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INFORMED INFRASTRUCTURE
The magazine for civil & structural engineers

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StormTrap®
MODULAR CONCRETE STORMWATER MANAGEMENT

Presented by:

City of San Fernando Regional Park Stormwater Infiltration Project - Improving Water Quality and Local Water Supply

December 7, 2023

INFORMED INFRASTRUCTURE
The magazine for civil & structural engineers

Introduction

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CWE

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Agenda

- Project Overview
- Purpose and Community Needs
- Pre-Project Conditions
- Alternatives Analyzed
- Design
- Construction Phase
- Community Education and Outreach
- Project Funding
- Lessons Learned
- Operation and Maintenance
- Project Completion

Project Overview

MS4 Discharges within the
Coastal Watersheds of Los Angeles County

ORDER NO. R4-2012-0175
NPDES NO. CAS004001

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

LOS ANGELES REGION

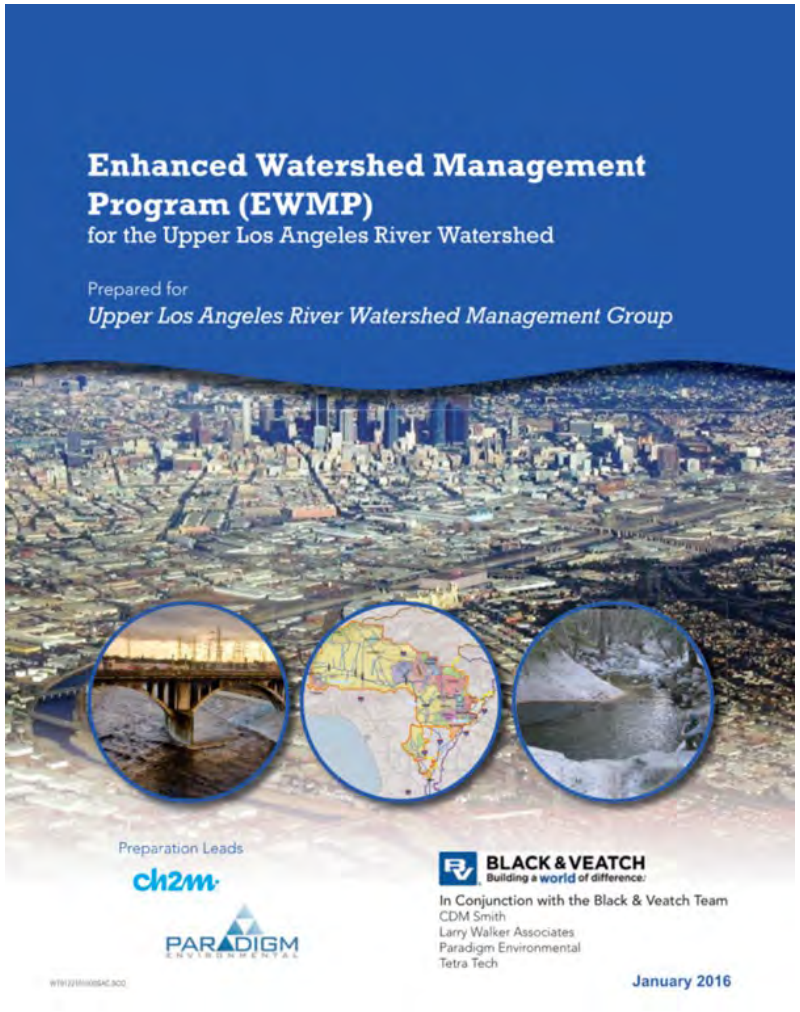
320 W. 4th Street, Suite 200, Los Angeles, California 90013

Phone (213) 576 - 6600 • Fax (213) 576 - 6640

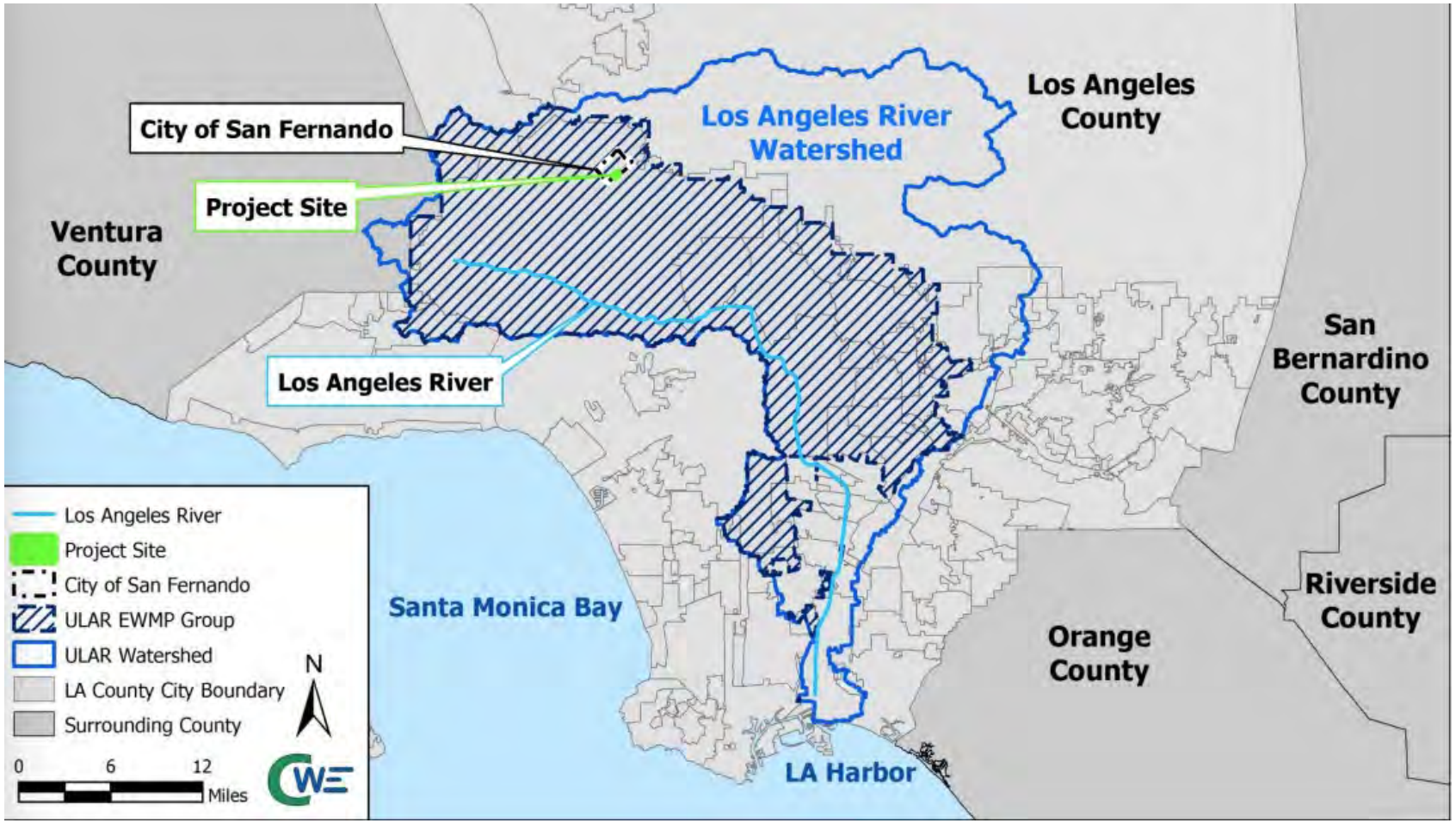
http://www.waterboards.ca.gov/losangeles

