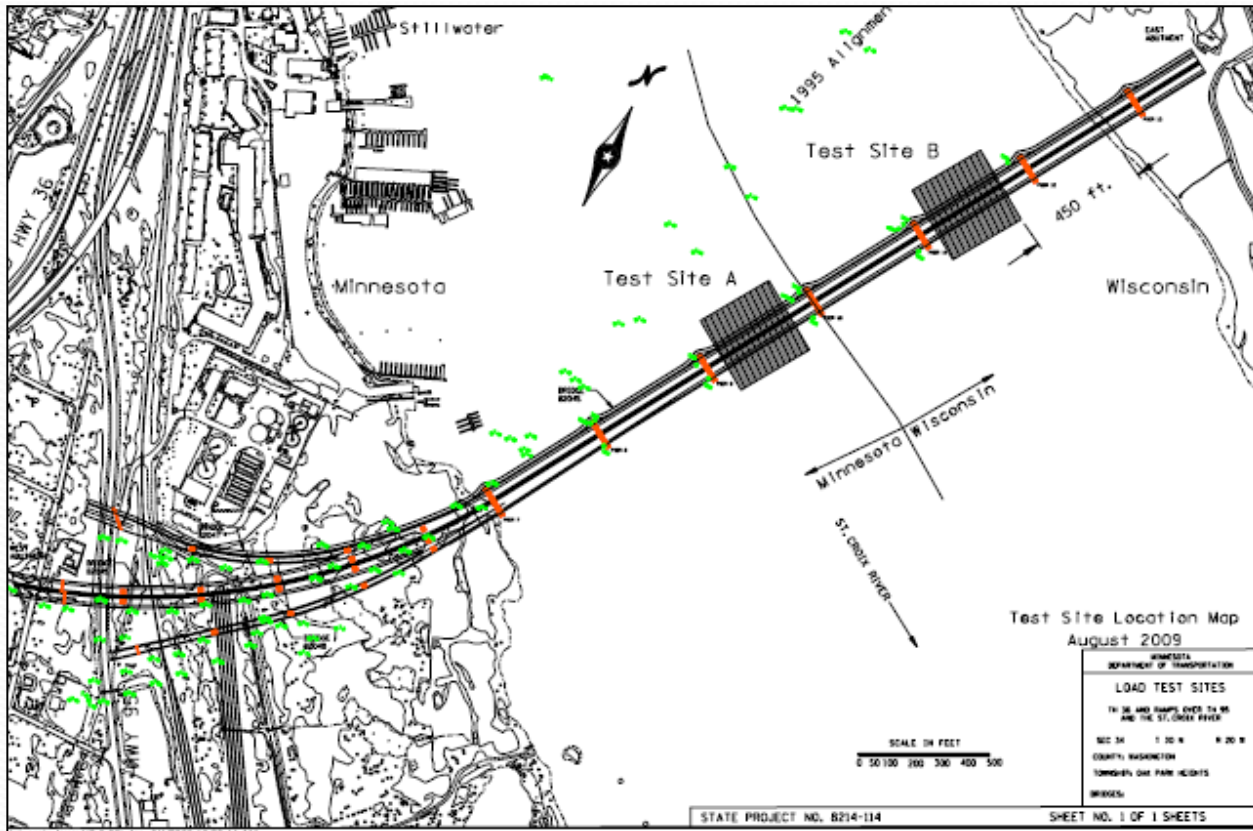
