

# Streambank Stabilization and Water Quality Trading for MS4 TMDL Compliance

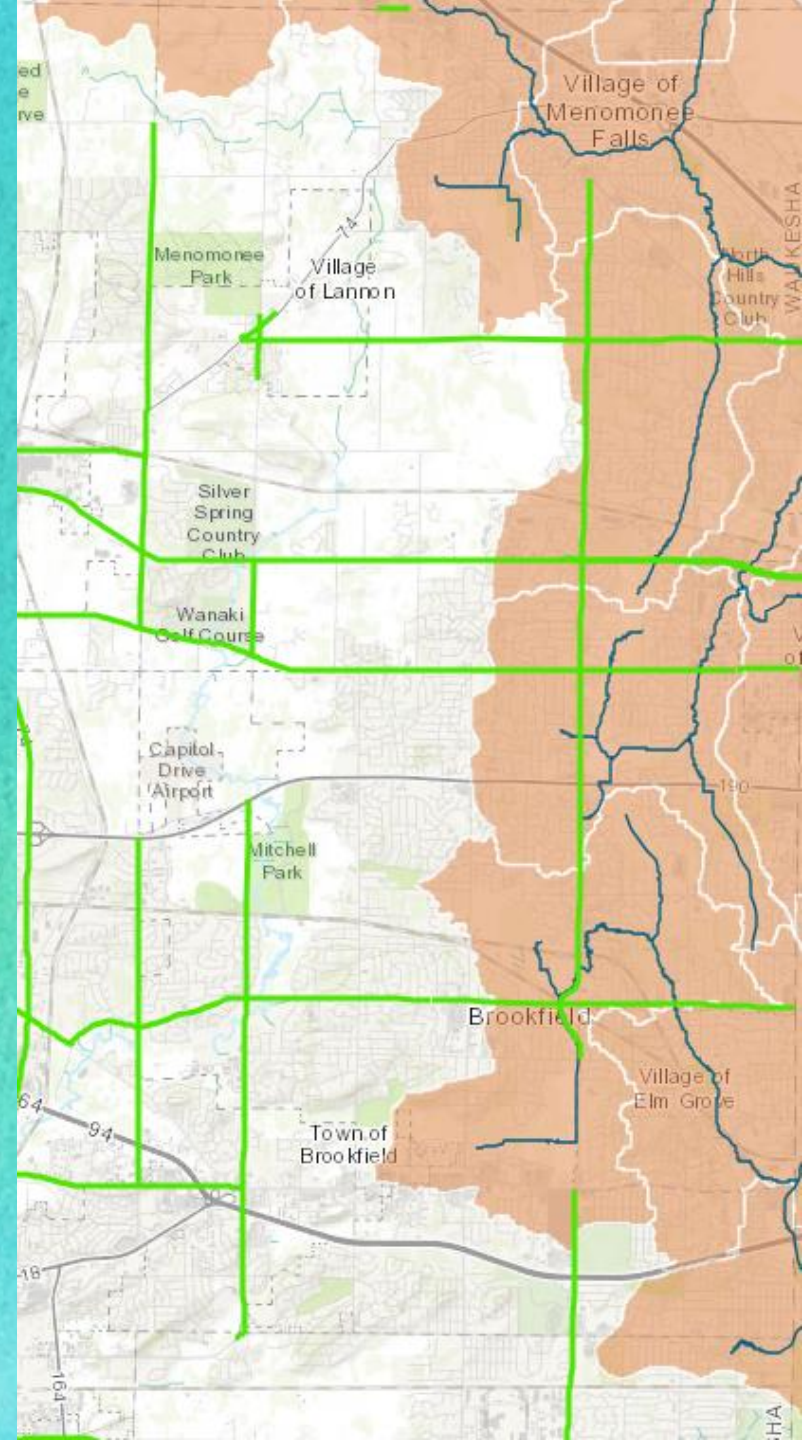
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# Background, Goals

- County MS4 permit requires compliance with MKE River TMDL
- County MS4 in MKE watershed is entirely highways, mix of rural x-section and curb-and-gutter, 2- and 4-lane. Areas in-between are municipal MS4
- County does not own any other property in watershed (parks, DPW shops, golf courses,...)
- TMDL within County comprises 8 reachsheds
- County has MS4 in 7 of the reachsheds, with TSS and / or TP treatment shortfall in all 7



Looked initially at ag trading, but

- There was no available ag land within these reachsheds.
- There was upstream ag land in only one reachshed, in Washington Co. Two reachsheds had no upstream reaches.
- Could not find a farmer to partner with, after evaluating about 60 candidate properties and sending one agreement for signature

Reviewed 2020 Water Quality Trading guidance: Appendix F details streambank stabilization WQT process.

