

# **ATTACHMENT 3**

**Waste Discharge Requirements  
and  
Water Quality Certification  
Oak to Ninth Project  
City of Oakland, Alameda County**

**Post Construction Stormwater Treatment Measures  
for the Project Site**

### **Attachment 3**

#### **Post-Construction Stormwater Management at the Project Site**

##### **Source Reduction Measures**

The Project shall implement the source control measures described in the City of Oakland document *Source Control Measures to Limit Stormwater Pollution*, included as Appendix B to this Attachment to the Order, as appropriate for each phase of the Project.

To reduce the amount of impervious area at the site, the Project includes modified parking requirements. Parking for the Project shall be consistent with parking requirements for the City of Oakland Planned Waterfront Zoning District (PWD-4). To achieve adequate parking supply, the Project shall provide shared parking between different uses, since different users will have different times of peak demand. Implementing shared parking between different uses along with incorporating 3,448 of the total 3,902 parking spaces as off-street covered parking under buildings will significantly reduce the total paved area of the site, and thus reduce water quality impacts generated from impervious surfaces.

##### **Post Construction Stormwater Treatment BMPS at the Oak to Ninth Project Site** ***Bioretention Treatment Areas A, B, and C***

Phases II, III, and IV will be treated with bioretention areas C, B, and A respectively (see Figure 4 in Appendix A of this Attachment). Each bioretention area will be graded flat to promote an even distribution of ponding, and will include a network of 12-inch x 12-inch “bubble-ups”, providing one bubble-up for every 1,600 square-feet of bioretention area (i.e. about one bubble for each 2 acres of contributing impervious area)(See Sheets 2 of 7, 3 of 7, 4 of 7, 6 of 7 and 7 of 7 in Appendix A to this Attachment). Use of this distribution network will evenly distribute ponding and infiltration, consistent with the 2-acre treatment area limit recommended in the *Alameda County Clean Water Program (ACCWP) C.3 Stormwater Technical Guidance* handbook ([http://www.cleanwaterprogram.org/uploads/01\\_ACCWP\\_Title-OCT19.pdf](http://www.cleanwaterprogram.org/uploads/01_ACCWP_Title-OCT19.pdf)). Because of the relatively flat grades within the Project site, treatment flows will be delivered to the bubble ups in the bioretention areas with pumps, which will be located within treatment manholes (see Sheet 6 of 7 in Appendix A to this Attachment) that are sized to deliver the treatment volume to the bioretention cells. Bubble-ups will also dissipate the treatment flow velocity to reduce the risk of erosion or plant damage in the bioretention cell. Bioretention areas A, B and C have a design ponding depth of approximately 1-foot. Design calculations are summarized in Appendix D to this Attachment.

A 40 mil HDPE liner will be installed below bioretention areas A, B, and C, because local groundwater depth is within 10-feet of the existing grade. This liner will also separate the bioretention cells from any remaining soil and groundwater contamination in the subsurface of the site, which will prevent the migration of contaminated groundwater to the Bay via the subdrain systems of the bioretention cells. Depending on the adjacent land use, the borders of the bioretention areas will be designed as shown on Detail 3 of Sheet 6 of 7 in Appendix A to this Attachment. Bioretention areas will be constructed with the following two basic edge conditions:

- **Sidewalk/Trails:** A concrete downturned edge will be constructed to protect the sidewalk base materials from any potential damage from saturated bioretention soils. The 40 mil HDPE impermeable liner will also be placed along the downturned edge for further protection.

- **Landscape/Lawn/Park Areas:** These areas will include the 40 mil HDPE impermeable liner, which will extend from beneath the bioretention cell to within 6-inches of the finished ground.

As much as possible, bioretention areas at the site will include a 3H to 1V maximum slope around their perimeters to minimize safety risks associated with a sudden drop-off. Where bioretention areas are adjacent to sidewalks or other areas with high pedestrian activity, a 6-inch curb may also be installed next to the bioretention area to further improve safety. The Project will also consider the installation of bioretention planting that discourages public access on the perimeter of bioretention areas where public safety is a potential concern.

The bio-retention cells shall be designed in conformance with Provision C.3.c. (2)(vi) of the Municipal Regional Permit (MRP) (Regional Water Board Order R2-2009-0074 (adopted 10-14-09 and revised 11-28-11); NPDES Permit No. CAS612008), which states:

Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff at a minimum of 5 inches per hour during the life of the facility. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L (of this Order).

Since treatment flows will be delivered to bioretention areas by a pump, the volume of runoff will be limited to the treatment flow of 0.2 inches/hour. Bioretention areas will be isolated from flows greater than the treatment flow, since these flows will bypass the treatment manhole (see Sheet 6 of 7 in Appendix A to this Attachment) and discharge to the Bay via the Project's new outfalls (see Figure 4 in Appendix A to this Attachment). If bioretention areas receive treatment flows that result in greater than the 1-foot design ponding depth (or greater than 1.8 foot deep in Treatment Area D), overflow/outlet structures (see Sheet 6 of 7 in Appendix A to this Attachment) will discharge excess water directly to the new outfalls.

Planting plans for bioretention areas will be designed by a licensed landscape architect and will be consistent with the recommend plant list provided in Appendix B of the ACCWP C.3 Stormwater Technical Guidance handbook. Plants in the bioretention cells must be capable of withstanding periods of inundation and extended periods of drought.

#### ***Treatment Cell D - Extended Detention/Bioretention Treatment Area***

The design for Treatment Area D will use a combination of interconnected detention basins and bioretention cells. The treatment volume will equalize between the basins via a leveling pipe and the treatment volume in the two basins will then percolate through the bioretention area located within the westernmost basin for final treatment and discharge to the Bay. See Sheets 5 of 7 and 7 of 7 in Appendix A to this Attachment for details and sections of the extended detention/bioretention area.

To enable treatment of the entire area of Phase I, the ponding depth in Treatment Cell D will need to be about 1.8-feet (See supporting calculations in Appendix D to this Attachment), which is deeper than the 1-foot depth that is typically recommended for bioretention areas.

As shown on Sheet 7 of 7 in Appendix A to this Attachment, the extended detention/bioretention area will be constructed of concrete, which will separate the bioretention cell from contact with

potential existing soil and groundwater contamination in the subsurface of the Project site.

To minimize risk of sudden drop-off for users, the basin is designed with a series of steps on the southern limit of the basin to allow safe public access to the water feature. The northern side of the basin will have a graded slope no steeper than 3H to 1V, leading down to the bioretention areas as recommended in the ACCWP C.3 Stormwater Technical Guidance handbook.