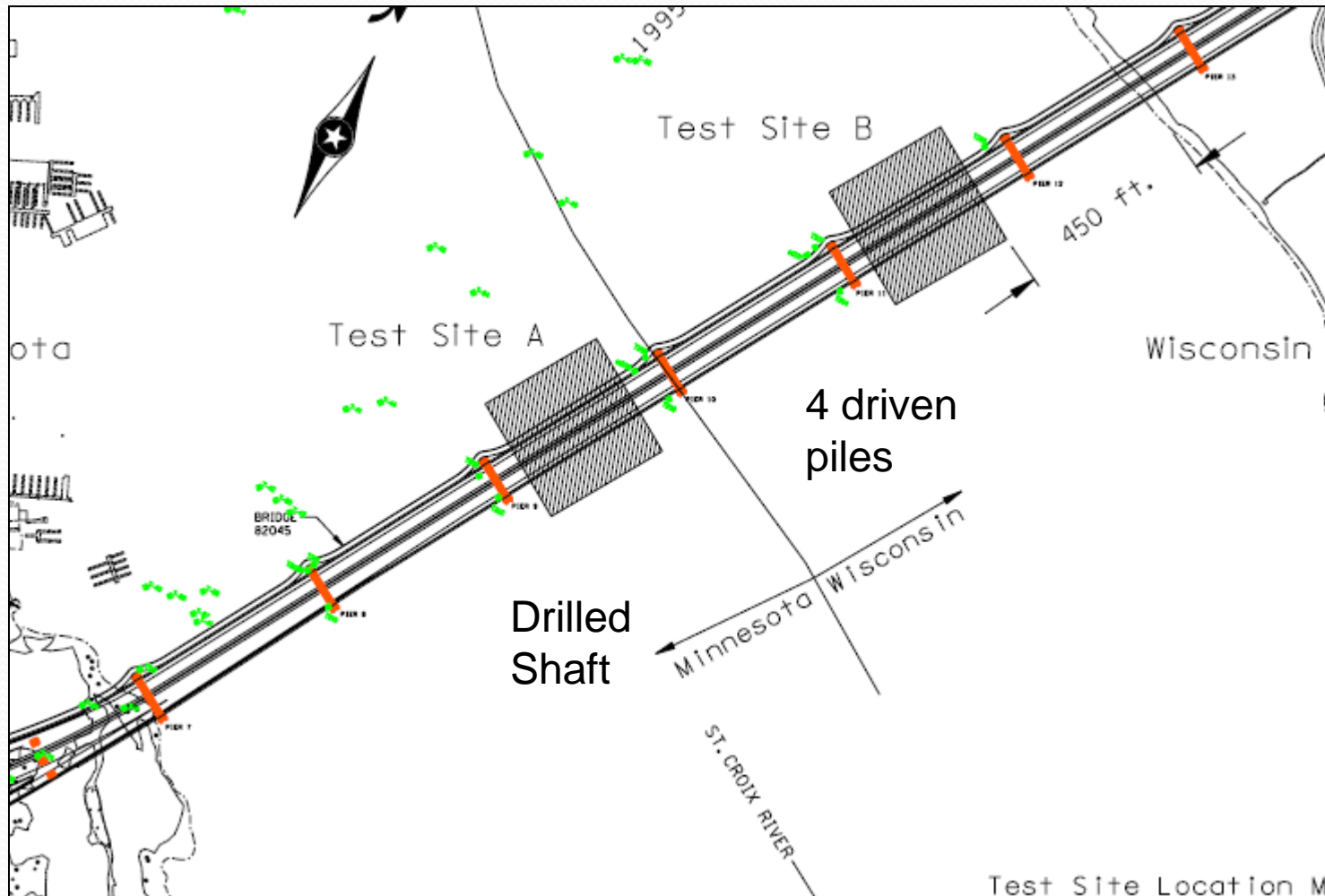
