



The Clean Beaches and Ocean Parcel Tax Measure V Program

5-Year Capital Improvement Plan



December 2009



B&V Project No. 162324



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ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this report.

AF	acre-feet
B&V	Black & Veatch
BMP	Best Management Practice
CASQA	California Stormwater Quality Association
EPA	United States Environmental Protection Agency
LARWQCB	Los Angeles Regional Water Quality Control Board
LID	Low Impact Development
O&M	Operations and Maintenance
OC	Measure V Citizens Oversight Committee
sf	square feet
TMDL	Total Maximum Daily Loads
WERF	Water Environment Research Foundation
WMP	Watershed Management Plan



1.0 INTRODUCTION

1.1 Background

Measure V

In November 2006, the Clean Beaches and Ocean Parcel Tax (Measure V) was passed by over two-thirds of voters in the City of Santa Monica (City). Measure V raises property tax revenue to be used solely for the purpose of implementing watershed water quality improvements in the City in accordance with the City's Watershed Management Plan (WMP) adopted in 2006.

5-Year Capital Improvement Plan

Black & Veatch (B&V) was retained to assist the City with development of a 5-Year Plan (FY2010-11 through FY2014-15) for implementation of various stormwater best management practice (BMP) projects. Based on the Guidance List of BMP and Low Impact Development (LID) Strategies, which has been reviewed and approved by the Oversight Committee (OC) in June 2009, the following general categories of projects are proposed. A brief project description for each category of projects is provided in Chapter 2.

1. Permeable Surface Alleys
2. Permeable Surface Street Gutters/Intersections
3. Miniature Parkway/Sidewalk Biofilters
4. Street Curb Extensions
5. Green Streets
6. Permeable Surface Parking Lots
7. Park Retrofits
8. Deep Infiltration In-Line Storm Drain Pilot Project
9. Payment on J-2/J-3 Agreement with City of Los Angeles
10. Trash BMPs
11. Downspout Redirect Program
12. Rain Barrel Program
13. Cistern Program

As part of this effort, B&V was also retained to develop several initial alternatives for water quality improvements to the Pico-Kenter Watershed, in addition to the alternatives previously presented.

1.2 Capital Improvement Plan Goals

Upon successful completion of this 5-Year Capital Improvement Plan, it is anticipated that the following goals will be achieved:

- ▼ Approximately 1,200 acres of drainage area will be treated through various structural and non-structural BMP and LID strategies.
- ▼ Total urban runoff will be reduced by approximately 12.3 MG per year.
- ▼ An estimated 10.5 million gallons (MG) of water will be harvested and used for irrigation each year.



2.0 PROJECT DESCRIPTIONS

The following sections describe each category of projects. Where project-specific data is available, additional details are provided.



2.1 Permeable Surface Alleys

Project Description

As part of routine alley replacement program, center swales will be replaced with a permeable surface, such as pervious concrete, to demonstrate the effective use of permeable products on the market. Three to five locations will be selected per year for this type of improvement. Measure V will fund the incremental cost between the regular concrete and pervious concrete or equivalent.

Appendix A presents a list of alleys that are scheduled for alley replacement for FY2009-10 through FY2013-2014. For planning purposes, the City is divided into five zones, and the alley replacement will be performed in one zone per fiscal year as follows:

- ▼ FY2009-10: Zone 1
- ▼ FY2010-11: Zone 2
- ▼ FY2011-12: Zone 3
- ▼ FY2012-13: Zone 4
- ▼ FY2013-14: Zone 5

Reference Standard

California Stormwater Quality Association (CASQA) BMP Fact Sheets SD-20 will be utilized as guideline. Another option may include area drains at 50 feet apart with 2 foot gravel base to accommodate 3/4" rainfall.

Local site conditions shall be considered when designing and implementing these types of improvements to avoid issues associated with saturated soils. In some locations, subsurface conditions may require sub-drainage systems to relieve water to local storm drains or other means of drainage.

Costs

An approximate unit cost for installation of pervious concrete is estimated to be \$9.3/sf (Water Environment Research Foundation, WERF). The unit cost includes construction costs, contingency, engineering, and construction management. Unit cost of regular concrete is estimated to be \$3.0/sf (RS Means). Thus, the guideline incremental cost of \$6.3/sf will be funded by Measure V.

Annual O&M costs associated with the water quality benefits derived from this application is estimated to be \$0.4/sf (WERF).

An initial guideline annual budget of \$70,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to implement this type of projects.

Table 2.1 shows a summary of the cost breakdown. It is estimated that approximately 8,000 to 10,000 sf or 4,000 to 5,000 linear feet of 2 foot wide center swales will be replaced each year.



Table 2.1: Summary of Project Costs for Pervious Concrete Alleys

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Installed Area (sf)	10,448	9,829	9,238	8,688	8,161	46,364
Unit Incremental Installation Cost* (\$/sf)	\$6.5	\$6.7	\$6.9	\$7.1	\$7.3	-
Unit Annual O&M Cost* (\$/sf)	\$0.4	\$0.4	\$0.4	\$0.5	\$0.5	-
Capital Costs**	\$67,796	\$65,695	\$63,599	\$61,601	\$59,601	\$318,291
O&M Costs	\$4,304	\$8,605	\$12,901	\$17,199	\$21,499	\$64,509
Total Project Costs	\$72,100	\$74,300	\$76,500	\$78,800	\$81,100	\$382,800

* Escalated at 3% per year.

**Includes construction costs, contingency, engineering, and construction management.



2.2 Permeable Surface Street Gutters/Intersections

Project Description

As part of routine street improvement program, concrete cross-gutters and intersections will be replaced with permeable products, such as pervious concrete, to demonstrate the effective use of different permeable products on the market. Measure V will fund the incremental cost between the regular concrete and pervious concrete or equivalent.

Pervious concrete street gutters have previously been installed in:

Oak Street and Hill Street between 18th and 25th Street
Ashland Avenue between 23rd and 25th Street
21st Street between Pearl Street and Pier Avenue
Grant, Pacific and Maple Streets between 14th and 16th Street
Washington Avenue between 26th and Stanford Street
Harvard Street between Montana Avenue and Wilshire Boulevard

For planning purposes, the City is divided into five zones, and the street gutters/intersections replacement will be performed in one zone per fiscal year as follows:

- ▼ FY2010-11: Zone 7
- ▼ FY2011-12: Zone 1
- ▼ FY2012-13: Zone 2
- ▼ FY2013-14: Zone 3
- ▼ FY2014-15: Zone 4

Appendix B shows a map of the City zones for the street improvement program as well as the locations of the existing pervious concrete street gutters.

Reference Standard

CASQA BMP Fact Sheets SD-20 will be utilized as guideline.

Local site conditions shall be considered when designing and implementing these types of improvements to avoid issues associated with saturated soils. In some locations, subsurface conditions may require sub-drainage systems to relieve water to local storm drains or other means of drainage.

Costs

An approximate unit cost for installation of pervious concrete is estimated to be \$9.3/sf (WERF). The unit cost includes construction costs, contingency, engineering, and construction management. Unit cost of regular concrete is estimated to be \$3.0/sf (RS Means). Thus, the incremental guideline cost of \$6.3/sf will be funded by Measure V.

Annual O&M costs associated with the water quality benefits derived from this application is estimated to be \$0.4/sf (WERF).

An initial guideline annual budget of \$70,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to implement this type of projects.

Table 2.2 shows a summary of the cost breakdown. It is estimated that approximately 8,000 to 10,000 sf of street gutters/intersections will be replaced each year.



Table 2.2: Summary of Project Costs for Pervious Concrete Gutter/Intersections

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Installed Area (sf)	10,448	9,829	9,238	8,688	8,161	46,364
Unit Incremental Installation Cost* (\$/sf)	\$6.5	\$6.7	\$6.9	\$7.1	\$7.3	-
Unit Annual O&M Cost* (\$/sf)	\$0.4	\$0.4	\$0.4	\$0.5	\$0.5	-
Capital Costs**	\$67,796	\$65,695	\$63,599	\$61,601	\$59,601	\$318,291
O&M Costs	\$4,304	\$8,605	\$12,901	\$17,199	\$21,499	\$64,509
Total Project Costs	\$72,100	\$74,300	\$76,500	\$78,800	\$81,100	\$382,800

* Escalated at 3% per year.

**Includes construction costs, contingency, engineering, and construction management.



2.3 Miniature Parkway/Sidewalk Biofilters

Project Description

Where nuisance or dry season flow exists, demonstration-scale wetlands, tree wells, and other bioretention features will be installed to capture and utilize the runoff. A custom-designed system or a packaged system may be utilized. Larger applications favor custom-designed systems.

Reference Standard

CASQA BMP Fact Sheets TC-32 will be utilized as guideline. Similar projects that have been implemented in the City of Portland could also be used as general guideline.

<http://www.portlandonline.com/bes/index.cfm?c=44463&>

Suggested Products and Suppliers

MWS by Bioclean Environmental Services. <http://www.biocleanenvironmental.com>

Bioretention System by Filterra. <http://www.filterra.com>

Tree Wells and Biofilters by Contech. <http://www.contech-cpi.com>

Treepod Biofilter by Kristar. <http://www.kristar.com/>

Costs

An approximate unit cost for installation of bioretention features is estimated to be \$70,000/acre of drainage area (WERF). The unit cost includes construction costs, contingency, engineering, and construction management.

Annual O&M cost is estimated to be \$10,000/acre of drainage area (WERF).

An initial guideline annual budget of \$100,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to implement this type of projects.

Table 2.3 shows a summary of the cost breakdown. It is estimated that the City will be able to install bioretention features that would treat approximately 0.7 to 1.3 acres of drainage area each year.

Table 2.3: Summary of Project Costs for Miniature Parkway/Sidewalk Biofilters

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Drainage Area Treated (acres)	1.3	1.1	1.0	0.8	0.7	4.9
Unit Installation Cost* (\$/acre)	\$72,100	\$74,263	\$76,491	\$78,786	\$81,149	-
Unit Annual O&M Cost* (\$/acre)	\$10,300	\$10,609	\$10,927	\$11,255	\$11,593	-
Capital Costs**	\$90,125	\$81,234	\$73,227	\$66,014	\$59,427	\$370,027
O&M Costs	\$12,875	\$24,866	\$36,073	\$46,586	\$56,473	\$176,873
Total Project Costs	\$103,000	\$106,100	\$109,300	\$112,600	\$115,900	\$546,900

* Escalated at 3% per year.

**Includes construction costs, contingency, engineering, and construction management.





2.4 Street Curb Extensions

Project Description

In this application, the street curb is extended at the downstream end of streets to install wider, depressed landscaping to capture and retain runoff; these extensions will include climate-appropriate plants and drip irrigation. Installation of a cistern will be considered where suitable to supply water for onsite landscaping. Runoff would be captured in one location rather than distributed along the street.

Reference Standard

CASQA BMP Fact Sheets TC-12, TC-32 and SD-11 will be utilized as guideline.

Suggested Products and Suppliers

A list of cistern system suppliers can be found at the City's website:

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Barrel_Cistern_Supplierslist%204-22.pdf

As with many water quality features, larger applications favor the development of a custom-designed facility.

Costs

An approximate unit cost for installation of curb contained bioretention features is estimated to be \$70,000/acre of drainage area (WERF). The unit cost includes construction costs, contingency, engineering, and construction management. Additional cost for a cistern and irrigation system will be determined once specific project locations are selected. For the purpose of the 5-Year Plan, \$50,000 is allocated per project to cover the costs for the cistern and irrigation system in addition to the costs associated with the bioretention features.

Annual O&M cost is estimated to be \$10,000/acre of drainage area for the bioretention features and \$12,000/acre for a cistern and irrigation system (WERF).

An initial guideline annual budget of \$100,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to implement this type of projects.

Table 2.4 shows a summary of the cost breakdown. It is estimated that the City will be able to install bioretention features with a cistern system to treat approximately 0.2 to 0.5 acres of drainage area each year.

Table 2.4: Summary of Project Costs for Street Curb Extensions

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Drainage Area Treated (acres)	0.5	0.4	0.3	0.2	0.2	1.7
Unit Installation Cost for Bioretention* (\$/acre drainage area treated)	\$72,100	\$74,263	\$76,491	\$78,786	\$81,149	-
Allocation for Additional Costs* (Cistern, Irrigation, etc.)	\$51,500	\$53,045	\$54,636	\$56,275	\$57,964	-
Unit Annual O&M Cost for Bioretention, Cistern, and Irrigation*	\$22,660	\$23,340	\$24,040	\$24,761	\$25,504	-
Capital Costs**	\$90,685	\$83,762	\$78,722	\$75,167	\$72,710	\$401,045
O&M Costs	\$12,315	\$22,338	\$30,578	\$37,433	\$43,190	\$145,855
Total Project Costs	\$103,000	\$106,100	\$109,300	\$112,600	\$115,900	\$546,900

* Escalated at 3% per year.

