Final Project Report

for

Santa Monica Bay Low Flow Diversion Upgrades Project

Prepared by:
City of Los Angeles
Department of Public Works
Bureau of Sanitation – Watershed Protection Division

April 23, 2012

Funding and Cost:
State of California Proposition 50 Clean Beach Initiative (CBI): $767,077
American Recovery and Reinvestment Act (ARRA): $4,361,106
City of Los Angeles Proposition O Program: $2,986,815
Total Project Cost: $8,114,998

This report is prepared in accordance with agreement 08-351-550 between the State of California and the City of Los Angeles. Funding of this project has been provided in part through an agreement with the State Water Resources Control Board under the American Recovery and Reinvestment Act of 2009. The contents of this document do not necessarily reflect the views and policies of the SWRCB.

GRANT SUMMARY

Completed Grant Summaries are made available to the public on the State Water Resources Control Board's (SWRCB) website at http://www.waterboards.ca.gov/funding/grantinfo.html
Use the tab and arrow keys to move through the form. If field is not applicable, please put N/A in field.

Date filled out: **March 9, 2012**

Grant Information: Please use complete phrases/sentences. Fields will expand as you type.

1. **Grant Agreement Number:** 08-311-550-1 (ARRA) and 07-579-550-0 (Prop 50 CBI)
2. **Project Title:** Santa Monica Bay Low Flow Diversion Upgrades
3. **Project Purpose – Problem Being Addressed:** The purpose of this project is to increase the capacity of six low flow diversions to accommodate the higher flow rates of winter dry-weather runoff. The six low flow diversions can then be operated year-round, except during wet weather conditions.
4. **Project Goals**
   a. **Short-term Goals:** Improve beach water quality during the winter period (November 1- March 31)
   b. **Long-term Goals:** Improve beach water quality year-round during dry weather.
5. **Project Location:** (lat/longs, watershed, etc.) Lat/Longs: 34.03960/-118.54963; Watershed: Santa Monica
   a. **Physical Size of Project:** (miles, acres, sq. ft., etc.) Project Site: 2,000 acres of total drainage area served by the project
   b. **Counties Included in the Project:** Los Angeles
   c. **Legislative Districts:** (Assembly and Senate) Assembly District 53, Senate District 28
6. **Which SWRCB program is funding this grant?** Please "X" box that applies.

☐ Prop 13 ☐ Prop 40 ☒ Prop 50 ☐ EPA 319(h) ☒ Other: ARRA

Grant Contact: Refers to Grant Project Director.

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Grant Time Frame: Refers to the implementation period of the grant.

From: October 26, 2006 **To:** December 31, 2011

Project Partner Information: Name all agencies/groups involved with project. City of Los Angeles

Nutrient and Sediment Load Reduction Projection: (If applicable) Not applicable

Please provide a hard copy to your Grant Manager and an electronic copy to your Program Analyst for SWRCB website posting. All applicable fields are mandatory. Incomplete forms will be returned.

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Section I: Executive Summary

In 2003, the Los Angeles Regional Water Quality Control Board adopted Total Maximum Daily Load (TMDL) regulations to reduce bacteria levels in Santa Monica Bay. To meet the requirements of the Santa Monica Bay Beaches Bacteria Dry Weather Total Maximum Daily Load (SMBBB TMDL), the City of Los Angeles (City) constructed eight Low Flow Diversions (LFDs) along Santa Monica Bay to divert storm drain flows from the beach to the sanitary sewer system during summer dry weather. In June 2009, the SMBBB TMDL's requirements for winter dry weather, when runoff flow rates are generally higher than in the summer, took effect. Thus, the City implemented this Santa Monica Bay Low Flow Diversion Upgrades Project (Project) to increase the capacity, facilitate the maintenance, and improve the reliability of the LFDs so they may be operated year-round without interruption during dry weather. The facilities were improved by providing back-up power, auxiliary pumps, telemetry systems, and other redundant mechanical and electrical systems. Construction began in July 2009 and was completed in January 2011. As-built plans have been completed.

The projected cost of the Project was $6,378,183. The actual cost was $8,114,998. A total amount of $5,128,183 in grant funding, provided by the State Proposition 50 Clean Beach Initiative (CBI) and the American Recovery and Reinvestment Act (ARRA), was expended on the Project. Of the total amount, $767,077 of the $5,000,000 awarded by the Proposition 50 CBI grant was used to implement the Project before the State's grant programs were put on hold during the State's fiscal crisis. Subsequently, the remaining Proposition 50 CBI funding was replaced by ARRA funds. All of the $4,361,106 awarded by ARRA was used to implement the Project. As a result of this grant funding, the City was able to leverage funding from its Proposition O Program in the amount of $2,986,815 to fund the remaining cost of the Project.

<table>
<tr><td colspan="2">Projected Cost:</td><td>$6,378,183</td><td></td></tr>
<tr><td>Funding Source</td><td>Total Awarded Amount</td><td>Expended Amount</td><td>Notes</td></tr>
<tr><td>Proposition 50 CBI</td><td rowspan="2">$5,128,183</td><td>$767,077</td><td rowspan="2">The State changed the funding source from Prop 50 CBI to ARRA in December 2008.</td></tr>
<tr><td>ARRA</td><td>$4,361,106</td></tr>
<tr><td>City of Los Angeles Proposition O</td><td></td><td>$2,986,815</td><td></td></tr>
<tr><td colspan="2">Actual Cost:</td><td>$8,114,998</td><td></td></tr>
</table>

Dry and wet weather water quality monitoring was conducted between January 2011 and August 2011. This report concludes the project was successfully designed and implemented. With the diversion and treatment of year-round dry weather runoff at the City's Hyperion Treatment Plant, all of the water being captured, and all of the pollutants of concern contained therein, are kept from being discharged into Santa Monica Bay. The captured pollutants include bacteria (E.Coli, Enterococcus, and Total Coliforms), oil and grease, metals (copper, zinc, lead, and nickel), suspended solids, trash, and nutrients. Thus, water quality in Santa Monica Bay is being improved as a result of the implementation of the Project.

Section II: Problem Statement and Relevant Issues

Will Rogers and Dockweiler State Beaches make up a seven-mile stretch along the shore of Santa Monica Bay (SMB), where the City owns and operates eight LFDs. Popular activities in SMB include swimming, surfing, sailing, and skin diving, which attract 55 million beachgoers to SMB annually. Prior to the operation of the diversions, storm drain flows were discharged directly into the bay, posing health concerns due to the presence of pollutants such as bacteria, trash, debris, sediments, nutrients, toxic trace metals, pesticides, and pathogens. Swimmers within 400 yards of the storm drains were at risk, as were as marine habitat and overall water quality. Local beaches throughout SMB were closed or posted with signs warning beachgoers of the presence of bacterial pollution. In 2001, three beach-mile-days (bmd) of beach closures and 15.57 bmd of beach warning postings were reported for Will Rogers State Beach. Routine shoreline monitoring conducted by the City under the SMBBB TMDL Coordinated Shoreline Monitoring Plan and in accordance with State Assembly Bill (AB) 411 detected frequent exceedences of bacterial standards. In addition, Heal the Bay's Beach Report Card had listed Will Rogers State Beach with an "F" grade at several locations during the period of April 2005 thru October 2006.

The purpose of this Project was to improve water quality at public beaches, and to assist the City in meeting applicable health and safety codes and in complying with the SMBBB TMDL requirements for winter dry weather. The City had previously designed and constructed eight LFDs to divert dry weather runoff to the Hyperion Treatment Plant for treatment. However, the LFDs operated only during the summer months, from April to October. Per the SMBBB TMDL, as of July 15, 2009, there may be no more than three (3) days when bacteria levels exceed the allowed limits during winter dry weather. In order to help meet the July 2009 deadline, the City upgraded the eight LFDs to operate year-round during all dry weather days (i.e., except during rain events and the 72-hour period thereafter). Six of the eight LFD upgrades were funded by ARRA. Funds to upgrade the remaining two LFDs were provided by the City's Proposition O Program.

