Why Vibracore Sediment Acquisition Monitoring is Being Considered at More Sites for Remedial Design

Ongoing Refinements to V-Sam Technology
2022 WEDA Dredging Expo
July 25-28, 2022
Houston, Texas
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Topics

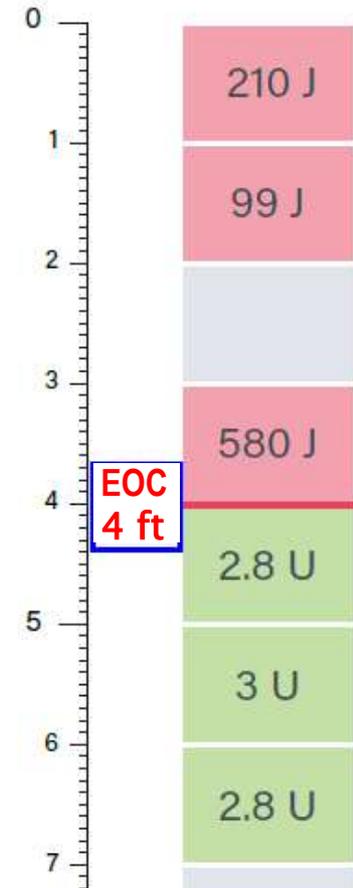- Sediment Characterization for Remedial Design
  - Elevation of Contamination
  - Accuracy: Removal vs. Dredging
- Vibracoring
  - Conventional Vibracoring
    - Uncertainty – Elevation of Contamination (EOC)
  - V-SAM Vibracoring
    - Equipment – incremental recovery
  - V-SAM vs. Conventional Vibracoring
- Ongoing Refinements
  - Updated Equipment and Second System Development
  - Field Observations and Adjustments

