



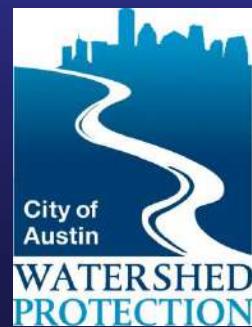
# Restoring Shoreline

## at Emma Long Metropolitan Park



Andrew Clamann  
WPD, ERM

7/17/2019 Environmental Commission

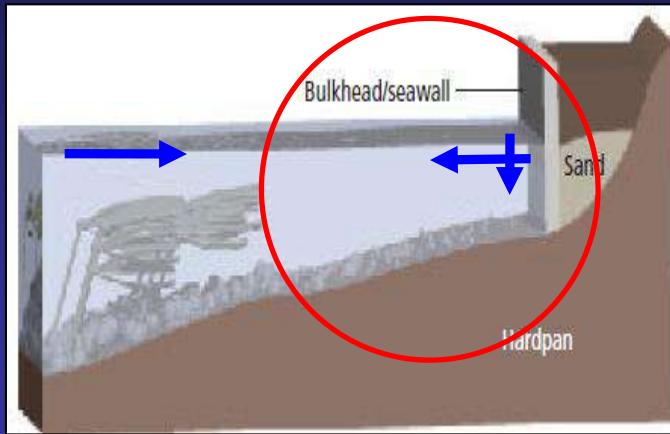


An aerial photograph of a lake shoreline. A large, light-colored sandy area is adjacent to the water. A red rectangular box highlights a specific section of the shoreline between two wooden piers. Several small white structures, possibly boat ramps or storage units, are visible near the piers. The surrounding land is green with scattered trees and shrubs.

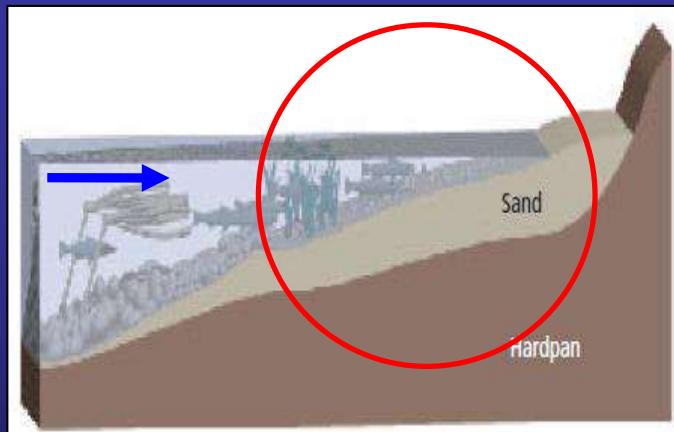
Project area:  
140 ft shoreline between piers  
at the boat ramps

Problem: The old wood bulkhead wall was failing, and vertical walls are no longer compliant





