

# MD 24 Slope Remediation Projects- Section A

Advisory Committee Meeting  
March 12, 2014





## In This Presentation....

- Project Purpose and Need
- Re-cap from the previous meetings
- Design Re-Evaluation
  - ✓ Findings from the Geomorphology Report
  - ✓ Revisions in selected design alternative
  - ✓ Imbricated stone
  - ✓ Other detailed design features
- Project Schedule

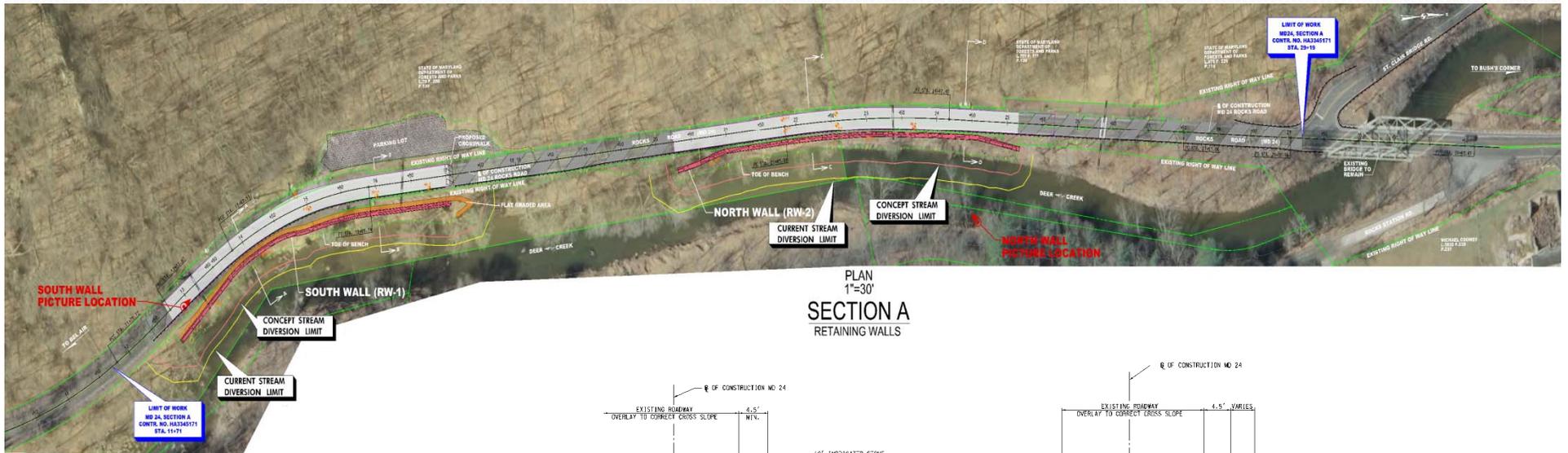


# Project Purpose and Need

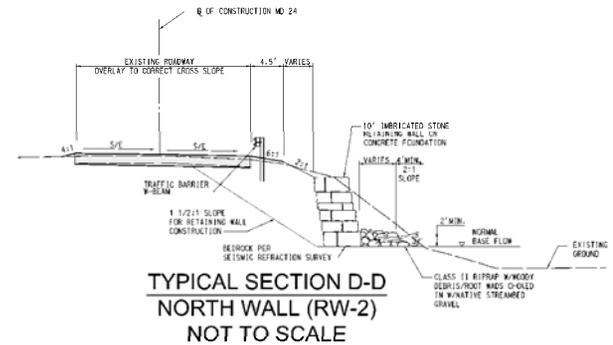
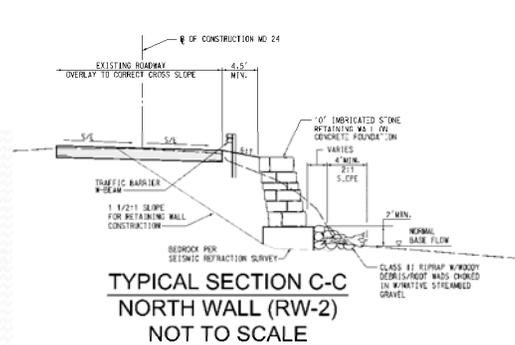
- Purpose and Need –  
To improve road safety along MD 24 and address roadside safety concerns associated with the eroding supporting slopes.
- Project Objectives –
  - ✓ Minimize Creek impacts
  - ✓ Protect historic, cultural and endangered species
  - ✓ Limit disturbance and/or enhancement of rock features

# Recap: Design Alternative from Previous Meetings

## Meetings



PLAN  
1"=30'  
SECTION A  
RETAINING WALLS



LOOKING NORTH ALONG MD 24 AT NORTH WALL - EXISTING

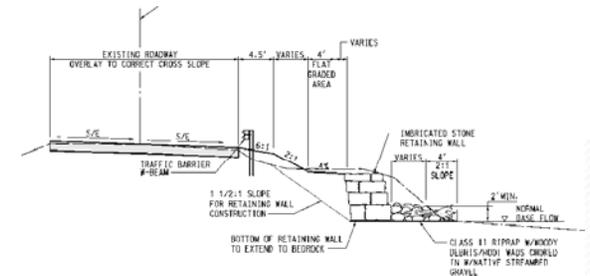
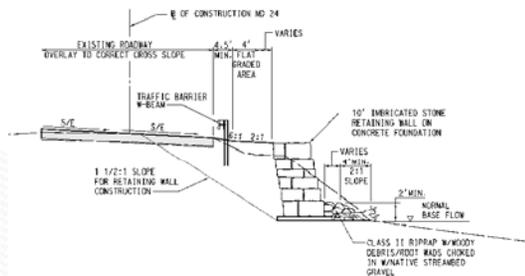
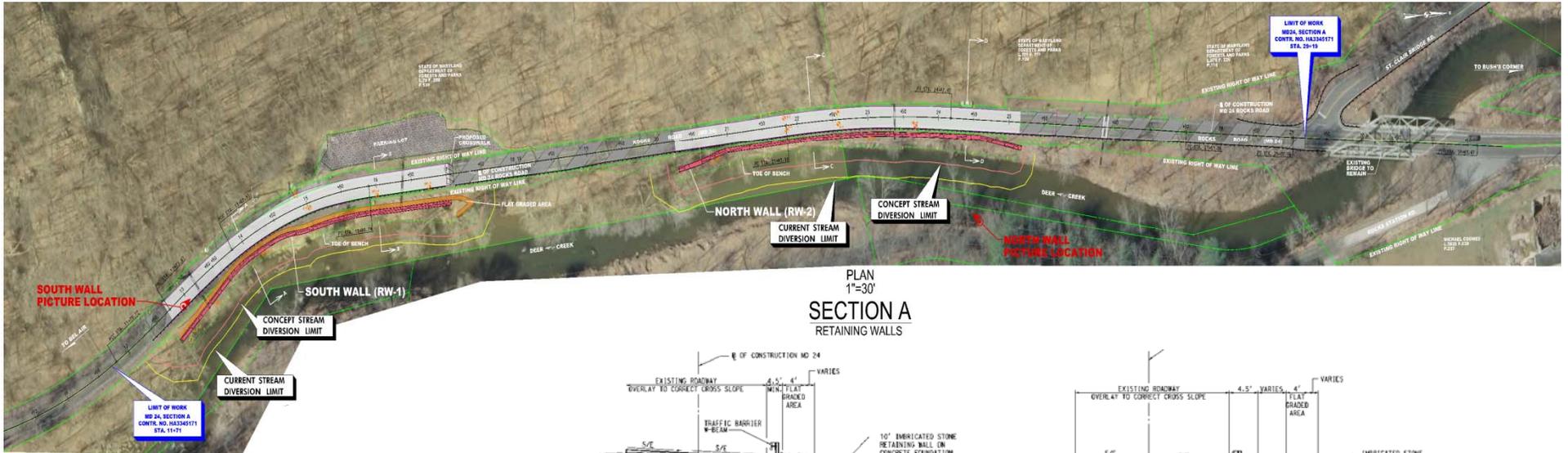