**Includes construction costs, contingency, engineering, and construction management.





2.5 Green Streets

Project Description

Ocean Park Boulevard Green Street Project will include implementation of various LID features, such as permeable gutters, sub-surface infiltration, permeable parking lanes, depressed parkways with drip irrigation and climate-appropriate plants, curb extensions, and depressed planters to capture runoff. A map of the project area is included in Appendix C. It is anticipated that construction of this project will start in 2011.

It is currently planned that \$1M of the total project capital costs, O&M costs, and other associated costs will be funded by Measure V in support of water quality benefits provided by the project. If implementation of the Ocean Park Blvd. Green Street Project is found infeasible due to funding or other issues, retrofits at Los Amigos Park and Parking Lot 9A or 11 will be considered as an alternate project. Concept for the alternate project is to divert runoff from the middle section of the sub drainage area to Los Amigos Park, capture runoff, and use the harvested flow for irrigation. Similarly, runoff from the southwesterly section of the sub drainage area would be diverted to Parking Lot 9A or 11, which is located on Neilson Way, and the runoff would be captured for infiltration, if deemed feasible.

Reference Standard

CASQA BMP Fact Sheets TC-32 and SD-20 will be utilized as guideline. Bicknell Green Street Project will also be used as a model.

Costs

It is assumed that \$700,000 and \$300,000 will be expended in FY2010-2011 and FY2011-12, respectively, to cover the capital costs. Annual maintenance cost is estimated to be \$7,000/acre of drainage area (WERF). Annual O&M cost associated with water quality benefits are estimated to be \$21,000 based on the drainage area of approximately 3 acres (WERF).

Table 2.5 shows a summary of the cost breakdown.

Table 2.5: Summary of Project Costs for Green Streets

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Capital Costs*	\$700,000	\$300,000	\$0	\$0	\$0	\$1,000,000
O&M Costs**	\$0	\$22,279	\$22,947	\$23,636	\$24,345	\$93,207
Total Project Costs	\$700,000	\$322,279	\$22,947	\$23,636	\$24,345	\$1,093,207

*Includes construction costs, contingency, engineering, and construction management.

** Escalated at 3% per year.



2.6 Permeable Surface Parking Lots

Overview

As part of City's overall facility program, permeable surfaces, such as porous asphalt, will be utilized for retrofit or new city parking facilities to demonstrate the effective use of different permeable products on the market. Depressed planters will also be implemented to capture runoff. Measure V will cover the portion of the project cost that is associated with the stormwater quality enhancement (i.e. depressed planters and incremental cost between the regular asphalt and porous asphalt).

The installation cost is estimated based on an incremental unit cost of \$0.80/sf (\$1.4 for permeable asphalt and \$0.6 /sf for regular asphalt) and an allocation of \$10,000/acre of parking lot for depressed planters. Annual O&M cost associated with the water quality benefits derived from this application are estimated to be \$0.2/sf (WERF). The following parking lots are planned for resurfacing and re-stripping in FY2011-12.

Parking Lot 9

- ▼ *Project Location.* Parking Lot 9 is located eastside of Neilson Way between Ashland Avenue and Hill Street.
- ▼ *Lot Size.* 1.55 acres
- ▼ *Installation Costs.* \$73,685
- ▼ *Annual O&M Costs.* \$14,314*

Parking Lot 9A

- ▼ *Project Location.* Parking Lot 9A is located eastside of Neilson Way from Hill Street to mid-block.
- ▼ *Lot Size.* 1.2 acres
- ▼ *Installation Costs.* \$57,047
- ▼ *Annual O&M Costs.* \$11,082*

Parking Lot 11

- ▼ *Project Location.* Parking Lot 11 is located eastside of Neilson Way between Ocean Park Boulevard and Hollister Avenue.
- ▼ *Lot Size.* 1.3 acres
- ▼ *Installation Costs.* \$61,801
- ▼ *Annual O&M Costs.* \$12,005*

Parking Lot 26

- ▼ *Project Location.* Parking Lot 26 is a small lot located eastside of Neilson Way between Hollister Avenue and Strand Street (most of the block is community gardens).
- ▼ *Lot Size.* 0.16 acres
- ▼ *Installation Costs.* \$7,606
- ▼ *Annual O&M Costs.* \$1,478*

*FY2011-12 O&M costs based on escalation at 3% per year.

Reference Standard

CASQA BMP Fact Sheets SD-20 will be utilized as guideline.

Local site conditions shall be considered when designing and implementing these types of improvements to avoid issues associated with saturated soils. In some locations, subsurface conditions may require sub-drainage systems to relieve water to local storm drains or other means of drainage.



Table 2.6 shows a summary of the cost breakdown.

Table 2.6: Summary of Project Costs for Porous Asphalt Parking Lots

	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
Installed Area (acres)	0.0	4.2	0.0	0.0	0.0	4.2
Unit Incremental Installation Cost for Porous Asphalt* (\$/sf)	-	\$0.8	-	-	-	-
Planter Costs (\$10,000/acre*)	\$0	\$44,664	\$0	\$0	\$0	-
Unit Annual O&M Cost* (\$/sf)	-	\$0.2	\$0.2	\$0.2	\$0.2	-
Capital Costs**	\$0	\$200,309	\$0	\$0	\$0	\$200,309
O&M Costs*	\$0	\$38,911	\$40,079	\$41,281	\$42,519	\$162,790
Total Project Costs	\$0	\$239,220	\$40,079	\$41,281	\$42,519	\$363,098

* Escalated at 3% per year.

**Includes construction costs, contingency, engineering, and construction management.



2.7 Park Retrofits

Overview

As part of these projects, wet weather runoff from a main storm drain will be diverted to an adjacent park for treatment (pretreatment and disinfection), storage, and use as irrigation water within the park. A replicable model will be developed and used throughout the City.

It is currently assumed that a vortex separator or equivalent will be provided for pretreatment, and a tank will be used for storage.

Data from the California Irrigation Management Information System (CIMIS), which is included in Appendix D, was utilized to estimate the typical turf watering requirements in Santa Monica during the wet season. The size of the storage tank at each project location was estimated based on the 6-month average (October through March) irrigation requirement of 1.8 inches/month, the approximate turf area at each park, and 2 weeks of storage period required between storm events.

The following locations are considered for park retrofits.

Memorial Park

- ▼ *Project Description.* Memorial Park is a multi-purpose Park located centrally within the City. The City is planning to construct a 1 MG buried non-potable water reservoir and a pump station at Memorial Park to improve the operational flexibility, reliability and performance of their existing non-potable water system. This reservoir will provide additional storage in the system for SMURRF effluent to meet potential peak system demands, and the booster pump station would eliminate existing pressure problems. In conjunction with this planned project, the City is proposing to construct a stormwater harvesting and use facility at this Park to divert some of the wet weather flows from the Kenter Storm Drain, retain and treat the flow, and utilize the harvested water for Park irrigation and other non-potable uses in nearby areas. As Memorial Park is located adjacent to the Kenter Storm Drain, which carries flows from a significant drainage area within the Kenter Canyon Basin, it is one of the most suitable locations within the City to implement a stormwater diversion and harvesting project. The stormwater harvesting system will likely include:
 - A diversion structure
 - A submersible pump station for conveying stormwater to the park
 - A pre-treatment system for trash and sediment removal
 - A below-grade tank
 - A strainer and disinfection system
 - A pumping facility for irrigation
 - Site piping for irrigation (modifications to and/or replacement of the existing piping)
 - Irrigation system improvements (modifications to and/or replacement of the existing system)

As both projects will require a below-grade tank and a pump station, it would be cost effective to combine the two projects. A dual reservoir with two compartments (hydraulically isolated) with a divider wall in the middle could be constructed, in lieu of two separate reservoirs. By the logic outlined above, it is estimated that a 200,000-gallon tank would be required in this application.

- ▼ *Capital Costs.* \$3.7M including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$25,000
- ▼ *Schedule.* It is anticipated that the stormwater harvesting facility will be constructed concurrently with construction of the non-potable reservoir for SMURRF effluent, which is currently scheduled for FY2012-13.



Ozone Park

- ▼ *Project Description.* Ozone Park is located within the Lincoln Basin near the City boundary with the City of Los Angeles. A stormwater harvesting and use facility similar to the one proposed for Memorial Park is considered. It is estimated that a 15,000-gallon tank would be required in this application.
- ▼ *Capital Costs.* \$845,000 including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$20,000
- ▼ *Schedule.* It is anticipated that the facility will be constructed in FY2010-11.

Marine Park

- ▼ *Project Description.* Marine Park is located within the 16th Street Basin near the City boundary. Upon completion of Phase 2 (the recycled component) of the Penmar Project (City of Los Angeles), a non-potable water pipeline could be extended from the reservoir at the Penmar project site to Marine Park for use of the captured stormwater.
- ▼ *Capital Costs.* \$1.0M including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$20,000
- ▼ *Schedule.* It is anticipated that the facility will be constructed in FY2011-12.

Virginia Park

- ▼ *Project Description.* Virginia Avenue Park is located within the Pico-Caltrans Basin south of the 10 Freeway. The City is considering a stormwater harvesting and use facility similar to the one proposed for Memorial Park. It is estimated that a 65,000-gallon tank would be required in this application.
- ▼ *Capital Costs.* \$1.9M including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$20,000
- ▼ *Schedule.* It is anticipated that the facility will be constructed in Post-2015.

Reed Park

- ▼ *Project Description.* Reed Park is located within the Wilshire Basin. The City is considering a stormwater harvesting and use facility similar to the one proposed for Memorial Park. It is estimated that a 40,000-gallon tank would be required in this application.
- ▼ *Capital Costs.* \$1.7M including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$20,000
- ▼ *Schedule.* It is anticipated that the facility will be constructed in Post-2015.

Clover Park

- ▼ *Project Description.* Clover Park is located within the Airport Basin. The City is considering a stormwater harvesting and use facility similar to the one proposed for Memorial Park. It is estimated that a 200,000-gallon tank would be required in this application.
- ▼ *Capital Costs.* \$5.3M including construction, design, and construction management costs.
- ▼ *Annual O&M Costs.* \$25,000
- ▼ *Schedule.* It is anticipated that the facility will be constructed in Post-2015.

Los Amigos Park

- ▼ *Project Description.* Los Amigos Park is located within the Pico-4th Street Basin. The City is considering a stormwater harvesting and use facility similar to the one proposed for Memorial Park. Retrofits at Los Amigos Park will be considered as an alternative project, if implementation of the Ocean Park Boulevard Green Street Project is found infeasible due to funding or other issues.

A conceptual level cost opinion for each of the park retrofit projects is included in Appendix E.



During the OC meeting held in September 2009, the OC requested that an estimated unit cost for stormwater harvesting at each park be provided (in \$/ac-ft) for comparison with cost of potable water. This information is provided in Appendix E.

Reference Standard

CASQA BMP Fact Sheets TC-12, TC-32 and SD-11 will be utilized as guideline.

Suggested Products and Suppliers

A list of cistern system suppliers can be found at the City's website:

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Barrel_Cistern_Supplierslist%204-22.pdf. A package system may be considered in some applications; however, these larger applications may find benefits in a custom-designed facility.



2.8 Deep Infiltration In-Line Storm Drain Pilot Project

Project Description

A pilot-scale aquifer recharge system will be considered to infiltrate dry and wet weather runoff from a storm drain via deep infiltration wells. B&V reviewed geotechnical reports made available by the City to assess general surface soil conditions within the City area. A summary of the geotechnical reports review is provided in Appendix F. Geologic reconnaissance will be performed to further assess feasibility of such project and to develop concept.

Costs

It is assumed that \$100,000 plus an escalation rate of 3% per year will be allocated to perform the geologic reconnaissance and develop concept(s) in FY2010-11.



2.9 Payment on J-2/J-3 Agreement with City of Los Angeles

Project Description

Per the *Draft Memorandum of Agreement (MOA) with the City of Los Angeles for the Santa Monica Bay Beaches Wet Weather Bacterial TMDL Implementation Plan Projects Cost Sharing Jurisdictional Groups Two and Three*, dated August 2007, it is currently assumed that the City of Santa Monica will contribute a total of \$4M over a 20-year term towards implementation of a series of City of Los Angeles projects in the jurisdictions, including the Penmar Water Quality Improvement Project.

Costs

It is assumed that \$200,000/year plus an interest rate of 3.25% per year will be paid to the City of Los Angeles over the next 20 years.



2.10 Trash BMPs

Project Description

In order to achieve compliance with a Santa Monica Bay trash TMDL, trash BMPs, such as vortex separators or inlet filter/inserts, will be installed to reduce the amount of trash entering the Bay upon storm events.