ORDER NO. R4-2012-0175
NPDES PERMIT NO. CAS004001

WASTE DISCHARGE REQUIREMENTS
FOR MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) DISCHARGES WITHIN THE COASTAL WATERSHEDS OF LOS ANGELES COUNTY, EXCEPT THOSE DISCHARGES ORIGINATING FROM THE CITY OF LONG BEACH MS4



Project Overview



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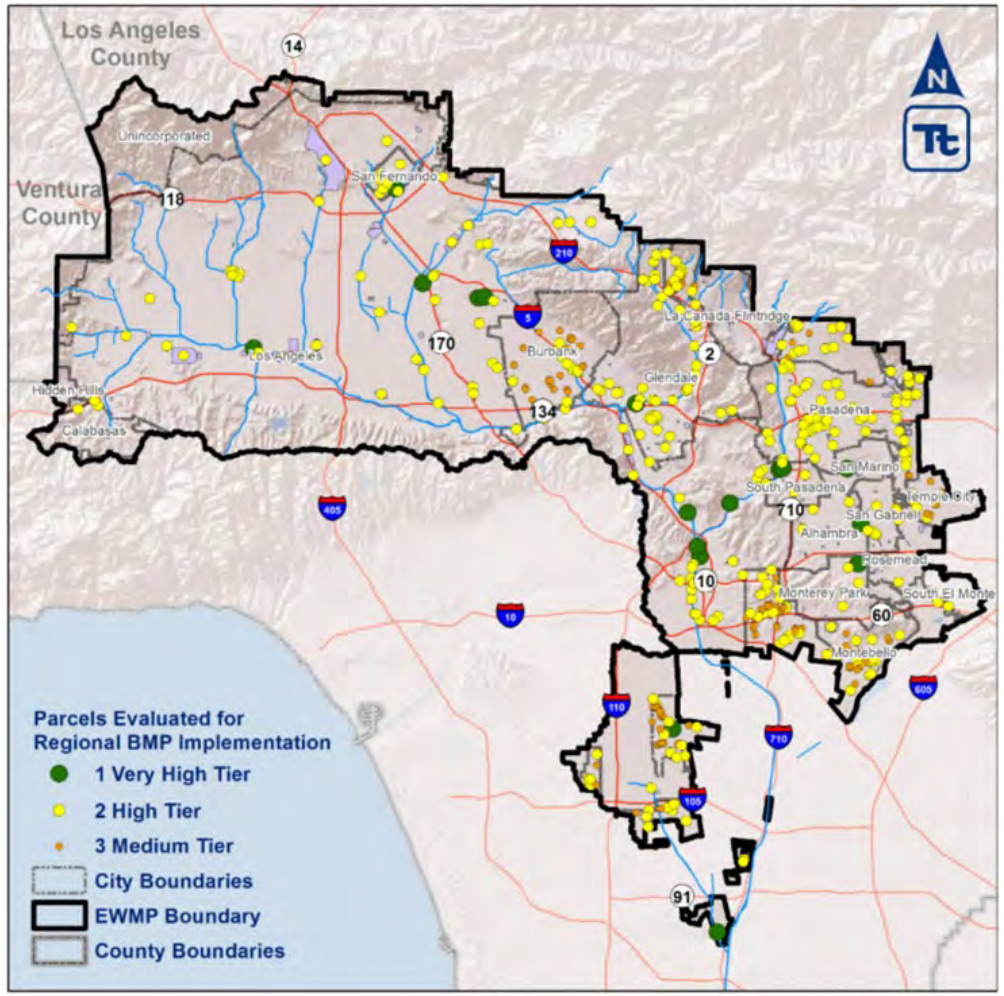

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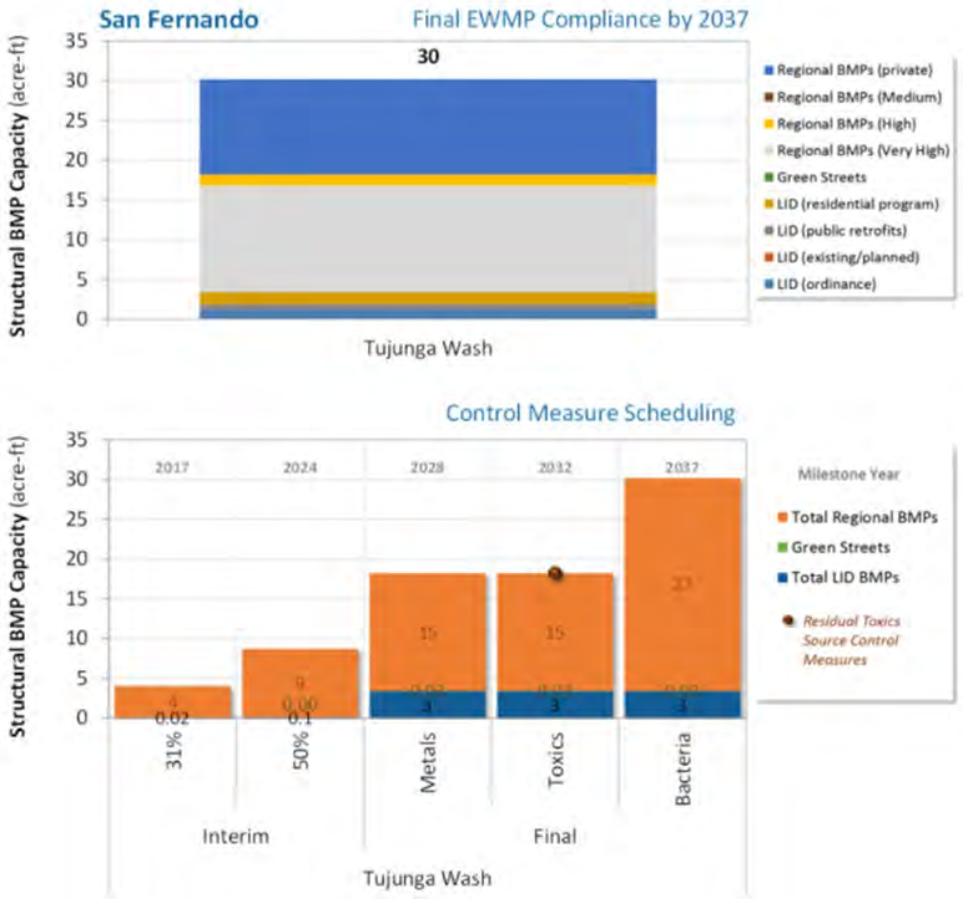