DNR WQT/AM map shows 49 examples of WQT,

- All for WWTPs.
- Mostly ag.
- Found a few streambank trades (Mineral Point, Belmont, Belleville...).
- None for MS4s.



# WQ Trading Evaluation



Guidance for Implementing  
Water Quality Trading in WPDES Permits

Guidance Number: 3200-3400-3800-2020-03  
Wisconsin Department of Natural Resources  
6/1/2020

Did inventory of stream reaches using GIS and field surveys, and located at least one section of streambank in each of three reachsheds that

- Showed measurable bank erosion through comparison of historic air photos and in-field survey, and
- Was located on accessible, municipally-owned land (WC does not own any land outside of highway ROW in watershed)

# Site Selection



- Generated cost estimates and estimated load reductions
- Had no funding. Counties are prohibited by statute from forming utility districts. Previous grant apps unsuccessful.
- COVID happened
- Obtained ARPA water infrastructure funding
- Also obtained funding for new street sweeper
- Reached out to the four potential municipal partners with offer to pay for and manage projects in exchange for access and sharing of load reductions – all accepted
- Hired design consultant
- Did soil sampling and prelim field work

# Project Initiation



# WQTP: Design

- Urban streams have **many constraints!**
  - Zone AE floodplains, property boundaries, utilities, access, levels of permitting, flashy hydrology, etc.
- But many stream corridor best practices used in more rural, continuous stream rehabilitation projects still apply:
  - Native vegetation
  - Floodplain benching
  - Large wood
  - Boulder toe
- Design to meet the WQ criteria, construction budget, be permittable, and maximize habitat



# Site Visit and Concept Design

- Visit w/ Waukesha Co. staff to review and confirm work areas
- Tie-in points and red flags / potential issues
- Provide concept designs, techniques, and estimated costs to County
- Habitat improvements improve WQ trading ratio from 1:3 to 1:2