Reducing the amount of trash discharged from Pico-Kenter Outlet is considered as the primary focus of the City's trash BMP implementation in the next 5 years. Three basins (Kenter Canyon, Pico-Caltrans, and Pico-4th Street Basins) totaling over 4,000 acres drain to the Pico-Kenter Outlet, and limited trash BMPs have been implemented in these basins to date. Approximately 2/3 (or 2,645 acres) of Kenter Canyon Basin, which is the largest of the three basins, is located within the City of Los Angeles.

The following three alternatives are considered for trash BMPs for the three basins (collectively referred as Pico-Kenter Watershed) that discharge to the Pico-Kenter Outlet.

- ▼ Alternative 1. Install catch basin screening throughout watershed. It assumed that all of the City of Santa Monica owned catch basins within Pico-Kenter Watershed without inserts/filters will be retrofitted with inserts/filters in the first phase of implementation. In the second phase of implementation, the City will coordinate with the County of Los Angeles, City of Los Angeles, and other entities to retrofit the remainder of the catch basins within the Watershed.
- ▼ Alternative 2. Install five vortex separators at the Pico-Kenter Outlet. All separators will be installed at once.
- ▼ Alternative 3. Install five vortex separators at the Pico-Kenter Outlet. The five separators will be installed in phases. In FY2010-11, one unit will be installed at the northwest side of the outlet. In FY2012-13, another unit will be installed at the southeast side of the outlet. In FY2014-15, three additional units will be installed at the northwest side of the outlet.

A breakdown of the ownership and retrofit costs are summarized in Table 2.10-1.

Table 2.10-1: Cost for Filters/Inserts for Catch Basins throughout the Pico-Kenter Watershed

		with Inserts/ Filters	without Inserts/ Filters	Capital Cost to Add Inserts/ Filters*	Total Catch Basins within Watershed	Annual Cost to Maintain Inserts/ Filters**
Watershed with in Santa Monica	Catch Basins Owned by Santa Monica***	25	284	\$766,800	309	\$93,373
	Catch Basins Owned by Others	0	514	\$1,387,800	514	\$155,319
Watershed outside Santa Monica	Catch Basins Owned by Others	0	366	\$988,200	366	\$110,597
	Totals	25	1,164	\$3,142,800	1,189	\$359,300

* Based on estimated installed cost of \$2,700 per catch basin (based on quote from Bio-Clean with an 80% allowance to account for contingencies). Program oversight and administrative costs of \$98,000/year to be included in annual expenditure schedule in addition to the filter/insert costs.

** Maintenance costs developed with 3 cleaning/year with a 2 person crew spending 1/2 hour per catch basin. Labor costs estimated at \$35/hour/person. Vactor operating costs estimated at \$130/hour. Solids disposal cost at \$66/ton. Solids generation of 66 lbs/catch basin is assumed based on data provided by the City.

*** All catch basins owned by the City of Santa Monica are considered to be Phase 1.





Costs

In order to compare the long-term overall project costs of the three alternatives, a 20-year present-worth cost analysis was performed, as summarized in Table 2.10-2. In addition, advantages of each alternative are also summarized in Table 2.10-2.



Table 2.10-2: Pico-Kenter Watershed Treatment Alternatives – Summary Cost Comparison

Alt.	Description	Location(s)	Project Summary	Advantages	Phase 1 Project Cost** (\$)	Phase 2 Project Cost (\$)	Phase 3 Project Cost (\$)	Total of All Phases (\$)	Annual O&M Cost* (\$)	20-Year PW Cost @ 6% (\$)
1	Catch Basin Screening	Throughout watershed	Screens at all catch basins within the watershed.	Intercepts flow further up in the watershed; may distribute maintenance between agencies better.	\$1,002,900	\$2,376,000	\$0	\$3,378,900	\$360,000	\$8,451,000
2	End of Pipe	Discharge at the Beach	Concept for five 64 cfs vortex separators at the foot of Pico Blvd. All five separators will be installed at once.	Single site; economy of scale.	\$7,200,000	\$0	\$0	\$7,200,000	\$35,000	\$7,694,000
3	Phased End of Pipe	Discharge at the Beach	Phased concept to implement a total of five 64 cfs vortex separators at the foot of Pico Blvd. In FY2010-11, one unit will be installed at the northwest side of the outlet. In FY2012-13, another unit will be installed at the southeast side of the outlet. In FY2014-15, three additional units will be installed at the northwest side of the outlet.	Single site; phasing allows for incremental addition and improvement.	\$3,812,000	\$2,342,000	\$3,536,000	\$9,690,000	\$35,000	\$10,184,000

* See Table 2.10-1 for development of Alternative 1 O&M costs. For Alternatives 2 & 3, four cleanings/yr with a 2 person crew, spending 4 hour per vortex separator assumed. Solids capture was the same by area as with Alternative 1.

**Costs include sanitary sewer diversion and improvements to dry weather diversion at the Pico-Kenter Pump Station. The total project cost for these improvements are estimated to be \$236,100.





Although Alternative 2 (i.e. a regional facility) demonstrates long-term cost effectiveness, the upfront cost of over \$7M would consume over 3 years of revenues from Measure V. The phasing approach in Alternative 3 allows for incremental addition and improvements; however, the total project cost is high due to escalation factors and reduced economy of scale. As a result, per direction of the City, Alternative 1 is currently proposed, as this option will allow for trash to be captured further up stream and may distribute maintenance better between agencies.

It is assumed that the first phase of implementation, which is to install inserts/filters in all of the City of Santa Monica owned catch basins within Pico-Kenter Watershed, will be included in this 5-Year Plan. The first phase of project will be implemented in FY2010-11 and FY2011-12 with a capital cost of \$1,002,900. The Phase 1 project cost includes costs for addition of sanitary sewer diversion capability and improvements to the existing dry weather diversion piping at the Pico-Kenter Pump Station, which are estimated to be \$236,100. The improvements include addition of a forcemain from the pump station routed to a sewer manhole, which would allow for diversion of dry weather runoff to sanitary sewer when SMURRF is out of service. Improvements to the existing diversion piping would allow for more reliable diversion of dry weather runoff to SMURRF. Annual O&M cost is estimated to be \$93,400 for Phase 1. The costs associated with the second phase of implementation (i.e. retrofit of catch basins owned by other agencies) are not included in this 5-Year Plan.

Additional details on the conceptual level cost opinions for Alternatives 2 and 3 are provided in Appendix G.

Other Alternatives

Two other alternatives, as summarized in Table 2.10-3, were also considered. However, due to cost and complexity, these alternatives were not carried forward in the evaluation.

**Table 2.10-3: Other Alternatives Initially Considered
 (but not carried forward due to cost and complexity)**

Description	Location(s)	Project Summary	Advantages
Memorial Park + Phased End of Pipe*	Memorial Park + Discharge at the Beach	Capture and use of wet season flows at Memorial Park with phased concept for multiple vortex separators at the foot of Pico Blvd. Over \$12M in capital costs. O&M costs could exceed \$75,000/year.	Beneficial use of wet season flows; some benefits of sharing the site with planned 1 mgd non-potable reservoir for SMURRF effluent at Memorial Park; may allow for additional storage and more effective use of dry season flows.
Brentwood + Memorial Park + Downstream Sub watersheds	Brentwood + Memorial Park + Downstream Sub watersheds	Capture and use of wet season flows at Brentwood and Memorial Park with vortex separators downstream watersheds (Pico-Caltrans, Pico 4th and drainage at the foot of Pico Blvd.) Over \$18M in capital costs. O&M costs could exceed \$75,000/year.	Similar to above; may reduce size of the Pico Blvd. facility.

*The stormwater harvesting component of this alternative will be carried forward as part of the Memorial Park Retrofit Project, as described under Section 2.7.





Other Considerations

During the OC meeting held in September 2009, it was requested that a hybrid option that implements both catch basin screening and vortex separators be also considered. It was suggested that this hybrid facility could be located either near the beach (similar to Alternatives 2 and 3) or near the City boundary with the City of Los Angeles. It was surmised that this approach may help address uncertainties associated with how the other agencies within the Pico-Kenter Watershed may implement TMDL measures in the future (i.e. timing and extent of catch basin screening implementation and the level of maintenance to be provided).

In addressing OC's comment, a brief evaluation on the hybrid option was conducted to estimate the capacity of the vortex separators that would be required and the additional costs associated with implementation of the vortex separators. It was estimated that the scale and cost of the vortex separator facility near the beach would be similar to Alternatives 2 and 3 described above. If the facility were to be located near the City boundary with the City of Los Angeles near Brentwood, the size of the facility could be reduced by approximately 40%. Due to high capital cost and City's belief that other stakeholders may choose their own compliance methods, further evaluation of the hybrid solution was discontinued.

Other agencies regulated by the Los Angeles Regional Water Quality Control Board (LARWQCB) have developed approaches and implementation plans for trash TMDLs. The County of Los Angeles, as one such agency, has developed an approach that the LARWQCB has certified to achieve full capture for trash removal. This approach, as defined in Resolution No. 04-023, contains criteria for a full capture trash removal system that are summarized below:

- ▼ The system shall trap particles retained by a 5mm mesh.
- ▼ Sizing is based on a one year frequency, one hour rainfall event.
- ▼ Rational method hydrology is utilized for determining the peak flow rate.

The LARWQCB has accepted a Connector Pipe System (a vertical stainless steel screen with 5mm openings inside a catch basin in such a manner that all water entering the basin must pass through the device) as an approved full capture system for the County's needs. Some concern exists relating to the screens blinding within these systems, thereby limiting hydraulic capacity at the catch basin, and creating flood control challenges upstream.

Early in the design phase of the City's Trash BMP Program, it is recommended that examples of approved practices within the region are assessed carefully and balanced with maintenance practices and flood control objectives of the City. This initial determination and any refined criteria specific to the City's Program should be reviewed with the LARWQCB prior to commencing design of the catch basin inserts. As noted above, this evaluation utilizes a Bio-Clean system to derive a unit cost for the catch basin insert/filter system. It is believed this system serves as a conservative unit cost for this comparison. During the design phase this system, as well as others, may be considered to meet the objectives of the City's Program.

Reference Standard

The criteria for a full capture system, as described above, will be considered in design of the Trash BMPs.

CASQA BMP Fact Sheets MP-52 will also be utilized as guideline.

Suggested Products and Suppliers

Bio Clean Environmental Services, Inc. <http://www.biocleanenvironmental.com/products/>
Flogard by Kristar. <http://www.kristar.com/>



2.11 Downspout Redirect Program

Project Description

The City currently administers the Downspout Redirect Rebate Program. Up to \$40 of rebates per qualified downspout are available for the cost (material and labor) of redirecting rain gutter downspouts to permeable surfaces, such as landscaped areas. Additional information could be found at the City's website:

<http://www.smgov.net/Departments/OSE/categories/content.aspx?id=3847>.

Reference Standard

DS Redirect Instructions.

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Downspout_Redirect_HowTo.pdf.

Costs

An annual budget of \$4,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to support this program.



2.12 Rain Barrel Program

Project Description

The City currently administers the Rain Barrel Rebate Program for storage of rainwater. Rebates up to \$250 per barrel (limited up to 499 gallons) are available for the cost of design, labor and materials. Additional information could be found at the City's website:

<http://www.smgov.net/Departments/OSE/categories/content.aspx?id=3847>.

Reference Standard

Rain Barrel Installations & Maintenance

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Install_Maintain_RainBarrel.pdf

City's List of Suppliers

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Barrel_Cistern_Supplierslist%204-22.pdf

Costs

An annual budget of \$12,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to support this program.



2.13 Cistern Program

Project Description

The City currently administers the Cistern Rebate Program for storage of rainwater. The City may increase the rebate amount from \$250-\$500 (per the existing program) to \$800 to help cover installation costs, which include electrical, plumbing, backflow prevention devices, and permitting costs for pressurized system. The rebates are limited to cisterns over 500 gallons each. Additional information could be found at the City's website:

<http://www.smgov.net/Departments/OSE/categories/content.aspx?id=3847>.

Reference Standard

Rain Barrel Installations & Maintenance

http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/Install_Maintain_RainBarrel.pdf

Costs

An annual budget of \$50,000/year plus an escalation rate of 3% per year is allocated in the Measure V 5-Year Plan to support this program.



3.0 SUMMARY OF THE 5-YEAR CAPITAL IMPROVEMENT PLAN

Table 3-1 presents a summary of the proposed Measure V 5-Year Capital Improvement Plan.

A schedule of project implementation is presented in Table 3-2.

A schedule of expenditure for capital costs, O&M costs, and the total project was also developed based on the proposed Measure V 5-Year Capital Improvement Plan and is presented in Table 3-3, 3-4, and 3-5, respectively. The costs presented in Table 3-5 are total project costs, including construction, engineering, construction management, burdened salary for the City's Watershed Program Manager, administrative expenses, and O&M costs. It is estimated that the annual expenditure for Measure V in the next 5 years will range from \$1.3M to \$4.1M, totaling \$13.7M.

