Final Report
Temescal Canyon Low Flow Diversion

INTRODUCTION

Background

In May 1996, the Santa Monica Bay Restoration Project released the findings of an epidemiological study that examined the adverse impact of swimming near storm drains[1]. The study found positive associations between adverse health effects and proximity to storm drains and also between adverse health effects and presence of enteric viruses or high bacterial indicators. The study concluded that there is an increased risk of a relatively broad range of symptoms caused by swimming in ocean water at beaches covered in the study, particularly at areas close to the storm drains where indicator densities increase. Therefore, results demonstrated that people swimming in ocean water near storm drain outlets have an increased risk of contracting certain illnesses.

Following the release of this epidemiological study, the City of Los Angeles conducted two studies on two specific watersheds, including Temescal Canyon watershed to examine the sources and evaluate alternative solutions, one of which was to assess the need to implement a low-flow diversion program to re-route the flow from this storm drain to the sewer. In addition the water quality near storm drains including that of Temescal Canyon storm drain was monitored and occasional exceedances of bacteriological standards were documented.

As part of these studies, a number of alternatives were investigated including diverting dry weather runoff to the sewer, chemical treatment (i.e., chlorine), ozone treatment, and ultraviolet treatment. After considering each alternative, diverting to the sewer system was selected because it is a proven effective method, and is relatively low in construction cost. It is also the best option to remove significant amount of bacterial pollutants from the storm drain runoff, improve the water quality of Santa Monica Bay, and meet the requirements of the recently adopted Santa Monica Bay Bacteria TMDL for Dry Weather. The diverted flow would be discharged to the sewer and eventually treated at the Hyperion Treatment Plant. The Temescal Canyon storm drain was also selected for diversion. Construction of the diversion facility began in late 2002 and was completed in early 2003. Operation of the facility commenced in April 2003.

Facility Description

The storm drain discharges into Santa Monica Bay across Pacific Coast Highway and Will Rogers State Beach in a 10-foot wide by 7-foot high double reinforced concrete box (20'x7') at Temescal Canyon Road (Figure 1-2). The system covers an area of approximately 1,660 acres, with 100% of the discharge from the City of Los Angeles (Figure 1-1). The purpose of this project was to divert dry weather runoff from the storm drain channel before discharging into the Santa Monica Bay.

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[1] Santa Monica Bay Restoration Project. 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay.

The scope of work consisted of the construction and operation of a low flow diversion facility, a proven effective control method and technology that will prevent all pollutants from the Temescal Canyon storm drain system from flowing into the Santa Monica Bay during dry weather seasons. The facility is located at the east-south corner where Temescal Canyon Road intersections with Pacific Coast Highway.

Flow is diverted from the storm drain channel via a concrete berm constructed along the channel floor. Diverted flow first enters a trash well for pre-screening of trash and other floatables, then travels to the pump well. At the pump well, flow is pumped to the sanitary sewer, which in turn is conveyed to the Hyperion Treatment Plant. The diversion structure includes a trash well to collect trash and debris, a pump well for pumping out diverted flow, a concrete valve box for controlling flow directions and an instrumentation panel for control switches. A sluice gate is included in the trash well to control flow from the drain during maintenance. System controls are set to shut the entire system down on high and low water levels in the pump well (Figures 1-3 & 4).

PROJECT IMPLEMENTATION

Construction of the diversion facility began in late 2002 and was completed in March 2003. The table below lists deliverables previously submitted, followed by a discussion of each of the project tasks:

Task	Deliverable by Subtask #	Date Submitted
Task 1. Project Management		
Subtask 1.2	Quarterly Progress Report	01/10/04
Subtask 1.5	Contract Summary Form	07/10/02
Subtask 1.6	Subcontract Documentation	07/10/02
Subtask 1.7	Project Survey Form	01/10/04
Task 2. State and Local Permitting		
Subtask 2.1	CEQA Documentation	12/01/01
Subtask 2.2	Secure Environmental Clearances and Permits	08/02/02
Task 3. Quality Assurance Project Plan		
Subtask 3.1	QAPP	1/10/03
Task 4. Project Engineering		
Subtask 4.1	Final Plans and Specifications	10/10/01
Subtask 4.2	Award Board Report	07/10/02
Task 5. Project Implementation		
Subtask 5.1	Project Construction	12/30/02
Subtask 5.2	Start-Up	04/15/03
Subtask 5.3	Construction Management	04/15/03
Task 6. Reporting		
Subtask 6.1	Monitoring and Reporting Plan	01/10/04
Subtask 6.2	Draft Final Report	01/10/04
Subtask 6.3	Final Report	04/10/04

