of Purpose

The purpose of this workplan is to identify the scheduled timeframes and other key information for implementing prioritized green infrastructure (GI) projects identified as part of Provision C.3.j Early Implementation.

2. Schedule, Budget, and Responsible Party

The following table identifies milestones for the implementation of prioritized projects, as well as the budget, funding source, and responsible party for each project.

	Schedule								Budget	Funding source	Responsible Party
	Planning		Preliminary Design		Final Design		Construction				
Name of Project	Start	Finish	Start	Finish	Start	Finish	Start	Finish			
Lower Grand Triangle - SWRP Project db_index: ROW_72519	Aug 2017	Oct 2019	Nov 2019	Dec 2019	Jan 2020	June 2020	Oct 2020	Dec 2020	TBD	TDB	Dept. of Public Works

Appendix C. General Guidelines for GI Projects

Appendix C. General Guidelines for GI Projects

These General Guidelines have been developed to guide the City of Piedmont in designing a project that has a unified, complete design that implements the range of functions associated with GI projects, and in providing for appropriate coordination of projects and project elements. The guidelines apply to projects that incorporate GI into an existing roadway segment or a previously developed public parcel and are not Regulated Projects as defined in Provision C.3.b of the MRP. The guidelines are organized as follows.

C.1 Functions Associated with GI

The functions associated with GI retrofits of existing streets and GI retrofits of public parcels are identified below.

C.1.1 Functions Associated with GI Retrofits of Existing Streets

The following functions are associated with GI retrofits of existing streets:

- Street use for stormwater management, including treatment;
- Safe pedestrian travel;
- Use as public space for bicycle, transit, and vehicle movement/parking; and
- Use as locations for urban forestry.

C.1.2 Functions Associated with GI Retrofits of Public Parcels

Existing facilities on public parcels may be retrofitted with GI. Although there are potentially a wide range of public uses that could occur on various parcels, key issues are associated with the outdoor use of public parcels for landscaping and parking. The following functions are associated with GI retrofits of public parcels:

- Site use for stormwater management and landscaping
- Circulation and parking within the site

C.2 Guidelines for GI Retrofits of Existing Streets

Streets must perform the range of functions described in Section C.1.1. The following guidelines provide general guidelines for designing and constructing GI facilities within the right-of-way of existing streets, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) stormwater treatment facilities, is provided in Chapters 5 and 6 of the Alameda Countywide Clean Water Program's C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.2.1 Guidelines Addressing Street Use for Stormwater Management

The GI guidelines to support street functionality for stormwater management are organized around the following objectives:

- Convey stormwater to GI facilities,
- Identify the appropriate GI typical designs for the project, and
- Convey stormwater away from transportation facilities.

Convey Stormwater to GI Facilities

GI retrofits of existing streets must be designed to convey stormwater runoff from the roadway surface to the proposed GI facilities. Key issues include working with the street profile, working with the existing drainage system, and considering conveyance facilities where needed.

Work with the Existing Street Profile

Modifying the profile of an existing street is costly. Therefore, the designs of GI street retrofits should generally maintain the existing street profile where feasible. The street profile affects how stormwater runoff flows off of a street and is considered in the design of GI facilities. The most common street profile is crowned, although some streets may be reverse crowned, or may drain to one side, as illustrated in Figures C-1 through C-3. Occasionally, a street may have a flat profile, such as the example shown in Figure C-4 in which a street is designed to drain into pervious pavement. Unless pervious pavement is used for the full width of the street, GI facilities would be located downslope from the roadway surface. In a crowned street, this may allow for GI facilities on both sides of the street. In a reverse crowned street, GI facilities may be considered in the median; and in a side-sloping street, GI facilities would be located on the downslope side.

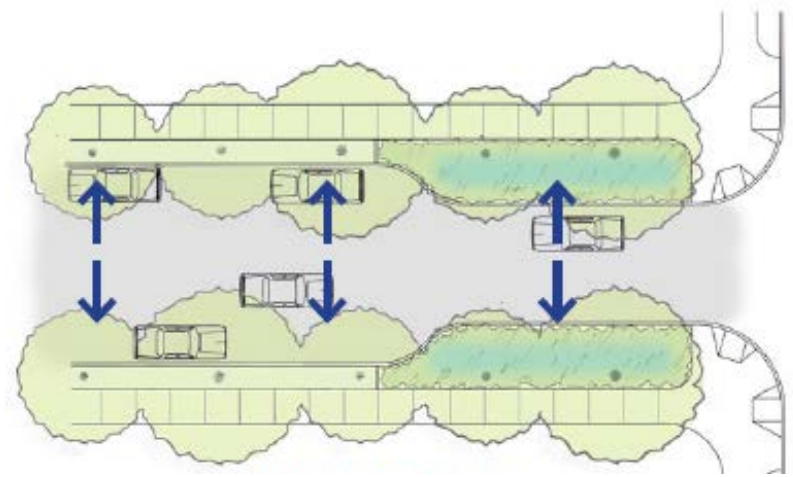


Figure C-1. Crowned Street Profile. A crowned street is designed so that the highest elevation is in the middle of the street, such that stormwater runoff drains to the sides of the street. GI facilities may be located on either side of the street.

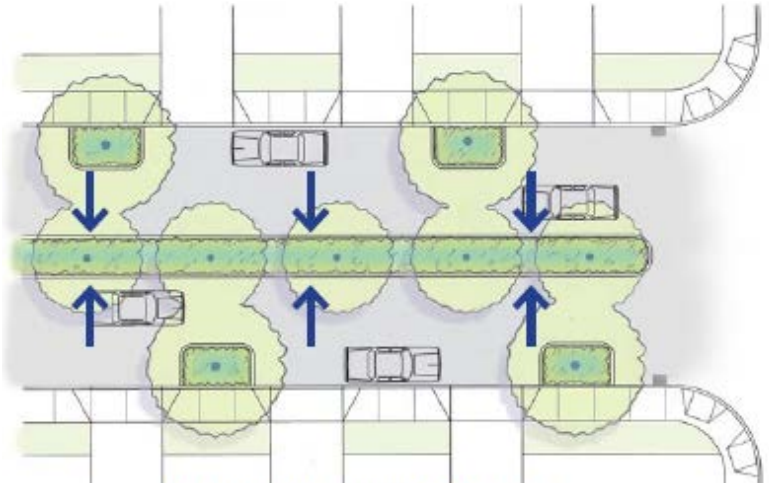


Figure C-2. Reverse Crowned Street Profile. A reversed crowned street is the opposite of a crowned street and directs runoff to the center line of the street. GI facilities may be considered in the median.

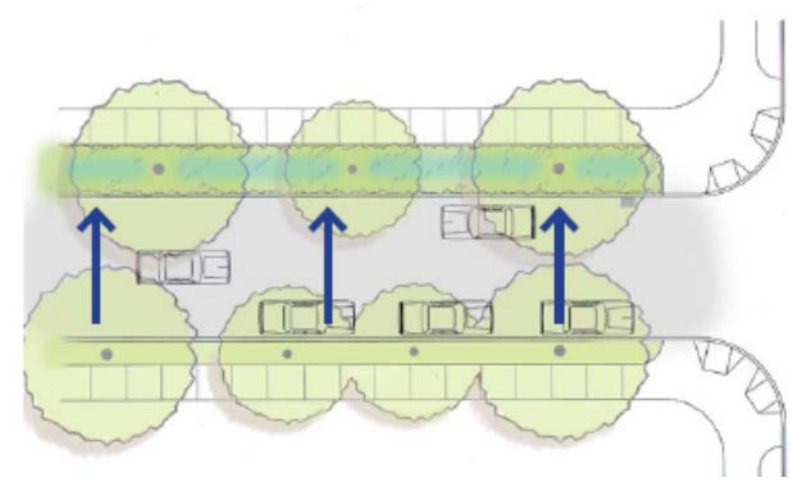


Figure C-3. Side Shed Street Profile. Side shed streets are designed to shed all water to one side of the street. GI facilities would be located on the downslope side.

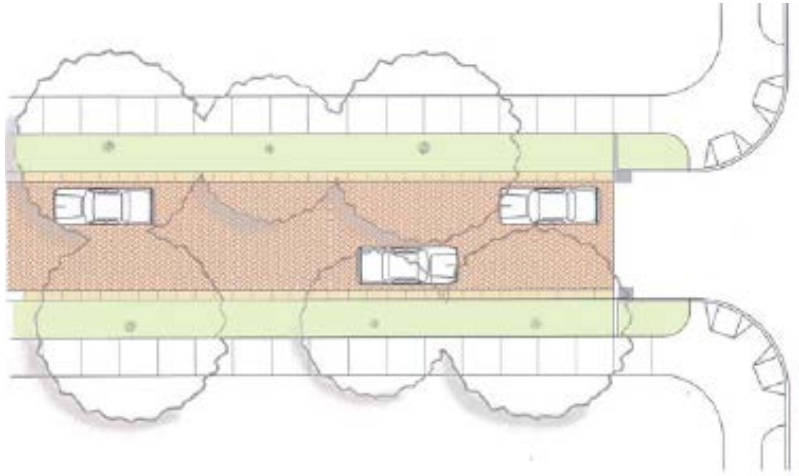


Figure C-4. Flat Street Profile. Flat streets are designed to drain through pervious paving. While these facilities do not have a marked slope, they may be graded slightly so that they drain to the sides or center of the street when there is too much water.

Source: San Mateo Countywide Water Pollution Prevention Program/Nevue Ngan

Work with the Existing Drainage System

If an underdrain will be included in the GI facility design, a street retrofit site should have an existing storm drain line, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

Figure C-5. Donnelly Street Green Street Project. The Donnelly Street Green Street Project includes a rain garden, pictured at right, which captures runoff from the adjacent commercial buildings and parking lot. The rain garden was designed with no underdrain and an enlarged subsurface layer of rock, which serves as a reservoir and allows runoff to slowly infiltrate to the underlying soil. The system was designed for onsite management of flows that exceed the 30-year storm. An overflow to the curb is provided for a 50- to 100-year event scenario.
Source: City of Burlingame

Consider Conveyance Facilities

In some cases, a street retrofit project may be located near an appropriate site for a larger stormwater facility than can be accommodated in the typical street right-of-way. For example, a street retrofit project may be designed to convey stormwater runoff to a bioretention facility that will be constructed on an adjacent park or greenway. This approach is illustrated by the City of El Cerrito's Ohlone Greenway Natural Area and Rain Garden project's incorporation of a rain garden (Figure C-6) that captures and treats stormwater runoff from an adjacent segment of Fairmont Boulevard. Various methods may be considered for conveying runoff to nearby GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8).

Figure C-6. Ohlone Greenway Natural Area and Rain Garden. This rain garden captures and treats runoff from an adjacent segment of Fairmont Boulevard. In this instance, the rain garden location provided an opportunity to convey and treat stormwater outside the street right-of-way.
Source: PlaceWorks

Figure C-7. Trench Drain. A trench drain can be used to convey runoff to GI facilities.

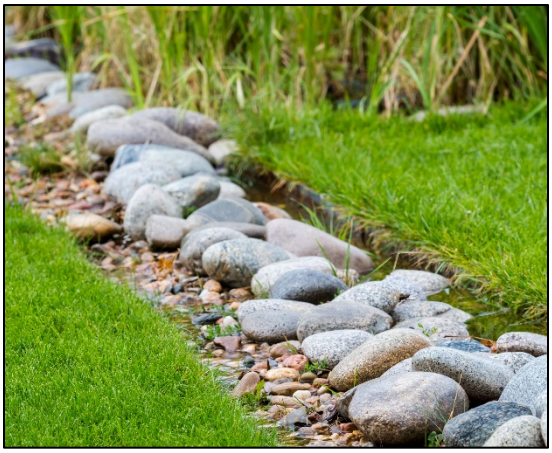


Figure C-8. Pervious Drainage Channel. Pervious, unlined drainage channels can be designed to convey runoff to GI facilities.

Identify the Appropriate Typical Design for Street Project Site

Refer to Attachment C-4 of this appendix to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Appropriate Hydraulic Sizing Criteria

Refer to Attachment C-1 for guidance on identifying and using the appropriate hydraulic sizing criteria for the proposed project.

Convey Stormwater away from Transportation Facilities

To manage the risk of flooding, adequate drainage facilities must be provided for all segments of roadway, in accordance with the City's storm drainage design standards, including design criteria, standards, policies, and procedures for storm drainage improvements. All storm drainage facilities must be designed in accordance with the applicable standards and accepted engineering principles, as directed by Department of Public Works.

C.2.2 Guidelines Addressing Pedestrian Travel within Street Right of Way

To help reduce pollution from automobiles, the City has a goal to improve and expand transportation choices, including the pedestrian mode of travel. As part of meeting this goal, the design of GI retrofits of existing streets should incorporate measures that seek to enhance the safety and attractiveness for pedestrians. The following measures may be considered:

- Incorporate into project intersections curb extensions, also referred to as bulbouts, which reduce the street width at intersections and shorten the length of street crossings for pedestrians, while also providing space for GI facilities (see Figure C-9).
- Provide attractive landscaping designs that enhance the sense of place for pedestrians and may potentially include amenities such as shade trees and seating areas.
- Locate the GI facility between the sidewalk and vehicle travel lanes, in order to enhance pedestrian safety by providing protected sidewalks.

Figure C-9. Curb Extension. In addition to reducing the street width and shortening the length of street crossings for pedestrians, curb extensions, or "bulbouts," such as this example in Albany, also provide space for GI facilities.
Source: bluegreenbldg.com

C.2.3 Guidelines Addressing Street Use for Bicycle, Transit, and Vehicle Movement/Parking

Complete streets balance the needs of pedestrian, bicycle, automobile, and public transit modes of travel. To meet the goal of improving and expanding transportation choices, described in Section C.2.2, in addition to pedestrian transportation, GI retrofits of existing streets must also be designed to accommodate bicycles, motor vehicles, and, where appropriate, public transit. The design and construction of each GI project should incorporate appropriate measures to enhance transportation safety and help improve the attractiveness of alternative modes of travel. The following measures may be considered:

Bicycle-Friendly Measures

- Include bicycle lanes in GI retrofits of existing streets.
- Provide a protected bicycle lane by locating a GI facility or other landscaped area, or a lane of parking, between a bicycle lane and lanes of motor vehicle travel.
- Include bicycle racks in GI street retrofit projects.

Public Transit-Friendly Measures

- Enhance the comfort of public transit users by providing shelter, shade, and greenscape at bus stops and other public transit stops.
- Integrate GI into transit facilities, such as boarding bulbs and islands, or rooftops of transit shelters.
- Provide bicycle racks at public transit stops.