Section III: Project Goals

As identified in the Project Assessment and Evaluation Plan (PAEP), the goals of this project were to:

1. Upgrade the existing LFDs to enhance their functionality, reduce bypassing, and enable year-round operation.
2. Reduce beach closures.

The desired outcomes of this project were to:

1. Successfully complete construction.
2. Divert all storm drain flows, except during rain events.
3. Reduce bacterial discharges into Santa Monica Bay.
4. Improve water quality as determined by reduced levels of indicator bacteria at the shoreline near the storm drain outlets.
5. Assist the City in complying with dry and wet weather bacteria TMDLs.

The project performance measures are summarized in Table 1 below.

Table 1. Project Performance Measures for Load Reduction Activities
Santa Monica Bay Low Flow Diversion Upgrades Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Upgrade the existing LFDs to enhance their functionality, reduce bypassing, and enable year-round operation	1. Successfully complete construction 2. Divert all storm drain flows except during rain events	1. Meeting design, schedule and budget goals 2. Complete Diversion Days (except during rain events)	1. Percent design completion, % schedule delay, % budget overrun 2. % compliance without bypass	1. Practices established by City guidelines 2. Recordings through the SCADA system	1. 100 % construction completion, no delay, below budget 2. 100 % diversion
Reduce beach closures	1. Reduce bacterial discharges into Santa Monica Bay 2. Improve water quality as determined by reduced levels of indicator bacteria at the shoreline near storm drain outlets 3. Assist the City in complying with dry and wet weather bacteria TMDLs.	1. Flow and concentrations of the runoff diverted 2. before and after beach bacterial concentrations 3. number of exceedences	1. Flow volumes and bacterial counts of the diverted flow 2. Percent reduction in concentrations 3. number of days of exceedences and percent compliance	1. SCADA flow measurement, and grab samples analyzed by Rapid Assessment Method 2. Grab samples analyzed by Rapid Assessment Method 3. Tracking compliance based on the established dry and wet weather bacterial TMDL	1. All flow and associated bacterial pollution (except during rain events) 2. Concentrations below AB411 standards 3. No exceedences over baseline allowances as established in the TMDL documents

Section IV: Project Description

To comply with the requirements of the SMBBB TMDL, the City upgraded its eight LFDs to divert both summer and winter dry weather flows to the sanitary sewer. The eight LFDs were originally designed to handle only summer dry weather flows. The six LFDs that were upgraded by this ARRA grant are:

- Bay Club Drive
- Imperial Highway
- Marquez Avenue
- Temescal Canyon
- Thornton Avenue
- Venice Pavilion

The work to upgrade the Palisades Park and Santa Monica Canyon LFDs was funded by the City's Proposition O Program.

The scope of work featured the following:

1. Installing flow-sensing automatic operation sensors in the discharge sewers. The LFDs are automatically shut down and started based available sewer capacity as determined by sewer flow levels.
2. Providing emergency power generators for full back-up capabilities during a power outage, including a fuel tank with associated secondary containment and leak detectors.
3. Installing standby and back-up pumps so the design flow can be met if the two largest pumps are out of service, and constructing a second pump well to house the added pumps and associated piping.
4. Installing camlock connection fittings on each force main to allow for quick connections of portable back-up pumps.
5. Installing telemetry and alarms systems to enable remote control from the Venice Pump Plant SCADA (Supervisory Control and Data Acquisition) system.
6. Installing other associated instrumentation, control, and electrical systems.

The Project was designed by a contracted engineering consultant (Psomas) and subsequently advertised for construction bids. The selected contractor (Los Angeles Engineering, Inc.) began construction in July 2009. The LFDs were operation as of November 2010 and construction was completed in January 2011. See Figure 2 for a profile view of the BMP treatment system. Lists of references and grant deliverables, and project photographs, are included in Appendices A – C.

The Project was determined to be exempt from the requirements of the California Environmental Quality Act (CEQA) per Exemption Class 1(4) of the City's CEQA Guidelines, which provides that "installation of new equipment and /or industrial facilities involving negligible or no expansion of use is exempt from the requirements of CEQA if required for safety, health, the public convenience, or environmental control." The Notice of Exemption was completed and filed with the Los Angeles County Clerk.