**Vertical walls  
erode  
the lake bed**



**Natural slope  
absorbs  
wave energy**



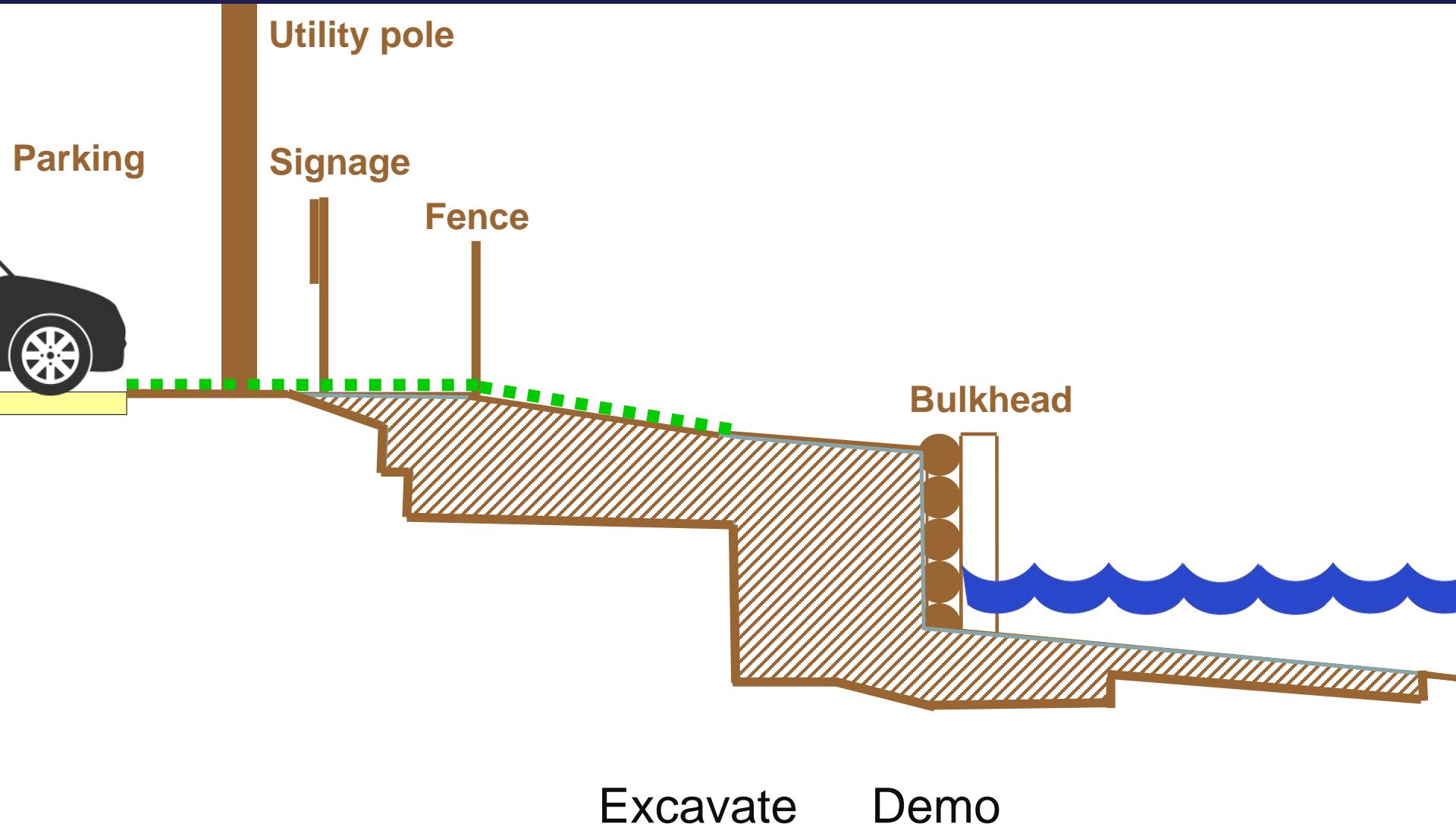
## LDC requirements

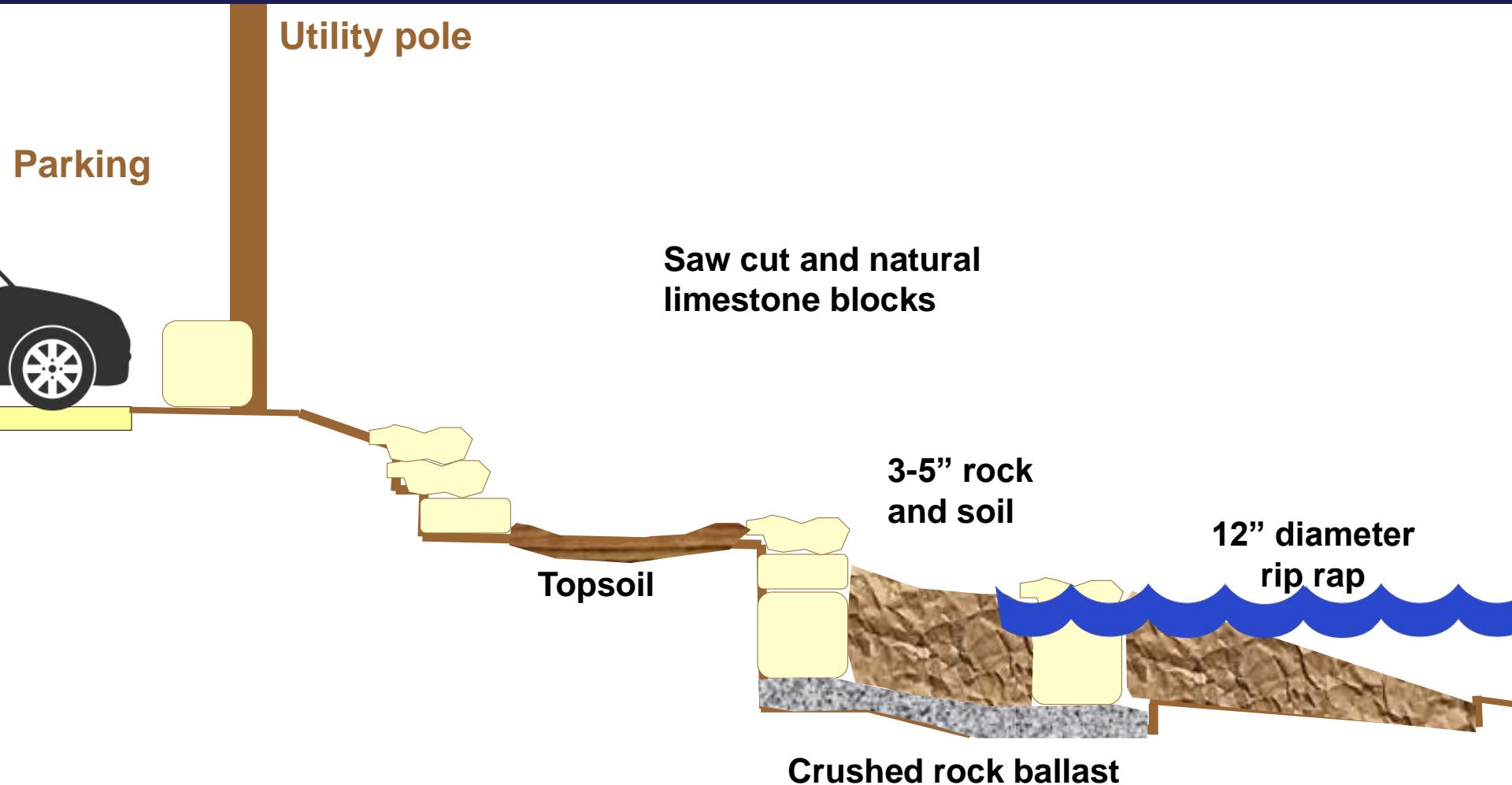
- Slope ( $\leq 45^\circ$  in the wave action zone)
- Vegetation ( $\leq 10\text{ft}$  of the shoreline)
- Scour protection (toe, overtop, flanking)
- Natural materials (exterior)