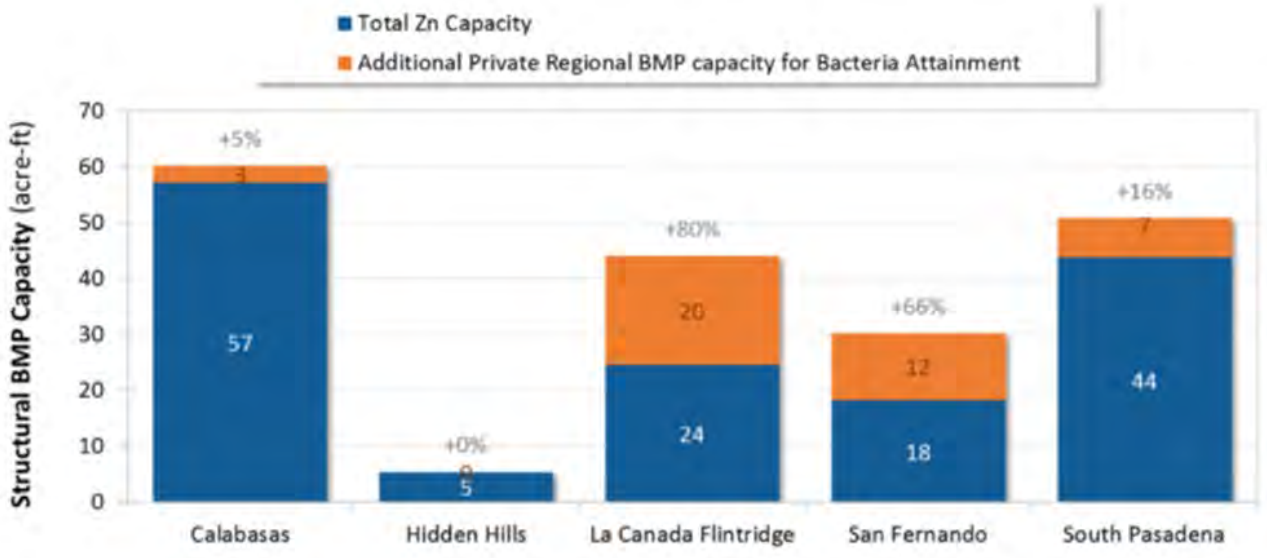

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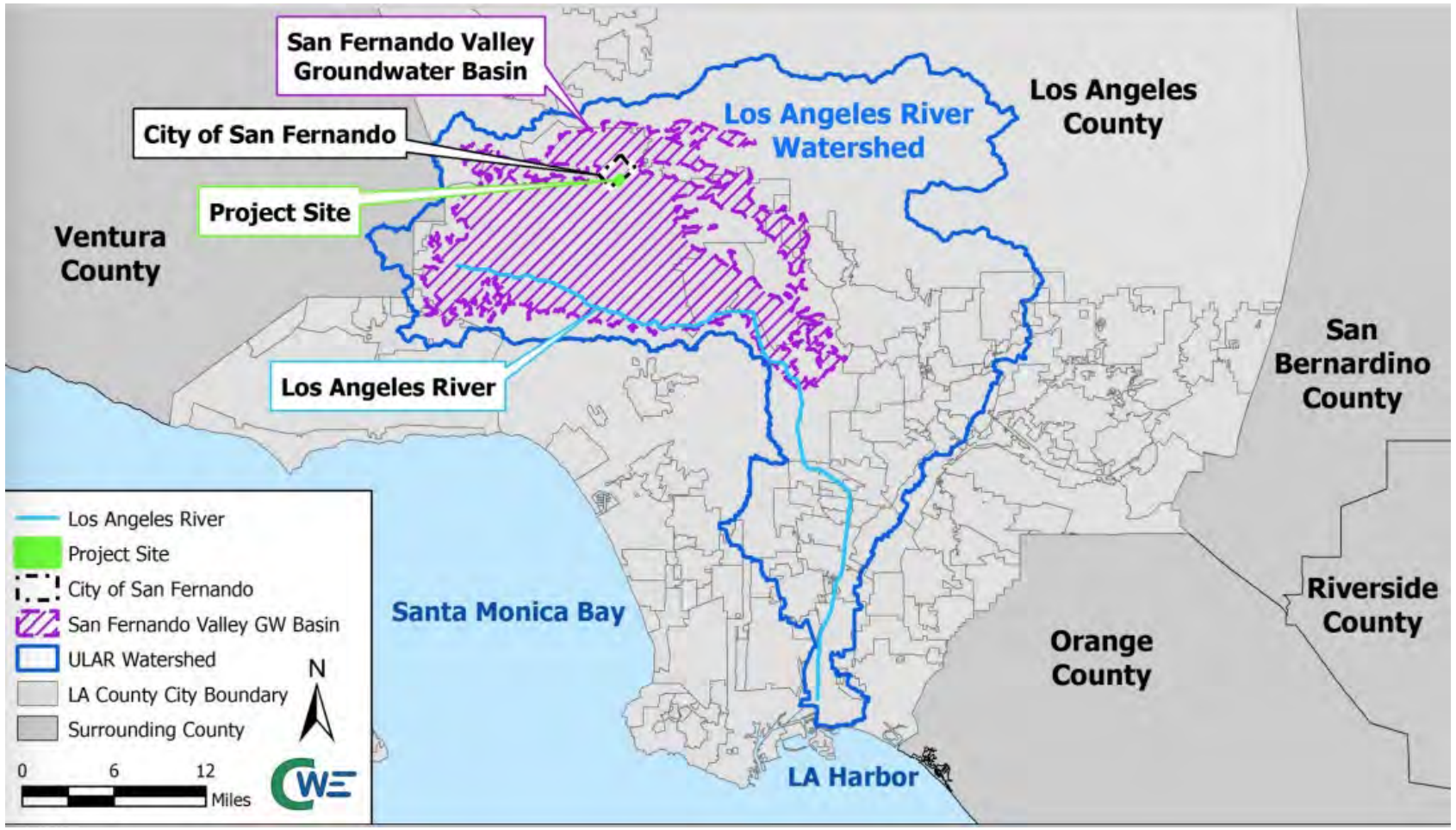

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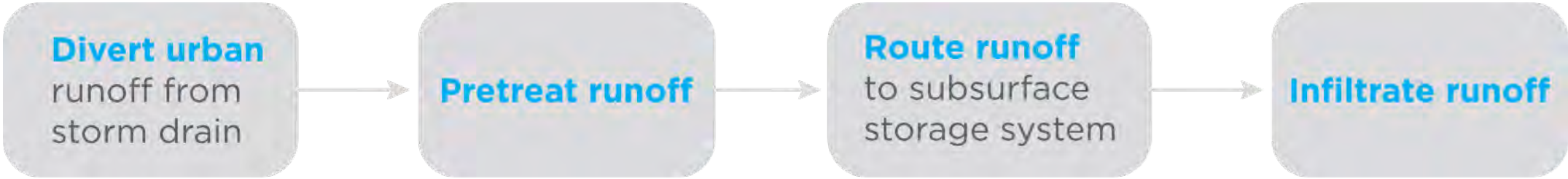


Purpose and Community Needs

- Enhance water quality locally and in downstream water bodies
- Contribute towards the City's Enhanced Watershed Management Program (EWMP) implementation goals
- Reduce local dependency on imported water through groundwater recharge
- Educate local communities through education and outreach
- Meet the California State Water Resources Control Board (SWRCB) grant requirements

Pre-Project Conditions

- Design subsurface storage system to bypass onsite utilities, especially the sewer under the baseball fields