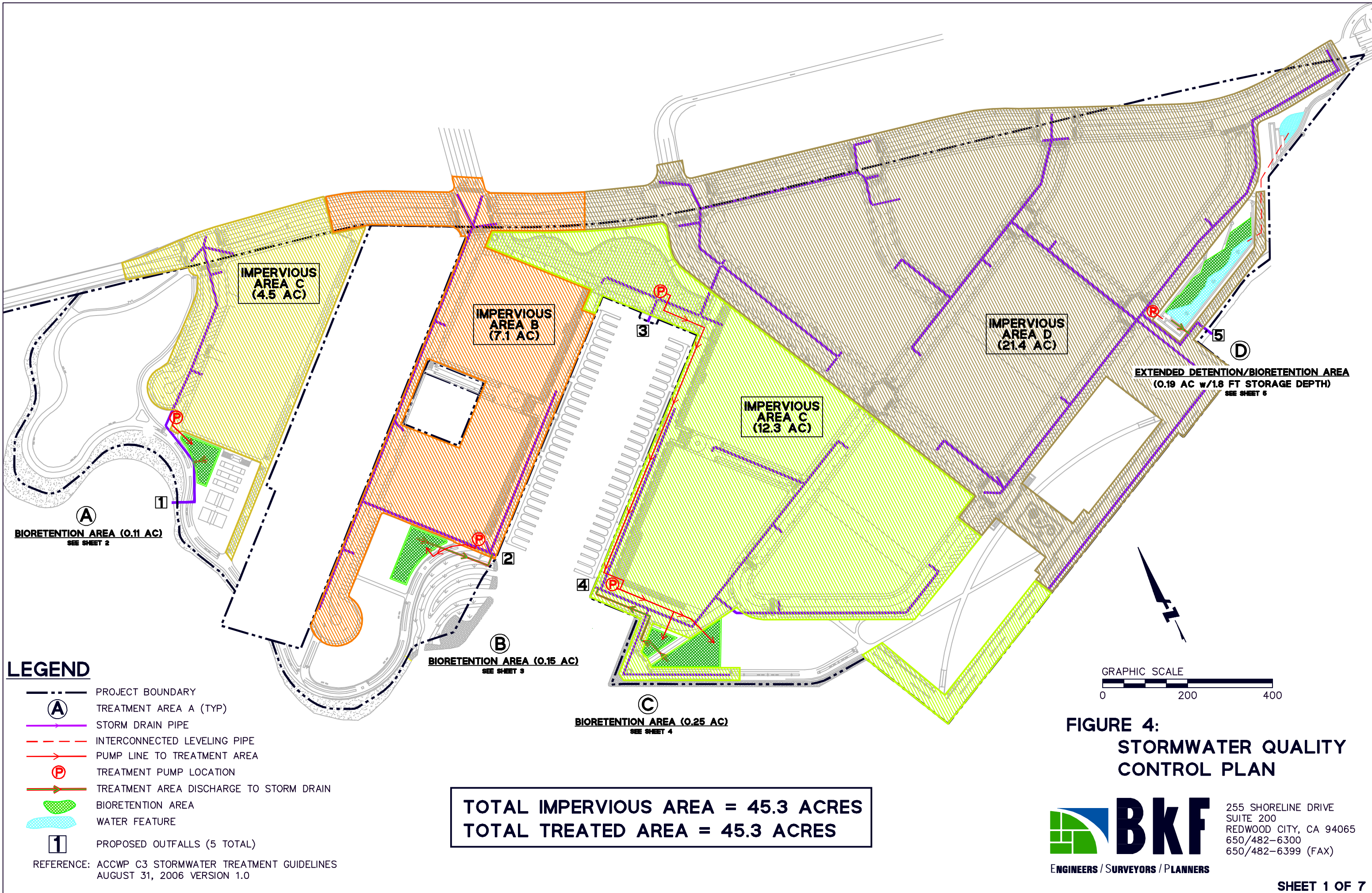
Planting plans for bioretention areas will be designed by a licensed landscape architect. Landscape designs for bioretention areas will be consistent with the recommend plant list provided in Appendix B of the ACCWP C.3 Stormwater Technical Guidance handbook. As with locations A, B and C, the bioretention area of Treatment Area D will also consider installation of bioretention planting that discourages public access on the perimeter of bioretention areas where public safety is a potential concern. To compensate for the increased treatment water depth needed for the bioretention area, the planting scheme will use plants that are more suited to deeper inundation.

# **APPENDIX A**

## **Treatment Control Details**



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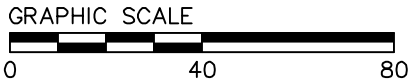
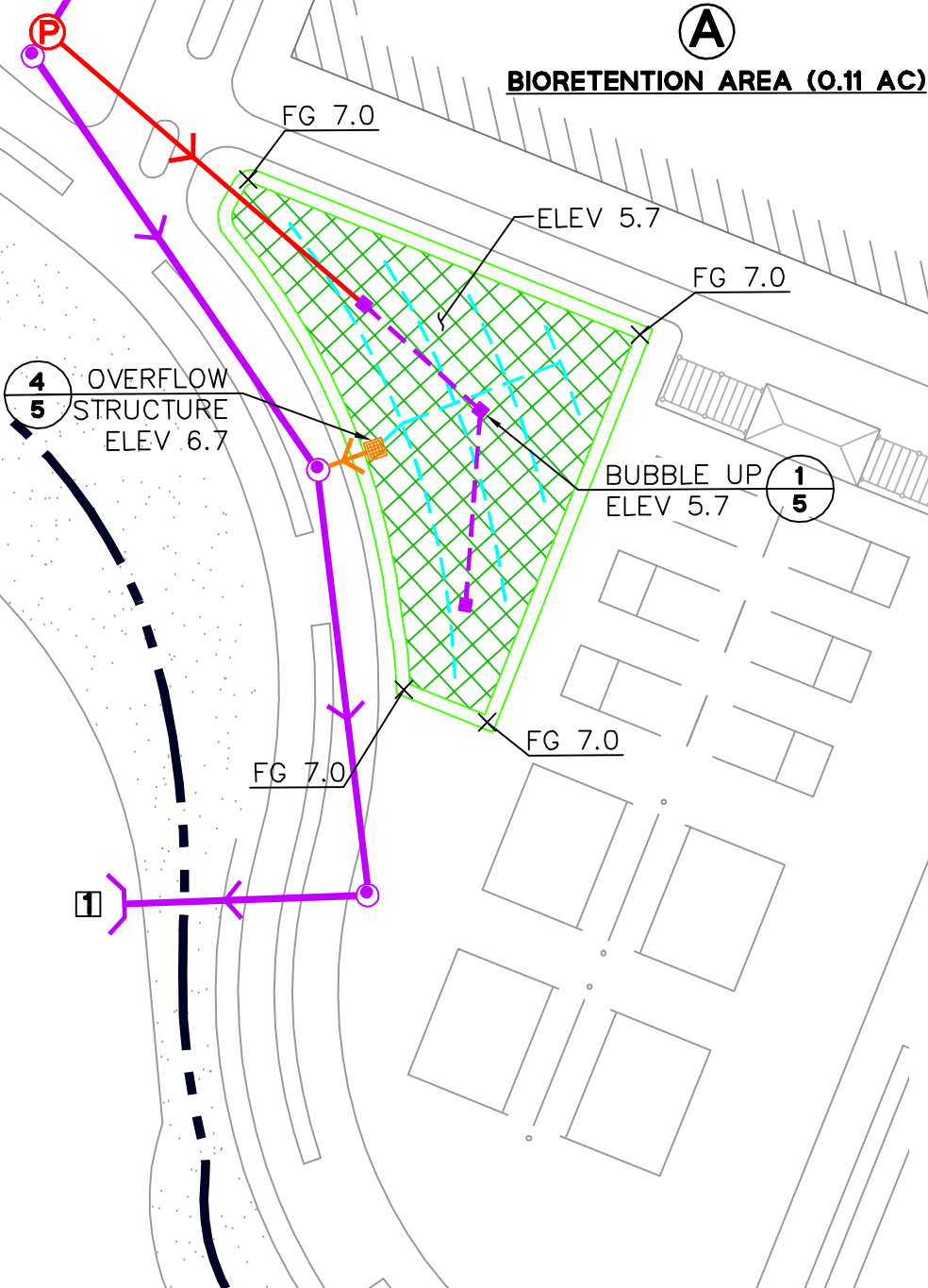
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LEGEND