Sediment Characterization for Remedial Design

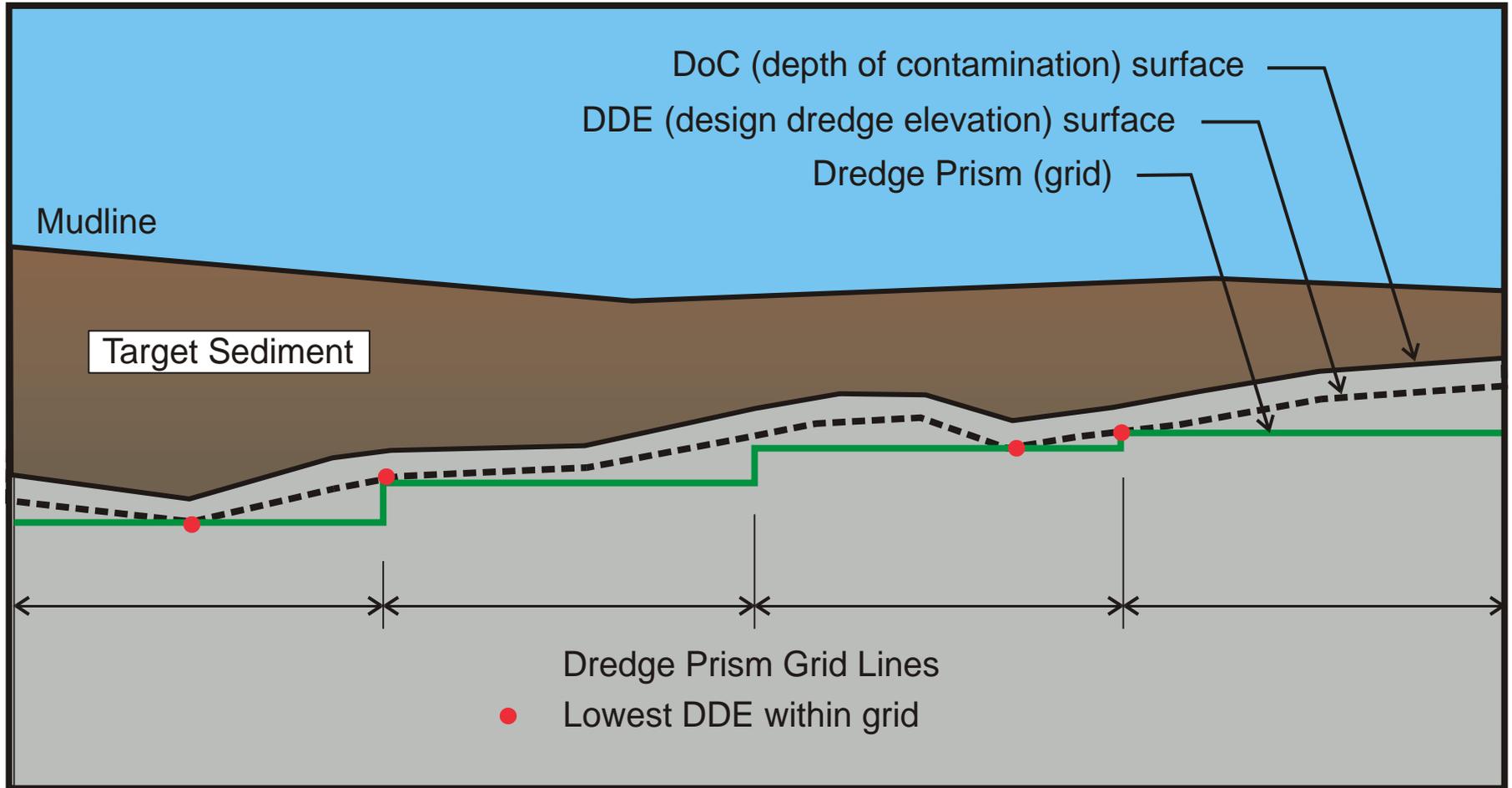>> Elevation of Contamination

Elevation of Contamination (EOC)

- Collect a sample every in-situ foot increment of core
- Send samples to lab to test for ROD chemicals
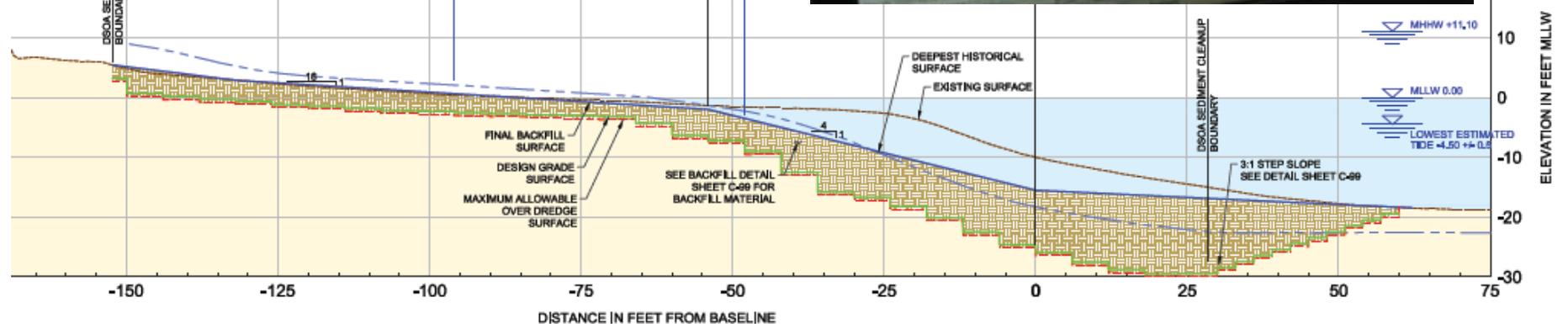- EOC – "Elevation of Contamination" is deepest sample above criteria
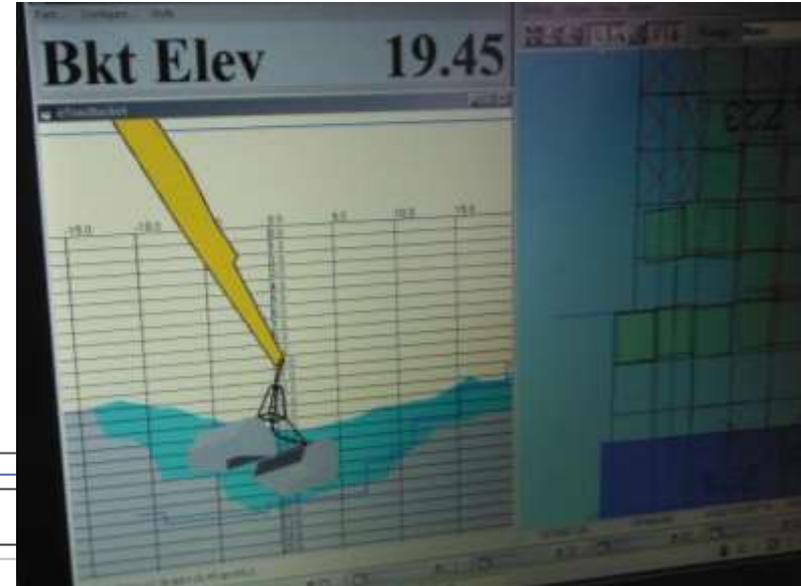