A summary of drainage area treated, reduction of runoff resulting from the Measure V 5-Year Capital Improvement Plan, and capital cost per drainage area treated for the proposed projects is provided in Appendix H.



**Table 3-1: Guidance List of Best Management Practices and Low Impact Development Strategies
Summary of Measure V - 5-Year Capital Improvement Plan**



Project ID No.	Project Type/Category	Project Summary & Notes	Selection Criteria	Guideline Cost to Measure V	Cost for 5-year Program	Timing
1	Permeable Surface Alleys	As part of routine alley replacement program, center swales will be replaced with permeable surface, such as pervious concrete, to demonstrate the effective use of permeable products on the market. 3-5 locations will be selected per year for this type of improvement. Measure V will fund the incremental cost between the regular concrete and pervious concrete or equivalent.	Alley replacement required as part of a CIP project	\$70,000/year*	\$350,000*	Annual
2	Permeable Surface Street Gutters/Intersections	As part of routine street improvement program, concrete cross-gutters and intersections will be replaced with pervious surface, such as pervious concrete, to demonstrate the effective use of different permeable products on the market. Measure V will only fund the the incremental cost between the regular concrete and pervious concrete or equivalent.	Street gutter/intersection improvement in low traffic areas required as part of a CIP project	\$70,000/year*	\$350,000*	Annual
3	Miniature Parkway/Sidewalk Biofilters	Where nuisance or dry season flow exists, demonstration-scale wetlands, tree wells, and other bioretention features will be installed to capture and utilize the runoff. A custom-designed system or a packaged system may be utilized. Larger applications favor custom-designed systems.	Custom design or optimum available products on the market	\$100,000/year*	\$500,000*	Annual
4	Street Curb Extensions	In this application, the street curb is extended at the downstream end of streets to install wider depressed landscaping to capture and retain runoff; these extensions will include climate-appropriate plants and drip irrigation. Installation of a cistern will be considered where suitable to supply water for on-site landscaping. Runoff would be captured in one location rather than distributed along the street.	Wide streets with high runoff rate	\$100,000/year	\$500,000*	Annual
5	Green Streets	Ocean Park Blvd. Green Street Project (construction will start in 2011) will include implementation of various LID features, such as permeable gutters, sub-surface infiltration, permeable parking lanes, depressed parkways with drip irrigation and climate-appropriate plants, curb extensions, and depressed planters to capture runoff. If implementation of the Ocean Park Blvd. Green Street Project is found infeasible due to funding or other issues, retrofits at Los Amigos Park and Parking Lot 9A or 11 will be considered as an alternate project.	Wide streets with high runoff rate, target areas to infiltrate	\$1M* for Ocean Park Blvd. Green Street Project (or Retrofits at Los Amigos Park)	\$1,000,000*	FY 2010-11
6	Permeable Surface Parking Lots	As part of City's overall facility program, permeable surfaces, such as porous asphalt, will be utilized for retrofit or new city parking facilities to demonstrate the effective use of different permeable products on the market. Depressed planters will also be implemented to capture runoff. Measure V will cover the portion of the project cost that is associated with the stormwater quality enhancement (i.e. depressed planters and incremental cost between the regular asphalt and porous asphalt).	City parking lots due for improvements, planned new parking lots, or parking lots with drainage issues	See Project Descriptions for cost detail for resurfacing and installing depressed planters in Parking Lots 9, 9A, 11, and 26	See Table 3-5, Schedule of Expenditures	FY 2011-12
7	Park Retrofits	As part of these projects, wet weather runoff from a main storm drain will be diverted to an adjacent park for treatment (pretreatment and disinfection), storage, and use as irrigation water within the park. A replicable model will be developed and used throughout the City.	Parks near regional storm drain	As planned	See Table 3-5, Schedule of Expenditures	Ozone Park: FY 2010-11 Marine Park: FY 2011-12 Memorial Park: FY 2012-13 Clover Park, Virginia Ave. Park, and Reed Park: Post-2015 Los Amigos Park: (in-lieu of Item 5)
8	Deep Infiltration In-Line Storm Drain Pilot Project	A pilot-scale aquifer recharge system will be considered to infiltrate dry and wet weather runoff from a storm drain via deep infiltration wells. Geologic reconnaissance will be performed to assess feasibility of such project and to develop concept.	Strategic locations to be selected based on results of geologic reconnaissance	\$100,000* for initial geologic reconnaissance and concept development	\$100,000*	FY 2010-11
9	Payment on J-2/J-3 Agreement with City of L.A.	Payment for the Draft Memorandum of Agreement (MOA) with City of L.A. for the Santa Monica Bay Beaches Wet Weather Bacteria TMDL Implementation Plan Projects Cost Sharing Jurisdictional Groups Two And Three. Assumes payment of \$4M over 20-year term.	See MOA	\$200,000/year plus interest rate of 3.25% per year	See Table 3-5, Schedule of Expenditures	Annual
10	Trash BMPs	In order to achieve compliance with a Santa Monica Bay trash TMDL, trash BMPs, such as vortex separators or inlet filter/inserts, will be installed to reduce the amount of trash entering the Bay upon storm events.	See Table 2.10-2, Pico-Kenter Watershed Treatment Alternatives	As shown in Phase 1	See Table 3-5, Schedule of Expenditures	See Project Description
11	Downspout Redirect Program	Offer \$40 rebate for parts/installation per DS		\$4,000/year*	\$20,000*	Annual
12	Rain Barrel Program	Offer \$250 rebate up to 499 gallon barrel		\$12,000/year*	\$60,000*	Annual
13	Cistern Program	May increase the rebate amount from \$250-\$500 (per the existing program) to \$800 to help cover installation costs, which include electrical, plumbing, backflow prevention devices, and permitting costs for pressurized system. This applies to system of 500 gallons or more.		\$50,000/year*	\$250,000*	Annual

*Initial budgets without escalation, burdened salary for City's Watershed Program Manager, or administrative expenses considered.



**Table 3-2: Implementation Schedule of BMP Practices and LID Strategies
 Measure V 5-Year Capital Improvement Plan**

Project ID No.	Project Type/Category	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015
1	Permeable Surface Alleys					
2	Permeable Surface Street Gutters/Intersections					
3	Miniature Parkway/Sidewalk Biofilters					
4	Street Curb Extensions					
5	Green Streets					
6	Permeable Surface Parking Lots					
7	Park Retrofits					
	- Ozone Park					
	- Marine Park					
	- Memorial Park					
8	Deep Infiltration In-Line Storm Drain Pilot Project					
9	Payment on J-2/J-3 Agreement with City of L.A.					
10	Trash BMPs					
11	Downspout Redirect Program					
12	Rain Barrel Program					
13	Cistern Program					





**Table 3-3: Schedule of Expenditures for Best Management Practices and Low Impact Development Strategies
 Measure V 5-Year Capital Improvement Plan – Capital Costs***

Project ID No.	Project Type/Category	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
1	Permeable Surface Alleys	\$71,786	\$70,986	\$67,395	\$74,181	\$83,559	\$367,907
2	Permeable Surface Street Gutters/Intersections	\$71,786	\$70,986	\$67,395	\$74,181	\$83,559	\$367,907
3	Miniature Parkway/Sidewalk Biofilters	\$95,430	\$87,776	\$77,598	\$79,496	\$83,315	\$423,615
4	Street Curb Extensions	\$96,023	\$90,507	\$83,421	\$90,518	\$101,937	\$462,405
5	Green Streets	\$741,206	\$324,159	\$0	\$0	\$0	\$1,065,365
6	Permeable Surface Parking Lots	\$0	\$216,439	\$0	\$0	\$0	\$216,439
7	Park Retrofits						
	- Ozone Park	\$894,742	\$0	\$0	\$0	\$0	\$894,742
	- Marine Park	\$211,773	\$676,411	\$211,938	\$0	\$0	\$1,100,122
	- Memorial Park	\$0	\$540,265	\$2,903,548	\$602,113	\$0	\$4,045,925
8	Deep Infiltration In-Line Storm Drain Pilot Project	\$109,063	\$0	\$0	\$0	\$0	\$109,063
9	Payment on J-2/J-3 Agreement with City of L.A.	\$218,656	\$230,381	\$233,281	\$273,715	\$329,019	\$1,285,051
10	Trash BMPs	\$845,217	\$428,039	\$106,820	\$109,760	\$112,700	\$1,602,536
11	Downspout (DS) Redirect Program	\$4,363	\$4,585	\$4,632	\$5,421	\$6,501	\$25,502
12	Rain Barrel Program	\$13,088	\$13,756	\$13,895	\$16,264	\$19,503	\$76,507
13	Cistern Program	\$54,532	\$57,317	\$57,898	\$67,768	\$81,264	\$318,778
	Totals	\$3,427,665	\$2,811,606	\$3,827,820	\$1,393,418	\$901,356	\$12,361,865

*Includes escalation at 3% per year, burdened salary for City's Watershed Program Manager, and administrative expenses. Also includes program administrative cost of \$98,000/year escalated at 3% per year for implementation of Trash BMPs.





**Table 3-4: Schedule of Expenditures for Best Management Practices and Low Impact Development Strategies
 Measure V 5-Year Capital Improvement Plan – O&M Costs***

Project ID No.	Project Type/Category	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
1	Permeable Surface Alleys	\$4,304	\$8,605	\$12,901	\$17,199	\$21,499	\$64,509
2	Permeable Surface Street Gutters/Intersections	\$4,304	\$8,605	\$12,901	\$17,199	\$21,499	\$64,509
3	Miniature Parkway/Sidewalk Biofilters	\$12,875	\$24,866	\$36,073	\$46,586	\$56,473	\$176,873
4	Street Curb Extensions	\$12,315	\$22,338	\$30,578	\$37,433	\$43,190	\$145,855
5	Green Streets	\$0	\$22,279	\$22,947	\$23,636	\$24,345	\$93,207
6	Permeable Surface Parking Lots	\$0	\$38,911	\$40,079	\$41,281	\$42,519	\$162,790
7	Park Retrofits						
	- Ozone Park	\$0	\$21,200	\$21,800	\$22,400	\$23,000	\$88,400
	- Marine Park	\$0	\$0	\$21,800	\$22,400	\$23,000	\$67,200
	- Memorial Park	\$0	\$0	\$0	\$28,000	\$28,750	\$56,750
8	Deep Infiltration In-Line Storm Drain Pilot Project	\$0	\$0	\$0	\$0	\$0	\$0
9	Payment on J-2/J-3 Agreement with City of L.A.	\$0	\$0	\$0	\$0	\$0	\$0
10	Trash BMPs	\$0	\$99,004	\$101,806	\$104,608	\$107,410	\$412,828
11	Downspout (DS) Redirect Program	\$0	\$0	\$0	\$0	\$0	\$0
12	Rain Barrel Program	\$0	\$0	\$0	\$0	\$0	\$0
13	Cistern Program	\$0	\$0	\$0	\$0	\$0	\$0
	Totals	\$33,799	\$245,808	\$300,885	\$360,742	\$391,686	\$1,332,920

* Includes escalation at 3% per year.





**Table 3-5: Schedule of Expenditures for Best Management Practices and Low Impact Development Strategies
 Measure V 5-Year Capital Improvement Plan – Total Project Costs**

Project ID No.	Project Type/Category	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	FY 2014 - 2015	Totals
1	Permeable Surface Alleys*	\$76,091	\$79,590	\$80,296	\$91,380	\$105,058	\$432,416
2	Permeable Surface Street Gutters/Intersections*	\$76,091	\$79,590	\$80,296	\$91,380	\$105,058	\$432,416
3	Miniature Parkway/Sidewalk Biofilters*	\$108,305	\$112,642	\$113,671	\$126,082	\$139,788	\$600,488
4	Street Curb Extensions*	\$108,338	\$112,845	\$113,999	\$127,951	\$145,127	\$608,261
5	Green Streets*	\$741,206	\$346,438	\$22,947	\$23,636	\$24,345	\$1,158,572
6	Permeable Surface Parking Lots	\$0	\$255,351	\$40,079	\$41,281	\$42,519	\$379,229
7	Park Retrofits						
	- Ozone Park	\$894,742	\$21,200	\$21,800	\$22,400	\$23,000	\$983,142
	- Marine Park	\$211,773	\$676,411	\$233,738	\$22,400	\$23,000	\$1,167,322
	- Memorial Park	\$0	\$540,265	\$2,903,548	\$630,113	\$28,750	\$4,102,675
8	Deep Infiltration In-Line Storm Drain Pilot Project*	\$109,063	\$0	\$0	\$0	\$0	\$109,063
9	Payment on J-2/J-3 Agreement with City of L.A.	\$218,656	\$230,381	\$233,281	\$273,715	\$329,019	\$1,285,051
10	Trash BMPs	\$845,217	\$527,043	\$208,626	\$214,368	\$220,110	\$2,015,364
11	Downspout (DS) Redirect Program*	\$4,363	\$4,585	\$4,632	\$5,421	\$6,501	\$25,502
12	Rain Barrel Program*	\$13,088	\$13,756	\$13,895	\$16,264	\$19,503	\$76,507
13	Cistern Program*	\$54,532	\$57,317	\$57,898	\$67,768	\$81,264	\$318,778
	Totals	\$3,461,464	\$3,057,414	\$4,128,705	\$1,754,159	\$1,293,042	\$13,694,785

*Costs include escalation at 3% per year, burdened salary for City's Watershed Program Manager, and administrative expenses in addition to the initial budgets that are shown in Table 3-1.





