



MODESTO AREA 2 STORM DRAIN CROSS CONNECTIONS REMOVAL

PROJECT PHASE 1 - GARRISON PARK

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OUTLINE

- Project Overview
- LID Design
- Permitting and Regulatory Compliance
- Challenges and Successes
- Operations and Maintenance
- Lessons Learned



GARRISON PARK TODAY



PROJECT OVERVIEW

- Garrison Park is Located in Northwest Modesto
- The area has no positive storm drain system
- The area's rockwells have failed over time and sewer cross connections were installed in the past to alleviate street flooding

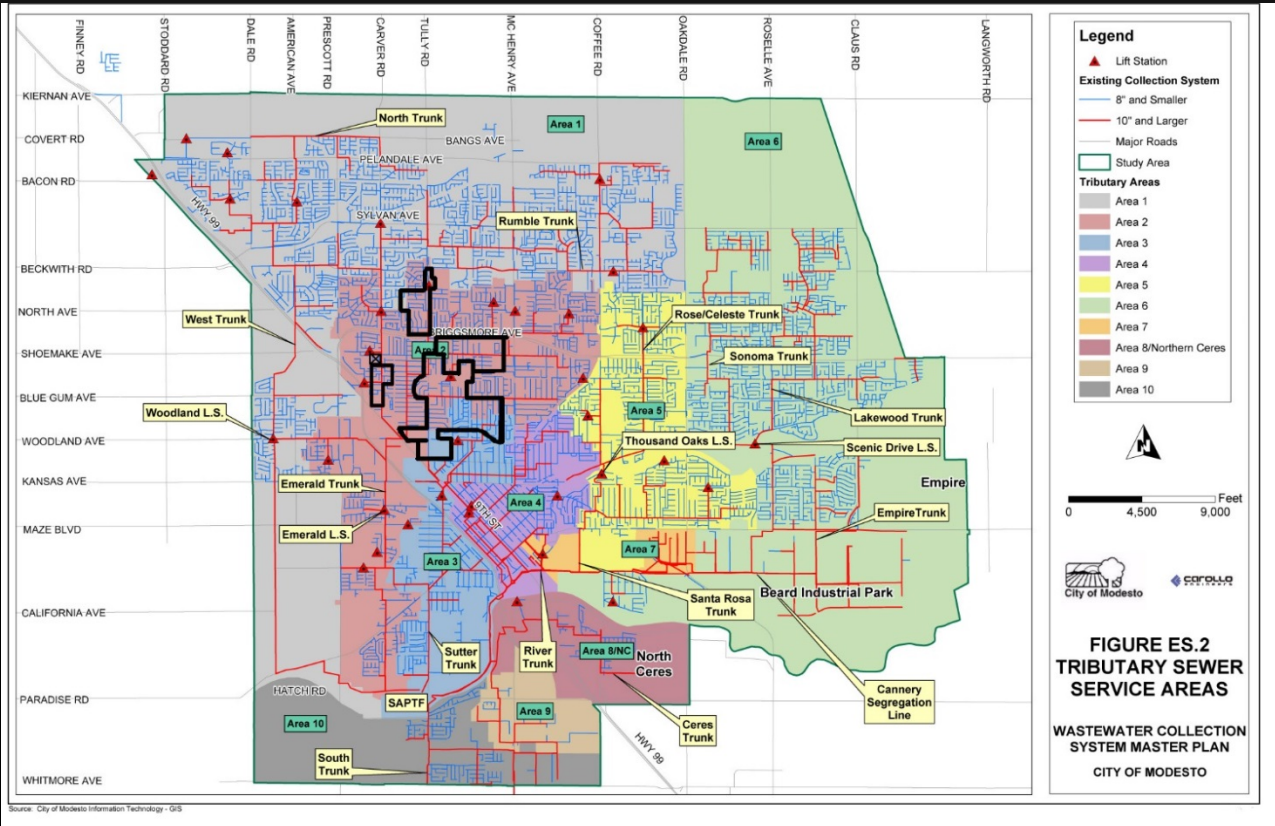


PROJECT OVERVIEW

- The City's 2007 Wastewater Master Plan and MS4 Permit identify the Cross Connections for removal
 - Listed as a high priority
- 2007 Storm Drain Cross Connection Removal Report
 - Identified over 50 cross connections
- Increased peak wet weather flow in sewer system results in:
 - Potential SSO's
 - Increased costs in downstream sewer improvements
 - Additional wastewater treatment plant costs



