



**FINAL CONTRACT AGREEMENT REPORT  
Wilshire Boulevard Dry-Wet Weather  
Urban Runoff BMP Mitigation Project  
for the State Water Resources Control Board  
Contract #02-225-550-1  
March 23, 2009**



Another project to improve California's watersheds funded in full or in part through agreements with the State Water Resources Control Board (SWRCB) pursuant to the Clean Water, Clean Air, Safe Neighborhood Parks and Coastal Protection Act of 2002 (Proposition 40), any amendment thereto for the implementation of California's Nonpoint Source Pollution Control Program, all which have been administrated through the SWRCB. The information herein does not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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## I. INTRODUCTORY SECTION

### Statement of Project Purpose & Objectives

The Project goal is to reduce the pollutants in urban runoff carried to the Santa Monica Bay through the Wilshire Boulevard Watershed. The purpose of this project is to install a best management practice treatment system to remove pollutants commonly found in urban runoff, leading to a reduction in the number of pathogen exceedances and corresponding beach postings at this storm drain outlet location, and restore and protect the water quality and environment of local coastal waters, estuaries and near shore waters of the Santa Monica Bay. Through this objective, beneficial uses of the Bay will be protected and preserved; water quality objectives will be achieved by reducing the pollutants of concern most common in urban runoff: trash, debris, sediments, oil and grease, nutrients, heavy metals and organics. In addition, this project will help the City comply with various NPDES, TMDL, NPS and watershed restoration programs and to better safeguard aquatic habitats and beaches for wildlife and people. Moreover, this project will help meet the goal of protecting and restoring beneficial uses of these waters as outlined in the Los Angeles Regional Board's Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.

The project purpose and goals were defined through the following processes:

- + Identification of factors that affect the concentrations and loads of problem constituents in urban runoff;
- + Identification of the physical and chemical mechanisms that affect the mobilization, transport, and transformation of problem constituents; and
- + Review of existing data on costs, effectiveness, and benefits of stormwater BMPs.

The project is designed to improve urban runoff quality through a two-stage BMP treatment train. The treatment system will improve water quality by removing to the maximum extent practicable trash, debris and sediments, and other soluble TMDL pollutants of concern, such as heavy metals, nutrients, pathogens and synthetic organics. By removing pollutants of concern, the Santa Monica Bay will be enhanced for the many beneficial uses of these waters, used by both aquatic species and people.

To assess if the overall objectives of the project are met, a set of numeric water quality objectives or criteria goals are established to determine whether successful treatment has been achieved, within the Wilshire Boulevard Basin:

- + Removal of 100% of floatables and solids through the primary stage vortex unit (for all dry weather and up to 80% of wet weather flows);
- + Removal of 70% of Total Suspended Solids (TSS), oil and grease, and other soluble pollutants attached to solids through the primary stage vortex unit (removal efficiency will vary based upon influent concentrations); and
- + Treatment through the primary BMP device and diversion to the sanitary sewer (instead of out to the Bay via the Wilshire storm drain outlet on the beach as was previously done) of all dry weather flows and initial wet weather flows (first flush) up to a designed one cubic foot per second (cfs) flow rate, and treatment of

approximately 80% of wet weather events through the primary treatment BMP and discharged to the Bay (60 cfs).

### **Scope of the Project**

This project installed a 2-stage Best Management Practice (BMP) treatment train at the intersection of Wilshire Boulevard and Ocean Avenue within the County of Los Angeles Public Work's storm drain system in the City of Santa Monica. This project treats all dry weather flowing from the City's Wilshire Boulevard Watershed, a highly urbanized area in the north-central part of the City, excluding a small fraction of runoff below the bluffs. The project also treats up to 80% of wet weather flows.

### **Project Area**

The location of the project area is the intersection of Ocean Avenue and Wilshire Boulevards adjacent to Palisades Park on the west side of Ocean Avenue.

Runoff from the project location flows into the Santa Monica Bay, a marine coastal habitat, sand beach bottom with a gradual slope along the Bay floor.

Beneficial uses include bathing and swimming. Surfing and fishing occur north and south of this area. Other beneficial uses include breeding and feeding by aquatic and terrestrial animals.

The watershed that drains to the project area is approximately 600 acres and is 100% built-out. Land uses include single-family residential, light commercial and transportation.

Appendix E contains a map of the watershed and project location area.

### **History of Project**

The planning for the project began in June 2001, when the City began negotiations with the Los Angeles County Department of Public Works to develop a low-flow diversion for the Montana and Wilshire storm drain outlets, which are owned by the County. An agreement was forged in January 2002 in which the County would contribute \$50,000 to the City for the City to design a low-flow diversion. The City hired Burns & McDonnell to develop the diversion scheme, in late 2002. The design was completed in mid-2004.