Task 1 – Project Management and Administration

This project's preliminary engineering and design work were completed prior to contract execution between the City of Los Angeles and the State. For the most part, reporting activities focused on construction activities and project close out. The project team, consisting of project engineers, project management, and construction management, met on a monthly basis to discuss work progress and identify and resolve any potential delays in project schedule. There were a few minor delays that contributed to the delay in the completion of the project including: receipt of the California Coastal Commission Permit, which required additional mitigation requirements from the Department of Fish & Game (DFG) as part of permit requirements; and some minor delay in the preparation and submittal of the Quality Assurance Project Plan (QAPP).

Task 2 – State and Local Permitting

The project received CEQA Exemption on December 1, 2001. Following some minor delays (as explained above), this project finally received the CCC Permit on August 2, 2002.

Task 3 – Quality Assurance Project Plan

The City of Los Angeles, on January 10, 2003, submitted to the SWRCB the Quality Assurance Project Plan (QAPP). The QAPP discussed the monitoring process and sampling procedures for the project once the low flow diversion facility comes on-line. Included in the QAPP were the sampling protocols, the ELAP certified lab where the samples were analyzed, and frequency of sampling.

Task 4 – Project Engineering

The final plans and specifications were submitted to the SWRCB on October 10, 2001. The low flow diversion facility is designed to diverted dry weather urban runoff from the Temescal Canyon storm drain system into the sewer for subsequent treatment at the Hyperion Treatment Plant located in Marina del Rey. The diversion facility is designed to divert a maximum flow of one million gallons per day. During the dry weather season from April 2003 to October 2003, over 24 million gallons of highly polluted urban runoff have been diverted for treatment that would otherwise have discharged into the Santa Monica Bay.

Task 5 – Project Implementation

Construction of the low flow diversion facility was essentially completed in March 2003. The facility has been in operation since April 2003.

Task 6 – Draft and Final Report

This Final Report is submitted with the quarterly progress report for period ending March 31, 2004.

RESULTS

Pollutant Load Removal

The diversion facility has been in operation since April 2003 and has removed over 24 million gallons of polluted urban runoff from the Temescal Canyon storm drain. Samples were collected on a monthly basis following start up of the facility. The sampling results below quantify the pollutant loading for each constituent.

MONTH	Flow gallons	Ni (lbs)	Pb (lbs)	Cu (lbs)	Zn (lbs)	E. Coil (Count)	Entero coccus (count)	Total Coliforms (count)
April	215,840	0.175	0.023	0.242	0.108	1.1E+12	2.0E+11	2.0E+12
May	6,335,700	1.006	<0.688	0.476	1.059	2.9E+11	5.5E+10	3.1E+12
June	5,616,300	3.519	<0.610	2.346	5.068	3.6E+12	4.3E+11	8.9E+12
July	3,608,100	2.412	<0.006	1.266	3.105	2.5E+11	1.0E+12	1.4E+13
August	2,567,700	3.840	0.515	3.411	14.739	2.3E+12	6.7E+11	2.3E+12
September	3,930,700	4.467	0.427	2.200	9.229	2.8E+11	1.9E+11	>5.1E+12
October	1,965,350	1.604	0.274	1.262	3.446	2.3E+12	5.2E+11	6.4E+12
Total	24,239,690	17.023	<2.513	11.204	36.754	1.01E+13	3.1E+12	>4.1E+13

Based on the sampling results, the Temescal Canyon Low Flow Diversion Facility has significantly reduced bacterial discharges to Santa Monica Bay. During the dry weather sampling period, the facility removed over 10 trillion of fecal coliform bacteria and over 40 trillion total coliform bacteria.