LOOKING NORTH ALONG MD 24 AT NORTH WALL - PROPOSED

## Northern imbricated wall:

- 500' long and 6-9' tall
- Two rolls of imbricated stones
- Concrete footing to bedrock: 16' deep in max
- Vegetated bench at the toe of the wall

# Recap: Design Alternative from Previous Meetings



## Southern imbricated wall:

- 430' long and 3-9' tall
- Two rolls of imbricated stones
- Concrete footing to bedrock: 12' deep in max.
- Vegetated bench at the toe of the wall
- Flat grading area on the top

# Recap: Design Alternative from Previous Meetings

Construction consists of the following major elements:

- Vegetated benches at the toe of the walls
- Roadway reconstruction at locations of wall construction
- Landscaping
- Brown traffic barrier
- Re-graded existing parking lot
- Improved the roadside drainage facilities wherever feasible
- Relocated utility poles on northbound MD 24



# Recap: Design Challenges

## – Stream Diversion and Constructability

- Dewatering and diverting flow from the creek
- Temporary Diversion System Criteria
  - ✓ Shortest construction duration/minimal impact to the stream
  - ✓ Height of the diversion barrier system
  - ✓ Stability
  - ✓ Erosion and sediment control during construction

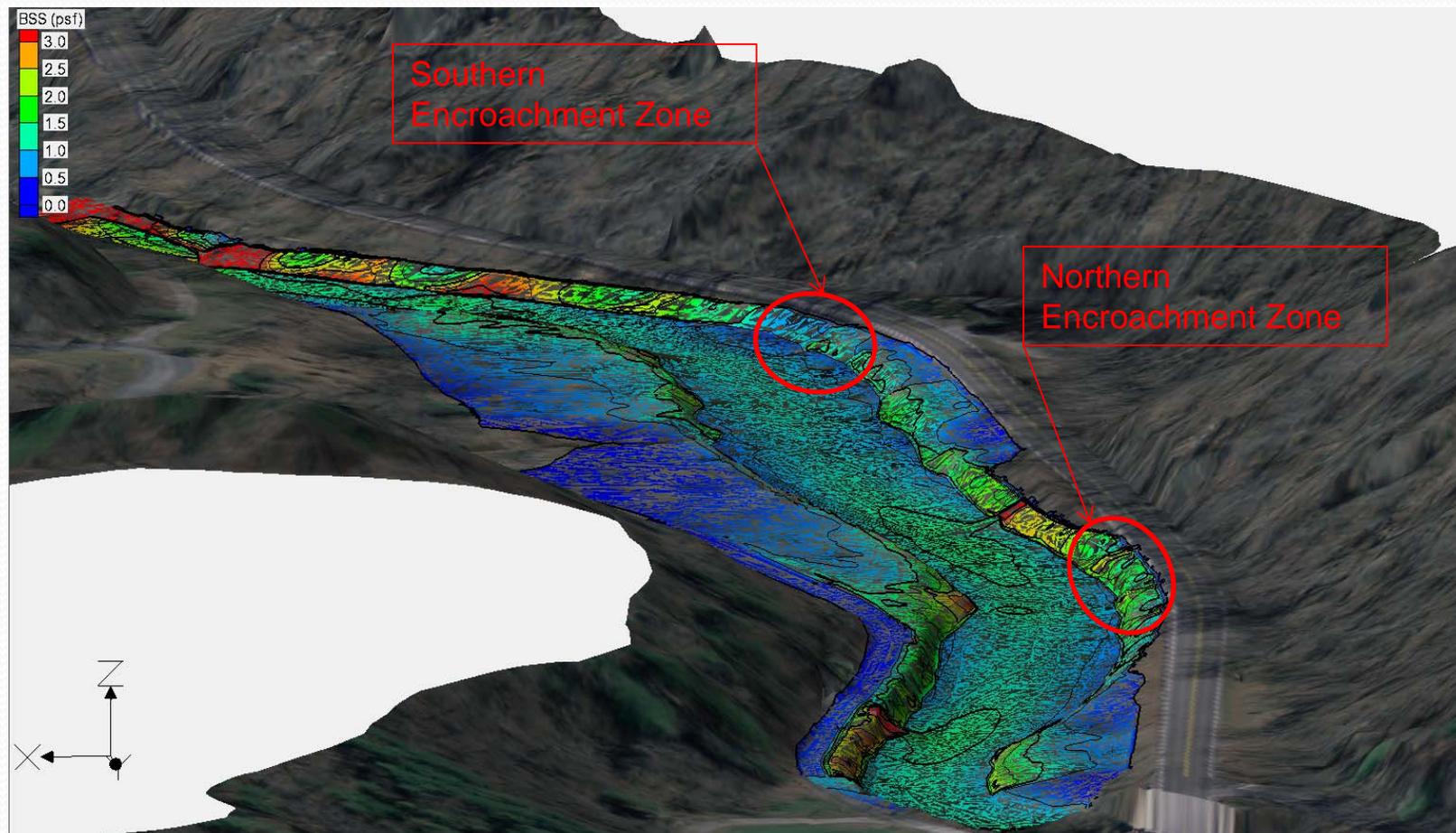


# Design Re-evaluation

- Ensure safety and constructability
- Minimize the impacts to the surrounding environmental features
- Reduced size and length of the proposed walls
- Aesthetics