Motor Vehicle-Friendly Measures

- Implement GI with geometric changes that reduce vehicle speed and/or improve visibility. This may include "road diet" projects that reduce the number of lanes of travel, or traffic calming projects that incorporate areas of landscaping, such as traffic islands, as visual cues to help slow down traffic.
- Provide visual cues to help slow down traffic and alert drivers to the presence of GI facilities, to help prevent motor vehicles from driving into a stormwater facility. Visual cues may include curbs and landscaping that is readily visible to drivers.

C.2.4 Guidelines Addressing Urban Forestry in Public Right of Way

Increasing the planting of street trees in the City is anticipated to benefit local water quality, air quality, energy efficiency, and property values. GI projects should incorporate measures to preserve existing street trees and promote the planting of new street trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with the requirements of the Public Works Department.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3

Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3 Guidelines for GI Retrofits of Public Parcels

Public parcels must perform the range of functions described in Section C.1. The following guidelines provide general guidelines for GI retrofitting of public parcels, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) storm water treatment facilities, is provided in Chapters 5 and 6 of the ACCWP C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.3.1 Guidelines to Address Parking Lot Use for Landscaping and Stormwater Management

Parking lots often contain excess parking spots and oversized parking spaces and drive aisles. GI retrofits of public parcels should consider options to reduce any unnecessary parking areas, in order to provide space for landscaping, stormwater management, and pedestrian walkways. The following measures may be considered:

Maximize Space for GI and other Landscaping

To allow more space for GI and other landscaping, shorten parking stall lengths to 15 feet, and drive/back-up aisle widths to 22 feet, subject to municipal approval. Parking should be designed to meet "average day" needs and utilize pervious overflow parking zones to meet peak parking needs.

Consider Specifying Pervious Paving Pervious paving may be used in parking lot designs. Where pervious paving is underlain with pervious soil or pervious storage material sufficient to hold the Municipal Stormwater Regional Permit Provision C.3.d volume of rainfall runoff, it is not considered impervious and can function as a self-treating area. Please see Section 6.6 of the C.3 Technical Guidance for further design guidance for pervious pavement installations.

Convey Stormwater to GI Facilities

GI retrofits of existing sites must be designed to convey stormwater runoff from impervious surfaces (roofs and/or parking lots) to the proposed GI facilities. Key issues include working with the existing drainage system and considering conveyance facilities where needed.

Work with the Existing Drainage System

If an underdrain will be included in the GI facility design, the site should have access to an existing storm drain line, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

Consider Conveyance Facilities

Various methods may be considered for conveying runoff from impervious surfaces to GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8). In parking lots that include speed bumps, consider using speed bumps to help direct stormwater runoff to GI facilities.

Identify the Appropriate Typical Design for the Project Site

Refer to Attachment C-4, included in this appendix, to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Hydraulic Sizing Criteria Identified in Provisions C.3.c and C.3.d

Refer to Attachment C-1 for guidance on using the appropriate hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to design GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects).

Prioritize Tree Preservation and Planting

In order to benefit local water quality, air quality, energy efficiency, and property values, GI projects on public parcels should incorporate measures to preserve existing street trees and promote the planting of new trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with the requirements of the Public Works Department.
- Incorporate trees in landscaped areas within parking lots – which serves to shade vehicles and paved surfaces, improve air and water quality, intercept stormwater in the tree canopy, and take up stormwater through the root system.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3 Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3.2 Guidelines to Address Parking Lot Use for Vehicular Parking

GI retrofits of public parcels should provide for adequate motor vehicle and bicycle parking for the proposed public use. The following measures may be considered:

- Include bicycle parking facilities.
- Provide pedestrian walkways within parking lots, including bridged walkways across GI facilities.

- Provide safe pedestrian access to and directional signage for adjacent public transit stops.
- Consider other improvements to enhance existing pedestrian circulation and safety.
- Depending on the type of use, larger public parcel retrofits should consider providing bicycle storage, changing rooms, and preferred parking for carpooling

C.4 Guidelines for Coordination of Projects

Installing GI components at a project prior to the completion of that project, or the construction of an adjacent project, has the potential to degrade the functioning of the GI facility. Street improvement or other infrastructure projects, the development of public parcels, and other public and private projects should therefore include coordination of construction schedules to minimize impacts to GI.

The following measures shall be implemented in all GI projects to protect investments in GI:

1. GI facilities shall not be used as temporary sediment basins during construction.
2. Erosion control plans shall include protections for GI; erosion control plans are subject to the requirements in Piedmont Municipal Code Chapter 19.
3. Installed GI facilities shall be protected from construction runoff and kept offline until the contributing drainage area is stabilized.

Contractors are encouraged to construct GI facilities at the end of a project, to help protect the facilities from construction-related impacts.

Attachment C-1: Hydraulic Sizing Criteria

This provides guidance on the following topics:

- Hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects)
- Alternate sizing approach for constrained street projects

C1.1 Hydraulic Sizing Criteria in MRP Provisions C.3.c and C.3.d

Provision C.3.c requires the use of low impact development (LID) stormwater controls. To meet the MRP definition of LID, bioretention facilities must have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour.

Provision C.3.d of the MRP includes volume-based, flow-based, and the combination volume- and flow-based hydraulic sizing criteria. Bioretention areas may be sized using a simplified flow-based hydraulic sizing method, known as the "4 percent method," in which the surface area of the bioretention area is 4 percent of the effective impervious surface area that is treated. However, by using a combination volume- and flow-based hydraulic sizing approach, it may be possible to provide a bioretention area that is less than 4 percent of the effective impervious surface area, which can help reduce costs. Step-by-step instructions for using the 4 percent method and the volume-based sizing criteria are provided in Section 5.1 of the C.3 Technical Guidance. Guidance for using the combination flow and volume criteria from Section 5.1 of the C.3 Technical Guidance document are copied below. The worksheet for using this method is provided in Attachment C-2.

The implementation of LID stormwater treatment facilities designed in accordance with Provisions C.3.c and C.3.d of the MRP will provide hydromodification management benefits by infiltrating and detaining stormwater runoff.

Step-by-Step Guidance for Combination Flow and Volume Method

To apply the combination flow and volume approach, use the following steps, which may be performed using the combination flow and volume sizing criteria Excel worksheet provided in Attachment C-2 of this appendix.

1. **Mean Annual Precipitation**
    - Determine the mean annual precipitation (MAP) for the project site using the Mean Annual Precipitation Map of Alameda County (Attachment C-3). Use the Oakland Airport unit basin storage volume values from Table C1-1(below) if the project location's mean annual precipitation is 16.4 inches or greater and the San Jose values if it is less than 16.4 inches.
    - In order to account for the difference between MAP of the project site and the two rainfall locations shown, calculate the ***MAP adjustment factor*** by dividing the project MAP by the MAP for the applicable rain gauge, as shown below: MAP adjustment factor = (project location mean annual precipitation

$$Map\ adjustment\ factor = \frac{(project\ location\ mean\ annual\ precipitation)}{(18.35\ or\ 14.4, as\ appropriate)}$$

2. Effective Impervious Area for the Drainage Management Area

- Based on the topography of the site and configuration of buildings, divide the site into drainage management areas (DMAs), each of which will drain to a treatment measure. Implement the steps below for each DMA with a volume-based treatment measure.
- Minimize the amount of landscaping or pervious pavement that will contribute runoff to the treatment measures. Refer to Sections 4.1 and 4.2 of the C.3 Stormwater Technical Guidance to design areas of landscaping or pervious pavement as "self-treating areas" or "self-retaining areas," so that they do not contribute runoff to the LID treatment measure and may be excluded from the DMAs for the treatment measures.
- For each DMA in which the area that will contribute runoff to the treatment measure includes pervious surfaces (landscaping or properly designed pervious paving), multiply the area of pervious surface by a factor of 0.1.
- For applicable DMAs, add the product obtained in the previous step to the area of impervious surface, to obtain the "***effective impervious area***." (For DMAs that are 100% impervious, use the entire DMA area.)

3. Unit Basin Storage Volume

- The effective impervious area of a DMA has a runoff coefficient of 1.0. Refer to Table C1-1 to obtain the ***unit basin storage volume*** that corresponds to your rain gauge area. For example, using the Oakland Airport gauge, the unit basin storage volume would be 0.67 inches. Adjust the unit basin storage volume for the site by multiplying the unit basin storage volume value by the MAP adjustment factor calculated in Step 1.
- Calculate the ***required capture volume*** by multiplying the effective impervious area of the DMA calculated in Step 2 by the adjusted unit basin storage volume. Due to the mixed units that result, such as acre-inches, it is recommended that the resulting volume be converted to cubic feet for use during design. For example, say you determined the adjusted unit basin storage volume to be 0.5 inches, and the effective impervious area draining to the bioretention facility is 7,000 square feet. Then the required capture volume would be:

$$Required\ capture\ volume = 0.5\ inches\ \times \left(\frac{1\ foot}{12\ inches}\right) \times 7{,}000\ feet^2 = 292\ cubic\ feet$$

Table C1-1. Unit Basin Storage Volume (Inches) for 80 Percent Capture with 48-Hour Drawdown Time		
		Unit Basin Storage Volume for Effective Impervious Area of Drainage Management Area
Location	**Mean Annual Precipitation (inches)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56
Source: CASQA 2003, cited in Table 6-2 of the C.3 Technical Guidance.		

4. Depth of Infiltration Trench or Pervious Paving Base Layer

- Assume that the rain event that generates the required capture volume of runoff determined in Step 3 occurs at a constant rainfall intensity of 0.2 inches/hour from the start of the storm (i.e., assume a rectangular hydrograph). Calculate the ***duration of the rain event*** by dividing the unit basin storage volume by the intensity. In other words, determine the amount of time required for the unit basin storage volume to be achieved at a rate of 0.2 inches/hour. For example, if the unit basin storage volume is 0.5 inches, the rain event duration is 0.5 inches ÷ 0.2 inches/hour = 2.5 hours.

5. Preliminary Estimate of the Surface Area the Facility

- Make a ***preliminary estimate of the surface area*** of the bioretention facility by multiplying the DMA's impervious area (or effective impervious surface if applicable) by the 4 percent method sizing factor of 0.04. For example, a drainage area of 7,000 square feet of impervious surface × 0.04 = 280 square feet of bioretention treatment area.
- Assume a bioretention area that is about 25% smaller than the bioretention area calculated with the 4 percent method. Using the example above, 280 – (0.25 × 280) = 210 square feet.
- ***Calculate the volume of runoff that filters through the biotreatment soil*** at a rate of 5 inches per hour (the design surface loading rate for bioretention facilities), for the duration of the rain event calculated in Step 4. For example, for a bioretention treatment area of 210 square feet, with an infiltration rate of 5 inches per hour for a duration of 2.5 hours, the volume of treated runoff = 210 square feet × 5 inches/hour × (1 foot/12 inches) × 2.5 hours = 219 cubic feet. (Note: when calculating ponding depth, the mulch layer is not included in the calculation.)

6. Initial Adjustment of Depth of Surface Ponding Area

- Calculate the portion of the required capture volume ***remaining after treatment is accomplished by filtering*** through the treatment soil. The result is the amount that must be stored in the ponding area above the reduced bioretention area assumed in Step 6. For example, the amount remaining to be stored comparing Step 3 and Step 5 is 292 cubic feet – 219 cubic feet = 73 cubic feet. If this volume

is stored over a surface area of 210 square feet, the ***average ponding depth*** would be 73 cubic feet ÷210 square feet = 0.35 feet or 4.2 inches.

- Check to see if the ***average ponding depth is between 6 and 12 inches***, which is the recommended allowance for ponding in a bioretention facility or flow-through planter.

7. **Optimize the Size of the Treatment Measure**
    - If the ponding depth is greater than 12 inches, a larger surface area will be required. (In the above example, the optimal size of the bioretention area is 190 square feet with a ponding depth of 6 inches.) In order to build conservatism into this sizing method, the Countywide Program recommends that municipalities not approve the design of any bioretention areas or rain gardens that have a surface area that is less than 3 percent of the effective impervious area within the DMA.

Please note that Appendix C of the C.3 Stormwater Technical Guidance includes an example of sizing bioretention areas using the combination flow- and volume-based method.

C1.2 Alternate Sizing Approach for Constrained Street Projects

Provision C.3.j.i.(2)(g) of the MRP allows the jurisdictions subject to the MRP (MRP Permittees) to develop an alternate sizing approach for street projects that are not subject to Provision C.3.b.ii. (non-Regulated Projects) in which project constraints preclude fully meeting the C.3.d sizing requirements. This approach, developed by BASMAA, is referred to as *Green Infrastructure Facility Sizing for Non-Regulated Street Projects* (June 2019) and is included as Attachment C-6.

The BASMAA guidance states that bioretention facilities in street projects should be sized as large as feasible and meet the Provision C.3.d sizing criteria where possible. It further states that bioretention facilities in street projects smaller than what would be required to meet the Provision C.3.d criteria may be appropriate in some circumstances, and provides guidance that may be applied to those circumstances.

On June 21, 2019, the RWQCB provided conditional acceptance of BASMAA's guidance. The conditional acceptance directs Permittees to use existing MRP Provision C.3.d regulated project sizing for green street bioretention treatment control initial sizing. With cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(g) approach, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees), and with reporting in their Annual Reports, Permittees may use the proposed C.3.j.i.(g) sizing for "non-Regulated Project" green streets projects, including non-Regulated Project green streets projects in Permittees' GI Plans and purely voluntary green streets projects.

Attachment C-2: Worksheet for Calculating the Combination Flow and Volume Method

The worksheet for calculating the combination flow and volume method is provided on the following page.

EXHIBIT B

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1 Project Name:

1-2 City application ID:

1-3 Site Address or APN:

1-4 Tract or Parcel Map No:

1-5 Site Mean Annual Precip. (MAP)[1] **Inches**

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as:

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, shown in Table 5.2, below.)

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA:

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface		1.0	
2-3	Pervious service		0.1	
	Total DMA Area (square feet) =			

2-4 ***Total Effective Impervious Area (EIA)*** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1 Rainfall intensity **0.2 Inches per hour**

4-2 Divide Item 3-2 by Item 4-1 **Hours of Rain Event Duration**

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1 4% of DMA impervious surface **Square feet**

5-2 Area 25% smaller than item 5-1 **Square feet**

5-3 Volume of treated runoff for area in Item 5-2 **Cubic feet** (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1 Subtract Item 5-3 from Item 3-3 **Cubic feet** (Amount of runoff to be stored in ponding area)

6-2 Divide Item 6-1 by Item 5-2 **Feet** (Depth of stored runoff in surface ponding area)

6-3 Convert Item 6-2 from ft to inches **Inches** (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1 Enter an area larger or smaller than Item 5-2 **Sq.ft.** (enter larger area if you need less ponding depth; smaller for more depth.)