Water quality samples were collected at the pump well of the facility. Because the entire flow gets diverted, there is no effluent flow to collect samples. Rather, the performance of the system is evaluated through mass emission quantification, by multiplying influent concentration with the amount of flow diverted, as shown above.

Shoreline Water Quality

Water quality assessment of the Bay can also be determined by looking at the Beach Report Card (BRC) issued by Heal the Bay. During the 2002 dry weather, Will Rogers State Beach at the shoreline at the outlet of the Temescal Canyon storm drain received a grade of C. During the summer of 2003, following start up and operation of the diversion facility, this same reach received an A+ grade. The grading system used by Heal the Bay is based on the AB-411 standards. The AB-411 standards require that a single sample shall not exceed 10,000 total coliform bacteria per 100-mL, or 400 fecal coliform bacteria per 100-mL, or 104 enterococcus bacteria per 100-mL, or 1,000 total coliform bacteria per 100-mL, if the ratio of fecal/total coliform bacteria exceeds 0.1. Additional information regarding the BRC rating can be found at Heal the Bay website at www.healthebay.org.

CONCLUSION

The diversion facility has been in operation since April 2003 and has removed over 10 trillion of fecal coliform bacteria and over 40 trillion total coliform bacteria. This has resulted in an upgrade from a C to an A+ in Heal the Bay's BRC. Additionally, sampling data shows a year-over-year improvement of water quality during the dry season when the facility is in operation.

Based on the sampling results and the amount of flow diverted, the diversion facility proves to be highly effective in reducing bacterial pollution discharges to Santa Monica Bay. This project has proven successful in preventing urban generated pollutants from discharging into local receiving waterbodies, thereby reducing health risk to swimmers and improving the water quality. The low flow diversion facility has shown to be a viable management measure in reducing non-point source pollution.

Diversion can completely stop the flow of polluted urban runoff from reaching the ocean or other receiving water body during dry weather. This, in essence, can be looked at as 100% treatment. The same cannot be said for a conventional "treatment" process. Furthermore, the facility is designed and constructed to allow diversion outside the AB 411 season, i.e., divert low flow year-round except during rain events. Currently, the facility is operating only during the summer months, but the City is presently pursuing EPA approval, as well as addressing other regulatory, technical and contractual issues for year round diversion of dry weather flow.