# Project considerations

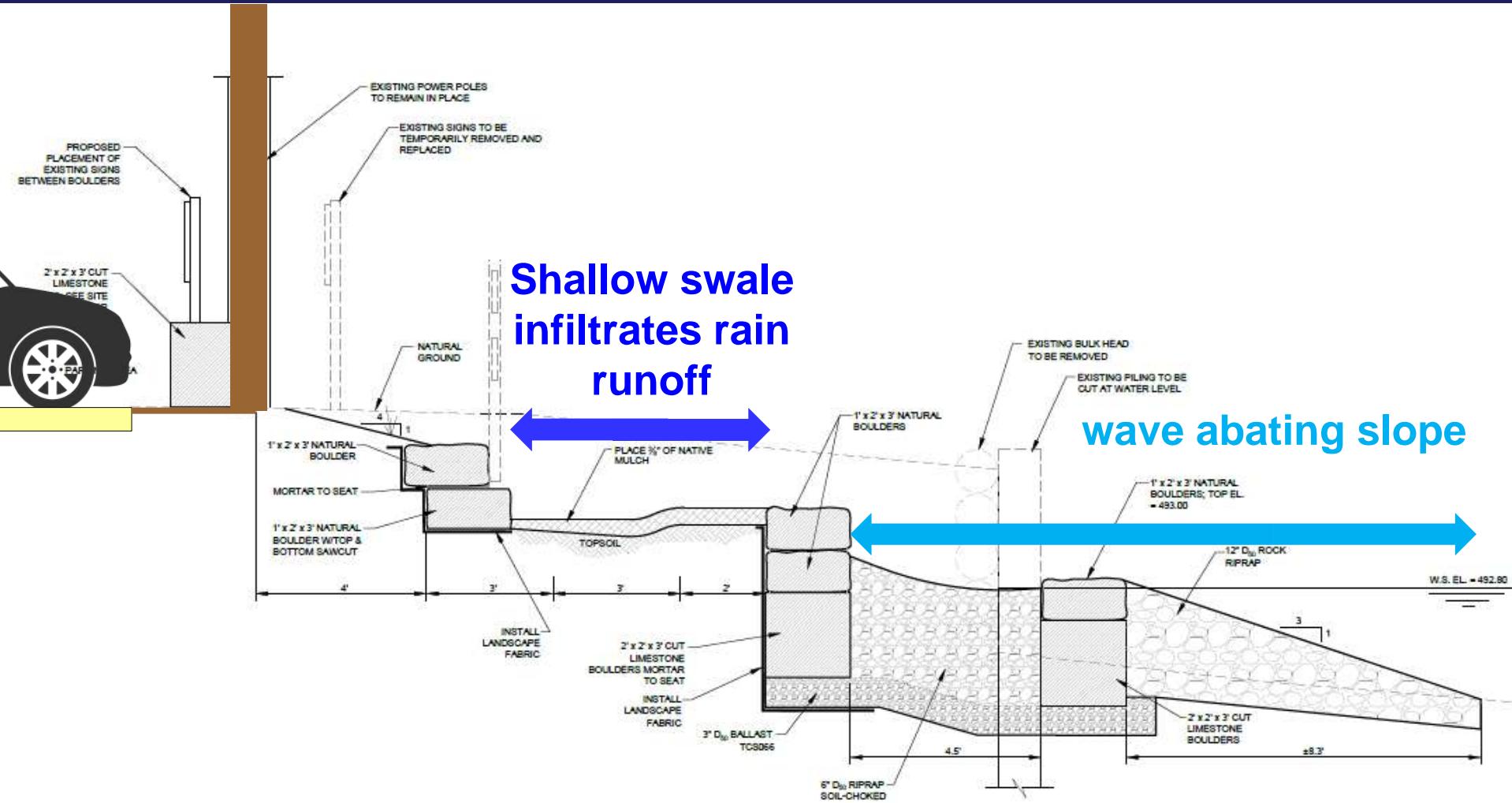


**Stabilize shoreline**  
**Absorb waves**  
**Restore riparian function**  
**Code compliance**  
**Narrow workspace**





# Water quality and wave abatement features



PROPOSED TYPICAL SECTION

**“Before”**



12 Jan 2017

lake  
drawdown

excavate toe



embedded  
rip rap toe

Silt boom

temporary silt fence



**backfill  
ballast  
footer**

**2' x 2' x 3'  
chopped boulders**





**backfilled with  
native soil and rock**

natural ledgestone  
over the  
cut boulders



rip rap was  
soil “choked”

