City of
Santa Monica®

CITY OF SANTA MONICA
A Sustainable Community
www.smepd.org

FINAL CONTRACT AGREEMENT REPORT

Montana Avenue Dry-Wet Weather Urban Runoff BMP Mitigation Project for the State Water Resources Control Board

Contract #03-177-554-2

March 21, 2008

CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

COUNTY OF LOS ANGELES PUBLIC WORKS

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 Costa-Machado Water Act of 2000, Clean Beaches Initiative (Proposition 13), and 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.

Table of Contents

I.	Introduction	4
	A. Statement of Project Purpose	4
	B. Scope of the Project	4
	C. Project Area	5
	D. History of Project	5
	E. Description of Approach & Techniques During Project	7
II.	List of Submittals	8
III.	Additional Information	9
	A. Project Personnel and Partners	9
	B. System Approach & Techniques	9
	C. Summary of Project Budget	11
	D. Contact Information	11
IV.	CEQA Documentation	11
V.	Quality Assurance Project Plan	11
VI.	Project Assessment & Evaluation Plan	11
	A. Load Reduction Analysis	11
	B. Non-bacterial Indicators Analysis	12
	C. Bacterial Indicators Analysis	14
	D. Flow Analysis	16
VII.	Public Education & Outreach	16
	A. Reaching Out to the Public	16
	B. Website Accessibility	16
	C. Tours	17
	D. Signage & Outreach Materials	18
	E. Conferences	18
VIII.	Conclusions, Challenges & Lessons Learned	18
	A. Conclusions	18
	B. Challenges	19
	C. Lessons Learned	20
IX.	Photo Diary	20
X.	Appendices	21
	A. Appendix A: Project Budget Summary	21
	B. Appendix B: Water Quality Results	23
	i. Water Sampling Summary Table	24
	ii. Water Quality Reports (not included)	
	iii. Summary of Parameter Concentrations	25
	C. Appendix C: Educational Materials	31
	i. Construction Sign	32
	ii. Final Sign and Mounted in Place	33
	iii. Website Printout	35
	iv. Outreach Material	36
	D. Appendix D: Structural Features	38
	i. Diversion Box Schematic	39

- ii. CDS Unit Schematic 40
- E. Appendix E: Project Site Information 41
  - i. Watershed 42
  - ii. Aerial of Project Site & Monitoring Locations 43
  - iii. Treatment System Schematic & Monitoring Locations 44
- F. Appendix F: AB411 Monitoring Site & Annual Posting Data 45
  - i. 2005 46
  - ii. 2006 47
  - iii. 2007 48
  - iv. 2008 49
  - v. Summary 50
- G. Appendix G: Photo Diary 51

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 Montana Avenue 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 Montana Watershed 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 Montana 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 Montana Avenue 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 Montana Avenue 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 and Montana Avenues 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 13, CBI funding, Phase 2 during the 2003. City Council approved a staff report in May 2003 to proceed with a Proposition grant. The grant agreement was executed in spring 2004 for $962,000.

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 Montana 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 Montana Avenue 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 Montana 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.

Construction Phase and Additional Funding

As the plans developed in 2004-2005 with Burns & McDonnell and then LA County, and as construction costs globally increased exponentially, the City realized that it would need additional funds. The City sought out a second grant through the Proposition 40, Phase 2 process and successfully received a $600,000 grant. The grant agreement was executed in February 2007. At this time, the Proposition 40 grant was incorporated into the original Proposition 13 grant to become one agreement and amount. The City contributed the balance of the construction bid, almost one million dollars.

Project Construction Timing

RFP released	March 14, 2006
Construction Bids received	April 19, 2006
Award of contract	June 13, 2006

Construction phase begins	August 7, 2006
Construction phase ends	April 10, 2007
Start up of system	July 12, 2007

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 extant 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 Montana 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
1		**PROJECT ADMINISTRATION**		
	1.2	Progress Reports	October 10, 2004 & quarterly	Quarterly
	1.2	Annual Summary Report	January 10, 2008	3/25/08
	1.5	Contract Summary Form	October 10, 2004	6/30/05
	1.6	Subcontractor Documentation	October 10, 2004 & quarterly	NA
	1.7	Expenditure/Invoice Projections	October 10, 2004 April 10, 2005 October 10, 2005	
	1.8	Project Survey Form	March 1, 2007	2/21/08
2		**CEQA/NEPA DOCUMENTATION AND PERMITS**		
	2.1	CEQA/NEPA Documentation	July 15. 2004	6/30/05
	2.2	Signed Coversheets of Required Permits and Agreements	August 1, 2006	NA
3		**QUALITY ASSURANCE PROJECT PLAN**		
	3.1	Approved and Signed QAPP	February 15, 2007	2/28/07
	3.2	Approved Monitoring Plan	February 15, 2007	2/28/07
4		**PROJECT ASSESSMENT AND EVALUATION PLAN**		
	4.1	Project Assessment and Evaluation Plan	November 1, 2004	6/30/05
5		**PROJECT DESIGN**		
	5.3	Draft Design Plan (to the SWRCB's Project Representative only)	June 30, 2006	6/30/06
	5.5	Final Design Plan	August 15, 2006	6/30/06
	5.6	Letter to Proceed	August 15, 2006	9/30/06
6		PROJECT IMPLMENTATION		
	6.3	Pre-, During-, and Post-installation Photograph Documentation	February 1, 2008	2/1/08
	6.4	"As-Built" Drawings	February 11, 2008	11/07
7		WATER QUALITY MONITORING		
	7.7	Final Water Quality Changes Report	March 1, 2008	3/27/08
8		EDUCATION AND OUTREACH		
	8.1	Education Materials	August 1, 2007	2/1/08
	8.3	Printout of Updated Contractor's Website	August 1, 2007	3/27/08
	8.4	Photograph Documentation of Signage Installed	August 1, 2007	2/1/08
	8.5	List of Tour Participants	April 10, 2007 January 31, 2008	2/1/08

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, Jeff Mack, 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 13, Clean Beaches Initiative Proposition 40, Safe Neighborhood Parks & Coastal Protection Act of 2002 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 Montana Avenue 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 Montana Avenue storm drain under Palisades Park at the intersection of Ocean and Montana Avenues.

Location of the sanitary sewer connection: See Appendix E. In alley between Ocean Avenue and 2nd Street, at Montana Avenue, south side of Montana.

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.

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 Montana 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.

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.

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.

Electrical Panel

The electrical panel is across the street from the wet well and pump vaults as the electrical connection was closer on that side of the street and 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 street-level hatches (in a walking path adjacent to the curb of the west side of Ocean Avenue at the intersection) 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. Dry weather effluent samples are taken from the pump vault (south side parking lanes of Montana Avenue just east 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. Dry weather influent samples are also being taken as an alternative at a manhole cover one block east of Ocean Avenue, near 2nd Street in the center of Montana.

Summary of Project Budget

See Appendix A.

Contact Information

For readers with questions about the project or the report:

Neal Shapiro
200 Santa Monica Pier
Suite K
Santa Monica, CA 90401
310.458.8223
neal.shapiro@smgov.net

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. 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 initial results, there does not appear to be water quality improvement in the effluent samples for dry weather. The reason 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). These results are based upon minimal sampling data due to problems stemming from such minimal flow in the pipeline and inability to get adequate grab samples, and dangerous odors in the effluent, prohibiting samplers to breathe the fumes during sampling. When the pumps were checked on March 18, they were found to be working properly; no build up of runoff was occurring, which will likely lead to more reliable water quality results in the future.

In addition to the problem described above, 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. Complete water monitoring reports are available from the City in hard or electronic format. Due to problems in getting influent and effluent samples for dry weather samples on the same day, data could not be adequately analyzed. For each dry weather sample, a problem occurred either with the influent or effluent samples -- whether the flow was too low to sample or a noxious odor was present. This analysis will review the two wet weather samples, the focus of which is the CDS unit only as no wet weather goes to the sanitary sewer system, which only takes dry weather flow.

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 concentration due to minimal flows and the difficult 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 the two rain events, one showed improvements and one showed reductions in water quality. Oil and grease showed up only once for both dry and wet weather events. For the one wet weather, the treatment system reduced this constituent, improving water quality.

General Minerals

No improvements were found in these constituents except for TSS. For both wet weather events, significant improvements occurred due to the treatment system. Water quality improved.

Metals

Results for these constituents suggest that water quality degrades through the treatment system. The cause may be gross solids captured in the CDS sump and whatever soluble constituents attached to these solids.

Nitrogen & Phosphorus

Mixed results. The first wet event sample showed increases in concentrations of these constituents. The second event showed reduction in constituent concentrations.

Organic Chemicals

Mixed results for these constituents. Only 10 constituents showed up in any samples, which are listed in Table 7 of Appendix B. Most of the time non-detects were the rule. A majority of the constituents showed concentration reductions for the two wet events; however, toluene had a significant increase in the second wet event.