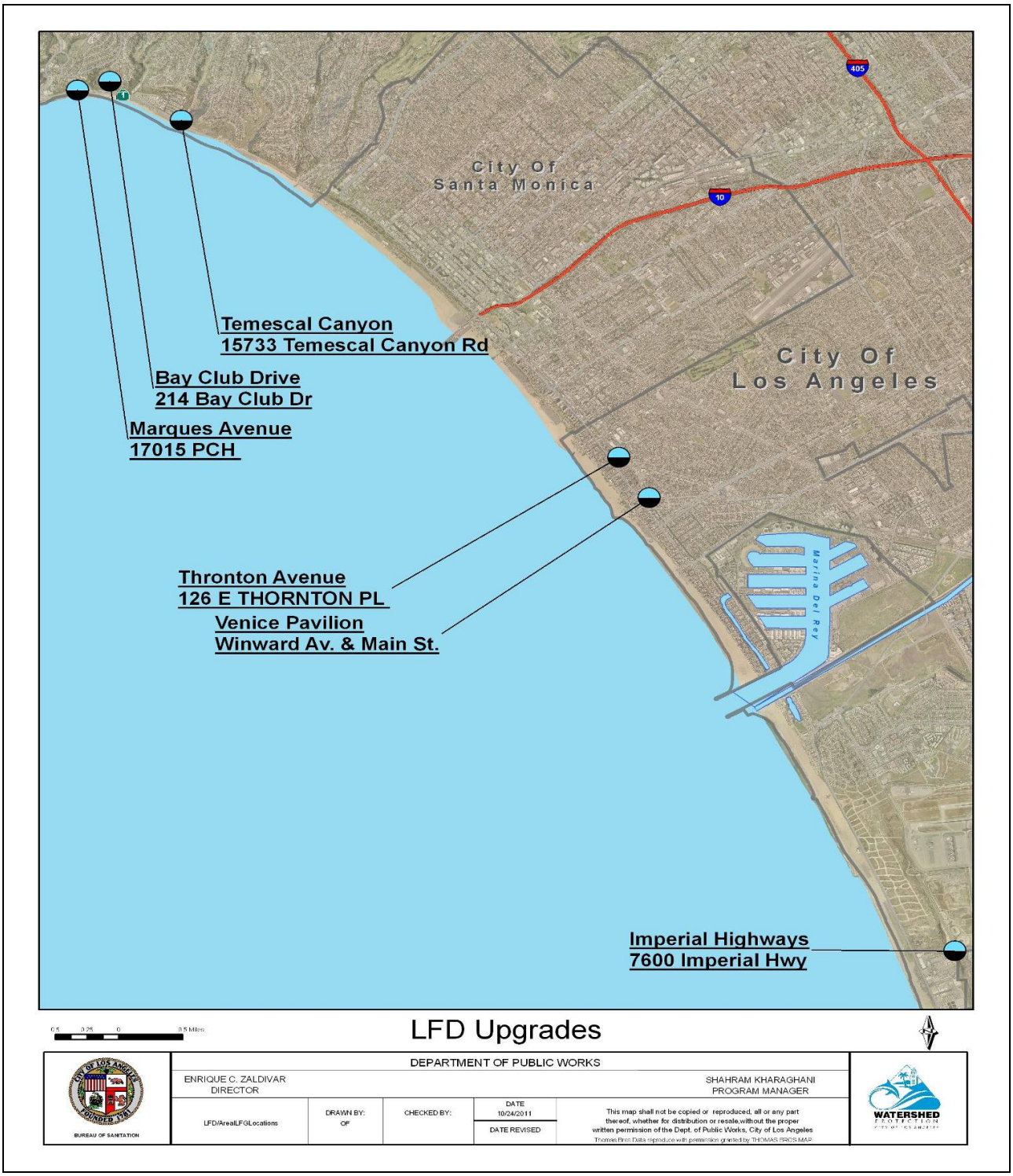

Figure 1 – Map of Santa Monica Low Flow Diversion Locations

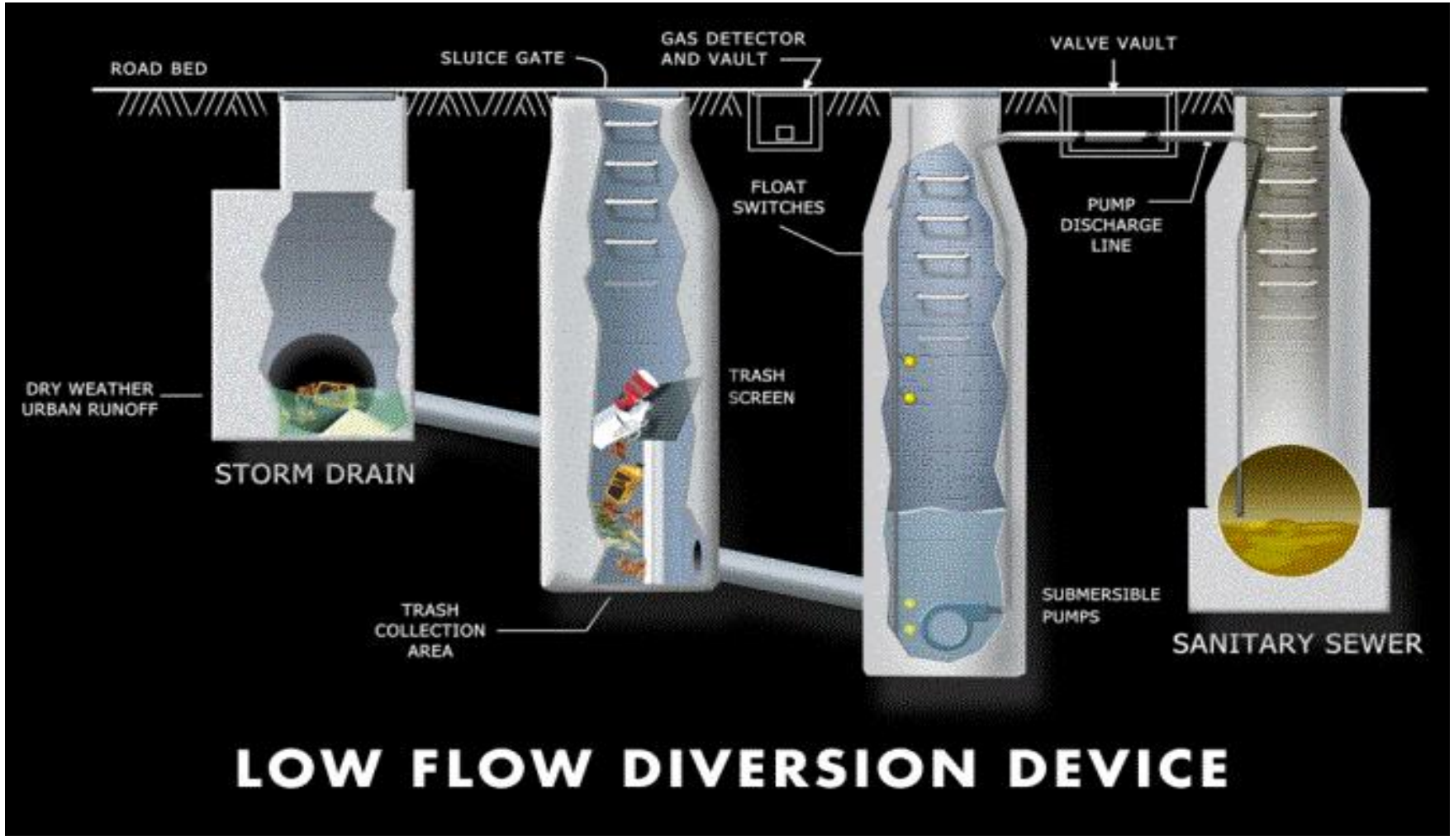

Figure 2 – Profile of Overall BMP Treatment Train for Low Flow Diversion Device

Section V: Monitoring Procedures

Monitoring procedures were established in the Project's Monitoring Plan to compare water quality at the shoreline before and after the LFDs were upgraded. Improvements in water quality were determined by reductions of total coliform, *E. coli*, and *Enterococcus* concentrations as fecal indicator bacteria. Also, applicable REC-1 limits for the fecal indicator bacteria were defined by the Water Quality Control Plan (Basin Plan) for the Los Angeles Region and the SMBBB TMDL as follows:

- 10,000 total coliform bacteria per 100 ml;
- 400 fecal coliform bacteria (*E. coli*) per 100 ml;
- 104 enterococcus bacteria per 100 ml;
- 1,000 total coliform bacteria per 100 milliliters if the ratio of fecal (or *E. coli*)/total coliform bacteria exceeds 0.1.

Wasteload allocations in the SMBBB TMDL were expressed as the allowable number of days on which one or more of the REC-1 limits are exceeded. The actual number of exceedence days during the winter, before and after upgrading the LFDs, was compared to the number of exceedence days allowed by the TMDL. It is noted the Regional Water Quality Control Board - Los Angeles Region (LARWQCB) approved substituting *E. coli* in place of fecal coliforms using a 1:1 translator.

The activities under the Monitoring Plan were coordinated with an existing shoreline monitoring program of the City that was required by the SMBBB TMDL and approved by the LARWQCB. Two of the sampling locations were already being monitored as part of the existing monitoring program; three other locations were added for the purpose of this grant agreement.

Sampling was conducted weekly on Tuesdays through the winter season (November 1 – March 31).

Table 2 – Sampling Schedule

Activity	Date Initiated	Date Completed
Pre-construction sampling and analyses	November 1, 2008	March 31, 2010
Post-construction sampling and analyses	November 1, 2010	March 31, 2011

Approximately 20-25 samples per LFD were collected and tested during both pre-construction and post-construction. The number of samples depended on the accessibility of the site due to tide conditions, safety considerations, and the number of wet days that fell on the scheduled days for sampling. Since the purpose of the Project was to divert dry weather runoff only, samples were not collected on wet weather days. Wet weather days were defined in the SMBBB TMDL as days with 0.1 inch or more of rain and the three days following the rain event. Wet weather determinations were made using rain gauges in accordance with the procedures outlined in the Coordinated Shoreline Monitoring Plan for the SMBBB TMDLs. Grab samples were collected from the wave wash (point zero) on the shoreline. The wave wash is defined as the point at which the LFD storm drain discharges and the flow from that storm drain initially mixes with the receiving ocean water.

Sample handling requirements are summarized in Table 3. All sample bottles were identified with the project title, appropriate identification number, analysis to be performed, date and time of sample collection, and the sampler's initials. In addition, a field duplicate and a field blank were included for each type of analysis (fecal indicator bacteria, metals/hardness, and TSS).

Table 3 – Sample Types, Required Volume, and Handling Requirements

Sample Type	**Sample Volume**	**Containers (#, size, type)**	**Preservation**	**Holding Time**
Total coliform *E. coli* *Enterococcus*	125 ml	(1) 125 ml sterile plastic bottle	Store Cool at 1-4ºC	6 Hours

The following laboratory analytical procedures were followed for this project:

- Total coliform and E. coli were determined by enzyme substrate testing using the Colilert ® Quanti-Tray® system (Standard Methods 9223).
- Enterococci were determined by enzyme substrate testing using Idexx Enterolert™ reagent (Idexx Laboratories, Inc., per manufacturer's instructions).

All laboratory analyses were performed by the City of Los Angeles Environmental Monitoring Division (EMD).