- PROJECT BOUNDARY
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- STORM DRAIN PIPE
- PUMP LINE TO TREATMENT AREA
- TREATMENT PUMP LOCATION
- TREATMENT AREA DISCHARGE TO STORM DRAIN
- BIORETENTION AREA BALANCING PIPE SYSTEM (FLAT)
- PERFORATED UNDERDRAIN SYSTEM
- BIORETENTION AREA
- PROPOSED OUTFALL

CHANNEL PARK

OAKLAND ESTUARY



OAK TO NINTH AVENUE PROJECT  
STORM WATER QUALITY PLAN  
BIORETENTION TREATMENT AREA A

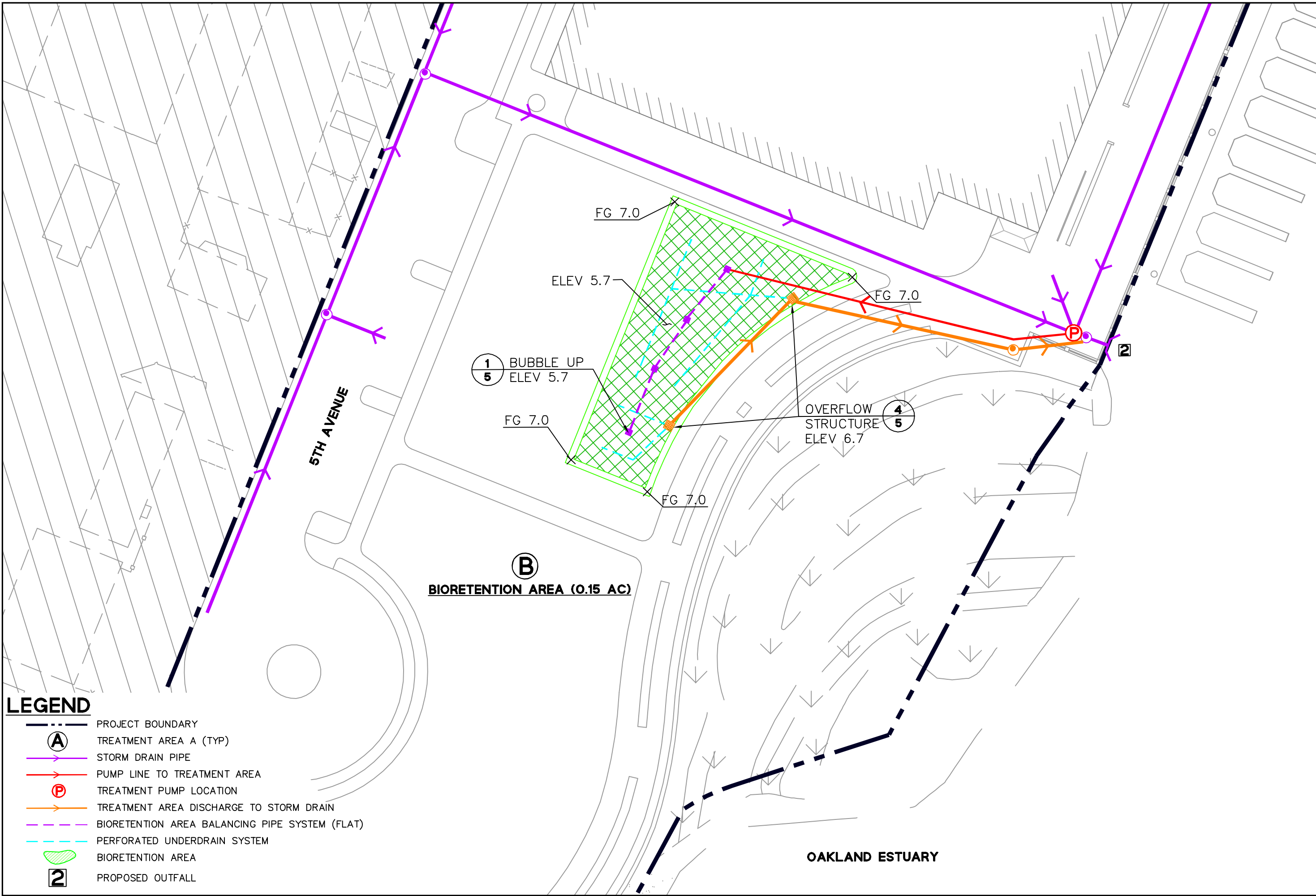
CITY OF OAKLAND  
ALAMEDA COUNTY  
CALIFORNIA