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. Due to problems in getting influent and effluent samples for dry weather samples on the same day, data could not be adequately analyzed. For each dry weather sample, a problem occurred either with the influent or effluent samples -- whether the flow was too low to sample or a noxious odor was present. This analysis will review the two wet weather samples, the focus of which is the CDS unit only as no wet weather goes to the sanitary sewer system, which only takes dry weather flow.

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 concentration due to minimal flows and the difficult 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.

Data from Table 2 shows no reduction of any of the three bacterial indicators (total Coliform, fecal Coliform and Enterococcus). It was expected that for dry weather sampling, reductions would occur, but the lack of adequate data precludes any conclusions. However, because all dry weather flows are diverted to the sanitary sewer, 100% effectiveness is occurring for dry weather flows.

For wet weather sampling, the concentrations are so high that no measurable improvement was seen.

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 not effective at meeting the three indicator thresholds (10,000, 400 and 104 per 100 ml, respectively). The monitoring site, 3-1, 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 1-4 show pre- and post-construction beach posting data of exceedances for the three bacterial indicators from December 2004 to February 2008, by month. Table 5 is a summary showing annual totals, summary of pre- versus post-construction data, and percent improvement of post-construction over pre-construction data.

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 September and December. January 2008 also had very high numbers unlike previous Januarys, which is a continuation of December exceedances.

But when the data is sorted by pre- and post-construction periods, the results are very interesting. Table 5 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 3-1. It is important to note that for pre-construction, 25 months of data is used to generate the exceedance totals. The post-construction results are based upon 8 months of exceedance data, a 3:1 difference. It may be that in 1.5 years the data will be similar. Table 5 also shows the difference between pre- and post-construction if time is factored into the results. As shown, the results for dry weather are still positive but not as dramatic. For wet weather, the results are worse in most cases.

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 are 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 (no table available)

With regard to flow through the system, a check of the meter on February 6, 2008 showed that the Wet Well was being pumped out at 170 gallons per minute, when the pumps come on, and since the system went on-line in early Summer 2007, the system has pumped approximately 2.7 million gallons (through March 17), which have been diverted from the storm drain and sent into the sanitary sewer. On a per day average, the amount of runoff diverted from the Bay and to the sanitary sewer is about 12,000 gallons.

The dry weather flow can be considered the normal dry weather flow for pre-construction also, as nothing was changed upstream to alter the flow before and after the project. There may be higher dry weather flows during the winter months because of rainfall, infiltration and runoff. However, no data is available from the flow meter record as the recording paper roll was not changed during the months of rainfall due to miscommunications with maintenance staff. This situation has since been rectified.

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

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.

August 2006: Construction begins

July 2007: Construction completed and start-up of treatment system.

Post July 2007: 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. 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 Fergussen, 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 submitted an abstract, which was accepted for oral presentation, for this project to the California Non-point Source (NPS) annual conference in May 2008 in San Diego, and will submit to future conferences when available. The City has a similar paper accepted for StormCon in Orlando, Florida in August 2008.

VIII. CONCLUSIONS, CHALLENGES & LESSONS LEARNED

Conclusions

Data is lacking to empirically determine if the primary treatment stage, the CDS unit, is effective in reducing gross pollutants. However, based upon visual observations, gross solid pollutants were observed in the CDS sump. 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. 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 not consistent 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. Better maintenance of the CDS may resolve this issue.

<u>Meeting the Project Objectives</u>

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 has not been reached because the removal efficiency is approximately 30-50% for TSS, though based on two wet weather events and no dry weather influent/effluent combination samples. Oil and grease have been at ND generally. 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 Montana 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.

Challenges

- Dry weather Effluent – During sampling, there has been a strong septic hydrogen sulfide odor, prohibiting sampling. Pumps are not kicking on to pump out treated water from wet well or not enough dry weather flow is accumulating before it goes septic. A possible system operation problem exists. However, as of March 20, 2008, the problem seems to have been resolved on its own.
- Influent sampling (pre-CDS) – This sampling location, as designed, is a small port, deep, and hard to get a sampling container down the horizontal pipe to the storm drain. Since the dry weather flow is minimal, when the sample container lands on the pipe floor, very difficult to get container in the right position to collect adequate samples. As a result, sampling requires multiple grab samples, which is very time-consuming. There is no weir to allow water to back-up, build-up and to provide depth for the grab sample. City sampling staff has tried to take samples from a near-by upstream manhole cover, a block away, as the opening is larger and pipe not deep. But the very low flow in the pipe makes taking samples time-consuming with small amounts per sample. A suggestion is to place sand bags along bottom of pipe, allow runoff to back-up, take samples quickly, and then remove the bags. This option is being evaluated along with other options.
- Dry weather effluent sample: 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. City examining any if there are pumping problems, though as of March 20, the pumps seem to be operating more consistently.
- Effluent wet weather – Same issue as in bullet 2 above for the influent sampling port, but this sample is for the post-CDS treatment wet weather return line to main Montana storm drain. However, when high flow in return line, flow has ripped off the sampling container. A weir might have prevented this problem by slowing the flow.
- 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.
- Staff has manually activated pumps, opened the sanitary sewer connection manhole cover, and seen low-flow runoff pumped into the sanitary sewer.
- Staff has opened up the CDS vault covers to observe the trash in the CDS bottom. City has yet to locate a system 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.
- Sample-friendly water sampling ports for influent and effluent lacking. 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 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 it getting primary treatment to remove gross solids and soluble pollutants attached to solids.

IX. PHOTO DIARY

See PowerPoint Attachment, Appendix G

- Pre-Construction
- Construction
- Post-Construction

APPENDIX A

Project Budget Summary

The City of Santa Monica
Contract summary

Contract name:	**Montana Dry-Wet Weather Urban Runoff Diversion Project** **SWRCB Agreement**
Contract Number	03-177-554-2
Contracting agency:	CA State Water Resources Control Board

Contract amount:	
Prop 13	962,000.00
Prop 40	600,000.00
Sub-Total Grants	1,562,000.00
City matching amount (required per contract)	940,915.00
Est. Total (estimated construction, required	**2,502,915.00**

Contract Amount	**Actual City Match Amount**					
Construction	Labor	Construction	Other	**Total City Match**	**Total Contract and Match**	
	215,500.60			215,500.60	215,500.60	LA County DWP - Design
			13,257.44	13,257.44	13,257.44	Burns & McDonnel - Design
1,562,000.00		740,450.00		740,450.00	2,302,450.00	Mladen Buntich Construction Co
	70,411.21			70,411.21	70,411.21	Labor Distribution Report
			15,524.62	15,524.62	15,524.62	So Cal Edison - Utility connection
			3,374.50	3,374.50	3,374.50	GeoSyntec - QAPP/ML
			6,227.14	6,227.14	6,227.14	Harris & Company
			707.89	707.89	707.89	MRC Technologies
			10,000.00	10,000.00	10,000.00	Brown & Caldwell - QAPP/ML
			146.17	146.17	146.17	City signage docs - Education outreach
1,562,000.00	285,911.81	740,450.00	49,237.76	**1,075,599.57**	**2,637,599.57**	**Total Actual Project Cost**

APPENDIX B

1. Water Sampling Summary, Table 1

2. Water Quality Reports

A. September 07

B. November 07

C. December 07

D. January 08

(excluded from Final Report due to length; available upon request. Data summarized in tables below)

3. Summary of Parameter Concentrations Influent v. Effluent Tables 2-7

Table 1. Sampling Summary.

MONTANA AVENUE DRY-WET WEATHER RUNOFF
WATER QUALITY IMPROVEMENT PROJECT
WATER MONITORING RESULTS

Sample Date	Sampled	Dry or Wet Weather	Storm Event	Influent or Effluent	Job #	Notes
09/05/2007	Y	D		I	43875	Influent only, no access for Effluent
09/12/2007	Y	D		E	43999	Effluent only as follow up to 9/5 sample
10/17/2007	N	D		I		Extreme low flow, unable to sample
10/17/2007	N	D		E		Strong sulfur odor, thick dark water
11/14/2007	N	D		I	44789	No influent flow
11/14/2007	Y	D		E	44789	
11/30/2007	Y	W	1	I	44978	
11/30/2007	Y	W	1	E	44978	
12/26/2007	Y	D		I	45405	
12/26/2007	N	D		E	45405	Strong sulfur odor, thick dark water
01/04/2008	Y	W	2	I	45497	
01/04/2008	Y	W	2	E	45497	

Table 2. Bacteria.

Montana Avenue Water Sampling Results - Bacteria

Date	Dry or Wet	Influent or Effluent	Coliform total	Coliform fecal	Fecal Enterococci
09/05/2007	D	I	>160,000	>160,000	ND
09/12/2007	D	E	>160,000	>160,000	ND
11/14/2007	D	E	>160,000	>160,000	ND
11/30/2007	W	I	>160,000	>160,000	>16,000
11/30/2007	W	E	>160,000	>160,000	>16,000
12/26/2007	D	I	>160,000	>3,000	ND
01/04/2008	W	I	>16,000	>16,000	ND
01/04/2008	W	E	>16,000	>16,000	2

Table 3. General Minerals.