TRIBUTARY SERVICE AREAS

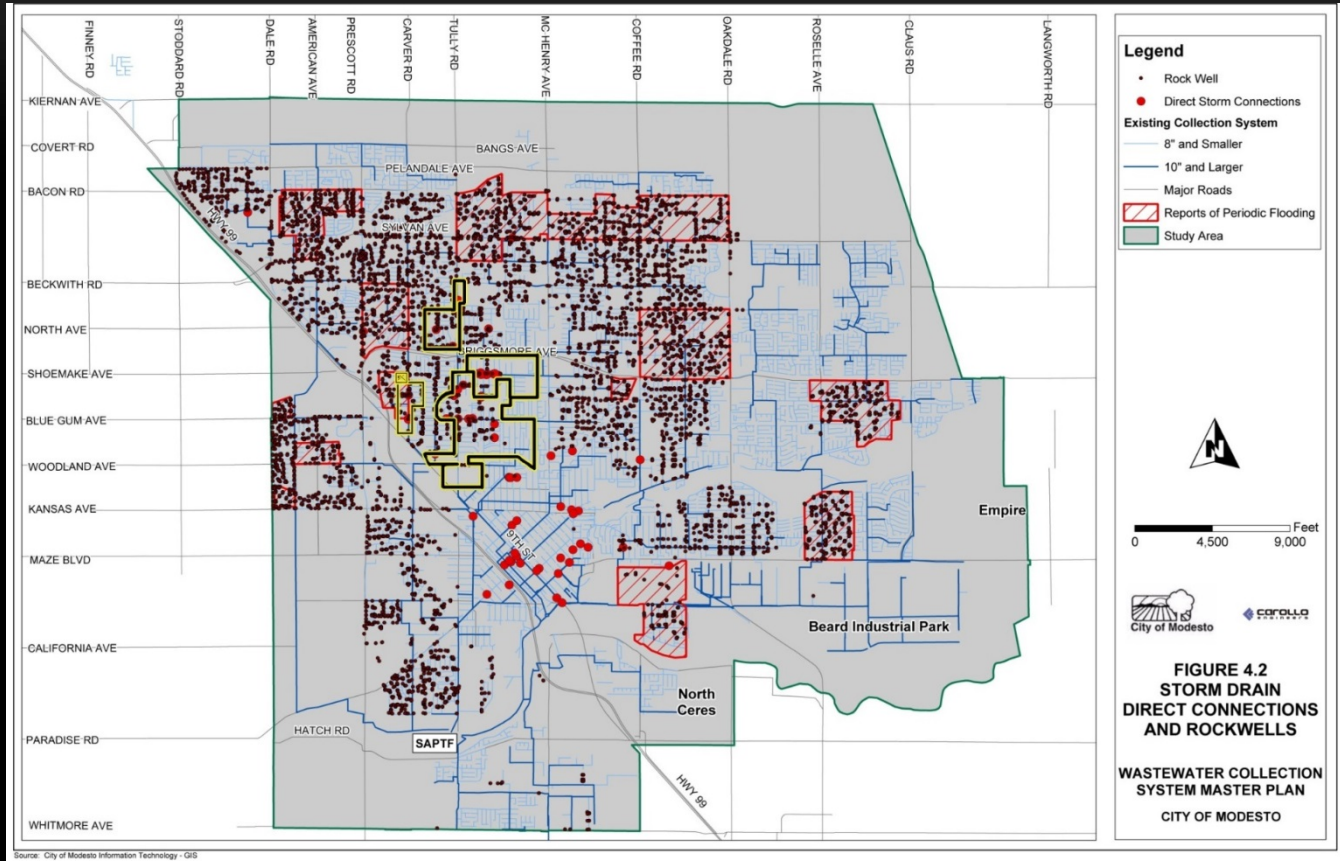


PROJECT OVERVIEW

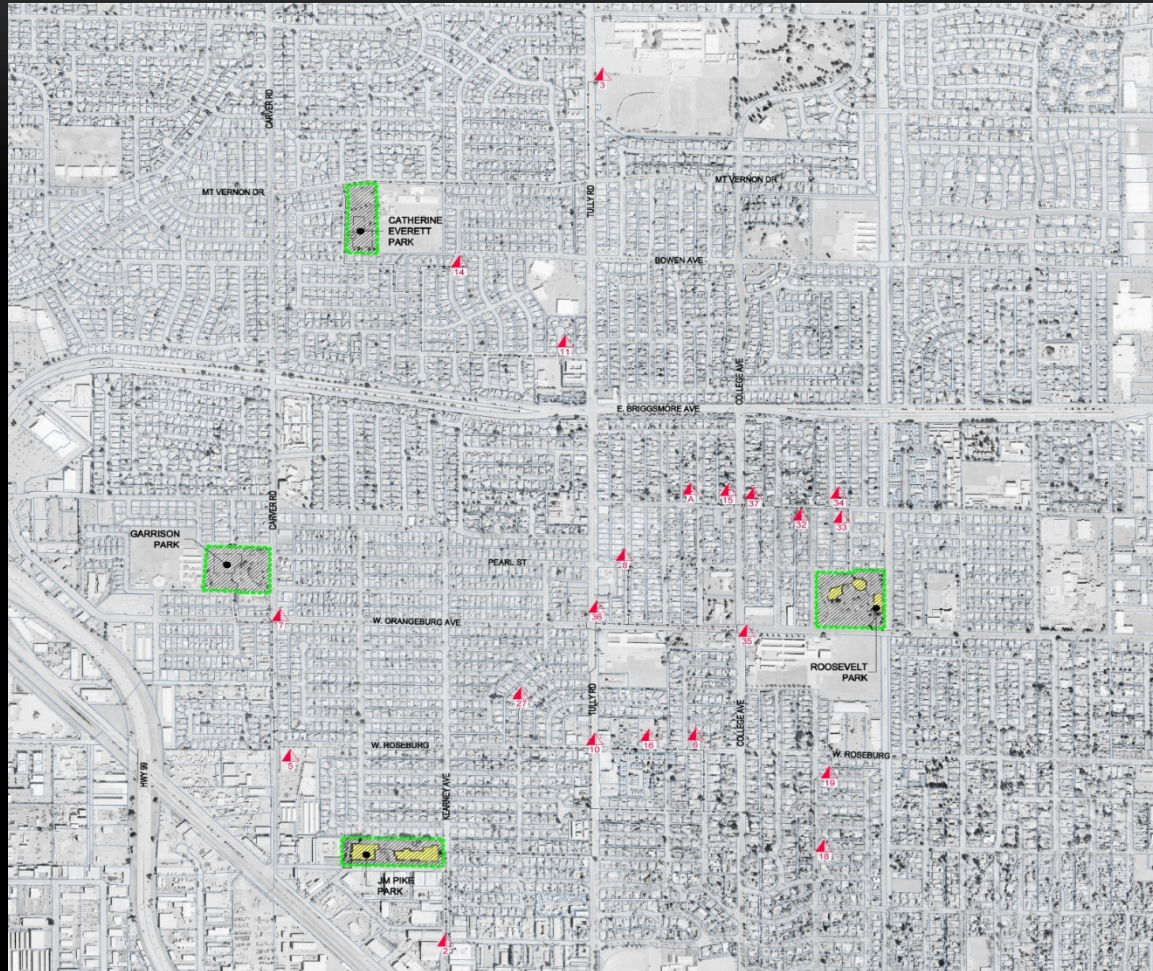
- 35% Preliminary Design Report (PDR) completed in July 2010
- Total construction cost estimate for Area 2 is \$23.8 Million
- PDR identified 4 neighborhood parks for underground storage
 - Garrison, Pike, Roosevelt, and Catherine Everett
 - Project was divided into 4 phases
 - Phase I – Garrison Park



