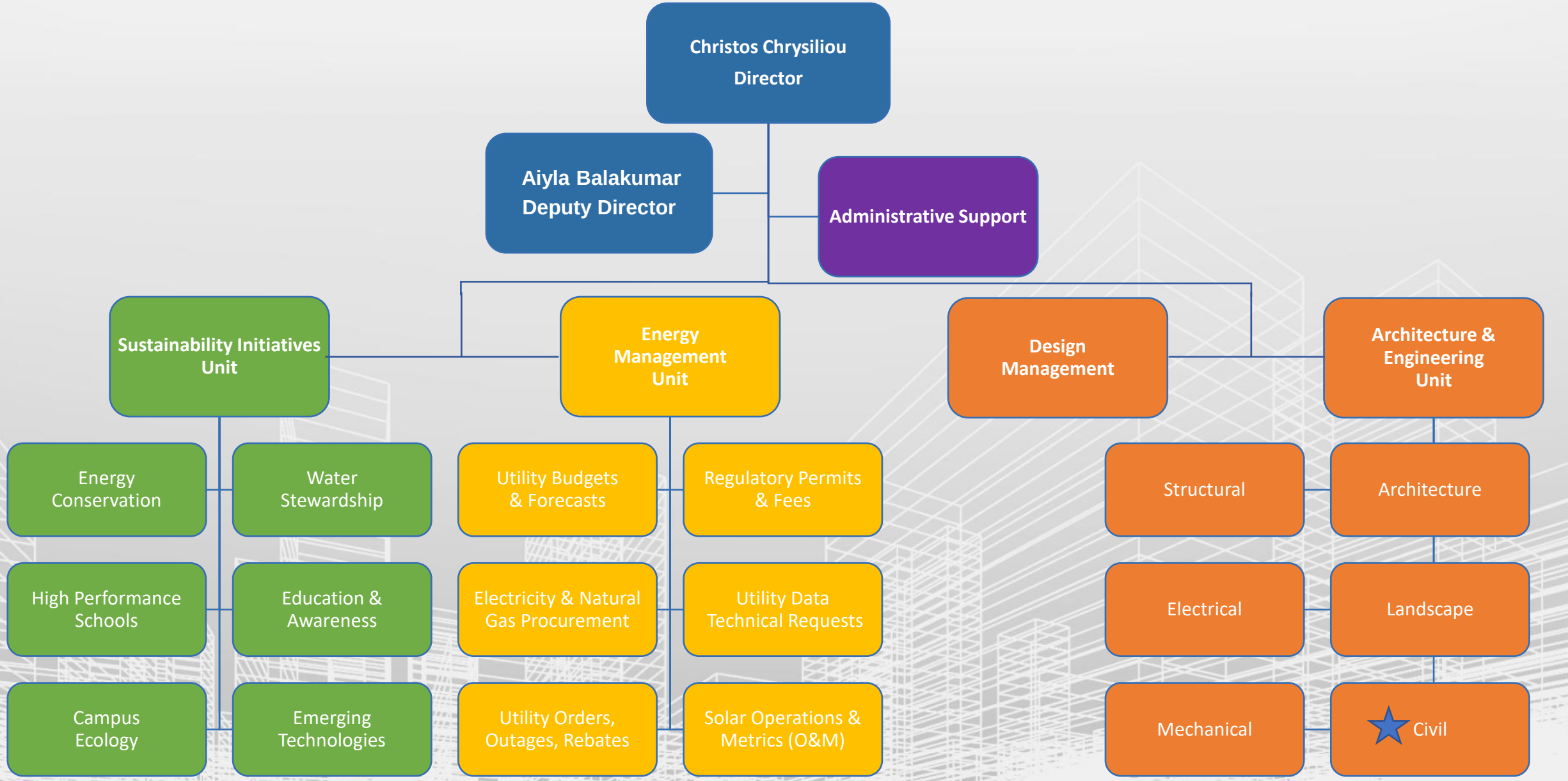
Stormwater Capture LID/BMP's Presentation

Maintenance & Operations Branch

ARCHITECTURAL & ENGINEERING SERVICES

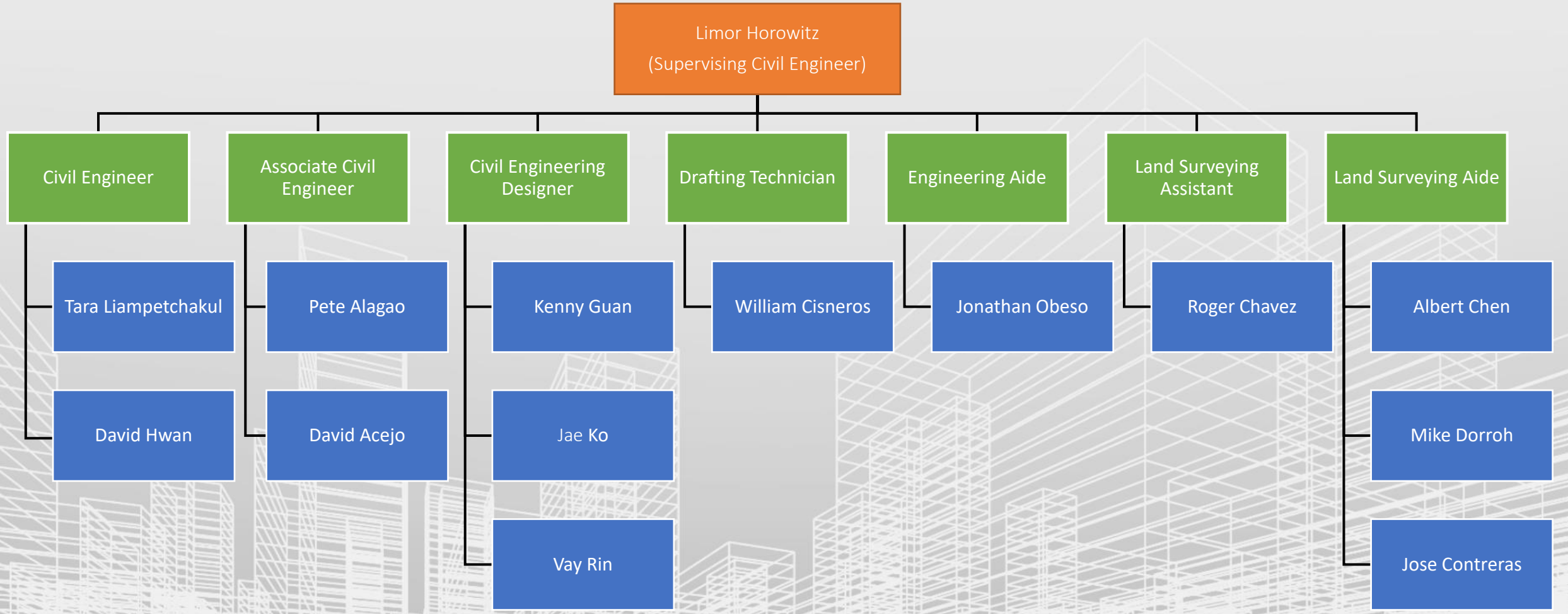
June 1, 2022

Christos Chrysiliou, AIA, CCM, LEED AP BD+C
Director of Architecture & Engineering Services



A&E Services Organization Structure

Civil Engineering Unit



A&E Services Organization Structure

Civil Engineering Unit Duties

Pre-Design

- Scoping/ PRDs
- Site Analysis
- Feasibility Studies

Survey

- Field Survey
- Topographic Plan
- GPR & Ground Marking
- CCTV/ Utility Potholing
- Legal Descriptions

Design

- Grading and Paving
- Utilities
- Erosion Control
- Low Impact Development
- Hydraulic and Hydrology Analysis

Review

- Survey
- Legal Descriptions
- Civil Design Drawings and Specs
- Street Improvements

Construction Support

- Construction Staking
- Submittals and RFCs
- SWPPP permits and Inspections

Standards

- Update Standard Details, Specs, Design Guide, Storm Water Technical Manual
- Review Storm Water Drainage Products

