LIVING SHORELINES PROJECTS: DO THEY WORK????

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LS Projects: Start to Finish

- **Inquiry from interested Property Owner (P.O.).**
- **Schedule Site Visit**
  - Is erosion happening, if so, is it a problem?
  - Assessment of existing structures.
  - Explore ground situation: neighbor's property, existing spits, etc.
  - Photographs.
- **Detailed Research**
  - Google Earth®.
  - Maryland Shorelines Online.
  - Erosion rate.
  - Others.
- **Detailed Survey**
  - Topographic.
  - Bathymetric.
  - Others.

- **Pre-Project Meeting**
  - Discuss design options.
  - Estimation of costs.
  - Funding avenues.
  - Land Owner Agreement.
  - Check DNR/MDE/CBT or other sources.
  - Concept Plan, if applicable

- **Bidding Process**

- **Local Permits**
  - Building and grading permits.
  - Erosion and Sediment Control.
  - Buffer Management.
  - Critical Area.
  - Others.

- **Pre-construction Meeting**
  - Contact MDE.
  - Contact all parties involved.

- **Project Implementation Phase**
  - Meeting with Engineer and Contractor.
  - Periodic site inspection.
  - Photo documentation.
  - As-build calculation.
  - Post-construction meeting.

- **Planting.**

Major Factors in Selecting Design

- Energy absorbed by shoreline
  - Fetch – distance wind travels over surface of water
  - Fetch directly correlates to wave size
- Depth of water
- Existing shoreline
- Cost

Project Selection Criteria

Energy Environment	*Low Energy*	*Medium Energy*		*High Energy*
Shoreline Location	Creek or cove	Minor river	Major tributary	Main stem Bay
Water depth (ft)	-1.0	-1.0 to -2.0	-2.0 to -4.0	-4.0 to -15.0
Fetch (miles)	0.5	1.0 to 1.5	2.0 or more	2.0 or more
Erosion rate (ft/yr)	2 or less	2 to 4	4 to 8	8 to 20
Erosion Control Treatment Options	***Non-structural Projects***	***Hybrid Projects***		***Structural Projects***
	Beach replenishment	Marsh fringe w/ groins		Bulkheads
	Fringe marsh creation	Marsh fringe w/ sills		Revetments
	Marshy islands	Marsh fringe w/ breakwaters		Stone reinforcing
	Coir logs edging, groins	Beach replenishment w/ breakwaters		Groins & jetties
Cost per foot	$50-100	$150-300	$350-500	$500-1,200

Considerations Regarding Design

- Homeowner goals
  - Shoreline protection (erosion), aesthetics, cost, recreation (beach, kayaking, etc.)
- Landscape considerations
  - Site assessment, physical constraints (pool/building, steep bluffs, access, etc.)
- Plant selection and optimizing success
  - Selection of appropriate species, long term maintenance
- Implementation of design
  - Constructability: access, tides, etc.