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Drawn	RHK		
Approved	SRN		
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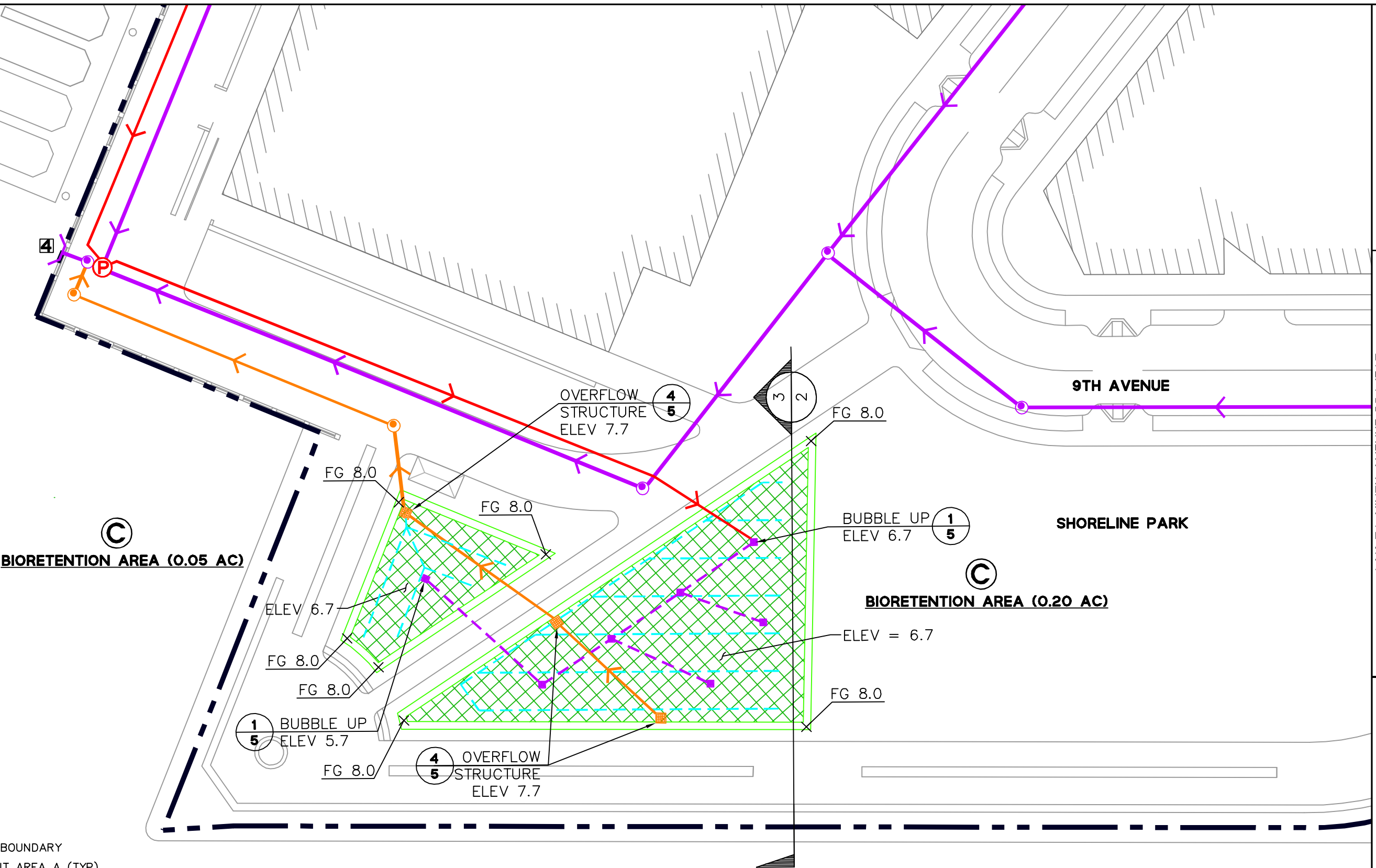
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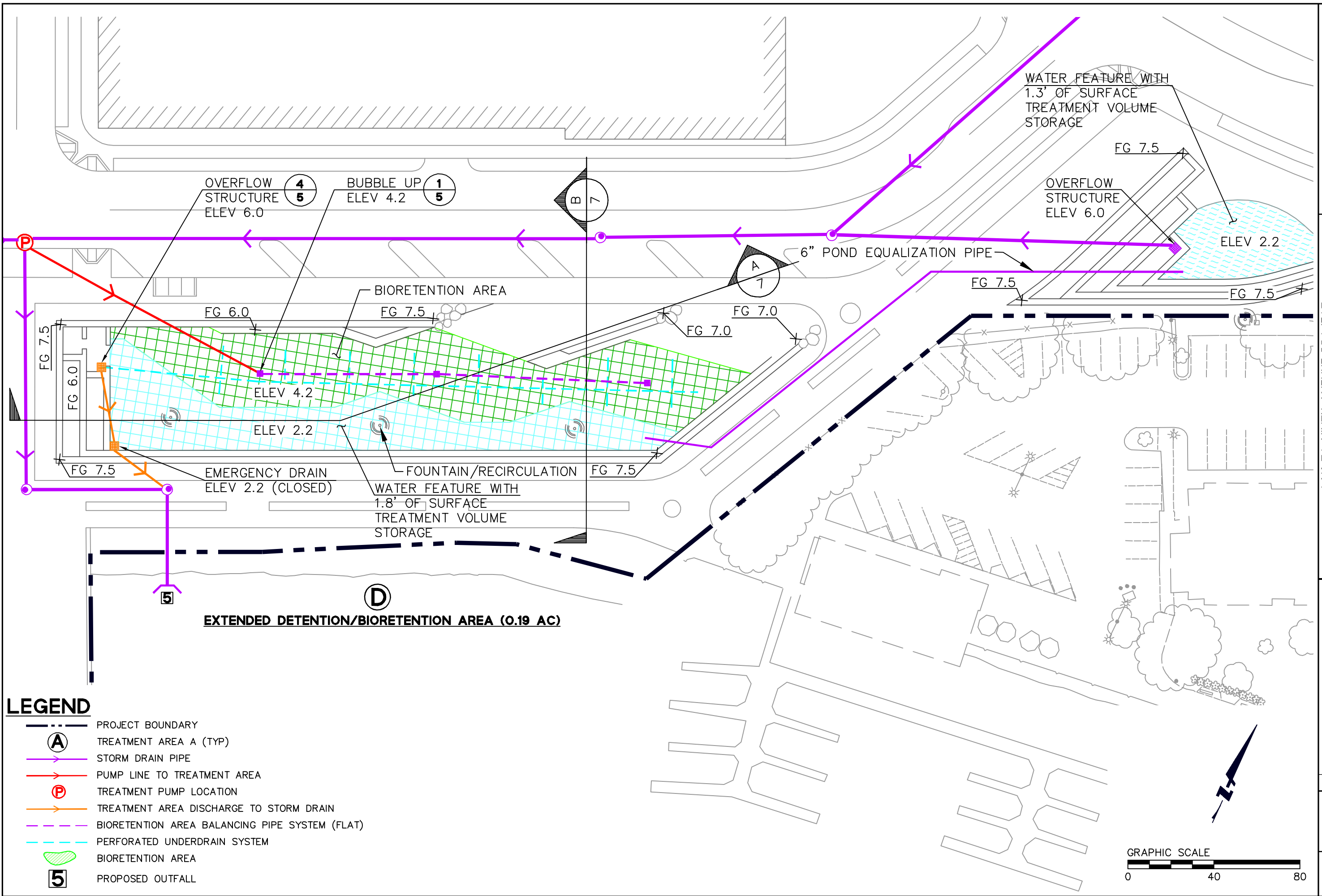
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- PROPOSED OUTFALL