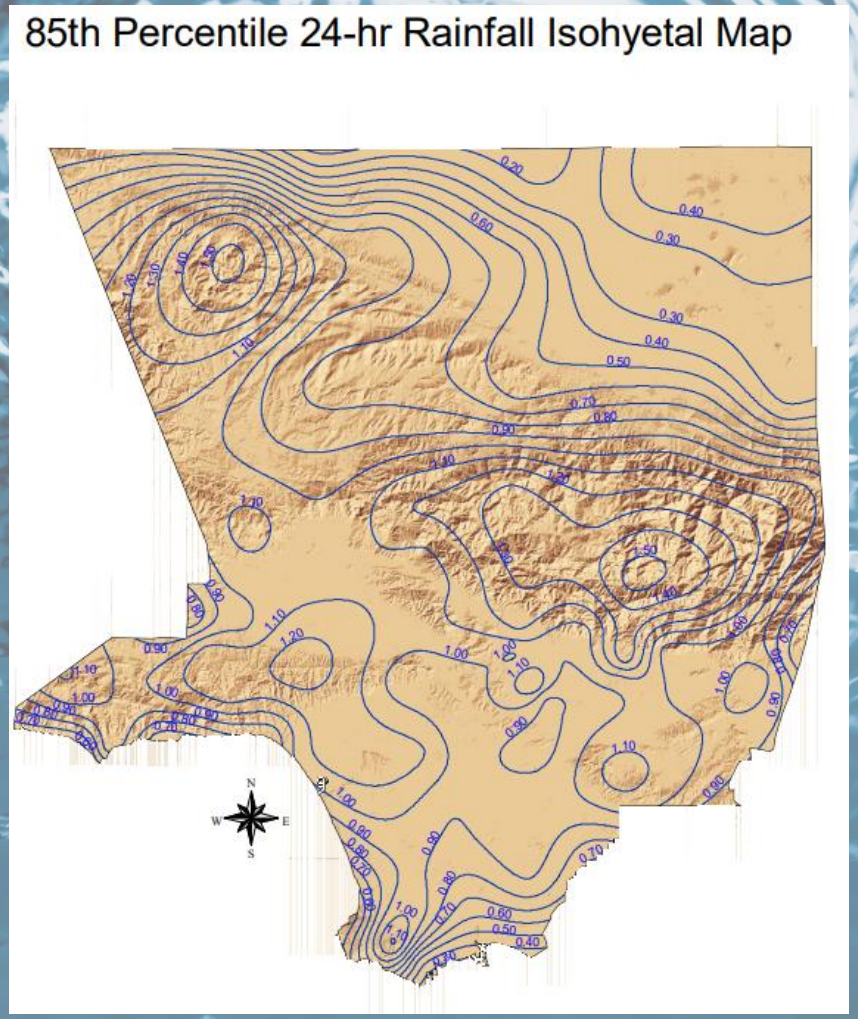
Stormwater Mitigation & Low Impact Development

Low Impact Development (LID) is a site design approach that uses techniques to store, infiltrate, evaporate, or re-use stormwater runoff on site

The goal of LID is to mimic undeveloped hydrology, increase groundwater recharge, enhance water quality, and prevent downstream degradation

LAUSD Requirements

- LAUSD implements Stormwater BMPs for projects that disturb more than 1 acre
- Currently, LAUSD is not mandated to comply with LA County LID requirements
- Per LAUSD Design Guide, projects shall be designed to meet the intent of the County LID requirements to the maximum extent practicable



LA County Hydrology Map:
https://dpw.lacounty.gov/wrd/hydrologygis/

What is the Required Stormwater Capture Volume?

- The capture volume is dependent on the size of the site and the location
- LID projects are required to capture the design storm, defined as the greater of:
  - The 0.75-inch, 24-hour rain event; or
  - The 85th percentile, 24-hour rain event
- Typically, the 85th percentile design storm will govern, as it is approximately $\pm$ 1 inch for most LAUSD sites.
- If infiltration is not feasible, alternative compliance is to treat 1.5 times the capture volume through bio-filtration

What are Stormwater BMPs?

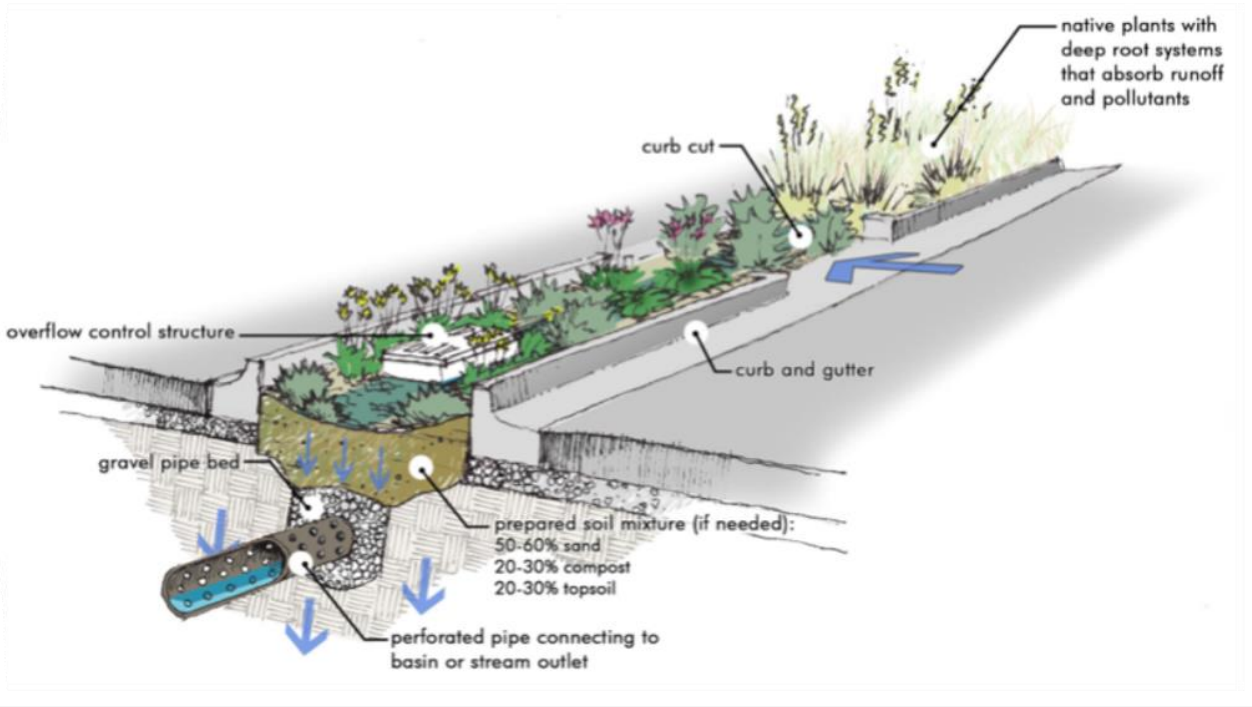
- BMP stands for Best Management Practices
- BMPs are structural, vegetative or managerial practices used to treat, prevent or reduce storm water pollution
- Examples of BMPs include vegetative swales, catch basin with filters, underground detention tanks, permeable pavement, hydrodynamic separation device, interceptors and many more