# Findings from the Geomorphology Report

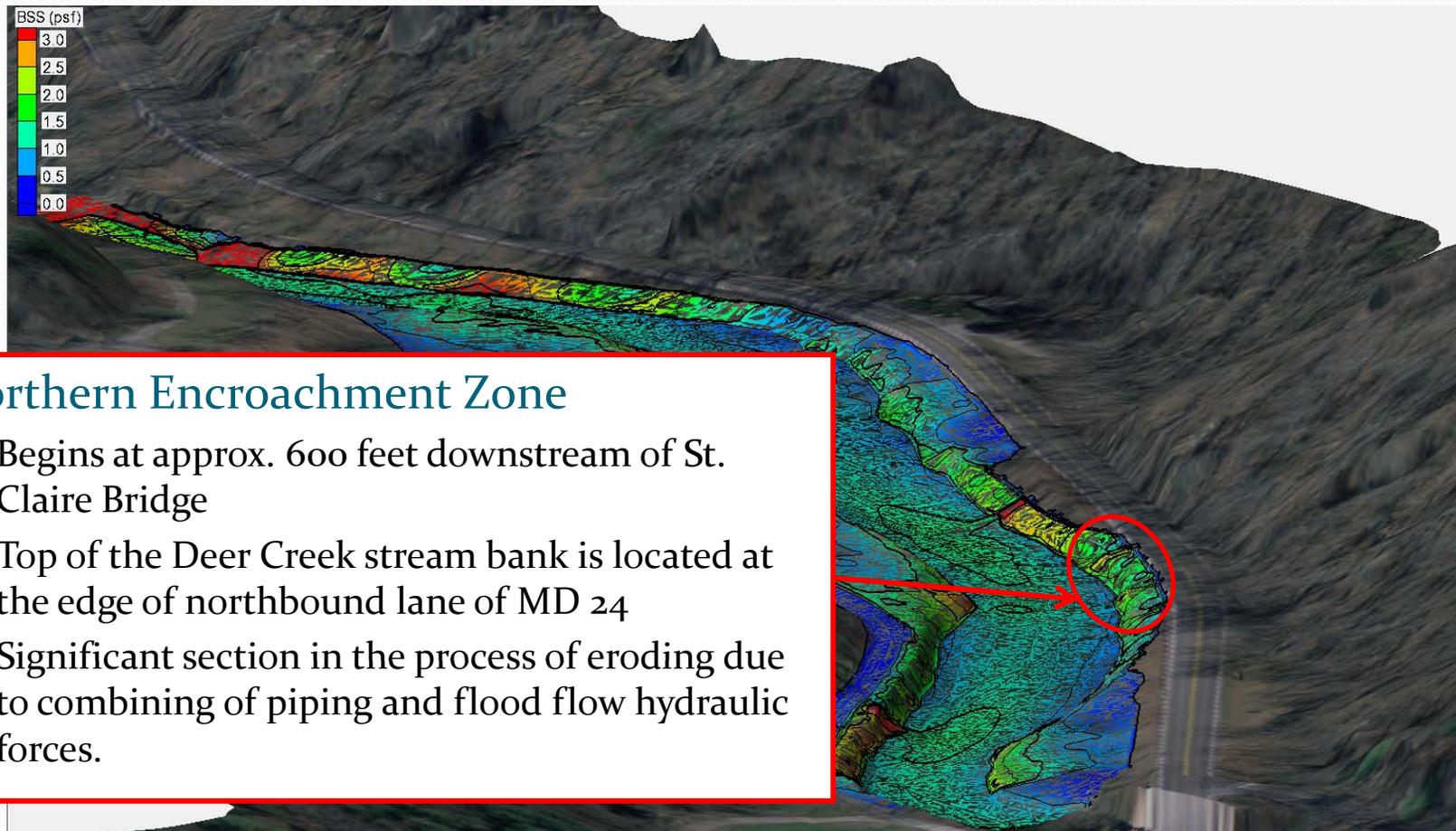
Dated February 2011



Existing Condition 6870 cfs Flow Boundary Shear Stress -Peak charge reported on Sept 30, 2010 storm

# Findings from the Geomorphology Report

Dated February 2011

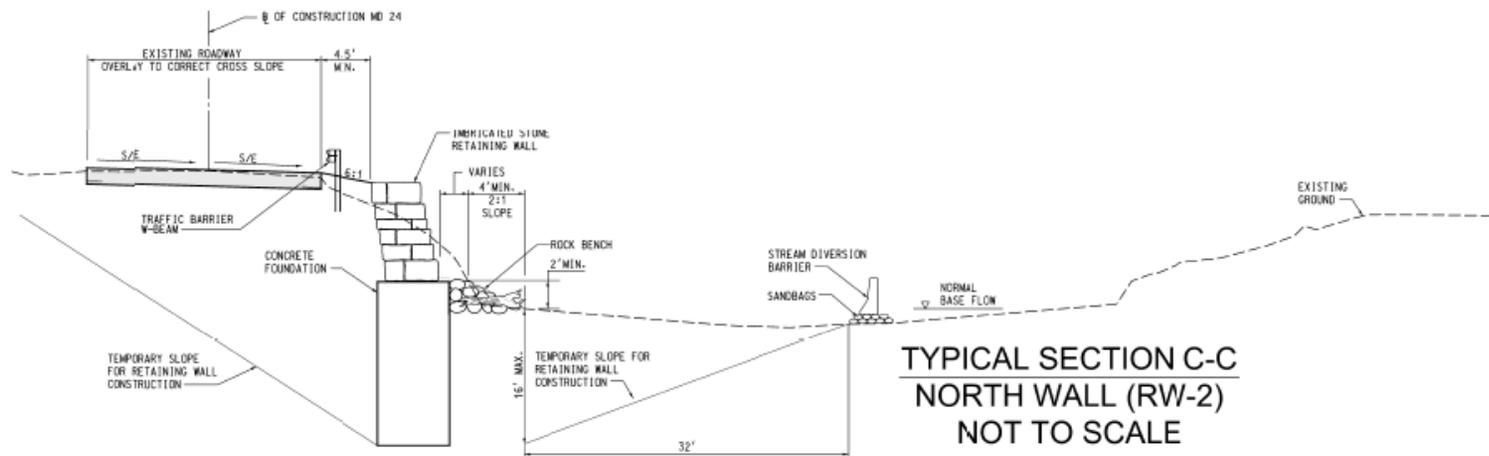
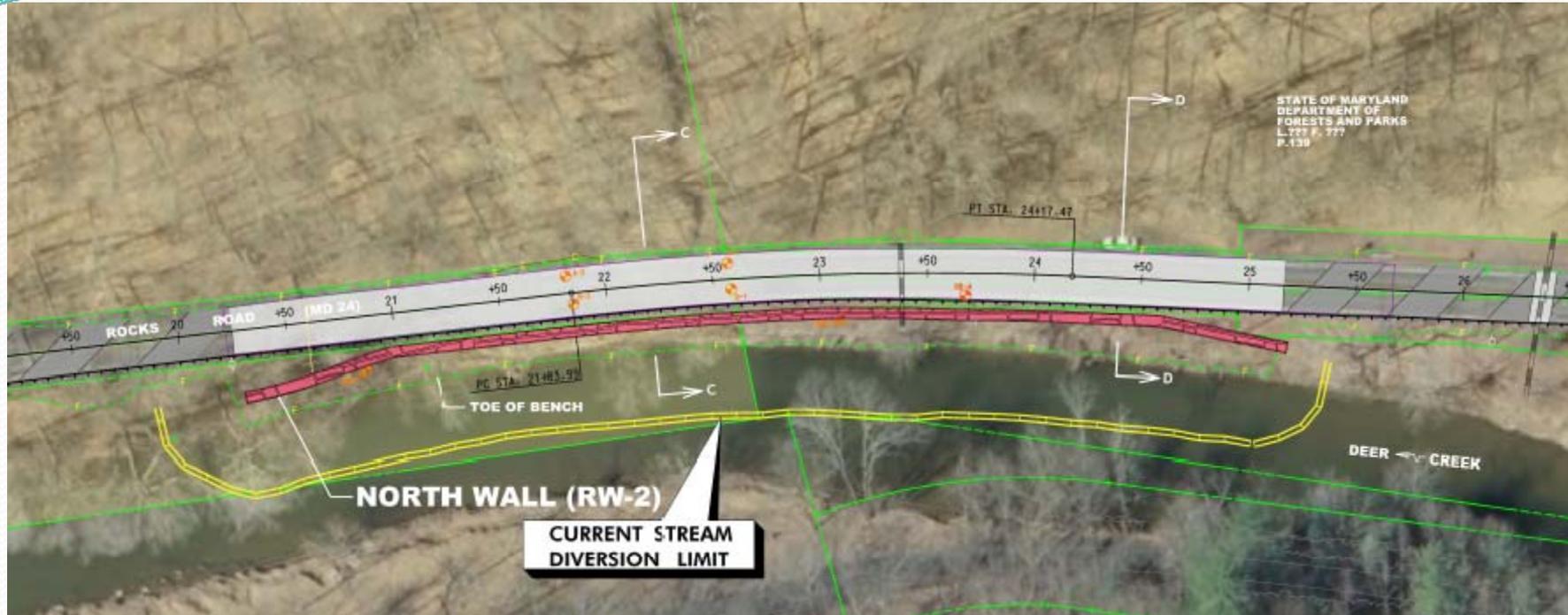