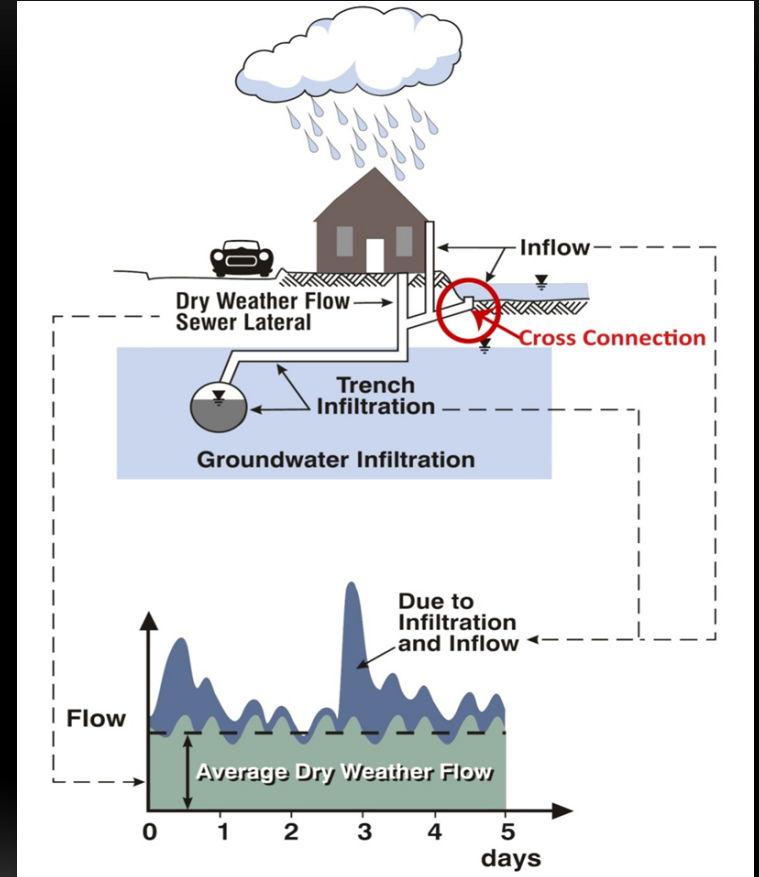
CROSS CONNECTIONS AND ROCKWELLS



PARK OVERVIEW



TYPICAL CROSS CONNECTION

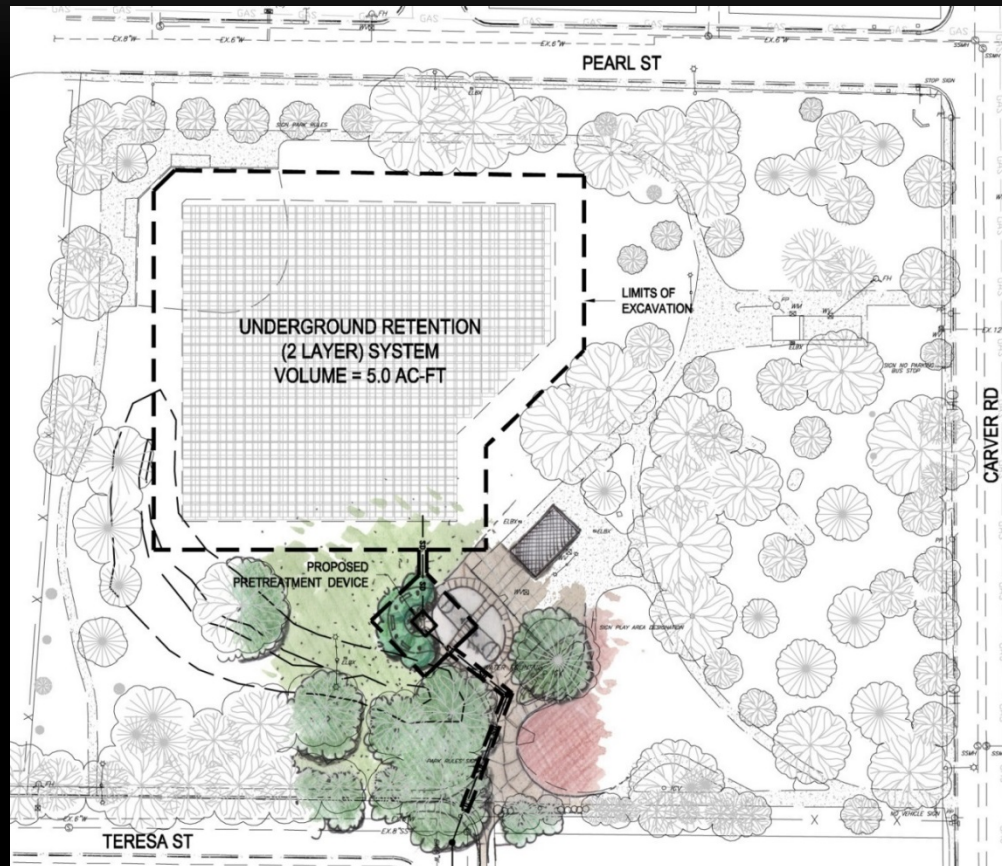


PROJECT OVERVIEW

- Located in Northwest Modesto
- Tributary Area – 24 Acres
 - Design Storage- 100-YR, 6 Day Storm (5.6 Inches)
- Storm Drain Pipe Sizing
 - 10-YR, 24 HR Storm
- Water Quality Flow Rate