The City applied for and received State Proposition 40, during the 2003. City Council approved a staff report in September 2003 to proceed with a Proposition grant. The grant agreement was executed in spring 2004 for \$980,000. A second grant, Proposition 12, was requested when during the design phase construction costs rose dramatically and the final design indicated greater than anticipated construction costs due to the new project location on the bluff. This \$500,000 grant was obtained and executed in 2006.

Initially, the City was responsible for the design and funding of the project, with the small contribution from the County. As the project developed and it became a much more complex project, the County contributed to the final project design and construction documents for the RFP. The County's design in-kind contribution was a significant amount. The responsible agencies were the City and County, the latter overseeing construction inspections with the City's own project manager (engineer) assisting. The City is now maintaining the treatment facility following completion of construction.

During 2003, the CEQA process was completed with the project obtaining a Categorical Exemption.

The initial and final objectives have been to divert all low-flow dry weather runoff into the sanitary sewer, year-round. Wet weather flow has been designed to be treated through a separation-screening CDS unit with up to 80% of the runoff from a 2-year storm treated, or 60 cfs. These two objectives for year-round treatment are expected to improve water quality in the surrounding coastal marine areas, to lead to less frequent exceedances for bacteria, and to improve beneficial uses at the Wilshire storm drain. Additionally, it is expected to prevent any ponding in the beach during dry weather during the winter season.

### Project Background and Location

The original project was to be built on the beach below the Palisades Bluffs of Palisades Park just west of Pacific Coast Highway, where all runoff from the Wilshire Boulevard Watershed could be harvested. However, upon further investigation, it was learned that this site would not be feasible given the original budget and technical realities. If built as originally designed, various public officials were concerned about surcharging and the blowing of manhole covers in areas frequented by beach visitors and vehicles. In addition, City officials had concerns about placing treatment devices close to residents along the Pacific Coast Highway, which face the ocean and beach, where regular maintenance would require vehicles to enter the beach. Finally, the construction of a major treatment system in the sand would have required unanticipated structural supports and the reconstruction of existing structures in the Wilshire storm drain outlet in the beach.

Based upon these significant concerns and additional expenses, the City requested a change of location at the top of the Palisades Bluff, which offered advantages:

- Close to a sanitary sewer connection;
- Easier access for maintenance;
- No aesthetic issues associated with being on the beach;
- No surcharging issues;
- Insignificant loss of dry weather flow; and
- Within budget.

### Project Construction Timing

RFP released	March 14, 2006
Construction Bids received	April 19, 2006
Award of contract	June 13, 2006
Construction phase begins	March, 2007
Construction phase ends	December, 2007
Start up of system	January 7, 2008

### **Description of Approach & Techniques During Project**

The project consists of an offline (from the main storm drain line) two-stage treatment train (primary stage vortex screening-separation, secondary stage diversion to sanitary sewer) to

remove trash, debris and sediments, and other soluble TMDL pollutants of concern, such as heavy metals, pathogens, nutrients and organics. The primary stage, a vortex screening-separation device called a Continuous Deflection Separation or CDS unit, removes gross solids and floatables, sediments and some solubles attached to sediments, and oil and grease. For dry and wet weather up to three-quarters of an inch (3/4") rainfall, the system is intended to remove 100% of floatables and solids, and about 70% for TSS, oil and grease, and other soluble pollutants attached to solids to the maximum extent practicable, given influent concentrations. Removal efficiency varies as influent concentration varies. The secondary stage is an urban runoff diversion that will direct all dry weather flows into the sanitary sewer for advanced wastewater treatment by the City of Los Angeles. During wet weather flows, the first three-quarter inch of rainfall is designed to be treated by the primary system only. A smaller portion up to 1 cubic foot per second (cfs), the first flush, is diverted to the sanitary sewer; the balance exits (bypass the sanitary sewer diversion) back into the main storm drain and to the beach. Larger flows exceeding the capacity of the initial diversion structure in the main storm drain upstream of the treatment train remain in the main storm drain, bypassing the diversion, and flow directly to the Bay. The project's primary stage treats up to an estimated 80% of wet weather events; the project sends all dry weather flows and the initial first flush up to 1 cfs into the sanitary sewer

Through this BMP treatment train, non-point source pollution found in urban runoff is dramatically reduced, improving water quality entering the Bay. Exceedances leading to beach postings and beach mile-days are expected to be dramatically reduced and help the City achieve the TMDL standards, and goals and priorities of the Santa Monica Bay Restoration Commission

For dry weather flows, the system operates on gravity flow from the Wilshire storm drain to the CDS unit and into the wet well. From the wet well, electrical pumps move the low-flow runoff into the sewer system. For wet weather flows, the system operates entirely by gravity.