## Northern Encroachment Zone

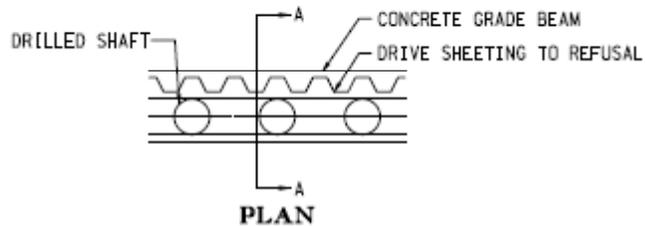
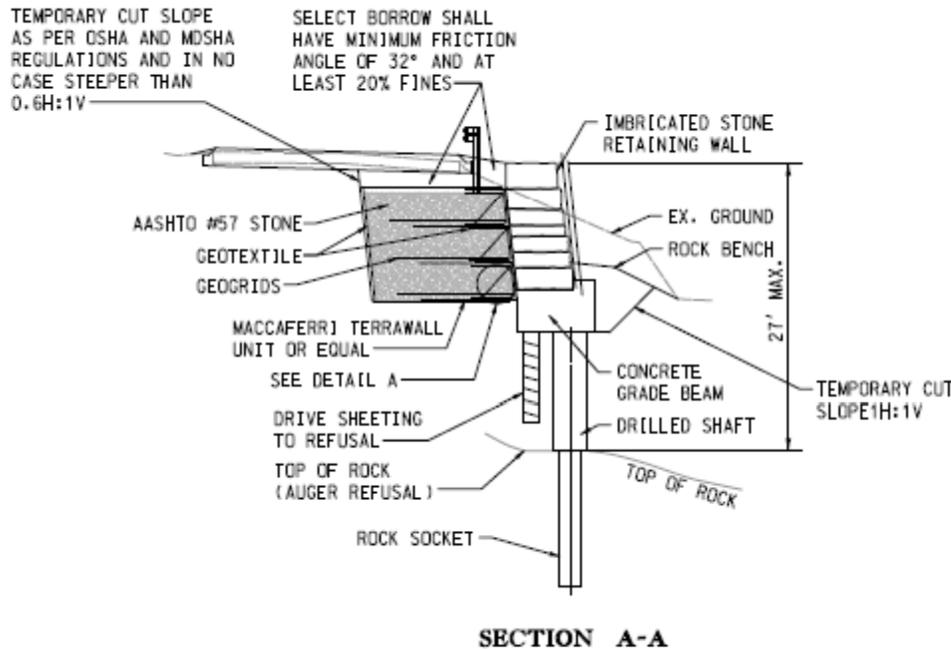
- Begins at approx. 600 feet downstream of St. Claire Bridge
- Top of the Deer Creek stream bank is located at the edge of northbound lane of MD 24
- Significant section in the process of eroding due to combining of piping and flood flow hydraulic forces.

Existing Condition 6870 cfs Flow Boundary Shear Stress -Peak charge reported on Sept 30, 2010 storm

# Northern Imbricated Wall - Before



# Northern Wall Typical Section - Current



MECHANICALLY STABILIZED EARTH (MSE) WALL WITH IMBRICATED STONE RETAINING WALL ON CONCRETE PIER CAP WITH DRILLED PILES.

## Wall Foundation:

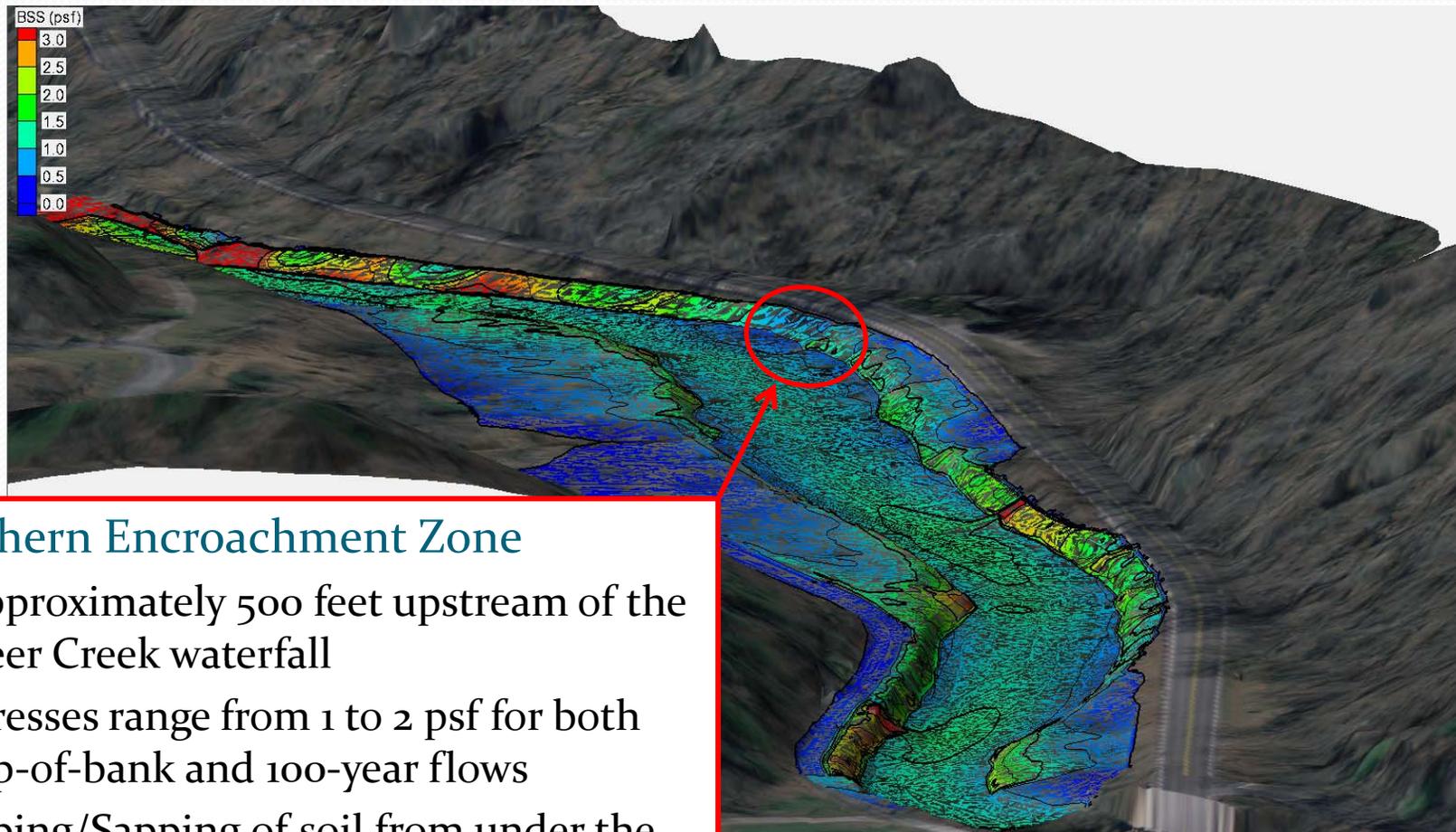
- Rock socket shaft
- Sheeting behind the shaft
- Concrete cap

## Wall Components:

- Geogrid Primary Reinforcement
- Terramesh wall System
- Geotextile fabric
- Imbricated Stones (one roll)

