

**SCVURPPP
C.3 Workshop
June 10, 2021**

GSI Product Updates

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Ward Street GSI Fact Sheet

Summary

- Pavement type: Pre-cast pervious concrete pavers
- Price: \$200 per square foot installed. The City of Berkeley is planning a 2nd project with the same paver and the bid price has come down from \$200 to \$100 per square foot now that the contractor has experience installing with the system.
- Useful for low traffic load locations like the gutter area.
- Modular system can be removed and replaced easily.

Before



During



During



After



Draft Fact Sheet

Santa Clara Valley Urban Runoff Pollution Prevention Program – Green Stormwater Infrastructure Case Study

WARD STREET IMPROVEMENT

GREEN AND COMPLETE STREET PROJECT

Project Description

The project is part of the City of Berkeley's green stormwater infrastructure (GSI) program installing GSI measures throughout the City with funding from a voter-approved initiative – Measure T1: Street Improvements and Green Infrastructure. The goals of the project were to improve safety, drainage, the environmental and durability with new paving, speed tables and by replacing the typical concrete gutter with precast pervious concrete pavers. The project improves the drainage and infiltration of water on one side of Ward Street. The pervious pavement manages 0.25 acres of roadway drainage area.

Completion Date
November 2020

Project Duration
Design/Bid Phase:
October 2019 –
June 2020

Construction Phase:
September 2020 –
November 2020

Funding and Costs
\$400,000
Source: City Funds

Stormwater Control Measures



Pervious Pavement

Precast pervious concrete pavers in the roadway gutter (approximately 2,000 sq. ft. total)

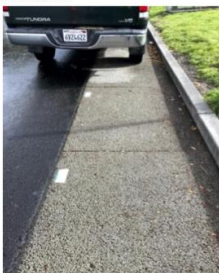
Construction Photo



Before Photo



After Photo



Key Elements

- 2,000 sq. ft. (4' wide strip) of precast pervious concrete panels were installed in the gutter area.
- The product used, "Stormcrete Precast Porous Concrete" slabs, has an expected lifespan of 25 to 40 years, depending on use and location, and comes with a 12-month warranty.
- Per the manufacturer, the average installed cost ranges from \$16-19 per sq. ft., depending on the number of slabs required and shipping distance.
- The prime contractor was Bay Cities Paving & Grading, and the subcontractor was Rosas Brothers Construction.



LOCATION

Ward Street from Mabel Street to Park Street
Berkeley, CA

WARD STREET IMPROVEMENT

Santa Clara Valley Urban Runoff Pollution Prevention Program Green Stormwater Infrastructure Case Study

Key Elements (continued)

- The installation cost range includes shipping of the concrete slabs from the manufacturing plant in Redding, CA to the Bay Area site but does not include the underground trenching work, placing underlying rock and materials, or installing underdrains which is contracted separately.
- The system utilizes Stormcrete Precast Porous Concrete slabs that are 6" thick and come in four standard sizes: 5'x4', 5'x3', 5'x2', 4'x2.5' (custom sizes and thicknesses available) allowing roadway runoff to sheet flow into the pavers and infiltrate into the road subgrade and gravel storage area underneath.
- Low maintenance and installation cost compared to bioretention systems.
- Consistent porosity and strength from precast process in industry manufacturing vs. poured-in-place pervious concrete.
- No loss of parking.
- Bolt holes in pavers allow for easy removal and replacement and/or maintenance of gutter area.
- This shallow system can create fewer utility conflicts than bioretention areas since the sub pavement section is only 21" deep (see section detail below).

Design Plans Available

Plans are not available on the City website but can be requested from the Department of Public Works.

Additional Information

City Website

<https://www.cityofberkeley.info/ContentDisplay.aspx?id=5896>
<https://berkeley.maps.arcgis.com/apps/MapTour/index.html?appid=0632dca176b944b4b487d0dd8d368d12>

Other Information:

Will Harris: wharris@stormcrete.com, www.stormcrete.com

PROJECT CONTACTS

Berkeley Public Works Department
Srinivas Muktevi SMuktevi@CityofBerkeley.info

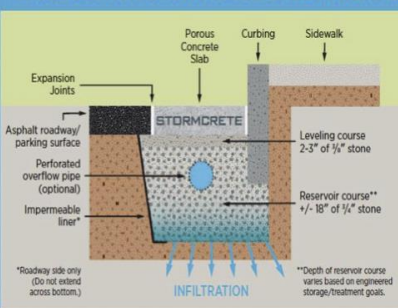
Project Outcomes and Lessons Learned

- The subcontractor found that while the top of each slab was consistently level, the underside of each slab varied in surface flatness. To compensate for this the contractor adjusted the bedding material for each slab during placement which slowed installation until they mastered the process.
- Sawing and removal of a narrow band of the existing asphalt and concrete in the gutter area is more cost effective than retrofitting the whole roadway with other types of pervious pavement.
- Since this was the first installation of this type of system in the Bay Area, it required some extra preparation and investigation by the City and the installer.

Operation and Maintenance

- City of Berkeley staff perform typical street sweeping on a monthly basis with parking enforcement to gain access to the curb and gutter area, but with non-metal sweeping brushes to reduce wear on the concrete.
- Vacuuming or hydrojetting as needed on a less often basis. See the manufacturer's recommendation for maintenance.