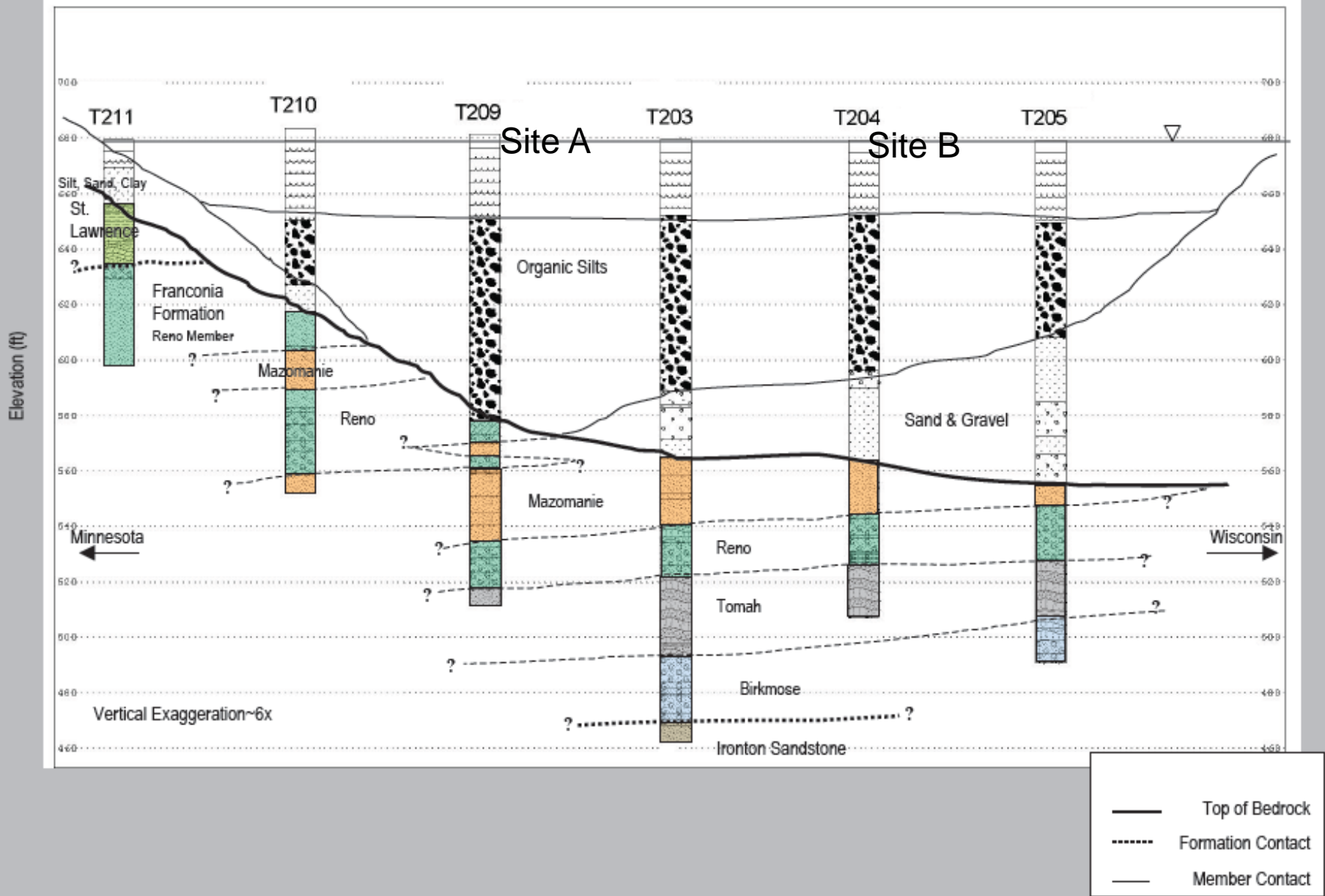