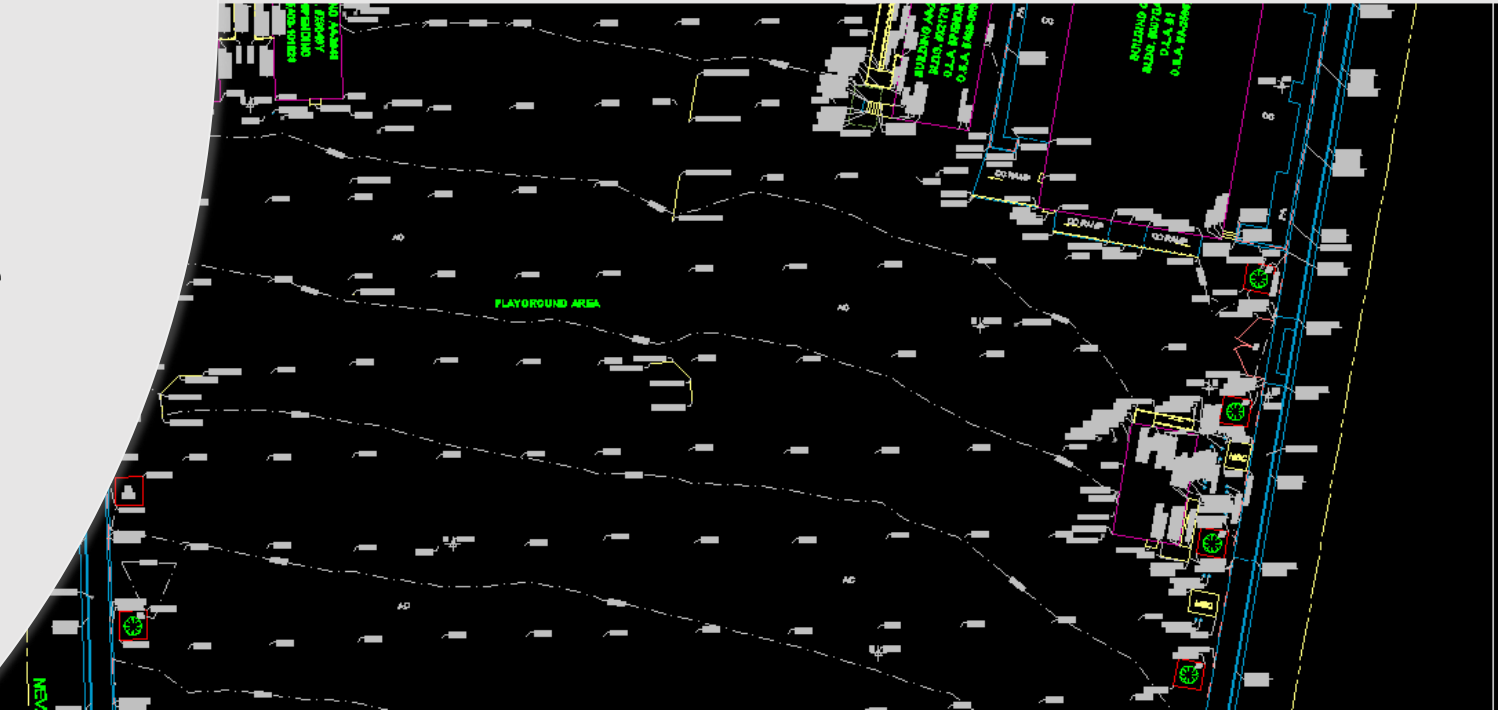
Benefits of Stormwater BMPs

- Reduces Stormwater Pollutants and Protects Water Quality
- Recharges Groundwater
- Alleviates Flooding by Reducing Runoff Volume
- Protects Streams, Natural Resources, and Aquatic Habitats and Species
- Increases Greening on School Campuses
- Provides Educational Opportunities

Site Considerations

- Topography
- Space Limitations/ Construction Access
- Safety/ ADA Requirements
- Pollutants of Concern
- Land Use
- Natural Drainage
- Geotechnical Considerations/ Soil Type
- Budget
- Life Cycle Cost and Maintenance

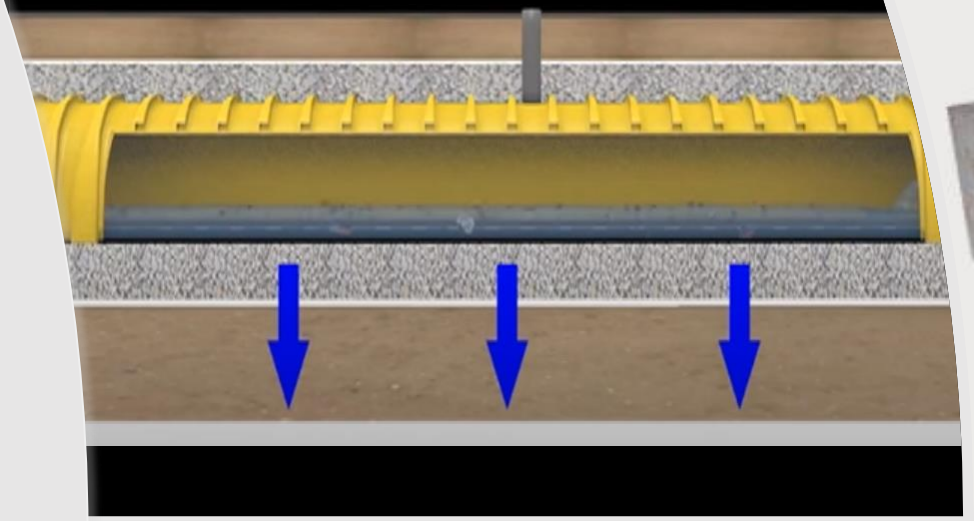




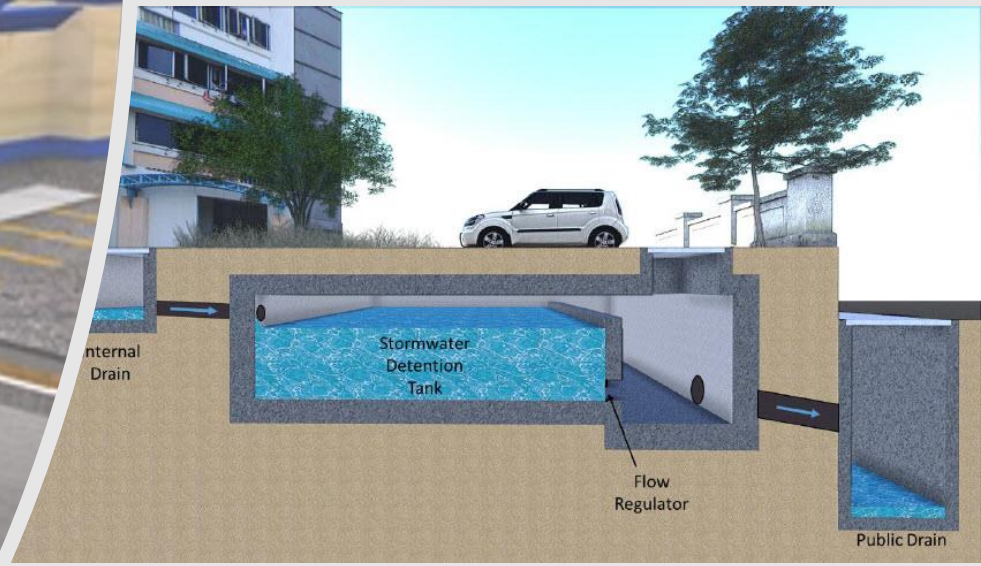
Underground Stormwater Tanks: Infiltration Vs. Detention

- Infiltration tanks allow for storage and infiltration of stormwater to recharge ground water and reduce runoff and pollutants
- Detention tanks collect and store stormwater runoff during a storm event, then releases it at a controlled rate allowing for sediment removal and reducing the impact on downstream infrastructure and streams
- Total of 74 tanks have been installed on 49 LAUSD sites
  - 57 Infiltration Tanks
  - 17 Detention Tanks