4.0 REFERENCES

Major references for this 5-Year Capital Improvement Plan are listed below.

Amendment to the Water Quality Control Plan for the Los Angeles Region to Amend the Total Maximum Daily Load for Trash in the Ballona Creek and Wetland, Los Angeles RWQCB Resolution No. 04-023, March 4, 2004

Certification of the Connector Pipe Screen Device as a Full Capture System for Trash Removal under the Ballona Creek and the Los Angeles River Trash Total Maximum Daily Loads, Los Angeles RWQCB, August 1, 2007

City of Santa Monica Hydrology Study (Volumes A & B), Berryman & Henigar, Inc., July 1998

City of Santa Monica Watershed Management Plan, Brown and Caldwell, April 2006

Draft Memorandum of Agreement, Santa Monica Bay Beaches Wet Weather Bacterial TMDL Implementation Plan Projects Cost Sharing Jurisdictional Groups Two and Three, August 16, 2007.

Investigation of Reported Beach Ponding Downstream of the Pier Storm Drain Diversion and Recommended Mitigation Measure, PSOMAS, October 2007

LID Cost Tool, WERF, May 2009

RS Means Heavy Construction Cost Data, 2007

Operational Assessment of the Santa Monica Urban Runoff Recycling Facility – Five Years Later, PSOMAS, March 2007

Pico-Kenter Storm Drain Upgrades Final Concept Report, Black & Veatch, April 2009

Santa Monica Bay Beaches Bacterial TMDL J2/3 Implementation Plan (PowerPoint Presentation), City of Los Angeles, Santa Monica, El Segundo, County of Los Angeles, and Caltrans, August 2008

Statement of support for the efforts of responsible jurisdictions and agencies in Jurisdictional Groups 2 and 3 to utilize an integrated water resources approach to achieve full compliance with the Santa Monica Bay Beaches Bacteria Wet Weather TMDL in the shortest possible timeframe and no later than 2021, Los Angeles RWQCB Resolution No. 2006-006, April 6, 2006



APPENDIX A: List of Alleys

ZONE #1 FY2009-10 NORTH OF MONTANA

YES/NO 2' GUTTER FIELD	SHORTDESC	CIP ZONE	ADD ALLEY_ID	LENGTH	WIDTH	AREA	DATE	INSP
yes	10th CT 502	1	5449	599	20	11980	2/27/2008	TB
yes	12th CT 302	1	5466	550	20	11000	1/18/2008	TW
yes	12th CT 502	1	5493	600	20	12000	1/18/2008	TW
yes	12th CT 602	1	5370	816	20	16320	1/18/2008	TW
yes	15th CT 502	1	5504	656	20	13120	1/19/2008	TW
yes	22nd CT 302	1	5901	794	20	15880	2/29/2008	TB
yes	9th CT 302	1	5433	347	20	6940	2/2/2008	RJ
yes	9th CT 402	1	5419	550	20	11000	2/2/2008	RJ
yes	9th CT 602	1	5374	816	20	16320	2/2/2008	RJ
yes	ALTA PL N 402	1	5378	1131	20	22620	2/2/2008	RJ
yes	EUCLID CT 302	1	5480	550	20	11000	2/9/2008	RJ
yes	SAN VICENTE PL N 124	1	5385	536	20	10720	2/29/2008	RJ
yes	SAN VICENTE PL N 340	1	5382	549	20	10980	2/29/2008	RJ
yes	SAN VICENTE PL N 402	1	5356	1356	20	27120	2/29/2008	RJ
yes	SAN VICENTE PL S 274	1	5911	137	20	2740	2/29/2008	RJ
	ZONE #1	15		9,987		199,740		

ZONE #2 FY2010-11 MONTANA TO WILSHIRE

YES/NO 2' GUTTER FIELD	SHORTDESC	CIP ZONE	ADD ALLEY_ID	LENGTH	WIDTH	AREA	DATE	INSP
yes	12th CT 1002	2	5750	600	20	12000	1/18/2008	TW
yes	12th CT 902	2	5716	601	20	12020	1/18/2008	TW
yes	15th CT 1102	2	5758	600	20	12040	1/19/2008	TW
yes	16th CT 902	2	5960	600	20	12000	2/29/2008	RJ
yes	21st CT 1162	2	6007	451	20	9020	2/29/2008	TB
yes	4th CT 902	2	5550	601	20	12020	2/1/2008	RJ
no	5th CT 902	2	6569	148	15	2220	2/1/2008	RJ
yes	6th CT 1002	2	5672	602	20	12040	2/1/2008	RJ
yes	6th CT 802	2	5633	599	20	11980	2/1/2008	RJ
yes	6th CT 902	2	5643	600	20	12000	2/1/2008	RJ
yes	7th CT 802	2	5634	600	20	12000	2/2/2008	RJ
yes	9th CT 902	2	5660	600	20	12000	2/2/2008	RJ
no	CHELSEA CT 1001	2	6136	371	15	5565	2/9/2008	RJ
yes	LINCOLN CT 802	2	5651	600	20	12000	2/15/2008	RJ
yes	LINCOLN CT 902	2	5657	599	20	11980	2/15/2008	RJ
yes	STANFORD CT 823	2	6280	1326	20	26520	2/29/2008	RJ
yes	STANFORD CT 824	2	6307	50	20	1000	2/29/2008	RJ
	ZONE #2	17		9,548		188,405		

ZONE #3 FY2011-12 WILSHIRE TO PICO east of 26th St

YES/NO 2' GUTTER FIELD	SHORTDESC	CIP ZONE	ADD ALLEY_ID	LENGTH	WIDTH	AREA	DATE	INSP
no	ARIZONA PL S 2634	3	6261	340	15	5100	2/2/2008	RJ
no	BERKELEY CT 1301	3	6382	436	16	6976	2/9/2008	RJ
no	BERKELEY CT 1701	3	7086	610	16	9760	2/9/2008	RJ
no	COLORADO PL S 3002	3	6448	290	16	4640	2/9/2008	RJ
no	FRANKLIN CT 1201	3	6462	296	16	4736	2/9/2008	RJ
no	FRANKLIN CT 1259	3	6387	158	16	2528	2/9/2008	RJ
no	FRANKLIN CT 1701	3	7087	610	17	10370	2/9/2008	RJ
yes	PICO PL N 3002	3	7128	902	20	18040	2/23/2008	RJ
no	SANTA MONICA PL S 2702	3	6369	311	15	4665	2/29/2008	RJ
no	SANTA MONICA PL S 2902	3	6347	340	15	5100	2/29/2008	RJ
no	SANTA MONICA PL S 3002	3	6402	340	15	5100	2/29/2008	RJ
no	SANTA MONICA PL S 3102	3	6395	340	15	5100	2/29/2008	RJ
no	STANFORD CT 1401	3	6342	426	15	6390	2/29/2008	RJ
no	STANFORD CT 1501	3	6433	440	15	6600	2/29/2008	RJ
no	STANFORD CT 1601	3	6449	475	15	7125	2/29/2008	RJ
no	WILSHIRE PL S 3202	3	6341	328	16	5248	2/29/2008	TB
no	YALE CT 1501	3	6421	440	17	7480	2/29/2008	TB
	ZONE #3	17		7,082		114,958		

ZONE #4 FY2012-13 WILSHIRE TO PICO west of 26th St

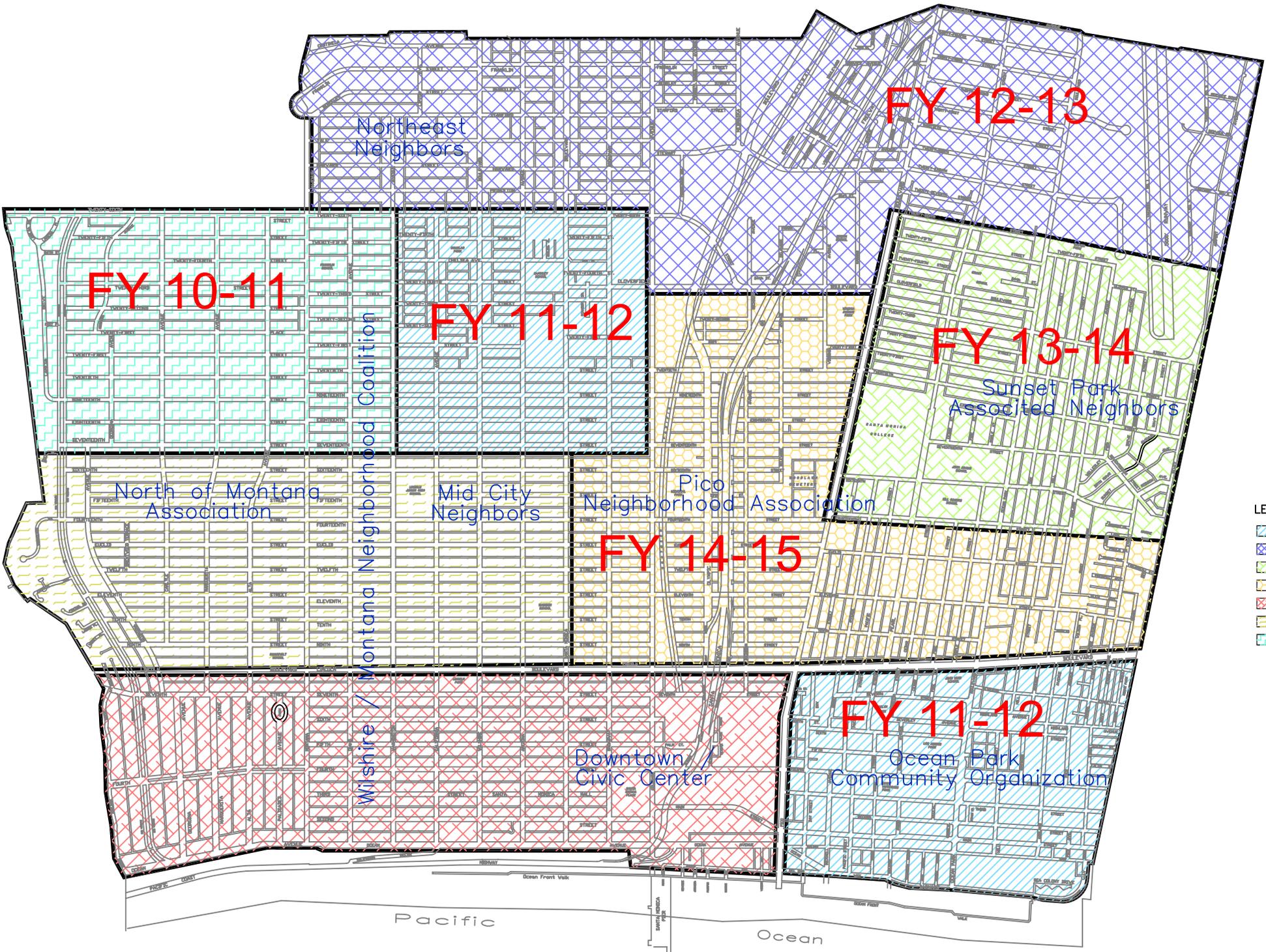
YES/NO 2' GUTTER FIELD	SHORTDESC	CIP ZONE	ADD ALLEY_ID	LENGTH	WIDTH	AREA	DATE	INSP
yes	14th CT 1202	4	5616	601	20	12020	1/18/2008	TW
yes	14th CT 1402	4	5832	601	20	12020	1/19/2008	TW
yes	17th CT 1502	4	6202	600	20	12000	2/29/2008	RJ
yes	19th CT 1402	4	6176	600	20	12000	2/29/2008	RJ
yes	20th CT 1501	4	6218	274	20	5480	2/29/2008	TB
no	24th CT 1202	4	6235	441	16	7056	2/9/2008	TW
yes	9th CT 1302	4	5794	600	20	12000	2/2/2008	RJ
yes	BROADWAY PL S 2001	4	6214	121	20	2420	2/9/2008	RJ
no	CALIFORNIA PL S 2502	4	6154	280	15	4200	2/9/2008	RJ
no	CHELSEA CT 1202	4	6249	442	15	6630	2/9/2008	RJ
yes	EUCLID CT 1202	4	5618	600	20	12000	2/9/2008	RJ
yes	EUCLID CT 1802	4	6603	1156	20	23120	2/9/2008	RJ
yes	LINCOLN CT 1202	4	5622	600	20	12000	2/15/2008	RJ
yes	LINCOLN CT 1402	4	5776	601	20	12020	2/15/2008	RJ
no	OLYMPIC PL S 18	4	5605	185	17	3145	2/23/2008	RJ
	ZONE #4	15		7,702		148,111		