St. Croix River Crossing Bridge Foundation Load Test Project



Load Test Sites





Load Test Purpose

- To gather design data for foundation design
 - Allows for more refined foundation designs
 - Helps contractor prepare bid with less contingencies
 - Reduces cost risk thus reducing project costs
- Helps prove proposed foundations can be efficiently constructed in river
 - Reduces cost risk to project

Cost Justification

- Load test projects provide high Benefit/Cost ratio for larger bridges
- Estimated cost of load test is \$3M, estimated benefit is reduction in foundation costs of \$10-15M.
- Projects that have had or will have load tests
 - Wakota
 - Lafayette
 - Hastings
 - Lowry Ave

Environmental Concerns



- Higgins Eye mussels
 - Potential Higgins Eye mussel habitat along Wisconsin shoreline in 3-20 ft. of water in firm, coarse sand (US Fish & Wildlife Biological Option 9/9/2005)
 - Load test project (both Site A & B) is in water depths of 24-26 ft. with muck bottom
- Zebra mussels
 - Contractor required to decontaminate barges before entering St. Croix River per US Fish & Wildlife protocol

Environmental Concerns

- Vibrations in water
 - Mn/DOT has not had any issues with vibrations in water
 - Vibrations should be lower than typical river bridge projects because of muck soils

Environmental Concerns

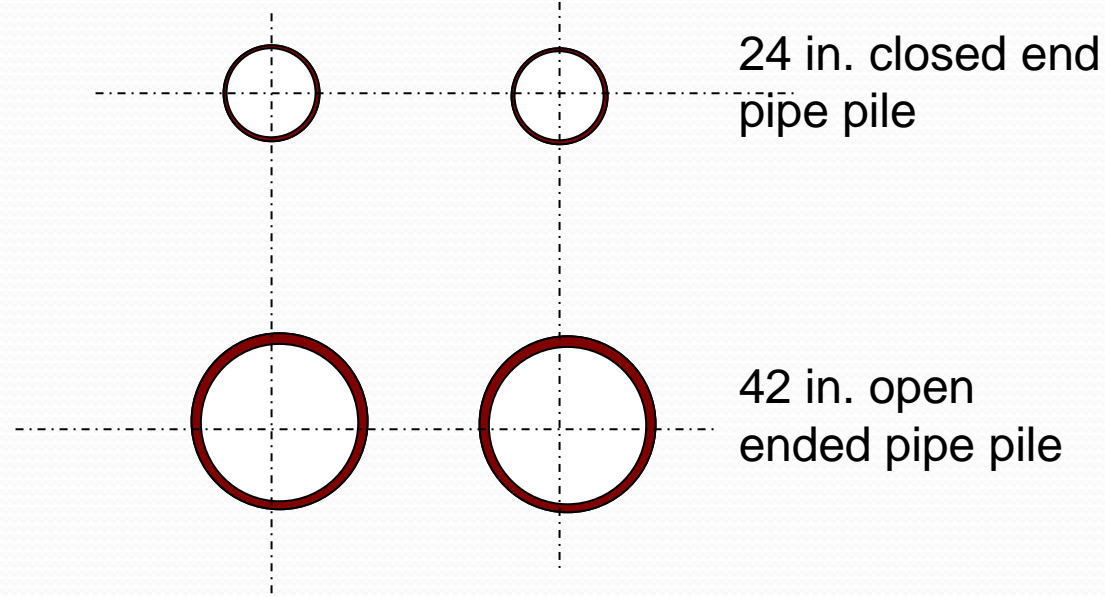
- Water Quality
 - Contractor required to prepare and submit pollution prevention plan to Mn/DOT and Mn/DNR
- Fish Spawning
 - Project schedule dictates that construction start as soon as ice is off river
 - DNR permit allows waiver of March 15th – June 15th restrictions