INFILTRATION

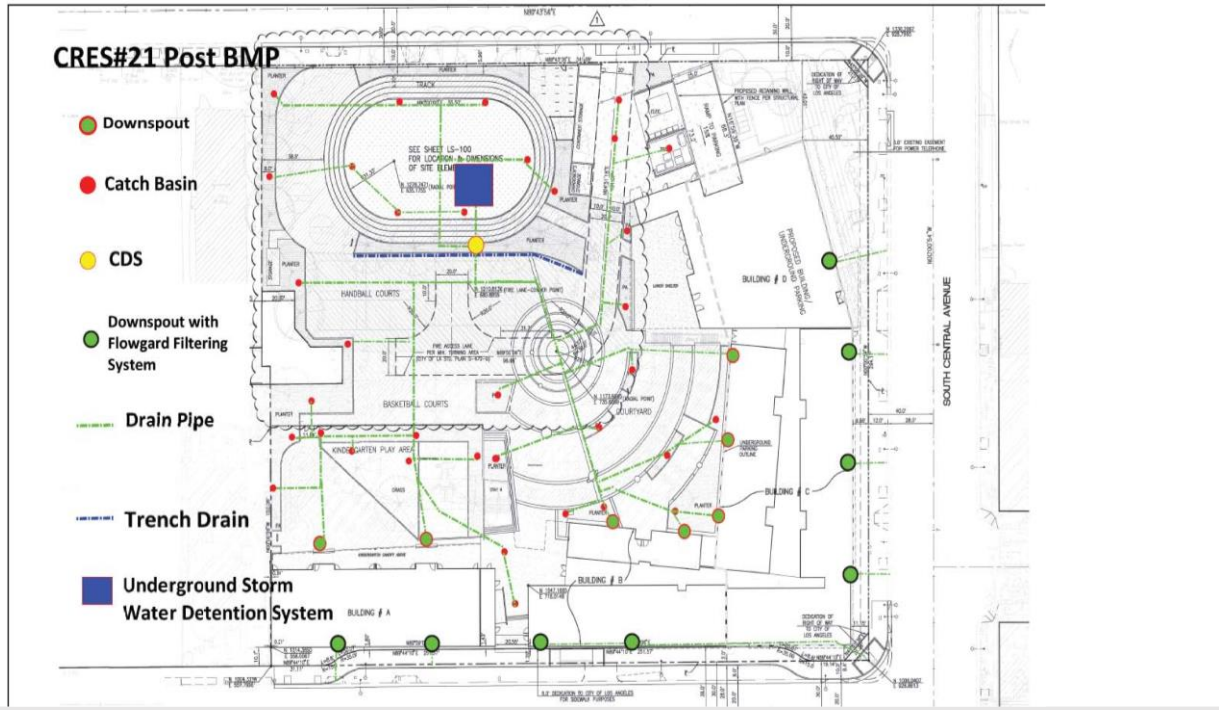


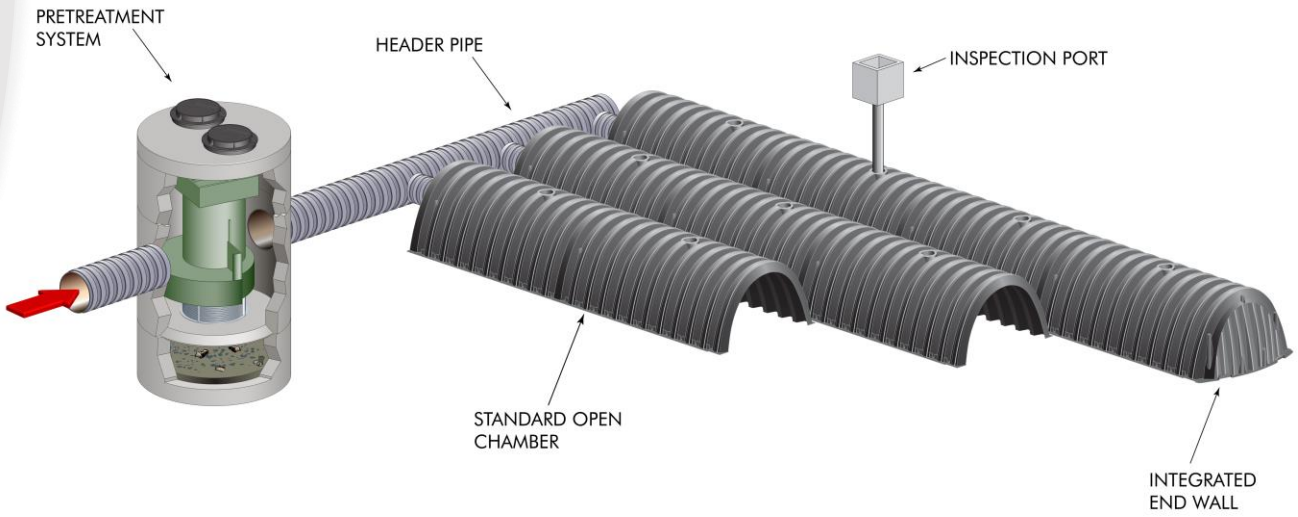
DETENTION



Site Design

- Stormwater Tanks should be located at the low end of the site to maximize the capture area and be installed away from buildings, foundations, retaining walls, and slopes
- Typically constructed under playground or play field areas and parking lots
- Pre-treatment is required to help prevent clogging and reduce maintenance of the tank
- Overflow/bypass connected to city storm drain system is required to prevent site flooding during larger storm events
- Depth and size will vary depending on site location, soil conditions, and drainage area

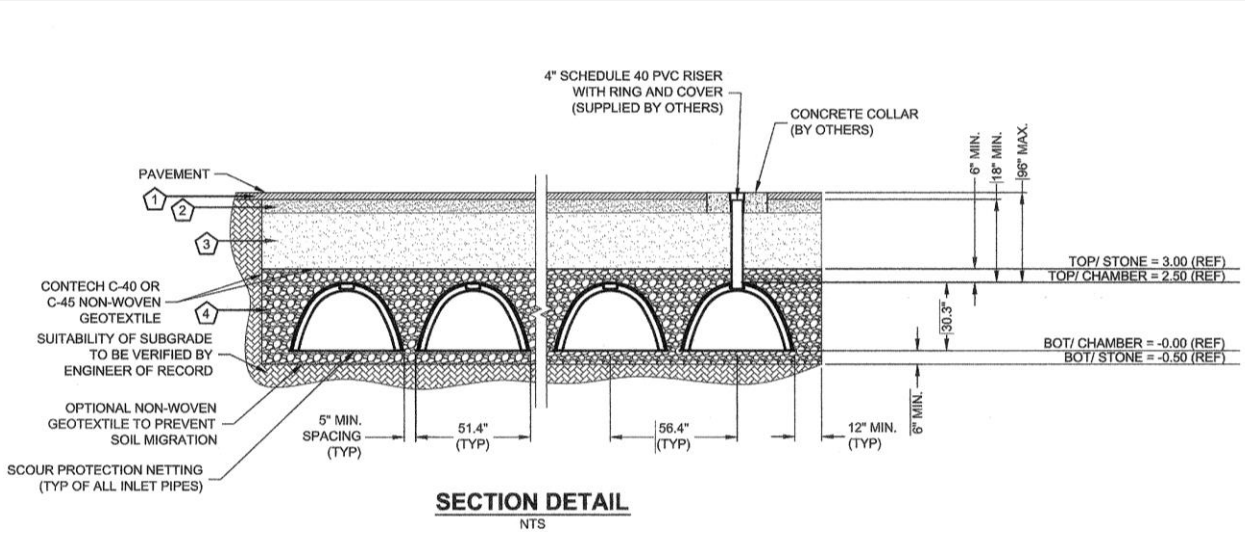




Infiltration Systems

- Used where soils have good infiltration rates, greater than 0.5 in/hr
- Depth of groundwater needs to be greater than 10 feet from bottom of infiltration system
- Not suitable for sites with clay or expansive soils, high groundwater table, or sites subject to settlement or liquefaction
- <u>Chatsworth HS – Paving Project</u>
  - Size/Footprint ≈ 8000 SF
  - Depth ≈ 7 FT
  - System Storage Volume ≈ 17,000 CF