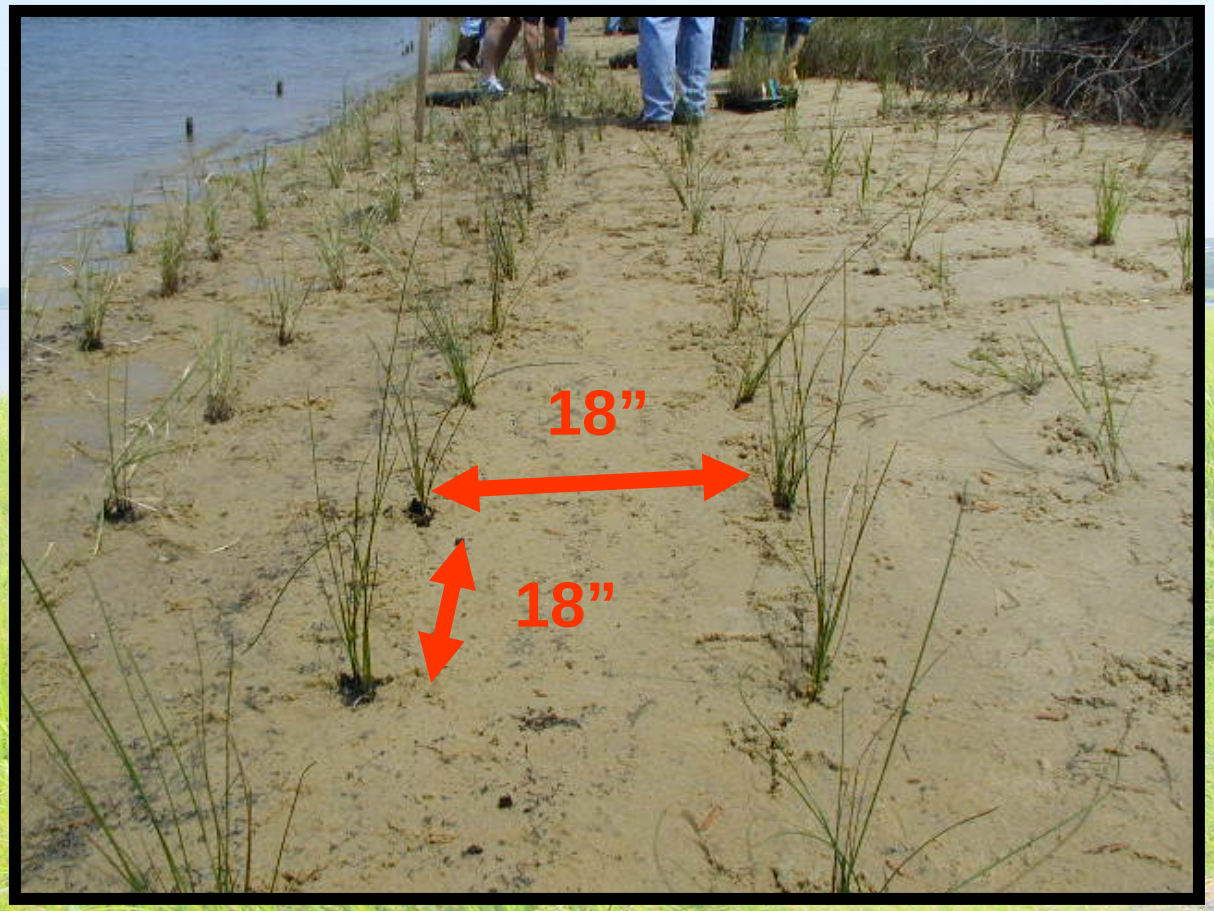
Options for Living Shorelines

- Marsh creation (non-tidal wetlands)
- Edging
- Biolog
- Rock groins with marsh plantings
- Rock sill with marsh plantings
- Breakwater