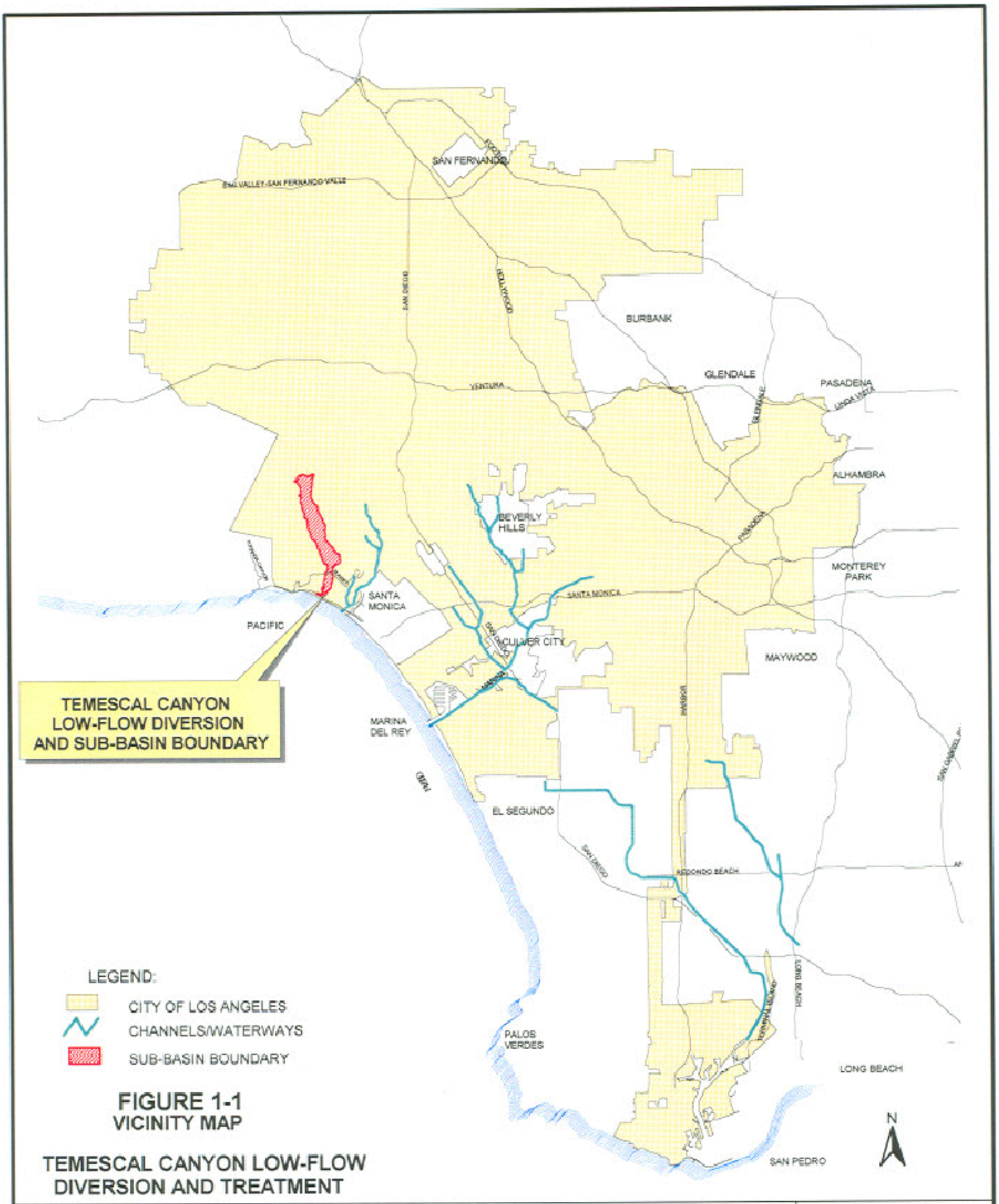

FIGURE 1-1
VICINITY MAP

TEMESCAL CANYON LOW-FLOW DIVERSION AND TREATMENT

DEPARTMENT OF PUBLIC WORKS

JUDITH A. WILSON
DIRECTOR

GARY LEE MOORE
PROGRAM MANAGER

FILE NAME	FILE LOC	DRAWN BY	CHECKED BY	APPROVED BY	DATE	DATE REVISED
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BUREAU OF SANITATION
STORMWATER MANAGEMENT DIVISION