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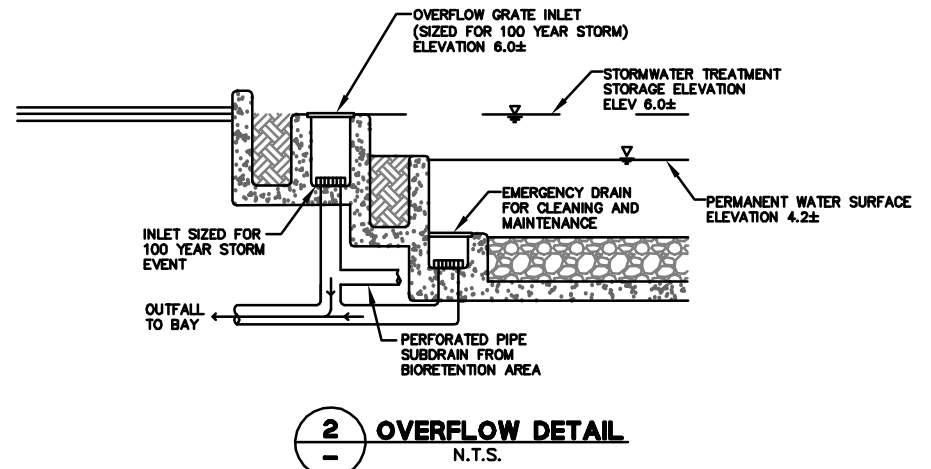
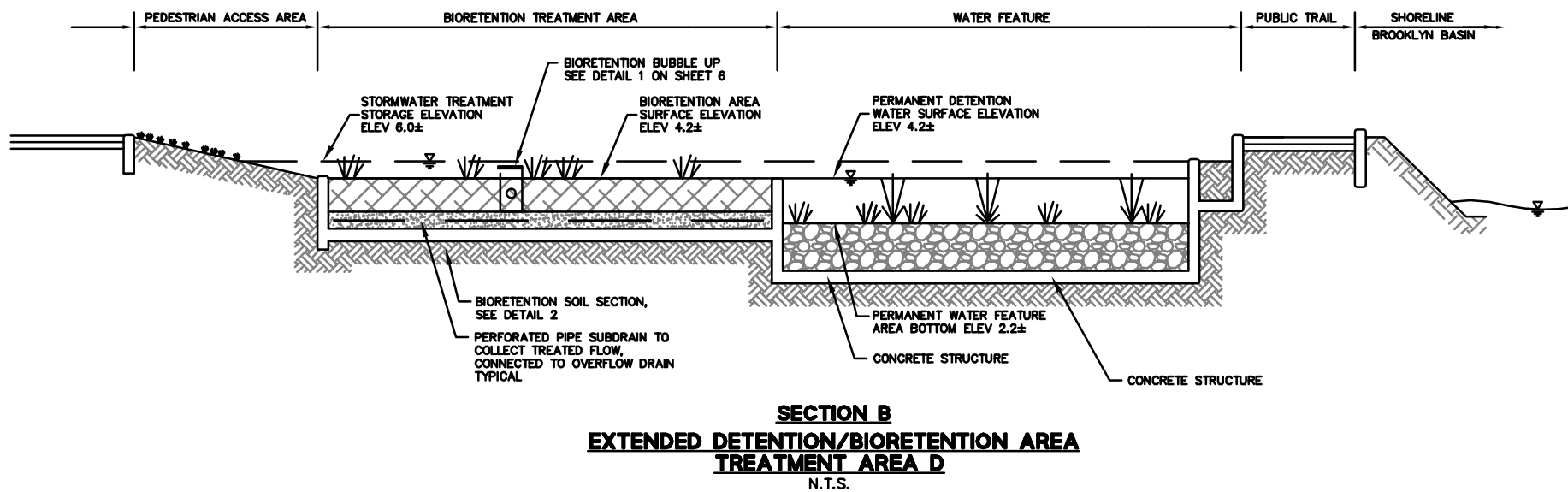
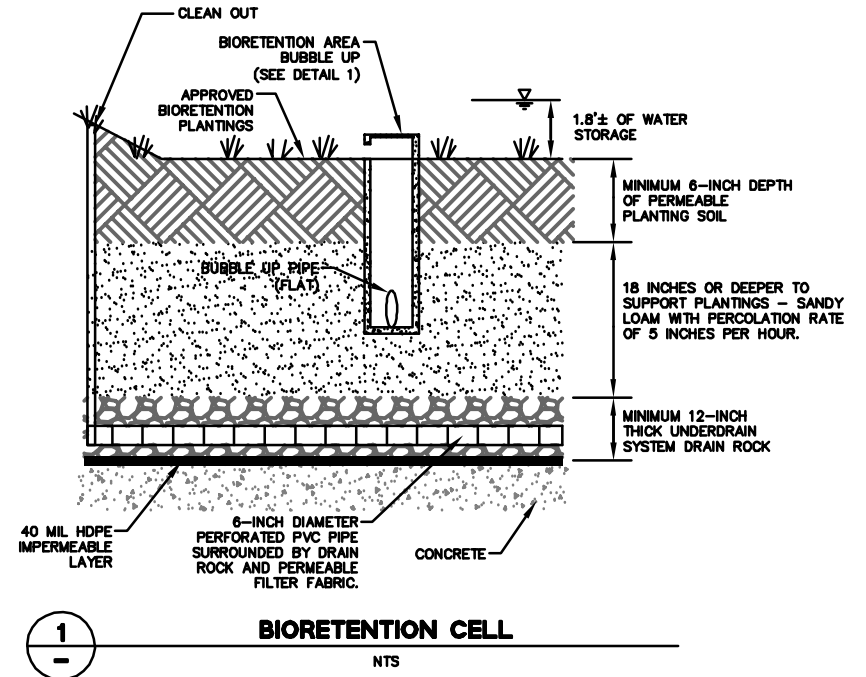
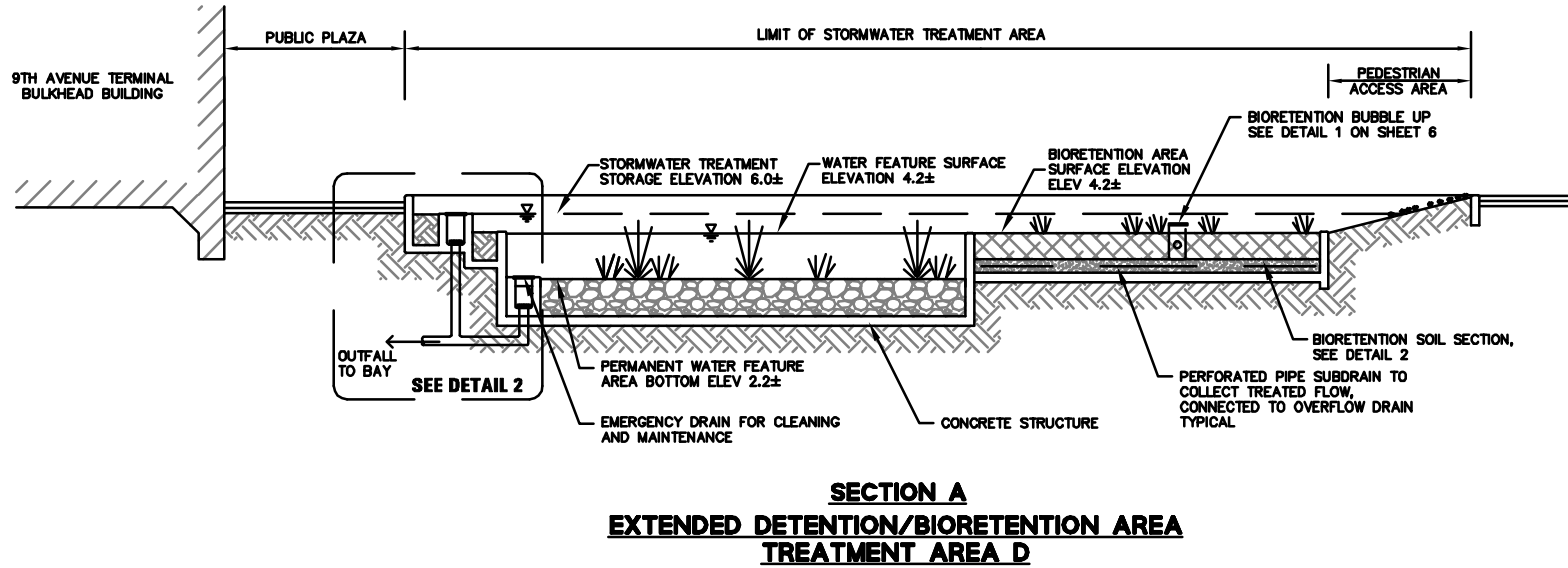
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- STORM DRAIN PIPE
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- TREATMENT AREA DISCHARGE TO STORM DRAIN
- - - BIORETENTION AREA BALANCING PIPE SYSTEM (FLAT)
- - - PERFORATED UNDERDRAIN SYSTEM
- BIORETENTION AREA
- 5 PROPOSED OUTFALL



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**APPENDIX B**  
**City of Oakland Source Control**  
**Measures to Limit Stormwater**  
**Pollution**



## SOURCE CONTROL MEASURES TO LIMIT STORMWATER POLLUTION

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On February 19, 2003, the Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB), issued a municipal stormwater permit under the National Pollutant Discharge Elimination System (NPDES) permit program to the Alameda Countywide Clean Water Program (ACCWP). The purpose of the permit is to reduce the discharge of pollutants in stormwater to the maximum extent practicable and to effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses. The City of Oakland, as a member of ACCWP, is a co-permittee under ACCWP's permit and is, therefore, subject to the permit requirements.

Provision C.3.k of the NPDES permit requires the City to impose source control measures to limit the generation, discharge, and runoff of pollutants in new development and redevelopment projects. Below are the City of Oakland Source Control Measures approved for use by the Chief of Building Services pursuant to Section 13.16.100 of the Oakland Municipal Code. These source control measures have been adapted from a model list developed by ACCWP for use by all co-permittees as specific conditions of project approval imposed by the City on applicable development and redevelopment projects. The City of Oakland Source Control Measures are effective immediately and are required in addition to standard stormwater-related best management practices (BMPs) required during construction and other post-construction stormwater pollution management requirements contained within the NPDES permit.

