

TERMINAL 18 PILE CAPS

Seaport Asset Stewardship Strategy
MAY 10, 2011



Seaport Asset Stewardship Strategy

Condition
Assessment
Process:



Inventory

Docks
(30,950 Lineal Feet)

Buildings
(1,259,836 Square Feet)

Yards (969 Acres)



Prioritize

Age (30-50 Years)

Condition (Known Issues)

Value (Revenues)



Inspect

Docks

- Berth Depth
- Bulkhead
- Deck
- Pile Caps
- Piles
- Utilities



Concrete Dock Concerns

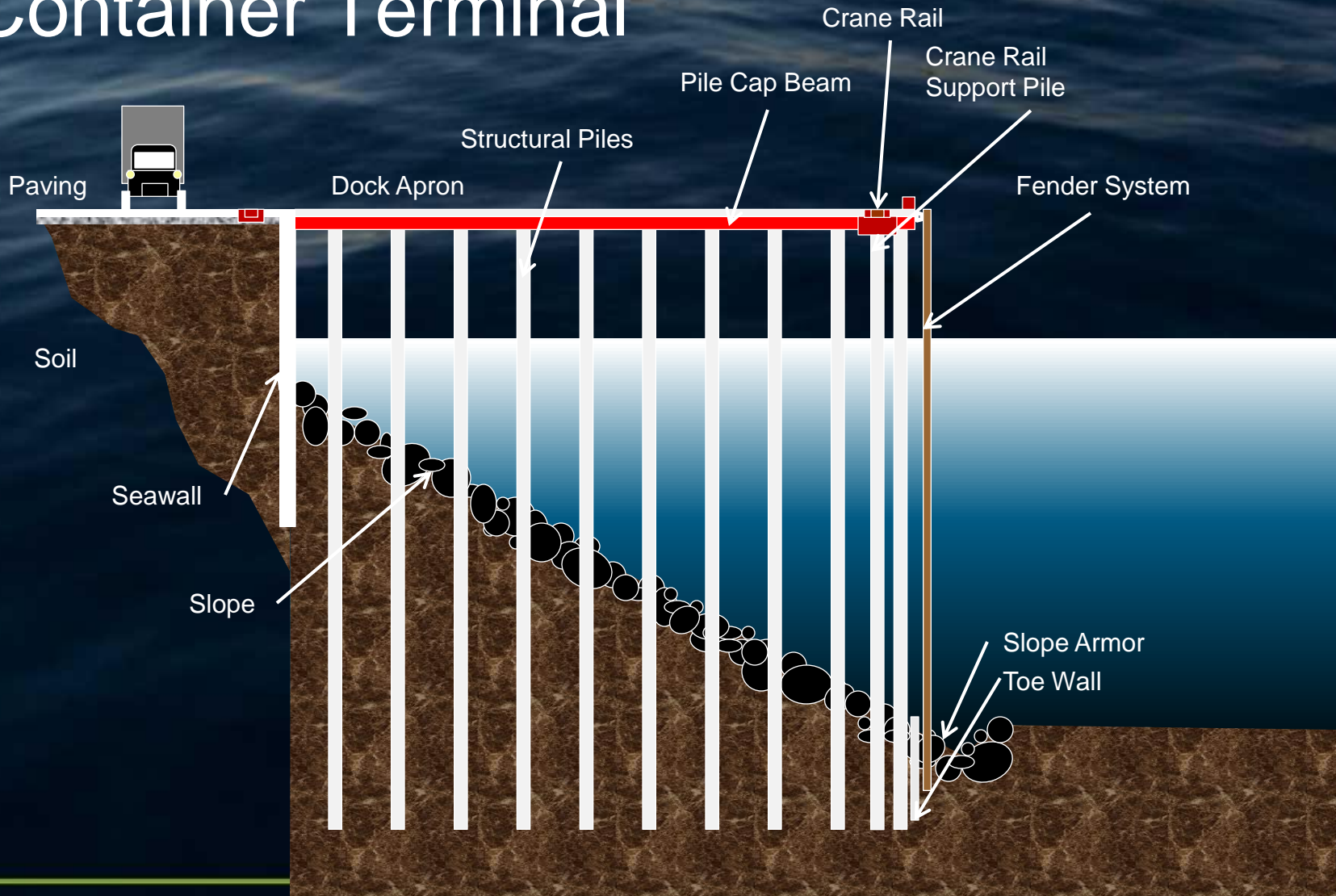


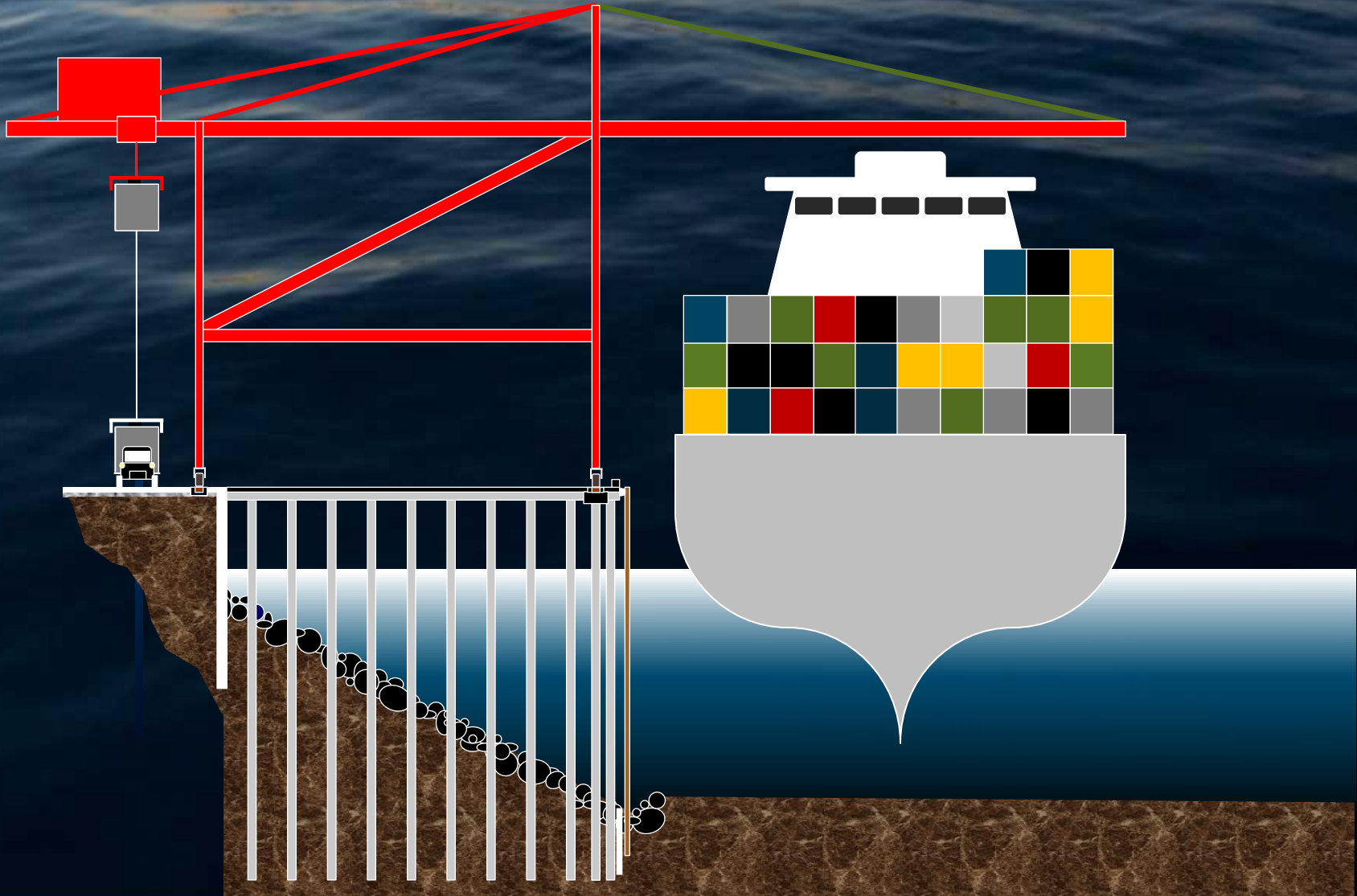
Concrete Pile Cap Distress



DEF in Concrete Piles

Container Terminal





Concrete Pile Cap Distress