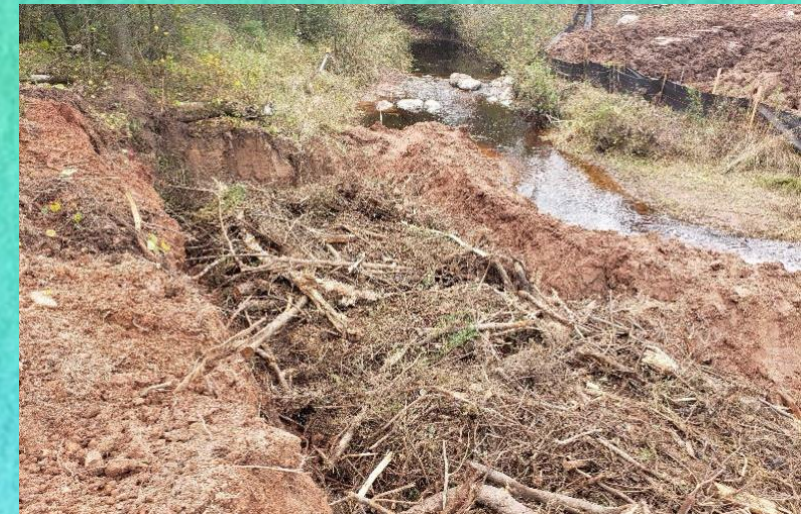
Vegetated Boulder Toe w/ Bank Grading



Rootwad w/ Stone Revetment



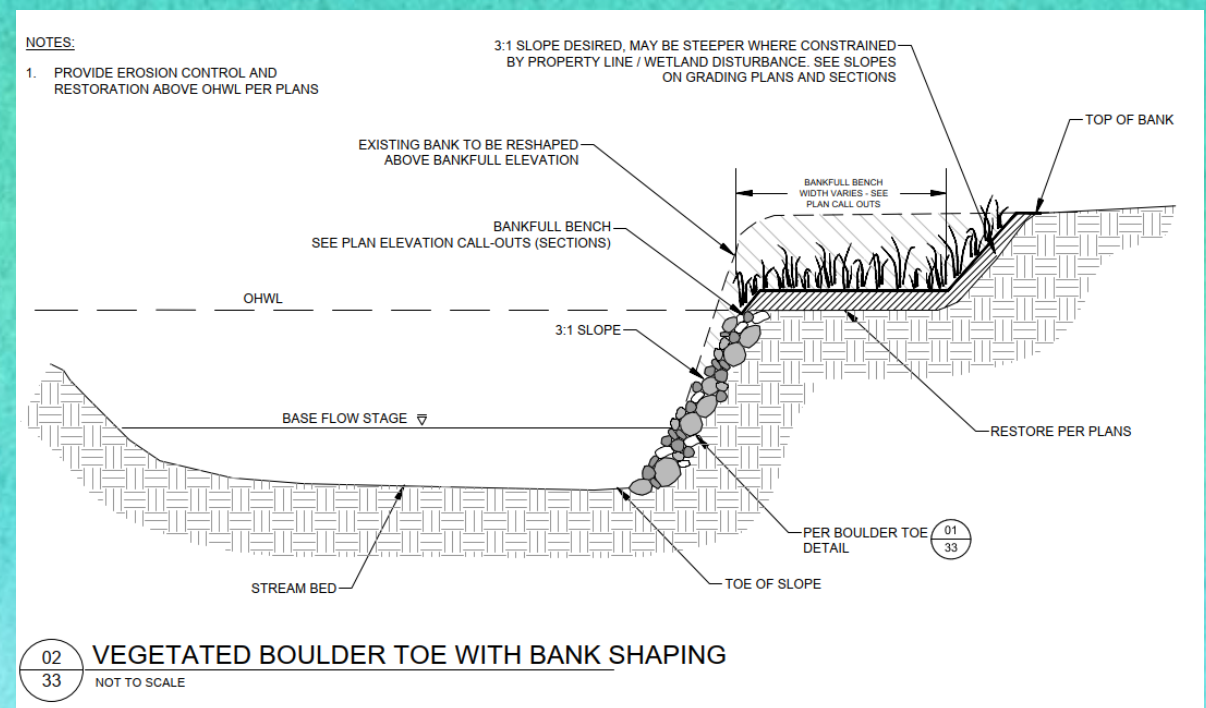
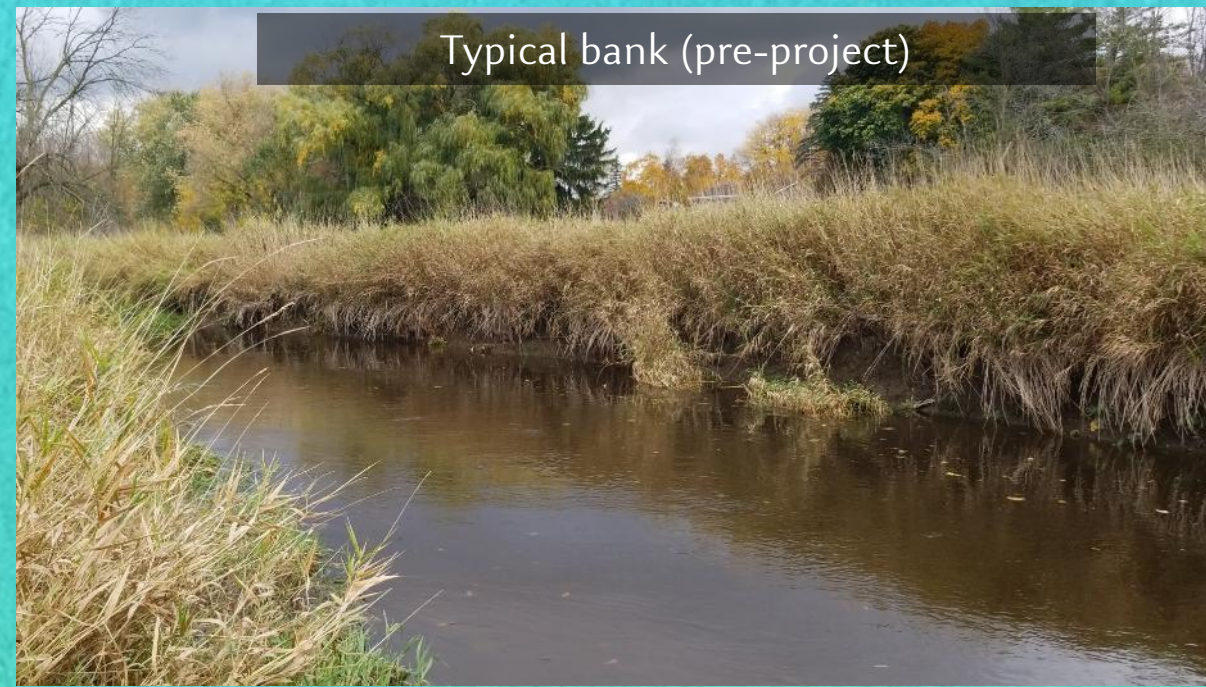
Toewood (pre-brush)