Runoff Flow Measurements

The amount of flow being diverted by each LFD was estimated on a daily basis by recording the time of operation of each LFD pump and multiplying the hours of operation with the known capacities of the pumps. The recommended winter dry-weather design flows from "City of Los Angeles BOE Report April 2007" are given below in Table 4. Figure 3 shows the flows which were recorded for the month of April 2011 for several of the LFD sites.

Table 4 – Recommended Winter Dry-Weather Design Flows Rounded from City of Los Angeles BOE Report April 2007

LFD SYSTEM NAME	SUMMER DRY-WEATHER DESIGN FLOW	WINTER DRY-WEATHER DESIGN FLOW	
	cfs	cfs	gpm
Marquez Avenue	0.03	0.22	99
Bay Club Drive	0.06	0.25	110
Temescal Canyon	1.30	2.60	1,167
Palisades Park	0.15	0.68	303
Santa Monica Canyon	5.00	12.00	5,386
Thornton Avenue	0.07	0.95	425
Venice Pavilion	na	0.56	250
Imperial Highway	0.10	0.68	306

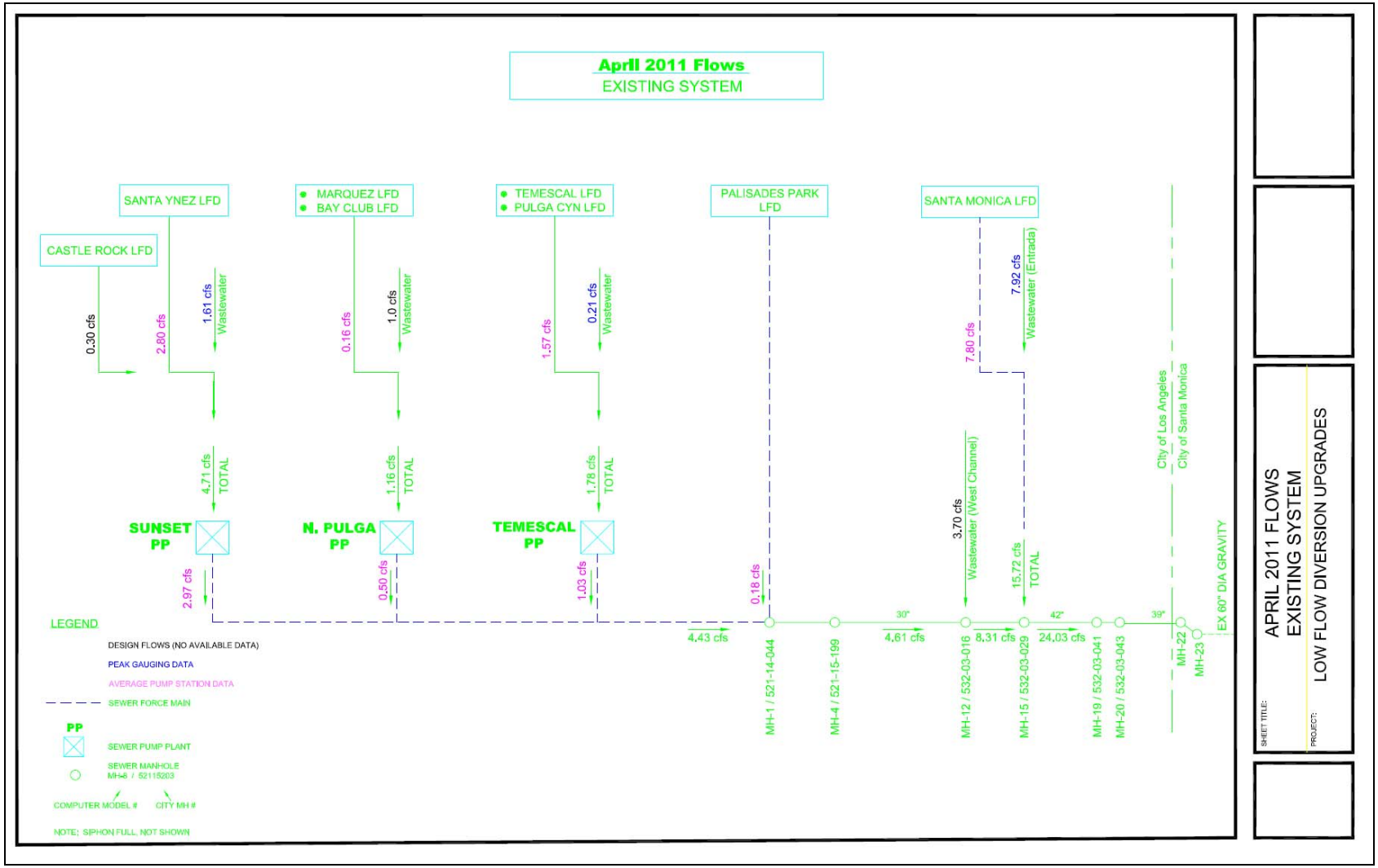

Figure 3 – Existing System for the April 2011 Flows for Santa Monica LFD Sites

Section VI: Monitoring Results

The list of sampling constituents and rationale for each is summarized in Table 5. This list was specified in the Grant Agreement.

Table 5 – Sampling Constituents

Constituent	Purpose	Comment
Fecal Indicator Bacteria: Total coliforms, E. coli, and Enterococcus	Indicates the possibility of Human Pathogens; Receiving waters have Bacteria TMDL targets.	Samples analyzed using chromogenic substrate methods (Idexx Colilert and Enterolert).

Dry weather runoff captured by the Project was treated and effectively removed from being discharged to Santa Monica Bay. The monitoring results are presented in Table 6 and Figures 3 thru 6, which summarize the pollutant reductions for the six sites before and after the LFD upgrades. Examination of the pollutant concentrations in the storm drain "before" samples revealed the runoff carries moderate levels of pollutants in dry weather conditions.

For all "before" samples, the pollutant concentrations at all six sites exceeded water quality limits. When comparing "before" samples to "after" samples, the results show the upgraded LFDs are quite effective in removing pollutants, with all paired samples showing reductions of greater than 90%. For the dry weather conditions shown in Figure 3, all "after" samples had pollutant concentrations below REC-1 (water contact recreation) limits. These results indicate this BMP system is an effective treatment system for watersheds that experience fecal contamination, and is a useful tool for meeting TMDL requirements for Santa Monica Bay.

An examination of the bacteria data indicate that this drainage area experiences high levels of total coliforms, moderate levels of E coli, and insignificant levels of enterococcus. In dry weather conditions, all "after" concentrations (for all bacteria) were below water quality limits, indicating the BMPs are providing sufficient treatment in dry weather conditions. In a few dry weather samples relative to the Imperial Highway LFD, some of the before/after pairs actually show a negative removal rate (i.e., an increase in bacteria concentration in the "after" sample relative to the "before" sample), but in each of these cases, the increase in bacteria concentration is insignificant. For example, one dry weather sample pair showed in an increase in bacteria concentration of 140%, but a closer examination of the "before" and "after" concentrations (92.8 MPN/100 ml and 150 MPN/100 ml, respectively) reveal that the concentrations are well below the 10,000 MPN/100 ml level that would harm aquatic life. In addition, the detected increase may just be an artifact of imprecision of the laboratory analysis (a problem which is amplified when bacterial concentrations are near the method detection limit).