# Findings from the Geomorphology Report

Dated February 2011

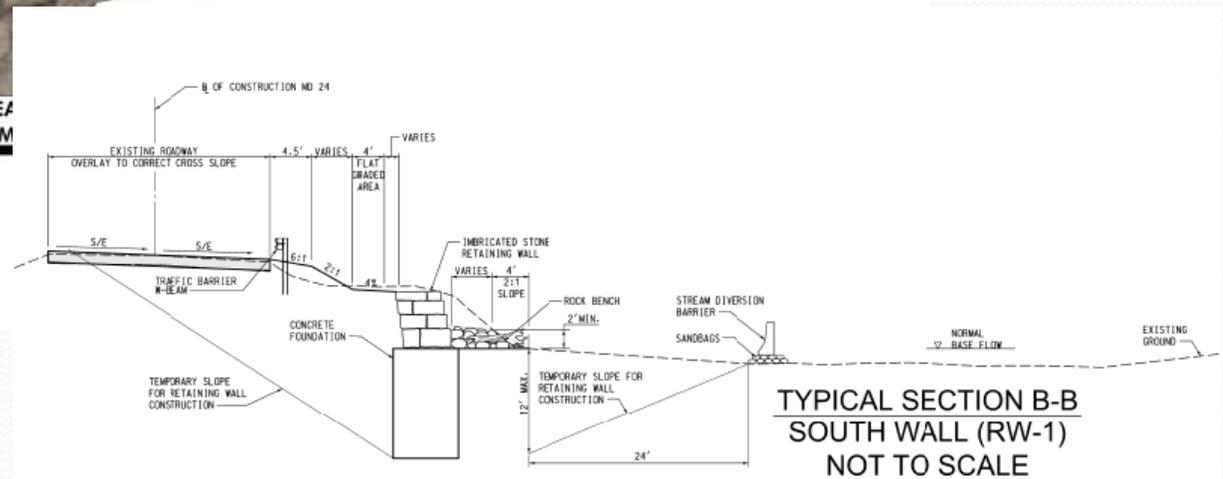
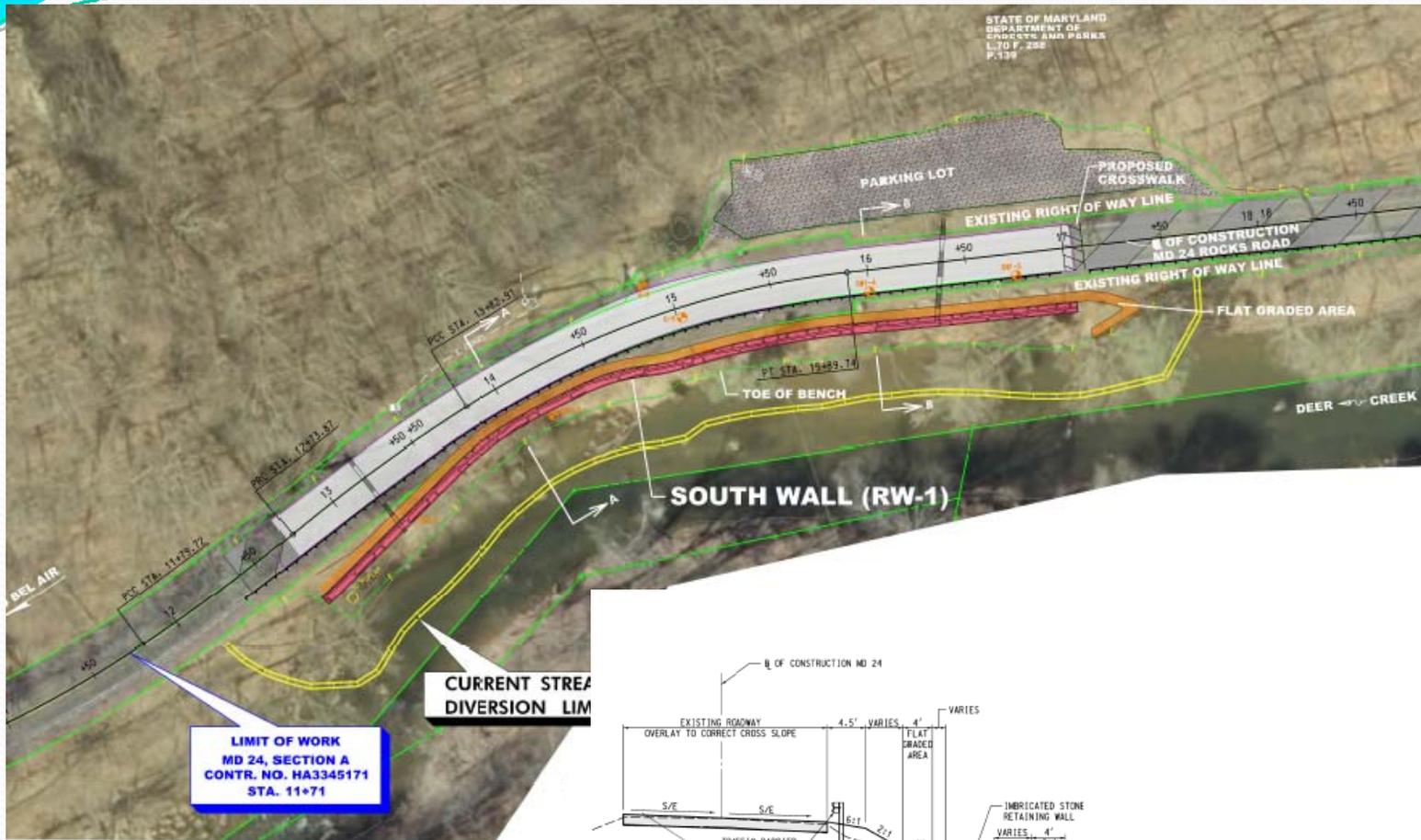


## Southern Encroachment Zone

- Approximately 500 feet upstream of the Deer Creek waterfall
- Stresses range from 1 to 2 psf for both top-of-bank and 100-year flows
- Piping/Sapping of soil from under the MD 24