Environmental Concerns

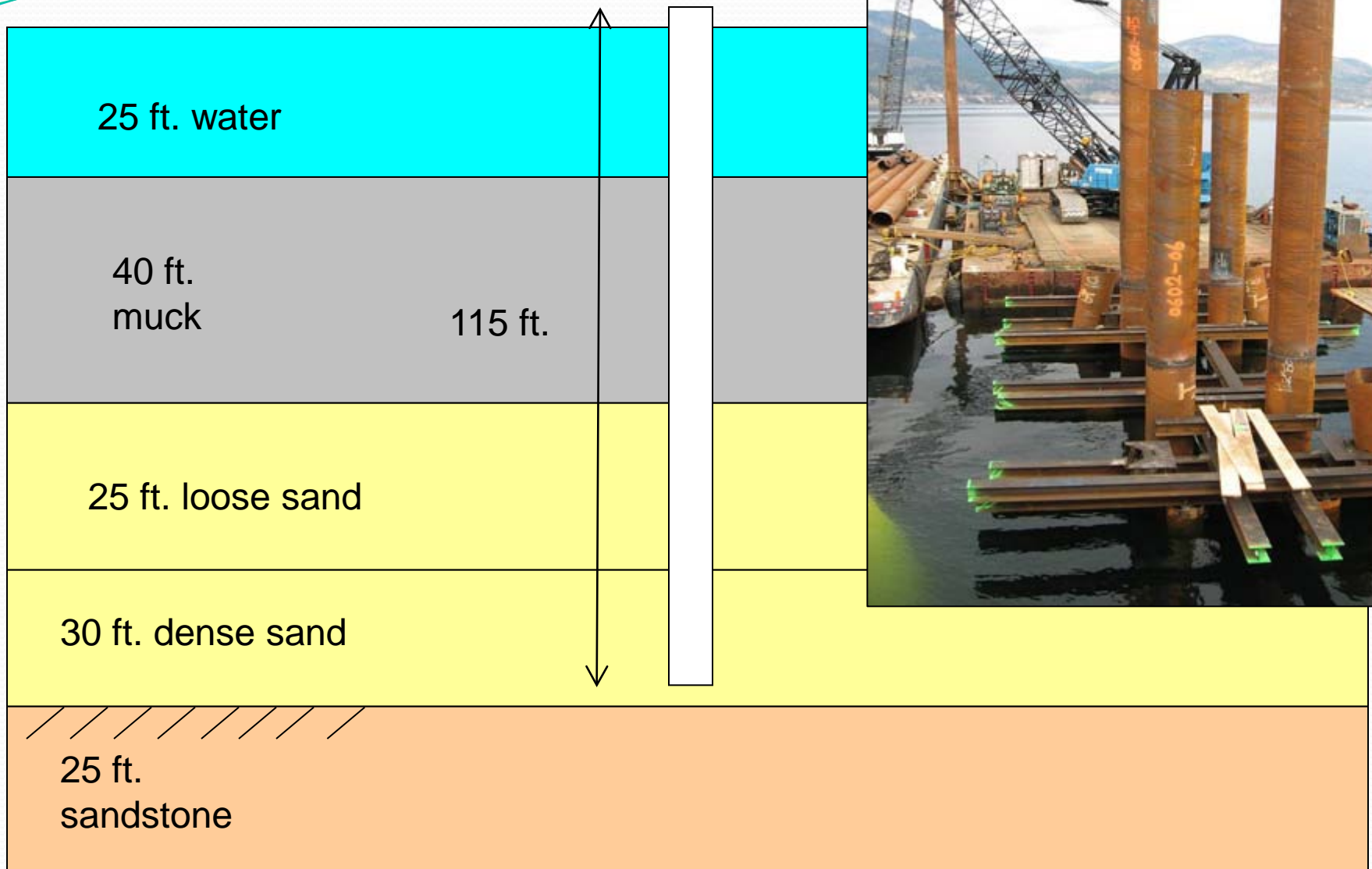
- Materials / Staging Area
 - Mn/DNR permit requires the following to be submitted
 - Final plan for material handling and disposal (for approval)
 - Erosion control plan
 - Sediment control plan
 - Water quality management plan
 - Contractor is responsible to identify staging area
 - One potential area is Aipel Property (City of Stillwater)

Driven Pile Load Test – Site B

- Drive two 42 in. pipe piles
- Drive two 24 in. pipe piles
- 115 ft. long ± 15 ft.
- Vertical load test all four piles
- Horizontal load test on two piles