Results for samples collected at sampling location SMB 2-13 to monitor the Imperial Highway LFD showed pollutant concentrations were higher after the LFD was upgraded. The sampling dates were from November 4, 2008 to March 30, 2010 (before) and from November 2, 2010 to March 29, 2011 (after). An examination of the data indicates the following:

- These results are mostly below the water quality limits given for the TMDL except for sampling dates listed above, which is typically observed during wet-weather periods. However, only one sample taken on 01/18/2011 that exceeded the water quality limit was during dry-weather.
- The "before" samplings span two rainy seasons (2008-09 and 2009-10), whereas the "after" samplings were only for the 2010-11 rainy season. Additional "after" samplings over more rainy seasons may provide for a more complete and comparable representation of pollutant concentrations at the sampling point.
- Several samples exceeded REC-1 limits for enterococcus. One factor that may have influenced the results is that the storm drain outlet at SMB-2-13 is typically submerged. Thus, it is difficult to observe the flow, if there is any. This was the case on 11/16/2010 and 01/18/2011. When it is submerged, samples are collected on the north side of the drain. A review of the observations sheets for both days shows nothing unusual was noted, except for a moderate amount of seaweed observed on 01/18/2011.
- Possible non-LFD-related causes of the high bacteria levels at the sampling point, include:
    - Discharges to the ocean from Airport which are in the immediate vicinity of the outfall of the Imperial Highway storm drain, can affect water quality at the drain's outlet.
    - Large recreational vehicle (RV) parking area/storage facilities were in the vicinity along the beach at the time sampling was performed. There have been unofficial reports of RV wastewater systems being discharged to storm drain inlets close to the sampling location.
    - Discharges directly to the ocean and storm drain from many industrial and commercial facilities which are located upstream.
- There is still an investigation of the operations and maintenance of this LFD upgrade. It could be that the LFD upgrade was off during these days of sampling or had higher flows which could not be captured to be treated at City of Los Angeles Hyperion Treatment Plant (HTP).

Table 6 – Comparison of Geometric Means

BEFORE						
Pollutant	**Comparison of Geometric Mean MPN/100 ml**					
	Bay Club	**Temescal**	**Imperial**	**Venice Pavilion**	**Marquez**	**Thornton**
E. Coli *(geometric mean)*	80.3	29.0	69.5	85.4	71.8	67.0
Enterococcus *(geometric mean)*	15.9	20.2	12.4	19.4	12.2	15.3
Total Coliforms *(geometric mean)*	150.4	107.2	92.8	131.9	99.8	82.3
AFTER						
Pollutant	**Comparison of Geometric Mean MPN/100 ml**					
	Bay Club	**Temescal**	**Imperial**	**Venice Pavilion**	**Marquez**	**Thornton**
E. Coli *(geometric mean)*	67.0	16.2	86.1	67.0	67.0	67.0
Enterococcus *(geometric mean)*	14.0	12.6	31.2	15.5	13.1	13.7
Total Coliforms *(geometric mean)*	93.0	33.8	155.5	76.1	78.9	67.0

Notes:

For calculating Bacteria Load reduction, the geometric mean value was used (not average).

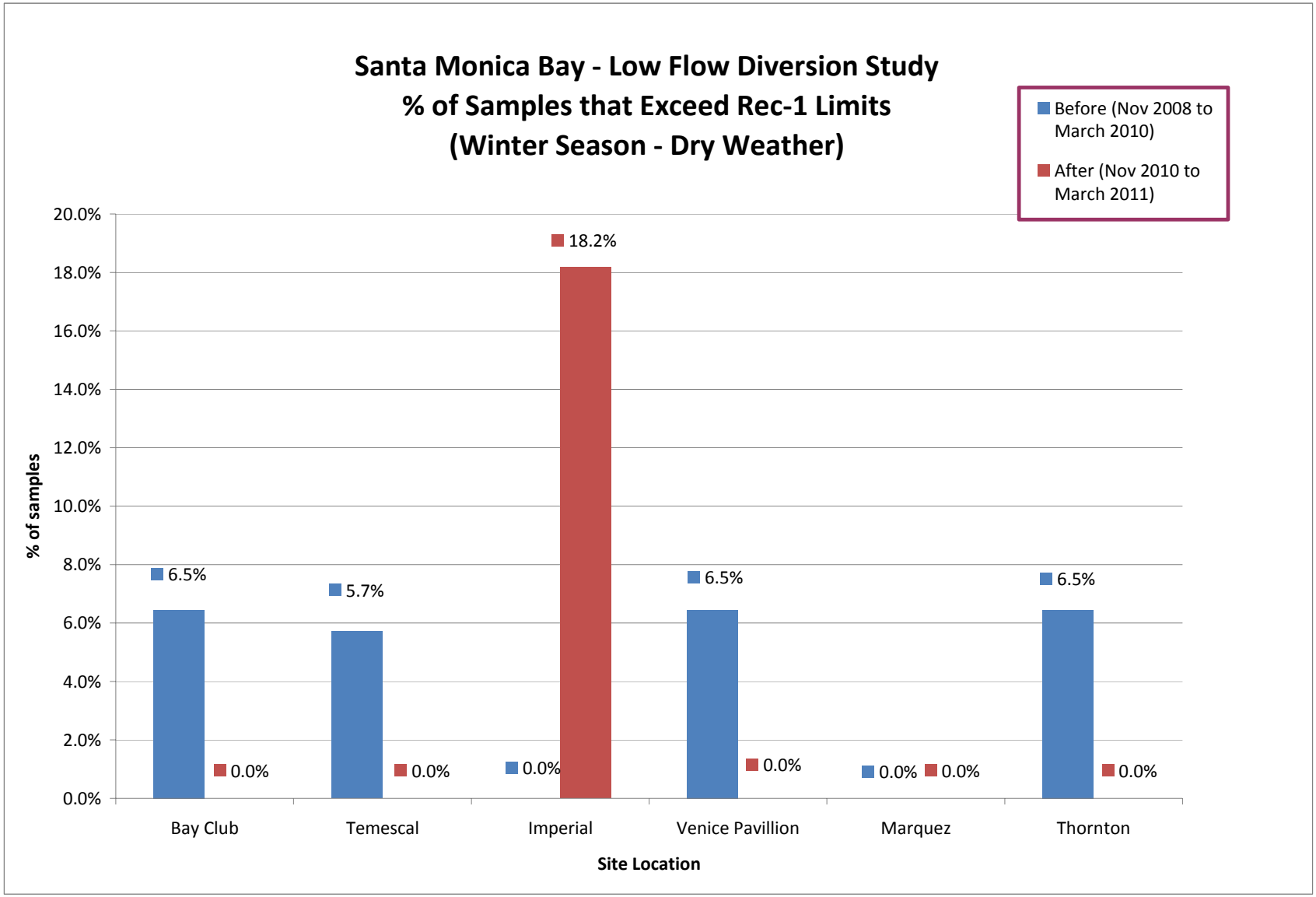

Figure 4 – Percentage of Samples that Exceed Rec-1 Limits for Santa Monica LFD Sites