Montana Avenue Water Sampling Results -
General Minerals (mg/L)

Date	Dry or Wet	Influent or Effluent	Total Alkalinity	Chloride	Conductivity	Hardness	pH	TDS	TSS
09/05/2007	D	I	135	108	740	176	7.69	524	10
09/12/2007	D	E	144	246	1,230	216	7.39	840	ND
11/14/2007	D	E	122	120	780	160	7.33	512	17
11/30/2007	W	I	16	8.8	100	28	6.93	78	91
11/30/2007	W	E	32	12.7	182	40	6.87	130	44
% Change			-100%	-44%	-82%	-43%	1%	-67%	52%
12/26/2007	D	I	136	276	1,290	275	7.41	855	9
01/04/2008	W	I	70	29.8	310	72	7.5	212	132
01/04/2008	W	E	86	40.6	374	84	7.14	258	87
% Change			-23%	-36%	-21%	-17%	5%	-22%	34%

Table 4. Metals.

Montana Avenue Water Quality Results - Metals (ug/L)

Date	Dry or Wet	Influent or Effluent	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
09/05/2007	D	I	3.35	0.3	8.65	24.4	1.74	ND	6.6	3.63	0.95	74.5
09/12/2007	D	E	6.6	0.12	1.14	46.2	17.7	ND	5.95	3.05	0.64	64
11/14/2007	D	E	2.17	0.05	1.19	17	1.76	ND	6.95	1.58	ND	38.9
11/30/2007	W	I	2.64	0.6	3.5	94	10.9	ND	23	1.16	0.57	283
11/30/2007	W	E	4.7	0.145	137	98	9.65	ND	69.5	1.8	0.49	282
% Change			-78%	76%	-3814%	-4%	11%		-202%	-55%	14%	0%
12/26/2007	D	I	2.25	ND	1.3	2.42	ND	ND	4.01	2.85	0.165	13.9
01/04/2008	W	I	11.7	0.33	1.71	34.8	0.83	ND	6	ND	ND	134
01/04/2008	W	E	12.7	0.53	1.8	38.9	2.59	ND	5.8	ND	ND	142
% Change			-9%	-61%	-5%	-12%	-212%		3%			-6%

Table 5. Miscellaneous.

Montana Avenue Water Sampling Results - Miscellaneous

Date	Dry or Wet	Influent or Effluent	Turbidity	Color	Oil Grease
09/05/2007	D	I	5.91	92	ND
09/12/2007	D	E	4.28	72	ND
11/14/2007	D	E	3.55	60	ND
11/30/2007	W	I	29.2	87	ND
11/30/2007	W	E	45.3	105	ND
% Change			-55%	-21%	
12/26/2007	D	I	7.5	77	ND
01/04/2008	W	I	82.3	146	5.2
01/04/2008	W	E	73.2	140	4.8
% Change			11%	4%	8%

Table 6. Nitrogen & Phosphorus

Montana Avenue Water Sampling Results - Nitrogen/Phosphorous (mg/L)

Date	Dry or Wet	Influent or Effluent	Nitrate	Nitrite	Ammonia	Ortho-phosphate
09/05/2007	D	I	0.6	ND	0.591	2.23
09/12/2007	D	E	1.6	0.1	1.1	2.14
11/14/2007	D	E	0.25	0.05	1.51	0.69
11/30/2007	W	I	2.15	0.05	1.4	0.666
11/30/2007	W	E	3.95	0.1	1.96	0.674
% Change			-84%	-100%	-40%	-1%
12/26/2007	D	I	1.35	0.15	0.458	0.676
01/04/2008	W	I	2.55	0.25	3.14	0.894
01/04/2008	W	E	2.25	0.2	2.99	0.872
% Change			12%	20%	5%	2%

Table 7. Organic Compounds.

Montana Avenue Water Quality Results - Organics (ug/L)

Date	Dry or Wet	Influent or Effluent	Semi-VOC Bis (2-ethylhexyl) phthalate	in Drinking Water Butyl benzyl phthalate	Diethyl phthalate	Chlorinated Pesticides/PCBs	Herbicides Dalapon	Volatile p-Isopropyltoluene	Organ Toluene
09/05/2007	D	I	ND	16	ND	ND	ND	ND	ND
09/12/2007	D	E	3.4	ND	ND	ND	ND	ND	ND
11/14/2007	D	E	3.1	ND	ND	ND	ND	2.57	3.88
11/30/2007	W	I	10	ND	ND	ND	ND	ND	ND
11/30/2007	W	E	4.8	ND	ND	ND	ND	ND	ND
			52%						
12/26/2007	D	I	3.8	ND	11	ND	0.4	ND	ND
01/04/2008	W	I	3.2	ND	ND	ND	ND	ND	0.56
01/04/2008	W	E	3.7	ND	ND	ND	ND	2.03	17.1
			-16%						-2854%

Montana Avenue Water Quality Results - Organics (ug/L)

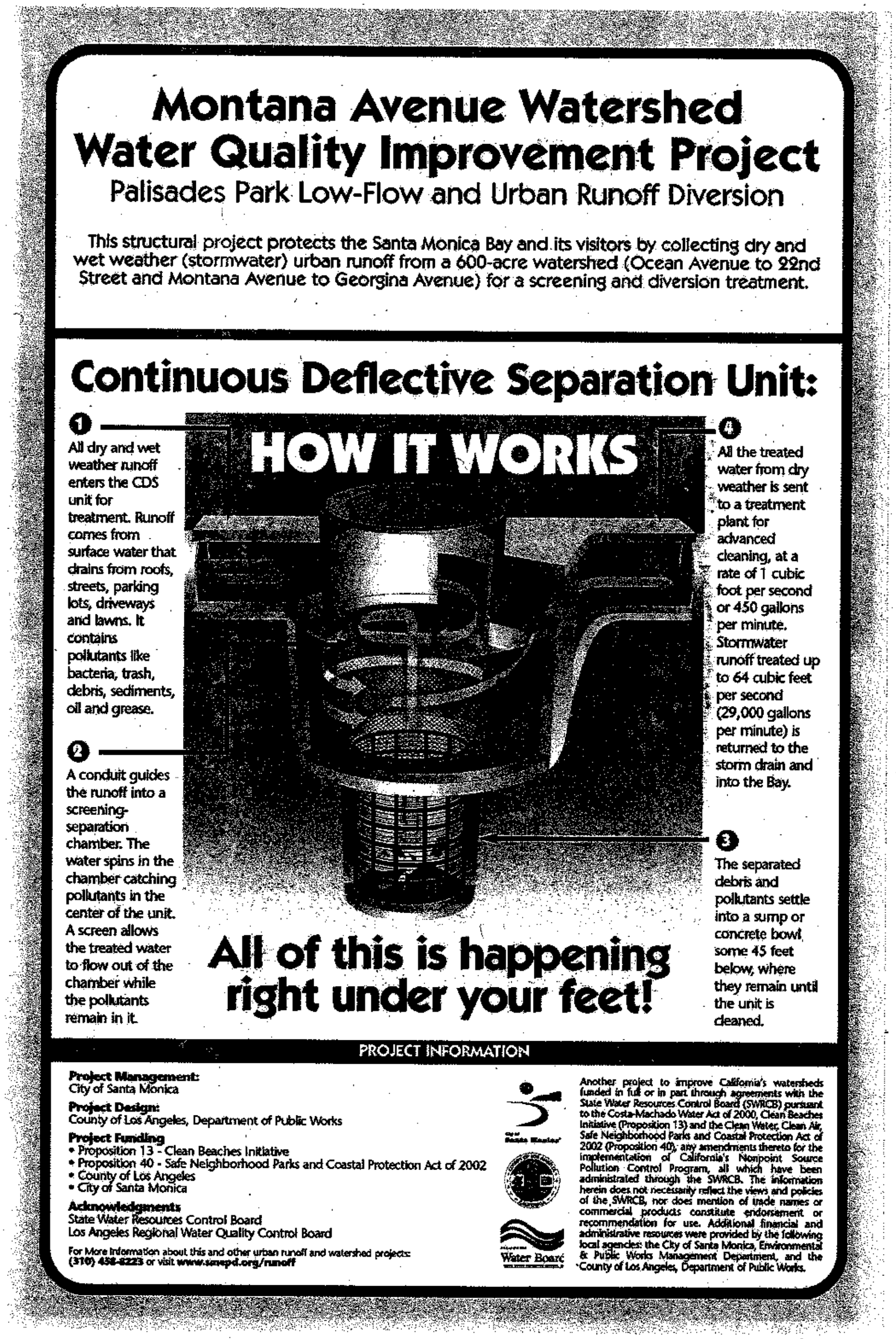
ic 4-Methyl 2-pentanone	Cmpds MEK 2-Butanone	PAHs
	ND	ND
	ND	ND
	ND	ND
	ND	ND
	ND	ND
	ND	ND
1.82	2.1	ND
1.64	1.71	ND
15%	19%	