Drive Piles

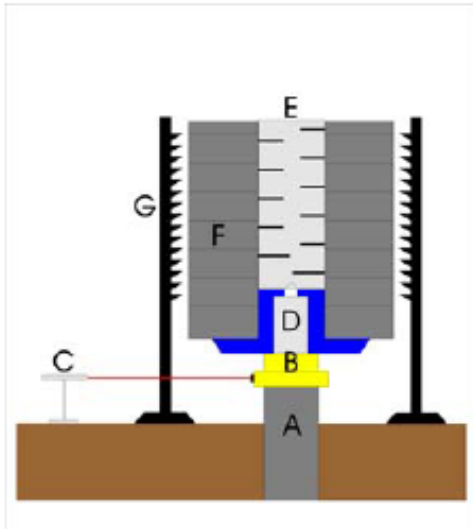


Vertical/Horizontal Load Test



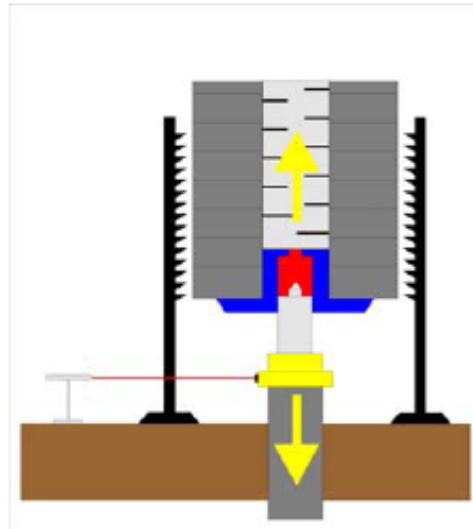
Statnamic Load Test

Stages of a Statnamic Load Test

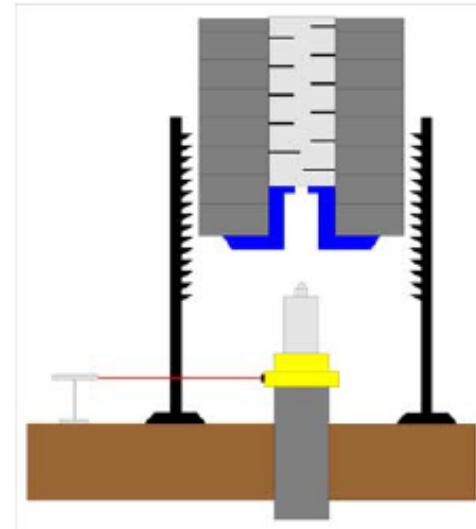


Before the test - reaction mass is in contact with pile.

A - Foundation Member
B - Calibrated Load Cell
C - Laser Displacement System
D - Piston & Cylinder
E - Silencer
F - Reaction Mass
G - Catch Mechanism



Burning fuel creates high pressures simultaneously propelling the reaction mass up and loading the pile in downward compression. The applied load and pile displacement are measured using high precision instrumentation and a data acquisition system.



After the load test, the reaction mass is safely caught using hydraulic systems or by mechanical means. It is easily lowered for cyclic loading on the same pile.

Source: Applied
Foundation Testing, Inc.