CHATSWORTH HS

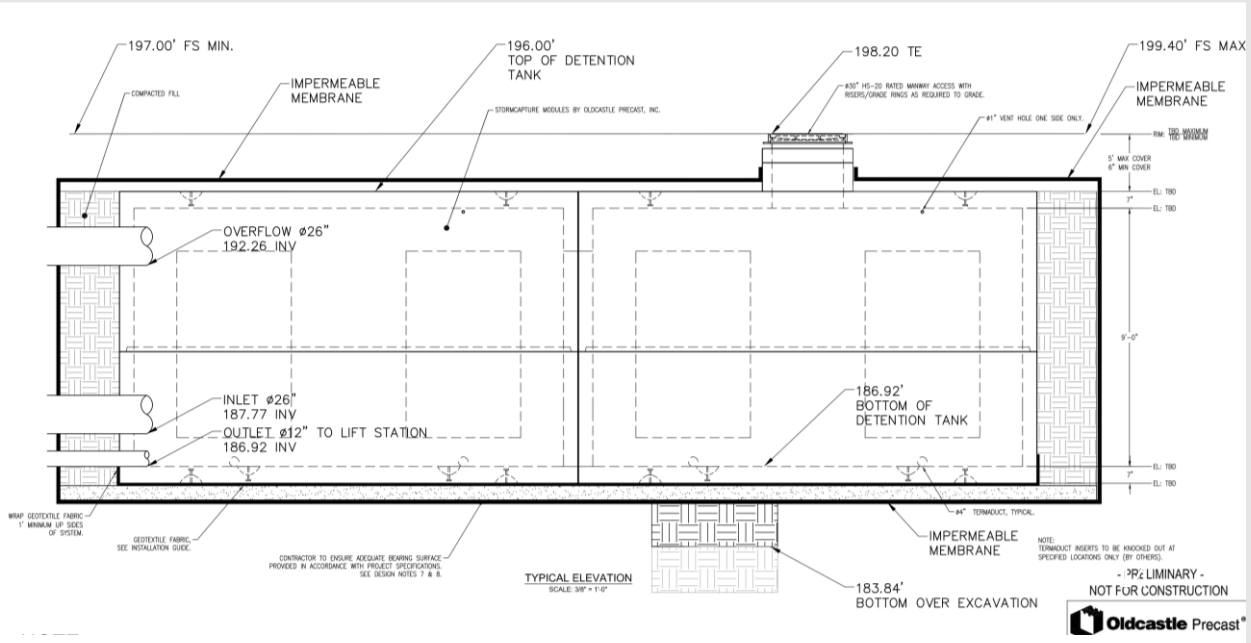


SECTION DETAIL
NTS

Detention Systems

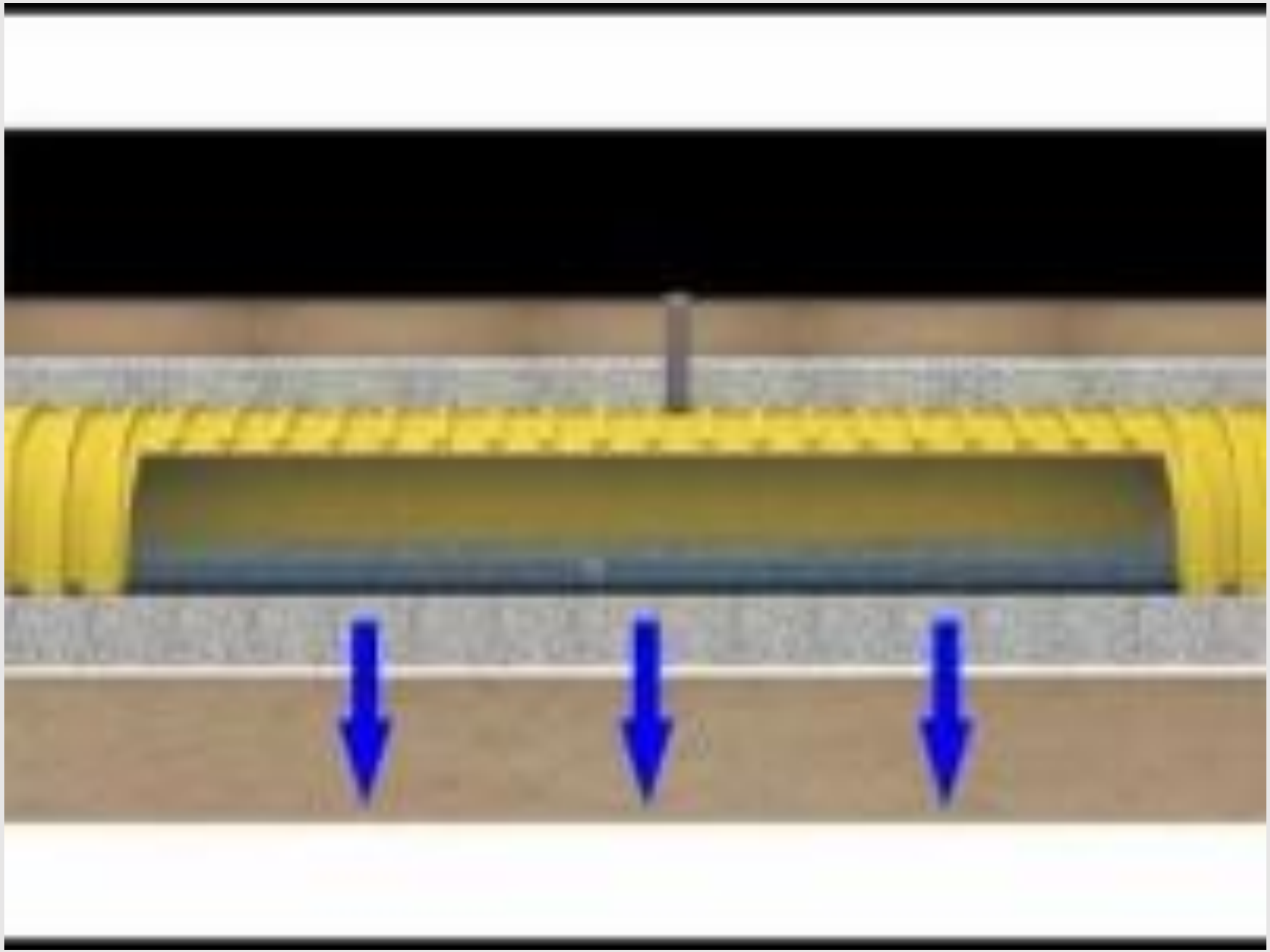
- Detention tanks allow for temporary storage and controlled release to public storm drain system
- Stormwater shall be treated prior to release
- Typically used when site soils have poor infiltration rates (<u>≤</u> 0.5 in/hr), high groundwater table, or other adverse soils conditions, or where infiltration is otherwise not feasible
- <u>Burroughs MS – Comprehensive Modernization</u>
  - Size/Footprint ≈ 4000 SF
  - Depth ≈ 10 FT
  - System Storage Volume ≈ 30,370 CF