The source control measures below are divided into two categories: structural control measures and operational best management practices (BMPs). Listed with each group of source control measures is the City department, or departments, responsible for the permit review, construction inspection, and/or enforcement of each group of source control measures.<sup>1</sup>

### A. STRUCTURAL CONTROL MEASURES

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This section describes source control measures that are physically incorporated into the design of a project. These source control measures apply to all building and other construction-related permits issued by the City for new facilities, wholly reconstructed facilities, and wholly reconstructed portions of existing facilities. The City of Oakland will verify a permit applicant's implementation of required source control measures during the review of construction plans, during construction inspections, and during inspections in response to complaints from the public.

#### 1. Marking of storm drain inlets (CEDA Building Services Division)

- On-site storm drain inlets shall be clearly marked with the words "No Dumping! Flows to Bay," or equivalent, using methods approved by the City of Oakland.

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<sup>1</sup> ABBREVIATIONS FOR CITY DEPARTMENTS:

## **2. Interior floor drains (CEDA Building Services Division)**

- Interior floor drains shall be plumbed to the sanitary sewer system and shall not be connected to storm drains. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

## **3. Parking garages (CEDA Building Services Division)**

- Interior level parking garage floor drains receiving non-stormwater discharge shall be connected to a water treatment device approved by the City of Oakland's Building Services Division (BSD) prior to discharging to the sanitary sewer system. The applicant shall contact BSD for specific connection and discharge requirements.

## **4. Pesticide/fertilizer application (CEDA Building Services Division; CEDA Planning and Zoning Division)**

- Landscaping shall be designed to minimize irrigation and runoff, promote surface infiltration where appropriate, and minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.
- Structures shall be designed to discourage the occurrence and entry of pests into buildings, thus minimizing the need for pesticides. For example, dumpster areas should be located away from occupied buildings, and building foundation vents shall be covered with screens.
- Landscaping shall comply with water-efficient landscape standards, as required.
- If a landscaping plan is required as part of a development project application, the plan shall meet the following conditions related to the reduction of pesticide use on the project site:
  - Where feasible, landscaping shall be designed and operated to treat stormwater runoff by incorporating elements that collect, detain, and infiltrate runoff. In areas that provide detention of water, plants that are tolerant of saturated soil conditions and prolonged exposure to water shall be specified.
  - Plant materials selected shall be appropriate to site specific characteristics such as soil type, topography, climate, amount and timing of sunlight, prevailing winds, rainfall, air movement, patterns of land use, ecological consistency, and plant interactions to ensure successful establishment.
  - Existing native trees, shrubs, and ground cover shall be retained and incorporated into the landscape plan to the maximum extent practicable.
  - Proper maintenance of landscaping, with minimal pesticide use, shall be the responsibility of the property owner.
  - Integrated pest management (IPM) principles and techniques shall be encouraged as part of the landscaping design. Examples of IPM principles and techniques include selecting plants that are well adapted to soil conditions at the site; selecting plants that are well adapted to sun and shade conditions at the site (consider future conditions when plants reach maturity and seasonal changes and time of day); providing irrigation appropriate to the water requirements of the selected plants; selecting pest- and disease-resistant plants; planting a diversity of species to prevent a potential pest infestation from affecting the entire landscaping plan; and using "insectary" plants in the landscaping to attract and keep beneficial insects.

**5. Pool, spa, and fountain discharges (CEDA Building Services Division)**

- Discharge drains from pools (including swimming pools, hot tubs, spas, and fountains but excluding public pools) shall not be connected directly to the storm drain or sanitary sewer system, unless the connection is specifically approved by the City of Oakland's Building Services Division.
- Subject to City requirements, when draining is necessary, a hose or other temporary system shall be directed into a sanitary sewer clean-out. The clean-out shall be installed in a readily accessible area. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
- Subject to City requirements, swimming pool, spa, and fountain water may be allowed to discharge to the storm drains if the water has been dechlorinated, the water is within ambient temperature, and no copper-based algae control projects have been added to the water.
- If commercial and public swimming pool discharges are discharged to land where the water would not flow to a storm drain or to a surface water, the discharge may be subject to the requirements of the State Water Resources Control Board's statewide general waste discharge requirements for discharges to land with a low threat to water quality.

**6. Food service equipment cleaning (CEDA Building Services Division)**

- Food service facilities (including restaurants and grocery stores) shall have a sink or other floor mat, container, and equipment cleaning area, which is connected to the sanitary sewer system. The cleaning area shall be large enough to clean the largest mat or piece of equipment to be cleaned. The cleaning area shall be indoors or in a roofed area outdoors; both areas must be plumbed to the sanitary sewer. Outdoor cleaning areas shall be designed to prevent stormwater run-on from entering the sanitary sewer and to prevent stormwater run-off from carrying pollutants to the storm drain. Signs shall be posted indicating that all food service equipment washing activities shall be conducted in this area. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

**7. Refuse areas (CEDA Building Services Division; CEDA Planning and Zoning Division)**

- New food-service facilities, recycling facilities, multi-family residential complexes or subdivisions, and similar facilities shall provide a roofed or enclosed area for dumpsters and recycling containers. The area shall be designed to prevent water run-on to the area and runoff from the area and to contain litter and trash, so that it is not dispersed by the wind or runoff during waste removal.
- Runoff from food service areas, trash enclosures, recycling areas, and/or food compactor enclosures or similar facilities shall not discharge to the storm drain system. Trash enclosure areas shall be designed to avoid run-on to the trash enclosure area. Any drains installed in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities shall be connected to the sanitary sewer. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.



- 8. Outdoor process activities/equipment** (CEDA Building Services Division; OFD Office of Emergency Services; applies to machine shops and auto repair shops, and industries that have pretreatment facilities)
- Process activities shall be performed either indoors or in roofed outdoor areas. If performed outdoors, the area shall be designed to prevent run-on to and runoff from the area with process activities.
  - Process equipment areas shall drain to the sanitary sewer system. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
- 9. Outdoor equipment/materials storage** (CEDA Building Services Division; CEDA Planning and Zoning Division; OFD Office of Emergency Services)
- All outdoor equipment and materials storage areas shall be covered and bermed, or shall be designed with BMPs to limit the potential for runoff to contact pollutants.
  - Storage areas containing non-hazardous liquids shall be covered by a roof and drain to the sanitary sewer system, and be contained by berms, dikes, liners, vaults or similar spill containment devices. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
  - All on-site hazardous materials and wastes, as defined and/or regulated by the California Public Health Code and the Oakland Fire Department, acting as the local Certified Unified Program Agency (CUPA), must be used and managed in compliance with the applicable CUPA program regulations and the facility hazardous materials management plan approved by the CUPA authority.
- 10. Vehicle/equipment and commercial/industrial cleaning** (CEDA Building Services Division; CEDA Planning and Zoning Division; OFD Office of Emergency Services)
- Wastewater from vehicle and equipment washing operations shall not be discharged to the storm drain system, with the exception of water containing no soap or other cleaning agent that is used in a car dealership for minimal rinsing of exterior vehicles surfaces for appearance purposes.
  - Commercial/industrial facilities having vehicle/equipment cleaning needs shall provide a roofed, bermed area for washing activities. Vehicle/equipment washing areas shall be designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. A sign shall be posted indicating the location and allowed uses in the designated wash area. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
  - Commercial car wash facilities shall be designed and operated such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed and the wastewater reused with no discharges to the storm drain. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