Peak Stress - Peak charge reported on Sept 30, 2010 storm

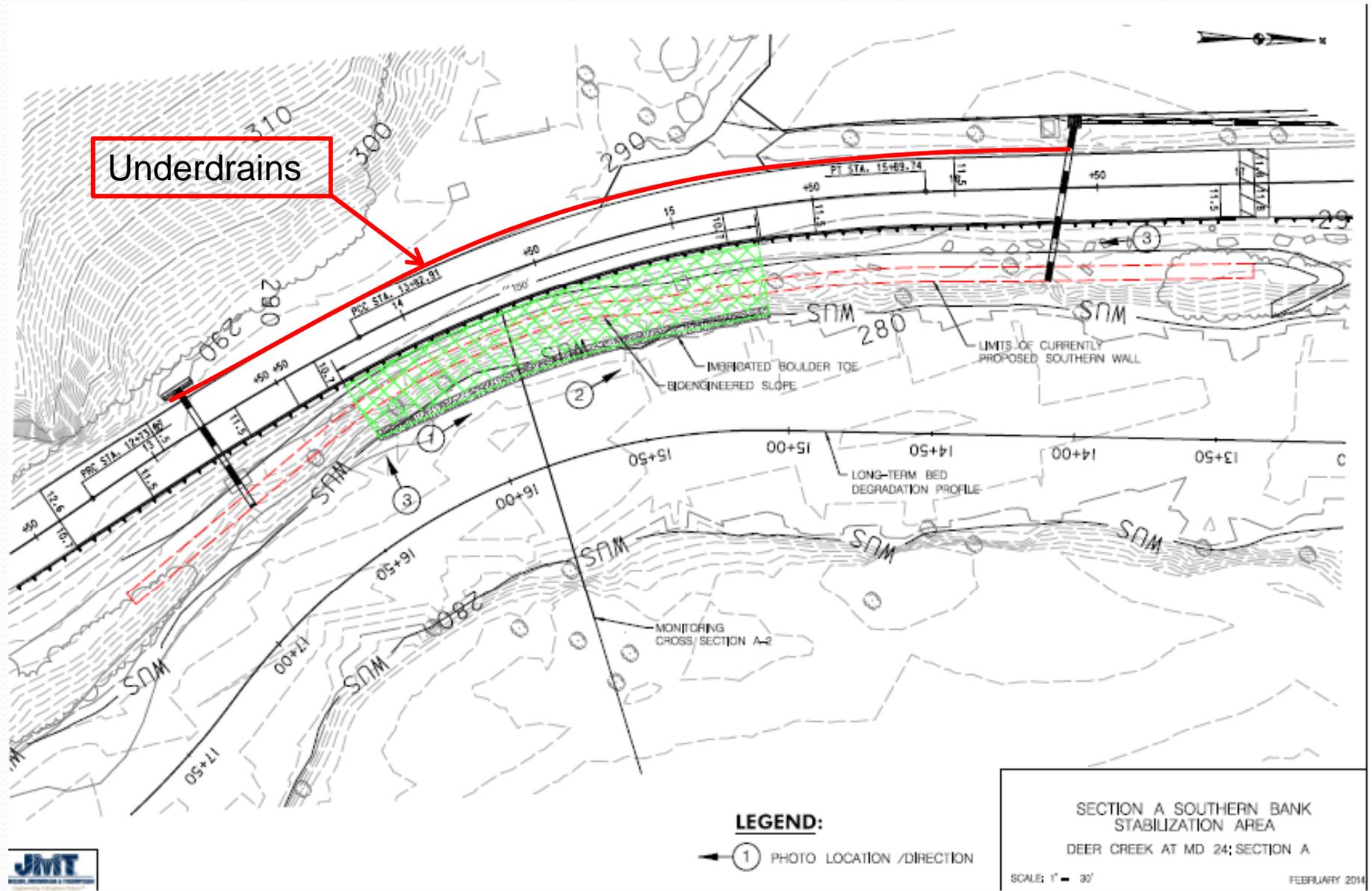
# Southern Imbricated Wall - Before



# Southern Slope



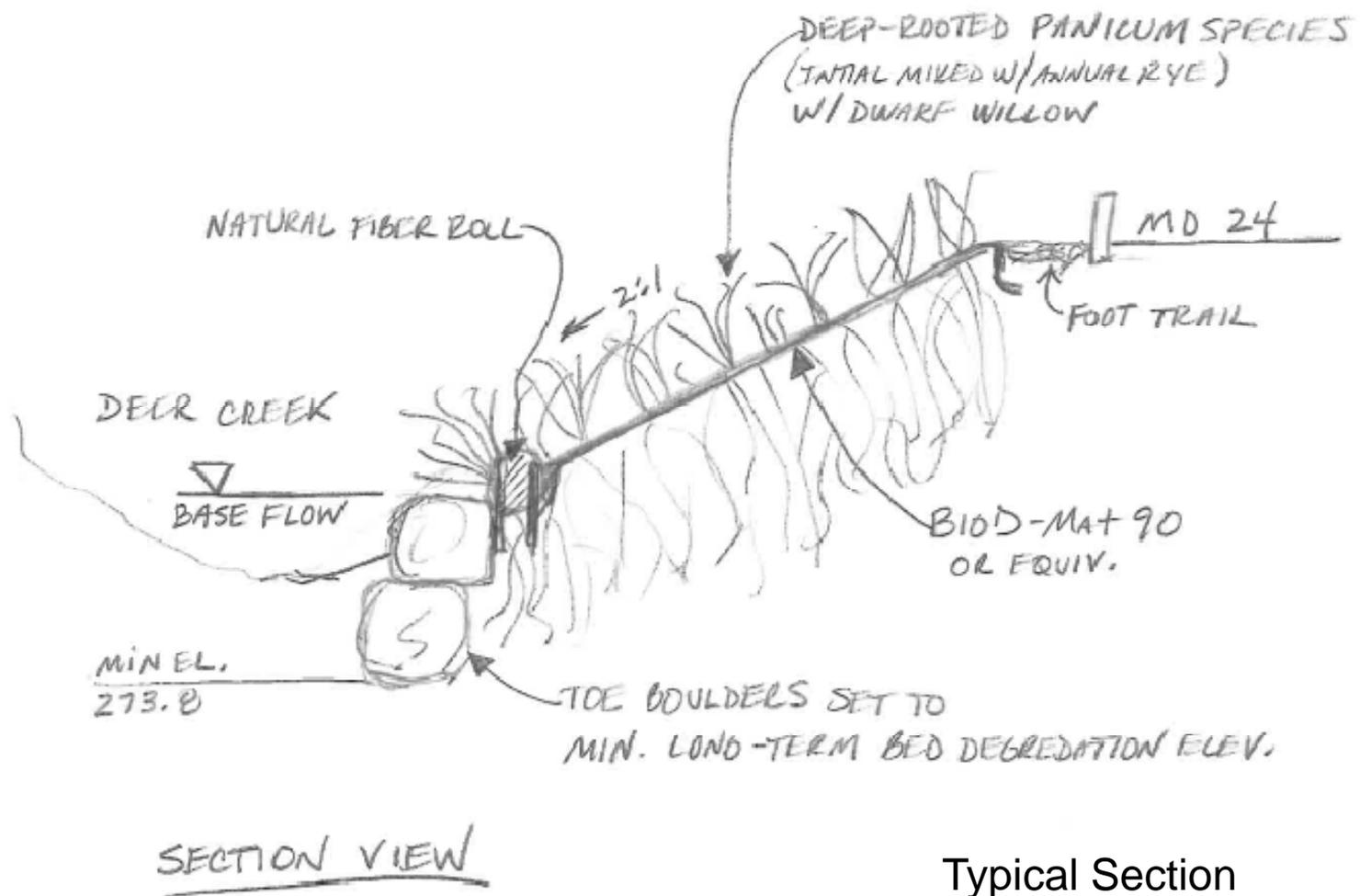
# Southern Slope Stabilization - Current



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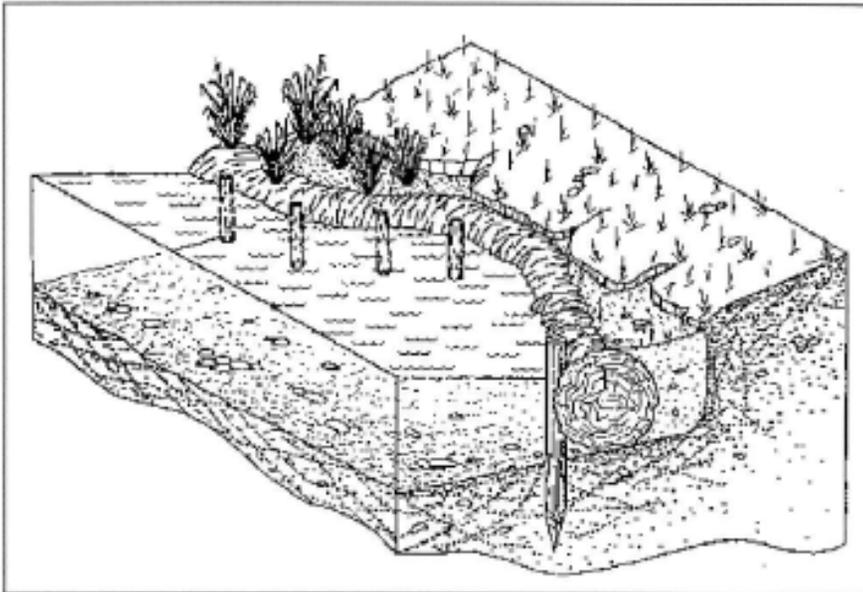
Project DEER CREEK @ MD 24 Job No. \_\_\_\_\_ of \_\_\_\_\_  
 Subject SOUTH WALL CONCEPT Sheet No. \_\_\_\_\_ Date \_\_\_\_\_  
 Computed By Fb Date 9/29/14 Checked By \_\_\_\_\_

**JMT**  
**JOHNSON, MERRIAM & THOMPSON**  
 Engineering A Brighter Future  
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 Telephone 717-741-1600 Fax 717-741-9100



Typical Section

# Natural Fiber Rolls



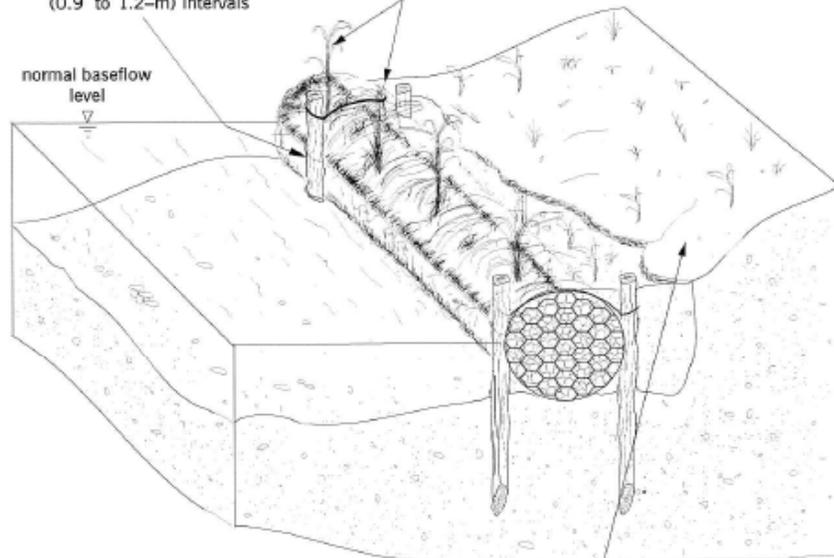
## Maryland's Guidelines To Waterway Construction DETAIL 2.6: NATURAL FIBER ROLLS