Toewood (brush cover)

# Rotary Park (Menomonee River)

- 500 LF of vegetated boulder toe with 5-10' floodplain benching at OHWM and 3:1 tie-out grading (3 separate sections)
- 9 rock wing deflectors for habitat credit
- 2 live staking areas on opposite bank for improved habitat and erosion resistance
- 1 area with native vegetative mat (beyond typical native seed restoration)
- 2 sets of fishing/access steps

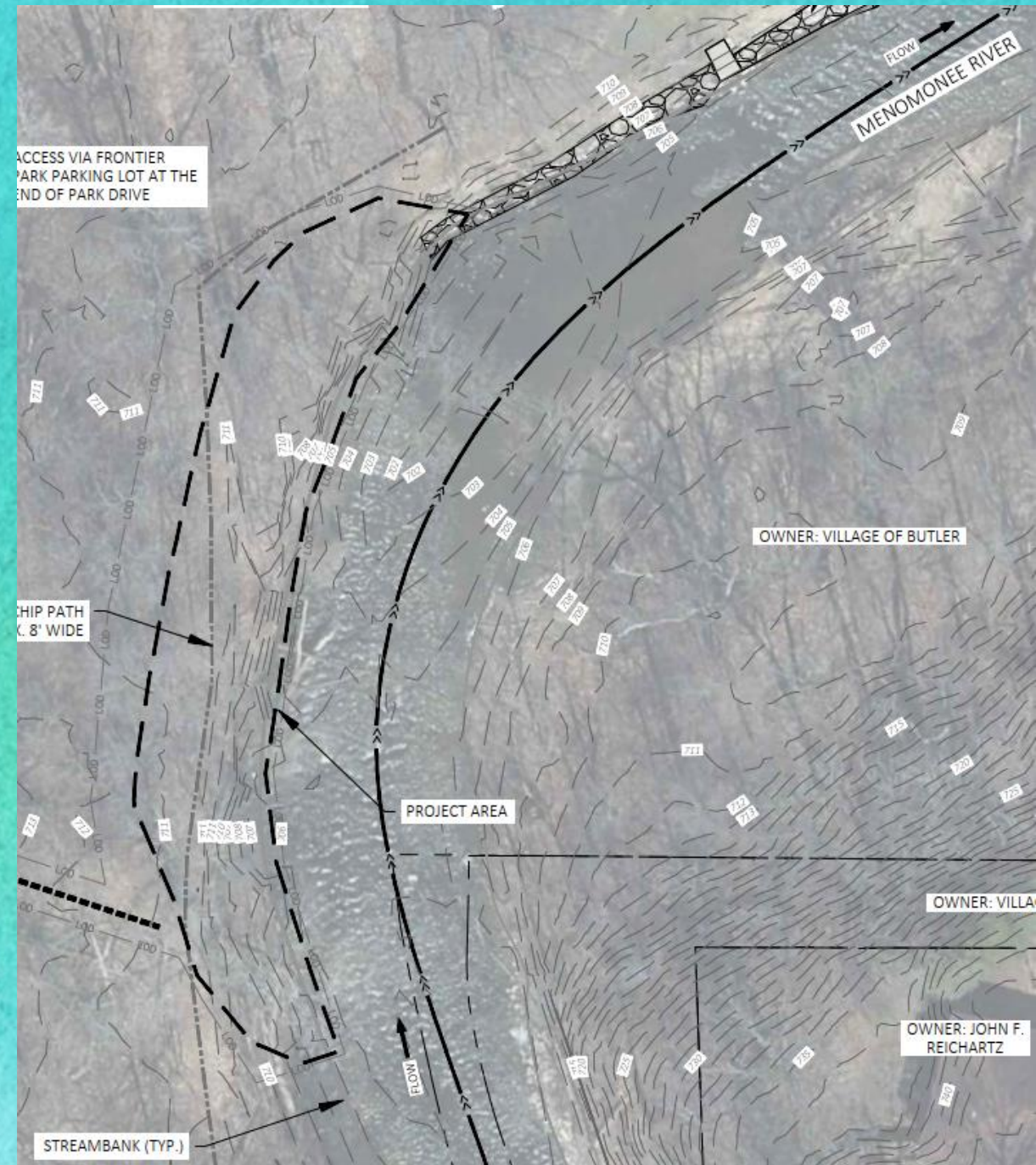




# Frontier Park (Menomonee River)

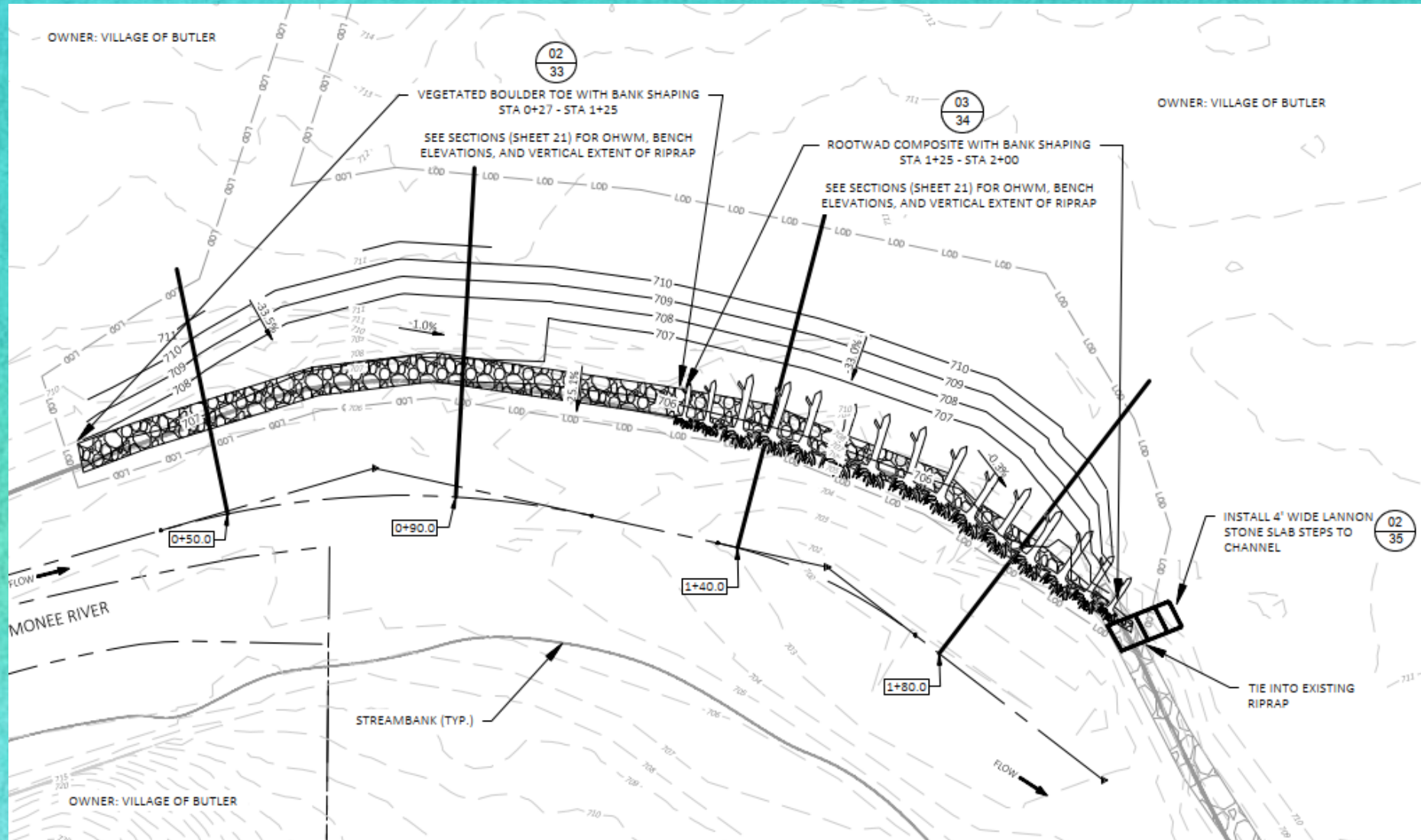


Failing bank and scour pool



# Frontier Park

- Boulder toe w/ bank shaping
- Rootwad composites w/ bank shaping
- Lannon slab access steps