**11. Vehicle/equipment repair and maintenance** (CEDA Building Services Division; CEDA Planning and Zoning Division; OFD Office of Emergency Services)

- Vehicle/equipment repair and maintenance shall be performed in a designated area indoors, or if such services must be performed outdoors, in an area designed to prevent the run-on and runoff of stormwater.
- Secondary containment shall be provided for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.
- Vehicle service facilities shall not contain floor drains unless the floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer, for which an industrial waste discharge permit has been obtained. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
- Tanks, containers, or sinks used for parts cleaning or rinsing shall not be connected to the storm drain system. Tanks, containers, or sinks used for such purposes may only be connected to the sanitary sewer system if allowed by an industrial waste discharge permit. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

**12. Fuel dispensing areas** (CEDA Building Services Division; CEDA Planning and Zoning Division; OFD Office of Emergency Services)

- Fueling areas (defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater) shall have impermeable surfaces (i.e., Portland cement concrete or equivalent smooth impervious surface) that are graded at the minimum slope necessary to prevent ponding and separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.
- Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump or by a roof the minimum dimensions of which must be equal to or greater than the area within the grade break or fuel dispensing area. The canopy or roof shall not drain onto the fueling area.

**13. Loading docks** (CEDA Building Services Division)

- Loading docks shall be covered or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Stormwater runoff from loading dock areas shall be drained to the sanitary sewer, diverted and collected for ultimate discharge to the sanitary sewer, or connected to a post-construction stormwater treatment measure prior to discharge to the storm drain system. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.
- Door skirts between the trailers and the building shall be installed to prevent exposure of loading activities to rain, unless one of the following conditions apply: the loading dock is covered, or the

applicant demonstrates that rainfall will not result in an untreated discharge to the storm drain system.

**14. Fire sprinkler test water (OFD Fire Prevention Bureau)**

- Fire sprinkler test water shall be drained to the sanitary sewer system (with approval from the City of Oakland's Building Services Division, or BSD) or drain to landscaped areas where feasible. In the event that BSD does not approve the connection and drainage to landscaped areas is infeasible, the applicant may propose an alternative method of providing for drainage of fire sprinkler test water, such as by filtering and dechlorinating the water prior to discharge to a storm drain, subject to approval by SFRWQCB staff.

**15. Boiler drain lines (CEDA Building Services Division)**

- Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

**16. Air conditioning units (CEDA Building Services Division)**

- For small air conditioning units, air conditioning condensate should be directed to landscaped areas as a minimum BMP. For large air conditioning units, in new developments or significant redevelopments, the preferred alternatives are for condensate lines to be directed to landscaped areas, or alternatively connected to the sanitary sewer system after obtaining permission from the City of Oakland's Building Services Division. Air conditioning condensate lines may discharge to the storm drain system provided they are not a source of pollutants. As with smaller units, any anti-algal or descaling agents must be properly disposed of. Any air conditioning condensate that discharges to land without flowing to a storm drain may be subject to the requirements of the State Water Resources Control Board's statewide general waste discharge requirements for discharges to land with a low threat to water quality.

**17. Roof drains (CEDA Building Services Division)**

- Roof drains shall discharge and drain away from the building foundation to an unpaved area wherever practicable.

**18. Roof-top equipment (CEDA Building Services Division)**

- Roof-top equipment other than that producing air conditioning condensate shall drain to the sanitary sewer (if its drainage does not come in contact with stormwater) or shall be covered and have no discharge to the storm drain. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

## **19. Washing and steam-cleaning (CEDA Building Services Division)**

- Most washing and/or steam-cleaning must be done at an appropriately equipped facility that drains to the sanitary sewer. Any outdoor washing or pressure washing must be managed in such a way that there is no discharge of soaps or other pollutants to the storm drain. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

## **B. OPERATIONAL BMPs**

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This section describes operational best management practices (BMPs) that rely on a property owner to implement following the construction of a project. These BMPs apply to all building and other construction-related permits issued by the City. Responsibility for implementation of these BMPs clearly rests with the property owners. The City of Oakland will verify a property owner/operator's implementation of required operational BMPs during industrial and commercial business inspections and during inspections in response to complaints from the public.

### **1. Paved sidewalks and parking lots (CEDA Building Services Division; PWA Environmental Services Division)**

- Sidewalks and parking lots shall be swept regularly to minimize the accumulation of litter and debris. Debris resulting from pressure washing shall be trapped and collected to prevent entry into the storm drain system. Washwater containing any soap, cleaning agent, or degreaser shall not be discharged to the storm drain and shall be collected and either discharged to the sanitary sewer or treated prior to being lawfully disposed of. The applicant shall contact the City of Oakland's Building Services Division for specific connection and discharge requirements.

### **2. Private streets, utilities, and common areas (CEDA Building Services Division; CEDA Planning Zoning Division)**

- The owner of private streets and storm drains shall prepare and implement a plan for street sweeping of paved private roads and cleaning of all storm drain inlets.
- For residential developments where other maintenance mechanisms are not applicable or otherwise in place, a property owners' association, architectural committee, maintenance assessment district, special assessment district, or similar organization or arrangement shall be created and be responsible for maintaining all private streets and private utilities and other privately owned common areas and facilities on the site including the landscaping. These maintenance responsibilities shall include implementing and maintaining stormwater BMPs associated with improvements and landscaping and may include the maintenance responsibilities described in the maintenance plan that would be included as an attachment to the stormwater treatment measure maintenance agreement for the subject property. CC&R's creating a property owners' association may be reviewed and approved by the City of Oakland Attorney's Office prior to the recordation of a final map and shall be recorded prior to the sale of the first residential unit. The CC&R's or special assessment district shall describe how the stormwater BMPs associated with privately owned improvements and landscaping shall be maintained by the association or the special assessment district.



**3. Vehicle/equipment repair and maintenance** (CEDA Building Services Division; OPD Office of Emergency Services; PWA Environmental Services Division)

- No person shall dispose of, nor permit the disposal, directly or indirectly, of vehicle fluids, hazardous materials, or rinsewater from parts cleaning operations into storm drains.
- No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.
- No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area that cannot discharge to the storm drain, such as an area with secondary containment.

**4. Fueling areas** (CEDA Building Services Division; OPD Office of Emergency Services; PWA Environmental Services Division)

- The property owner shall dry sweep the fueling area and spot clean leaks and drips routinely. Fueling areas shall not be washed down with water unless the wash water is collected and disposed of properly (i.e., not in the storm drain).

**5. Loading docks** (CEDA Building Services Division)

- The property owner shall ensure that BMPs are implemented to prevent potential stormwater pollution. These BMPs shall include, but are not limited to, a regular program of sweeping, litter control, and spill clean-up.

**6. On-site storm drains** (CEDA Building Services Division)

- All on-site storm drains must be inspected and, if necessary, cleaned at least once a year immediately prior to the rainy season. Additional cleaning may be required by the City of Oakland.