APPENDIX C

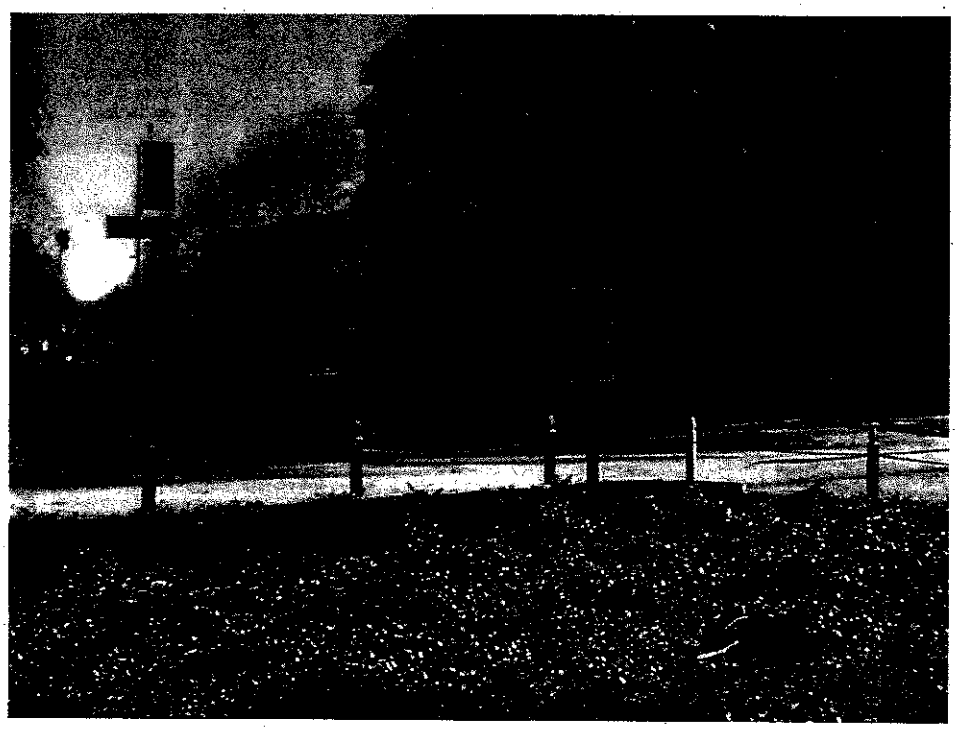
Educational Materials:

1. Construction Sign
2. Final Sign and Mounted at Site
3. Website Printout
4. Outreach Brochure

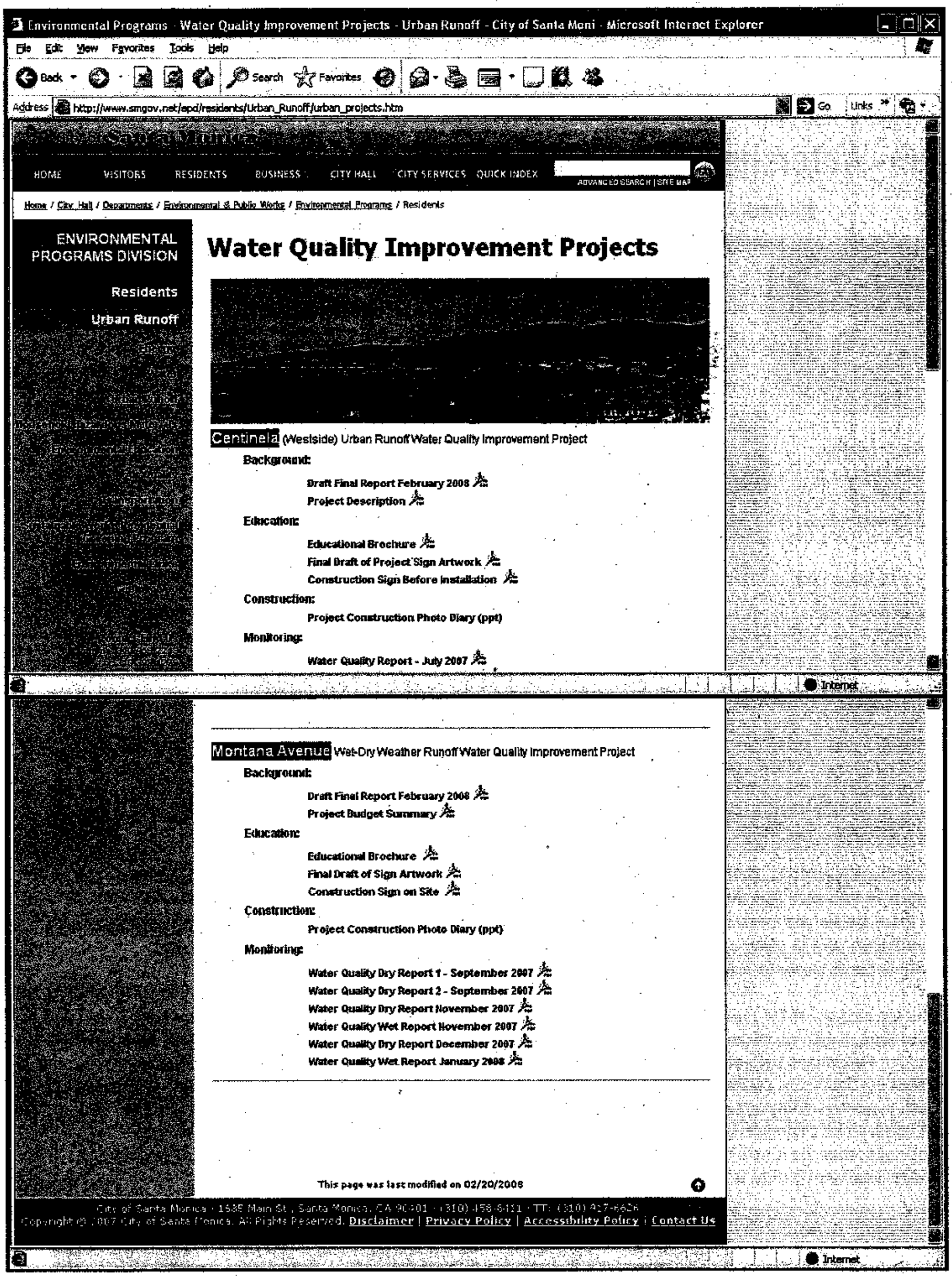
Construction Sign: informing the public what project is being installed and the purpose of the project to improve water quality reaching the Santa Monica Bay. Located north and south of construction site.



Final Sign: informing the public the purpose of the project to improve water quality reaching the Santa Monica Bay. Located west of construction site in a location that maximizes public viewing. Includes contact info for follow-up questions.



Final Sign mounted at project location, front view (top) and back view (above).


Environmental Programs - Water Quality Improvement Projects - Urban Runoff - City of Santa Moni - Microsoft Internet Explorer

Address http://www.smgov.net/epd/residents/Urban_Runoff/urban_projects.htm

HOME VISITORS RESIDENTS BUSINESS CITY HALL CITY SERVICES QUICK INDEX

Home / City Hall / Departments / Environmental & Public Works / Environmental Programs / Residents

ENVIRONMENTAL PROGRAMS DIVISION

Residents

Urban Runoff

Water Quality Improvement Projects

Centinela (Westside) Urban Runoff Water Quality Improvement Project

Background:

- Draft Final Report February 2008
- Project Description

Education:

- Educational Brochure
- Final Draft of Project Sign Artwork
- Construction Sign Before Installation

Construction:

- Project Construction Photo Diary (ppt)

Monitoring:

- Water Quality Report - July 2007

Montana Avenue Wet-Dry Weather Runoff Water Quality Improvement Project

Background:

- Draft Final Report February 2008
- Project Budget Summary

Education:

- Educational Brochure
- Final Draft of Sign Artwork
- Construction Sign on Site

Construction:

- Project Construction Photo Diary (ppt)

Monitoring:

- Water Quality Dry Report 1 - September 2007
- Water Quality Dry Report 2 - September 2007
- Water Quality Dry Report November 2007
- Water Quality Wet Report November 2007
- Water Quality Dry Report December 2007
- Water Quality Wet Report January 2008

This page was last modified on 02/20/2008

Copyright © 2007 City of Santa Monica. All Rights Reserved. Disclaimer | Privacy Policy | Accessibility Policy | Contact Us

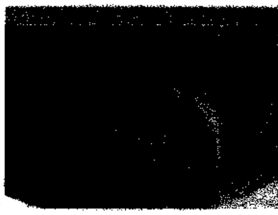
Printout of Updated Contractor's Website

City of Santa Monica Urban Watershed Management Program

Low Impact Development Strategies

Sub-Watershed Runoff Quality Improvement Projects

Montana Avenue/Ocean Avenue and Wilshire Boulevard/Ocean Avenue

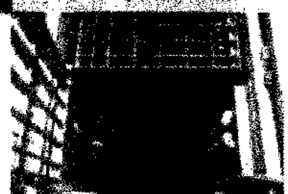


<--[Continuous Deflective Separation Unit: during installation, primary treatment to remove gross pollutants]

<--[Diversion Structure: during construction, drop or sump box receives run-off from the main storm drain line and diverts it for primary treatment]

[Pump Vault: moves runoff from main storm drain line to the sanitary sewer line] -->

[Wet Well Chamber: receives runoff from initial screening before being pumped for advanced treatment] -->



Opened in the spring 2007 and early 2008, the Montana Ave. and Wilshire Blvd. Sub-Watershed Runoff Quality Improvement Projects (Projects) treat to the maximum extent practicable urban runoff from the north-central portions of the City of Santa Monica, which run from the west to east borders. Other goals include improving and preserving water quality entering the Bay and protecting beneficial uses of our coastal waters. Runoff from these sub-watersheds flow directly to the Bay, the outlets being in the Santa Monica beach.