Concentration > criteria

Concentration < criteria

Core profile:
- 210 J
- 99 J
- 580 J
- EOC 4 ft
- 2.8 U
- 3 U
- 2.8 U

Elevation of Contamination

DoC (depth of contamination) surface

DDE (design dredge elevation) surface

Dredge Prism (grid)

Mudline

Target Sediment

Dredge Prism Grid Lines

● Lowest DDE within grid

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Accuracy—Removal vs Dredging

Accuracy Considerations

RTK – GPS Positioned Excavator
Placement of the Bucket within +/- 4 inches

Excavator Dredge with RTK GPS – based system for accurate bucket positioning

Conventional Vibracoring

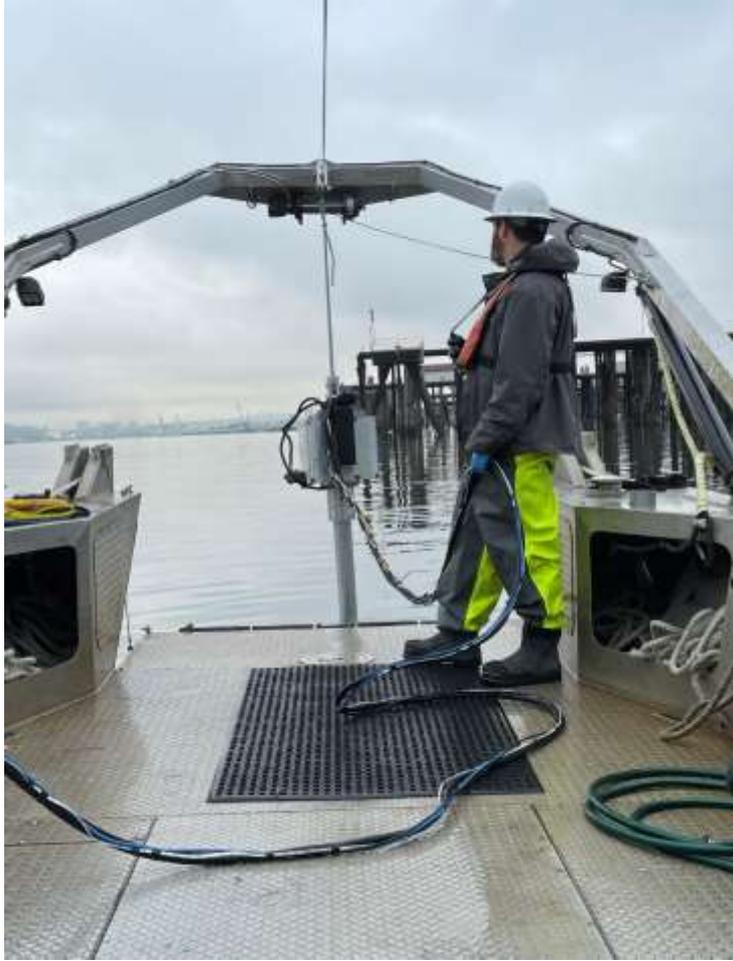>> Elevation of Contamination

Vibracoring

SDI VibeCore D

EQUIPMENT
- Aluminum or plastic tubes
- 5' – 20' long
- Vibrating head attached to top of tube
- Core catcher at bottom of tube

METHOD
- Position tube on sediment bed
- Activate vibratory head
- Advance core tube into sediment
- Retract tube and process