Natural, 4" Disc  
Material: Aluminum  
Symbol: Fish



Natural, 4" Disc  
Material: Brass  
Symbol: Crab



Natural, 4" Disc  
Material: Stainless Steel  
Symbol: Fish



1 Color, 4" Disc  
Material: Stainless Steel  
Symbol: Fish  
Option: Rivet Fastener



1 Color, 4" Disc  
Material: Stainless Steel  
Symbol: Catch Basin



2 Colors, 4" Disc  
Material: Stainless Steel  
Symbol: Lobster



1 Color, 4" Disc  
Material: Aluminum  
Symbol: Lobster



1 Color, 4" Disc  
Material: Brass  
Symbol: Crab



1 Color, 4" Disc  
Material: Stainless Steel  
Symbol: Fish  
Option: Serialization



1 Color, 4" Disc  
Material: Stainless Steel  
Symbol: Trout

## CUSTOM MARKERS



## RECTANGULAR MARKER



1 Color, 3"x10" Rectangle  
Material: Aluminum (Also Avail. in Stainless Steel)  
Symbol: Trout

**NEW!**



1 Color, 2 1/8" Disc  
Material: Avail in Stainless Steel, Anodized Aluminum & Brass  
Standard & Custom Symbols, Colors & Legends Available

# **APPENDIX D**

## **Treatment Measure Sizing Calculations**

## OUTFALL 1 TREATMENT AREA CALCULATIONS

<b>TREATMENT MEASURE:</b>	Bio-retention Area
<b>SIZING METHODOLOGY:</b>	Flow and Volume Design Basis

<i>A</i>	<b>Impervious Area:</b>	196,020	Square Feet (SF)
<i>C</i>	<b>Composite C Factor:</b>	0.9	
<i>i</i>	<b>2x 85th Percentile Intensity</b>	0.2	in/hr

### STEPS

#### 1 Use 4% rule to determine preliminary treatment area size

Area:	196,020 SF
4% of Area:	7,841 SF

#### 2 Determine the duration of the Treatment Event Rainfall

Mean Annual Precipitation:	21 inches
48 hr Unit Basin Storage Volume:	0.60 inches
Adjusted Unit Basin Storage Vol.:	0.69 inches
Readjusted for 100% capture	0.77 inches
Duration of Rainfall	3.83 hours

#### 3 Total Volume for 48 hr. Rainfall Event

Composite C x A	176,418 SF
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#### 4 Required Treatment Volume

Composite C x A	176,418 in/hr
Adj. Unit Basin Storage Volume	0.69 inches
Treatment Volume	10,144 cubic feet (CF)

#### 5 Volume of Runoff Filtered through Soils

Soil Media Infiltration Rate	0.42 ft/hr
Estimated Reduced Treatment Area	3,999 SF
	0.10 Ac
Volume of Treated Runoff in Soils	6,428 CF

#### 6 Determine Depth of Surface Storage

Remaining Treatment Volume	3,716 ft/hr
Storage Depth	0.93 feet

## OUTFALL 2 TREATMENT AREA CALCULATIONS

<b>TREATMENT MEASURE:</b>	Bio-retention Area
<b>SIZING METHODOLOGY:</b>	Flow and Volume Design Basis

<i>A</i>	<b>Impervious Area:</b>	309,276	Square Feet (SF)
<i>C</i>	<b>Composite C Factor:</b>	0.9	
<i>i</i>	<b>2x 85th Percentile Intensity</b>	0.2	in/hr

### STEPS

#### 1 Use 4% rule to determine preliminary treatment area size

Area:	309,276 SF
4% of Area:	12,371 SF

#### 2 Determine the duration of the Treatment Event Rainfall

Mean Annual Precipitation:	21 inches
48 hr Unit Basin Storage Volume:	0.60 inches
Adjusted Unit Basin Storage Vol.:	0.69 inches
Readjusted for 100% capture	0.77 inches
Duration of Rainfall	3.83 hours

#### 3 Total Volume for 48 hr. Rainfall Event

Composite C x A	278,348 SF
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#### 4 Required Treatment Volume

Composite C x A	278,348 in/hr
Adj. Unit Basin Storage Volume	0.69 inches
Treatment Volume	16,005 cubic feet (CF)

#### 5 Volume of Runoff Filtered through Soils

Soil Media Infiltration Rate	0.42 ft/hr
Estimated Reduced Treatment Area	6,309 SF
	0.14 Ac
Volume of Treated Runoff in Soils	10,142 CF

#### 6 Determine Depth of Surface Storage

Remaining Treatment Volume	5,863 ft/hr
Storage Depth	0.93 feet

## OUTFALL 4 TREATMENT AREA CALCULATIONS

<b>TREATMENT MEASURE:</b>	Bio-retention Area
<b>SIZING METHODOLOGY:</b>	Flow and Volume Design Basis

<i>A</i>	<b>Impervious Area:</b>	537,197	Square Feet (SF)
<i>C</i>	<b>Composite C Factor:</b>	0.9	
<i>i</i>	<b>2x 85th Percentile Intensity</b>	0.2	in/hr

### STEPS

#### 1 Use 4% rule to determine preliminary treatment area size

Area:	537,197 SF
4% of Area:	21,488 SF

#### 2 Determine the duration of the Treatment Event Rainfall

Mean Annual Precipitation:	21 inches
48 hr Unit Basin Storage Volume:	0.60 inches
Adjusted Unit Basin Storage Vol.:	0.69 inches
Readjusted for 100% capture	0.77 inches
Duration of Rainfall	3.83 hours

#### 3 Total Volume for 48 hr. Rainfall Event

Composite C x A	483,477 SF
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#### 4 Required Treatment Volume

Composite C x A	483,477 in/hr
Adj. Unit Basin Storage Volume	0.69 inches
Treatment Volume	27,800 cubic feet (CF)

#### 5 Volume of Runoff Filtered through Soils

Soil Media Infiltration Rate	0.42 ft/hr
Estimated Reduced Treatment Area	10,959 SF
	0.25 Ac
Volume of Treated Runoff in Soils	17,617 CF

#### 6 Determine Depth of Surface Storage

Remaining Treatment Volume	10,183 ft/hr
Storage Depth	0.93 feet

## OUTFALL 5 TREATMENT AREA CALCULATIONS

<b>TREATMENT MEASURE:</b>	Bio-retention Area
<b>SIZING METHODOLOGY:</b>	Flow and Volume Design Basis

<i>A</i>	<b>Impervious Area:</b>	930,923	Square Feet (SF)
<i>C</i>	<b>Composite C Factor:</b>	0.804	
<i>i</i>	<b>2x 85th Percentile Intensity</b>	0.2	in/hr

### STEPS

#### 1 Use 4% rule to determine preliminary treatment area size

Area:	930,923 SF
4% of Area:	37,237 SF

#### 2 Determine the duration of the Treatment Event Rainfall

Mean Annual Precipitation:	21 inches
48 hr Unit Basin Storage Volume:	0.60 inches
Adjusted Unit Basin Storage Vol.:	0.69 inches
Readjusted for 100% capture	0.86 inches
Duration of Rainfall	4.28 hours

#### 3 Total Volume for 48 hr. Rainfall Event

Composite C x A	748,462 SF
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#### 4 Required Treatment Volume

Composite C x A	748,462 in/hr
Adj. Unit Basin Storage Volume	0.69 inches
Treatment Volume	42,970 cubic feet (CF)

#### 5 Volume of Runoff Filtered through Soils

Soil Media Infiltration Rate	0.42 ft/hr
Estimated Reduced Treatment Area	8,274 SF
	0.19 Ac
Volume of Treated Runoff in Soils	14,889 CF

#### 6 Determine Depth of Surface Storage

Remaining Treatment Volume	28,081 CF
Surface Storage Area	16,081 SF
Storage Depth	1.75 feet