 - 2-YR, 6 HR Storm (0.15 IN/HR)
- Construction Cost \$3.2 Million



GARRISON PARK

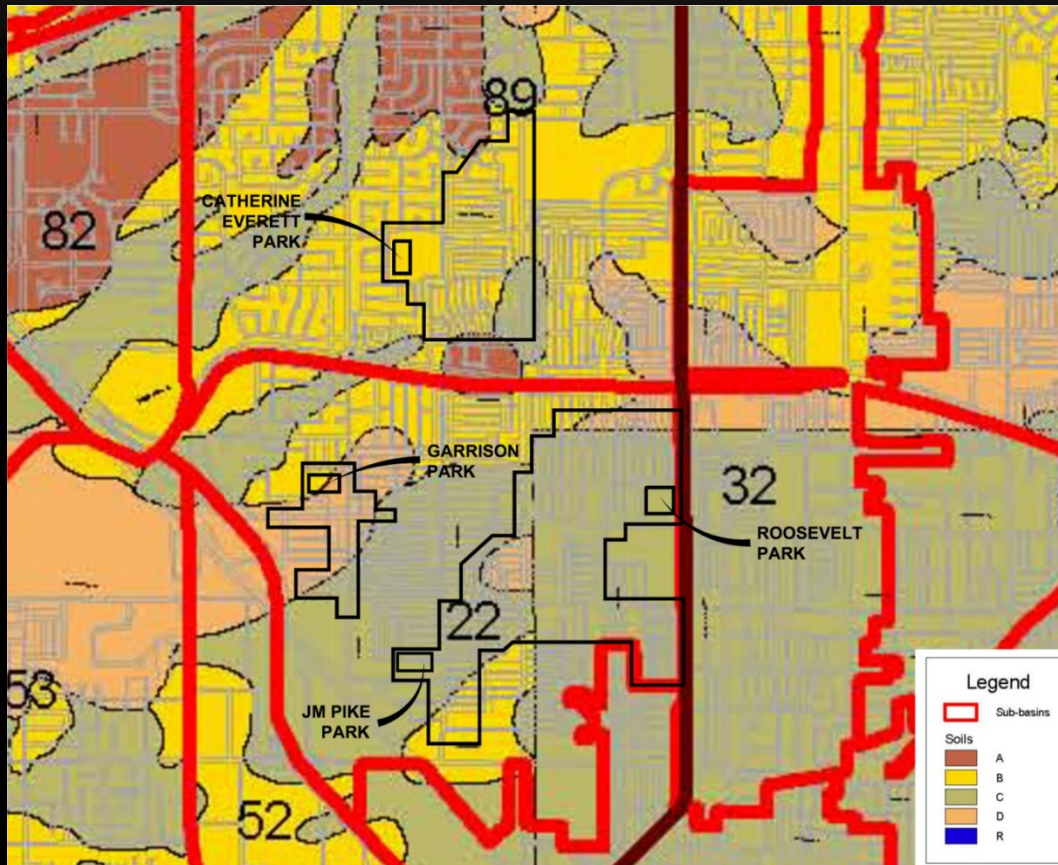


LID DESIGN

- 35% Design Report Evaluated Feasibility
- Looked to infiltrate near the source (parks)
- Reviewed Ex. Soil Maps
 - Conducted Site Specific Geotech borings and infiltration tests
 - Evaluated Pre-Treatment and Infiltration Systems