Appendix E contains an aerial photograph of the project site and a schematic diagram of the design.

## II. LIST OF SUBMITTALS

TASK	SUB-TASK	DELIVERABLES	DUE DATES	DATE SUBMITTED
		EXHIBIT A – SCOPE OF WORK		
1.0		QUALITY ASSURANCE PROJECT PLAN and MONITORING PLAN		--
	1.1	Quality Assurance Project Plan	December 2005	December 2005
	1.2	Monitoring Plan	December 2005	December 2005
2.0		WORK TO BE PERFORMED BY GRANTEE	--	
	2.6	Final Design Plans and Specifications	March 2006	March 31, 2006
4.0		PROJECT IMPLEMENTATION, OPERATION, and MAINTENANCE		
	4.1	Photo Documentation of Construction (pre, during, and post)	Continuous during construction	
	4.2	Construction Project	September 2005	January 2008
	4.3	As Builts	June 2008	May 2, 2008
5.0		DRAFT and FINAL PROJECT REPORTS and ANNUAL PROGRESS SUMMARY		
	5.1	Annual Summary with Photo Documentation	September 2005 September 2006 September 2007 September 2008	October 2005 October 2006 October 2007 September 2008
	5.2	Draft Final Project Report	February 2009	2/27/09
	5.3	Final Project Report	April 1, 2009	3/31/09
		EXHIBIT B – INVOICING, BUDGET DETAIL AND REPORTING PROVISIONS		
5.0		STANDARD REQUIREMENTS CERTIFICATION FORM	(as needed)	
6.1		Progress Reports by the tenth (10 <sup>th</sup> ) of the month following the end of the calendar quarter (March, June, September, and December)	Quarterly	Completed
6.2		Expenditure/Invoice Projections	Quarterly	Completed
6.3		Grant Summary Form	Day 90	Completed
6.4		Natural Resource Projects Inventory project survey form	Before final invoice	3/10/09

TASK	SUB-TASK	DELIVERABLES	DUE DATES	DATE SUBMITTED
		EXHIBIT C – SWRCB GENERAL CONDITIONS		
# 6		Copy of final CEQA/NEPA documentation	March 2005	March 31, 2005
#21		Signed cover sheets for all permits	July 15, 2006	September 2007
		EXHIBIT D – GRANT PROGRAM TERMS & CONDITIONS		
#5		Monitoring and Reporting Plan	December 2005	December 2005

### III. ADDITIONAL INFORMATION

#### Project Personnel and Partners

City of Santa Monica	Neal Shapiro, Project Coordinator Susan Lowell, Eric Bailey, Carlos Rosales, Project Managers/Design & Construction Gary Welling, Dina Khadavi, Water Quality Monitoring Gary Welling, Danny Gomez, Operation & Maintenance
Grant Funding Agencies	State Water Resources Control Board Los Angeles Regional Water Quality Control Board Proposition 12, Safe Neighborhood Parks, Clean Water, Clean Air and Coastal Protection Bond Act of 2000 Proposition 40, Clean Beaches Initiative County of Los Angeles Public Works
Construction Manager Inspection During Construction	City of Santa Monica County of Los Angeles Public Works
Contractor	Mladen Buntich Construction Company, Inc.
Design	Burns & McDonnell County of Los Angeles Department of Public Works
Product Vendor	CDS, Inc.

#### System Approach & Techniques (Operation)

The following discussion is intended to provide a general overview of how the Wilshire Boulevard runoff treatment project operates.

Construction dates are above in Section I as requested.

Project location is above in Section I as requested. See Appendix E also.

Location of storm drain connection: see Appendix E. Off line of main Wilshire Boulevard storm drain under Palisades Park at the intersection of Ocean Avenue and Wilshire Boulevard.

Location of the sanitary sewer connection: See Appendix E. In Ocean Avenue just north of Wilshire Boulevard, east side of Ocean.

### *Diversion Box*

Concrete box was inserted or spliced into the main storm drain. Inside the box is a low point, called a drop box. Dry (low-flow) and wet weather runoff enter the drop box and naturally flows downward to the low point. The accumulated runoff exits into a pipe that carries the flow to the CDS unit for treatment. Runoff volume that exceeds the drop box diversion by-passes the diversion and continues through the main storm drain line to the ocean.