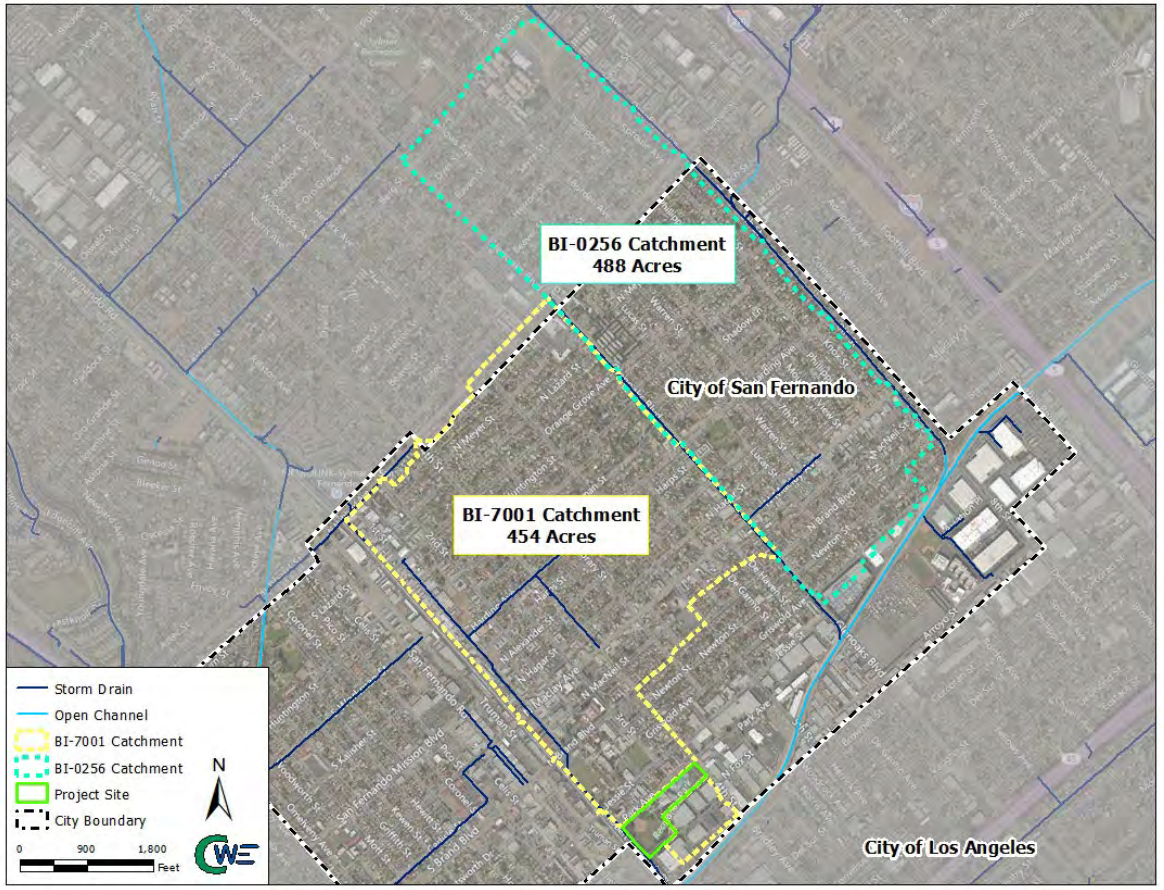
- Replace landscaping and park components, including electrical elements, around subsurface storage system for the Project

Pre-Project Conditions

- Infiltration rates found to be about 12.5 inches/hour
- Encountered some boulders and larger rock material in trench

Pre-Project Conditions

- Original EWMP catchment area was 454 acres
- CWE suggested increasing the capture by adding an additional diversion (4,000 feet away)
- Total drainage area = 942 acres

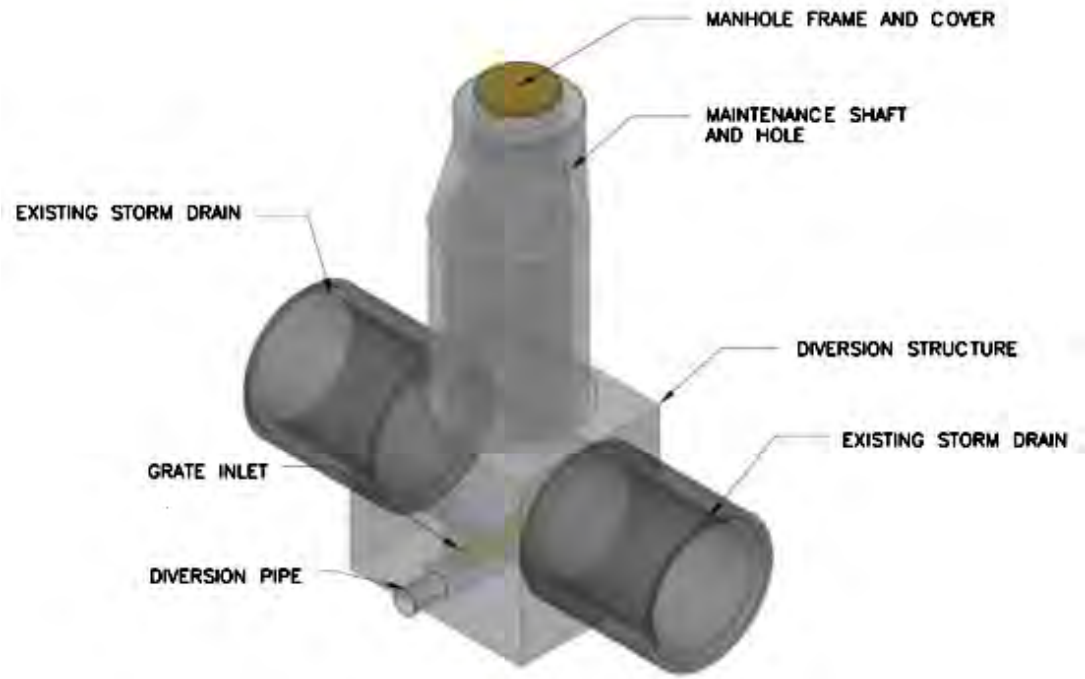


Alternatives Analyzed

- Major Project component alternatives for diverting runoff from local storm drains, pretreating runoff, and then conveying captured runoff into a subsurface storage system for infiltration:
  - Diversion
  - Pump System
  - Subsurface Storage System

Alternatives Analyzed - Diversion

- Two diversion systems were proposed to capture runoff from First Street
  - The first alternative is to construct a single diversion structure just downstream of the MTD 597 connection at the existing manhole.
  - A second alternative is to construct two diversion structures, one on BI-7001 and another on MTD 597



Alternatives Analyzed - Diversion

Alternatives Analyzed – Pump System

- A pumped system at the BI-7001 Catchment diversion would allow for shallower placement of the subsurface storage system, which would reduce excavation and fill volumes while minimizing the depth of shoring.

Pros & Cons for Pumped Diversion to Capture BI-7001 Catchment

Pros	Cons
• Shallower system • Less excavation/fill • Minimize shoring	• Pump maintenance required • Electrical building required • Operational costs for power

- Slightly higher construction cost for a gravity diversion, while the pump would have a higher operational cost (decided to use gravity system).

Alternatives Analyzed – Subsurface Storage System

- The high onsite infiltration rates allow a significant portion of the diverted runoff to be infiltrated during the storm.
  - This allowed the dead storage system volume to be less than the design capture volume.
- The volume of runoff infiltrated during a storm event is based on the infiltration area, or the footprint of the subsurface storage system.

Comparison of Storage Alternatives

Component	Alternative A	Alternative B	Alternative C
Footprint	1.01 acres	1.41 acres	1.60 acres
	44,431 sf	61,420 sf	69,696 sf
Storage depth	11.30 feet	5.67 feet	4.25 feet
Single storm dead storage capacity	11.58 acre-feet	7.95 acre-feet	6.70 acre-feet
Single storm infiltration capacity	13.29 acre-feet	16.92 acre-feet	18.17 acre-feet
Total single storm capture capacity	24.87 acre-feet	24.87 acre-feet	24.87 acre-feet