7-2 Volume of treated runoff for area in Item 7-1 **Cubic feet** (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)

7-3 Subtract Item 7-2 from Item 3-3 **Cubic feet** (Amount of runoff to be stored in ponding area)

7-4 Divide Item 7-3 by Item 7-1 **Feet** (Depth of stored runoff in surface ponding area)

7-5 Convert Item 7-4 from feet to inches **Inches** (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

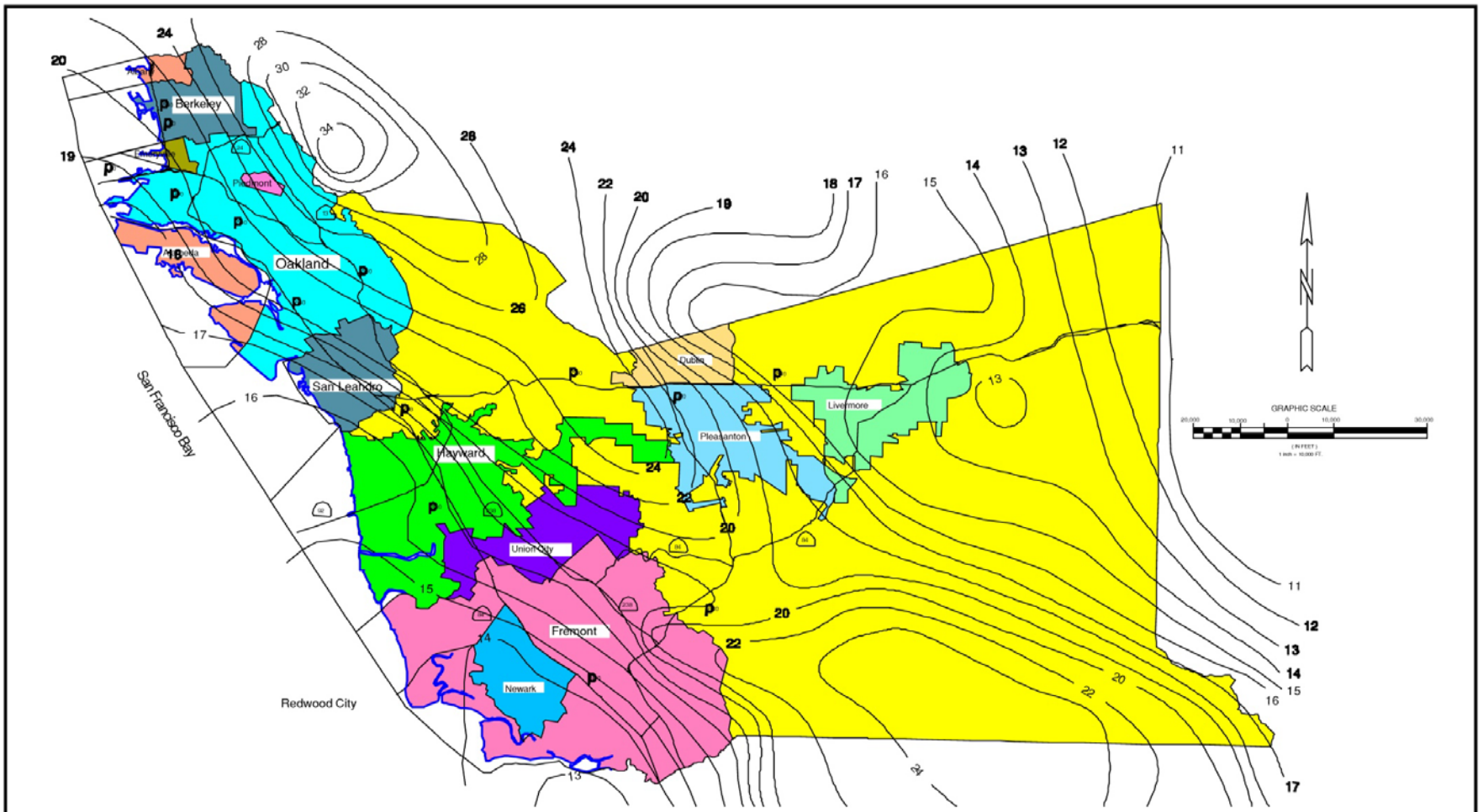
8-1 Final surface area of treatment* **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Attachment C-3: Mean Annual Precipitation Map

The Mean Annual Precipitation Map for Alameda County is provided on the following page.

EXHIBIT B



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	MEAN ANNUAL PRECIPITATION (VALUES IN INCHES)	DATE: MAY 2003 **ATTACHMENT-6**

Attachment C-4: Standard Specifications and Typical Designs

The ACCWP adopted the City of Dublin's standard specifications and details. Standard specifications and typical design drawings for GI projects are provided on the following pages, as indicated in Table C5-1.

Table C5-1: ACCWP GI Typical Designs/Standard Specifications

Sheet No.	Title of Drawing/Standard Specifications	Site Characteristics		
		Land Use	Street Classification	Other
GI-2A	Bioretention area: Plan view with street parking	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane
GI-2B	Bioretention area: Bulbout plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with sidewalks
GI-2C	Bioretention area: Street Median	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-3A	Bioretention Area: Sloped Sides Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Sidewalk
GI-3B	Bioretention Area: Vertical Side Wall Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-4	Bioretention Components: Outlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-5	Bioretention Components: Edge Treatment Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	No parking
GI-6A	Bioretention Components: Gutter Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-6B	Bioretention Components: Trench Drain Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-6C	Bioretention Components: Curb Cut At Bulbout Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with Sidewalks
GI-7	Bioretention Components: Check Dam Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Slope requiring check dams
GI-8	Bioretention area with bike lane plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Bike lane

EXHIBIT B

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)

NOT FOR CONSTRUCTION

cleanwater PROGRAM

BIORETENTION AREA: NOTES

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

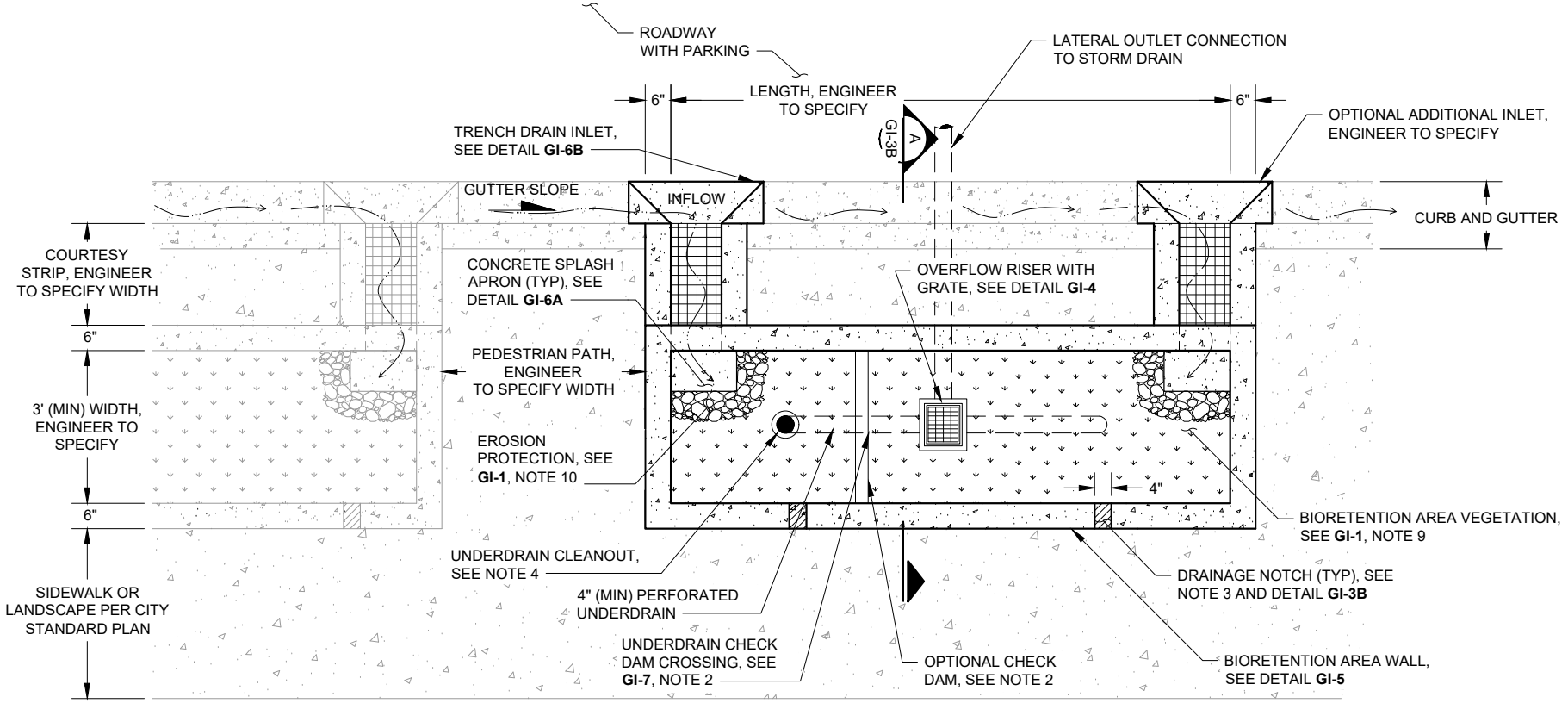
SCALE: NOT TO SCALE

DATE: MAY 11, 2018 REVISED: JUNE 11, 2019

DRAWN BY: K. K. REVISED BY: E. F.

CHECKED BY: A. R.

GI-1



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

cleanwater PROGRAM

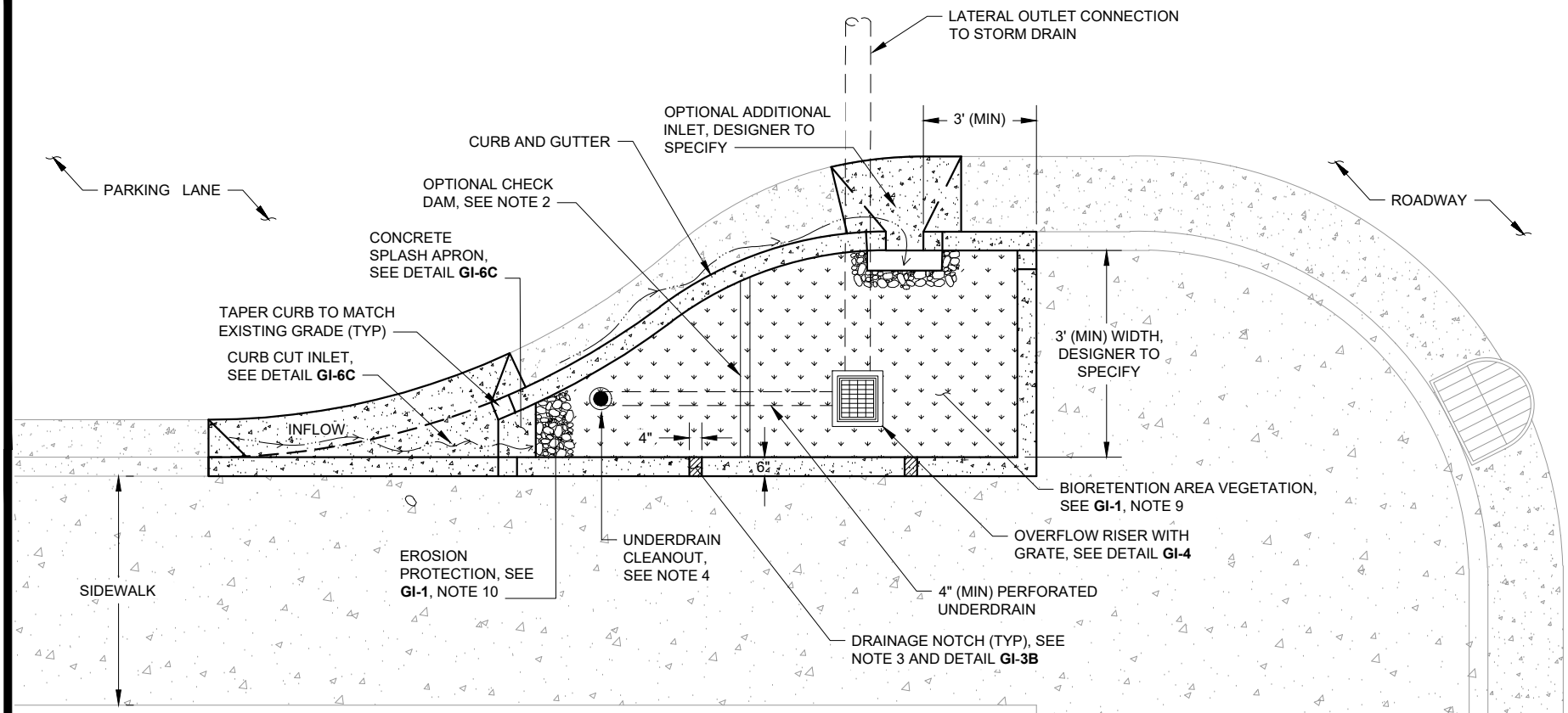
BIORETENTION AREA: PLAN VIEW WITH STREET PARKING