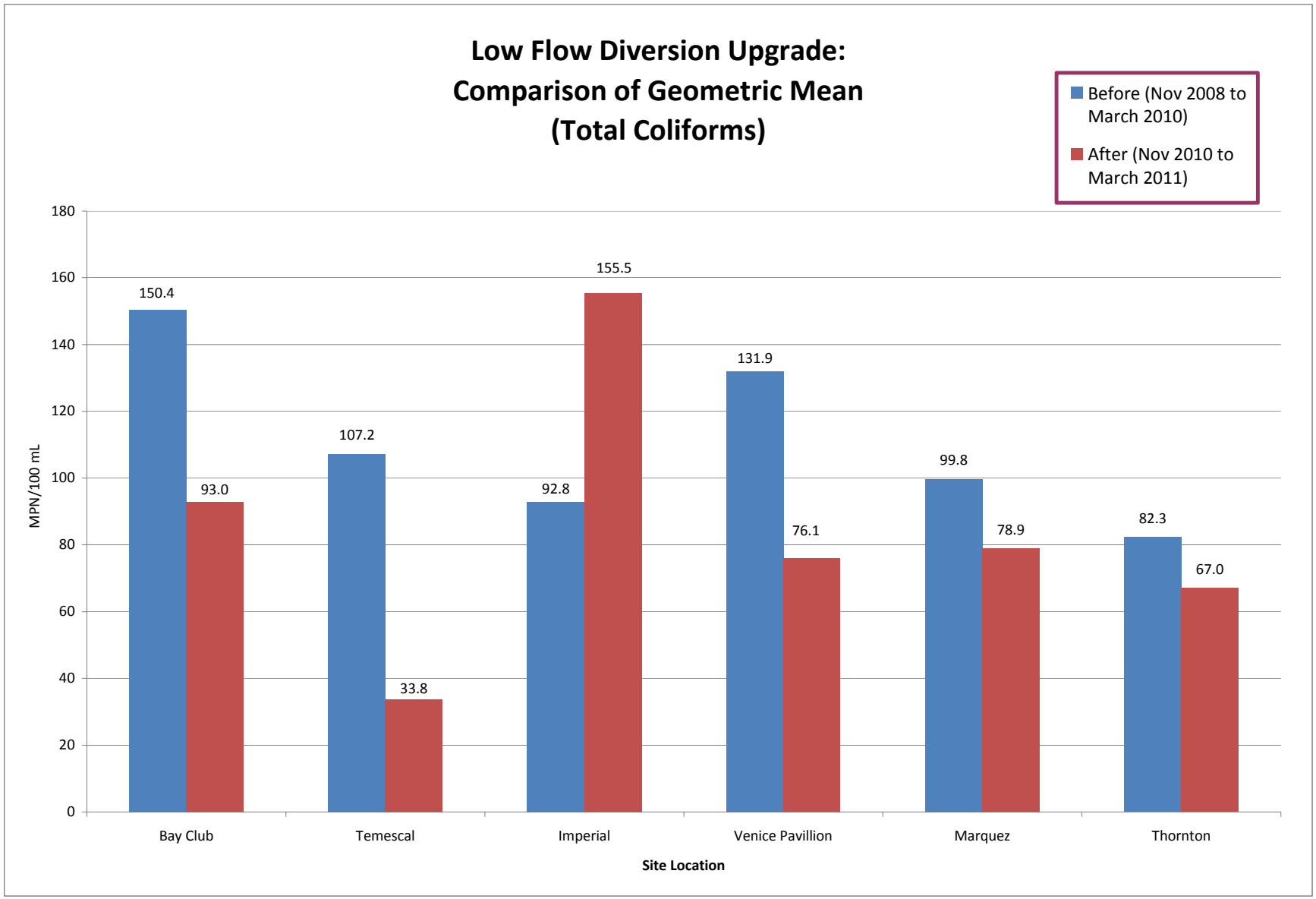

Figure 5 – Average Total Coliforms Concentration for Santa Monica LFD Sites

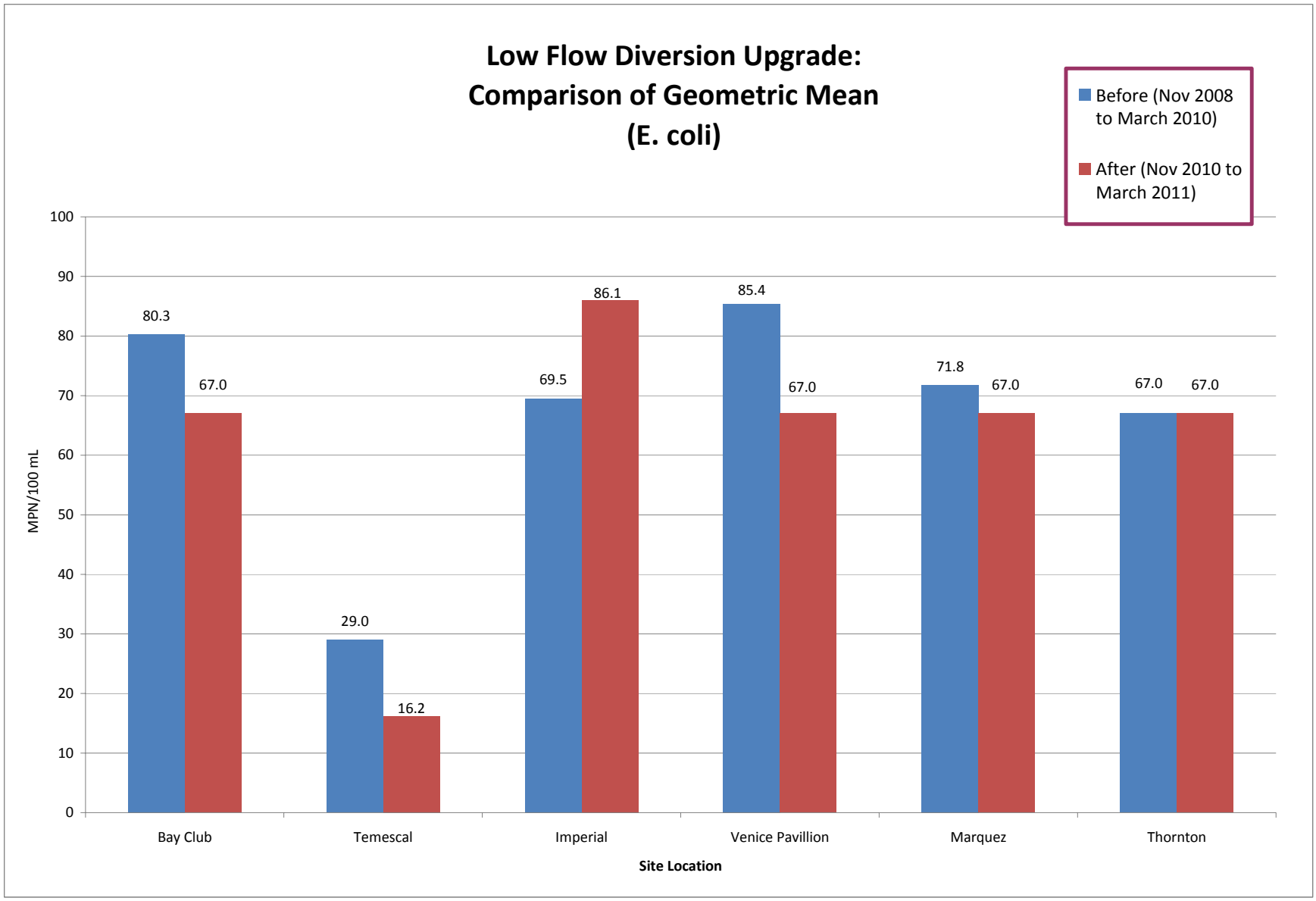

Figure 6 – Average Total E Coli Concentration for Santa Monica LFD Sites

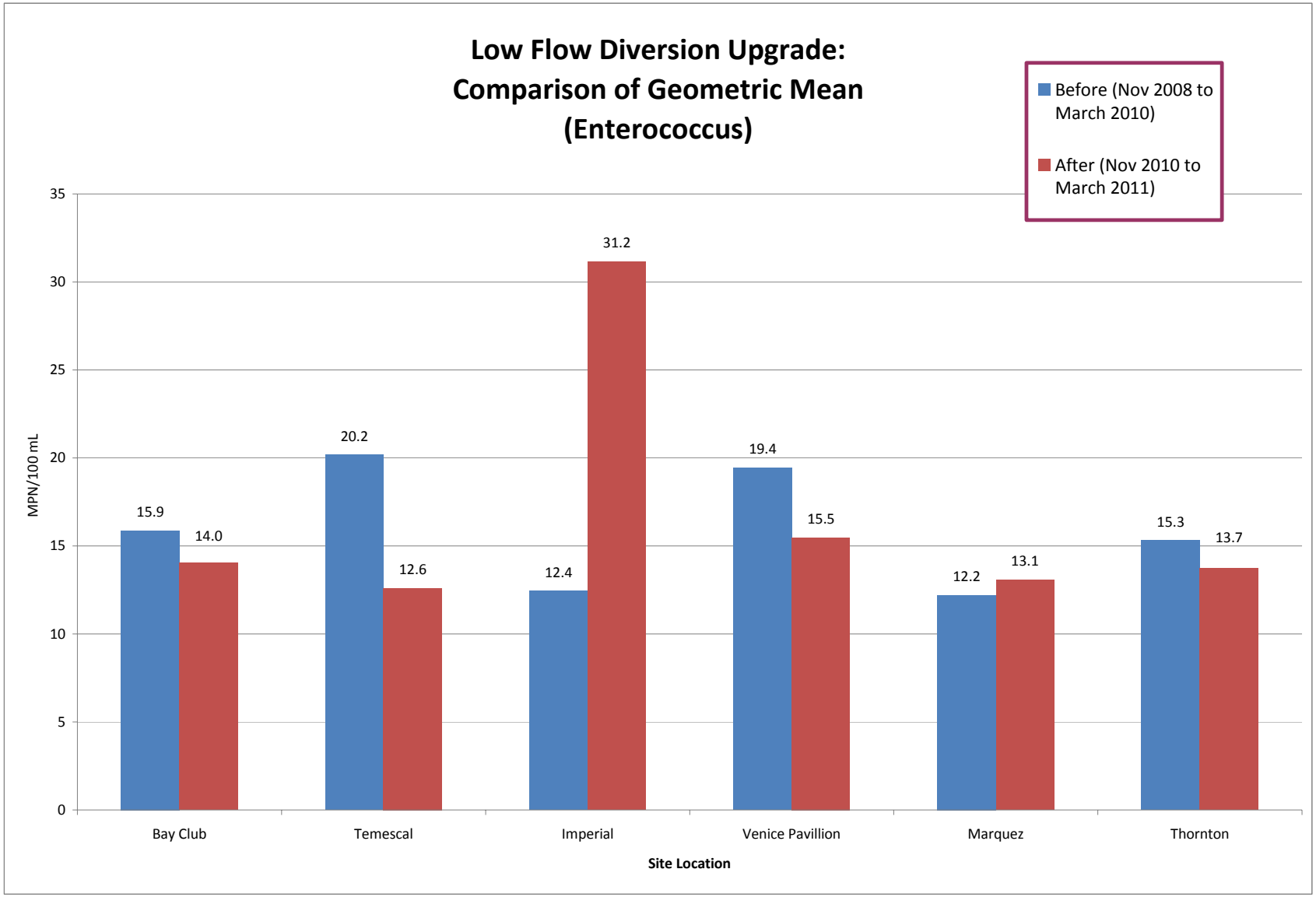

Figure 7 – Average Total Enterococcus for Santa Monica LFD Sites

Section VII: Maintenance

The maintenance requirements for these LFD system sites are similar to those of the current LFD systems. The upgraded LFD system sites required some additional operation and maintenance effort that is over and above which is currently being done. In most cases, there is at least one additional pump in the system. However, in the other cases, the number of pumps required for normal operation is reduced to one pump in operation. Each site also has one additional trash maintenance hole that requires routine cleaning. Finally each site has a generator that requires being exercised 24 hours per year along with routine refueling, oil changes and other similar functions.

Section VIII: Public Outreach

Public outreach consisted of various project presentations, briefings, and coordination meetings. The City met interested parties on several occasions, including:

- Office of City of Los Angeles Councilmember Bill Rosendahl, 11th Council District - July 19, 2007
- Pacific Coast Highway condominium residents - September 23, 2010 and December 15, 2010
- Pacific Palisades Community Council - May 8, 2008
- Santa Monica Bay Restoration Commission Meeting - February 18, 2009
- Santa Monica Canyon Civic Association - September 4, 2010 and November 18, 2010
- State Senator Shelia Kuehl's Pacific Coast Highway Taskforce - November 5, 2007

The City's Public Affairs Office (PAO) supplemented the outreach efforts via information mailers to the Pacific Palisades communities and received community inquires via the project hotline [(213) 978-0333]. During construction, the PAO also kept local residents informed with project flyers.

The Project has been generally viewed as one of the successes of the City's Watershed Protection Program and a key contributor to improve water quality in Santa Monica Bay. The City has been promoting this project, such as in presentations made at the 2009 United States Environmental Protection Agency (USEPA) National Beach Conference in Huntington Beach, California ("Stormwater Infrastructure Improvements: City of Los Angeles Innovative Approaches to BMP Designs for Clean Beaches") and at the 2011 conference held in Miami, Florida ("California's Clean Beach Initiative (CBI) Projects: Are they working?"). The City also presented the Project in several technical sessions of the 2011 Water Environment Federation Technical Exhibition and Conference (WEFTEC) in Los Angeles, California. The technical sessions included "Dry Weather Urban Runoff Diversion Program: The Benefit to Beach Water Quality, and the Impacts on Wastewater Systems."

The success of this and other Watershed Protection Program projects will continue to be promoted when suitable forums become available. In addition to workshops and conferences, the City will pursue promotional opportunities via websites, e-newsletters, blogs, and Facebook posts. Such efforts will support the implementation of future projects by the City and other agencies in Southern California, such as the County of Los Angeles, the City of Santa Monica, and the City of San Diego.