Core Recovery Parameters – %R
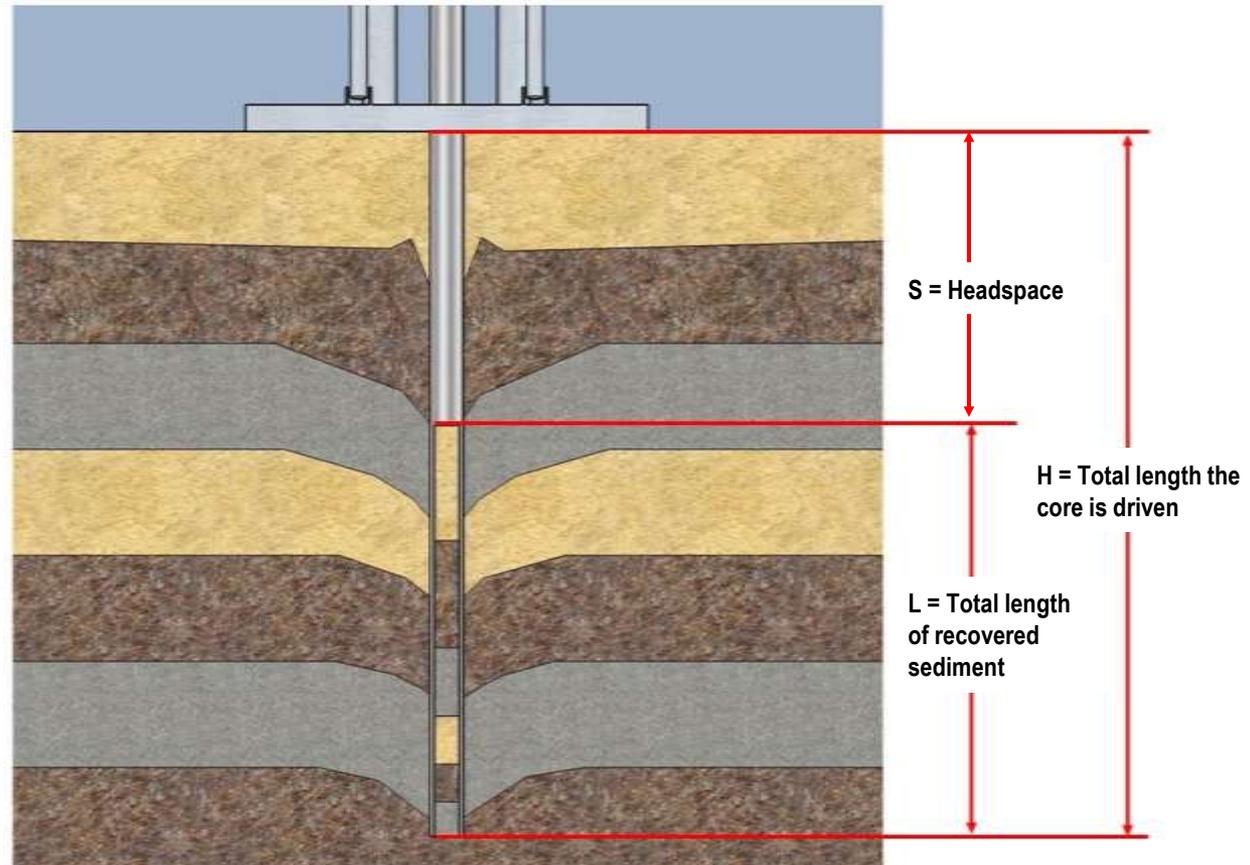
L = Recovered Length
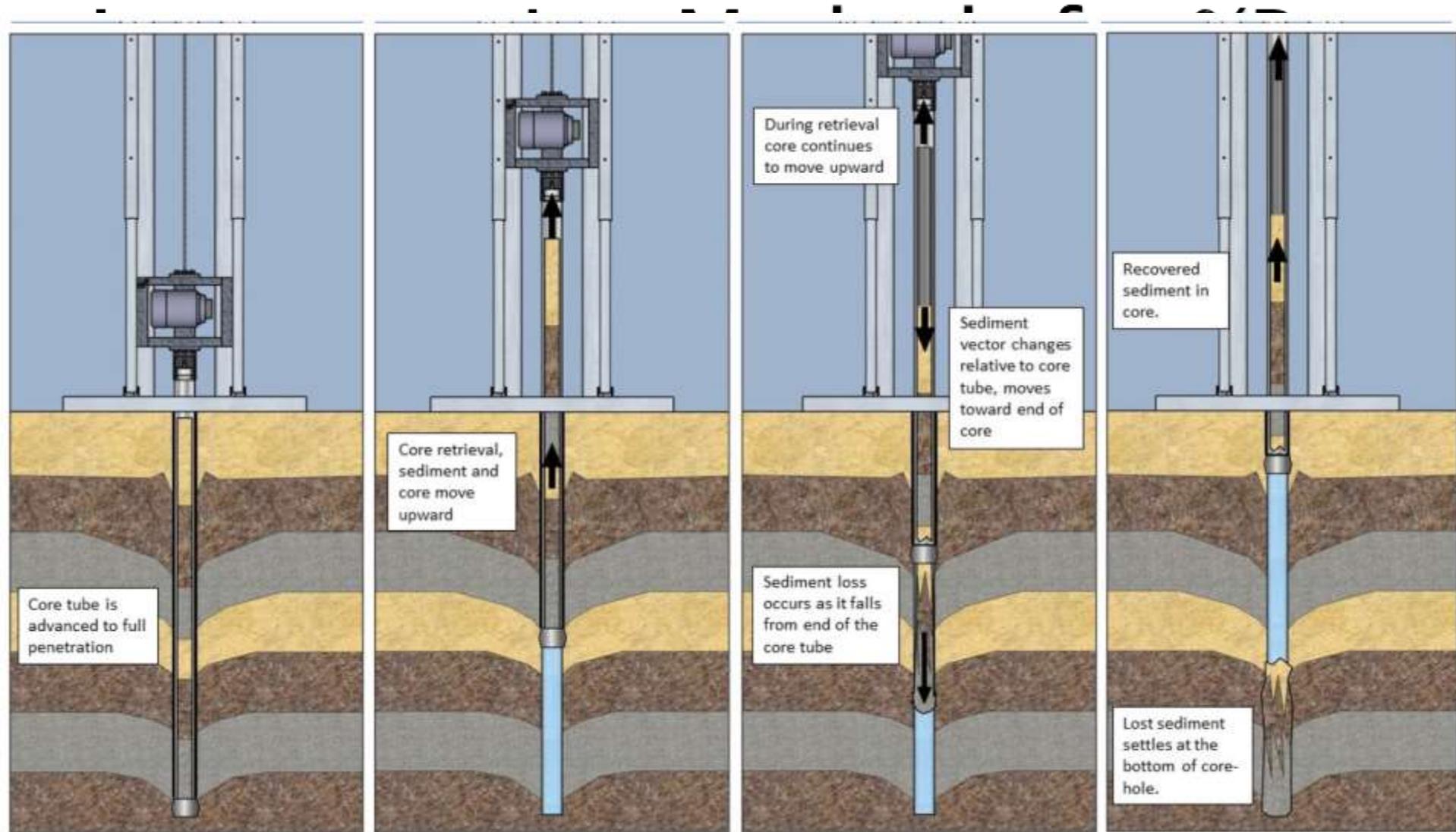H = Driven Length
S = Headspace