Marsh Creation

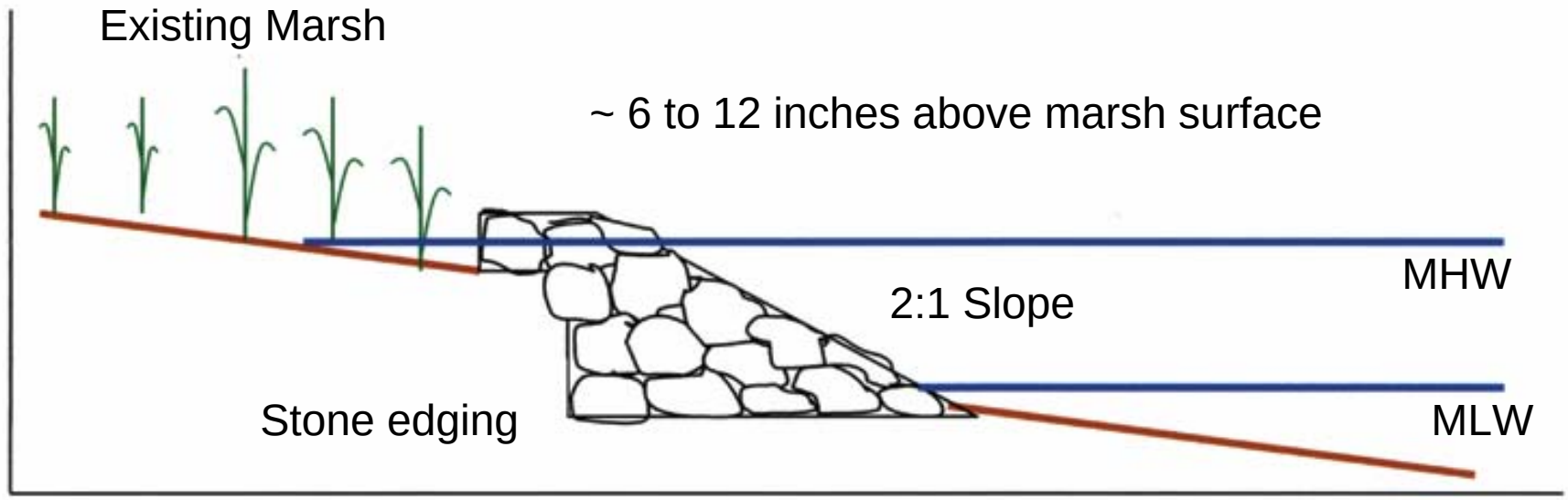
NOAA Restoration Center

Marsh Creation



VIMS Center for Coastal Resources Management

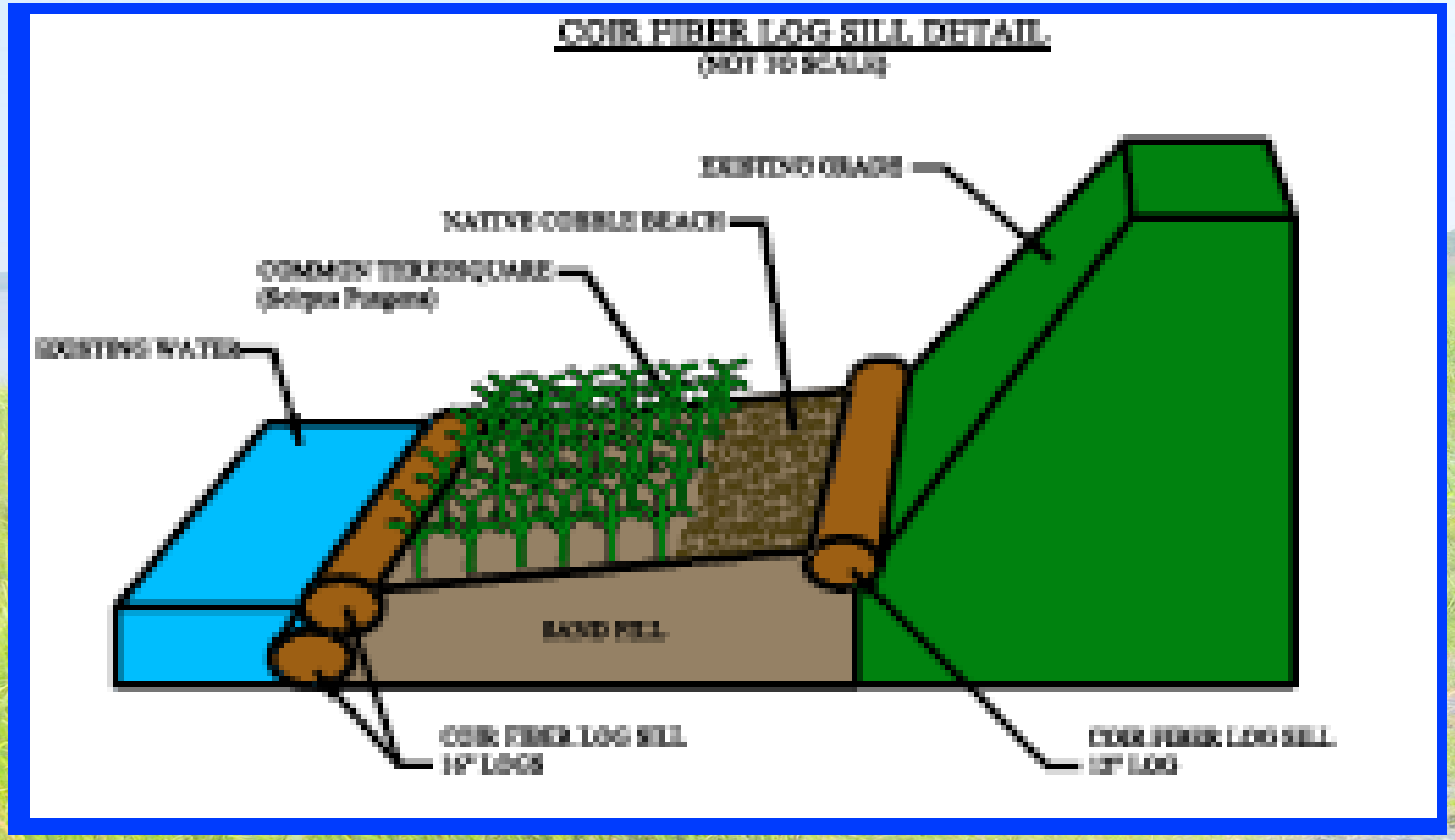
Marsh Edging



MHW - Mean High Water MLW - Mean Low Water

Profile of a typical marsh edge stabilization project used to prevent wetland edge loss.