**backfill  
top soil**

**silt fence removed  
in anticipation  
of lake refilling**



turbidity  
contained  
after a storm

Install third  
boulder wall



Third row of  
ledgestone



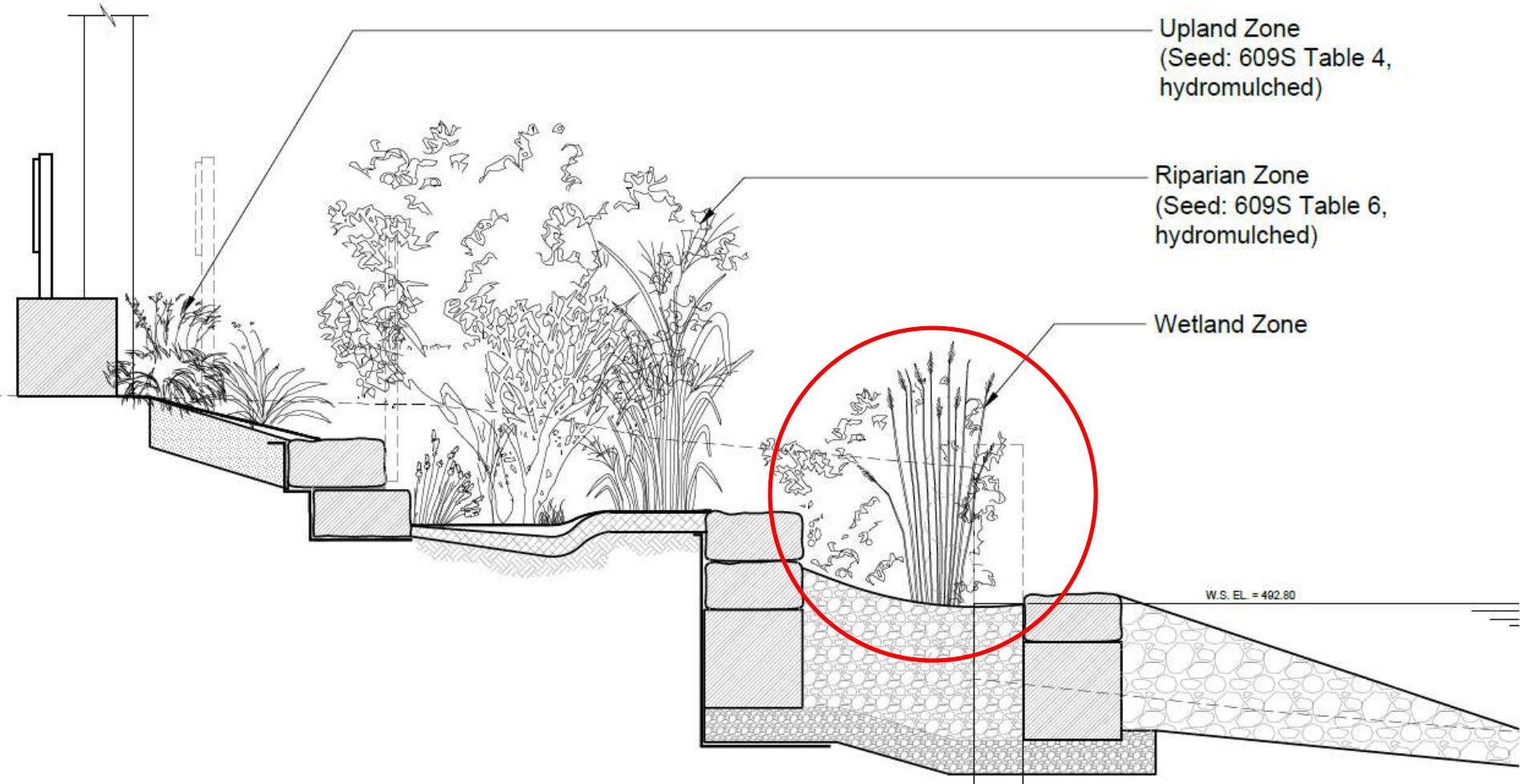