ZONE #5 FY2013-14 SOUTH OF PICO

YES/NO 2' GUTTER FIELD	SHORTDESC	CIP ZONE	ADD ALLEY_ID	LENGTH	WIDTH	AREA	DATE	INSP
yes	11th CT 2701	5	6753	300	20	6000	1/18/2008	TW
yes	24th CT 2206	5	6834	837	20	16740	2/9/2008	TW
yes	5th CT 2648	5	5640	600	20	12000	2/1/2008	RJ
yes	ASHLAND PL N 1802	5	6951	500	20	10000	2/2/2008	RJ
no	HILL PL N 402	5	6528	160	17	3200	2/15/2008	RJ
yes	HILL PL N 804	5	6733	787	20	15740	2/15/2008	RJ
no	MAPLE PL N 1002	5	6680	501	17	8517	2/23/2008	RJ
yes	OCEAN PARK PL N 1702	5	6956	417	20	8340	2/23/2008	RJ
yes	PEARL PL S 2532	5	7055	168	20	3360	2/23/2008	RJ
yes	PICO PL S 2502	5	6832	316	20	6320	2/23/2008	RJ
no	PINE PL N 1002	5	6658	500	16	8000	2/29/2008	RJ
	ZONE #5	11		5,086		98,217		



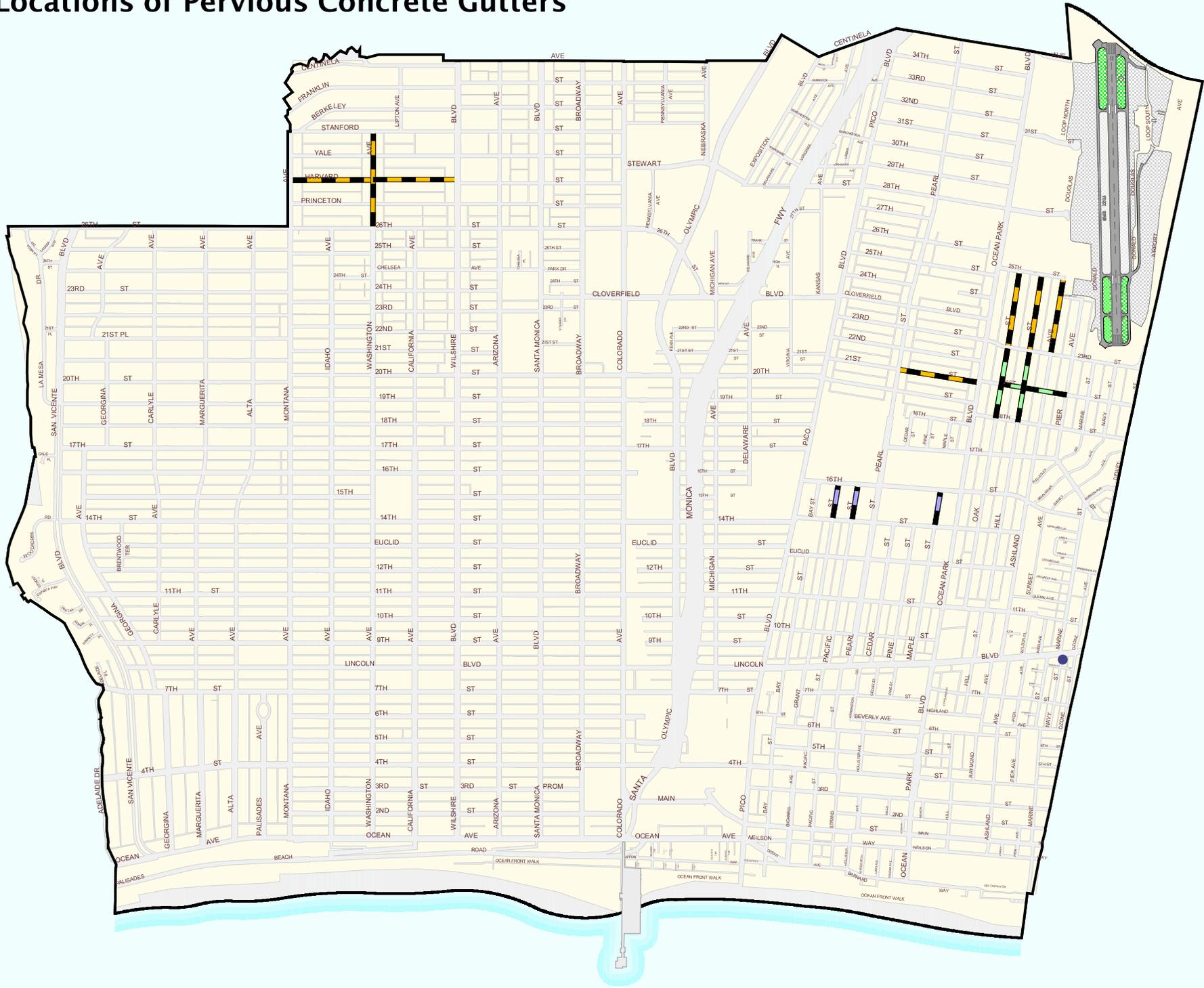
APPENDIX B: Map of City Zones for Street Improvement Program & Locations of Existing Pervious Concrete Gutters



LEGEND:

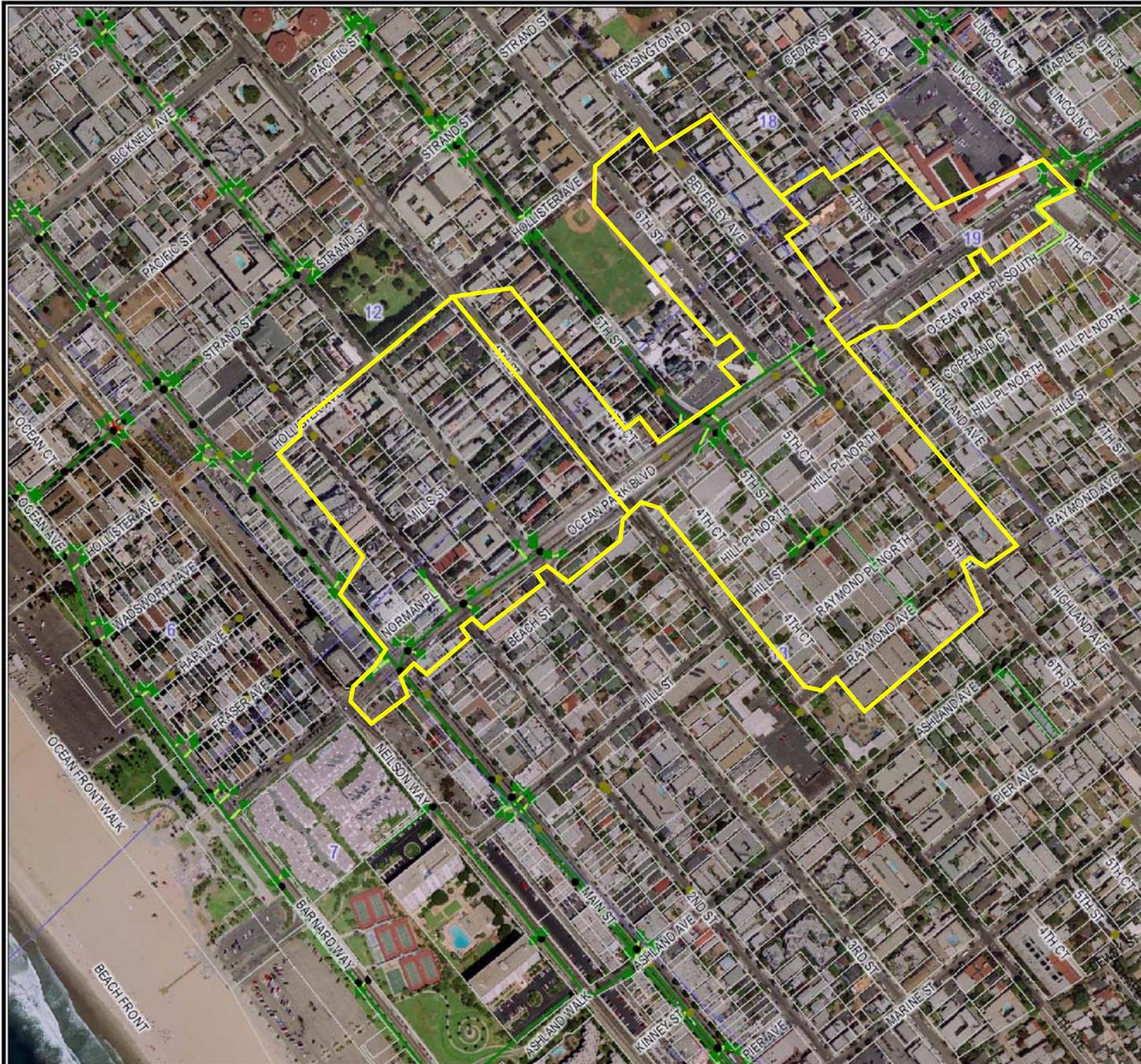
	ZONE 1
	ZONE 2
	ZONE 3
	ZONE 4
	ZONE 5
	ZONE 6
	ZONE 7

Locations of Pervious Concrete Gutters





APPENDIX C: Map of Ocean Park Boulevard Project Area



- Parcel
- Utility Grid System
- Storm Catch Basin
- Storm Maintenance Hole
- Storm Outlet
- Storm Transition Box
- Continuous Deflective System
- BMP
- Storm Drain
- Active
- Abandoned
- Future
- Storm Lateral
- Orthophoto (3in, Aug 2000)



OP BI Drainage

Scale 1:5,937
 City of Santa Monica GIS
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APPENDIX D: Estimated Turf Irrigation Requirements in Santa Monica



Average Monthly Turf Irrigation Requirements in Santa Monica, CA

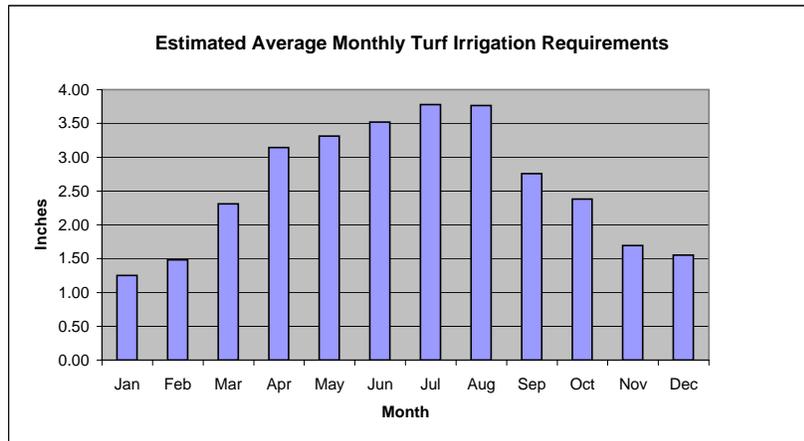
Station ID: 99
 Station Name: Santa Monica
 Region: Los Angeles Basin

$ET_c = K_c \times ET_o$

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monthly Average ET_o (inches)	1.79	2.12	3.3	4.49	4.73	5.03	5.4	5.38	3.94	3.4	2.42	2.22	44.22
Monthly Average ET_c (inches)	1.25	1.48	2.31	3.14	3.31	3.52	3.78	3.77	2.76	2.38	1.69	1.55	30.95

$K_c = 0.7$ for turfgrass (an average of cool and warm season species)

- *Monthly average ET_o was calculated based on a long-term average of monthly ET_o data since December 1992.
- *Data source: California Irrigation Management Information System (CIMIS) <http://www.cimis.water.ca.gov>
- * ET_o : Reference Evapotranspiration
- * ET_c : Crop Evapotranspiration
- * K_c : Crop Coefficient



Wet season (Oct - Mar Monthly Average) = 1.78 inches/month
 Dry season (Apr - Jun Monthly Average) = 3.38 inches/month



APPENDIX E: Park Retrofit Projects Conceptual Level Cost Opinions & Estimated Costs of Wet Season Harvesting Projects within the City of Santa Monica