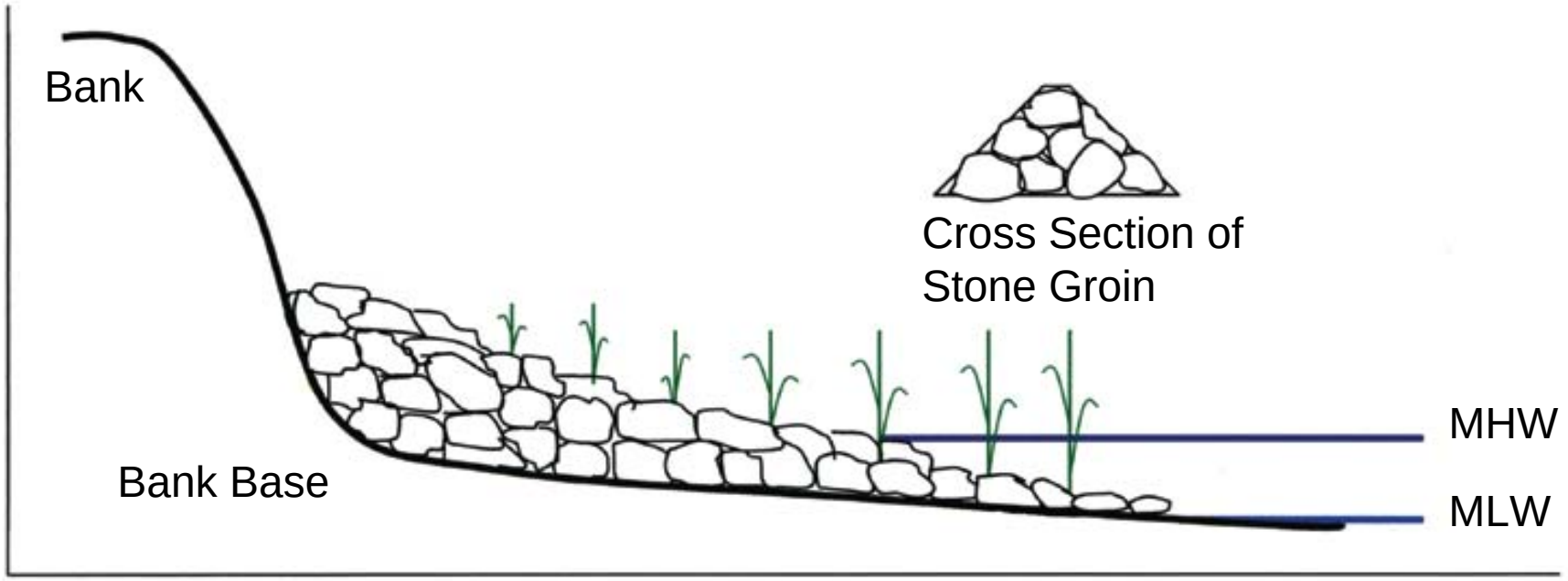
Biolog Based Designs



Biolog Based Designs

Biolog Based Designs