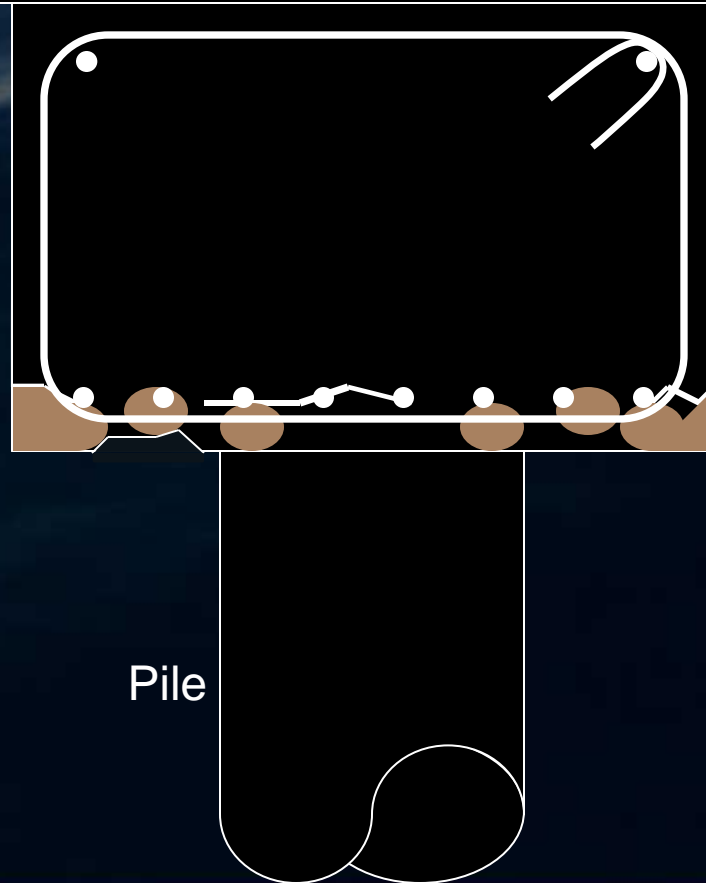
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Pile Cap Aging

Apron Deck

Pile Cap

Pile



Uncracked pile cap

Minor cracking begins

Water enters, corrosive concrete starts forming

Cracks grow, concrete is corrosive, reinforcing corrodes, and concrete spalls.