**Large boulders  
as bollards**







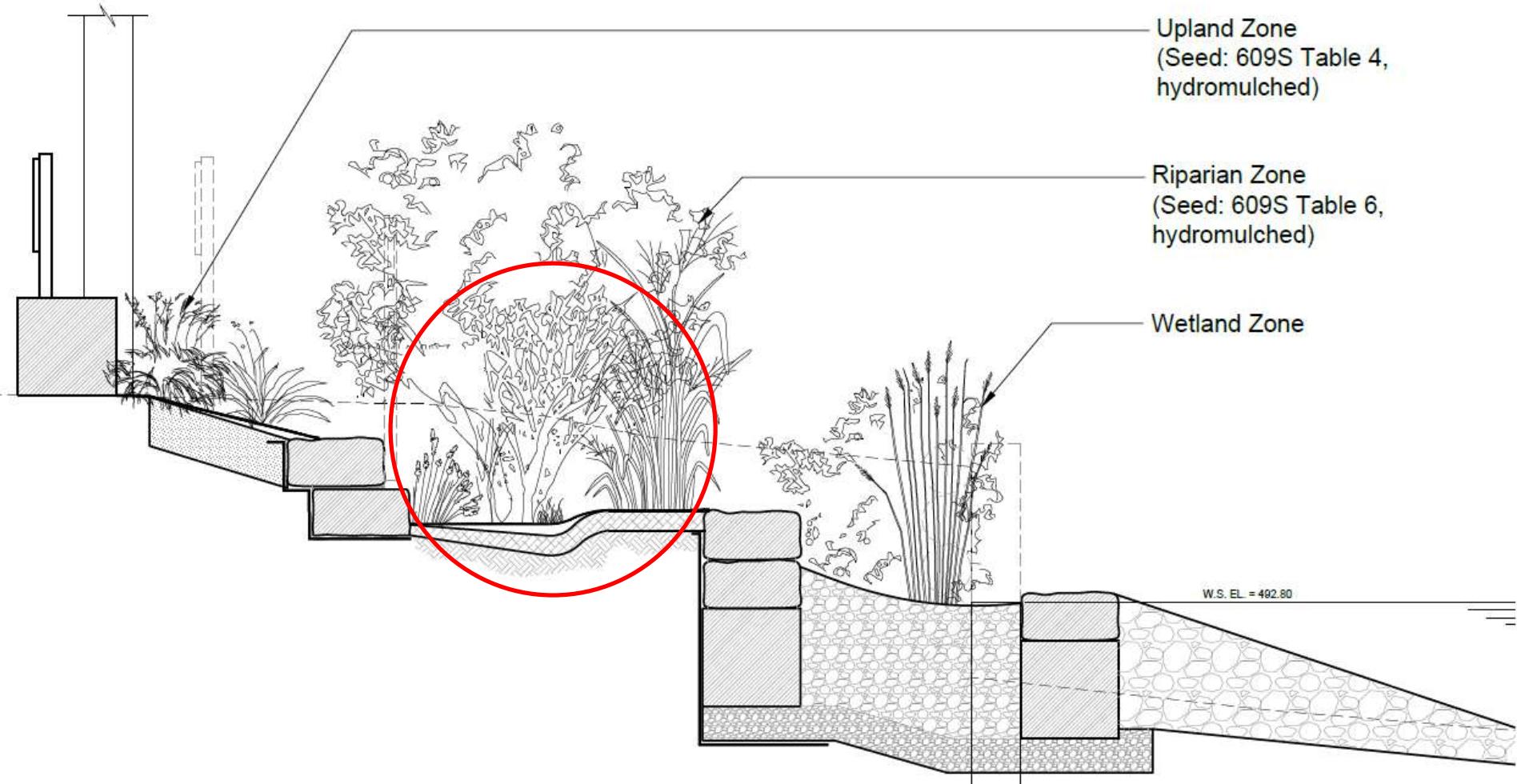
# Wetland



sawgrass buttonbush false indigo water-willow giant cutgrass pickerelweed horsetail spikerush