Alternatives Analyzed – Subsurface Storage System

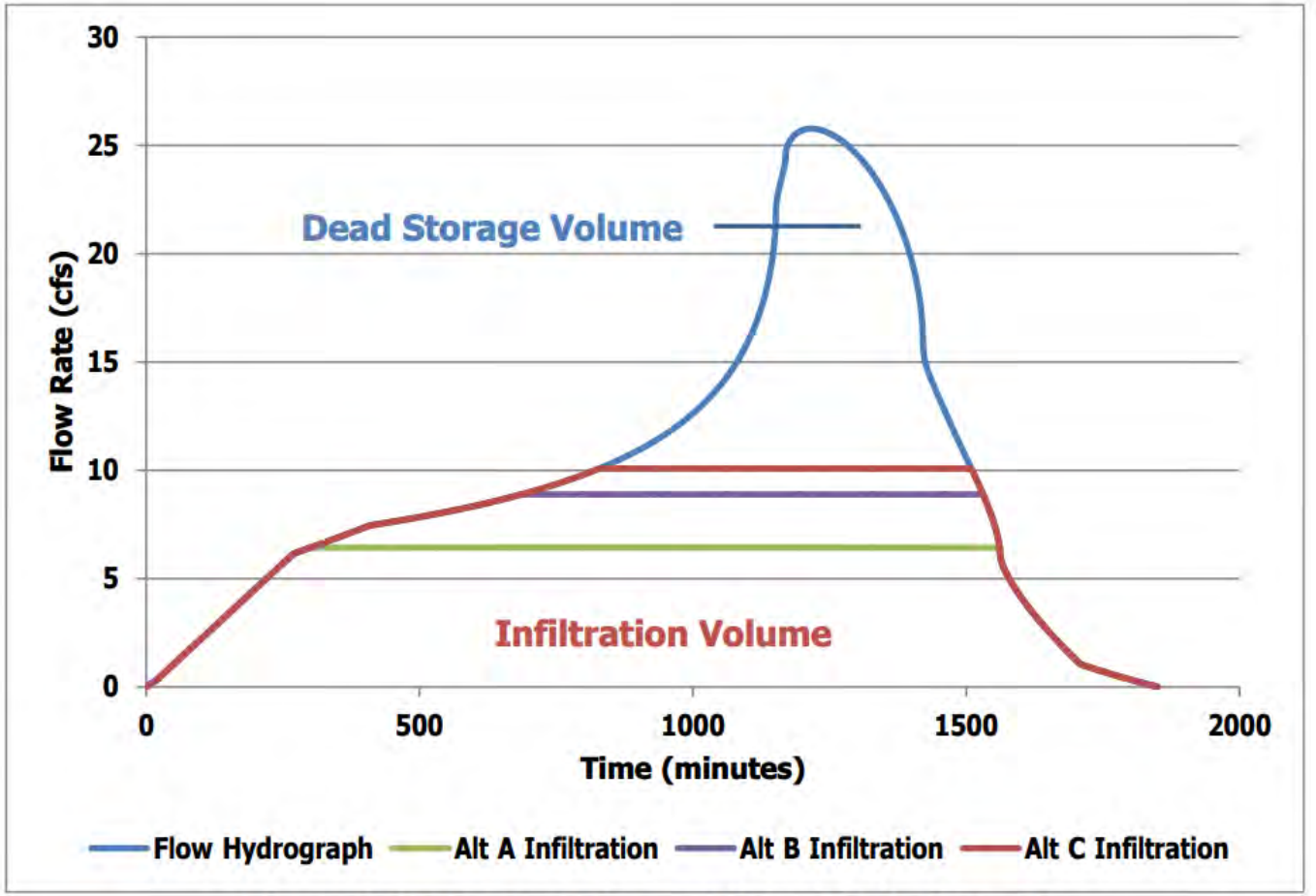


Figure 6-5 Subsurface Storage Alternative Hydrographs

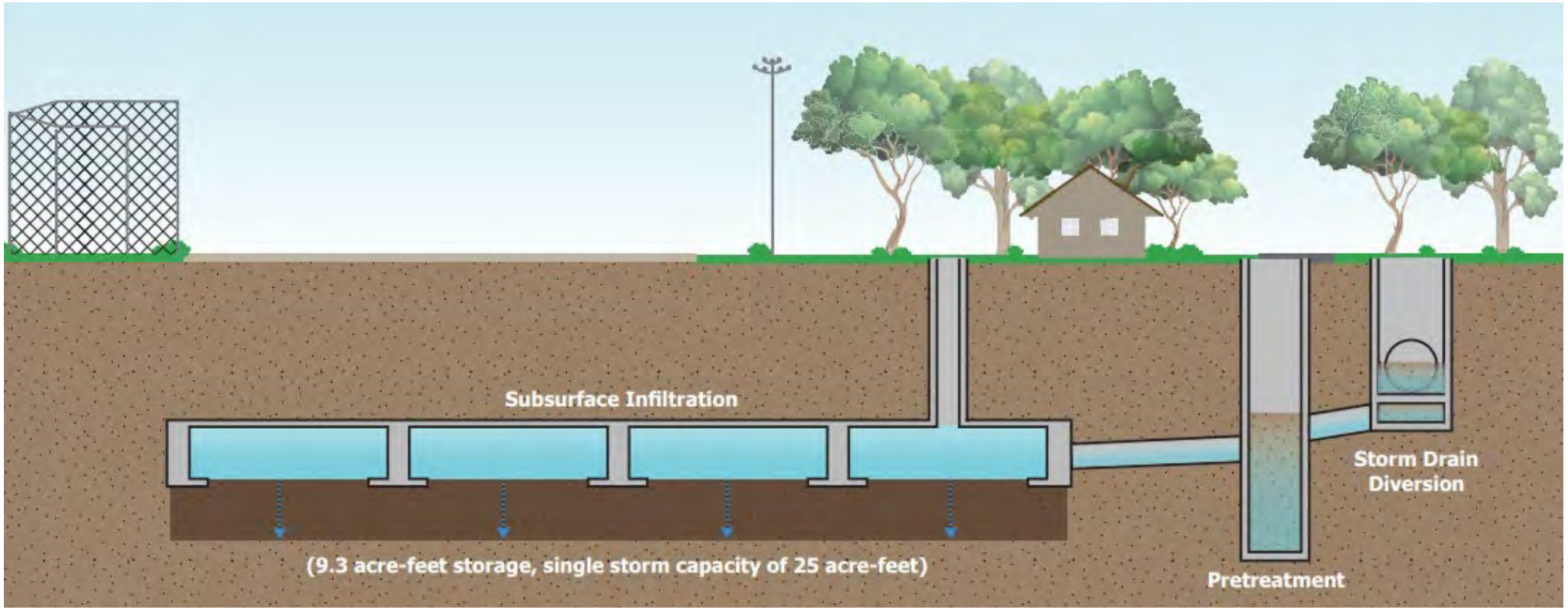
Alternatives Analyzed – Subsurface Storage System

StormTrap SingleTrap

- Modular, precast concrete system
- Innovative design that facilitates quick and efficient installations and minimizes footprint
- 1'-1" to 15'-0" in height in 1" increments
- Large infiltrative surface area

Design

Design



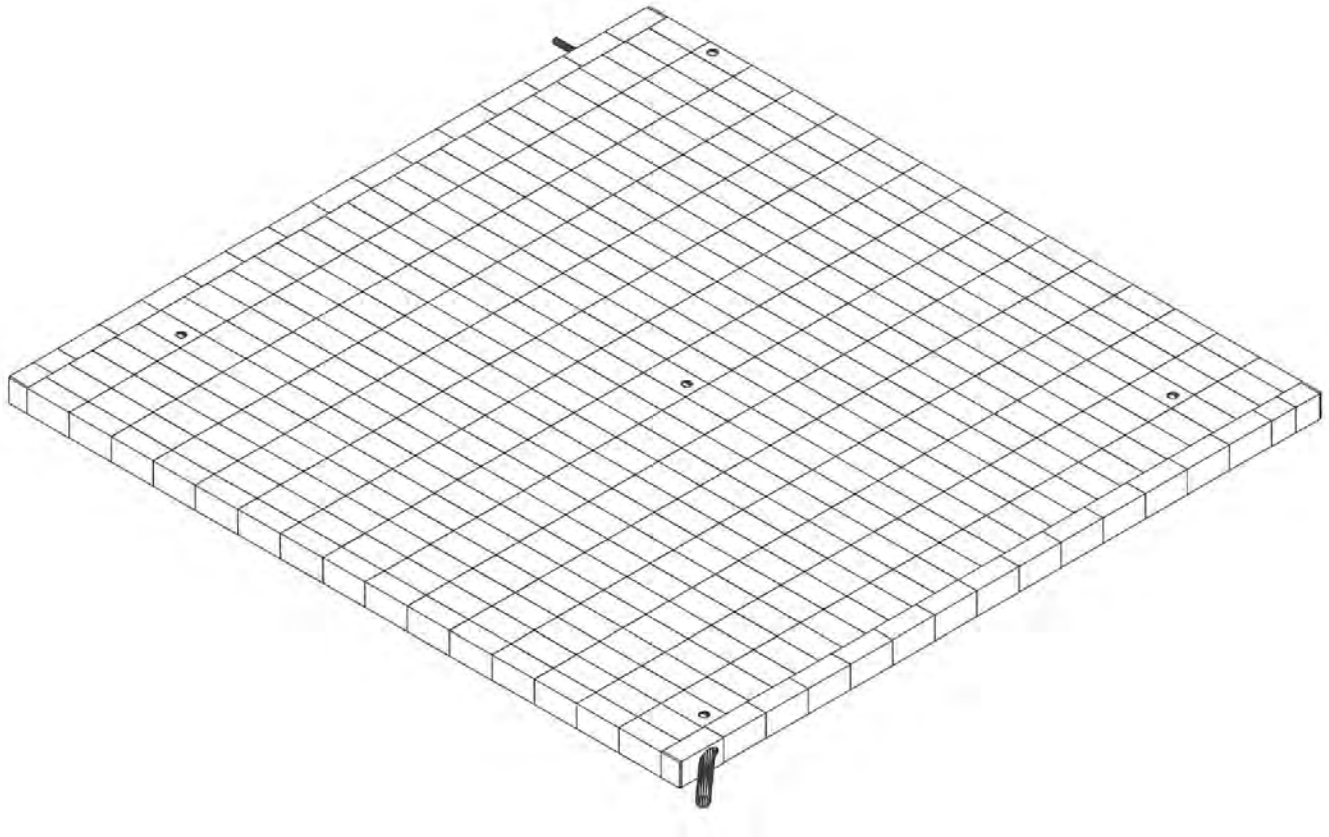
Average annual capture expected to be between 200 and 400 acre-feet per year