Section IX: Conclusions

The desired outcomes of the Santa Monica Low Flow Diversion Project were successfully achieved. Thus, the Project is a useful tool that contributes towards meeting the TMDL requirements for Santa Monica Bay. Although construction was completed after July 2009 (the first interim compliance milestone of the Santa Monica Bay Beaches Bacteria TMDL), the Project still assists the City in reducing winter dry weather bacteria exceedence days at Santa Monica Bay beaches, and thus meet future compliance milestones. It will also assist the City in meeting the TMDL requirements for bacteria. All of the pollutants in the captured runoff are effectively removed from being discharged to Santa Monica Bay. The capture of multiple pollutants for which they are impaired – bacteria – will enhance the beneficial and recreational uses of the receiving waters, preserve the aquatic marine habitat, and reduce the potential risks to human health and safety. Water quality in Santa Monica Bay is improved as a result of the implementation of the Project.

In general, this BMP is effective at reducing pollutant concentrations in both summer and winter dry weather conditions. Fecal contamination is arguably the most significant pollutant affecting this drainage area—not only in terms in the magnitude and consistency of high concentrations measured in the input samples, but also the inherent health risks associated with this type of pollution (i.e., waterborne pathogens). The water treated by this system showed dramatic decreases in fecal bacteria, such that in dry weather conditions would be deemed “safe” for water contact recreation (e.g., swimming, wading); and in wet weather, bacteria levels were below limits which are deemed safe for activities such as fishing or hiking, in which incidental contact is possible but ingestion is not likely.

The next step for the City is to implement future projects that incorporate the design concepts of the Santa Monica Low Flow Diversion Project. The City is continually assessing opportunities to develop and implement projects that capture, treat, and beneficially use water and have other benefits, such as reducing the demand for potable water and creating green streets, recreational areas, open space, and habitat. The City is pursuing the use of natural systems for treating urban runoff where feasible.

Appendix A

Appendix A – List of References

1- Minnesota Urban Small Size BMP Manual - http://www.metrocouncil.org/environment/watershed/bmp/CH3_STFiltBioretention.pdf

2- FILTERRA® Stormwater Bioretention Filtration System - http://filterra.com/

3- Watershed Protection Division. (2009). Water Quality Compliance Master Plan for Urban Runoff. City of Los Angeles, California (http://www.lastormwater.org/Siteorg/download/pdfs/tech_docs/WQCMPURChapters.pdf)

4- Green Infrastructure for Los Angeles (2009). Addressing Urban Runoff and Water Supply Through Low Impact Development/Green Streets & Green Alleys Design Guidelines Standards. City of Los Angeles, California (http://www.lastormwater.org/Siteorg/program/green.htm).

