TEXAS STATE
INGRAM SCHOOL OF ENGINEERING

C2.06 – Sustainable Biogarden Solutions

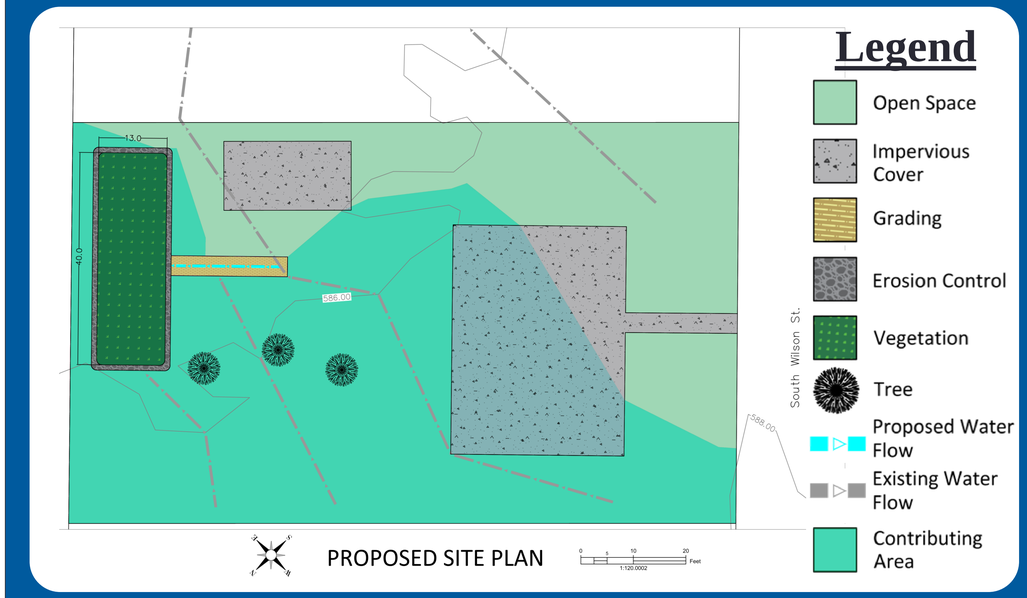
Bryce Kennedy (PM) – Selina Padilla – Madison Silvernail

Sponsors: Brittiny Moore & Amy Thomaides with City of San Marcos

Site - Problem

- Current stormwater infrastructure contributes to pollution and a poor water cycle.
- CoSM tasked the team with finding a solution by designing a biogarden to be implemented at a residential level.

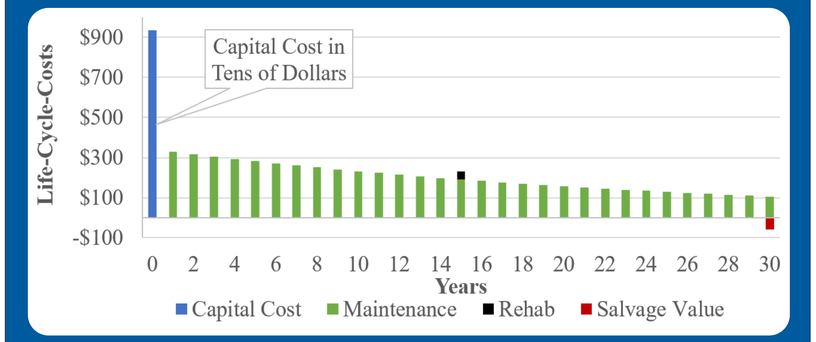
Constraints & Standards



- Minimum Infiltration rate:
  - 2 in/hour
- Rational Method: Q = CiA
  - Runoff generated from site
- Manning's Equation
  - $Q = \frac{1.49}{n} \times A \times R_h^{\frac{2}{3}} \times S^{\frac{1}{2}}$
- Channel Sizing
  - 5-year 15-min storm event

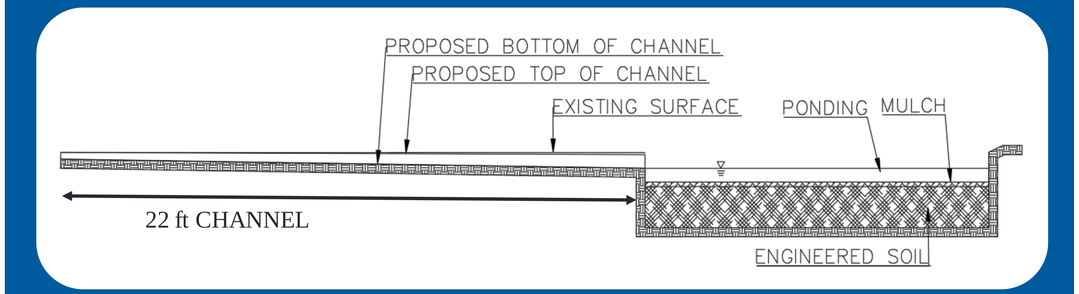
- San Marcos Stormwater Manual
- San Marcos LID Manual

Cost

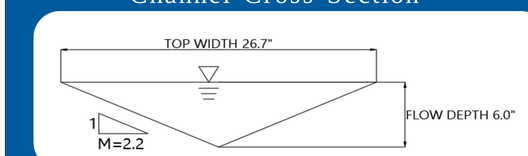


Capital Cost		Life-Cycle-Cost		
Components	Cost	Maintenance	Rehabilitation	Salvage Value
ASTM C-33 Concrete Sand	$ 6,903	-	-	-
Screened Bulk Topsoil	$ 639	-	-	-
Mulch	$ 172	100%	-	-
Deer Muhly	$ 409	25%	-	-
Carolina Jessamine	$ 276	25%	-	-
Erosion Control	$ 372	-	20%	50%
1-Ton Mini Excavator Rental	$ 339	-	-	-
7x14 Dump Trailer Rental	$ 229	-	-	-
Total	$ 9,340	Net Present Value (NPV)		$ 15,382

Engineering Solution Designs

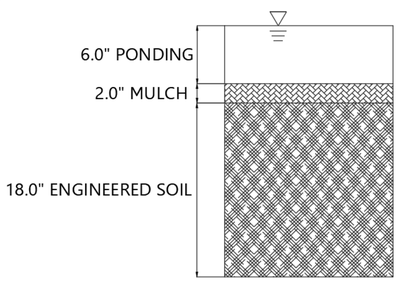


Channel Cross-Section

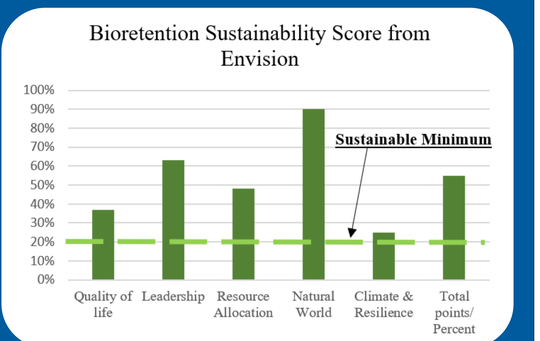


- Rational Flow 0.212 CFS
- Manning's Flow
  - Start of Channel 0.224 CFS
  - End of Channel 1.549 CFS

Bioretention Cross-Section



Sustainability



The Bioretention received a platinum score of 55% utilizing Envision.

PLATINUM 55%

Carolina Jessamine

Muhly Grass