# Riparian



possumhaw



yaupon holly



roughleaf dogwood



buckthorn



cardinal flower



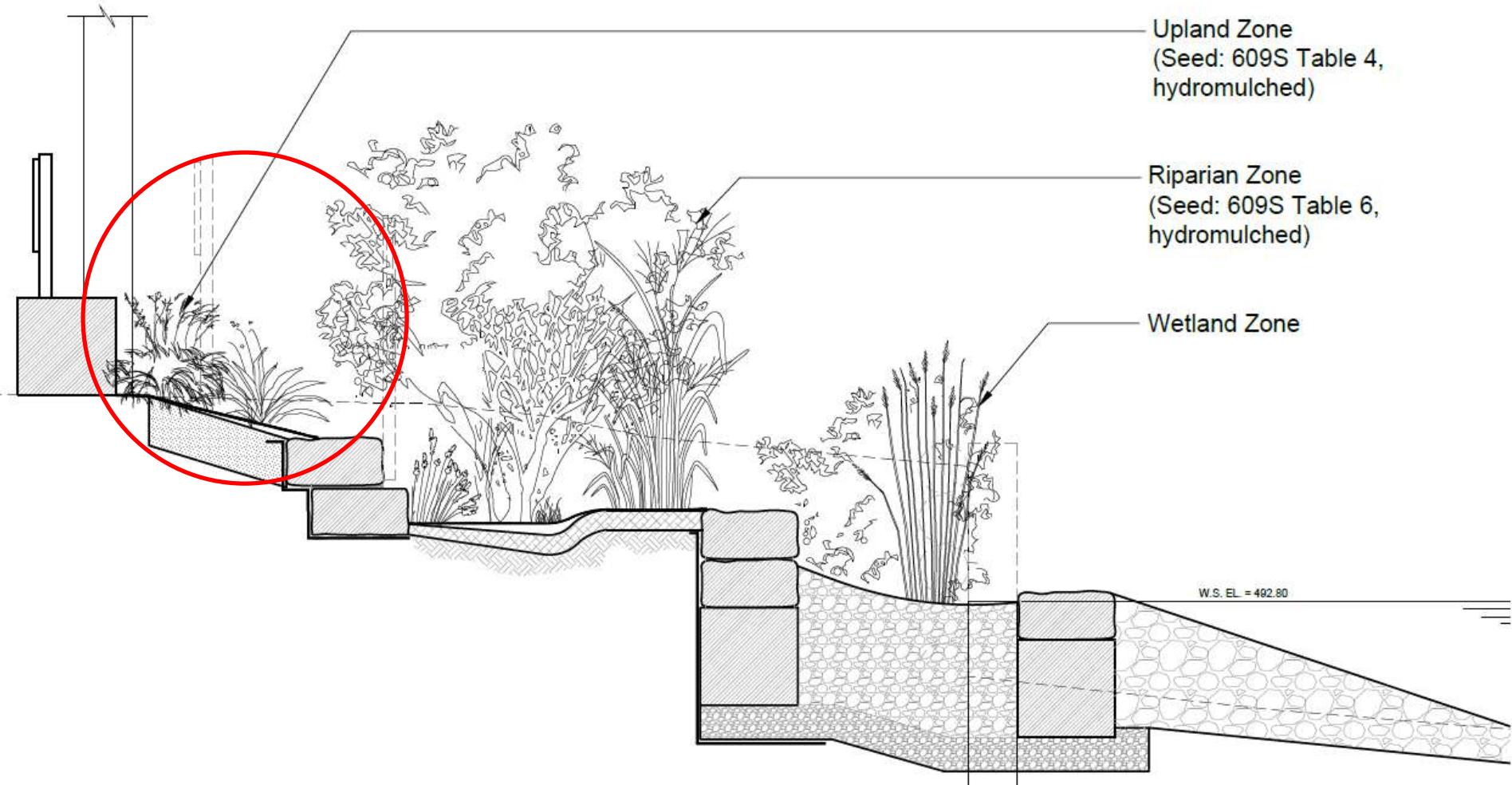
gamagrass



bushy bluestem



# Upland



agarita



big muhly



nolina



cenizo



cactus



mt laurel



twist leaf and red yucca



March 2017



June 2017



May 2018



Jun 2019



# **Approximate Cost \$77,500 (\$554 per linear ft)**

Funding: Capital Improvement Project

Design & Permitting: WPD – Environmental Resource Management Division

Construction: WPD – Field Operations

Revegetation: Environmental Survey Consultants

## Costs

Permitting site plan: \$ 5,918.96

Turbidity Curtain (reusable): \$ 2,562.92

Rock (boulder, riprap, gravel): \$ 54,573.04

Revegetation: \$ 14,363.26



June 2019



A close-up photograph of a large, reddish-orange crab with prominent spiny claws. The crab is resting on a dark, textured rock surface, surrounded by fallen leaves and small pebbles. The lighting highlights the texture of its shell and the sharpness of its claws.

Questions?