SOIL CONDITIONS



INFILTRATION TESTING


















DISPOSAL SYSTEM RANKING

Manufacturer	Products	Product Description	Cost Ranking _s	Capital Cost (\$/CF)	Ability to be Implemented _s	Similar Installations _s	Installation Description	Corrosion Resistance _s	Warranty Ranking _s	Warranty Period Years	Maintainability _s	Total
Triton Environmental Solutions	Stormwater Chambers		4	\$4.24	4	4	Underground detention system designed for 100,000 cf. Keyser Shopping complex Keyser, West Virginia.	5	5	Limited Lifetime (100 yrs)	5	27
Hydrologic Solution	Storm Chamber		4	\$4.29	4	4	Commercial site in Jordan UT. (116,840 cf) Under parking lot.	5	5	Limited Lifetime	5	27
Contech	Corrugated Metal Pipe		5	\$3.90	5	5	Wal-Mart, Greeley Colorado underground detention system (255,353 cf)	3	1	1	5	24
Rotondo Environmental Solutions	Precast Conc. Vaults		2	\$10.00	5	4	Underground detention/infiltration/treatment system (200,000 cu-ft). WQV (30,400 cu-ft) Under commercial parking lot in Stafford VA.	5	1	Varies	5	22
Contech	Con/Span		1	\$14.00	5	4	Seattle Tacoma International Airport, precast detention system designed for (215,187cf)	5	1	1	5	21
Contech	Plate System		1	\$10.00	5	5	Wal-Mart and Sam's Club, Laurel Maryland. (163,000 cf of storage) under parking lot.	3	1	1	5	20
Stormtech / Landsaver	SC-740		3	\$5.32	1	5	Underground detention system using 5,600 units (420,000 cf) Parking Lot Application	5	1	1	5	20
Stormtech	MC3500		4	\$4.05	3	1	New Product.	5	1	1	5	19
Kristar	CUDO		3	\$6.00	5	3	Underground retention system (13,226 cf) Under Parking Lot Application	5	1	1	1	18
Brentwood	Storm Tank		3	\$5.45	4	4	Underground detention system (123,093 cf) athletic field	5	1	1	1	18
AOS	HDPE Pipe		1	\$14.40	3	3	Underground retention system (22,500 cf) under Walgreens parking lot in Naperville, IL	5	1	1	5	18
Layfield Group	Atlantis D		2	\$6.62	5	3	Underground detention system (26,839 cf) Parking Lot Application for Villa Riva Apartment Complex in Miami Florida	5	1	0	1	17
Contech	Chamber Max		2	\$6.30	1	3	Medical Plaza Way, Clarksville, Indiana underground retention system (62,000 cf)	5	1	1	5	17
Invisible Structure	Rainstore 3		2	\$7.09	5	2	Underground retention system (3,610 cf) under grass play area surrounded by tricycle track.	5	2	2	1	17

* Note - List developed from internet search for stormwater treatment systems and product advertisements in stormwater publications. Scoring system is based on a 1 thru 5 rating, with 5 being the most favorable.
 † Cost Ranking (S/ CFS): 5(≤ \$4.00), 4 (\$4.01 - \$5.00), 3 (\$5.01 - \$6.00), 2 (\$6.01 - \$9.99), 1 (≥ \$10.00) Cost are based on systems designed to hold at least 100,000 cf of storm runoff.
 ‡ Each product analyzed to verify if it can be implemented based on useable park area. Ranking based on number of applications (retention and detention). Maximum 8 points: 5 (≥ 6), 4 (5), 3 (4), 2 (3), 1 (≤ 2)
 § Similar Installations: 5 (systems designed for over 250,000 cf), 4 (systems design for 100,000 to 250,000 cf of storage), 3 (systems designed < 100,000 cf but under a parking lot), 2 (systems designed < 100,000 cf but under turf) and 1 (no installations)
 ¶ Corrosion Resistance: 5 (non corrosive), 3 (corrosive but can be protected), 1 (corrosive)
 †† Warranty Ranking: 5 (≥50), 4 (25 - 49.9), 3 (10 - 24.9), 2 (1.1 - 9.9), 1 (≤1)
 ††† Maintainability: 5 (can be accessed and hydraulically flushed) and 1 (not maintainable)