Percent Recovery
$\%R = (L/H) \times 100$

Range of %R
~50% to 100%+
- Material type
- Methods
- Equipment

S = Headspace

H = Total length the core is driven

L = Total length of recovered sediment

Figure 3. Bottom loss during retrieval.

Labels within the figure:

During retrieval core continues to move upward

Recovered sediment in core.

Sediment vector changes relative to core tube, moves toward end of core

Core retrieval, sediment and core move upward

Sediment loss occurs as it falls from end of the core tube

Core tube is advanced to full penetration

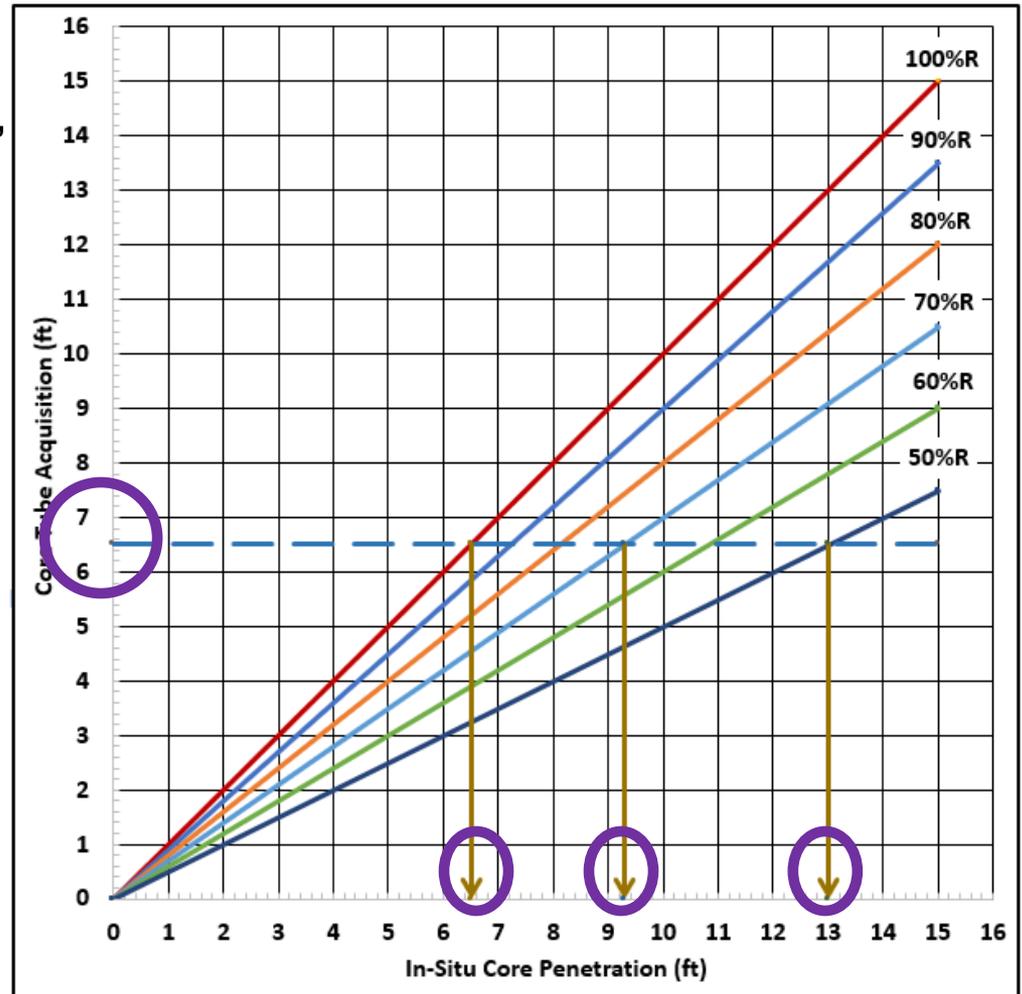Lost sediment settles at the bottom of core-hole.