# South Park Fields (Underwood Creek)



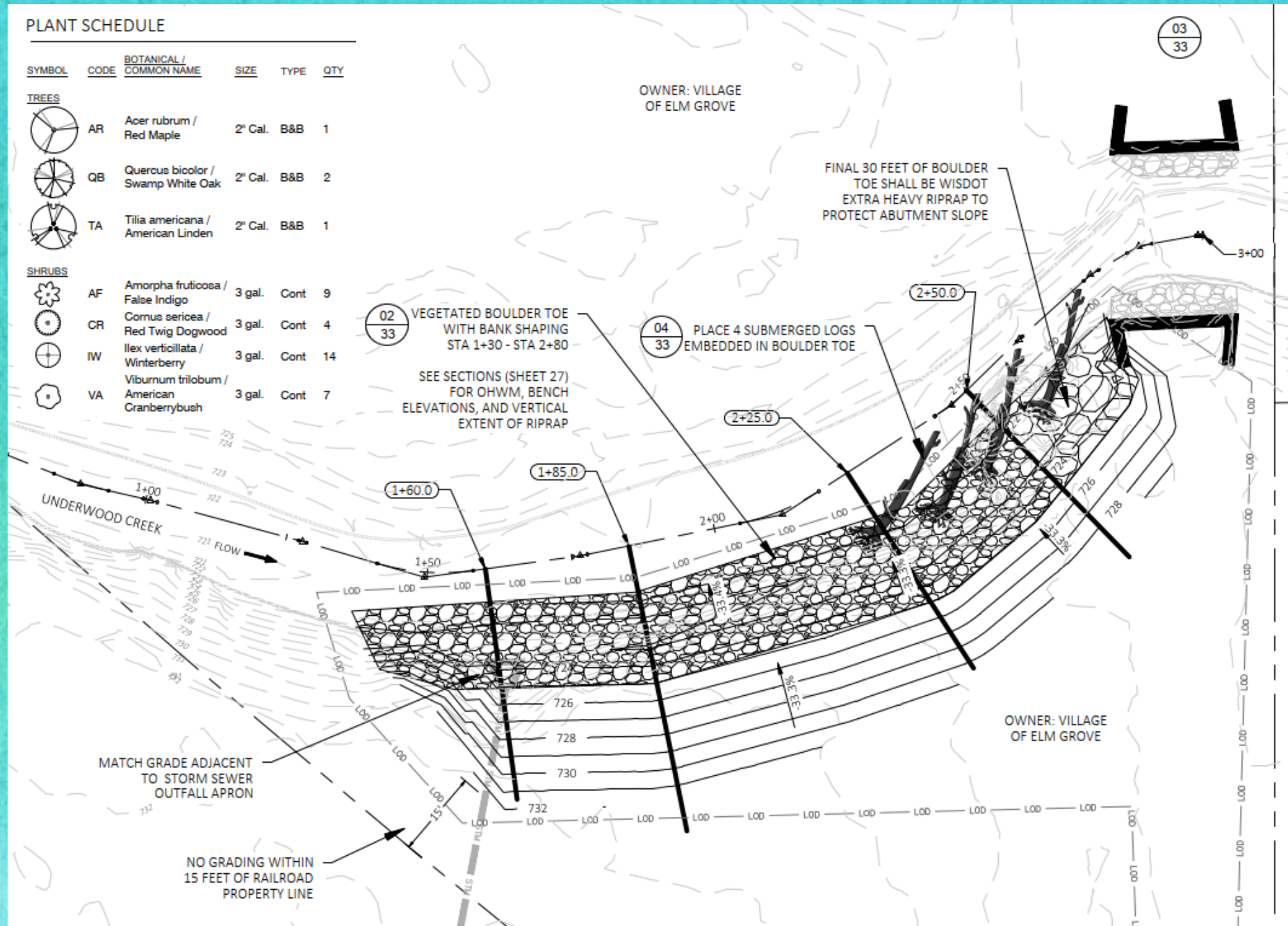
Failed revetment



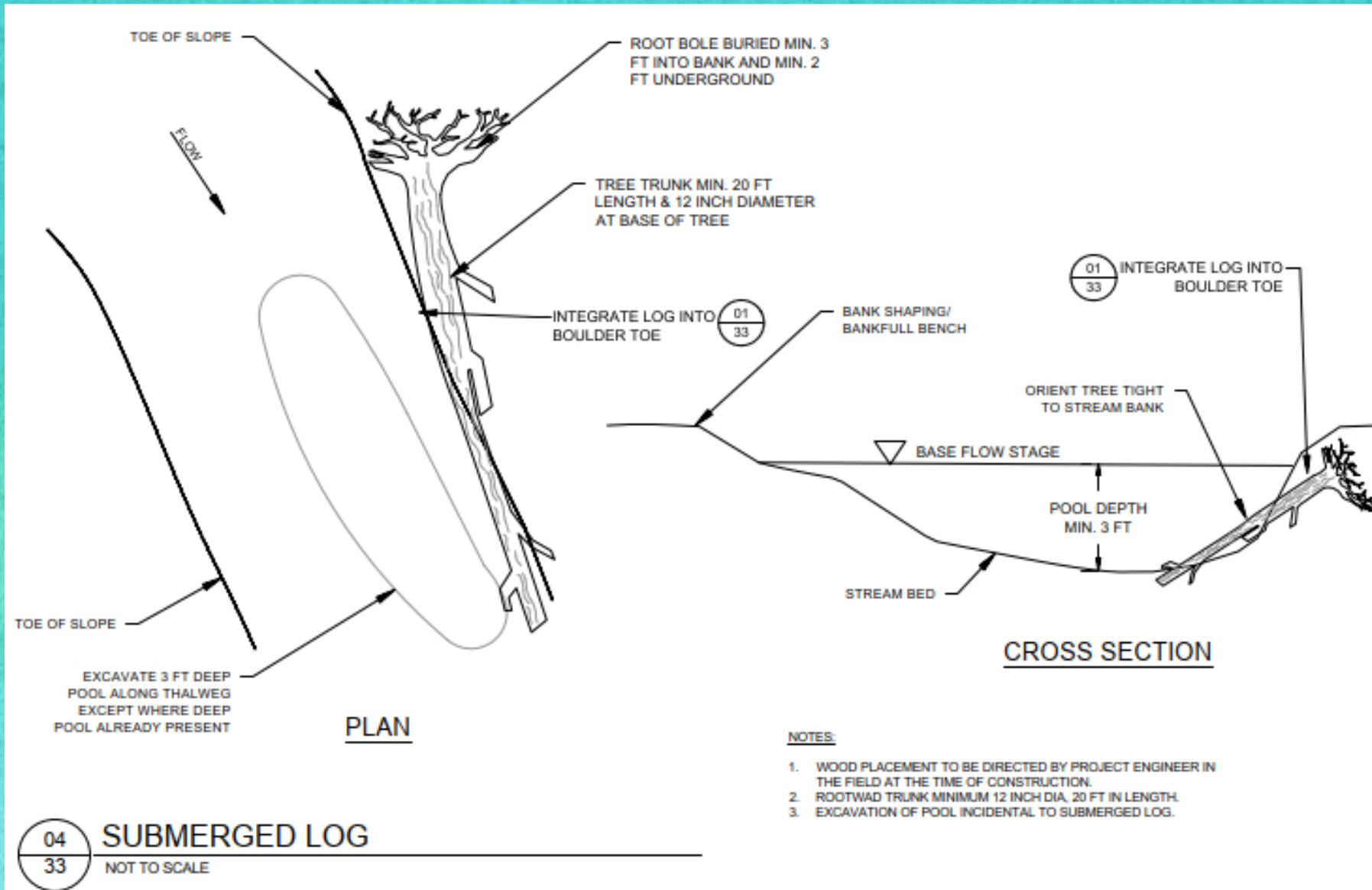
Steep failing banks

# South Park Fields

- Boulder toe w/ bank shaping; higher RR here (2' above OHWM) and extra heavy at abutment
- 4 submerged logs (salvaged on-site)
- Trees and shrubs on 3:1 slope (above rock)