Cross-section of a Typical Groin



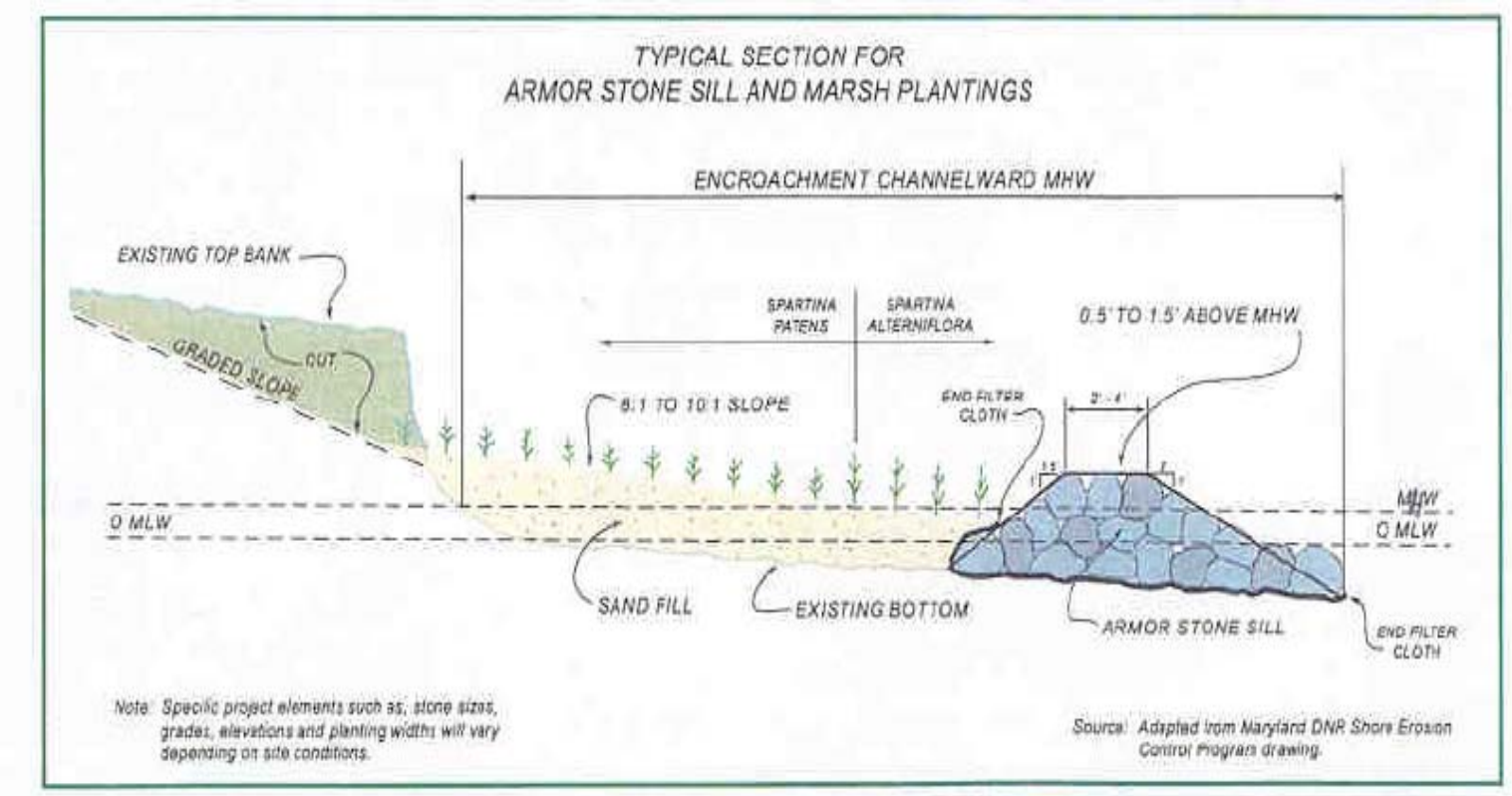
MHW - Mean High Water MLW - Mean Low Water