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-2A



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 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

cleanwater PROGRAM

BIORETENTION AREA: BULBOUT PLAN VIEW

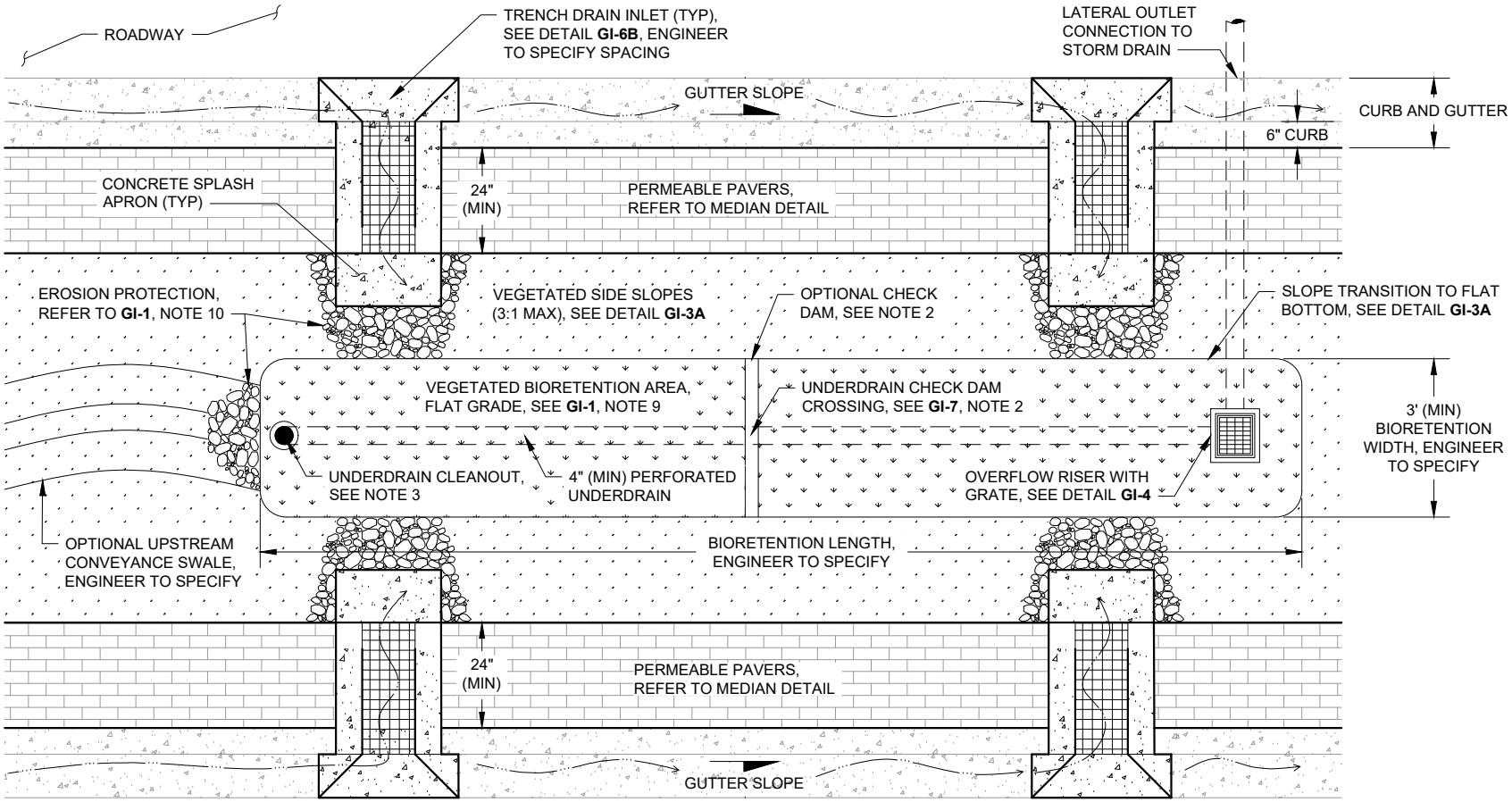
GREEN INFRASTRUCTURE EXAMPLE DETAILS

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-2B

EXHIBIT B



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

cleanwater PROGRAM

GREEN INFRASTRUCTURE EXAMPLE DETAILS

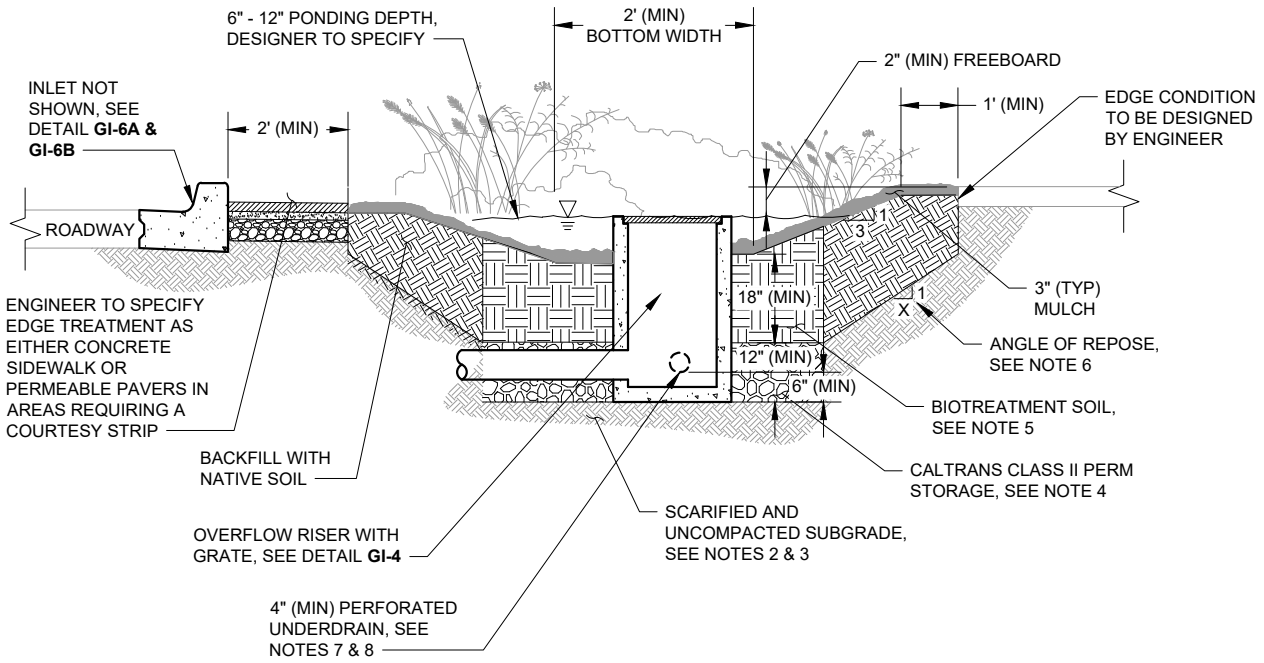
ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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-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

cleanwater PROGRAM

BIORETENTION AREA: SLOPED SIDES CROSS SECTION

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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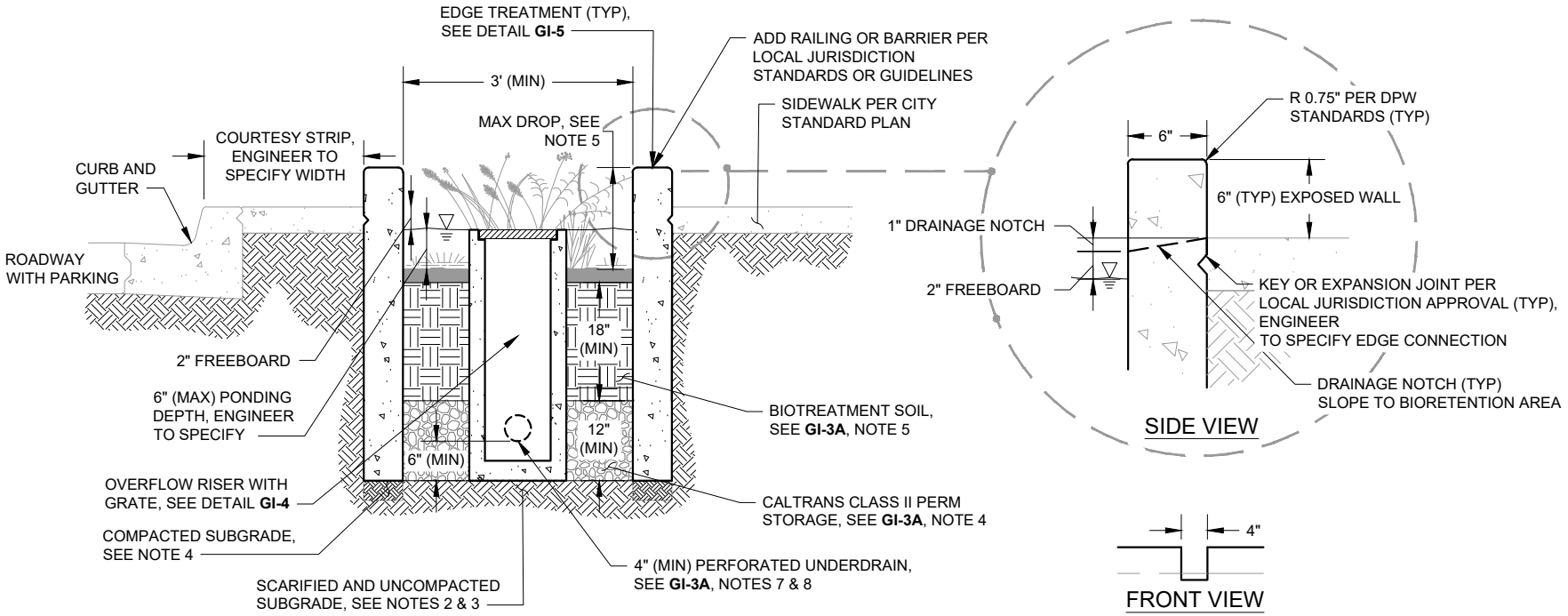
GI-3A



BIORETENTION AREA WITH VERTICAL SIDE WALLS (A)

DRAINAGE NOTCH DETAIL

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

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BIORETENTION AREA: VERTICAL SIDE WALL CROSS SECTION

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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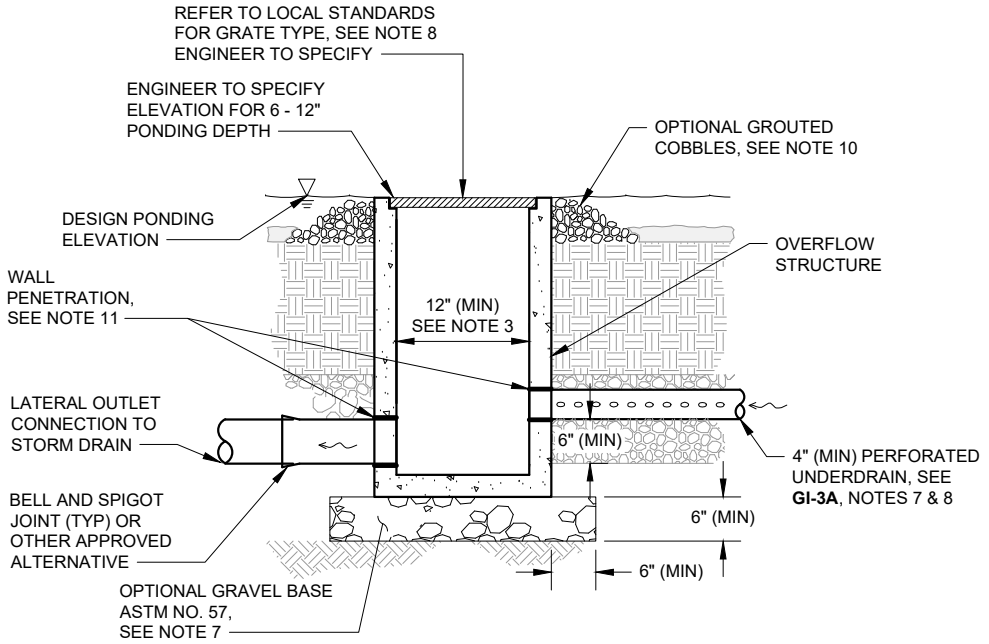
GI-3B

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

cleanwater PROGRAM

BIORETENTION COMPONENTS: OUTLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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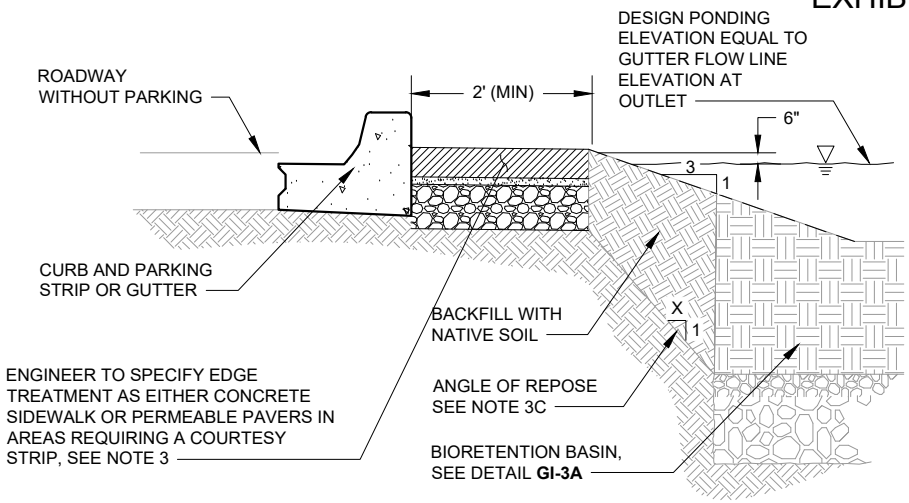
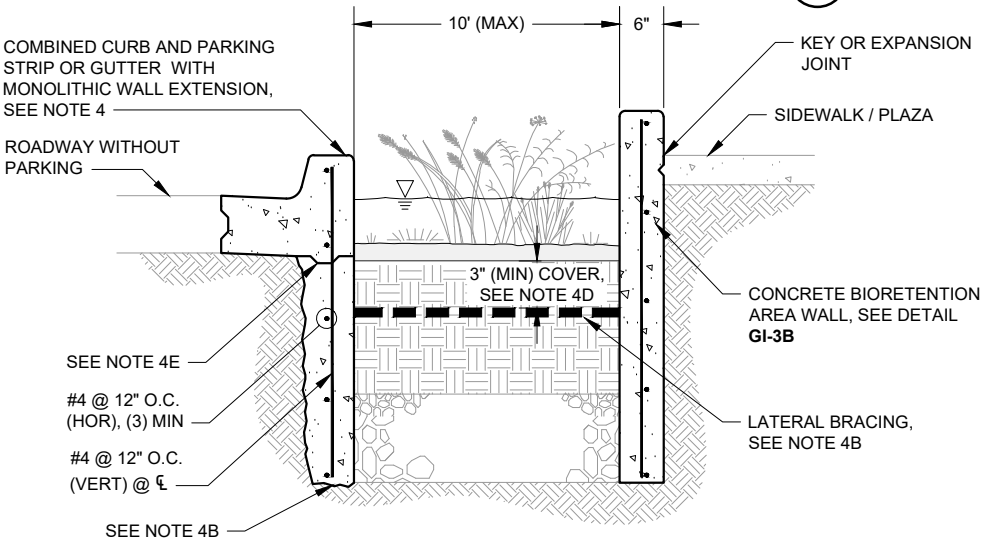
GI-4

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 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

cleanwater PROGRAM

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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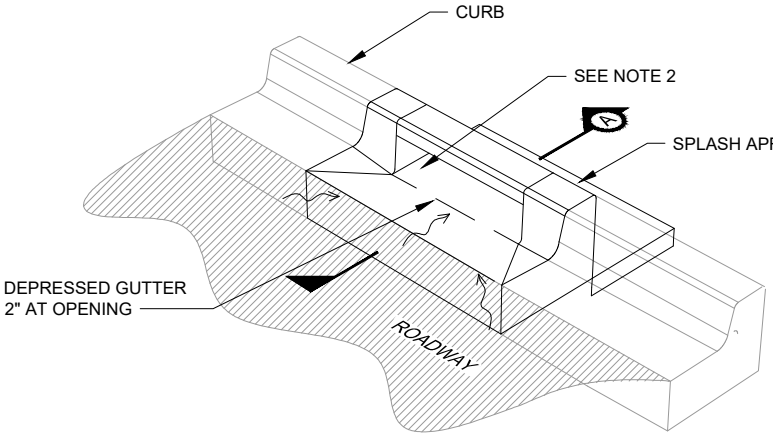
CHECKED BY: A. R.	