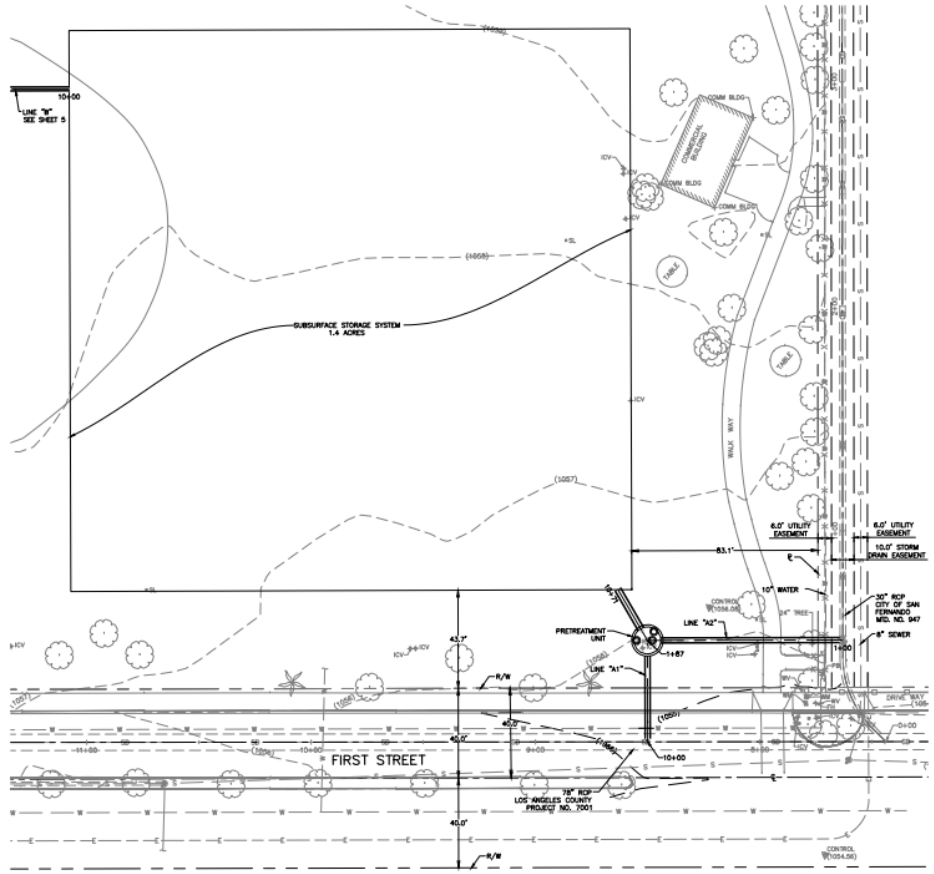
Construction Phase

Key Design Aspects

- Maximize storage within available footprint
- Utilize site for stockpiling
- Foundation and backfill material