BURROUGHS MS



LAUSD Approved Products

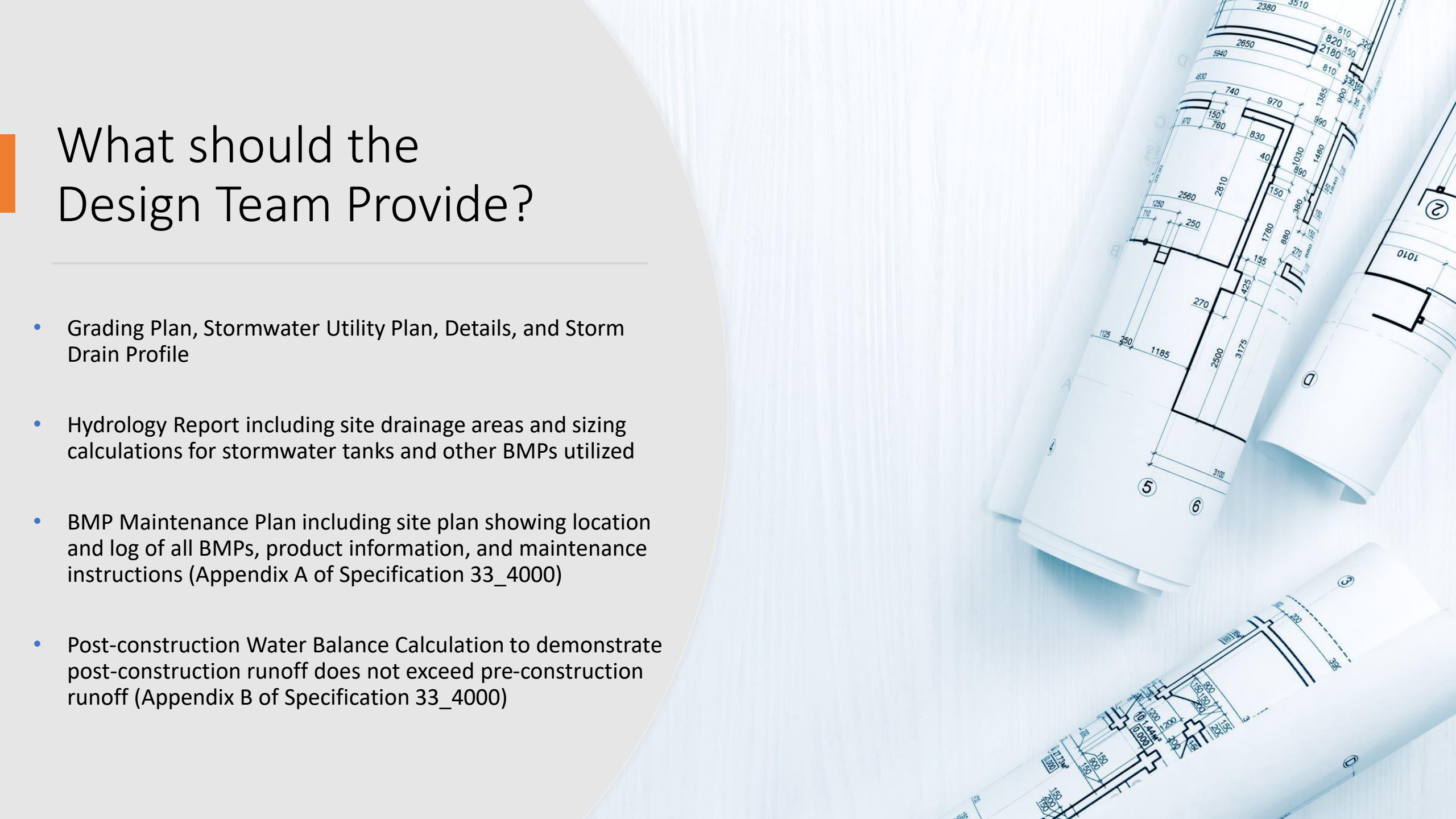
- Approved products are listed under Specification 33_4000 Storm Drainage Utilities
- All products can be used as either Infiltration or Detention Systems
  - Infiltration Systems will have an open bottom or permeable gravel layer
  - Detention Systems will have a closed bottom or impermeable liner
- <u>Proprietary Retention/Infiltration BMPs – Reinforced Precast Concrete:</u>
  - Jensen Precast: Precast-Concrete-Arches.
  - Oldcastle Precast Inc.: Storm Capture Infiltration.
  - StormTrap: Single-Trap-Infiltration.
- <u>Proprietary Detention/Infiltration BMPs – Polypropylene or Polyethylene:</u>
  - ADS - Storm Tech: MC3500, MC4500, SC740 or DC780.
  - Contech: ChamberMaxx.
  - NDS: StormChambers SC34 or SC44.
  - Prinsco: HydroStor HS180 or HS75.
  - Triton: S22 or S29.

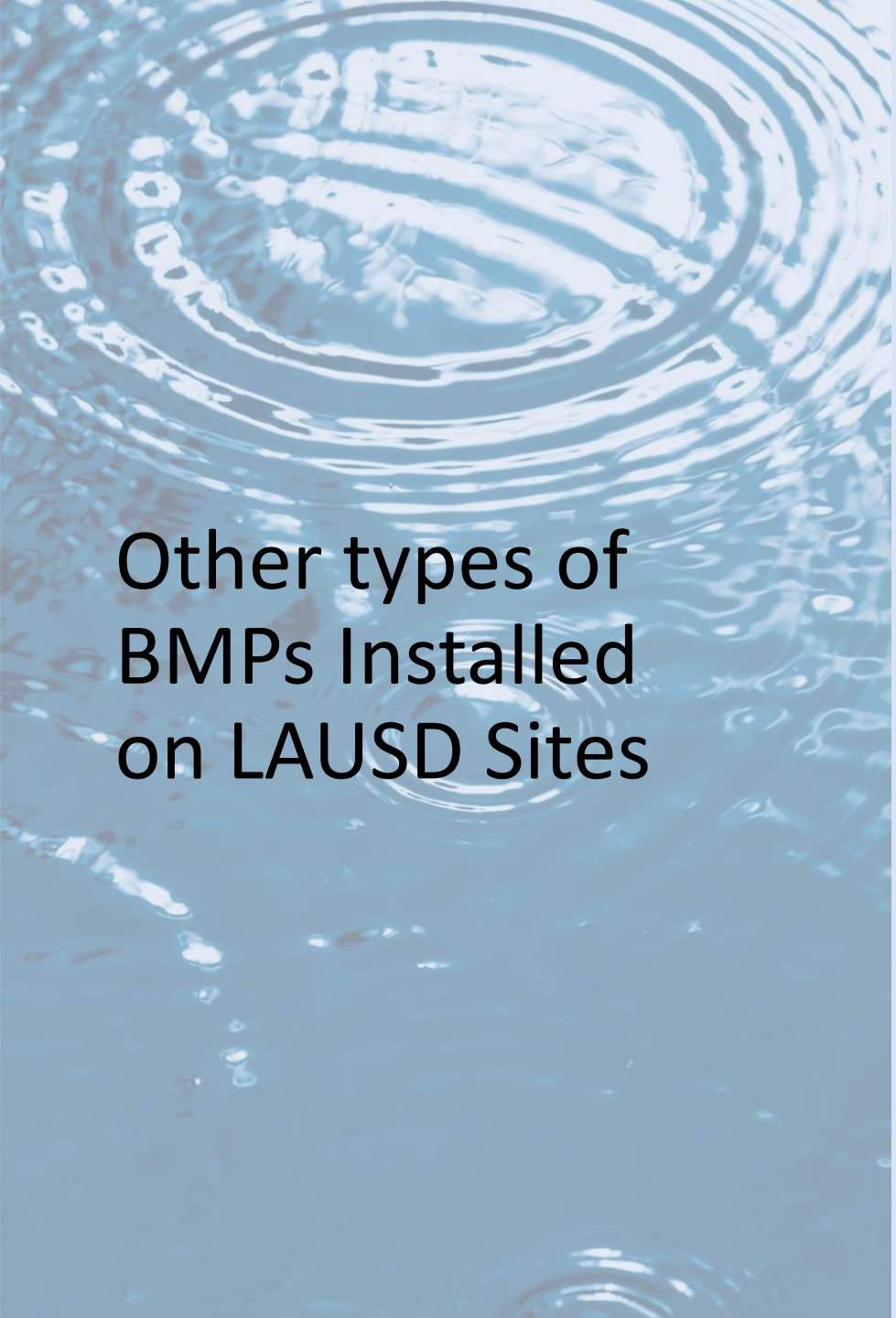


https://www.youtube.com/watch?v=Upn5aPEESGA

What should the Design Team Provide?

- Grading Plan, Stormwater Utility Plan, Details, and Storm Drain Profile
- Hydrology Report including site drainage areas and sizing calculations for stormwater tanks and other BMPs utilized
- BMP Maintenance Plan including site plan showing location and log of all BMPs, product information, and maintenance instructions (Appendix A of Specification 33_4000)
- Post-construction Water Balance Calculation to demonstrate post-construction runoff does not exceed pre-construction runoff (Appendix B of Specification 33_4000)





Other types of BMPs Installed on LAUSD Sites

Infiltration Systems

- Infiltration Trenches
- Bioretention Areas
- Drywells
- Permeable Pavement

Stormwater Filters

- Stormwater Interceptors
- Hydrodynamic Separation Devices
- Catch Basin Filters
- Downspout Filters