Profile of typical stone groin and cross section used to stabilize eroding banks.
Note: Plants are placed between groins on the sand fill.

Groins

Groins with Marsh Plantings

Sill Design



S. alterniflora is planted from mid-tide to mean high water

S. patens is planted above mean high water

Sills with Marsh Plantings

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Sills with Marsh Plantings

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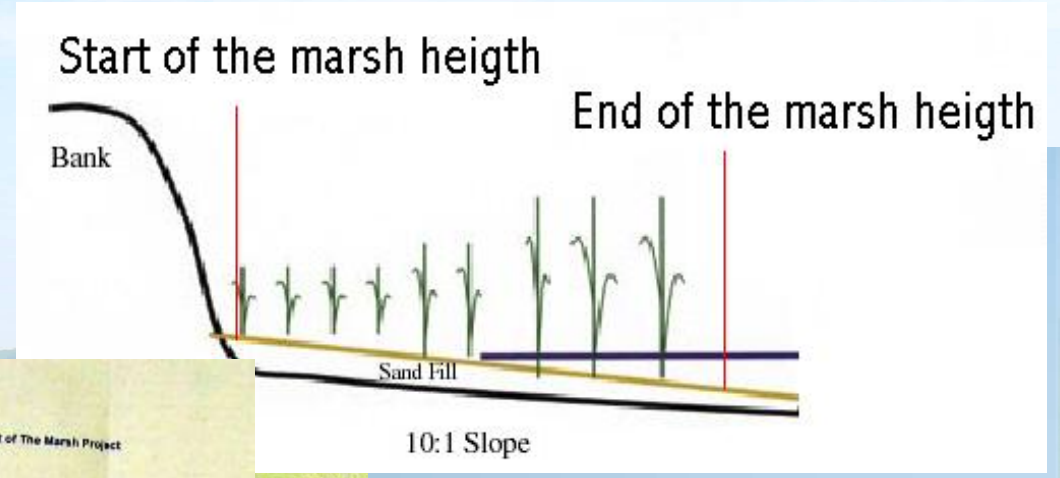
Breakwaters