Memorial Park Stormwater Harvesting (FY 2012-13)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Conventionally-Reinforced Concrete Reservoir*	\$500,000
300 gpm Submersible Pump Station (From 15' Deep Storm Drain)	\$150,000
Irrigation Pumps	\$10,000
Hydrodynamic Separators (CDS®), Diversion Structures and Piping	\$735,000
Strainer/Disinfection (Allocation)	\$75,000
Site Piping (Allocation)	\$100,000
Irrigation System Improvements (Allocation)	\$25,000
Subtotal 1, Construction Costs	<u>\$1,595,000</u>
Mobilization (5%)	\$79,750
Permits (10%)	\$159,500
Allowances (5%)	<u>\$79,750</u>
Subtotal 2	\$1,914,000
Estimating Contingency (25%)	<u>\$478,500</u>
Subtotal 3	\$2,392,500
Escalation (3 yr, 3% per year)	<u>\$221,849</u>
Subtotal 4	\$2,614,349
Construction Contingency (10%)	\$261,435
Construction Cost Total	<u>\$2,875,784</u>

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$2,876,000
Design (15% of Construction Costs)	\$432,000
Construction Management (15% of Construction Costs)	\$432,000
Total Project Costs	<u>\$3,740,000</u>

Ozone Park Stormwater Harvesting (FY 2010-11)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Conventionally-Reinforced Concrete Reservoir*	\$37,500
25 gpm Submersible Pump Station (Assume 15' Deep Storm Drain)	\$80,000
Irrigation Pumps	\$5,000
Hydrodynamic Separators (CDS®), Diversion Structures and Piping	\$237,850
Strainer/Disinfection (Allocation)	\$10,000
Site Piping (Allocation)	\$8,000
Irrigation System Improvements (Allocation)	\$3,000
Subtotal 1, Construction Costs	<hr/> \$381,350
Mobilization (5%)	\$19,068
Permits (10%)	\$38,135
Allowances (5%)	<hr/> \$19,068
Subtotal 2	\$457,620
Estimating Contingency (25%)	<hr/> \$114,405
Subtotal 3	\$572,025
Escalation (1 yr, 3% per year)	<hr/> \$17,161
Subtotal 4	\$589,186
Construction Contingency (10%)	\$58,919
Construction Cost Total	<hr/> \$648,104

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$649,000
Design (15% of Construction Costs)	\$98,000
Construction Management (15% of Construction Costs)	\$98,000
Total Project Costs	<hr/> \$845,000

Marine Park Retrofit (FY 2011-12)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Irrigation Piping from Penmar and Other Improvements (Allocation)	\$450,000
Subtotal 1, Construction Costs	<u>\$450,000</u>
Mobilization (5%)	\$22,500
Permits (10%)	\$45,000
Allowances (5%)	<u>\$22,500</u>
Subtotal 2	<u>\$540,000</u>
Estimating Contingency (25%)	<u>\$135,000</u>
Subtotal 3	<u>\$675,000</u>
Escalation (2 yr, 3% per year)	<u>\$41,108</u>
Subtotal 4	<u>\$716,108</u>
Construction Contingency (10%)	\$71,611
Construction Cost Total	<u>\$787,718</u>

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$788,000
Design (15% of Construction Costs)	\$119,000
Construction Management (15% of Construction Costs)	\$119,000
Total Project Costs	<u>\$1,026,000</u>

Clover Park Stormwater Harvesting (Post-2015)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Conventionally-Reinforced Concrete Reservoir*	\$1,000,000
400 gpm Submersible Pump Station (From 15' Deep Storm Drain)	\$175,000
Irrigation Pumps	\$15,000
Hydrodynamic Separators (CDS®), Diversion Structures and Piping	\$735,000
Strainer/Disinfection (Allocation)	\$75,000
Site Piping (Allocation)	\$120,000
Irrigation System Improvements (Allocation)	\$30,000
Subtotal 1, Construction Costs	<u>\$2,150,000</u>
Mobilization (5%)	\$107,500
Permits (10%)	\$215,000
Allowances (5%)	<u>\$107,500</u>
Subtotal 2	\$2,580,000
Estimating Contingency (25%)	<u>\$645,000</u>
Subtotal 3	\$3,225,000
Escalation (5 yr, 3% per year)	<u>\$513,659</u>
Subtotal 4	\$3,738,659
Construction Contingency (10%)	\$373,866
Construction Cost Total	<u>\$4,112,525</u>

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$4,113,000
Design (15% of Construction Costs)	\$617,000
Construction Management (15% of Construction Costs)	\$617,000
Total Project Costs	<u>\$5,347,000</u>

Reed Park Stormwater Harvesting (Post-2015)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Conventionally-Reinforced Concrete Reservoir*	\$100,000
75 gpm Submersible Pump Station (Assume 15' Deep Storm Drain)	\$100,000
Irrigation Pumps	\$70,000
Hydrodynamic Separators (CDS®), Diversion Structures and Piping	\$332,850
Strainer/Disinfection (Allocation)	\$30,000
Site Piping (Allocation)	\$30,000
Irrigation System Improvements (Allocation)	\$6,000
Subtotal 1, Construction Costs	<u>\$668,850</u>
Mobilization (5%)	\$33,443
Permits (10%)	\$66,885
Allowances (5%)	<u>\$33,443</u>
Subtotal 2	\$802,620
Estimating Contingency (25%)	<u>\$200,655</u>
Subtotal 3	\$1,003,275
Escalation (5 yr, 3% per year)	<u>\$159,796</u>
Subtotal 4	\$1,163,071
Construction Contingency (10%)	\$116,307
Construction Cost Total	<u>\$1,279,378</u>

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$1,280,000
Design (15% of Construction Costs)	\$192,000
Construction Management (15% of Construction Costs)	\$192,000
Total Project Costs	<u>\$1,664,000</u>

Virginia Avenue Park Stormwater Harvesting (Post 2015)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Conventionally-Reinforced Concrete Reservoir*	\$162,500
100 gpm Submersible Pump Station (Assume 15' Deep Storm Drain)	\$100,000
Irrigation Pumps	\$75,000
Hydrodynamic Separators (CDS®), Diversion Structures and Piping	\$347,850
Strainer/Disinfection (Allocation)	\$30,000
Site Piping (Allocation)	\$40,000
Irrigation System Improvements (Allocation)	\$8,000
Subtotal 1, Construction Costs	<u>\$763,350</u>
Mobilization (5%)	\$38,168
Permits (10%)	\$76,335
Allowances (5%)	<u>\$38,168</u>
Subtotal 2	\$916,020
Estimating Contingency (25%)	<u>\$229,005</u>
Subtotal 3	\$1,145,025
Escalation (5 yr, 3% per year)	<u>\$182,373</u>
Subtotal 4	\$1,327,398
Construction Contingency (10%)	\$132,740
Construction Cost Total	<u>\$1,460,138</u>

*Earthwork and dewatering included.

Conceptual Level Preliminary Total Project Costs

Construction Costs	\$1,461,000
Design (15% of Construction Costs)	\$220,000
Construction Management (15% of Construction Costs)	\$220,000
Total Project Costs	<u>\$1,901,000</u>

Estimated Costs of Wet Season Harvesting Projects within the City of Santa Monica

Park	Preliminary Storage Tank Size (gallons)	Estimated Capital Cost¹	Estimated Annualized Cost @ 6%, 20 year (\$/year)	Estimated Annual O&M Cost	Estimated Annualized Total Project Cost (\$/year)³	Estimated Harvested Stormwater (gallons/year)³	Estimated Unit Cost of Harvested Stormwater (\$/ac-ft)⁴
Memorial Park	200,000	\$3,700,000	\$323,000	\$25,000	\$348,000	2,571,000	\$44,100
Ozone Park	15,000	\$845,000	\$74,000	\$20,000	\$94,000	193,000	\$158,700
Marine Park	Storage at Penmar	\$1,100,000	\$96,000	\$20,000	\$116,000	1,170,000	\$32,300
Virginia Avenue Park	65,000	\$1,900,000	\$166,000	\$20,000	\$186,000	836,000	\$72,500
Reed Park	40,000	\$1,700,000	\$148,000	\$20,000	\$168,000	514,000	\$106,500
Clover Park	400,000	\$5,300,000	\$462,000	\$25,000	\$487,000	5,143,000	\$30,900

1. The project cost includes construction, design, and construction management.

2. Does not include burdened salary for Watershed program Manager or administrative expenses.

3. For the purpose of conceptual level assessment, a 2-week cycle is assumed for filling and use of the harvested water during the wet season (October through March). No dry season flows are included.

4. Current retail cost of potable water is generally less than \$1,000 per acre-foot.



APPENDIX F: Review of Geotechnical Reports



Review of Geotechnical Reports

No.	Project Name	Project Location	Percolation Rate	# of Logs	Predominant Soil Type Near Surface
1	Big Blue Bus	1660 7th Street Santa Monica, CA	B-8: 0.4 to 4.0 (gal/ft ² /day) = 0.032 to 0.27 (inch/hour) B-10: 0.004-0.04 (gal/ft ² /day) = 0.00032 to 0.0027 (inch/hour)	N/A	N/A
2	Douglas DC-3 Monument Project	Southwest Corner of Airport Avenue & Donald Douglas Loop South Santa Monica, CA	N/A	2	Silty Sand
3	City of Santa Monica Parking Structure #4	2nd Street (Between Arizona Ave and Santa Monica Boulevard) Santa Monica, CA	N/A	2	B-1: Lean Clay B-2: Poorly Graded Sand
4	City of Santa Monica Parking Structure #5	1440 Fourth St Santa Monica, CA	N/A	2	Clayey Silt
5	Mountain View Mobile Home Park	1930 Stewart Street Santa Monica, CA	N/A	13	A-2: Clay A-3: Sandy Clay A-4: Sandy Clay/Clay A-5: Silty Sand A-6: Sandy Clay/Silty Sand A-7: Clay A-8: Silty Sand A-9: Silty Sand A-10 -- A-14: Clay
6	Santa Monica Recycling and Drop Off Facility Project	2411 Delaware Ave Santa Monica, CA	BH-1: 23.0 (minutes/inch) = 2.6 (inch/hour) BH-8: 299.7 (minutes/inch) = 0.2 (inch/hour)	9 (only two borings were used to determine percolation rate)	BH-1: Clayey Sand/Sand BH-8: Clayey Sand/Clay/Sand
7	City of Santa Monica Parking Structures #1 and #6	1234 4th Street and 1431 2nd Street Santa Monica, CA	N/A	8	B-1: Silt with Sand B-2: Silt with Sand B-3: Silt with Clay and Sand B-4: Silt and Sand B-5: Sandy Silt with Clay B-6: Sandy Silt B-7: Sandy Silt B-8: Sandy Silt
8	Proposed Police, Fire and Emergency Operations Center	Olympic Drive & Fourth Street Santa Monica, CA	N/A	8	B-1: Silt with Sand B-2: Silt with Sand B-3: Silt with Clay and Sand B-4: Silt and Sand B-5: Sandy Silt with Clay B-6: Sandy Silt B-7: Sandy Silt B-8: Sandy Silt
9	City of Santa Monica City Hall Seismic Retrofit	1685 Main Street Santa Monica, CA	N/A	5	B-1 -- B-5: Lean Clay
10	Prior Ground Motion Study for City of Santa Monica City Hall	1686 Main Street Santa Monica, CA	N/A	9	B-1: Sandy Silt B-2: Silty Sand B-3: Silty Clay B-4: Silty Clay B-5: Silty Clay/Silty Sand B-6: Silty Sand B-7: Silty Clay/Silty Sand B-8: Silty Clay/Silty Sand
11	Bicknell Avenue Street Greening	Bicknell Avenue b/w Main Street and Ocean Ave Santa Monica, CA	0.25 (inch/hour)	4	B-1 -- B-4: Sandy Clay/Clayey Sand
12	Pier Storm Drain Improvement	1550 Parking Lot Santa Monica, CA	N/A	7	B-1 -- B-7: Sand (loose to medium dense)
13	Beach Greening	2030 Barnard Way Santa Monica, CA	60 (inch/hour)	5	B-1 -- B-5: Silty Sand
14	Colorado Ocean Relief Sewer	Colorado Avenue & Ocean Ave, Santa Monica, CA	N/A	11	B-1 -- B-11: Unclassified mix of soils, including dense clayey sand, firm to still clay, and silt



APPENDIX G: Pico-Kenter Trash BMPs Conceptual Level Cost Opinions for Alternatives 2 and 3