A small weir (2" high) located in the return (effluent) pipe from the CDS to the main storm drain line causes low-flows (dry weather runoff) to backup, pool, and enter another pipe that transports the runoff via gravity to the wet well for storage and the sanitary sewer. The bottom of this effluent pipe is filled in to produce the weir. During wet weather, the treated water flow exceeds the weir, flows over it, and goes back to the main storm drain line to the ocean. See diagram in Appendix D.

The diversion is located in Palisades Park between the west side of Ocean Avenue and the edge of the Park (e.g. bluff), which overlooks Pacific Coast Highway.

### *Continuous Deflective Separation Unit*

The CDS unit receives dry and wet weather flows from the main storm drain line. Through screening and separating processes provided by the vortex flow within the unit trash, debris, sediment, and free oil and grease are trapped within the central configuration of the CDS unit, and if heavy enough sink to the bottom sump and accumulate until removed during routine maintenance. For all dry weather flow (1 cfs) diverted from the Wilshire storm drain, treated (screening-separation processes) water exits the unit through a pipe, via gravity, to the wet well, where it accumulates until it is pumped into the sanitary sewer for advanced treatment. See Appendix D for CDS graphic and further explanations. For wet weather flows up to 80% of flows from a ¾" storm event, 60 cfs, treated water is returned back to the main storm drain through a separate pipe downstream of the diversion box, where it flows to the ocean.

The unit is located in the shoulder of the south-bound lanes of Ocean Avenue, the northwest corner of the intersection, south of the Wet Well.

### *Wet Well*

The Wet Well is a storage unit that receives treated runoff (dry weather only) from the CDS unit. Water is pumped out when enough runoff accumulates to trigger pumping. The pumps are designed to turn on and off through the use of a float system as the water level in the wet well rises and falls.

The unit is located in the shoulder of the south-bound lanes of Ocean Avenue, the northwest corner of the intersection, south of the Pump Vaults.

#### Pump Vault

The Pump Vaults move treated dry weather runoff from the wet well into the sanitary sewer where it flows to the City of Los Angeles' Hyperion treatment facility for advanced treatment and discharge into the ocean.

The unit is located in the shoulder of the south-bound lanes of Ocean Avenue, the northwest corner of the intersection, north of the Wet Well.

#### Electrical Panel

The electrical panel is located across Ocean Avenue and is on the north side of Wilshire Blvd. in front of the hotel at the northeast corner of the intersection, where there was more room to install a large control panel. This panel is the only electrical component of the system, and serves as the energy source to pump runoff to the sanitary sewer.

#### Monitoring Ports & AB411 Locations (see Appendix E)

Two at-grade utility covers (in walking paths adjacent to the curb of the west side of Ocean Avenue at the intersection and near the bluff) exist near the CDS unit for water sampling of runoff entering (influent sample) and leaving (back to the main storm drain line, wet weather flow only, wet weather effluent sample) the CDS unit. Influent samples taken from storm drain upstream of CDS unit under the utility cover in the walking path next to the Ocean Avenue curb, west side of street. Dry weather effluent samples are taken from the southern-most pump vault (west side shoulder of Ocean Avenue just north of the intersection), where a spigot is mounted for easy accessibility to sample the treated dry weather runoff before it goes to the sanitary sewer. Wet weather effluent samples are taken at the utility cover in the walking path near the bluff. See photos in appendix.

### **Summary of Project Budget**

See Appendix A. The figure only shows expenditures for Proposition 40. To obtain the total project cost, one has to include Proposition 12, a \$500,000 grant and match. The overall project cost was \$2,534,218. The Proposition 40 portion was \$2,022,308.

### **Contact Information**

For readers with questions about the project or the report:

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#### **IV. CEQA DOCUMENTATION**

Documentation was submitted far in advance of the project. See Table of Submittals.

#### **V. QUALITY ASSURANCE PROJECT PLAN**

Documentation was submitted. See Table of Submittals.

#### **VI. PAEP: WATER QUALITY ANALYSIS & EFFECTIVENESS SUMMARY OF FINDINGS**

##### **Load Reduction Analysis**

No pre-construction pollutant load data exists. Before the project, no system existed to capture and record the amounts of trash, debris, sediments and other gross pollutants leaving this storm drain outlet. Part of the objective of this project is to have a system that captures these loads, and which can be measured in order to establish how much has been exiting this storm drain in the past. To date, no post-construction data is available because the depth of the CDS unit is such that a normal maintenance technology, VacTruck, cannot adequately remove the debris from the CDS unit. Since January 2008, visual observations reveal trash and debris in the CDS sump. The City is in the process of locating a vendor that can remove these materials. Once data becomes available, it will be posted on the website, [http://www.smgov.net/epd/residents/Urban\\_Runoff/urban](http://www.smgov.net/epd/residents/Urban_Runoff/urban). The CDS unit is a 100% capture unit; when this new data become available, data on load reduction will be available, which will be 100% for 80% of storm events.