Pile Cap Repairs

Apron
Deck

Pile Cap

Pile

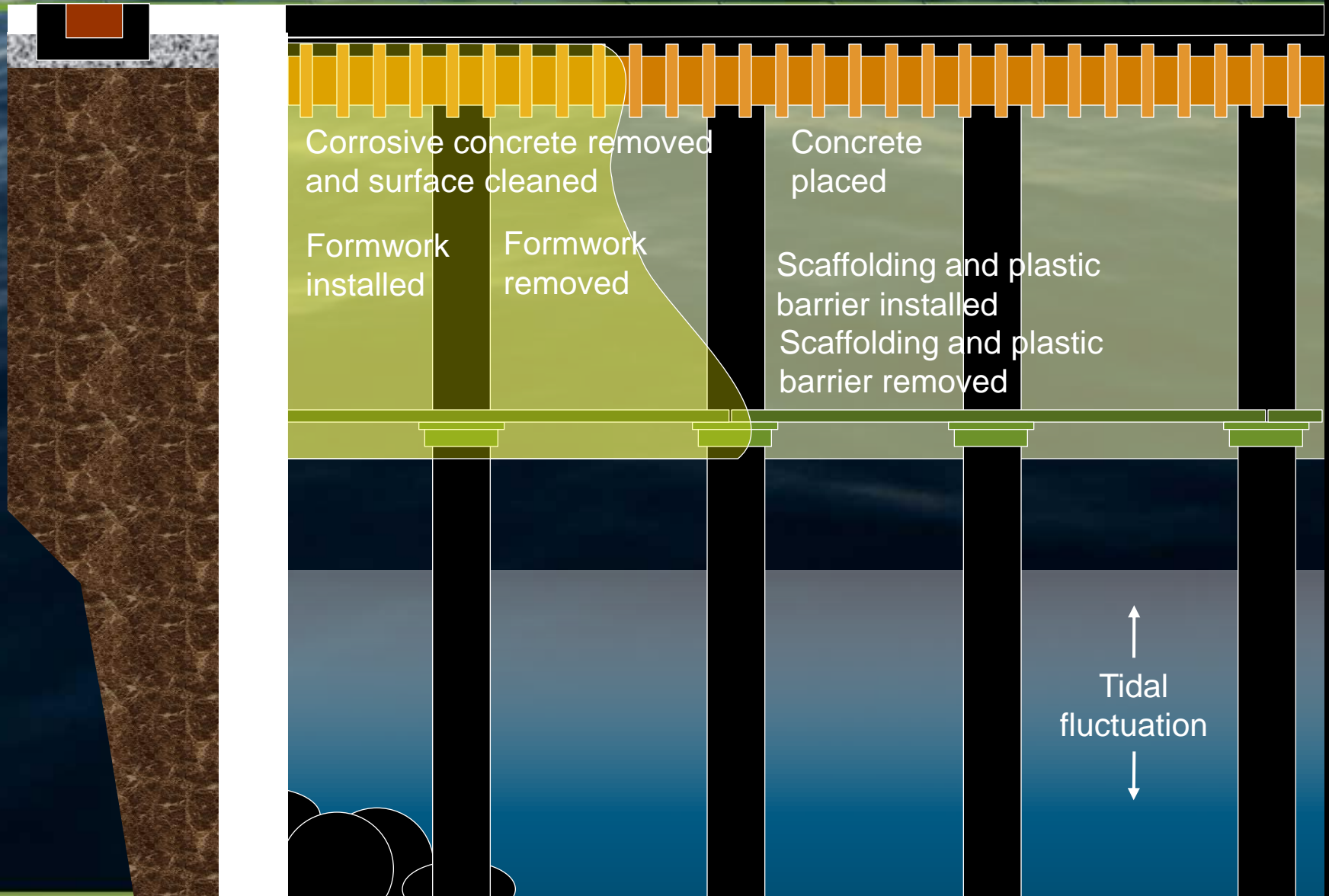
Cracking and corrosive
concrete

Corrosive concrete
removed

Surface chipped clean

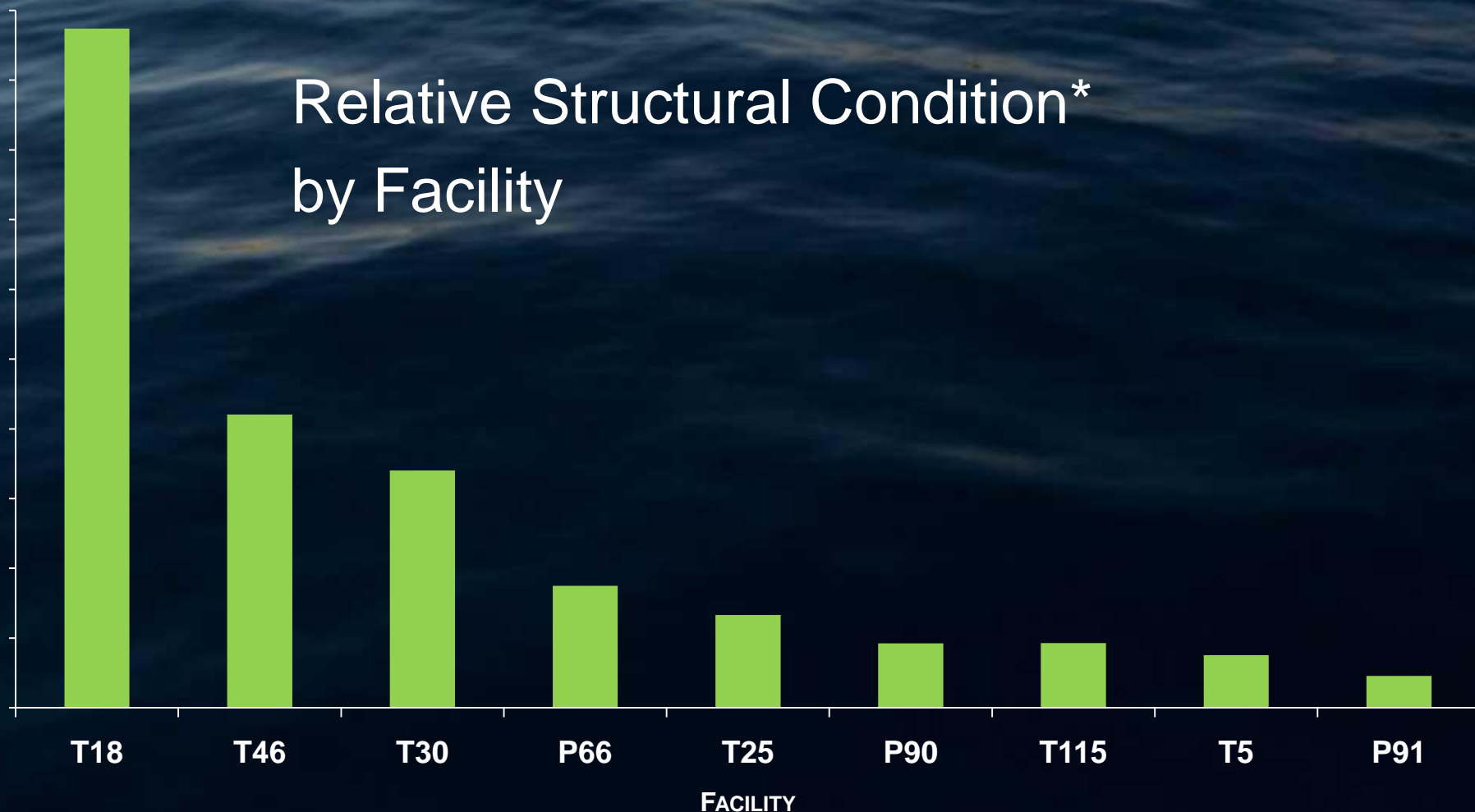
New concrete placed

Repair Logistics



Seaport Facilities Comparison