Biofiltration Systems

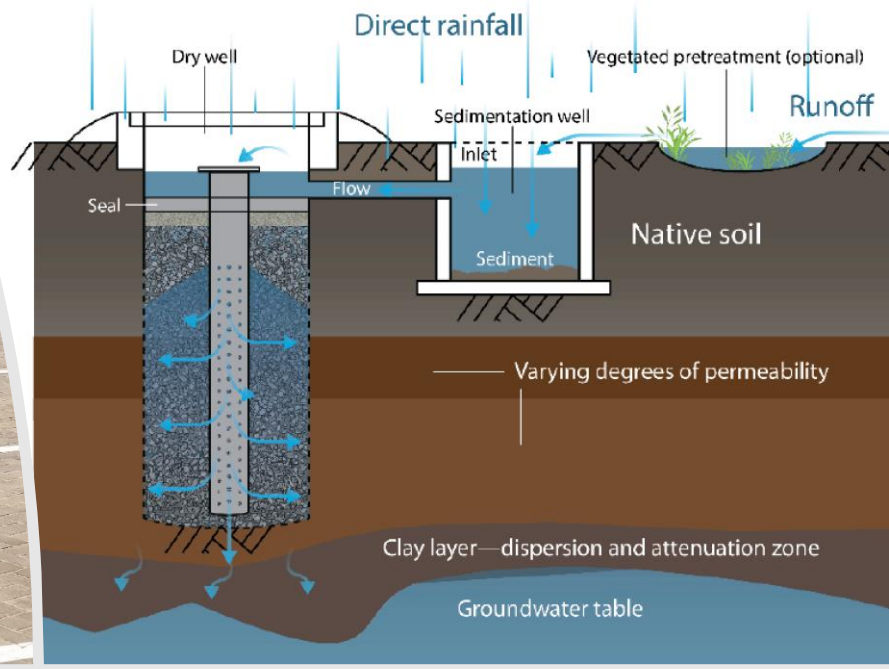
- Stormwater Planters
- Tree-well Filters
- Bioswales and Biofiltration Areas

Infiltration Trenches and Bioretention Areas

- Infiltration trenches are long, narrow, gravel-filled trenches that store and infiltrate stormwater runoff into the surrounding soils

- Bioretention areas are landscaped shallow depressions that capture, filter, and infiltrate stormwater runoff

Drywells and Permeable Pavement

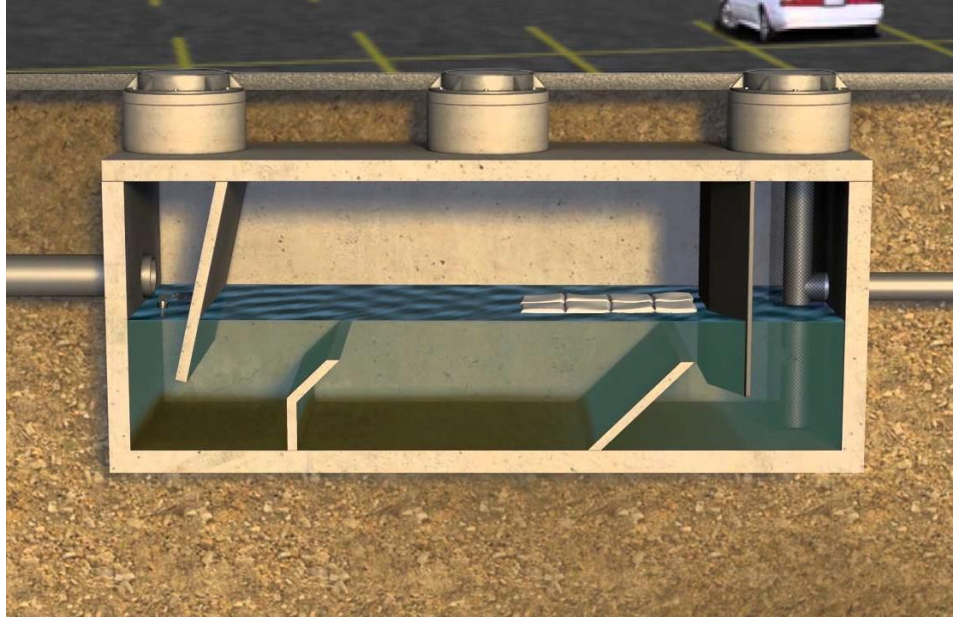


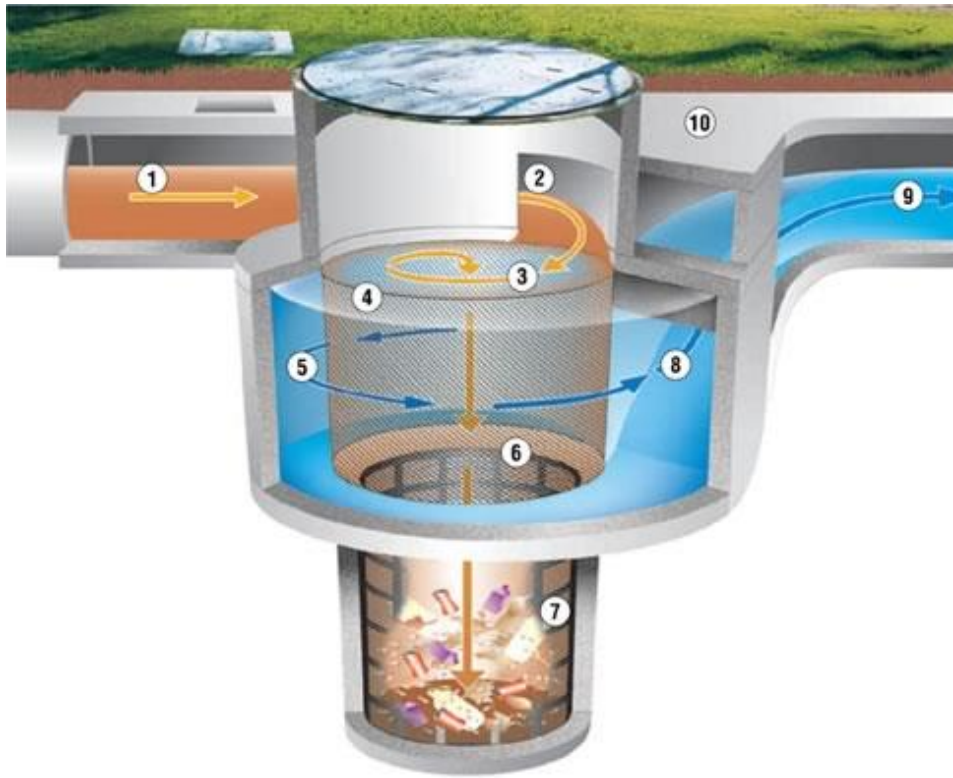
- Drywells are shafts constructed in the ground to alleviate flooding and to store and infiltrate runoff, primarily from rooftops or other impervious areas; used when there is limited space or where favorable soils are deeper

- Permeable pavements infiltrate water and reduces pollutants from reaching water bodies carried by runoff

Stormwater Interceptors and Hydrodynamic Separation Devices

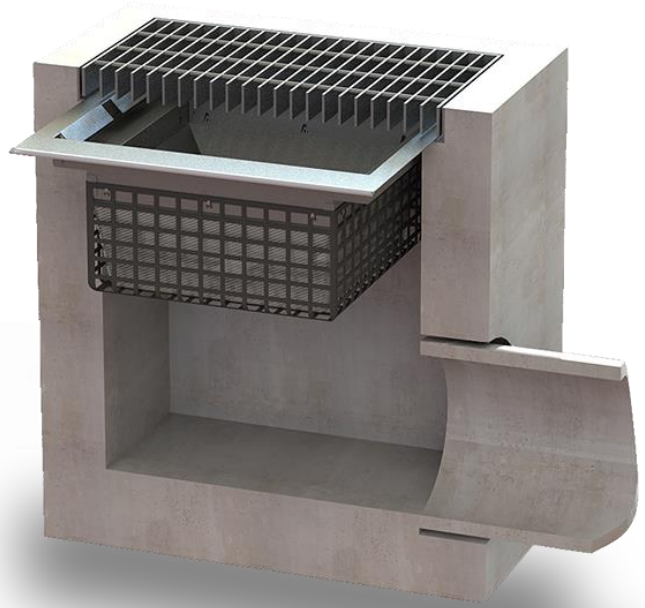
- A storm water interceptor is a system designed to capture contaminants and provide treatment of captured runoff
- Hydrodynamic separators use swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff
- Typically used for pretreatment or where there is limited space