Appendix B contains seven tables on water quality results from monthly water samples. Table 1 is a summary of all sampling dates. Table 2 has water quality effectiveness for bacteria. Tables 3-7 has water quality effectiveness for non-bacterial pollutants of concern.

Based upon early results, there does appear to be water quality improvement in the effluent samples for dry weather. A number of incidents of higher concentrations of pollutants did occur, and it is believe that this is likely because runoff in the wet well can sit for hours before the water level rises to trigger the pumps to pump the water into the sanitary sewer. Thus, the runoff is being concentrated over time. However, because all this water is going to the sanitary sewer; it is kept out of the Bay, and water quality benefits still accrue. For wet weather results, water quality improvements do appear to exist between the influent and effluent (post-CDS treated runoff).

In addition to the concentration problem in the wet well, runoff sits in the CDS unit while some of it, not all, moves via gravity to the wet well and then the sanitary sewer. However, the CDS unit sump, which is below the invert of the pipe that carries low-flow runoff to the wet well, still holds a great deal of runoff. During dry weather, much of it sits in the sump while the

low-flow moves to the wet well. Some mixing occurs. For the pollutant parameters being monitored, concentrations may go up as the concentrated runoff in the CDS sump, especially bacteria, is picked up. No large flows occur to flush the system, except for rain events. Normally low concentrations of parameters may increase as runoff passes through the CDS unit and mixes somewhat with the runoff sitting in the CDS sump. This reasoning may explain the higher effluent concentrations for dry weather and some wet weather results.

All dry weather flows go to the CDS and wet well, and into the sanitary sewer. While effluent concentrations are higher, the pollutants are still being removed from the storm drain system and kept out of the Bay for improved water quality. For wet weather flows, higher concentrations of parameters can be exiting the CDS unit to the Bay. In most cases, however trash, debris, and sediments are being removed for most wet weather events.

### **Result of Non-bacterial Data**

Tables three to seven in Appendix B contain the summary water quality data for samples taken for dry and wet weather periods through January 09. Complete water monitoring reports are available from the City in hard or electronic format.

For purposes of analysis, pre-construction water quality data is considered to be the same as influent water quality data. Samples were not obtained before construction due to minimal flows and the difficulty of obtaining grab samples. Moreover, as there is no change in any flows entering the treatment system before and after the project installation, the data can be considered the same. No changes occurred upstream to neither alter dry and wet weather runoff flows nor water quality before and after the project installation.

#### Miscellaneous Constituents

For turbidity and color, one would expect water quality to decrease because during wet weather that there will be more sediments and mixing in the system, causing this increase in turbidity and reduction in color. For both dry and wet weather samples, mixed results, sometimes reductions and sometimes increases. Did see improvements for wet weather events, showing effectiveness of the CDS unit. Oil and grease had mixed results but definite reductions of these pollutants.

#### General Minerals

Generally, good results, though mixed, as improvements occurred more for dry weather. Wet weather had good improvements for the wet weather events in January and February after earlier rain events may have washed most pollutants out. For the latter wet weather events in December and January (09), little improvements occurred perhaps because very little if any rain events before this time and build up of pollutants from spring to fall 08.

#### Metals

Generally, no consistency in results, some improvements and some degradation from influent to effluent. First wet weather event had lower influent concentration or ND compared to late wet weather events in December and January (09). The reason may be the fall/early winter rain washed out the concentrations so lower in January/February 08. Many results showed good improvements in effluent, but not as consistent. Random increases for many of the pollutants over the sampling events. No pattern.

### Nitrogen & Phosphorus

Mixed results. For nitrate/nitrite, consistently good results with reductions in concentrations. However, for ammonia and ortho-phosphate, consistently poor results, with increases in concentrations, especially September and October. The latter two constituents have unique chemical characteristics and make it difficult to remove through screen, separation and adsorption (to solids), in a CDS unit. Good results, lower effluent concentrations, for wet weather events for all constituents.

### Organic Chemicals

Mixed results for these constituents, generally inconsistent for the few pollutants that show up regularly. Only a few constituents showed up in any samples, which are listed in Table 7 of Appendix B. Most of the time non-detects were the rule. The results are a mixed bag; some improvements, some increases. Solubles in solution are hard to remove from screening, separation and adsorption versus pollutants that easily attach to solids and sediment, which would be removed by a CDS unit.