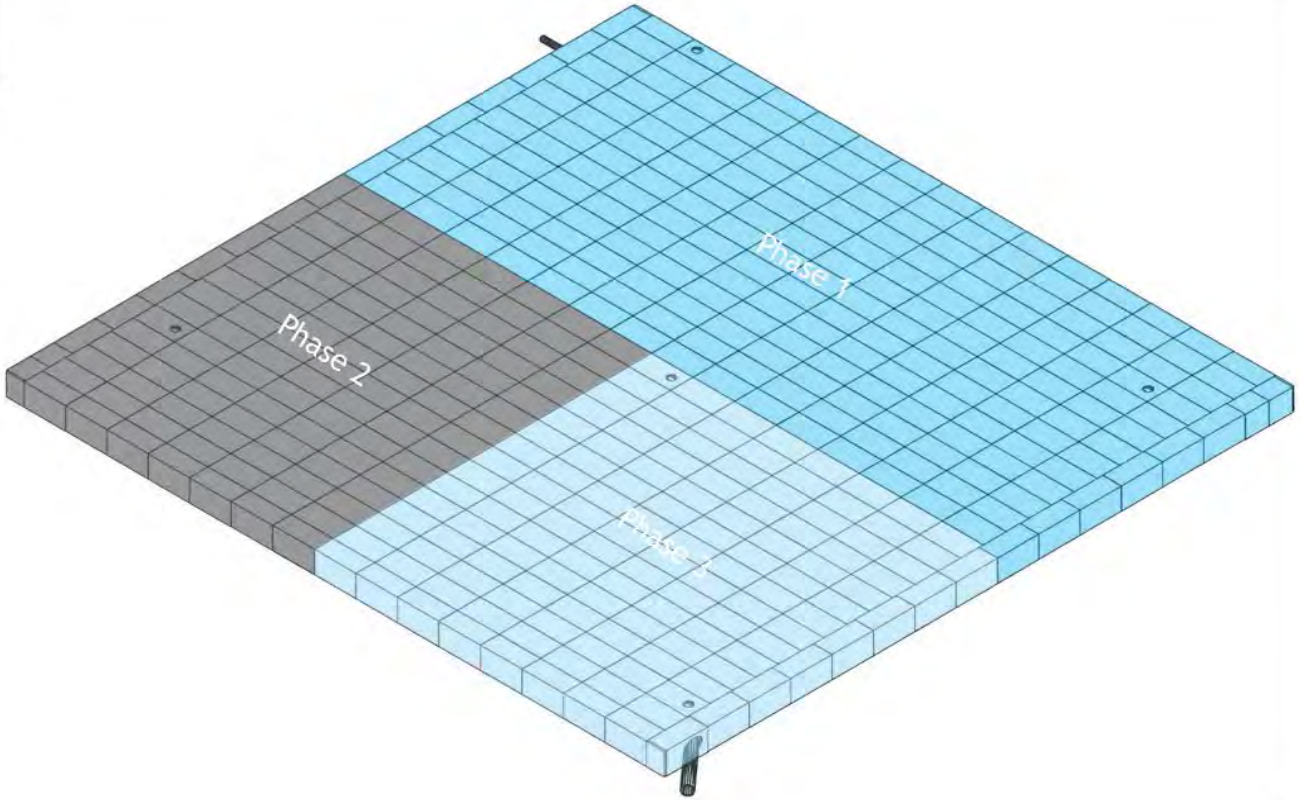
Construction Phase



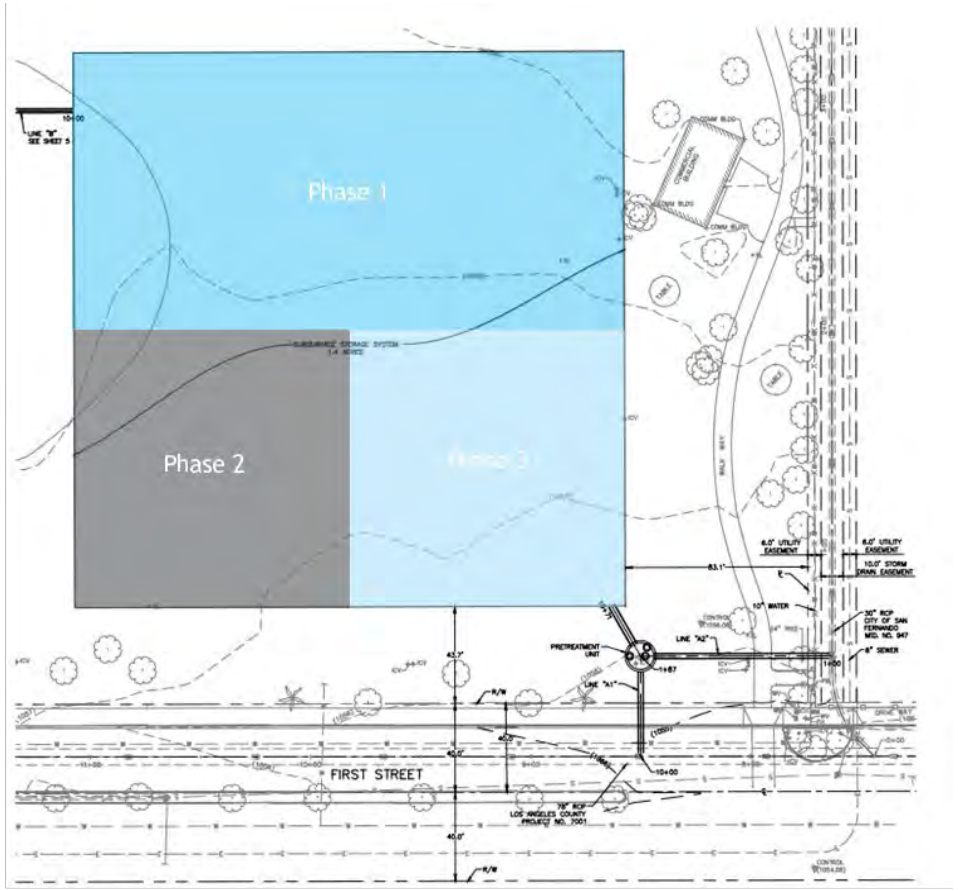


REGIONAL INFILTRATION - PROJECT 3
SAN FERNANDO , CA

Construction Phase



REGIONAL INFILTRATION - PROJECT 3
SAN FERNANDO, CA



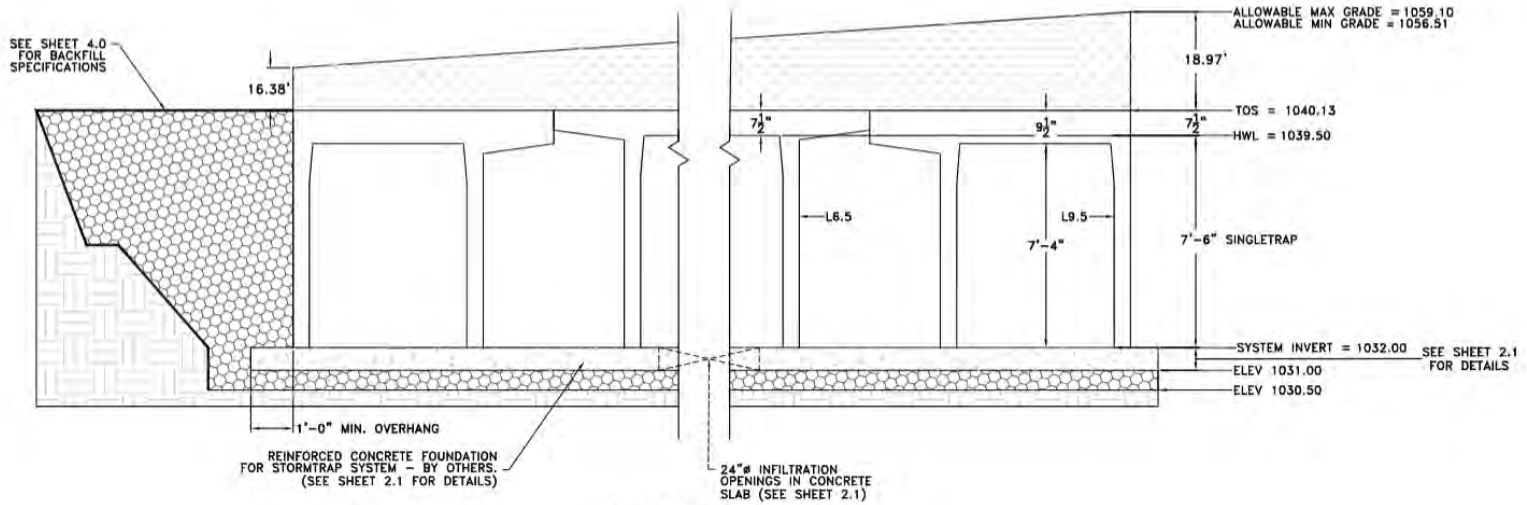
Construction Phase

- 452 StormTrap pieces
- 7’-6” SingleTrap
- 403,051 cf water storage (9.25 acre-feet)

Construction Phase

Foundation and Backfill Material

- Reinforced concrete foundation with 24" infiltration openings on top of ¾" stone aggregate
- Native backfill