### DETAIL

Adapted From Goldsmith and Bestmann (1992)

live or dead stakes, min. 3-ft (0.9-m) length, notched for twine or rope and spaced at 3 to 4-ft (0.9 to 1.2-m) intervals

plugs recommended by a plant specialist and spaced at appropriately – generally at 6 to 12-in (15 to 30-cm) intervals



slope shall be backfilled and protected with temporary erosion control measures until permanent vegetation is established

# Southern Slope Stabilization - Current

- Significantly reduced environmental impacts
- Significantly reduced groundwater piping
- Perform future monitoring a given period to ensure the slope stability remains

# Example: Stony Run Stream Restoration Project



# Southern Slope Stabilization

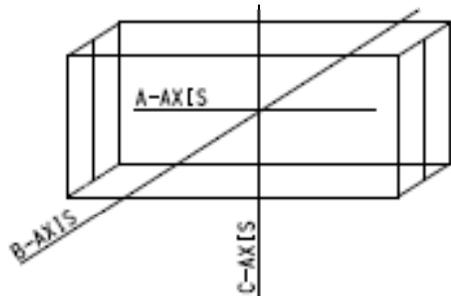


Before



Current

# Imbricated Stones



**IMBRICATED STONE**

ROCK SIZE	A-AXIS	B-AXIS	C-AXIS
MINIMUM SIZE, FEET	3.5	1.5	1.5
MAXIMUM SIZE, FEET	4	3	2



James Run Gneiss in Lafarge Churchville Quarry, Churchville, Maryland

# Example: Imbricated Wall along Little Falls NC Trail



# Example: MD 139 Imbricated Stone Wall



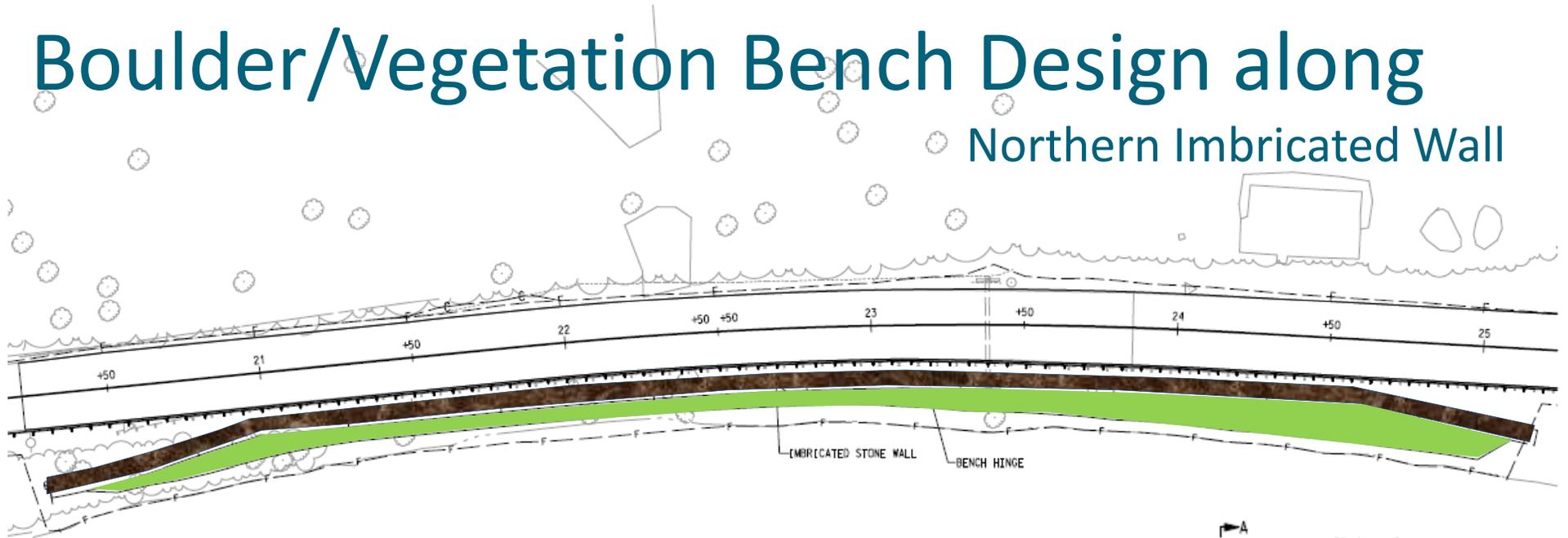
# Example: Imbricated Wall along MD 139



# Example: Imbricated Wall along MD 139

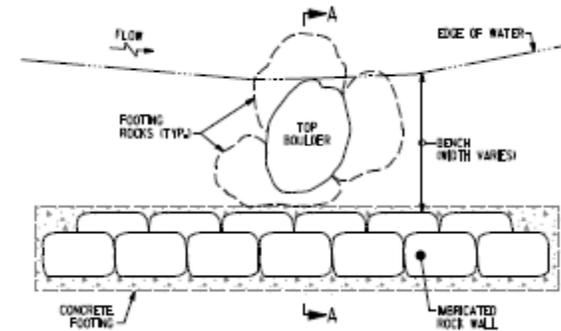
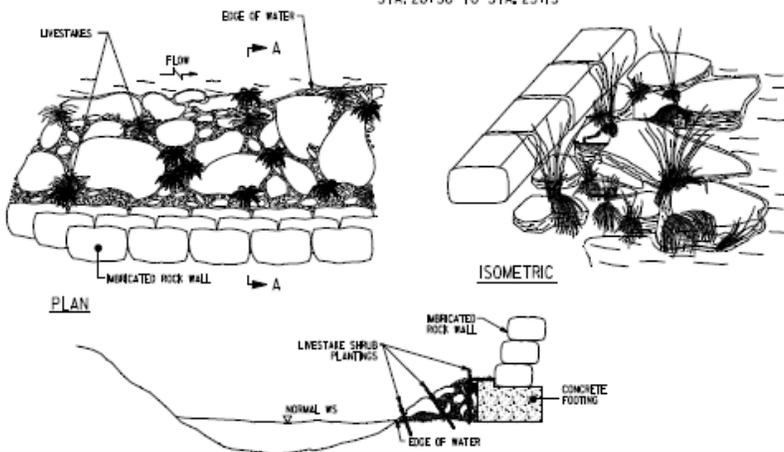


# Boulder/Vegetation Bench Design along Northern Imbricated Wall



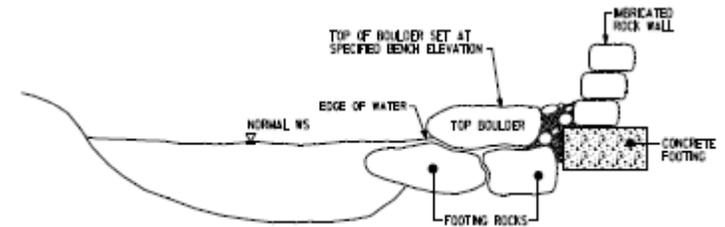
## LIVE STAKE SHRUB PLANTING DETAILS

N.T.S.  
STA. 20+30 TO STA. 25+45



## BOULDER CLUSTER DETAIL

N.T.S.