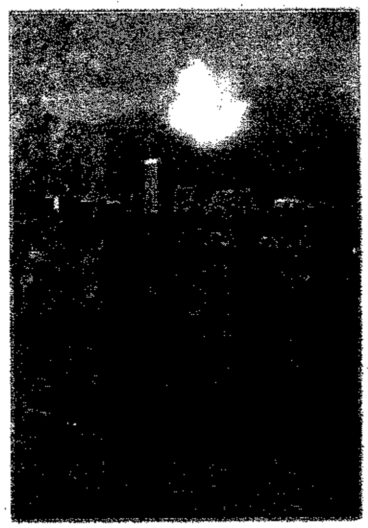
The Projects incorporate within a built-out urbanized area Low Impact Development and Smart Growth strategies to harvest dry and wet weather urban runoff from the City's Montana and Wilshire Sub-Watersheds (hydrology basins) for treatment through two similar Best Management Practices (BMPs) treatment trains. After state-of-the-art treatment, the runoff returns to the Santa Monica Bay, but without much of the pollution, i.e. heavy metals, organic chemicals, trash, debris, oil and grease and pathogens.

The Projects are located at the intersections of Montana and Ocean Avenues, and Wilshire Blvd. and Ocean Ave. under parts of Palisades Park and the shoulders of these roads. All features of the systems are underground, though there are surface metal covers for access to the monitoring ports for water sampling, to treatment devices for maintenance, and to pump vaults. Most of the systems operate using gravity flow; the last part requires electricity to pump the water into the sanitary sewer for final treatment.

Runoff is diverted out of the main Montana and Wilshire storm drain lines through a **drop box** (PHOTO top right - under construction). Runoff drops into this depressed vault, and a pipe at the bottom allows dry weather runoff to flow into the **Continuous Deflective Separation (CDS) unit** (PHOTO top left - under construction). The CDS screens and settles out floatables, sediment, and oil and grease, i.e. gross pollutants. After the CDS unit, dry weather runoff, which still contains soluble pollutants (i.e. heavy metals, organic chemicals), flows into a **wet well vault** (PHOTO bottom right), which periodically pumps water out of this vault and into the **pump vaults** (PHOTO bottom left). This last vault sends the runoff into the sanitary sewer for advanced treatment at the City of Los Angeles' Hyperion wastewater treatment facility. During rain events, most storm water is treated by the CDS units only.

City of Santa Monica Environmental Programs Division

Planning for a Cleaner Bay



Urban runoff, flowing through storm drains, is the single greatest source of pollution to the beaches and near shore waters of the Santa Monica Bay. Unlike sewage and discharges from industrial sources, urban runoff is not generally adequately treated before it reaches the Bay and our beaches.

The City of Santa Monica passed an ordinance that is designed to reduce the amount of urban runoff pollution that reaches our storm drain system and the Santa Monica Bay. The ordinance requires a reduction in urban runoff flowing off of all impermeable surfaces from newly developed or retrofitted parcels within the city.

Reducing the amounts of urban runoff and of pollutants contained in the runoff is essential for the health and safety of our community. A cleaner Bay means a healthier marine ecosystem and improved quality of life for residents, and increases Santa Monica's appeal to visitors and businesses.

By implementing post-construction Best Management Practices (BMPs) and making these strategies part of our daily lives, we can make a genuine difference -- and clean the Bay!

Factoring the LID on Urban Runoff the Santa Monica Bay

In the city's efforts to reduce runoff pollution through the use of BMPs, we can manage, use and redevelop our lands in a more sustainable manner through the use of low impact development (LID) and smart growth design strategies and BMPs. LID is an economically and environmentally responsible strategy to site development and urban runoff management. Whether single-family or large commercial project, LID integrates land planning, and site design practices and techniques to mitigate development impacts to land, water and air, to conserve and protect natural resources and ecosystems, and to reduce infrastructure costs, i.e. storm drain systems. This approach still allows land development, but in a long-term cost-saving manner that also mitigates potential environmental impacts.

This strategy views each development project as a small micro-watershed, part of the greater watershed or drainage basin of a particular area. The strategy promotes the concept of "start at the source," that is, to keep as much precipitation on each parcel to minimize the amount of runoff or waste water leaving a site. In the end, watershed management must include the individual and each parcel, and LID approaches must be used in planning and designing phases. The results of these strategies will be to maximize onsite runoff harvesting and retention, and to minimize runoff pollution in receiving waters.

For more information contact 310-458-8223 or visit www.smepd.org

Working for a cleaner bay

Urban Runoff & Watershed Management Program
City of Santa Monica Environmental & Public Works Management
Environmental Programs Division
200 Santa Monica Pier, Santa Monica, California 90401

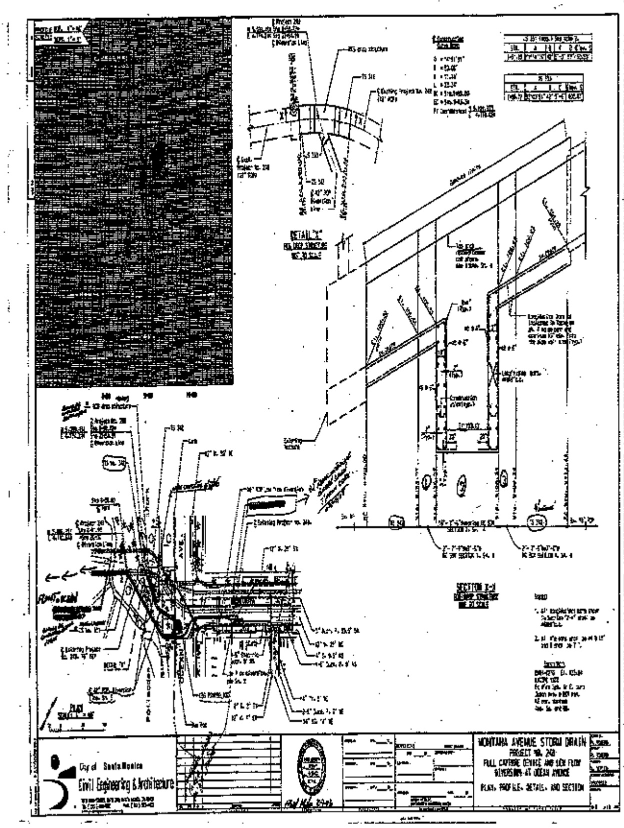
Printed on recycled paper with vegetable based inks.

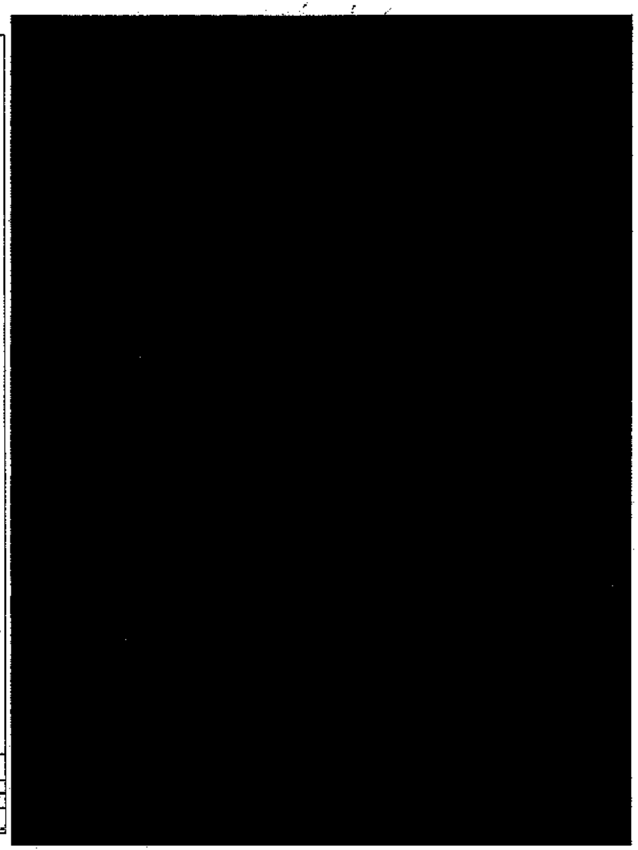
City of Santa Monica

Educational Brochure (pages 1/2): Project information brochure disseminated to the public when asked, at City public events and at conferences related to runoff themes.