EXHIBIT B



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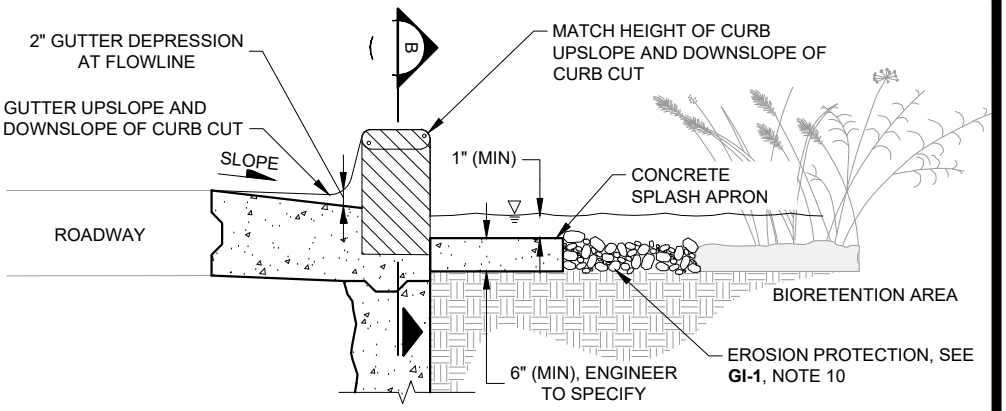
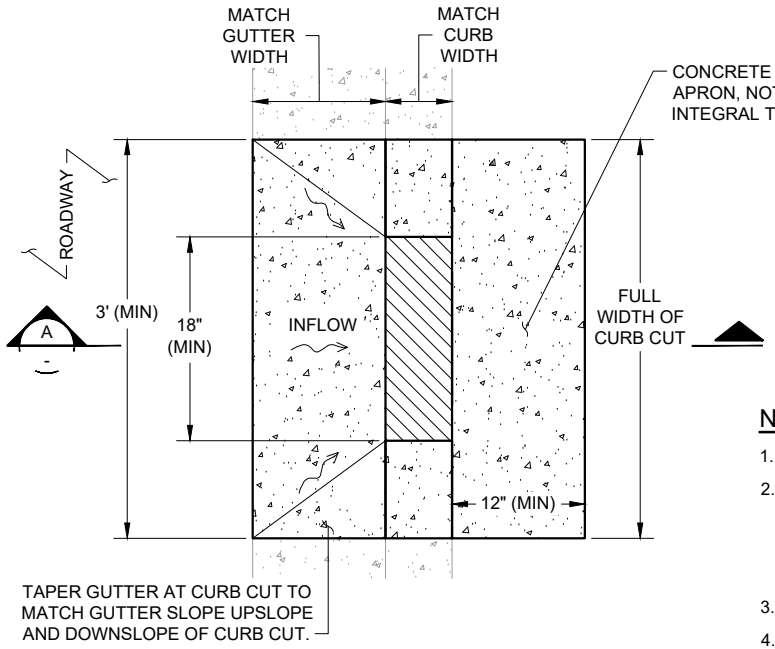
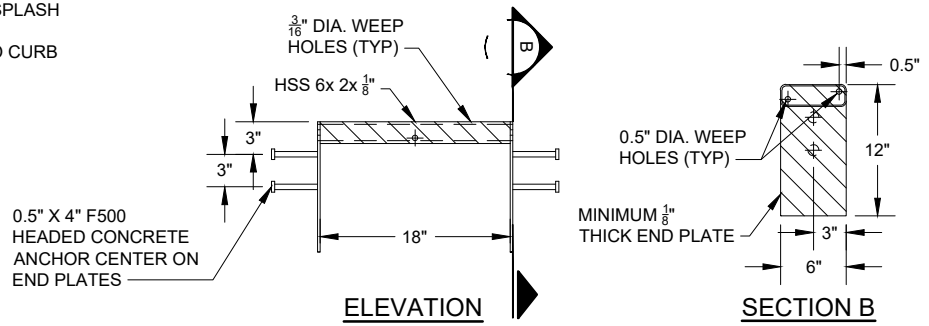


SECTION A



PLAN

METAL INLET ASSEMBLY



ELEVATION

SECTION B

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. CURB CUT INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. THE CURB CUT OPENING WIDTH SHALL BE SIZED BASED ON THE CATCHMENT AREA, LONGITUDINAL SLOPE ALONG THE CURB, AND THE CROSS SLOPE OF THE GUTTER OR ADJACENT PAVEMENT AT THE INLET. SEE SIZING EQUATIONS AND NOMOGRAPHS FOR CURB OPENING INLETS IN THE U.S. DEPARTMENT OF TRANSPORTATION HYDRAULIC ENGINEERING CIRCULAR NO. 27.
3. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
4. METAL INLET ASSEMBLY SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A-123.

NOT FOR CONSTRUCTION

cleanwater PROGRAM

BIORETENTION COMPONENTS: GUTTER CURB CUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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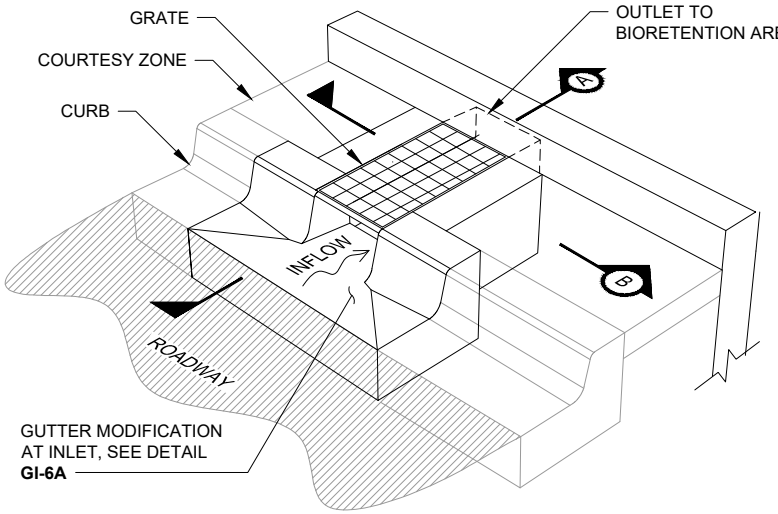
DRAWN BY: K. K.	REVISED BY: E.F.
CHECKED BY: A. R.	

GI-6A

EXHIBIT B

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.



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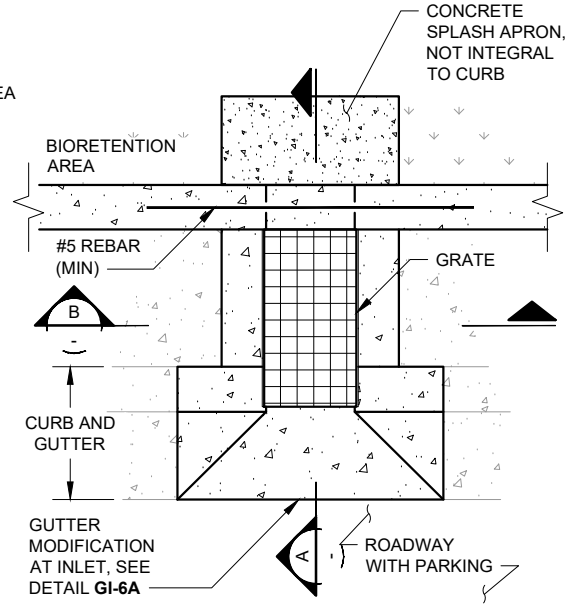
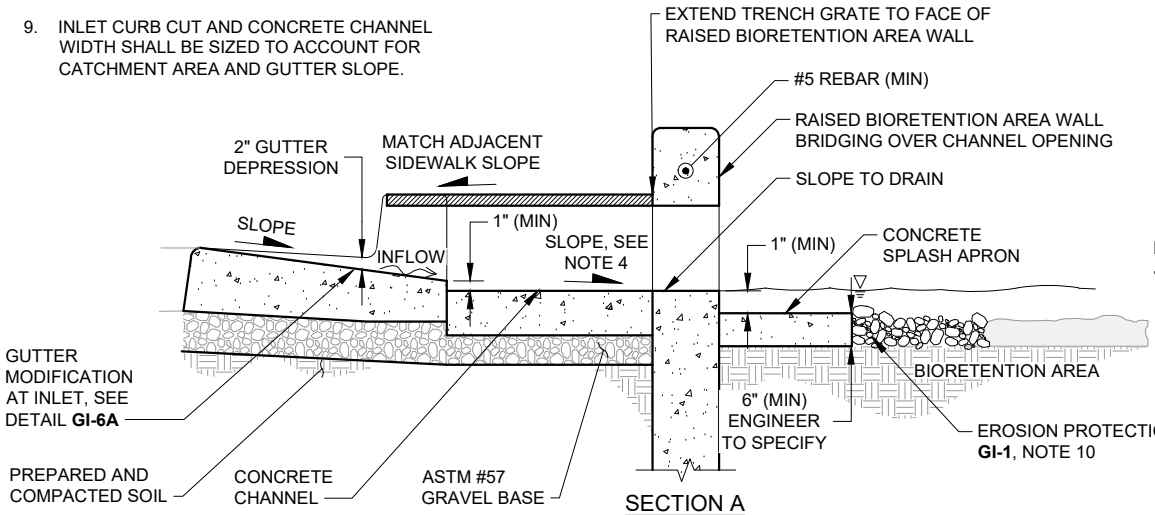
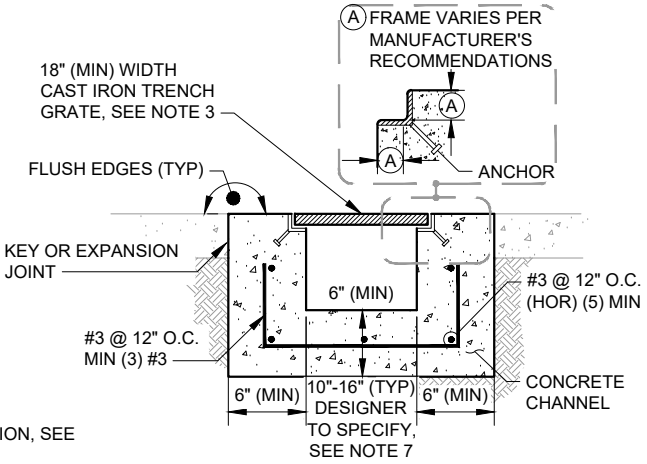




SECTION A



SECTION B

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: TRENCH DRAIN CURB CUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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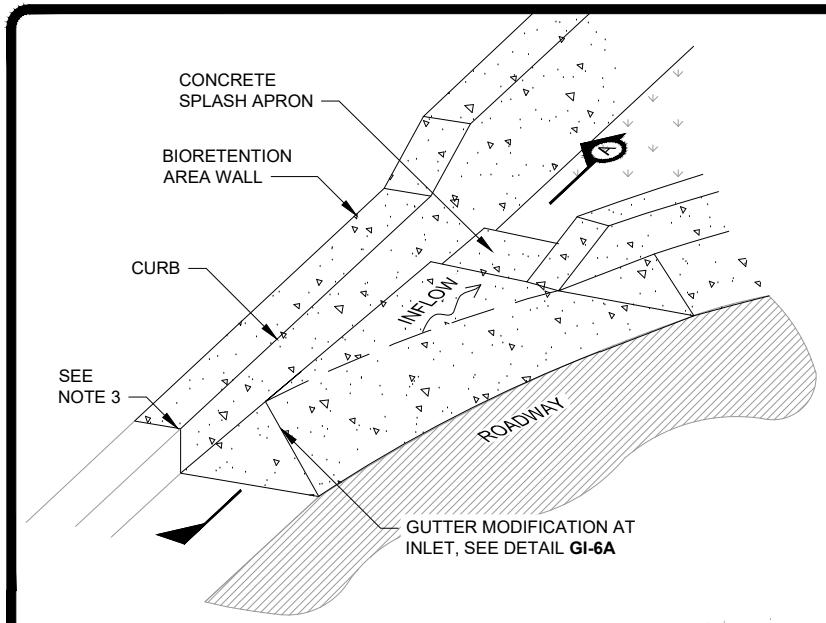
GI-6B



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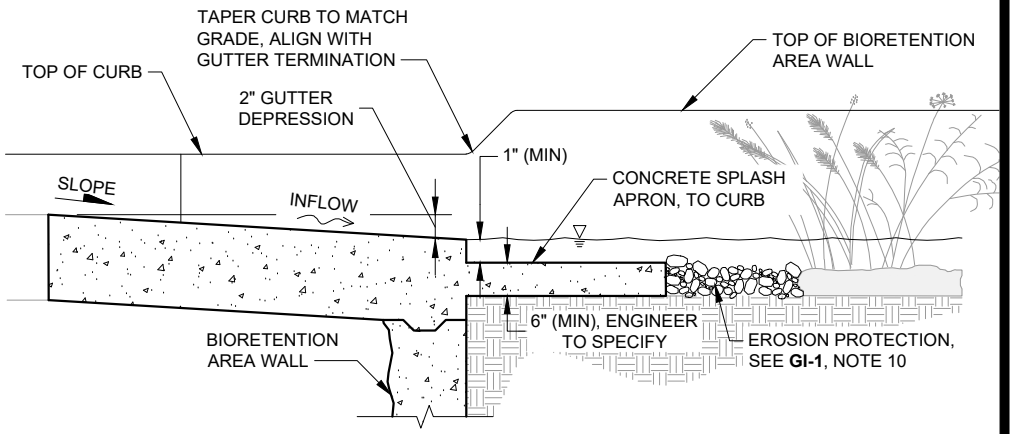
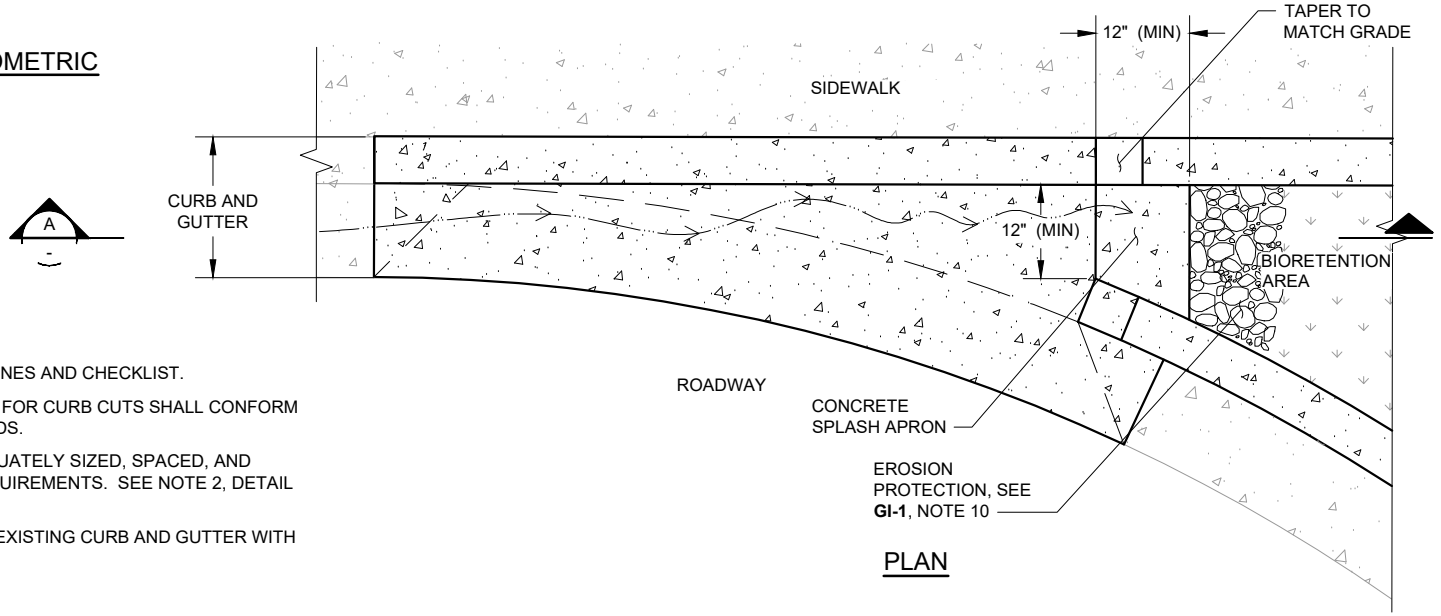