7'-6" SINGLETRAP

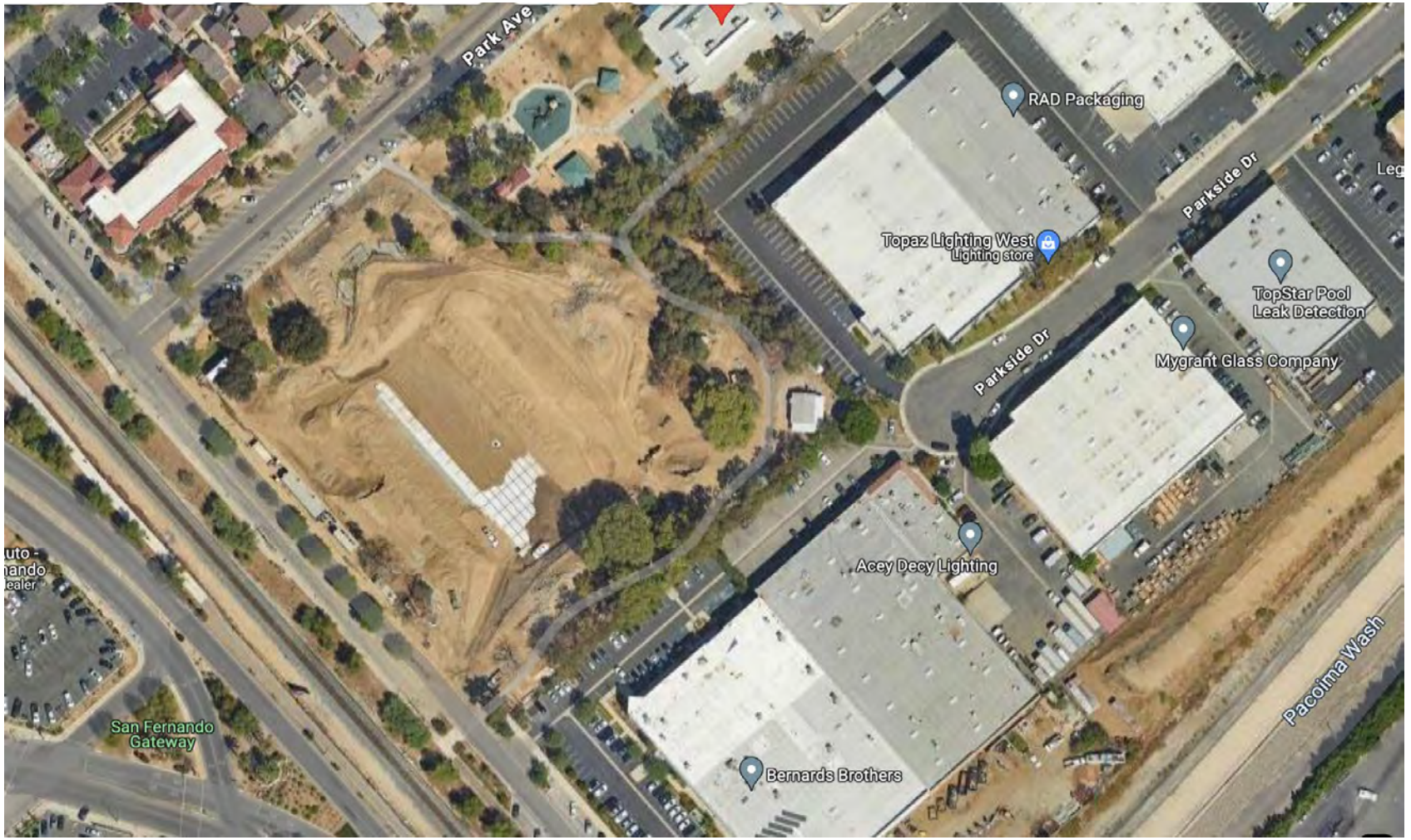
Construction Phase

Construction Phase

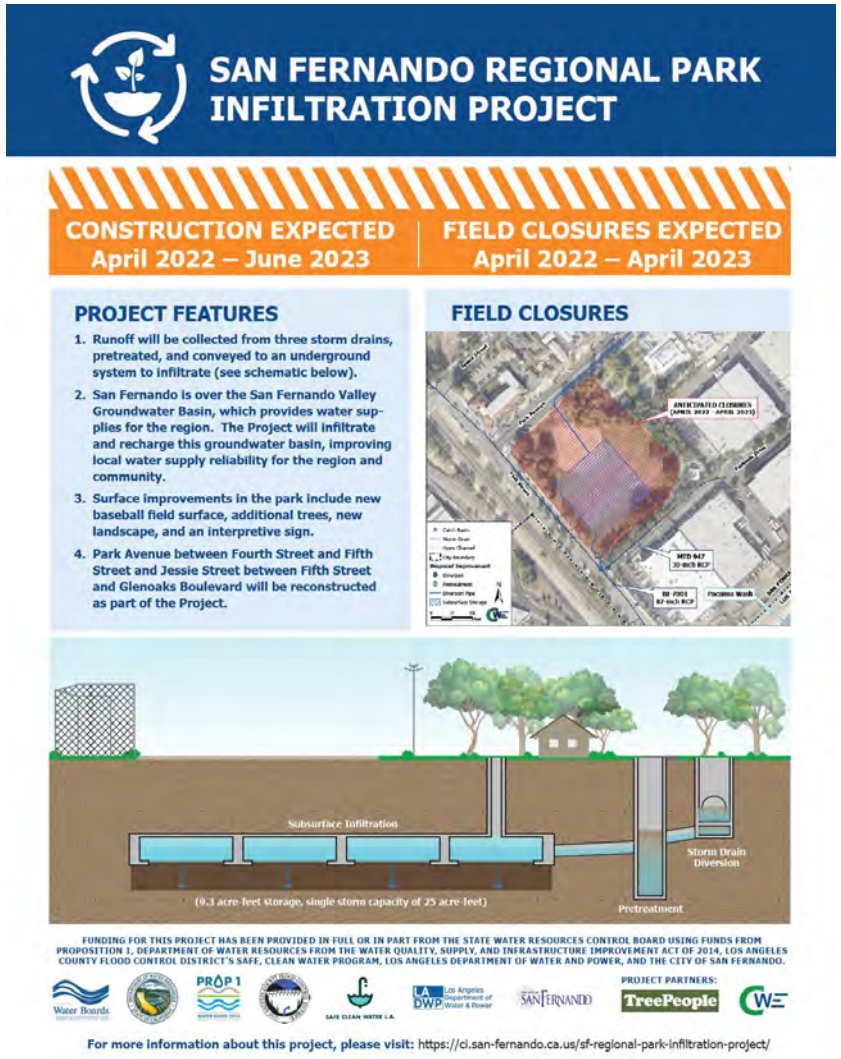
Construction Phase

Construction Phase

Construction Phase



Community Education and Outreach



Content prepared in English and Spanish

Project Funding

- State Water Resources Control Board using funds from Proposition 1
- Department of Water Resources from the Water Quality, Supply, and Infrastructure Improvement Act of 2014
- Los Angeles County Flood Control District's Safe, Clean Water Program
- Los Angeles Department of Water and Power
- City of San Fernando

Lessons Learned

- Consider additional capture alternatives: initial Project expansion helped the City improve water quality over a larger drainage area.
- Confined space within site: phasing is a good approach to reduce costs for additional trucking/storage.
- Funding challenges: think creatively to leverage multiple sources
  - The Project team secured a variety of funding, which allowed the City to move forward with Project implementation with minimal cost.
- Communication and controls: plan early on for how these systems will communicate and check in periodically for changes.

Operation and Maintenance

- Operations and Maintenance (O&M) is critical in project success and will prolong the Project's lifespan
- Includes information relevant to the diversion system, conveyances, proprietary systems, subsurface storage system, monitoring equipment, and electrical components.
- General O&M requirements anticipated are described in the following charts

Operation and Maintenance

Summary of Anticipated O&M by Project Component

Component	Operation/Maintenance	Inspection Frequency
Diversion System (Inlet and pipe)	• Inspect for accumulated sediment and debris over grate and within manhole • Remove accumulated sediment and debris (litter and leaves) from the grate and inside structure • Inspect conveyance pipe for clogging • Remove accumulated materials from the pipe system	Before and after the storm season
Pretreatment System	• Inspect for blockages or obstructions in the inlet and separation screen • Clear blockages or obstructions if observed • Inspect sump to assess volume of sediment accumulated • Use vacuum truck to remove accumulated sediment and debris once the sump is 75% full	Before and after the storm season
Subsurface Storage System	• Inspect for clogging at inlet pipes • Clear debris and material at inlet if clogged • Inspect for sediment accumulation within storage area • Use a vacuum truck to remove accumulated sediment and debris as appropriate • Observe infiltration rates over time to confirm infiltration areas are not clogged • Restore infiltration if rates impacted significantly (maintenance requirements may vary based on issue)	Before and after the storm season
Flow Meter	• Inspect flow data to identify anomalies • Troubleshoot with manufacturer if data anomalies observed • Mostly maintenance free, but should be calibrated annually	Once a year

Project Completion

AIA
Approved
Continuing
Education

Questions and Answers with:

Katie Harrel, P.E.
Special Projects Manager
CWE

Charlie Carter
Senior Territory Manager - West Region
StormTrap

Todd Danielson
Editorial Director
Informed Infrastructure

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