

Figure 2 Infiltration Trench

Manhattan Beach Trench Overview

The BMP planned along the beach within monitoring location SMB-5-2 in Manhattan Beach is an infiltration trench. Underground infiltration trenches are long, linear facilities with a permeable base and sides designed to infiltrate runoff. It is usually not practical to infiltrate runoff at the same rate that it is generated; therefore, these facilities generally include both storage and drainage components. Infiltration trenches remove pollutants from stormwater by infiltrating stormwater into the site's natural soils beneath the system.

Existing Site Conditions



The site is a public beach located within Manhattan Beach. The beach is adjacent to a walking/bike path and consists of recreational open space and numerous volleyball courts.

Treatment Process



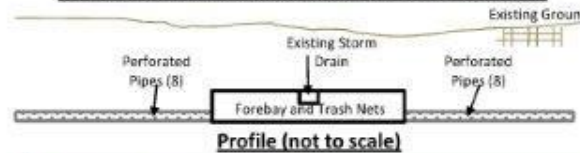
The BMP will consist of pretreatment of flows from existing outfalls and an infiltration trench. Dry- and wet-weather flows from the 28th Street storm drain will enter the forebay and trash nets for pretreatment and flow into a series of sixteen parallel perforated pipes extending laterally from both sides of the forebay. The perforated pipes will be laid amongst a bed and fill of gravel to enhance storage prior to infiltration into site soils. When persistent flows fill the system to storage capacity, additional runoff will overflow from the forebay via an overflow chute and re-enter the existing drainage system. Dry- and wet-weather flows from secondary outfalls (32nd St, 27th St, 24th St, Marine Pl, 21st St) will be treated by either existing or proposed pretreatment units and diverted from existing storm drains upstream of the trench and routed over the trench, into an open-bottom concrete vault, allowing flows to infiltrate into the trench from above.

*Products shown above were used for sizing and cost analyses; however, other equivalent products may be used.

Site Configuration



Plan View (Preliminary Footprint – Subject to Change)

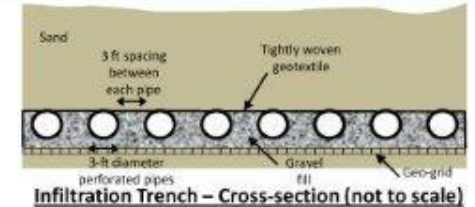


Design Parameters

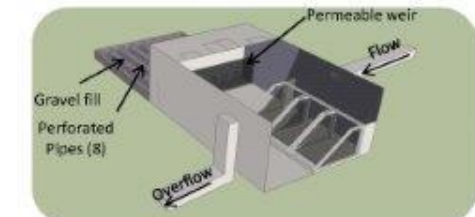
General						
Tributary Area (ac)	1565		Drawdown Time (hrs)	72		
Storm Drain	4'x6' box culvert		Sat. Hyd. Cond. (in/hr)	12.5		
Outfall						
	32 nd St ^a	28 th St	27 th St	24 th St	Marine Pl	21 st St
Design Criteria						
Max. Design Inflow Rate (Q _{max}) (cfs)	5.1	150	2.4	1.9	0.2	2.3
Design Storage Volume(AF)	9.1					
Cumulative Loss Rate (cfs)	48.75					
Infiltration Footprint (ft ²)	1,87,500					
Design Parameters						
Existing BMPs near outfall	Storm-ceptor	Storm-ceptor	WQ Catch Basin	-	WQ Catch Basin	-
CDS Unit required?	No	No	No	Yes	No	Yes
Forebay Footprint (ft ²)	-	12,500	-	-	-	-
Forebay Length/Width (ft)	-	250/50	-	-	-	-
Forebay Ponding Depth (ft)	-	3.5	-	-	-	-
Trench Footprint (ft ²)	1,87,500					
Trench Length/Width (ft)	3,750/50					

^aFactor of safety of 10 applied to saturated hydraulic conductivity
^b32nd Street outfall treated by 28th Street trench although it is within monitoring location SMB 5-1

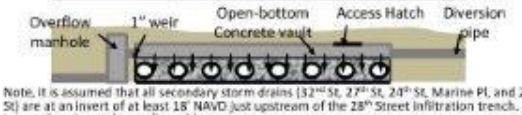
Typical Details



Infiltration Trench – Cross-section (not to scale)



In-line Forebay – Isometric view (not to scale)



Note: It is assumed that all secondary storm drains (32nd St, 27th St, 24th St, Marine Pl, and 21st St) are at an invert of at least 18' MVD just upstream of the 28th Street infiltration trench. Invert elevation to be confirmed by survey.