SECTION A



PLAN

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.

cleanwater PROGRAM

BIORETENTION COMPONENTS: CURB CUT AT BULBOUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

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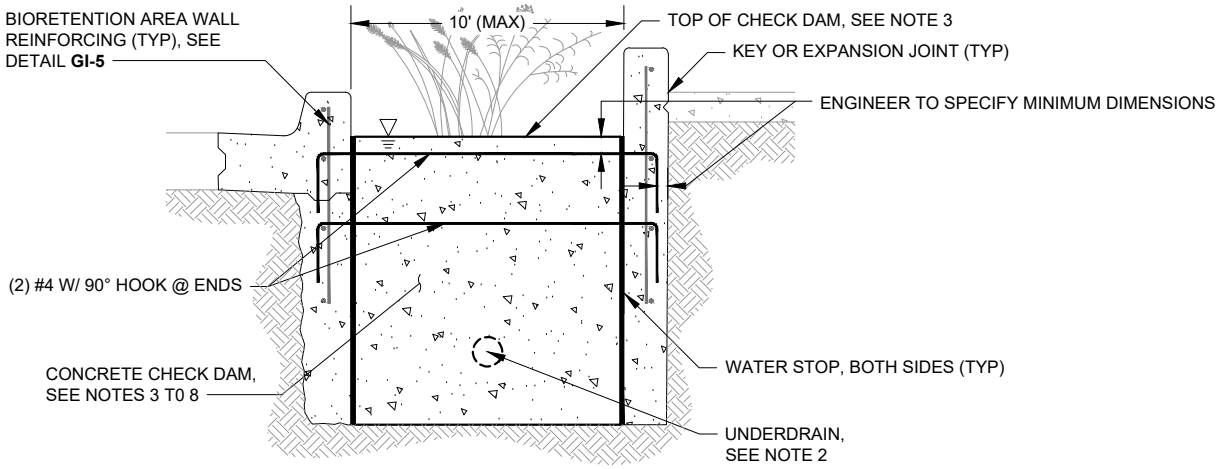
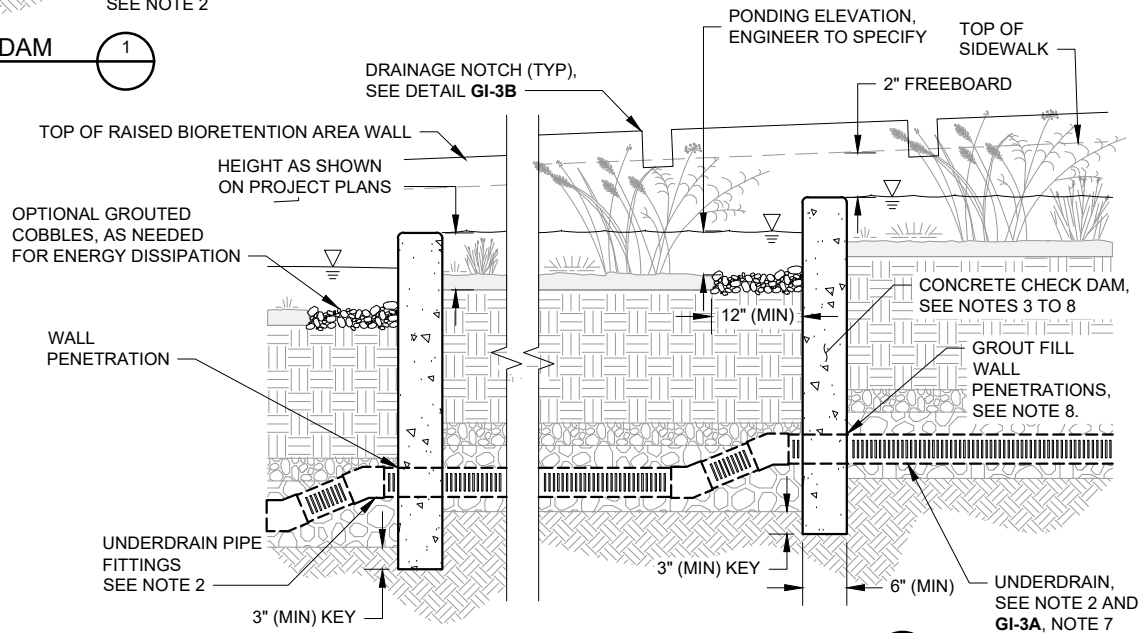
GI-6C



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

GREEN INFRASTRUCTURE EXAMPLE DETAILS

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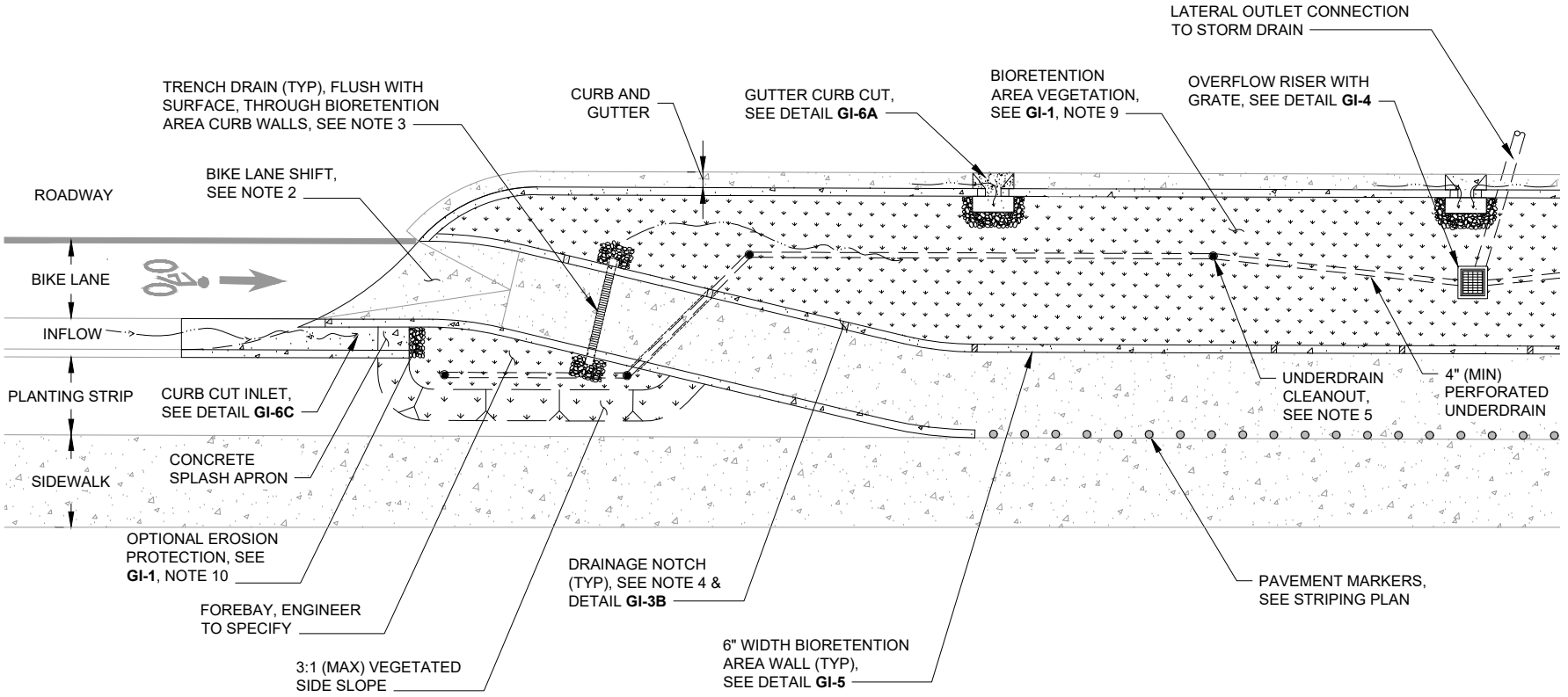
GI-7



NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. RAMP BIKE LANE UP ONTO BULBOUT AND SHIFT LANE OVER. MAXIMUM 1:5 HORIZONTAL TRANSITION RATE. TRANSITION GEOMETRY SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. HYDRAULIC CONNECTION OF SEPARATED BIORETENTION AREAS PROVIDED BY TRENCH DRAINS. ENGINEER TO SPECIFY, FOLLOWING FLOW AND STRUCTURAL REQUIREMENTS.
4. LAY OUT DRAINAGE NOTCHES AS APPLICABLE TO PREVENT PONDING BEHIND BIORETENTION AREA WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
5. 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). PIPE SLEEVES REQUIRED FOR UNDERDRAINS TRANSITIONING BETWEEN BIORETENTION AREAS.
6. DRAWING GI-XX MODIFIED FROM THE BASMAA URBAN GREENING BAY AREA TYPICAL GI DETAILS FIGURE C-1.4.

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BIORETENTION AREA: WITH BIKE LANE PLAN VIEW

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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GI-8

Attachment C-5: Capital Improvement Projects Sign-off Form

The Clean Water Program's Capital Improvement Projects Sign-off Form is provided on the following page. This form is used by the agency to document whether a Regulated Project (as defined in Provision C.3.b) has complied with Provision C.3 requirements, and whether a non-Regulated Project has been evaluated for GI potential.

How to Use the

C.3 Stormwater Compliance Sign-off Form for Capital Improvement Program (CIP) Projects

Introduction

The attached checklist is for Alameda Countywide Clean Water Program (Clean Water Program) member agencies to document that capital improvement program (CIP) projects either are exempt or have complied with the requirements for C.3 Regulated Projects, as defined in Provision C.3.b of the Municipal Regional Stormwater Permit (MRP), issued by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015.

Step-by-Step Instructions

1. Fill out the project information at the top of the form (Project Name, Address, etc.)

2. Review the project description and the square footage of impervious surfaces that will be created and/or replaced by the project to determine whether the project may meet any of the conditions identified in the form, under the heading, "Project is NOT a C.3 Regulated Project and the Review of GI Potential Is Documented." If the project meets any of those conditions, check the appropriate box (or boxes).
   - If one or more boxes are checked, the project is NOT a C.3 Regulated Project. Continue to Step 3.
   - If no boxes are checked, the project IS a C.3 Regulated Project. Skip to Step 4.

3. Refer to the Clean Water Program's Worksheet for Identifying GI Potential in Municipal CIP Projects[1] (or your agency's equivalent worksheet or form) to evaluate the project for the potential to include green infrastructure (GI). In the C.3 Stormwater Compliance Sign-off Form for CIP Projects, under the subheading, "Green Infrastructure Potential Review," check the box to indicate the name of the worksheet or form that was used for this review, and indicate the date on which the worksheet or form was completed.
   - Skip to Step 5.

4. Refer to the project's stormwater control plan, construction documents, and/or other project documentation, such as a completed Stormwater Requirements Checklist[2], to determine whether the requirements for C.3 Regulated Projects have been met. If all requirements have been met, including the hydromodification management (HM) requirements in Provision C.3.g (if applicable) and the documentation of operation and maintenance responsibility as required by Provision C.3.h.ii.(1), check the box to indicate the name of the applicable document(s), and write the date of the document(s).
   - Continue to Step 5.

5. Sign and date the completed C.3 Stormwater Compliance Sign-off Form for CIP Projects.

[1] The worksheet is available on the New Development Subcommittee's members only website at: https://cleanwaterprogram.org/index.php/committees/new-development-committee.html.

[2] The checklist is available on the Clean Water Program's public website at: https://cleanwaterprogram.org/. Click on "Resources," then "Development," and scroll down to "Stormwater Requirements Checklist."

C.3 Stormwater Compliance Sign-off Form for Capital Improvement Program (CIP) Projects

This form references Provision C.3 of the Municipal Regional Stormwater Permit (MRP), issued by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015.

Project Name: _____

Project Address: _____ APN: _____

Contact Person: _____

Contact Phone: _____ Contact Email: _____

☐ **Project is NOT a C.3 "Regulated Project" and the Review of "GI Potential" Is Documented.**

C.3 "Regulated Project" Review

The project is NOT a C.3 "Regulated Project" based on the Regulated Project definitions in Provision C.3.b as indicated below. Please check the applicable box(es):

☐ Project would create and/or replace less than 5,000 square feet of impervious area.

☐ 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:[3]

- o Sidewalks built as part of new streets or roads that direct stormwater runoff to adjacent vegetated areas.
- o 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.
- o 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).
- o Sidewalks, bicycle lanes, or trails constructed with permeable surfaces (pervious concrete, porous asphalt, unit pavers, or granular materials).
- o 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.

[3] *When calculating the impervious area of a Road Project, include all roadway surfaces related to creation of additional traffic lanes (including, for example, passing lanes and turning pockets). Shoulders and widened portion of existing lanes may be excluded from the calculation.*

"Green Infrastructure (GI) Potential" Review

Capital improvement program (CIP) projects that are NOT C.3 Regulated Projects must be reviewed to determine whether they have green infrastructure (GI) potential, as required in Provision C.3.j.ii.(2). When conducting these reviews, agencies should follow the Bay Area Municipal Stormwater Management Agencies Association's (BASMAA) Guidance for Identifying GI Potential in Municipal CIP Projects. One way to follow this guidance is to use the Clean Water Program's Worksheet for Identifying GI Potential in Municipal CIP Projects. These documents can be downloaded from www.cleanwaterprogram.com (click "Resources," then "Development"). Please attach documentation to demonstrate that the project was reviewed for GI potential.