### Ocean Plan Water Quality Objectives

The original goal was to compare project results to the LA Basin Plan; however, that plan oversees surface water quality related to consumptive uses. This project concerns marine water quality objectives, and the Ocean Plan, which is referred to in the Basin Plan, is the appropriate State document to use.

The CDS unit is expected to remove all trash, debris and sediments from up to 80% of wet weather and all dry weather flows. With regard to physical characteristics and water quality objectives, the water quality monitoring indicates that the project is meeting these objectives for oil and grease, color, sediment control, and trash.

For chemicals, specifically heavy metals, the results indicate that most are below the limiting concentrations. For copper and zinc, some exceedances occurred likely due to the concentration of vehicles in the watershed. For organic chemicals, all that showed up were below the limits of the Ocean Plan, except for one, bis (2-ethylhexyl) phthalate, which had concentrations at the limit.

If any follow-up action was required, or for any future projects, a BMP that treats soluble pollutants, like a StormFilter, would help reduce concentrations to below limits of the Ocean Plan. However, because all dry weather flows are diverted to the sanitary sewer, such a strategy is not necessary for most days of the year. Because all dry weather runoff is diverted to the sanitary sewer, the treatment project is 100% effective in eliminating all pollutants of concern, from gross solids to soluble. For wet weather flows, the system is very effective for gross solids, but has mixed effectiveness to date on soluble constituents.

Based upon limited data, no pattern appears to exist between non-bacterial constituents and bacterial indicators.

## **Result of Bacterial Data**

Table 2 in Appendix B contains the summary water quality data, results from samples taken for dry and wet weather periods. Complete water monitoring reports are available from the City in hard or electronic format.

For purposes of analysis, pre-construction water quality data is considered to be the same as influent water quality data. Samples were not obtained before construction due to minimal flows and the difficulty of obtaining grab samples. Moreover, as there is no change in any flows entering the treatment system before and after the project installation, the data can be considered the same. No changes occurred upstream to either dry and wet weather runoff flows nor water quality before and after the project installation.

Data from Table 2 shows reductions for the wet weather events. The same applies for dry weather samples. However, there were many high concentrations in late spring and summer in which the CDS unit was not effective for the dry weather flows. Some show significant improvements, and some show worsening concentrations for the three bacterial indicators (total Coliform, fecal Coliform and Enterococcus). Because all dry weather flows are diverted to the sanitary sewer, 100% effectiveness is occurring for dry weather flows.

Even for wet weather sampling, when the concentrations are higher, we had improvements. Some inconsistency of results could be due to the CDS sump having water all the time and getting stirred up during a storm. But for small storms, the mixing is not significant so that reductions of the pathogens can occur.

In terms of meeting the Ocean Plan Water Quality Objectives, the treatment project is effective for dry weather flows to meet these objectives for REC-1 uses. At this time, it appears the system is effective at meeting the three indicator thresholds (10,000, 400 and 104 per 100 ml, respectively). The monitoring site, 3-2, as per California code AB411, is allowed wet weather exceedances. The City will be monitoring this site closely during the remainder of the wet season.

### *AB 411 Monitoring Site Analysis*

Appendix F, Tables 1-5 show pre- and post-construction beach exceedance data for the three bacterial indicators from November 2004 to February 2009. Table 6 shows summary results from Tables 1-5, including differences between pre-construction and post-construction, comparing exceedances between the two time periods. The table shows the percent improvement between pre and post-construction data, which is quite significant.

No consistency seems to exist when comparing results between months and years. And no link to rainfall seems to exist, other than more exceedances occur during dry weather months versus wet months. During these years, there were very wet, very dry and near normal rainfall. What does seem obvious is that the 30-day geometric mean for Enterococcus seems to jump between around throughout the year, unrelated to anything. One year had lots of 30-day geometric exceedances in the spring and summer and then another year the opposite. The same for December-February period, whether rain or not – no consistency in this parameter.

When the data is sorted by pre- and post-construction periods, the results are very interesting. Table 6 of Appendix F shows significant water quality improvement, i.e. reduced exceedances for the bacterial indicators, between pre- and post-construction periods, and dry weather season over the wet weather season. Based solely on this result, it would appear that the project has had a positive impact on improving water quality around the AB 411 monitoring site 3-2. It is important to note that for pre-construction, 38 months of data is used to generate the

exceedance totals. The post-construction results are based upon 14 months of exceedance data, a 0.37 factor difference. It may be that in two years the data will be similar. Table 6 also shows the difference between pre- and post-construction if time is factored into the results. As shown, the results for dry and wet weather are still positive but not as dramatic.