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Appendix B

Appendix B – List of Grant Deliverables

Task	Due Date	% of Work Complete	Date Submitted
PLANS AND COMPLIANCE REQUIREMENTS			
GPS Information for Project Site and Monitoring Locations	11/13/07	Completed	10/30/08
Project Assessment Evaluation Plan (PAEP)	11/13/07	Completed	11/13/07
Non Point Source Pollution Reduction Project Follow-up Survey Form	Annually by 12/15/09 12/15/10 12/15/11	Completed	1/31/11
Monitoring Plan (MP)	8/30/08	Completed	10/30/08 1/30/09
Quality Assurance Project Plan(QAPP)	8/30/08	Completed	10/30/08 1/30/09
Copy of final CEQA/NEPA Documentation	10/31/07	Completed	10/30/08
Applicable Permits	As Needed		Not applicable
WORK TO BE PERFORMED BY RECIPIENT			
As-Advertised Construction Documents	July 2009	Completed	7/30/09
Bid Summary, Proof of Advertising, and Construction Notice to Proceed	July 2009	Completed	7/30/09
Photo Documentation of Construction Work At All Phases	July 2011	Completed	1/31/11
INVOICING	Quarterly	Completed	1/31/11
REPORTS			
Progress Reports by the thirtieth (30^{th}) of the month following the end of the calendar quarter(March, June, September, and December)	Quarterly	100%	7/29/11
Annual Progress Summary	9/30/08 9/30/10	Completed	10/29/10
Natural Resource Projects Inventory(NRPI) Project Survey Form	Before Final Invoice	Completed	1/31/11
Draft Project Report Certification	9/30/2011	100%	12/30/11
Final Project Report Certification	11/30/2011		

Appendix C

Site: Bay Club LFD

Before - Bay Club LFD before construction. Photo taken 6/18/09.

Construction - Bay Club shoring and excavation to expose existing LFD. Photo taken 4/14/10.

Site: Bay Club LFD

Construction - Bay Club LFD repavement. Photo taken 7/9/10. Hatches for new flow meter, cam locks and pumps also shown.

Finished - Bay Club LFD in the distance on Arno Way. Photo taken 7/15/10.

Site: Temescal LFD

Construction - Temescal LFD new precast structures for cam lock, flow meter, valve vault, and wet well. Photo taken 5/25/10.

Finished - Temescal LFD after construction.

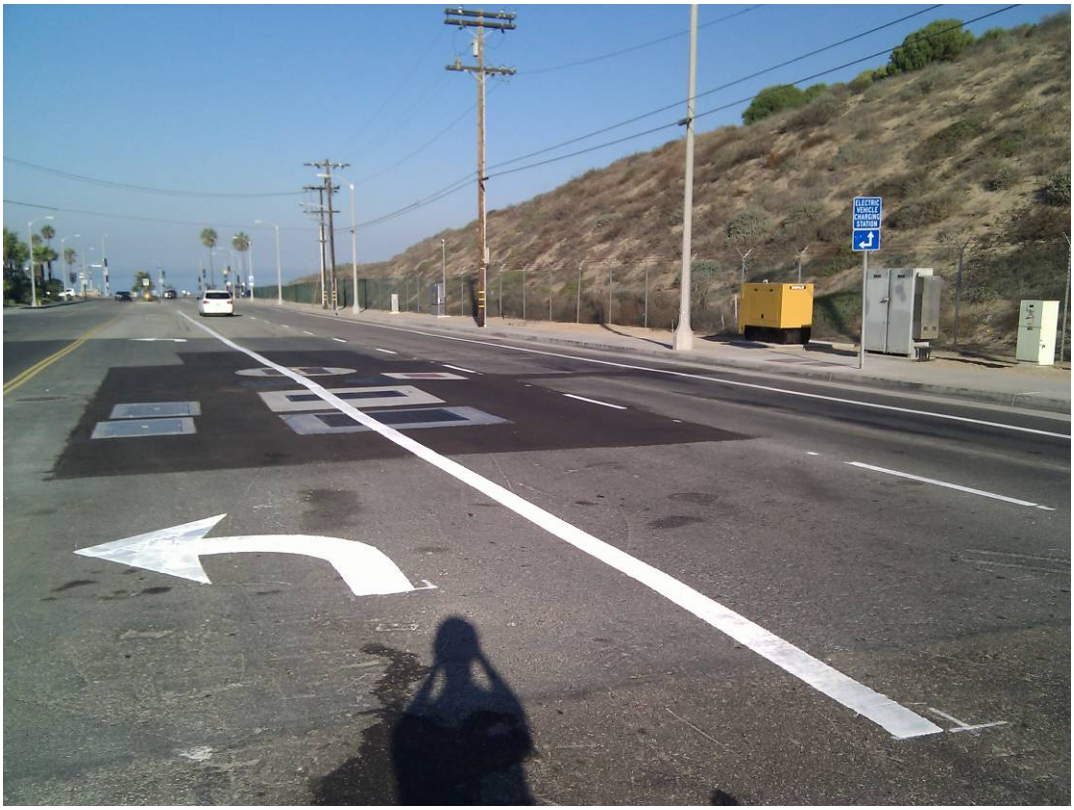
Site: Imperial Highway LFD

Before - Imperial LFD before construction. Photo taken 6/18/09.

Construction - Imperial LFD excavation and exposure of existing LFD. Photo taken 2/10/10

Site: Imperial Highway LFD

Construction - Imperial LFD placement of new structures. Photo taken 3/10/10.



Finished - Imperial LFD after construction. Photo taken 9/24/10.

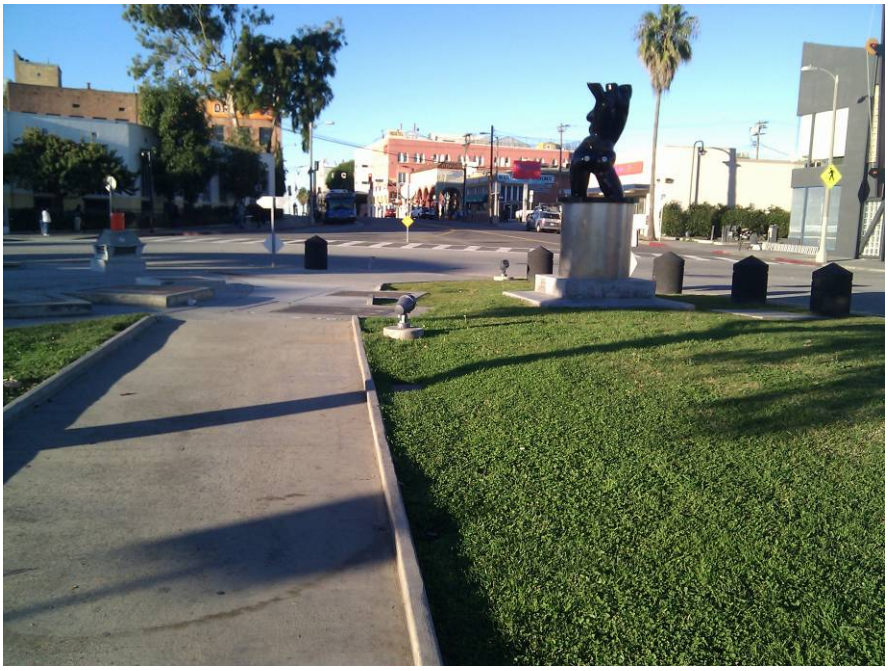
Site: Venice Pavilion LFD

Before - Venice Pavilion before construction. Photo taken 6/18/09.

Construction - Venice Pavilion exposure of lid for new hatch.
Photo taken 12/23/09.

Site: Venice Pavilion LFD

Construction - Venice Pavilion installation of new Valve Vault. Photo taken 2/24/10.



Finished - Venice Pavilion finished project picture.

Site: Marquez LFD

Before - Marquez LFD before construction. Photo taken 6/18/09.

Construction - Marquez LFD electrical trench. Photo taken 1/26/10.

Site: Marquez LFD


Construction - Marquez new flow meter vault (photo taken 3/8/10). Marquez LFD new larger hatch for three pump upgrade from two pumps (photo taken 3/24/10).

Finished – Picture of finished project.

Site: Thornton LFD

Before - Thornton LFD before construction. Photo taken 6/18/09.

Construction - Thornton shoring and excavation. Photo taken 1/15/10.

Site: Thornton LFD

Construction - Thornton LFD formwork. Photo taken 2/26/10.

Finished - Thornton new generator and housekeeping pad, and electrical panels distance. Photo taken 8/18/10.