DISPOSAL SYSTEM RANKING

Manufacturer	Products	Image	Provided Requested Information	Capital Cost Ranking	Capital Cost (\$)/Treatment CFS	Maintenance Cost Ranking ₄	Maintenance Cost \$/YR	Max Treatment Ranking ₅	Max Treatment Q (cfs)	Percent TSS Removal	Ability to be Implemented / Maintained ₄	Total
Baysaver Technologies Inc	Bay Separator		Yes	4	\$2,100	4	\$1,150	5	21.8	80	5	18
Contech	VortSentry HS		Yes	3	\$8,318	4	\$1,343	5	8.1	80	5	17
Contech	CDS		Yes	2	\$12,750	4	\$1,414	5	7.5	100	5	16
Bio Clean	Nutrient Separating Baffle Box		Yes	3	\$9,681	4	\$1,675	5	42.4	87	3	15
Contech	Vortechs		Yes	2	\$14,089	4	\$2,357	5	14.0	80	4	15
KriStar	FloGard Dual Vortex		Yes	1	\$22,838	3	\$3,063	5	9.5	80	5	14
KriStar	FloGard		Yes	3	\$5,450	5	\$100	3	3.9	80	3	14
Bio Clean	Grate Inlet Skimmer Box		Yes	5	\$800	5	\$267	1	1.0	84	3	14
Bio Clean	Curb Inlet Basket		Yes	5	\$1,059	5	\$267	1	0.9	93	2	13
Bio Clean	Nutrient Separating Baffle Box with Up Flow Media Filter		Yes	1	\$37,795	3	\$3,851	5	42.4	85	3	12
Contech	MFS		Yes	1	\$72,953	2	\$7,848	5	7.0	83.6	3	11
Fabco	Storm Basin		Yes	3	\$9,939	4	\$1,100	1	0.5	80	3	11
KriStar	Up-Flow Filter		Yes	1	\$98,949	1	\$11,863	5	7.0	80	3	10
KriStar	Perk Filter		Yes	1	\$76,367	1	\$15,525	5	7.5	80	2	9
Modular Wetlands	MWS Linear Underground Vault		Yes	1	\$103,704	5	\$860	1	0.3	98	2	9

* Note - List developed from internet search for stormwater treatment systems and product advertisements in stormwater publications. Scoring system is based on a 1 thru 5 rating, with 5 being the most favorable. All devices must have capability of removing trash and capturing a minimum of 80% T.S.S. and have submitted all the requested information and a minimum of three project references.

Capital Cost Ranking based on cost per Water Quality Treatment (CFS): 5 (< \$1,500), 4 (\$1,500 - \$5,000), 3 (\$5,001 - \$10,000), 2 (\$10,001 - \$20,000), 1 (> \$20,001)

Maintenance Cost Ranking based on estimated yearly cost: 5 (< \$ 1,000), 4 (\$1,001 - \$3,000), 3 (\$3,001 - \$5,000), 2 (\$5,001 - \$10,000), 1 (> \$10,000)

Max Treatment (CFS): 5 (2-7), 4 (5-6.9), 3 (3-4.9), 2 (1-2.9), 1 (< 1)

Ability to be Implemented: 5 (Small centralized), 4 (Medium centralized), 3 (Decentralized or large centralized), 2 (Decentralized w/ modification), 1 (Not applicable)

GARRISON PARK EXCAVATION



UNDERGROUND STORAGE CHAMBER INSTALLATION



CHAMBER BACKFILL – CRUSHED WASHED ROCK



PERMITTING AND REGULATORY COMPLIANCE

- Project is consistent with City's MS4 Permit
- Project Environmental was covered in the Sewer Master Plan EIR
- 35% Design Report Adopted by City Council



NPDES PERMIT

- Order No. R5-2008-0092
- Rockwell Monitoring Program
- Low Impact Development Strategies
- Targeted Pollutant Reduction Program
 - Fecal Coliform
 - Turbidity
 - TSS
 - Oil and Grease
- Annual Report



CHALLENGES AND SUCCESSES

- Challenges
 - Funding
 - Departmental Coordination
 - Existing Utilities
- Successes
 - Local Flooding Alleviated
 - SSO Reduction/Elimination
 - Treated Stormwater
 - Reduction in Pollutant Loads
 - Groundwater Recharge
 - Reduction in Treatment Plant Costs
 - Increased Public Awareness