*Is There a Link Between Runoff and Exceedances – A Puzzle*

An interesting observation in terms of the 30-day geometric mean can be noted in the tables. Some months seem to have very high exceedances, such as the entire month, though one cannot tie these exceedances to rainfall as exceedances occur during dry days in the fall and winter months, i.e. wet season. However, runoff flow is constant throughout the year in large part. If runoff is the cause, and if runoff quantity and quality are fairly constant, which they appear to be, then one would expect exceedances year-round at similar levels, and not infrequently and at random, which is what happens. The flows might be higher during winter months with rain as more water can seep out of landscapes and enter the storm drain system. But from a big picture perspective, runoff is fairly constant, unless there is a water main break or storm. Why then do these exceedances occur if runoff volume is constant and nothing has changed at the storm drain outlet? A diversion is still in place and a beach berm is still in place to prevent any runoff from reaching the ocean (during dry weather). This observation indicates that the 30-day geometric mean exceedances are NOT connected to daily runoff. The observation may also indicate that something else in the ocean upstream of this site may be the cause of exceedances. Perhaps a natural occurrence in the ocean tied to a natural cyclic event is the culprit, whether it is a physical or biological event in the ocean. Because exceedances are not regular during the year, and runoff discharges are, a cause other than urban runoff would seem to be responsible.

### **Flows to the Sanitary Sewer and Beach**

See the table in Appendix G for diversions amounts to the sanitary sewer.

The difference in flows on the beach can be demonstrated by the photos in Appendix H, showing the Wilshire storm drain outlet before construction, a typical condition, and the situation after construction. The change is remarkable.

### **Gross Solids Removal**

To date, the City has not cleaned out the CDS unit of gross solids because of the depth, approximately 50' and inadequate City equipment and staff to undertake this operation in-house. The City is completing a RFP to hire an outside company to do the regular O&M. The first cleaning is expected Spring 2009. No weight data is available at this time. During the two tours, significant amounts of trash and debris were seen at in the CDS sump.

## VII. EDUCATION & OUTREACH

### Reaching out to the Public

May 2003: Council approval of first funding grant. Public informed about the project and able to make comments at this meeting.

June 2006: Contract for construction contractor approved by Council. Public informed further about the specifics of the project.

Summer 2006: Residents of the construction-project area receive brochures about the project and whom to contact with questions or complaints.

March 2007: Construction begins

December 2007: Construction completed.

January 2008: Operation begins. Tours offered upon request. See below for more specifics.

### Website Accessibility

The City website to access information about this project is [http://www.smgov.net/epd/residents/Urban\\_Runoff/urban](http://www.smgov.net/epd/residents/Urban_Runoff/urban). The link to the project includes valuable project information:

- ✓ Project Signage, pre and post-construction
- ✓ Draft Final Report
- ✓ Water Quality Reports
- ✓ Educational Materials
- ✓ Project Budget

### Tours

The first post-construction tour took place on February 6, 2008, with a group of 15 state officials from the Regional Board and some residents. A second tour for various agency representatives and other interested parties took place on March 6, 2008. Further tours will occur as requests are received.

The City will continue to offer and conduct tours throughout 2008 and for the years to follow.

#### February 2008 Tour:

Residents: Grace Phillips, Stephanie Blanc Wilson

State & Regional Water Boards:

Scott Fergusson, Tahoe Region

Ann Crumb, State Board, Sacramento

Pansy Yuen, LA Region

Jose Morales, LA Region

Steve Mayville, Santa Ana Region

Mark Alpert, San Diego Region

Mark Bradley, State Board, Sacramento

David Boyer, OCC, State Board, Sacramento

Hugh Marley, LA Region

Dan Radelescu, Sacramento Region  
 Alan Friedman, San Francisco Region

#### March 2008 Tour

Mozaffar Bahrami, County of Los Angeles, Parks & Rec.  
 Bonnie Blue, City of Malibu  
 David Guth, Stormwater Solutions & Eco-Rain  
 Nancy Helsley, Resource Conservation District of the SM Mts.  
 Hal Helsley, LA County Regional Planning Commission  
 Daniel Henne  
 Laura Hunter, City of LA, Dept of Public Works  
 Stephanie Jacob, Transcapes  
 Melinda Kelley  
 Tom Liptan, City of Portland  
 Ricardo Moreno, City of LA, Dept of Public Works  
 Laurie Newman, Office of Senator Sheila Kuehl  
 Colum Riley, Loyola Marymount University  
 Krista Sloniowski, Connective Issue  
 Peter Tonthat, City of LA, Dept. of Public Works

#### **Signage and Outreach Materials**

See Appendix C for samples and descriptions, which include project signs posted during construction, post-construction signage, a printout of the website for project, and an educational brochure/hand-out for events.