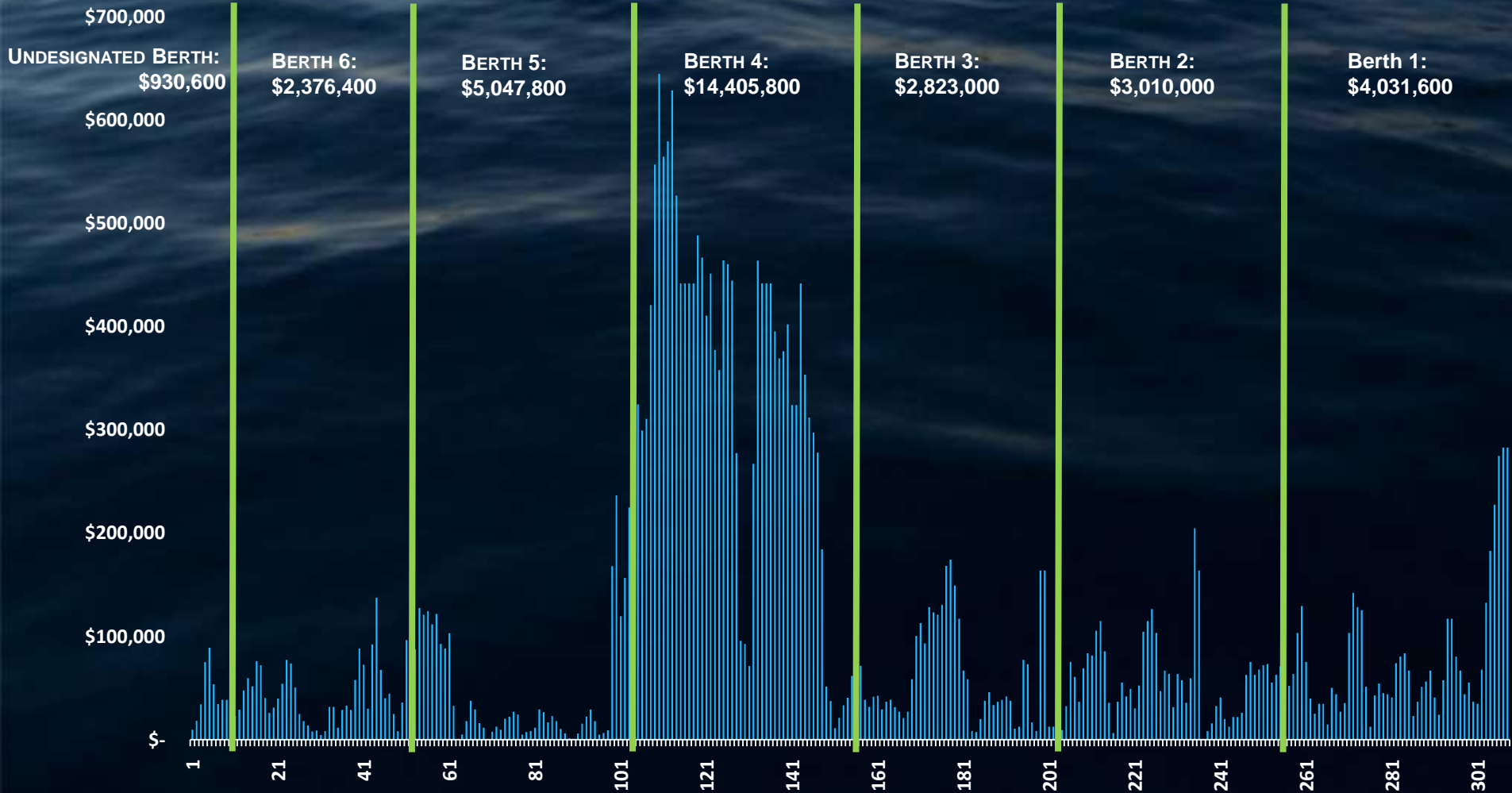
Relative Structural Condition* by Facility



*Condition metric combines percentage of distressed areas and severity of distress.
(Distress does not include DEF testing results.)

T18 Pile Cap Repair Costs*

Total Estimated Costs = \$32.6 Million



*Preliminary estimates are in 2011 dollars and include design, permits, sales tax, contingency and other soft costs.

T18 Pile Cap Repair Risks

- \$30M - \$50M
- Access Issues
- Work in Low Tides
- Disrupts Operations
- DEF Unknown
- Other Unknowns
- Pilot Project
Recommended