Secondary Connection to Infiltration Trench – Cross-section (not to scale)

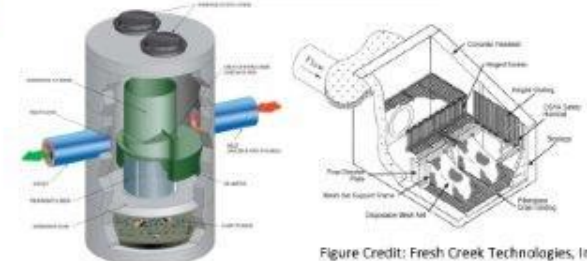


Figure Credit: Cotech Stormwater Solutions
 Product shown: Cotech In-line CDS Unit*

Figure Credit: Fresh Creek Technologies, Inc.
 Product shown: End-of-Pipe Netting Trash Trap **

CDS Unit – Isometric view (not to scale)

Trash Nets – Isometric view (not to scale)

FIGURE 11	SMB-5-2 Subsurface Infiltration Trench Conceptual Design (10% Design): Manhattan Beach	
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Figures 3 Infiltration Gallery

Polliwog Park BMP Overview

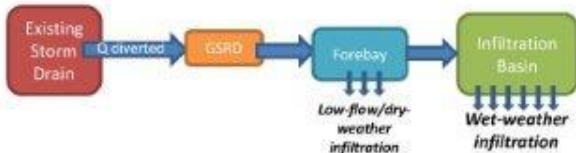
The BMP planned for the Polliwog Park site is an infiltration gallery. Infiltration galleries are generally similar to subsurface storm water detention systems but are constructed with a permeable base and sides designed to infiltrate runoff. It is usually not practical to infiltrate runoff at the same rate that it is generated; therefore, these facilities generally include both storage and drainage components. Infiltration basins remove pollutants from stormwater by infiltrating stormwater into the site's natural soils beneath the system.

Existing Site Conditions



The site currently consists of a 1-acre pond, three gazebos, botanical gardens, play areas, baseball fields, a recreational swimming pool, restroom facilities, and open grassy areas that can be used for recreational activities.

Treatment Process

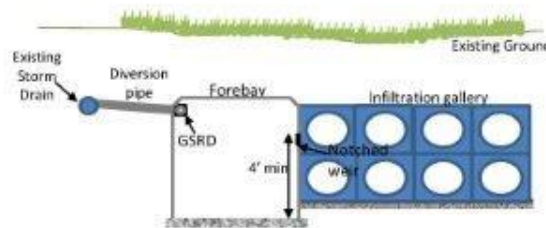


The BMP will consist of a diversion, conveyance pipes, a gross solids removal device (GSRD), a forebay, and an infiltration gallery. Dry- and wet-weather flows will be diverted from the existing storm drain up to the Q_{divert} , will flow into the forebay through the conveyance pipe and GSRD and begin to infiltrate into the site soils. Flows exceeding the loss rate of the forebay will fill the forebay and ultimately overflow via a notched weir into the infiltration gallery, where additional infiltration will occur. The system will fill until inflows no longer exceed loss rates, at which time the basin will drawdown. When persistent flows fill the system to storage capacity, runoff in the storm drain will bypass the diversion until capacity is freed up through infiltration losses.

Site Configuration



Plan View (Preliminary Footprint – Subject to Change)

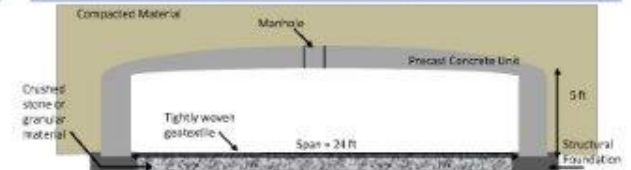


Profile (not to scale)

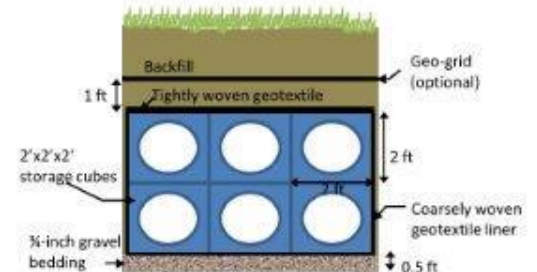
Design Parameters

General			
Tributary Area (ac) (portion treated by Manhattan Heights)	458	Drawdown Time (hrs)	72
Storm Drain Diverted	21" RCP	Sat. Hyd. Cond. (in/hr)	0.74
Design Criteria			
Max. Diversion Flow Rate (Q_{divert}) (cfs)	11	Cumulative Loss Rate (cfs)	0.64
Design Storage Volume (AF)	3.4	Infiltration Footprint (ft ²)	38,040
Design Parameters			
Pretreatment		Infiltration Gallery	
GSRD Length (24" diam.) (ft)	15	Gallery Footprint (ft ²)	36,068
Forebay Footprint (ft ²)	2,496	Gallery Length (ft)	254
Forebay Length (ft)	104	Gallery Width (ft)	142
Forebay Width (ft)	24	Gallery Ponding Depth (ft)	4
Forebay Ponding Depth (ft)	5		

Typical Details



Forebay – Cross-section (not to scale)



Infiltration Gallery – Cross-section (not to scale)

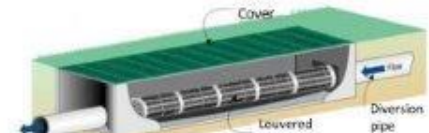


Photo credit: Roscoe Moss Company
Product shown: StormFlo™

GSRD – Isometric view (not to scale)



Photo credit: www.eishleryvision.com
Product shown: CUBO™

Stormwater Chambers

FIGURE 12	Polliwog Park Subsurface Infiltration Gallery Conceptual Design (10% Design): Manhattan Beach	
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