#### **Conferences**

The City has made oral presentations on this project at the California Non-point Source (NPS) annual conference, May 2008, San Diego, and StormCon in Orlando, Florida, August 2008.

### **VIII. CONCLUSIONS, CHALLENGES & LESSONS LEARNED**

#### **Conclusions**

Data seems to indicate that the primary treatment stage, the CDS unit, is effective in reducing gross pollutants, based upon visual observations (see above in Gross Solids Removal section). As mentioned above, the City is still reviewing technology that will be able to raise the pollutants from the sump for measurement and disposal. The CDS unit is a 100% capture BMP for all dry weather and most wet weather runoff, in terms of gross solids, and less for sediments and soluble pollutants.

The secondary treatment system, the sanitary sewer diversion, is operating properly, diverting approximately 12,000 gallons a day of dry weather flows, and keeping this amount off the beach. This strategy removes effectively 100% of all soluble pollutants. The monitoring

results for soluble pollutants, as described above, were mixed for most pollutants, i.e. concentrations sometimes increased, sometimes decreased between influent and effluent. However, the sampling locations may be a contributing factor, that is, the effluent may become more concentrated from standing water and debris in the CDS sump or the Wet Well. Better maintenance of the CDS may resolve this issue.

### Meeting the Project Objectives

1. Removal of 100% of floatables and solids through the primary stage vortex unit (for all dry weather and up to 80% of wet weather flows).  
**Objective 1 has been met based on initial observations. All floatables and solids used to exit at the beach but are now captured in the CDS unit.**
2. Removal of 70% of TSS, oil and grease, and other soluble pollutants attached to solids through the primary stage vortex unit (efficiency removal will vary based upon influent concentrations).  
**Objective 2 for TSS has been achieved because the removal efficiency varies 30-90% for TSS. For oil and grease, some removal has been achieved, up to 60%, but in some cases concentration has increased. Initial results are in the right direction.**
3. Treatment through the primary BMP device and diversion to the sanitary sewer (instead of out to the Bay via the Wilshire storm drain outlet on the beach as is presently done) of all dry weather flows and initial wet weather flows (first flush) up to a designed one cubic foot per second (cfs) flow rate, and treatment of approximately 80% of wet weather events through the primary treatment BMP and discharged to the Bay (60 cfs).  
**Objective 3 has been met.**

No additional steps will be taken to improve water quality. No continual postings-exceedances have occurred. Moreover, no signs of dry weather discharges reaching the ocean are occurring to cause exceedances. Other causes may be contributing, such as discharges from the near-by upstream Santa Monica Canyon channel, high tide ponding, or natural concentrations of bacteria in the sand.

### **Challenges**

- Dry weather effluent sampling: sample taken after low-flow runoff sits in the wet well for hours or days, perhaps, before enough water accumulates to trigger the pumps to pump to the sanitary sewer. Water quality results might not be real time since if pumps do not activate when the runoff level exceeds the level to turn on the pumps, runoff can sit for days.
- No easy accessibility to the diversion drop box exists. There is a small manhole cover above it in park but very confined space situation. One cannot access the storm drain from CDS unit. This is also confined space, but configuration of the CDS and its internal workings prohibit access to the return storm drain line.
- The system has not been seen operating since underground and accessibility is difficult being in roadways and parking lanes.

- CDS O&M: Staff has opened up the CDS vault covers to observe the trash in the CDS bottom. City is currently hiring an outside vendor to remove trash, debris, standing water and sediment in CDS sump. No gross pollutants removed to date.

### **Lessons Learned**

- Easy accessibility to diversion box and CDS unit was not designed into the system or given enough discussion during the design phase.
- A better system for taking samples which is not time-consuming and can result in loss of equipment is required. In the future, better communications during the design phase with water quality staff is necessary to design a more efficient system.
- Communication with operations and maintenance staff during design phase for input on possible problems for O&M and solutions is essential to avoid O&M challenges. This is especially critical before specifying a CDS unit or other similar unit. During the project design phase, agency maintenance people must be included to provide valuable information on how easy or difficult it is to service any BMP device, using experience from other BMP devices in one's municipality and information on what technical resources an agency has available or not to service a BMP.
- The system is effective in removing about 12,000 gallons a day of dry weather runoff, keeping this quantity and its pollution out of the Bay. Moreover, during wet weather up to 80% of runoff is getting primary treatment to remove gross solids and soluble pollutants attached to solids.

## **IX. PHOTO DIARY**

### **See PowerPoint Attachment, Appendix H**

-  Pre-Construction
-  Construction
-  Post-Construction