Downspout and Catch Basin Filters

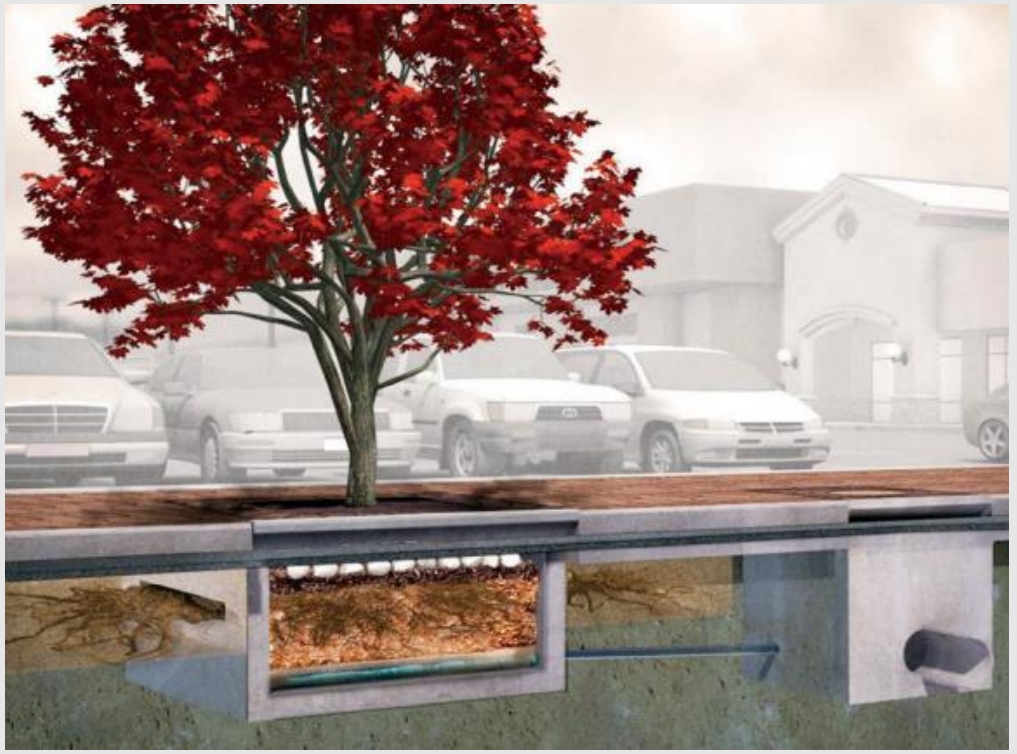
- Downspout Filters capture pollutants from rooftop stormwater runoff
- Catch basin filters are placed in a drop inlet to remove sediment and debris and may include sorbent media to remove floating oil
- Can be used for pre-treatment or where there is limited space or budget



Stormwater Planters and Tree Well Filters

- Stormwater planter boxes function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes, typically used to treat roof runoff

- Tree well filters are biotreatment devices that consist of pre-cast concrete boxes with a small tree or shrub planted in a bed filled with soil media



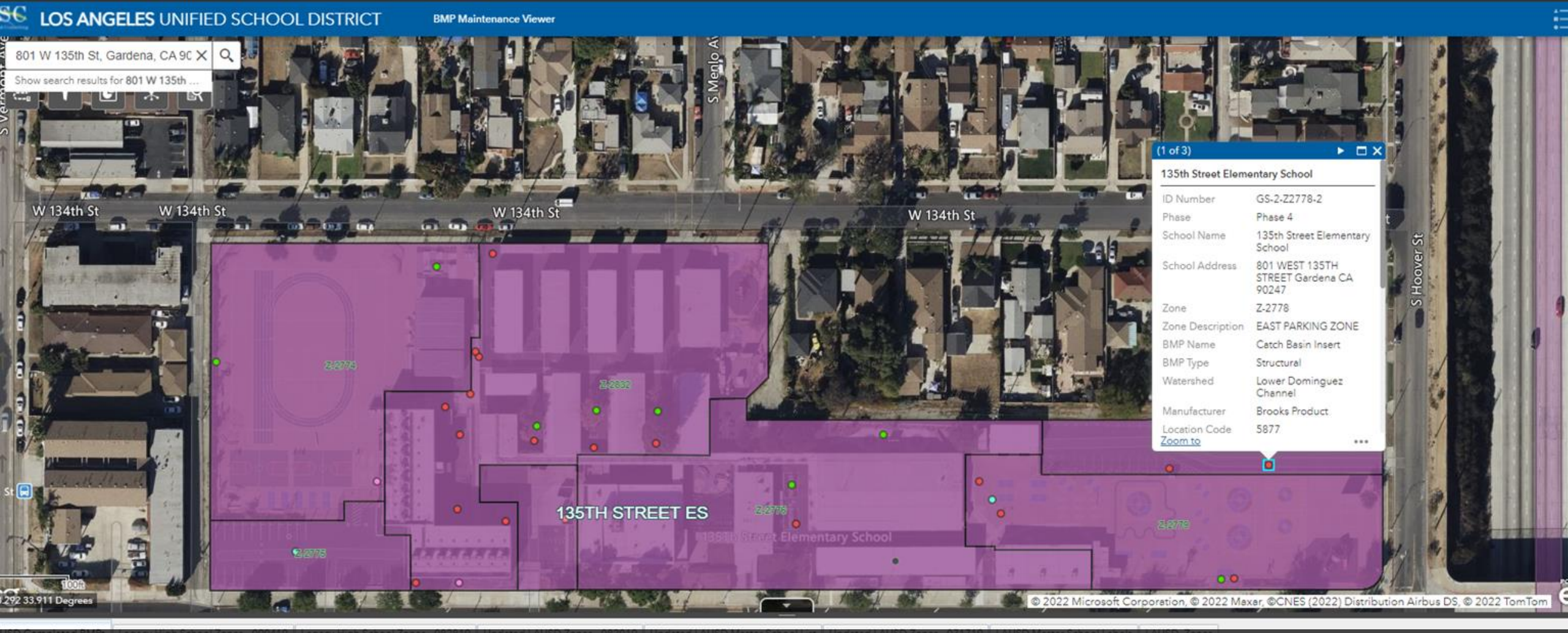
Bioswales and Biofiltration Areas

- Bioswales provide pollutant removal through settling and filtration in the vegetation lining the channels

- Biofiltration systems use vegetation and soils or other filtration media to treat stormwater runoff. The combined effects of filtration, absorption, and biological uptake removes pollutants.

BMP GIS Data Collection

- Database being developed to collect inventory of all BMPs installed at LAUSD sites to be incorporated into CAFM
- Will help track and ensure proper performance and maintenance of the BMPs
- 127 sites have been surveyed to date
- Future sites will be added as construction projects are completed



BMP GIS Data Collection

https://casceng.maps.arcgis.com/apps/webappviewer/index.html?id=fc3085e781d44707b0ba1bb13e3d2d8e

Phase	School Name	School Address	Zone	Zone Description	BMP Name	BMP Type	Watershed	Manufacturer	Location Code	Component ID	Quantity	Product/Model Number	Notes	Latitude	Longitude	Link to Maintenance Checklist
Phase 4	135th Street Elementary School	801 WEST 135TH STREET Gardena CA 90247	Z-2778	EAST PARKING ZONE	Catch Basin Insert	Structural	Lower Dominguez Channel	Brooks Product	5877	23848	1	Grate and fabric filter. Fabric is observed but damaged.		33.90958700	-118.28795900	
Phase 4	135th Street Elementary School	801 WEST 135TH STREET Gardena CA 90247	Z-2779	EAST PLAYGROUND ZONE	Proprietary Infiltration BMPs	Structural	Lower Dominguez Channel	Advanced Drainage System	5877	24279	1	Stormtech MC-3500		33.90950500	-118.28850900	

Reference Materials and Links

LAUSD Stormwater Technical Manual

https://www.laschools.org/documents/?folder_id=310975918

LAUSD Stormwater Specifications

https://www.laschools.org/documents/file?file_id=220073945

Los Angeles County LID Manual

https://pw.lacounty.gov/wmd/dsp_LowImpactDevelopment.cfm

Los Angeles DBS Guidelines for Storm Water Infiltration

https://www.ladbs.org/docs/default-source/publications/information-bulletins/building-code/p-bc-2020-118-guidelines-for-storm-water-infiltration.pdf?sfvrsn=32f9f753_10

Questions?

A&E Services