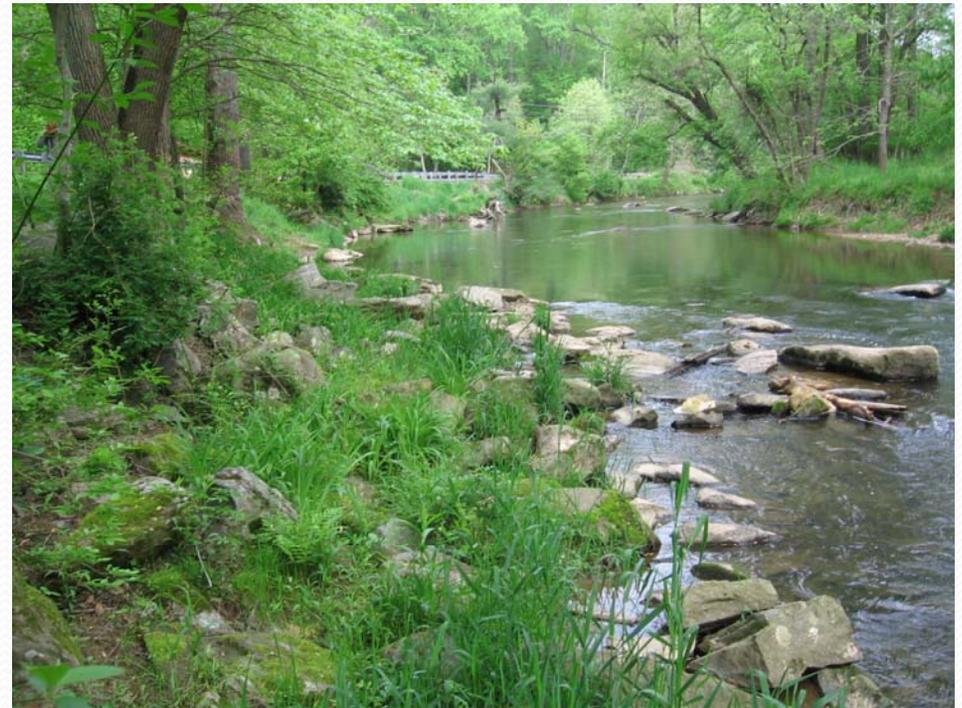
# Example: Boulder/Vegetation Bench Design

Northern Imbricated Wall

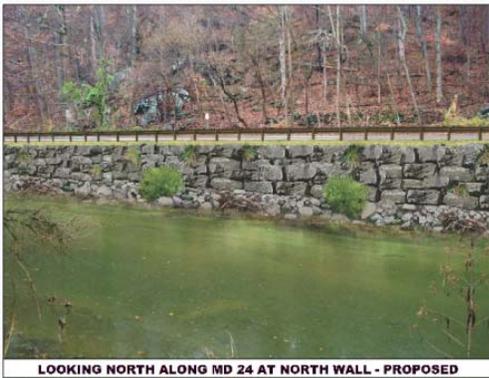


# Example: Boulder/Vegetation Bench Design

Northern Imbricated Wall



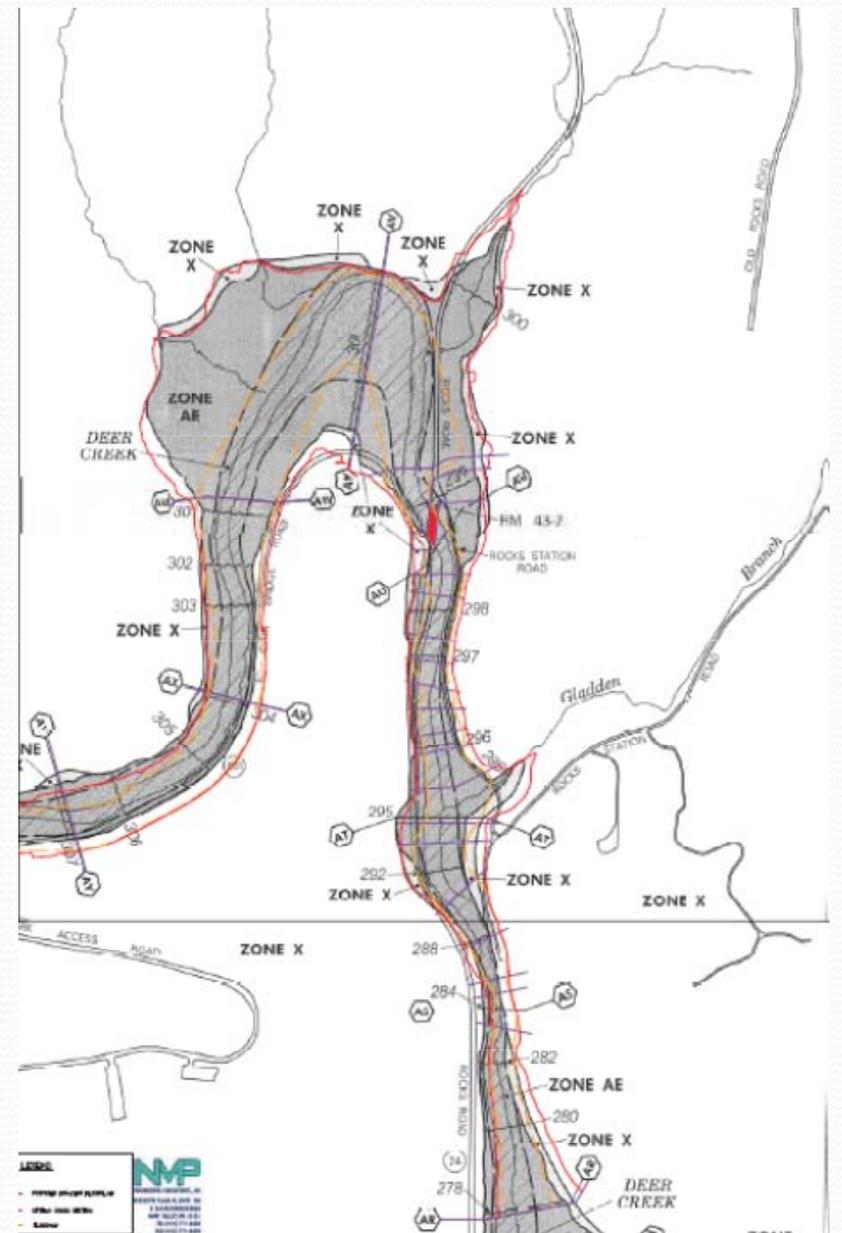
# Northern Imbricated Wall w/ Boulder/Vegetation Bench- Current



# Floodplain Analysis

## Hydraulic Analysis for FEMA

- Revised floodplain boundary based on our Re-Study of Existing Conditions
- No “mappable” difference between our existing floodplain and the proposed floodplain - the increase in base flow elevation (100-year water surface elevation) is 0.36 inch (<math><3/8\text{''}</math>) for the FEMA model



# Summary of Current Design Alternative

Construction consists of the following major elements:

- 500 feet long imbricated wall at the northern encroachment zone
- 150 feet slope stabilization at the southern encroachment zone
- Vegetated benches at the toe of the imbricated wall
- Roadway reconstruction in both encroachment zones
- Landscaping
- Brown traffic barrier
- Re-graded existing parking lot
- Improved the roadside drainage facilities wherever feasible
- Relocated utility poles on northbound MD 24

# Project Progress and schedule:

- Preliminary engineering is approximate 75% complete
- Coordinating with utility owner for utility relocation design
- Additional soil borings in March 2014

JPA Submittal	November, 2013
Environmental Document (NEPA) Approval	November, 2013
Final Design Completion	Early April 2014
Public Hearing (MDE)	Mid-April 2014
JPA approval	Late May 2014
Start Construction MD 24 Section A	June 2014
Complete Construction MD 24 Section A	November 2014



Questions?