The non-C.3 Regulated Project has been reviewed for GI potential as shown in the following document(s):

- ☐ Worksheet for Identifying GI Potential in Municipal CIP Projects, dated: _____
- ☐ Other documentation (describe): _____

☐ **Project IS a C.3 "Regulated Project" — Compliance Documented.**

The C.3 Regulated Project has met all requirements for C.3 Regulated Projects as shown in the following documents:

- ☐ Stormwater Control Plan, dated: _____
- ☐ Construction Documents, dated: _____
- ☐ Other documentation (describe): _____

Signature Date

Name Title

Attachment C-6: Guidance for Sizing Green Infrastructure Facilities in Street Projects

The Guidance for Sizing Green Infrastructure Facilities in Street Projects, provided by the Bay Area Stormwater Management Agencies Association (BASMAA), is included on the following page of paper copies of this GI Plan. The electronic version of this GI Plan includes the Guidance for Sizing Green Infrastructure Facilities in Street Projects as a stand-alone electronic file.

EXHIBIT B

Guidance for Sizing Green Infrastructure Facilities in Street Projects

Prepared by
Dan Cloak Environmental Consulting
EOA, Inc.

June 2019

Introduction and Regulatory Background

Provision C.3.j. in the reissued Municipal Regional Stormwater Permit[1] (MRP) requires each Permittee to "complete and implement a Green Infrastructure (GI) Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements."

Provision C.3.j.i.(g) further mandates that these plans include:

> *Requirements that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. For street projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects) Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that situation. The approach should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate, plus all other information as appropriate (e.g., how to account for load reduction for the PCBs or mercury TMDLs).*

This document represents the "single approach" collectively proposed by the Permittees for how to proceed when constraints on GI projects affect facility sizing in street projects. For other types of projects, information on hydraulic sizing is provided in the technical guidance manuals for Provision C.3 developed by each countywide stormwater program.

Hydraulic Sizing Requirements

MRP Provision C.3.d contains criteria for sizing stormwater treatment facilities. Facilities may be sized on the basis of flow, volume, or a combination of flow and volume. With adoption of the 2009 MRP, a third option for sizing stormwater treatment facilities was added to Provision C.3.d. This option states that "treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data."

This option can also be used to develop sizing factors for facilities with a standard cross-section (i.e., where the volume available to detain runoff is proportional to facility surface area). To calculate sizing factors, inflows, storage, infiltration to groundwater, underdrain discharge, and overflows are tracked for each time-step during a long-term simulation. The continuous simulation is repeated, with variations in the treatment surface area, to determine the minimum area required for the facility to capture and treat 80% of the inflow during the simulation.

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[1] Order R2-2015-0049

Such an analysis was conducted for BASMAA by Dubin Environmental Consulting and is described in the attached Technical Report. The analysis shows that bioretention facilities with the current-standard cross-section can capture and treat the Provision C.3.d amount of runoff when sized to 1.5% - 3% of tributary equivalent impervious area, depending on location.

Hydromodification Management

A principal objective of LID is to mimic natural hydrology in the post-development condition. This is accomplished by retaining and infiltrating runoff flows during small to medium events. Flows from larger events are detained and slowed.

MRP Provision C.3.g. includes requirements and criteria for implementing hydromodification management (HM). These HM requirements apply to Regulated Projects that create or replace an acre or more of impervious area, increase the amount of impervious area over the pre-project condition, and flow to creeks that are at risk of erosion. As such, the HM requirements do not apply to street projects that retrofit drainage systems that receive runoff from existing roofs and paving.

However, Provision C.3.j.i.(g) states that the Permittees' approach to sizing GI facilities "...should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate..."

Various criteria for HM design have been used in California and throughout the U.S. These criteria have been based on one or more of the following principles:

- Maintaining watershed processes
- Maintaining a site-specific water balance
- Maintaining the value of the curve number used in the NRCS method of computing peak runoff
- Controlling increases in peak flows from a specified storm size
- Controlling increases in the duration of flows at each intensity within a specified range (flow duration control)
- Controlling the likelihood of downstream erosion in streams (erosion potential, or Ep)

Generally, for any HM criterion used, facilities with more storage and a larger infiltrative area will be more effective in meeting the criterion than facilities with less storage and a smaller infiltrative area.

In the statewide municipal stormwater NPDES permit for small MS4s, Provision E.12.f. includes the following HM standard applicable to Bay Area small MS4s: "Post-project runoff shall not exceed estimated pre-project flow rate for the 2-year, 24-hour storm..."

Dubin (2014) conducted modeling to evaluate whether this standard would be met in the San Francisco Phase II counties (Marin, Sonoma, Napa, and Solano) by a bioretention facility meeting the minimum requirements in that permit's Provision

E.12.f. Dubin's analysis found that a facility sized to 4% of tributary equivalent impervious area, and having a 6-inch deep reservoir with 2 inches of freeboard, 18 inches of treatment soil, and a 12-inch-deep "dead storage" gravel layer below the underdrain, would meet this standard, even in the wettest portions of the Bay Area.

Additional Considerations for Bioretention Sizing

In summary, bioretention facilities for street projects sized to 1.5% - 3% of tributary equivalent impervious area (depending on their location in the Bay Area) can meet the criteria in Provision C.3.d., according to the modeling study documented in the attached Technical Memo.

There are many reasons to design and build facilities larger than the Provision C.3.d. minimum. Building larger facilities helps ensure the facilities perform to the minimum hydraulic capacity intended, despite minor flaws in design, construction, and maintenance, providing an engineering safety factor for the project. Further, larger-sized facilities may more effectively address objectives to maximize the removal of pollutants (particularly pollutants in dissolved form), to operate as full trash capture devices, and to manage hydromodification effects.

However, municipalities often face considerable challenges in retrofitting existing streetscapes with GI facilities. Constraints and design challenges typically encountered in the public right-of-way include:

- The presence of existing underground utilities (known and unknown during the design phase);
- The presence of existing above-ground fixtures such as street lights, fire hydrants, utility boxes, etc.;
- The presence of existing mature trees and root systems;
- The elevation of or lack of existing storm drains in the area to which to connect underdrains or overflow structures;
- Challenges of defining and controlling any catchment areas on adjacent private parcels that drain to the roadway surface;
- Low soil permeability and strength, and the need to protect the adjacent roadway structure;
- Competition with other assets & uses for limited right-of-way area; and
- Presence of archeologic/cultural deposits.

Use of the sizing factors in the attached Technical Memo will provide municipalities flexibility in design of bioretention facilities for street projects where constraints are present.

Recommendations for Sizing Approaches for Green Infrastructure Retrofit Facilities in Street Projects

1. Bioretention facilities in street projects should be sized as large as feasible and meet the C.3.d criteria where possible. Constraints in the public right-of-way may affect the size of these facilities and warrant the use of smaller sizing factors.

Bioretention facilities in street projects may use the sizing curves in the attached memorandum to meet the C.3.d criteria. Local municipal staff involved with other assets in the public right of way should be consulted to provide further guidance to design teams as early in the process as possible.

2. Bioretention facilities in street projects smaller than what would be required to meet the Provision C.3.d criteria may be appropriate in some circumstances. As an example, it might be appropriate to construct a bioretention facility where a small proportion of runoff is diverted from a larger runoff stream. Where feasible, such facilities can be designed as "off-line" facilities, where the bypassed runoff is not treated or is treated in a different facility further downstream. In these cases, the proportion of total runoff captured and treated should be estimated using the results of the attached memorandum. In cases where "in-line" bioretention systems cannot meet the C.3.d criteria, the facilities should incorporate erosion control as needed to protect the facility from high flows. See Figures 1 and 2 below for illustration of the in-line and off-line concepts.
3. Pollutant reduction achieved by GI facilities in street projects will be estimated in accordance with the Interim Accounting Methodology[i] or the applicable Reasonable Assurance Analysis[ii].

Figure 1: Off-line system in El Cerrito where low flow is diverted to the sidewalk planter and high flows continue down the gutter.

Figure 2: In-line system in Berkeley/Albany where low and high flows enter the system and overflows exit through a drain within the system.

[i] The Interim Accounting Methodology for TMDL Loads Reduced Report (BASMAA 2017) describes the methodology that is being used to demonstrate progress towards achieving the PCB and mercury load reductions required during the term of MRP 2.0. The methodology is based on the conversion of land use from a higher to a lower PCB or mercury loading rate during the redevelopment of a parcel. See: www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/POC/Final%20Interim%20Accounting%20Methodology%20Report%20v.1.1%20(Revised%20March%202017).pdf

[ii] A Reasonable Assurance Analysis (RAA) is a methodology used to demonstrate that implementation of pollutant control measures (such as GI facilities) over a specified time period will meet required pollutant load reductions associated with a TMDL. The Bay Area Reasonable Assurance Analysis Guidance Document (BASMAA 2017) establishes a regional framework and provides guidance for conducting PCBs and mercury RAAs in the San Francisco Bay Area. See: http://basmaa.org/Announcements/bay-area-reasonable-assurance-analysis-guidance-document

Appendix D. Workplan to Incorporate Green Infrastructure Requirements in Planning Documents

Table D-1
City of Piedmont Planning Document Review Summary and Workplan to Incorporate GI Requirements into Future Planning Document Updates

Plan (latest update made)	Supporting Language	Reference	GI Language Recommendation(s)	Timing for Update	Responsible Party
Where language restricts implementation of GI					
	None of the plans reviewed were found to contain language to restrict, discourage, or impede implementation of GI.				
Where supporting language or references to GI exists					
Piedmont General Plan (2009)					
Element: Natural Resources and Sustainability	*"As noted on Page 5-8, the City is actively involved in efforts to reduce stormwater pollution in the lake."*	Page 5-5	No Action		
	"Projects that create or replace more than 5,000 square feet of impervious surface or which alter runoff patterns must include best management practice (BMP) measures to control stormwater. Changes to impervious surface coverage are also tracked by the city. Piedmont has also adopted a Stormwater Management Ordinance that prohibits most non stormwater discharges to the storm drain system and bans illicit connections to the system. The ordinance includes provisions for watercourse protection, including a prohibition on altering the flow of water in a natural drainage course."	Page 5-9; Water Quality	No Action		
	"Allowing rainwater to percolate into the soil rather than flowing to storm drains provides many benefits. It reduces the risk of flooding, allows the aquifer to be recharged, and reduces the flow of pollutants to creeks. Stormwater can also provide a secondary water source for landscaping."	Page 5-16; Low Impact Development	No Action		
	"New measures may include adoption of "bay-friendly" landscape guidelines or standards to reduce water use and encourage native planting. The City may also explore the use of recycled water systems for landscaping its medians and parks, and encouraging gray water reuse systems, cisterns, and other water reducing measures in private construction."	Page 5-17; Low Impact Development	No Action		
	Goal 14: Urban Forest "Conserve and expand Piedmont's tree canopy to create visual beauty, provide shade, prevent erosion and absorb runoff, reduce noise and air pollution, and provide habitat for birds and other wildlife."	Page 5-21	No Action		
	Policy 15.5: Integrated Pest Management "To the extent feasible and appropriate, use integrated pest management techniques when maintaining City parks, medians, and public facilities. These techniques minimize the use of pesticides, herbicides, and other toxic materials that could potentially pollute surface water and groundwater."	Page 5-24; Air and Water Quality	No Action		
	Policy 16.3: Water Conservation "Maintain development standards and building requirements that encourage the efficient use of water. These requirements should include the use of plumbing fixtures designed for water efficiency, irrigation systems designed to minimize water waste, and allowances for graywater use in residential construction, where feasible."	Page 5-25; Sustainable Development	No Action		
	Policy 16.4: Permeable Pavement "Encourage the use of permeable materials for parking lots, driveways, walkways, and other paved surfaces as a way to absorb stormwater, recharge the aquifer, and reduce urban runoff."	Page 5-25; Sustainable Development	No Action		
	Policy 16.5: Hardscape Surface Standards "Maintain hardscape (impervious) surface standards in the Piedmont Municipal Code as a way to retain stormwater absorption capacity and reduce runoff to the storm drainage system. Consider other methods to reduce runoff, such as green roofs, rain barrels, and cisterns."	Page 5-25; Sustainable Development	No Action		
	Policy 16.6: Reclaimed Water Use "Support the use of reclaimed water ("gray water"), including treated effluent from the EBMUD wastewater facility, for landscape irrigation in Piedmont's parks and on medians. Periodically consider the feasibility of reclaimed water use based on EBMUD's capital improvement plans, cost factors, water supply, and other considerations."	Page 5-25; Sustainable Development	No Action		
	Action 17.G: Best Management Practices "Implement "best management practices" (BMPs) that reduce pollution and waste. Typical BMPs include household hazardous waste collection drives, proper storage of pesticides and household chemicals, prevention of illicit discharges into storm drains, and erosion control measures."	Page 5-27; Resource Conservation	No Action		
Element: Parks, Recreation, and Open Space	None identified in initial review.				