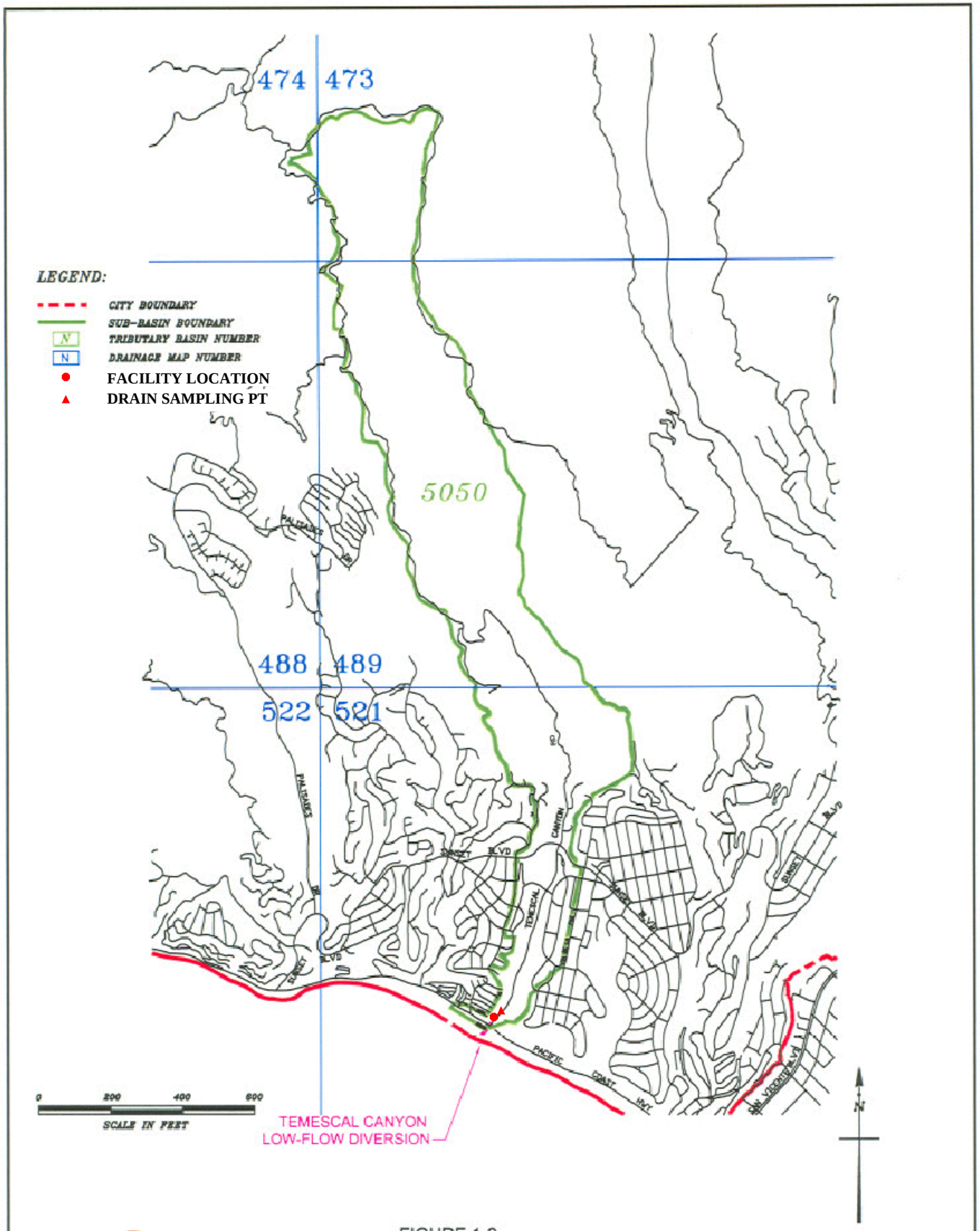

FIGURE 1-2
TEMESCAL CANYON DRAINAGE AREA

BUREAU OF SANITATION
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

DRAINAGE AREA : 1,660 ACRES
CITY OF LA : 100%

STORMWATER MANAGEMENT DIVISION
GARY LEE MOORE
PROGRAM MANAGER

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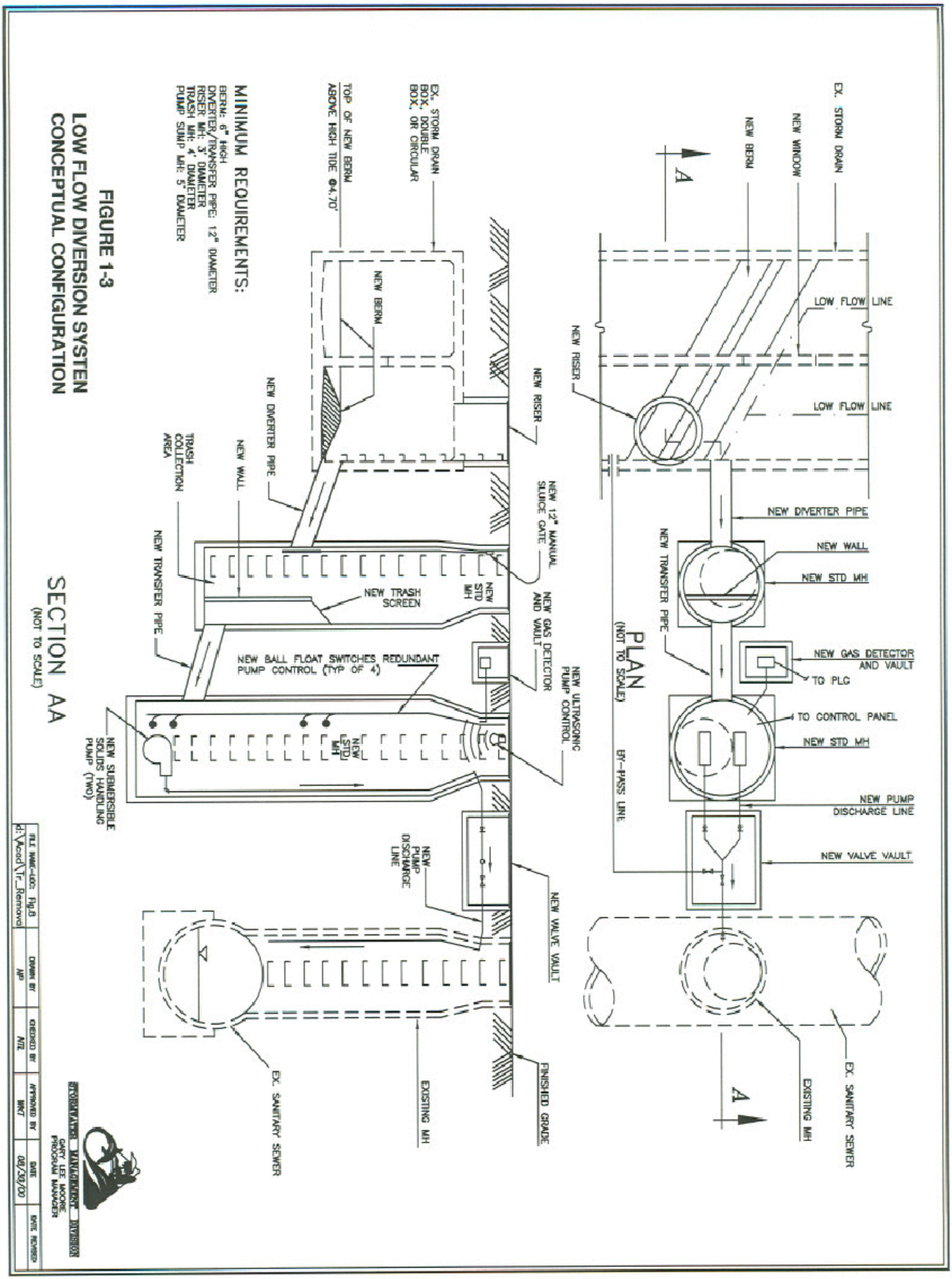
EX. STORM DRAIN
NEW WINDOW
NEW BERM
A
LOW FLOW LINE
NEW RISER
LOW FLOW LINE
NEW DIVERTER PIPE
NEW WALL
NEW STD MH
NEW TRANSFER PIPE
NEW GAS DETECTOR AND VAULT
TO PLC
TO CONTROL PANEL
NEW STD MH
NEW PUMP DISCHARGE LINE
NEW VALVE VAULT
PLAN
(NOT TO SCALE)
BY-PASS LINE
EXISTING MH
EX. SANITARY SEWER
A
EX. STORM DRAIN BOX, DOUBLE BOX, OR CIRCULAR
TOP OF NEW BERM ABOVE HIGH TIDE @4.70'
NEW BERM
NEW RISER
NEW 12" MANUAL SLUICE GATE
NEW GAS DETECTOR AND VAULT
NEW ULTRASONIC PUMP CONTROL
NEW STD MH
NEW TRASH SCREEN
NEW BALL FLOAT SWITCHES REDUNDANT PUMP CONTROL (TYP OF 4)
NEW STD MH
NEW SUBMERSIBLE SOLIDS HANDLING PUMP (TWO)
NEW PUMP DISCHARGE LINE
NEW VALVE VAULT
FINISHED GRADE
EXISTING MH
EX. SANITARY SEWER
MINIMUM REQUIREMENTS:
BERM: 6" HIGH
DIVERTER/TRANSFER PIPE: 12" DIAMETER
RISER MH: 3' DIAMETER
TRASH MH: 4' DIAMETER
PUMP SUMP MH: 5' DIAMETER
NEW DIVERTER PIPE
NEW WALL
TRASH COLLECTION AREA
NEW TRANSFER PIPE
SECTION AA
(NOT TO SCALE)
FIGURE 1-3
LOW FLOW DIVERSION SYSTEN
CONCEPTUAL CONFIGURATION
STORMWATER MANAGEMENT DIVISION
GARY LEE MOORE
PROGRAM MANAGER
FILE NAME-LOC: Fig.6
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AVZ
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MKT
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LOW FLOW DIVERSION