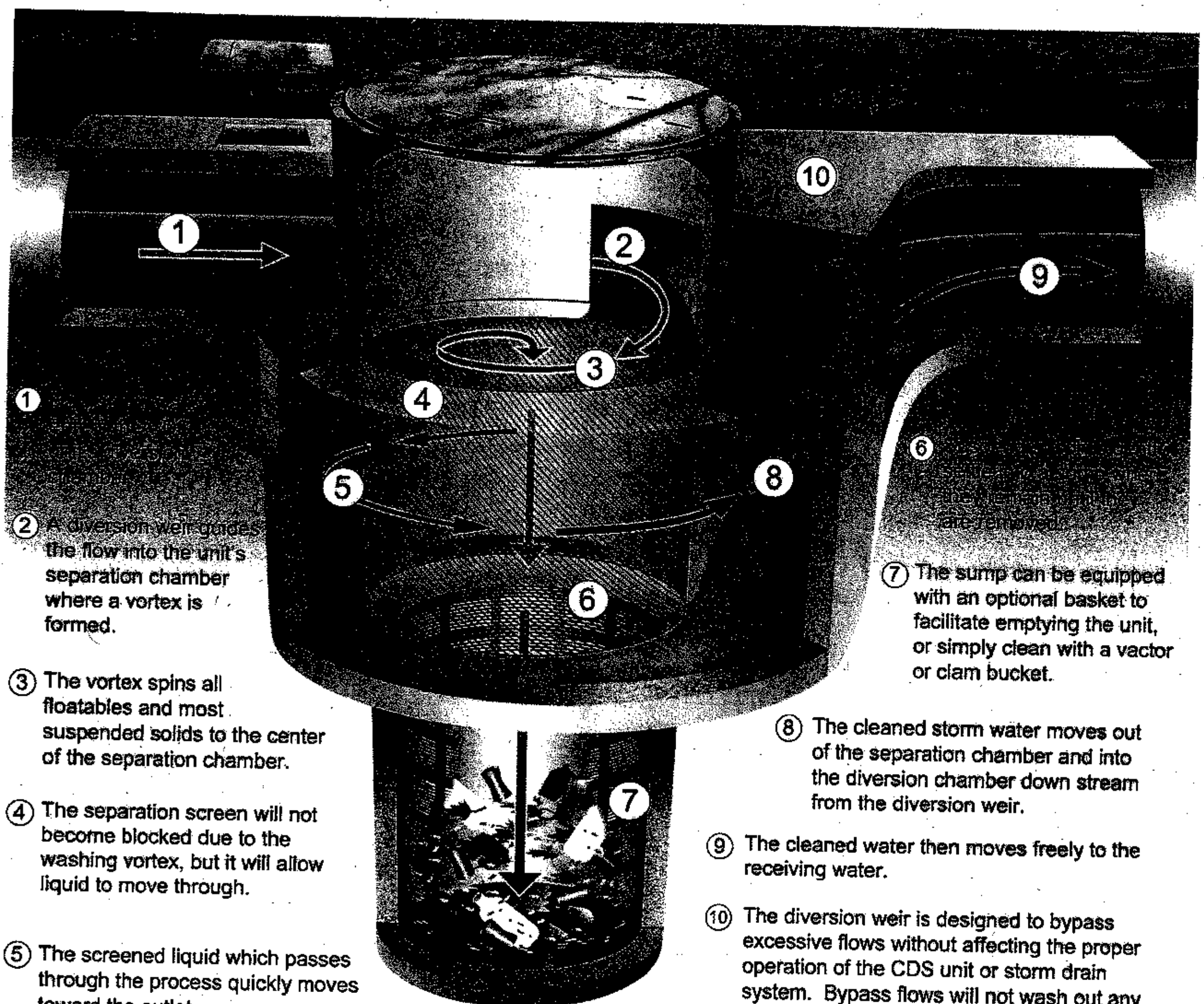
APPENDIX D

1. Diversion Box Schematic
2. Continuous Deflective Separation Unit Schematic





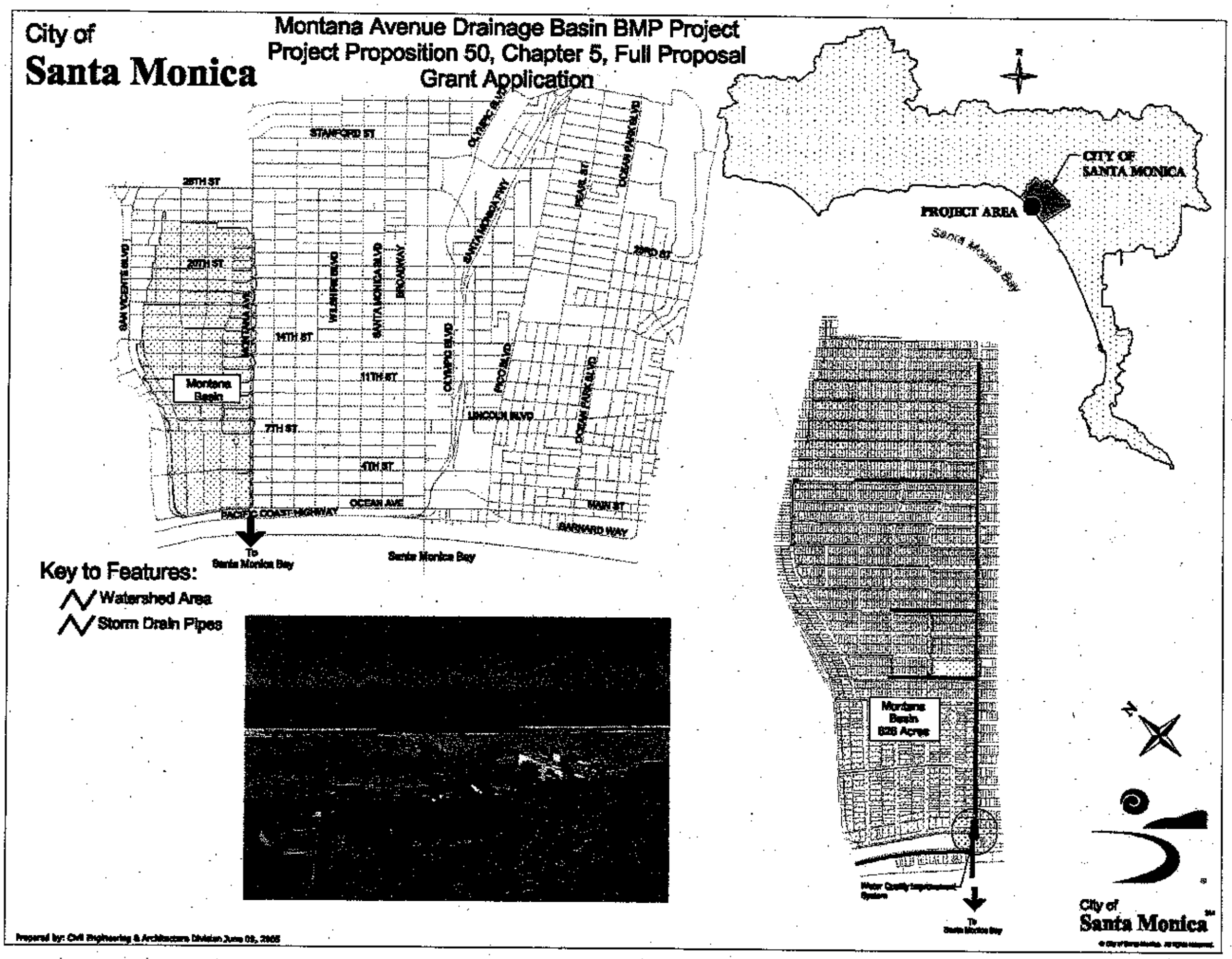
Diversion Box Schematic



CDS Schematic

APPENDIX E

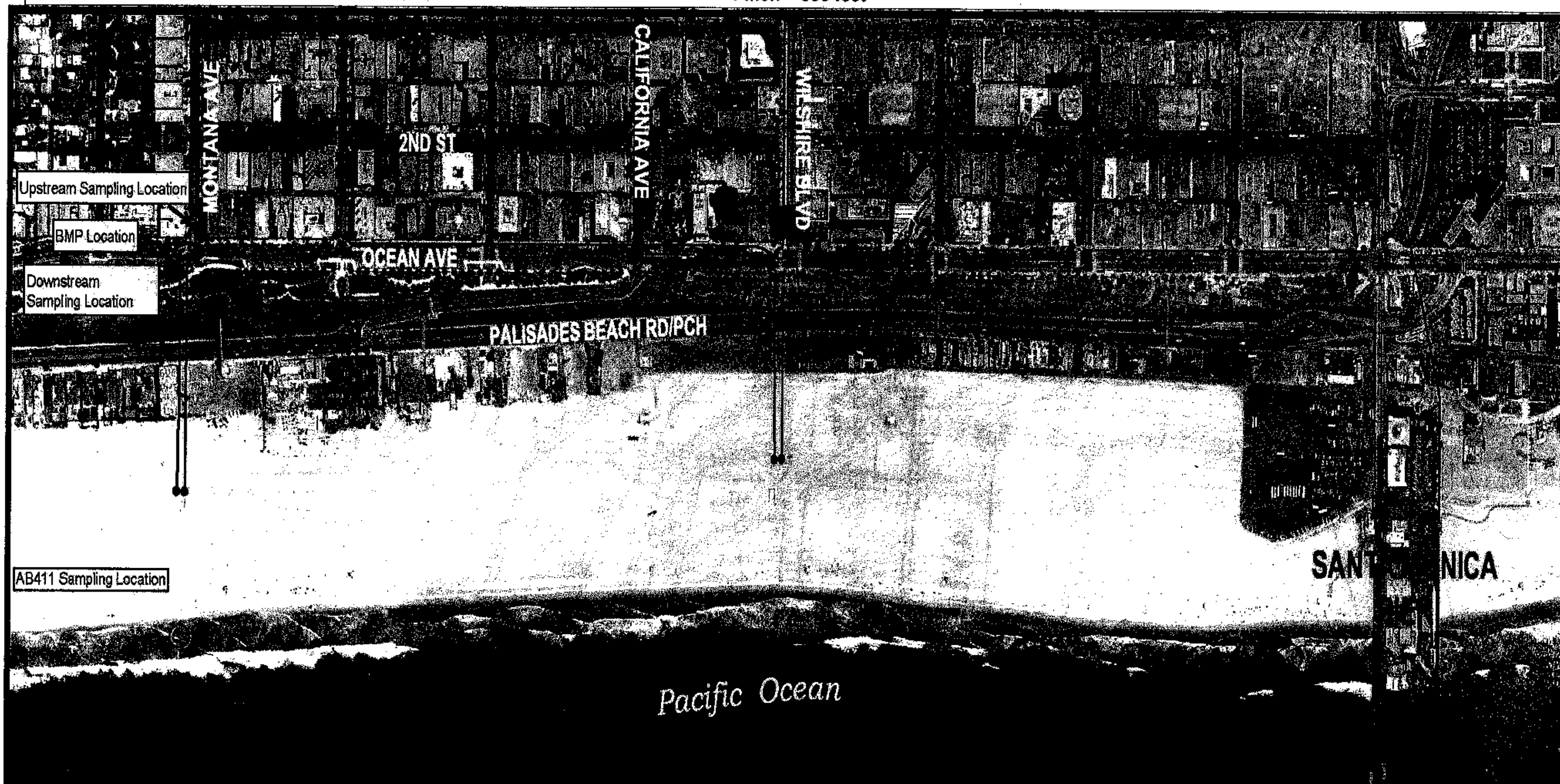
1. Montana Watershed,
2. Project & Sampling Locations (aerial),
3. Sampling and BMP Locations (schematic)

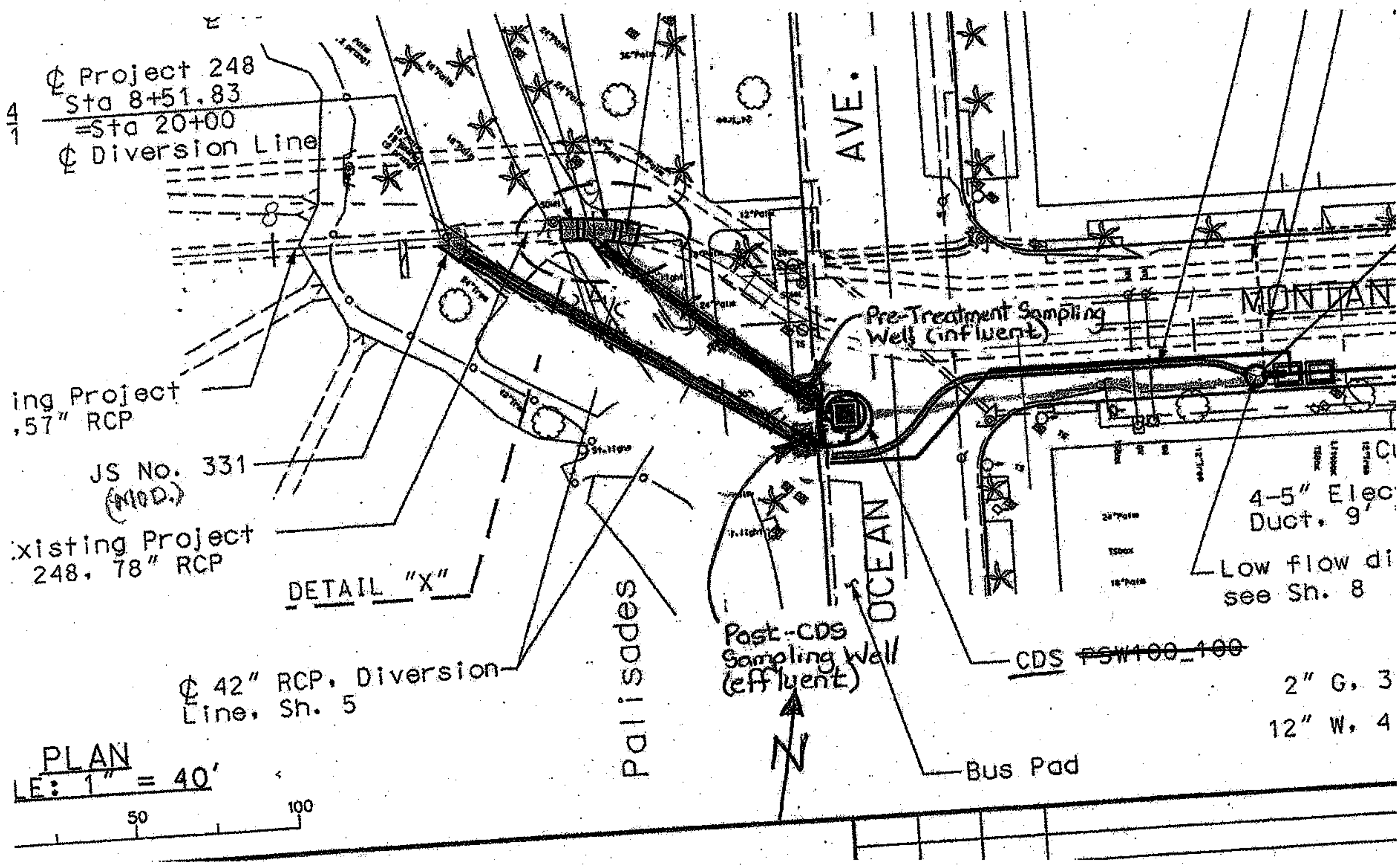


Montana Watershed

City of Santa Monica
Montana Storm Drain Outlet

Red Dots-Catch Basins
Green Circles-Storm Outlets
Green Lines-Storm Drains
1 inch = 800 feet





℄ Project 248
Sta 8+51.83
=Sta 20+00
℄ Diversion Line
ing Project
,57" RCP
JS No. 331
(MOD.)
xisting Project
248, 78" RCP
DETAIL "X"
℄ 42" RCP, Diversion
Line, Sh. 5
PLAN
LE: 1" = 40'
50
100
Palisades
AVE.
OCEAN
MONTAN
Pre-Treatment Sampling
Well (influent)
Post-CDS
Sampling Well
(effluent)
N
CDS PSW100-100
Bus Pad
4-5" Elec
Duct, 9'
Low flow di
see Sh. 8
2" G, 3
12" W, 4

APPENDIX F

AB411 Beach Monitoring Site
Bacterial Exceedances Data by Calendar Year
Pre and Post Construction

1. 2005
2. 2006
3. 2007
4. 2008
5. Summary 2005-08

SANTA MONICA BAY BEACHES BACTERIAL TMDL
MONTHLY SUMMARY
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	'(MPN/100ml)				'(MPN/100ml)			'(MPN/100ml)				'(MPN/100ml)		
2004														
December							18							9
2005														
January			2					2	2	2	1			
February	2	1	2	1	5		7							8
March														
April			1											
May														
June	1	1	1											
July														
August														
September														
October														
November														
December														
Totals	3	2	6	1	5	0	7	2	2	2	1	0	0	8

December 2004 almost entire month 30 day exceedances, but ends in January05
Lots of January rain, no 30 day mean exceedances
Lots of February rain with 30 day mean exceedances
Lots of March rain, no exceedances of any kind;
When rain is before or after Monday samplings, appear to be less exceedances
October some rain but no postings; Nov/Dec small rain events, no postings

Generated by NDL at 02/16/2007 11:27:23 AM using the Production Database and WISARD V2.0
WISARD - Legal TMDL - SMBB Bacteria (DHS).