Table D-1
City of Piedmont Planning Document Review Summary and Workplan to Incorporate GI Requirements into Future Planning Document Updates

Plan (latest update made)	Supporting Language	Reference	GI Language Recommendation(s)	Timing for Update	Responsible Party
Element: Community Services and Facilities	*"The District is also exploring storage of potable water in groundwater basins (aquifers)."*	Page 9-18; Infrastructure; Water	No Action		
	"The District also works with Piedmont and other cities in the service area to address pollution sources and reduce the flow of heavy metals and other pollutants into the system."	Page 9-19; Infrastructure; Sanitary Sewer	No Action		
	"EBMUD has also initiated the recycling of highly treated wastewater for irrigation of golf courses, parks, cemeteries, industrial processes, and equipment washdown. Although recycled water system installation is not planned for Piedmont at this time, it could be explored in the future."	Page 9-19; Infrastructure; Sanitary Sewer	No Action		
	Goal 37: Infrastructure: "Provide water, sewer, storm drainage, energy, and telecommunication services in the most efficient, cost-effective, and environmentally sound manner possible."	Page 9-29	No Action		
	Action 37.C: Reclaimed Water Use "Study options for using reclaimed water rather than potable water for irrigation of public landscaping, including parks and medians. Among the options to be considered could be a reclaimed water storage tank on EBMUD's Piedmont Reservoir site or using a tanker truck to deliver reclaimed water."	Page 9-30	No Action		
Element: Environmental Hazards	*Policy 19.5: Keeping Flood Hazards Low "Maintain Piedmont's low potential for flooding through storm drain maintenance, preservation of creeks and drainage courses in their natural state, and periodic clearing of debris from storm drains and catchment basins. Ensure that new development does not increase the risk of off-site flooding, either in Piedmont or downstream in Oakland."*	Page 6-24; Wildfire and Flooding Hazards	No Action		
	Policy 19.6: Managing Runoff "Ensure that runoff from individual properties is directed in a way that does not threaten adjacent properties. Runoff should be directed to places where it can be absorbed into the ground, detained in rain barrels or cisterns, or directed toward storm drains."	Page 6-25; Wildfire and Flooding Hazards	No Action		
	Action 19.F: Drainage Improvements "Require storm drainage improvements for any development or home improvement which could create or exacerbate the potential for flooding. Development applications should be reviewed by the Public Works Department to ensure that such hazards are identified and mitigated."	Page 6-25; Wildfire and Flooding Hazards; Managing Runoff	No Action		
Element: Transportation	None identified in initial review.				
Element: Design and Preservation	None identified in initial review.				
Piedmont 2015-2023 Housing Element (2014)	*Program 4.B: Home Improvement Seminars "Conduct City-sponsored meetings, programs, and seminars which inform residents on home improvement and maintenance practices (energy conservation, solar, bay-friendly landscaping, window replacement, etc.) in Piedmont. Such seminars could be aired on KCOM (local access cable) to reach as broad an audience as possible."*	Page 2-22; Evaluation of the 2007-2014 Housing Element Goal 4	No Action		
	Program 6.B: Green Housing "Explore ways to encourage and incentivize greener residential construction. This could include use of the Build-It Green checklist and provisions to allow gray water recycling."	Page 2-29; Evaluation of 2002 Housing Element Goal 6; and Page 6-35	No Action		
	"The City encourages the use of bay-friendly landscaping as a means of improving water quality and reducing potable water consumption. In addition, Countywide Clean Water Program Requirements call for best management practices (BMPs) to contain and treat urban runoff. BMPs include pervious pavement, rain gardens, directing runoff onto vegetated areas, and similar measures to reduce runoff to creeks and the Bay."	Page 5-7; Landscape Requirements	No Action		
Complete Streets Policy (Res No. 106-12), (2012)	*C. Implementation; 1. Design: "...and will also evaluate designs using the latest design standards and innovative design options."*	Page 4	No Action; Assume this includes GI options		
Pedestrian and Bicycle Master Plan 2015-2024 (2014)	*"Sidewalk bulb-outs provide opportunities to incorporate landscaping, pervious pavement and other measures which reduce stormwater runoff."*	Page 73; High Priority Projects	No Action		
	"Like sidewalk bulb-outs, street triangles provide opportunities to incorporate environmentally sustainable stormwater management measure."	Page 91; Lower-Priority Projects	No Action		

Table D-1
City of Piedmont Planning Document Review Summary and Workplan to Incorporate GI Requirements into Future Planning Document Updates

Plan (latest update made)	Supporting Language	Reference	GI Language Recommendation(s)	Timing for Update	Responsible Party
City of Piedmont Climate Action Plan 2.0, (2018)	*Action WW-2.2A: "Consider requiring greywater or water collection systems in new construction."*	Page 60; Water and Wastewater	No Action		Mira Hahn, CAP staff liaison
	Action WW-2.2B: "Create an outreach or community engagement program that encourages businesses and residents to construct greywater and rainwater collection systems that can be used for irrigation and other non-potable uses."	Page 60; Water and Wastewater	No Action		
	Objectives and Measures: "Water conservation and storm water management are important to both CAP 2.0 and to Piedmont's Green Infrastructure plan, which mandates storm water practices such as bioswales and rain gardens in certain development projects".	Page 59; Water and Wastewater	No Action		
	Action MUN-5.2C: "Implement the City's Green Infrastructure Plan"	Page 68; Municipal Strategies	No Action		
	Action A-1.2F: "Plant trees to intercept rain and build rain gardens, green roofs, and other vegetative storm water treatment features. Grade surfaces and direct downspouts so that storm water flows toward vegetated areas."	Page 77; Adaptation	No Action		
	Action A-1.2G: "Encourage the use of pervious pavement in new and existing development. Install rain gardens, bioswales, porous pavement, and disconnected downspouts to reduce runoff."	Page 77; Adaptation	No Action		
	Action A-2.1B: "Identify priority areas to expand urban tree and vegetation planting."	Page 77; Adaptation	No Action		
	Action A-2.1E: "Encourage the preservation of mature trees and vegetation. When preservation is not feasible require replacement trees and vegetation and ongoing maintenance measures to avoid net loss of plant coverage."	Page 78; Adaptation	No Action		
	Action A-2.1F: "Provide services, education, and incentives to encourage the planting and preservation of trees and vegetation on private property. Consider a tree protection ordinance."	Page 78; Adaptation	No Action		
Where GI language could be added					
Piedmont General Plan (2009)				The current *General Plan* is intended to cover until 2025. Updates are scheduled for 2025.Potential revisions summarized below will be evaluated at the time of the update. General Plan Elements that most need to be updated to identify GI are: *Transportation* and *Design and Preservation.* Transportation should be updated in conjunction with the Complete Streets Policy.	Planning Department/Kevin Jackson
Element: Natural Resources and Sustainability	*Policy 15.3: Urban Runoff "Protect the quality of groundwater and surface water in Piedmont and the watersheds it shares with Oakland. Support the efforts of state, federal, county, and adjacent city agencies to control urban runoff, thereby improving water quality in local creeks, Lake Merritt, and San Francisco Bay."*	Page 5-23; Air and Water Quality	Include recommendation to use GI in these efforts.		
	Policy 15.4: Countywide Clean Water Program Participation "Participate in the Alameda Countywide Clean Water Program and continue to be a co-permittee on the NPDES permit for urban runoff. This will require ongoing measures to monitor stormwater pollution, regulate construction runoff, sweep local streets and clean storm drain inlets, promote education and outreach programs (such as storm drain stenciling), enforce regulations and penalties for illicit discharges, and participate in County meetings to discuss water quality issues."	Page 5-23; Air and Water Quality	Include the words Green Infrastructure in this policy.		

Table D-1
City of Piedmont Planning Document Review Summary and Workplan to Incorporate GI Requirements into Future Planning Document Updates

Plan (latest update made)	Supporting Language	Reference	GI Language Recommendation(s)	Timing for Update	Responsible Party
	Policy 16.2: Green Building "Support the use of green building methods in new construction and rehabilitation projects, including both public agency projects and private projects undertaken by homeowners."	Page 5-25; Sustainable Development	Include support for GI in this policy.		
	Action 16.B: Building Code Amendments "Regularly evaluate any obstacles to green building construction in Piedmont. Periodically amend the building code to incorporate green building principles, respond to changes in state law which promote green building, and match the steps being taken by nearby Alameda County cities to encourage green construction".	Page 5-25; Sustainable Development	As part of periodic updates to the Building Code, the City could include description of GI.		
Element: Parks, Recreation, and Open Space	*Policy 23.3: Environmentally-Sensitive Park Design "Design parks, trails, and other recreational facilities in Piedmont's parks to be compatible with the natural environment, including habitat, views, and other environmental resources. New recreational buildings and other park structures and facilities should be sited in a way that minimizes their impacts on useable open space, avoids conflicts with existing park activities, and is compatible with the natural setting. Park design should also be compatible with city policies to reduce fuel loads and wildfire hazard."*	Page 7-14; Park Planning and Management	Include language to encourage GI.		
	Policy 24.8: Off-Site Impacts of Park Activities "Ensure that the off-site impacts of recreational facilities and activities such as noise and parking are mitigated. Where space allows, encourage the use of landscaped buffer zones between parks and adjacent residences."	Page 7-18; Park Planning and Management	Encourage buffered landscape zones to be GI.		
Element: Community Services and Facilities	*Policy 37.1: Water and Sewer Investments "Provide sustained capital investment in Piedmont's water, sewer and storm drainage facilities to replace deteriorated components, enhance system performance and efficiency, ensure public safety, and improve environmental quality."*	Page 9-29	Capital investment of the City's storm drainage facilities could be GI options.		
	Policy 37.5: Storm Drainage Improvements "Monitor and assess the need for storm drainage improvements to ensure adequate system capacity and respond to Countywide Clean Water objectives."	Page 9-29	During assessment of storm drainage improvement, opportunities for GI should be considered.		
Element: Environmental Hazards	None identified in initial review.				
Element: Transportation	*Policy 7.6: Regional Perspective "Recognize the relationship of local transportation decisions to broader regional issues such as congestion management and environmental sustainability."*	Page 4-25	Identify the Clean Water Program requirements. In response to these requirements the City will install GI where it is acceptable.		
	Action 10.A: Sidewalk Repair Program "Continue the city's sidewalk maintenance and repair program. Sidewalk repair requirements should be periodically reevaluated to ensure that they are adequate."	Page4-30; Walking and Bicycling; Sidewalk Condition	Encourage GI in sidewalk repair/replacement projects, such as use of permeable paving.		
	Policy 11.3: Parking Lot Design "Require off-street parking to be attractively landscaped and designed. Off street lots should generally be located to the rear of buildings, rather than along street frontages."	Page 4-31	Parking lot design could be more specific; that drainage from near buildings can be captured by parking lot and other GI options, such as permeable paving.		
	Action 10.F: Pedestrian Crossing Improvements "Improve crossings for pedestrians and bicyclists at key intersections through pavement changes, restriping, curb redesign, street trees and landscaping, and other measures which improve pedestrian mobility and increase driver awareness of pedestrians and bicycles. This should include continued compliance with the Americans with Disabilities Act."	Page 4-31	Pavement changes and landscaping could satisfy GI requirements.		
Element: Design and Preservation					
	Policy 27.5: Beautification Efforts "Support local beautification and median planting efforts by neighborhood and community groups."	Page 8-20	Beautification efforts could include GI.		
	Action 27.B: Rooftop Structures "Encourage residents to remove obsolete rooftop features such as antennae and satellite dishes that are no longer in use. At the same time, regulations and guidelines for rooftop structures should be reviewed to ensure that "green" features such as photovoltaic panels are not precluded or discouraged."	Page 8-22	Include that greenroofs are not precluded or discouraged.		
	Action 27.D: Funding for Beautification Projects "Apply for grants and other funding sources for citywide improvements, including landscaping, street trees, and street lighting."	Page 8-22	Grants and other funding sources could focus on GI improvements and landscaping.		
	Policy 28.12: Creativity and Innovation "To the extent possible, avoid the imposition of artificial or excessive limitations in the interpretation of the city's design guidelines. The policies laid out herein should be carried out without eliminating the possibility for architectural creativity and innovative design."	Page 8-24	...Including innovative designs or new methods for achieving GI protocols.		

Table D-1
City of Piedmont Planning Document Review Summary and Workplan to Incorporate GI Requirements into Future Planning Document Updates

Plan (latest update made)	Supporting Language	Reference	GI Language Recommendation(s)	Timing for Update	Responsible Party
	Policy 29.2: Landscape Design "Use landscaping to soften the appearance of buildings, frame desirable views, screen undesirable views, buffer potentially incompatible uses, and maintain an attractive streetscape. Landscape design should fit the surrounding context and complement the city's natural landscape."	Page 8-26	Encourage GI in the policy.		
	Action 29.A: Landscape Guidelines "Consider developing landscape guidelines to assist residents with plant selection and design concepts. The guidelines should achieve multiple city goals, including the greater use of native plants, conservation of Piedmont's urban forest, and reduction of fire hazards, as well aesthetic improvements."	Page 8-27	Include GI in the list of "city goals".		
Piedmont 2015-2023 Housing Element (2014)	*Policy 6.1: "Require all new housing to be designed to encourage energy efficiency. Building design and construction methods should promote and support energy conservation."*	Page 2-28; Evaluation of 2002 Housing Element Goal 6; and Page 6-34; Goal 6: Sustainability and Energy	Add GI	2023; Required Update every 8 years.	Planning Department/Kevin Jackson
Complete Streets Policy (Res No. 106-12) (2012)	*B. Complete Streets Principles; 2. Context Sensitivity: "Improvements that will be considered include sidewalks, shared use paths, bicycle lanes, bicycle routes, paved shoulders, street trees and landscaping, planting strips, accessible curb ramps, crosswalks, refuge islands, pedestrian signals, signs, street furniture, bicycle parking facilities, public transportation stops and facilities, transit priority signalization, traffic calming circles, sidewalk bulb-outs, road diets and other features assisting in the provision of safe travel for all users, as well as relevant and appropriate actions identified in the Transportation Element of the Piedmont General Plan."*	Page 3	Features listed can be expanded to include GI. Reference GI Plan.	Update in conjunction with and to be consistent with the Transportation Element of the *General Plan* . This Policy should be updated to consider Smart Growth America's 2018 updated and revised *The Elements of A Complete Streets Policy* .	Planning/Public Works
	B. Complete Streets Principles; 4. All Projects and Phases: "Complete Streets infrastructure sufficient to enable reasonably safe travel along and across the right of way for each category of users will be incorporated into all planning, funding, design, approval, and implementation processes for the construction, reconstruction, retrofit, repaving, rehabilitation, expansion, maintenance, operations, alteration, or repair of new or existing streets, roads, public easements, highways, bridges, and other portions of the transportation system, except that specific infrastructure for a given category of users may be excluded if an exception is approved via the process set forth in section D of this policy."	Page 1	GI should be included in Complete Streets infrastructure, and should be added to the processes where users are incorporated. Or reference GI Plan.		
Pedestrian and Bicycle Master Plan 2015-2024 (2014)	*6. Other Implementation Actions; Continuous*	Page 96	Regarding "new street triangles, improvements to the city's footpaths and stairways and other traffic-calming and street-beautification projects" add language to encourage and support GI in design of these projects. In order to obtain load reduction credit, street triangles and improvements would need to be designed to collect and treat stormwater runoff.	2024	Parks Division of the Public Works Dept.

Celebrating Our Clean, Green Harvest Festival

On Sunday, September 22, Piedmont celebrated the 21st anniversary of the Harvest Festival. Families enjoyed the farmers' market, edibles contest, live music, creatively bold scarecrows, cake competition, Fire Department water hose instructional, and more!

Behind the scenes, community members made sure that the event was clean and green. Harvest Festival organizers ensured that the Edibles Contest pavilion and Food Truck vendors utilized compostable or recyclable foodware. City Staff kept the water stations full to reduce plastic waste.

The City's outreach and education contractors, including Piedmont High School's own "Eco-Ambassadors", helped festival attendees recycle and compost using the carts provided by Republic Services.

Through these efforts, 1285.5 gallons of material generated at the festival were recycled or composted and only 70 gallons of waste were sent to the landfill. The Harvest Festival achieved a stupendous 95% recycling and composting rate and serves as a model for public events in the City. #PiedmontEvergreen

PIEDMONT evergreen