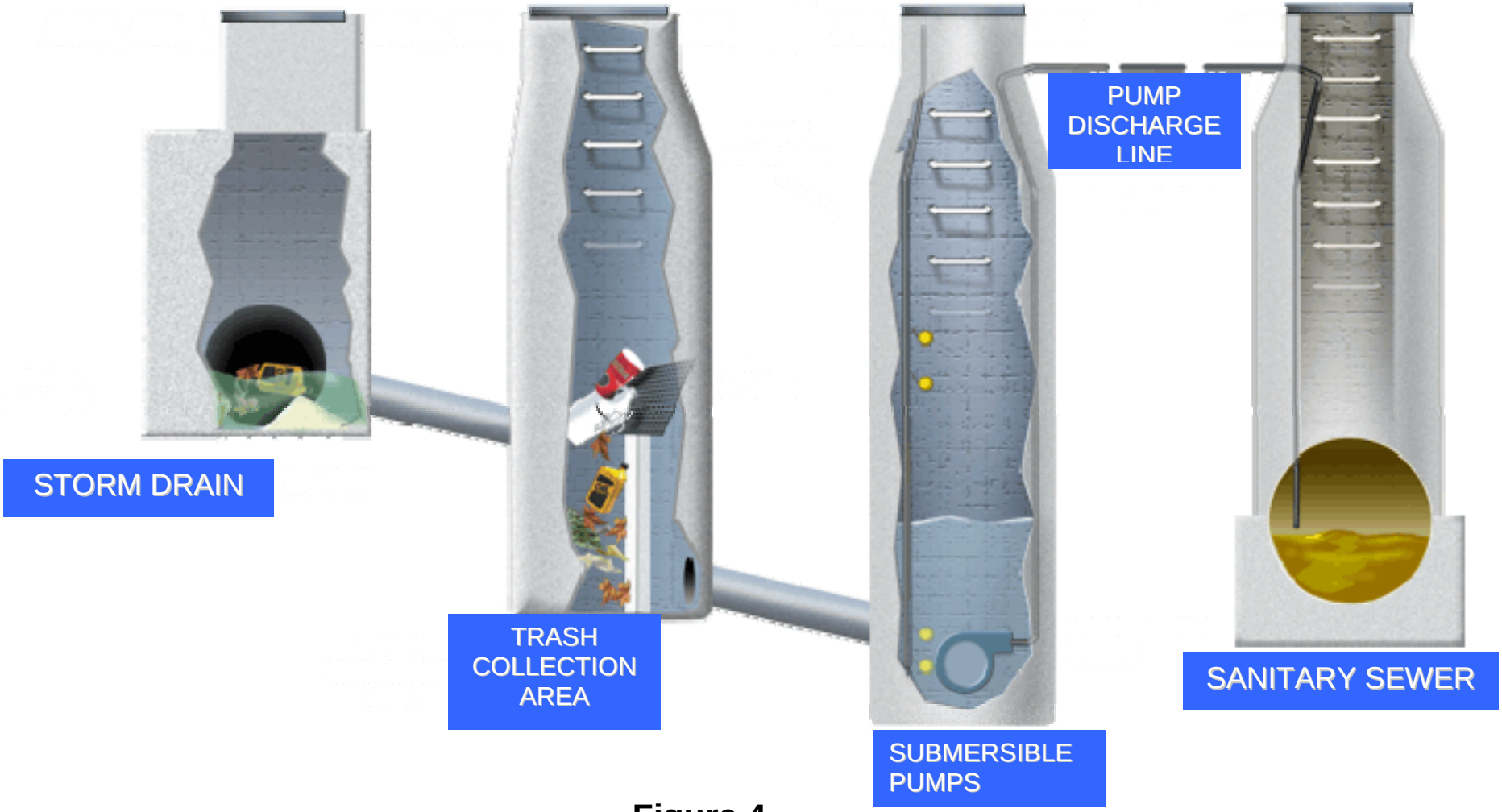

Figure 4