Legend: # - Indicates accelerated monitoring required for weekly sampling
^ - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
* - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

Allowable Single-Sample Exceedance Days:
0 per year during Summer-Dry Weather
1 per year during Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year during Summer-Dry Weather
0 per year during Winter-Dry Weather

Table 1. 2005 Pre-Construction.

SANTA MONICA BAY BEACHES BACTERIAL TMDL
MONTHLY SUMMARY
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	'(MPN/100ml)				'(MPN/100ml)			'(MPN/100ml)				'(MPN/100ml)		
2006														
January								1		1				
February														
March														
April			1							1				4
May									1	1				
June														
July			1											
August														
September		3	4				10							
October		1	4				27							4
November		1	1				26							4
December							6							
Totals	0	5	11	0	0	0	69	1	1	3	0	0	0	12

Lots of rain in later Feb, no postings; during March, no postings
Late September to early Dec lots of 30-day exceedances; flowing in the current from north to south? Fall fires? Not from rain.
Lots of rain in mid-end December, no postings.

Generated by NDL at 02/16/2007 11:27:23 AM using the Production Database and WISARD V2.0
WISARD - Legal TMDL - SMBB Bacteria (DHS)

Legend: # - Indicates accelerated monitoring required for weekly sampling
^ - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
* - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

Allowable Single-Sample Exceedance Days:
0 per year during Summer-Dry Weather
1 per year during Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year during Summer-Dry Weather
0 per year during Winter-Dry Weather

Table 2. 2006 Pre-Construction.

SANTA MONICA BAY BEACHES BACTERIAL TMDL
MONTHLY SUMMARY
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	'(MPN/100ml)				'(MPN/100ml)			'(MPN/100ml)				'(MPN/100ml)		
2007														
January			3				14							4
February							10							3
March														
April			1											
May														
June														
July														
August		1	2											
September			1											
October			1											
November														
December							19				1			11
Totals	0	1	8	0	0	0	43	0	0	0	1	0	0	18

Mid-Jan to mid-Feb something to cause 30 day mean exceedances
A lot of rain December; entire month 30 day mean exceedances
No impact from fires in the fall

Generated by NDL at 02/16/2007 11:27:23 AM using the Production Database and WISARD V2.0
WISARD - Legal TMDL - SMBB Bacteria (DHS)

Legend: # - Indicates accelerated monitoring required for weekly sampling
^ - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
* - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

Allowable Single-Sample Exceedance Days:
0 per year during Summer-Dry Weather
1 per year during Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year during Summer-Dry Weather
0 per year during Winter-Dry Weather

Table 3. 2007 Pre- and Post Construction (July).

SANTA MONICA BAY BEACHES BACTERIAL TMDL
MONTHLY SUMMARY
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	'(MPN/100ml)				'(MPN/100ml)			'(MPN/100ml)				'(MPN/100ml)		
2008														
January							10	1		2				6
February										2				
March														
April														
May														
June														
July														
August														
September														
October														
November														
December														
Totals														

January continues 30 day exceedances from Dec07.
Jan had rain in beginning, and 30 day mean postings, but much more rain end of month and 0 30 day mean postings
Feb had rain in beginning/end but no 30 day mean exceedences

Generated by NDL at 02/16/2007 11:27:23 AM using the Production Database and WISARD V2.0
WISARD - Legal TMDL - SMBB Bacteria (DHS)

Legend: # - Indicates accelerated monitoring required for weekly sampling
^ - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
* - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

Allowable Single-Sample Exceedance Days:
0 per year during Summer-Dry Weather
1 per year during Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year during Summer-Dry Weather
0 per year during Winter-Dry Weather

Table 4. 2008 Post-Construction.

SANTA MONICA BAY BEACHES BACTERIAL TMDL
ANNUAL SUMMARIES
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	(MPN/100ml)				(MPN/100ml)			(MPN/100ml)				(MPN/100ml)		
2005	3	2	6	1	5	0	7	2	2	2	1	0	0	8
2006	0	5	11	0	0	0	69	1	1	3	0	0	0	12
2007	0	1	8	0	0	0	43	0	0	0	1	0	0	18
2008 (thru Feb)	0	0	0	0	0	0	10	1	0	4	0	0	0	6
Totals	3	8	25	1	5	0	129	4	3	9	2	0	0	44
Pre-Construction	3	7	21	1	5	0	100	3	3	5	1	0	0	27
Post-Construction	0	1	4	0	0	0	29	1	0	4	1	0	0	17
Totals	3	8	25	1	5	0	129	4	3	9	2	0	0	44
Percent Improvement or Percent Reduction in Postings	100%	86%	81%	100%	100%	0%	71%	67%	100%	20%	0%	0%	0%	37%

Jan-March 2005 end of El Nino heavy rain year
2005-06 rain season about normal
2006-07 rain season driest in recorded history
2007-08 rain season normal '07, Jan/Feb '08, then dry
Dec 2007 entire month 30 day mean exceedances - without this post-construction exceedances significantly lower

WISARD - Legal TMDL - SMBB Bacteria (DHS)

Legend: # - Indicates accelerated monitoring required for weekly sampling
^ - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
* - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

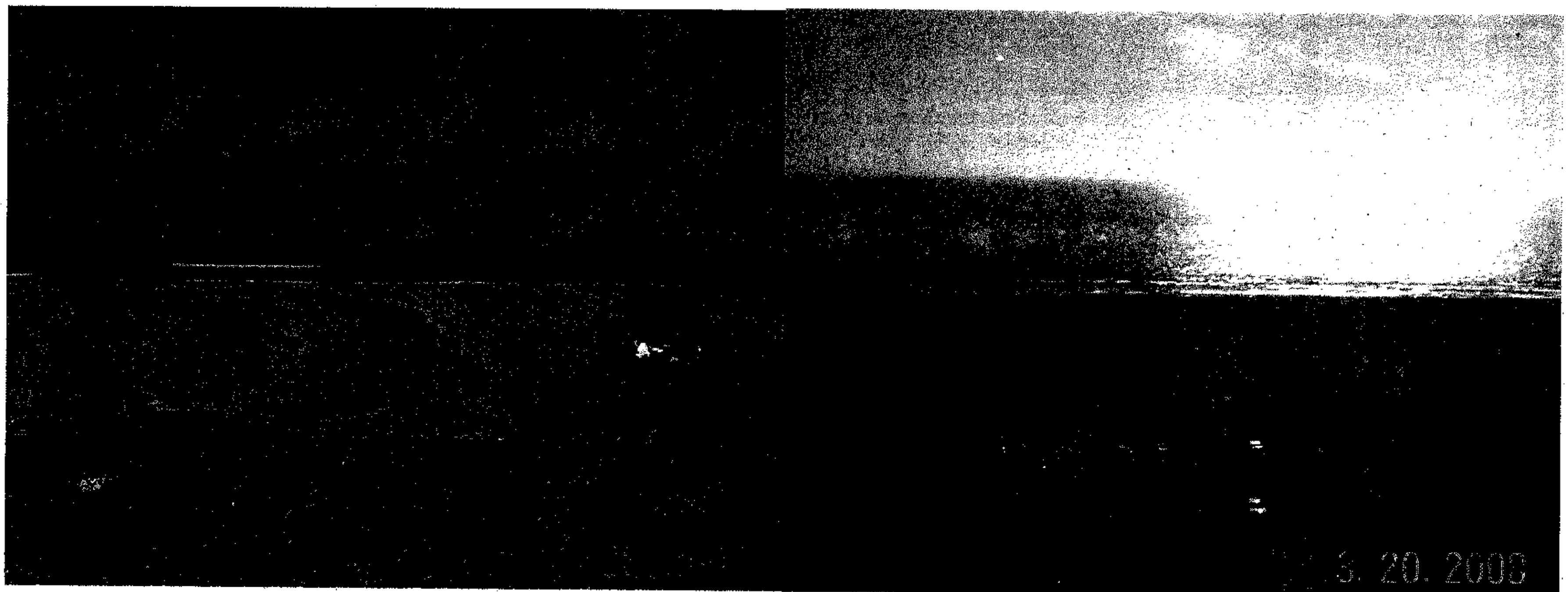
Allowable Single-Sample Exceedance Days:
0 per year Summer-Dry Weather
1 per year Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year Summer-Dry Weather
0 per year Winter-Dry Weather

Table 5. Summary of Pre- & Post-Construction Data Comparing Pre v. Post Exceedances and % Improvement

APPENDIX G

Project Construction Photo Diary



Left: Normal condition, pre-construction. Ponding.
Right: Normal condition, post-construction. Dry.