Pico-Kenter Trash BMP - Alternative 2, End of Pipe No Phasing

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Earthwork & Dewatering	\$1,192,500
Hydrodynamic Separators (CDS® or equivalent), Diversion Structures and Piping	\$2,351,000
Sewer Diversion Capability at Pico-Kenter PS & Improvements to Dry Weather Diversion	\$120,800
Subtotal 1, Direct Construction Costs	<u>\$3,664,300</u>
Mobilization (5%)	\$183,215
Permits (5%)	\$183,215
Allowances (5%)	<u>\$183,215</u>
Subtotal 2	<u>\$4,213,945</u>
Estimating Contingency (25%)	<u>\$1,053,486</u>
Subtotal 3	<u>\$5,267,431</u>
Escalation (1 yr, 3%)	<u>\$158,023</u>
Subtotal 4	<u>\$5,425,454</u>
Construction Contingency (10%)	\$542,545
Construction Cost Total	<u>\$5,968,000</u>

Conceptual Level Preliminary Total Project Costs

Cost Items	Total Cost
Construction Costs	\$5,968,000
Design (10% of Construction Costs)	\$597,000
Construction Management (10% of Construction Costs)	\$597,000
Total Project Costs	<u>\$7,162,000</u>

Pico-Kenter Trash BMP - Alternative 3, End of Pipe Phasing

Conceptual Level Preliminary Construction Costs

Phased Construction Costs	Total Cost
Phase 1, FY2010-11 (One unit installed at the northwest side of the P-K Outlet)	\$2,933,000
Phase 2, FY2012-13 (Another unit installed at the southeast side of the P-K Outlet)	\$1,806,000
Phase 3, FY2014-15 (Three additional units installed at the northwest side of the P-K Outlet)	\$2,742,000
Construction Cost Total	\$7,481,000

Conceptual Level Preliminary Total Project Costs

Cost Items	Total Cost
Construction Costs (Total of All Phases)	\$7,481,000
Design (15% of Construction Costs - Total of All Phases)	\$1,123,000
Construction Management (15% of Construction Costs - Total of All Phases)	\$1,123,000
Total Project Costs	\$9,727,000

Total Phase 1 Project Cost (with Design and Construction Management) =	\$3,813,000
Total Phase 2 Project Cost (with Design and Construction Management) =	\$2,348,000
Total Phase 3 Project Cost (with Design and Construction Management) =	\$3,566,000

Pico-Kenter Trash BMP - Alternative 3, Phase 1 (FY 2010-11)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Earthwork & Dewatering	\$462,500
Hydrodynamic Separators (CDS® or equivalent), Diversion Structures and Piping	\$1,217,000
Sewer Diversion Capability at Pico-Kenter PS & Improvements to Dry Weather Diversion	\$120,800
Subtotal 1, Direct Construction Costs	<u>\$1,800,300</u>
Mobilization (5%)	\$90,015
Permits (5%)	\$90,015
Allowances (5%)	<u>\$90,015</u>
Subtotal 2	<u>\$2,070,345</u>
Estimating Contingency (25%)	<u>\$517,586</u>
Subtotal 3	<u>\$2,587,931</u>
Escalation (1 yr, 3%)	<u>\$77,638</u>
Subtotal 4	<u>\$2,665,569</u>
Construction Contingency (10%)	<u>\$266,557</u>
Construction Cost Total	<u>\$2,933,000</u>

Conceptual Level Preliminary Total Project Costs

Cost Items	Total Cost
Construction Costs	\$2,933,000
Design (15% of Construction Costs)	\$440,000
Construction Management (15% of Construction Costs)	\$440,000
Total Project Costs	<u>\$3,813,000</u>

Pico-Kenter Trash BMP - Alternative 3, Phase 2 (FY2012-13)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Earthwork & Dewatering	\$438,000
Hydrodynamic Separators (CDS® or equivalent), Diversion Structures and Piping	\$606,900
Subtotal 1, Direct Construction Costs	<u>\$1,044,900</u>
Mobilization (5%)	\$52,245
Permits (5%)	\$52,245
Allowances (5%)	<u>\$52,245</u>
Subtotal 2	\$1,201,635
Estimating Contingency (25%)	<u>\$300,409</u>
Subtotal 3	\$1,502,044
Escalation (3 yr, 3%)	<u>\$139,280</u>
Subtotal 4	\$1,641,324
Construction Contingency (10%)	\$164,132
Construction Cost Total	<u>\$1,806,000</u>

Conceptual Level Preliminary Total Project Costs

Cost Items	Total Cost
Construction Costs	\$1,806,000
Design (15% of Construction Costs)	\$271,000
Construction Management (15% of Construction Costs)	\$271,000
Total Project Costs	<u>\$2,348,000</u>

Pico-Kenter Trash BMP - Alternative 3, Phase 3 (FY2014-15)

Conceptual Level Preliminary Construction Costs

Design Items	Total Cost
Earthwork & Dewatering	\$952,500
Hydrodynamic Separators (CDS® or equivalent), Diversion Structures and Piping	\$543,000
Subtotal 1, Direct Construction Costs	<u>\$1,495,500</u>
Mobilization (5%)	\$74,775
Permits (5%)	\$74,775
Allowances (5%)	<u>\$74,775</u>
Subtotal 2	\$1,719,825
Estimating Contingency (25%)	<u>\$429,956</u>
Subtotal 3	\$2,149,781
Escalation (5 yr, 3%)	<u>\$342,404</u>
Subtotal 4	\$2,492,186
Construction Contingency (10%)	\$249,219
Construction Cost Total	<u>\$2,742,000</u>

Conceptual Level Preliminary Total Project Costs

Cost Items	Total Cost
Construction Costs	\$2,742,000
Design (15% of Construction Costs)	\$412,000
Construction Management (15% of Construction Costs)	\$412,000
Total Project Costs	<u>\$3,566,000</u>



APPENDIX H: Approximate Treated Areas and Reduction of Urban Runoff & Estimated Costs per Drainage Area Treated

**Approximate Treated Areas and Reduction of Urban Runoff
Resulting from Measure V 5-Year Capital Improvement Plan**

Project ID No.	Project Type/Category	Estimated Drainage Area Treated (Acre)	Estimated Volume Reduction of Urban Runoff (MG/year)	Assumptions/Remarks
1	Permeable Surface Alleys	11	0.4	Approximately 1.1 acres of pervious concrete center swale will be installed in the 5-year period, as proposed in City's alley replacement program. Drainage area is based on 20-foot wide alley and 2-foot wide swale. Although potential infiltration will require further evaluation, 20% of a 3/4-inch storm over the drainage area is assumed to be the volume reduction. 10 rainfall events per year is assumed.
2	Permeable Surface Street Gutters/Intersections	22	0.9	Approximately 1.1 acres of pervious concrete center swale will be installed in the 5-year period, as proposed in City's street improvement program. Drainage area treated assumed to be approximately 20 times the area of installed pervious concrete street gutters/intersections. Although potential infiltration will require further evaluation, 20% of a 3/4-inch storm over the drainage area is assumed to be the volume reduction. 10 rainfall events per year is assumed.
3	Miniature Parkway/Sidewalk Biofilters	4.9	0.2	Approximately 4.9 acres of drainage area will be treated with parkway/sidewalk biofilters to be installed in the 5-year period. Although potential infiltration will require further evaluation, 20% of a 3/4-inch storm over the drainage area is assumed to be the volume reduction. 10 rainfall events per year is assumed.
4	Street Curb Extensions or Bulb-outs	1.7	0.8	Approximately 1.7 acres of drainage area will be treated with miniature parkway/sidewalk biofilters to be installed in the 5-year period. A total of 5 systems with a 15,000-gallon cistern per system is assumed. It is assumed that each cistern will be filled by the captured runoff 10 times per year.
5	Green Streets	3.5	0.1	Drainage area treated based on the approximate surface area of Ocean Park Blvd. between Neilson and Lincoln. Although potential infiltration will require further evaluation, 20% of a 3/4-inch storm over the drainage area is assumed to be the volume reduction. 10 rainfall events per year is assumed.
6	Permeable Surface Parking Lots	4.2	0.2	Approximately 4.2 acres of porous asphalt will be installed in the 5-year period, as proposed in City's facility program. Although potential infiltration will require further evaluation, 20% of a 3/4-inch storm over the drainage area is assumed to be the volume reduction. 10 rainfall events per year is assumed.
7	Park Retrofits			
	- Ozone Park	NA	0.2	Only a small portion of each storm event will be diverted for harvesting (i.e. not all of the flow from the upstream drainage area will be treated). The volume of harvested runoff is based on 2 weeks of storage between storm events during wet weather (October-March).
	- Marine Park	NA	1.2	
	- Memorial Park	NA	2.6	
8	Deep Infiltration In-Line Storm Drain Pilot Project	NA	NA	Pending results of pilot test.
9	Payment on J-2/J-3 Agreement with City of L.A.	57	Some reduction anticipated through proposed future water harvesting projects	Drainage area treated based on prorated share of \$1M (City of Santa Monica's share included as part of 5-Year CIP) for the total cost of \$86M to treat 4,920 acres as shown in Exhibit C of Draft MOA for J2/J3.
10	Trash BMPs	1,034	NA	Drainage area treated based on prorated share of 284 catch basin inserts/filters of a total of 1,164 catch basin inserts/filters within Kenter Canyon, Pico-Caltrans Basin, and Pico-4th Street Basins.
11	Downspout (DS) Redirect Program	NA	NA	Part of project category No. 12 or 13 below.
12	Rain Barrel Program	14	0.8	Drainage area treated based on 1,000 sf of roof area harvested by each rain barrel. The volume of harvested water based on a 125-gallon barrel filled 10 times per year. \$100 rebate per rain barrel assumed.
13	Cistern Program	46	5.0	Drainage area treated based on 2,000 sf of roof area harvested by each cistern. The volume of harvested water based on a 500-gallon cistern filled 10 times per year. \$250 rebate per cistern assumed.
	Total	1,198	12.3	Approximately 10.5 MG will be harvested and used for irrigation. Approximately 1.8 MG will be reduced by infiltration.

**Project Cost Per Drainage Area Treated
Measure V 5-Year Capital Improvement Plan**

Project ID No.	Project Type/Category	Capital Cost (\$)	Drainage Area (Acre)	Capital Cost per Drainage Area (\$/Acre)	Remarks
1	Permeable Surface Alleys	\$367,907	11	\$34,600	Approximately 1.1 acres of pervious concrete center swale will be installed in the 5-year period, as proposed in City's alley replacement program. Drainage area is based on 20-foot wide alley and 2-foot wide swale.
2	Permeable Surface Street Gutters/Intersections	\$367,907	22	\$16,700	Approximately 1.1 acres of pervious concrete center swale will be installed in the 5-year period, as proposed in City's street improvement program. Drainage area treated assumed to be approximately 20 times the area of installed pervious concrete street gutters/intersections.
3	Miniature Parkway/Sidewalk Biofilters	\$423,615	4.9	\$86,500	Approximately 4.9 acres of drainage area will be treated with parkway/sidewalk biofilters to be installed in the 5-year period.
4	Street Curb Extensions	\$462,405	1.7	\$272,000	Approximately 1.7 acres of drainage area will be treated with miniature parkway/sidewalk biofilters to be installed in the 5-year period.
5	Green Streets	\$1,065,365	3.5	\$304,400	Drainage area treated based on the approximate surface area of Ocean Park Blvd. between Neilson and Lincoln.
6	Permeable Surface Parking Lots	\$216,439	4.2	\$51,400	Approximately 4.2 acres of porous asphalt will be installed in the 5-year period, as proposed in City's facility program.
7	Park Retrofits				
	- Ozone Park	NA	NA	NA	Only a small portion of each storm event will be diverted for harvesting (i.e. not all of the flow from the upstream drainage area will be treated). Cost per volume harvested was developed instead (see Appendix E).
	- Marine Park	NA	NA	NA	
	- Memorial Park	NA	NA	NA	
8	Deep Infiltration In-Line Storm Drain Pilot Project	NA	NA	NA	Pending results of pilot test.
9	Payment on J-2/J-3 Agreement with City of L.A.	\$1,100,122	57	\$19,200	Drainage area treated based on prorated share of \$1M (City of Santa Monica's share included as part of 5-Year CIP Plan) for the total cost of \$86M to treat 4,920 acres as shown in Exhibit C of Draft MOA for J2/J3.
10	Trash BMPs	\$4,045,925	1,034	\$3,900	Drainage area treated based on prorated share of 284 catch basin inserts/filters of a total of 1,164 catch basin inserts/filters within Kenter Canyon, Pico-Caltrans Basin, and Pico-4th Street Basins.
11	Downspout (DS) Redirect Program	NA	NA	NA	Part of project category No. 12 or 13 below.
12	Rain Barrel Program	\$76,507	14	\$5,600	Drainage area treated based on 1,000 sf of roof area harvested by each rain barrel. \$100 rebate per rain barrel assumed.
13	Cistern Program	\$318,778	46	\$6,900	Drainage area treated based on 2,000 sf of roof area harvested by each cistern. \$250 rebate per cistern assumed.