Example of %R Stretch Method

COC_{max} = Deepest contamination measured in core tube.
DOC = In-Situ Depth of Contamination,
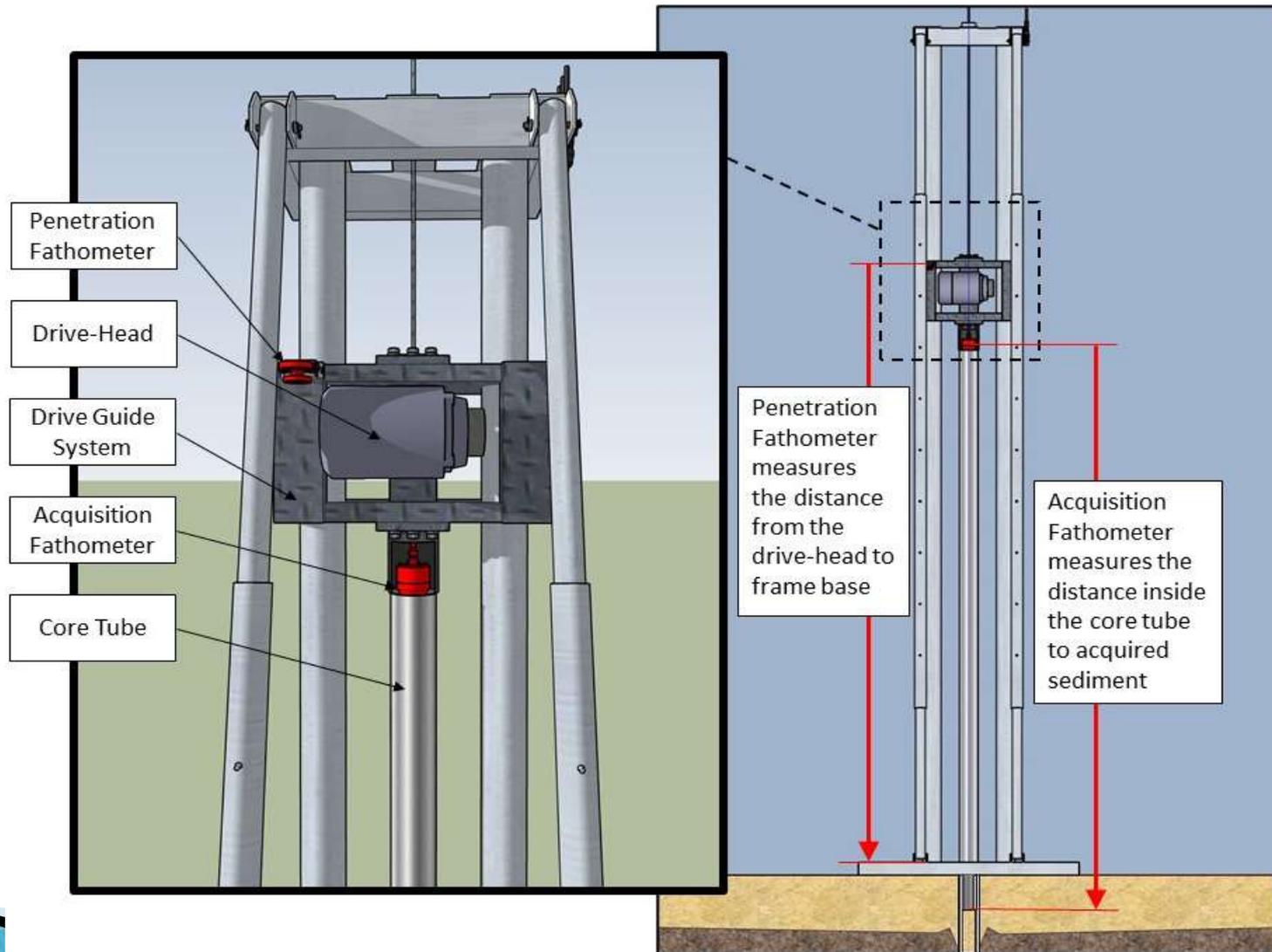