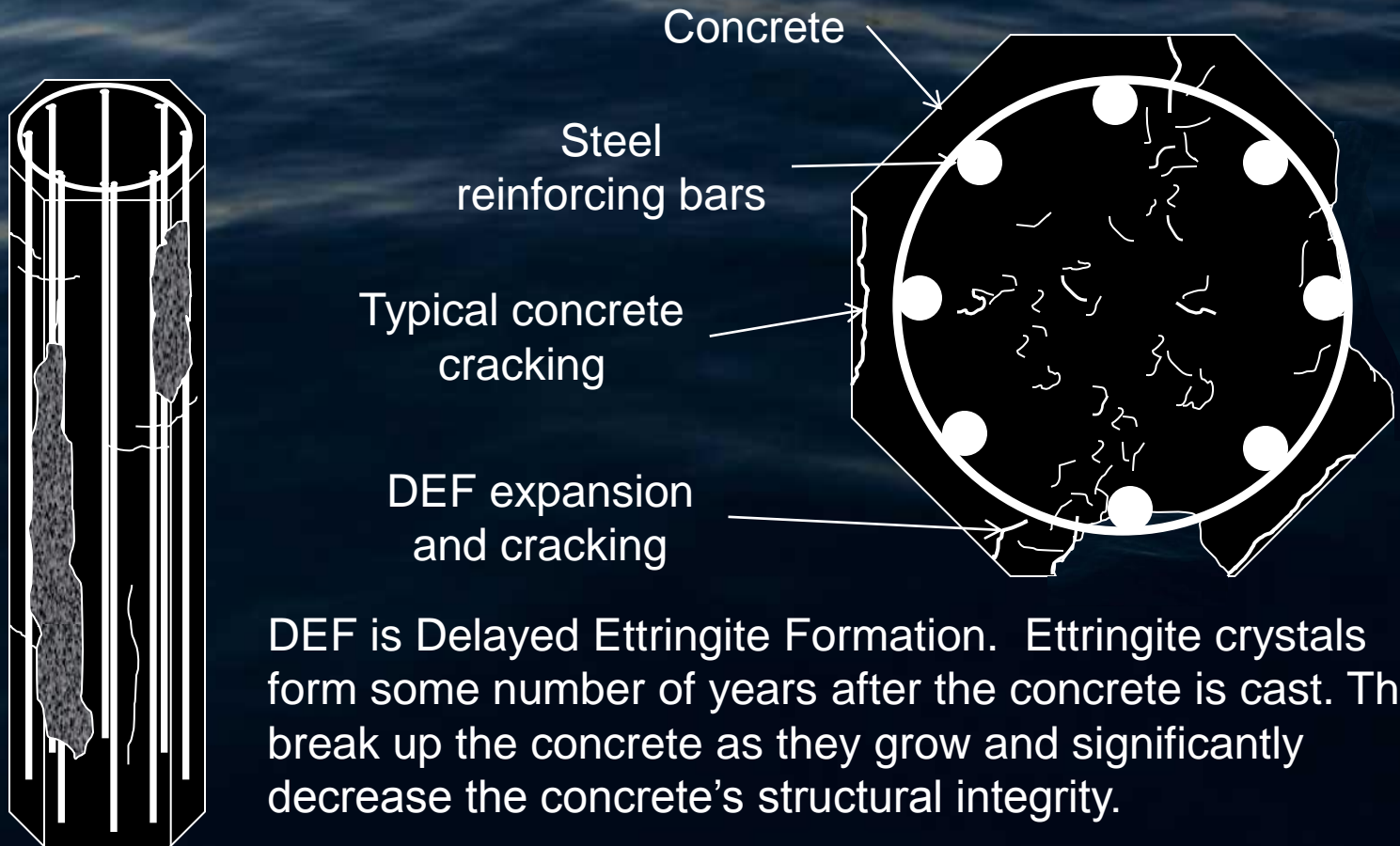
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Delayed Ettringite Formation

DEF in Concrete Piles



DEF in Concrete Piles



DEF is Delayed Ettringite Formation. Ettringite crystals form some number of years after the concrete is cast. They break up the concrete as they grow and significantly decrease the concrete's structural integrity.

Pile replacement is necessary.

Delayed Ettringite Formation

DEF in Concrete Piles

- Recent pile inspections confirmed DEF in two piles
- Additional inspections and testing underway
- Results expected by August 2011
- Pile Cap issue secondary if DEF is confirmed



T18 Pile Caps Repair Pilot Project

\$1M to Repair Several Pile Caps in 2012

- More Accurately Estimate Material and Labor Costs
- Refine Repair Procedure to be More Time and Cost-Efficient
- Identify Impact of Access Issues
- Document Contractor Production Rate
- Find Ways to Reduce Disruption to Operations
- Results will Benefit Pile Cap Repairs Needed at Other Terminals as well as T18



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