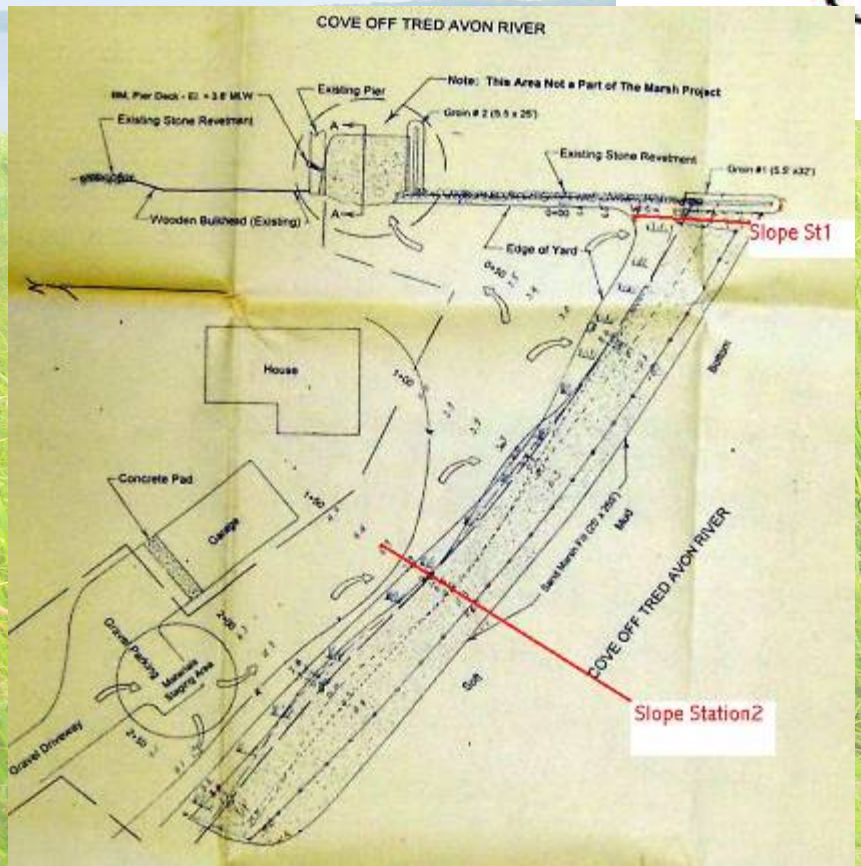
ASSESSMENT OF PROJECTS

Snapshot into Past Projects

- **Counties- Calvert, Caroline, Cecil, Charles, Dorchester, Kent, Queen Anne's, Talbot, Wicomico, Worcester.**
- **Total number of projects- 258 (1987-2006)**
- **Total cost of projects- $8.9 million**
- **Total project length- 117,208 linear ft**
- **Sediment saved- 49,876.85 tons/yr**
- **Wetlands created- 2,376,570 sq. ft**
- **Wetlands protected- 200,309 sq. ft**

Material and Methods: Survey





Materials and Methods: Pictures of the Project

RESULTS

Factors Analyzed

- Bank condition
- Marsh erosion
- Structure condition
- Non-planted vegetation

Erosion Signs: Bank Erosion

96- Stable banks

Undercut (69)

Slumping (12)

Marsh Erosion

Condition	Number of Projects
No erosion	10
< 50%	94
> 50%	39
Unknown	34

Erosion Signs: Marsh Erosion

Erosion signs: Structure Displacement

Excellent- 66

Displacement- 88

Sinking- 23

Non-Planted Vegetation

Final Evaluation

Evaluation	Number of Projects (177)	Percentage
Excellent	20	11%
Very Good	71	40%
Good	40	23%
Fair	36	20%
Poor	10	6%

Common Reasons

- Poor engineering and/ construction.
- Poor execution of Plans- integrity??.
- “Incorrect” planting.
- Choice of marsh grasses.
- Boat wake.
- Lack of maintenance.

Maintenance Protocol

- *Control the non-planted species*.
  - Use of moderate quantities of weed killers.
  - Choice of the weed killer: broad-spectrum vs. specific chemical.

- *Keep the sky clear for the plants.*
  - Uprooting young shrubs.
  - Pruning.

- *Clearing junk!!!*
  - Debris or dead tree trunks.

Other Recommendations

- Restore damages in stone structures.
- Most of the maintenance methods- simple, but yield great results.
- Survival of the marsh grasses- crucial for the success of the living shorelines projects.
- Marsh grasses- need constant attention and care to protect homeowners' property from erosion.


CONCLUSION

- Out of 177 projects, **131** of them were good or better.

- “Fair” project- would have higher success rate if maintained.

Thank You !!!!

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