Example Interpretation
If COCmax = 6.5'
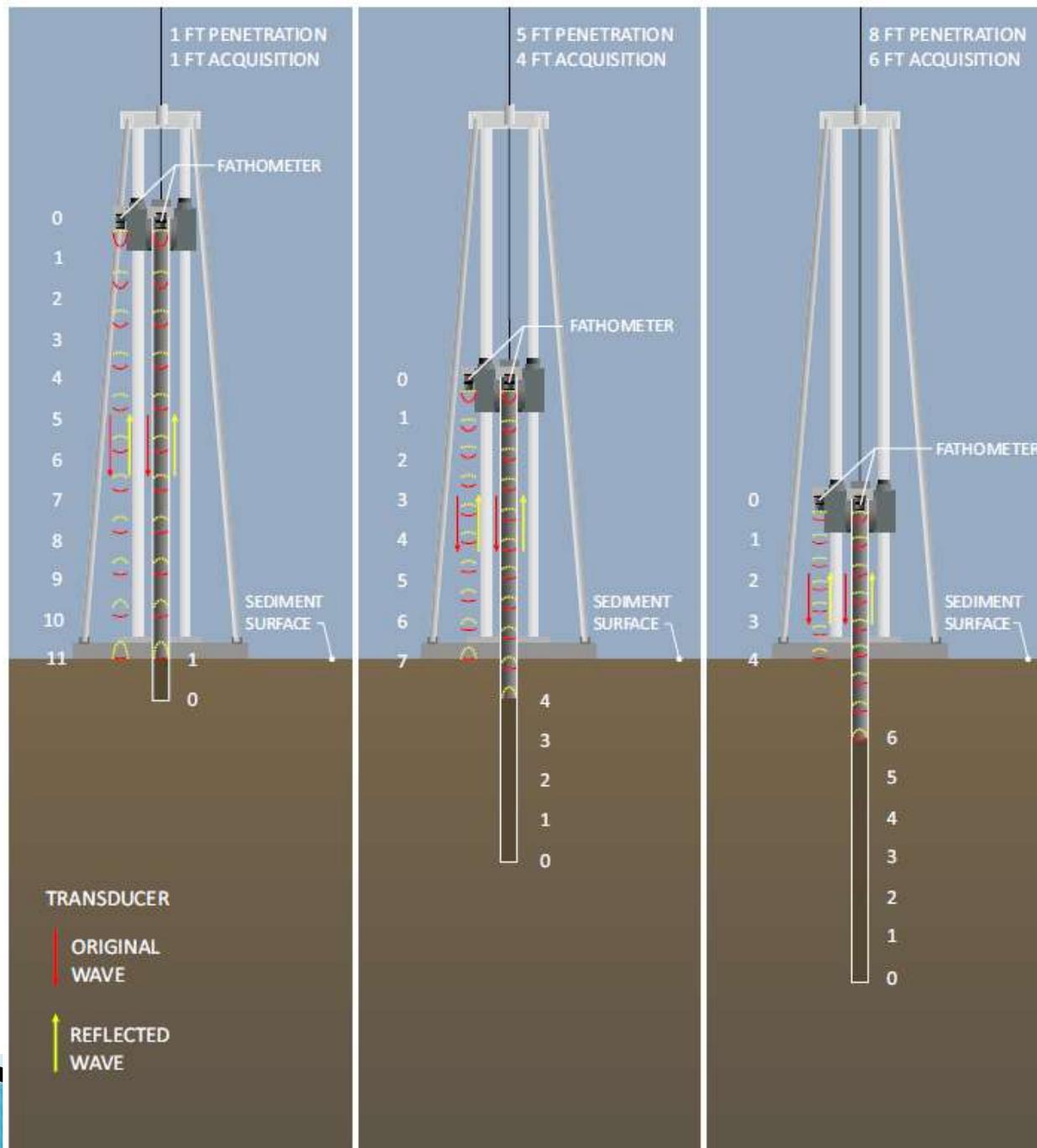- 100%R – DOC = 6.5'
- 70%R – DOC = 9.3'
- 50% R – DOC = 13'