Oakwood & Westland intersection (east) Rockwells overwhelmed



**DECEMBER 2014
100 YR EVENT – 2.9”
IN LESS THAN 24
HOURS**

**Oakwood & Westland
Intersection (north)
Rockwells Removed
Garrison Park System is
installed**





January 2012

Carver & Roseburg Intersection
Rockwells overwhelmed

December 2014
Carver & Roseburg Intersection
Rockwells Removed
New Garrison Park System is
installed

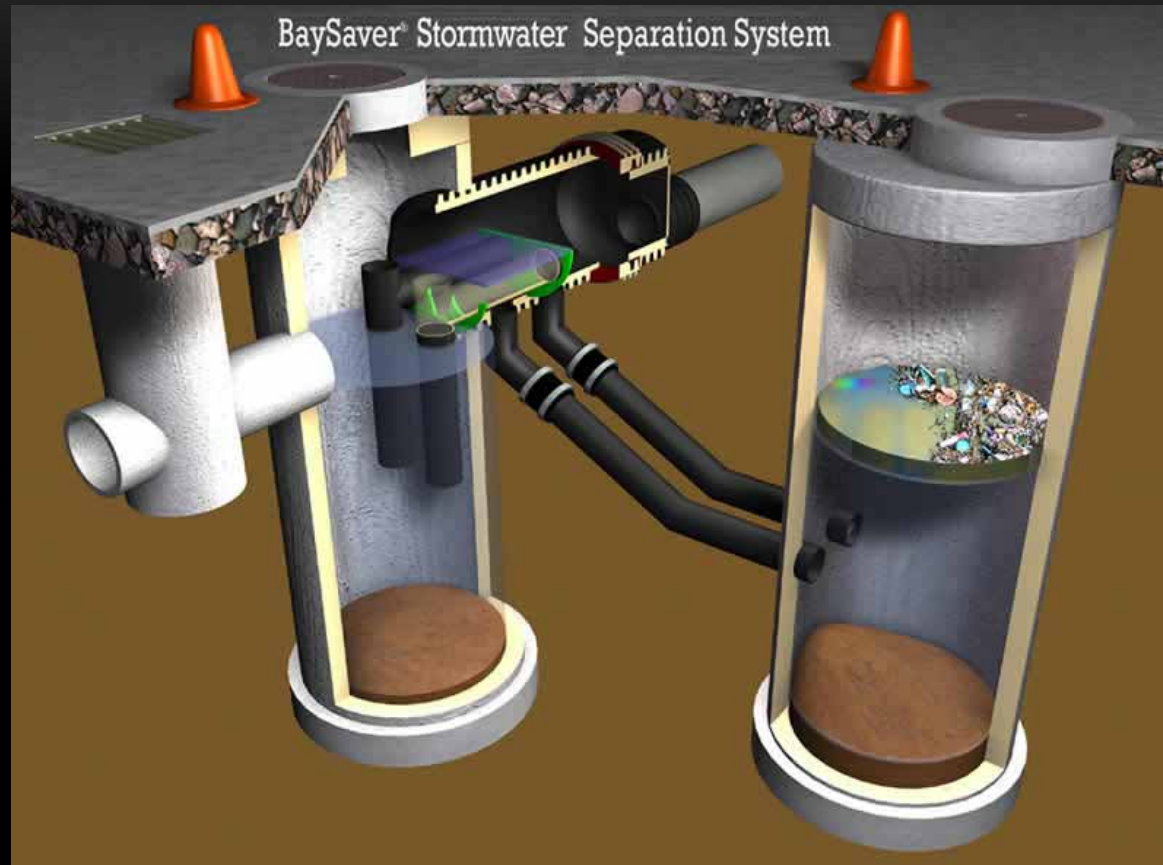


OPERATIONS AND MAINTENANCE

- Bay Separator Pre-Treatment Device – Clean twice a year
- Level Sensing Manhole connected to City WWTP SCADA provides real time data on retention system



OPERATIONS AND MAINTENANCE



OPERATIONS AND MAINTENANCE



LESSONS LEARNED

- Pothole Utilities Prior to Construction
- Color Permeable Concrete



PERMEABLE CONCRETE



QUESTIONS & ANSWERS