# South Park Fields

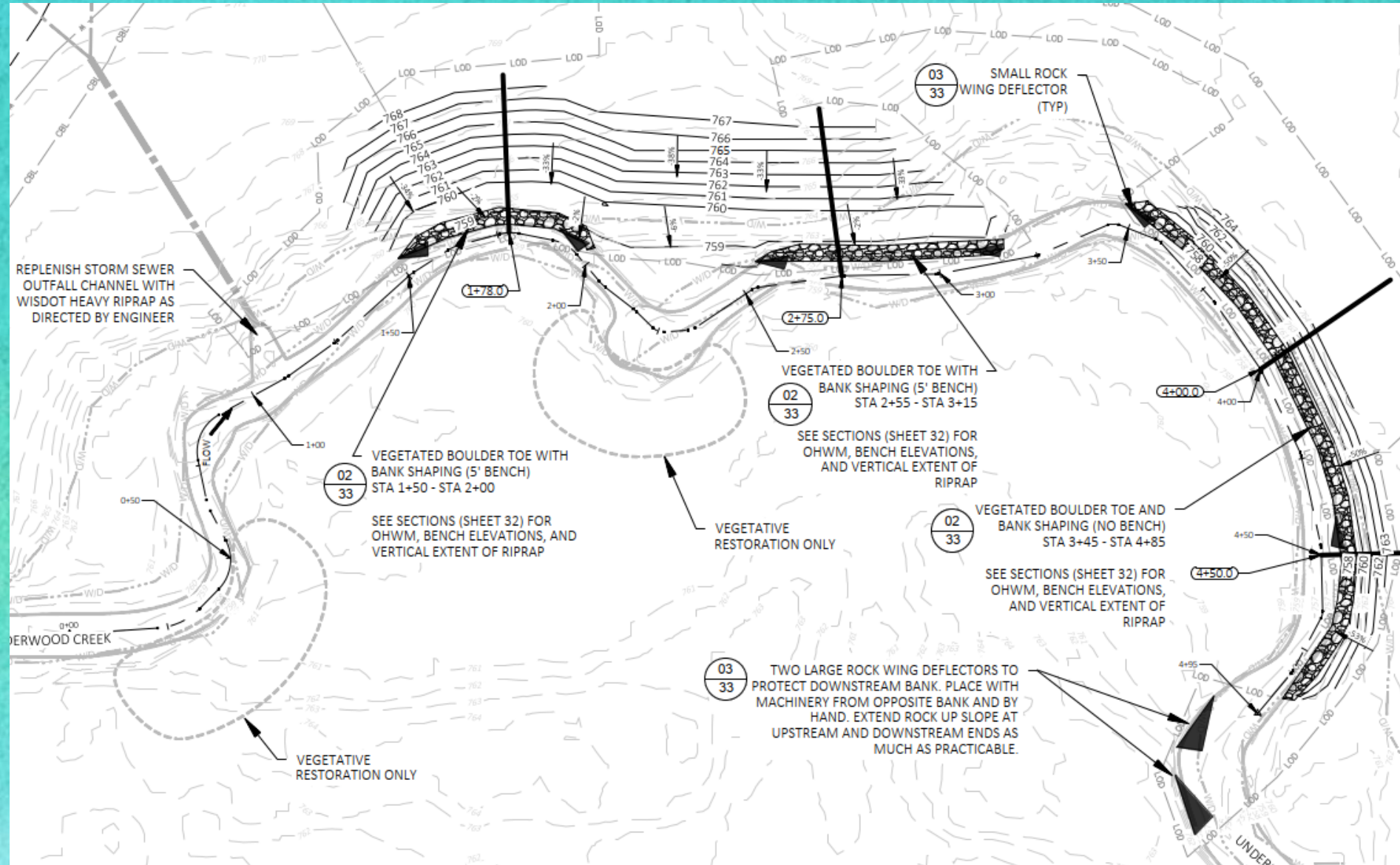


# Pomona Road (Underwood Creek)



# Pomona Road

- Boulder toe w/ some benching (space-constrained)
- 5 small rock deflectors
- 2 large rock deflectors to treat failing opp. bank w/out access
- Shrub planting



# Closing Design Thoughts

- DNR flexibility in permitting and WQ crediting was crucial
  - Wetland impacts
  - Re-use of wood and tree replacement
  - Habitat credits for rock deflectors (not channel spanning)
- Vertical features (rootwads, pool logs, wing deflectors) can be challenging to design and install in shallow waterways. Thorough survey-bathymetry helps!



- Tree removal – two sites
- Northern Long-Eared Bat deadline May 1
- Stockpiled root wads for re-use



Site Prep



# Opposite Bank Live Staking



# Turbidity Barriers



Contractor  
completed 75-100  
ft/day

# Boulder Toe, Benching



# Root Wad Installation



# Access Steps



Plantings – Trees & Shrubs



# Wing Deflectors

12 inches of rain in <24 hrs  
Lost some topsoil, seed, shrubs, and matting  
Damage repaired in one month



# The Flood

- Total streambank length = 1,025 ft
- Total construction bid ~ \$500,000 = \$490 / ft
- Design ~ \$100,000
- Load Reductions before trade ratio and sharing:
- 5-year TSS reduction ~ 62,300 lbs = \$9.60 / lb
- 5-year TP reduction ~ 81 lbs = \$7,400 / lb

# Numbers



# More Takeaways

- Streambank stabilization is a viable water quality trading option for MS4s
- Unit costs: less than basins; more than ag BMPs
- Obtain habitat credits through root wads, wing deflectors, J-hooks
- Waterway / wetland permitting process is manageable
- Having a good, experienced contractor is very important
- Quick work in-stream most-effective way to reduce construction sediment loss and vulnerability to flood events



# Questions?

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