# Vibracoring with V-SAM

>> Sediment Acquisition Monitoring (V-SAM)

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V-SAM Equipment

Core Acquisition Log

Fathometer Readings		TUBE (ft.)		Increment		Core Cut Plan (ft.)	
Depth	Acquire	Drive	Acquire	% Recover	Comment	In-Situ	Core
12.1	20	0.0	0.0			HS	3.2
15	18.9	2.9	1.1	38%		0.0	0.0
18	17	5.9	3.0	63%		1.0	0.4
21	14.1	8.9	5.9	97%		2.0	0.8
24.1	10.7	12.0	9.3	110%		3.0	1.2
27.2	7.5	15.1	12.5	103%		4.0	1.8
30	4.8	17.9	15.2	96%		5.0	2.4
31.1	3.4	19.0	16.6	127%		6.0	3.1

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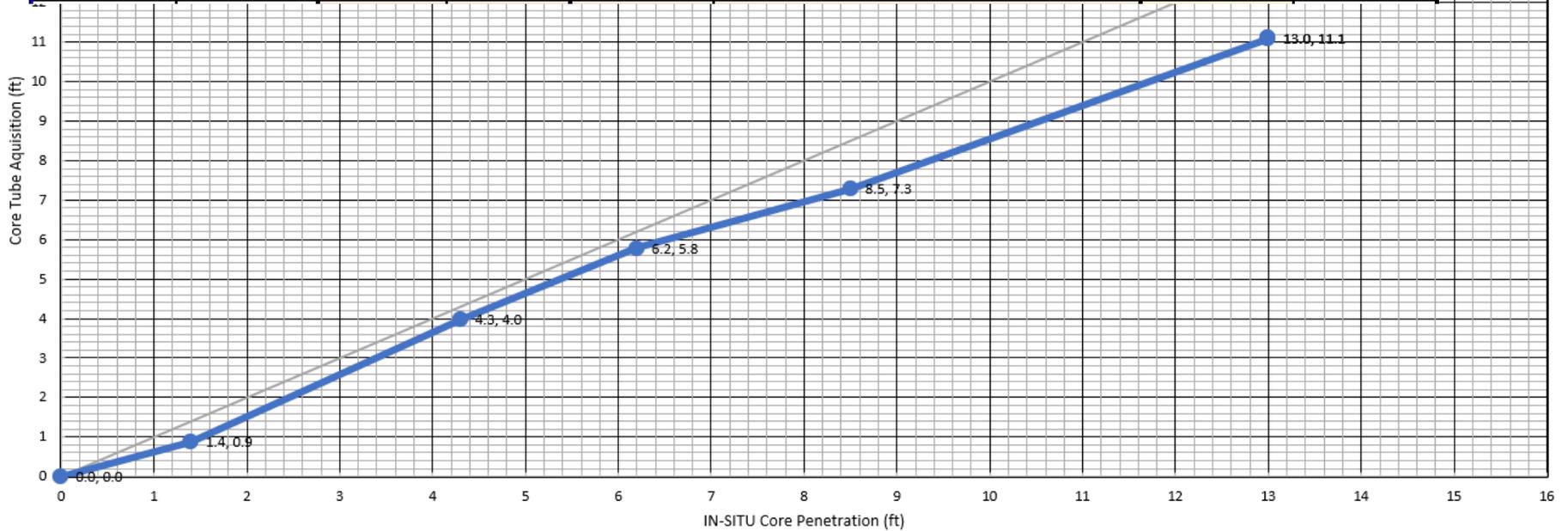
Ongoing Refinements

» Equipment

Contractor Optimization

- Total of 3 projects
- Over 140 cores
- Contractor tweaks and modifications

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Field Observations and Adjustments

- V-SAM was found for real-time adjustment during core advance to improve sediment acquisition and limit excess recovery:
    - Eliminate freefall of the coring system in very soft sediment
    - Advance the core slowly in soft sediment with managed vibration to improve collection of sediment into the core
    - Limit application of high energy vibration in dense sands and gravels to help limit over-acquisition or %R>100

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Questions?

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