CROSS SECTION SHOWING SUB-BASE MATERIAL



GSI Vegetation Guide

Subject: Small common GIS plants (not shrubs or trees)

Use: Inspection, maintenance, plan check

Purpose: Identify and characterize common GSI plants

Complement: San José Maintenance Field Guide

RUSHES

California Gray Rush (*Juncus patens*)

PLANT PROFILE

Characteristics:

Plant Type:	Rush
Height:	3 Feet
Width:	3 Feet
Leaf Type:	Evergreen
Growth Rate:	Fast
Sun Exposure:	  
Soil Preference:	Adaptable
Water Needs:	  
Planting Zones:	All
California Native:	Yes
Valley Water List:	Yes
Hardiness:	Tough

Primary



Flowers/Seeds



At Planting



At Maturity



In Decline



RUSHES

Small Cape Rush (*Chondropetalum tectorum*)

PROPER CARE

Characteristics:

- Maintenance:** Low
- Pruning Area:** Tops, Dead Stems
- Pruning Season:** Either Dry/Wet Season
- Dead Growth:** Textured Glove, Shears
- Dividing Method:** Root Ball

Properly Pruned



New Growth



Dead Plant



Improper Pruning



Improper Pruning (Closeup)



Mulch Guidance for Biotreatment Areas

Wood Mulch Types

- **Arbor Mulch**
- **Composted Arbor Mulch**

Rock Mulch Types

- **Gravel**
- **Cobble**

Raw (Uncomposted) Arbor Mulch



Composted Arbor Mulch



Draft Specification for Composted Arbor Mulch

Overview: This specification for composted wood-based mulch was developed for use in engineered stormwater biotreatment areas. The specification provides for a consistent mulch product which enhances water quality; improves water retention and plant health; has been treated to reduce any potential pathogens, insects or invasive weed seeds; and which has reduced floating and migration potential. There are three parts of the specification: feedstocks, processing and testing.

A. Feedstocks: This wood-based mulch for stormwater biotreatment areas shall be derived primarily from the first of the following two recycled feedstock material types with small amounts (up to 10% by volume) of the second material type:

1. Plant debris consisting of woody vegetation such as “Arbor Mulch” (i.e. tree trunks, branches, stumps and brush)
2. Source-separated food scraps and/or woody materials not included in item 1 above, such as clean uncoated lumber¹

B. Processing: These recycled feedstock materials shall be composted; meet the PFRP (Process to Further Reduce Pathogens) standard to reduce weed seeds, pathogens, and deleterious materials under 14 CA Code of Regs §17868.3; and screened to meet the following specifications in Table 1 below².

C. Testing and laboratory-related requirements: All testing of the mulch product shall be completed within 120 days of delivery to the site by an STA Program-approved laboratory³. Submit to the laboratory a 3 to 4 gallon sample of the mulch product for testing, as enough fines from the product must be available to complete the specific testing procedures.

Table 1: Specifications for Composted Wood Mulch for Stormwater Biotreatment Areas:

Property	Test method ⁴		Requirement	
1. pH	TMECC 04.11-A	Elastomeric pH 1:5 slurry method pH	6.0 – 8.5	
2. Soluble salts	TMECC 04.10-A	Electrical conductivity 1:5 slurry method dS/m (mmhos/cm)	6 or below	
3. Moisture Content (% dry weight)	TMECC 03/09-A	Total solids & moisture at 70±5°C % wet weight basis	30-55	
4. Organic matter content	TMECC 05.07-A	Loss-on-ignition organic matter method % dry weight basis	65 or above	
5. Maturity	TMECC 05.05-A	Germination and vigor % relative to positive control	--	
			Seed emergence	80 or above
			Seedling vigor	80 or above
6. Stability	TMECC 05.08-B	Carbon dioxide evolution rate mg CO ₂ -C/g OM per day	5 or below	
7. Pathogen	TMECC 07.01-B	Salmonella < 3 MPN per 4 grams, dry weight basis	Pass	
8. Pathogen	TMECC 07.01-B	Fecal coliform bacteria < 1,000 MPN per gram, dry weight basis	Pass	
9. Physical contaminants	TMECC 02.02-C	Human-made inert removal and classification: Plastic, glass, and metal: % > 4 mm fraction	combined total: < 0.5%	
10. Physical contaminants	TMECC 02.02-C	Film Plastic: % > 4 mm fraction	< 0.1%	
11. Sizing	TMECC 02.02-B	Sample sieving for aggregate size classification % dry weight basis	Min	Max
		Pass 3-inch sieve	100%	--
		Pass 2-inch sieve	90%	--
		Pass 3/8-inch sieve	20%	40%

¹ Unacceptable feedstocks: dyed mulches, plywood, laminated wood products, glued laminated timber (Glulam), oriented strand board (OSB); painted wood, stained wood, pressure-treated wood or other treated wood waste (TWW); adhesives or any other manufactured wood products with non-wood ingredients or wood treated with chemicals of any kind. Metal concentrations in compost must not exceed the maximum listed in 14 CA Code of Regs §17868.2.

² For reference information, the Caltrans specification for “Coarse Compost” is similar.

³ Click here for a list of approved testing laboratories: www.compostingcouncil.org/page/CertifiedLabs

⁴ TMECC refers to “Test Methods for the Examination of Composting and Compost,” published by the United States Department of Agriculture and the United States Compost Council (USCC).

Gravel



Cobble (Large and Small)



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