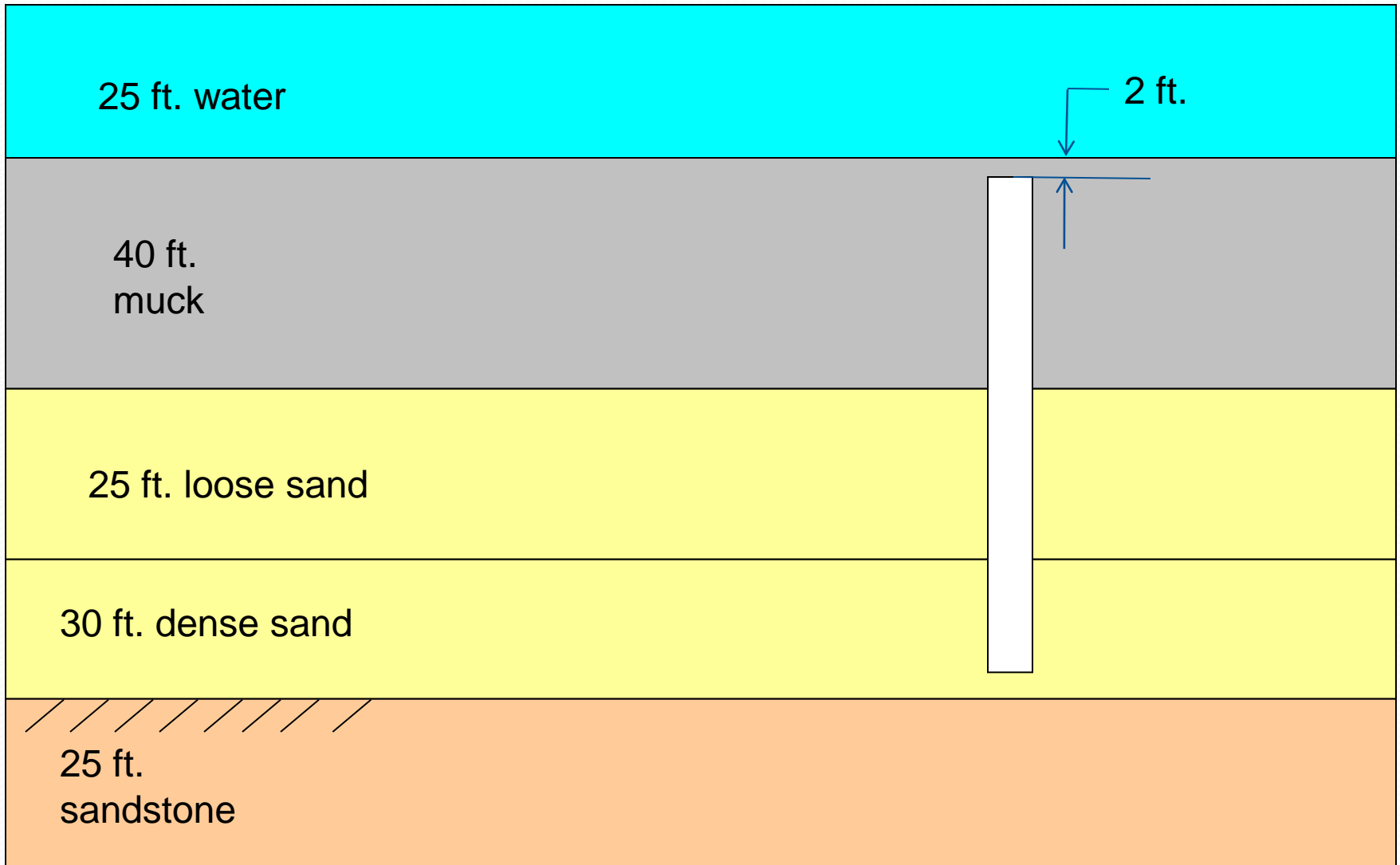


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St. Croix River Crossing Bridge - Foundation Load Test Project

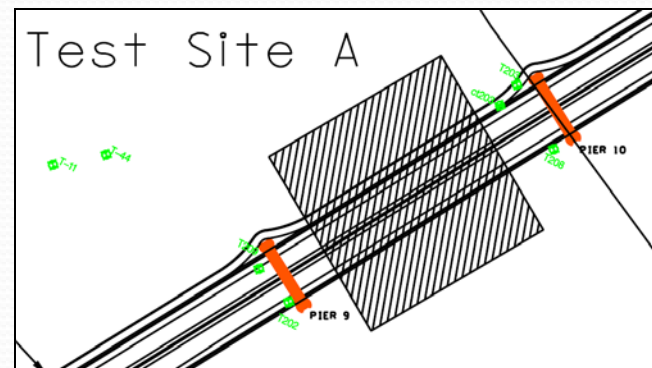


Cut off piles

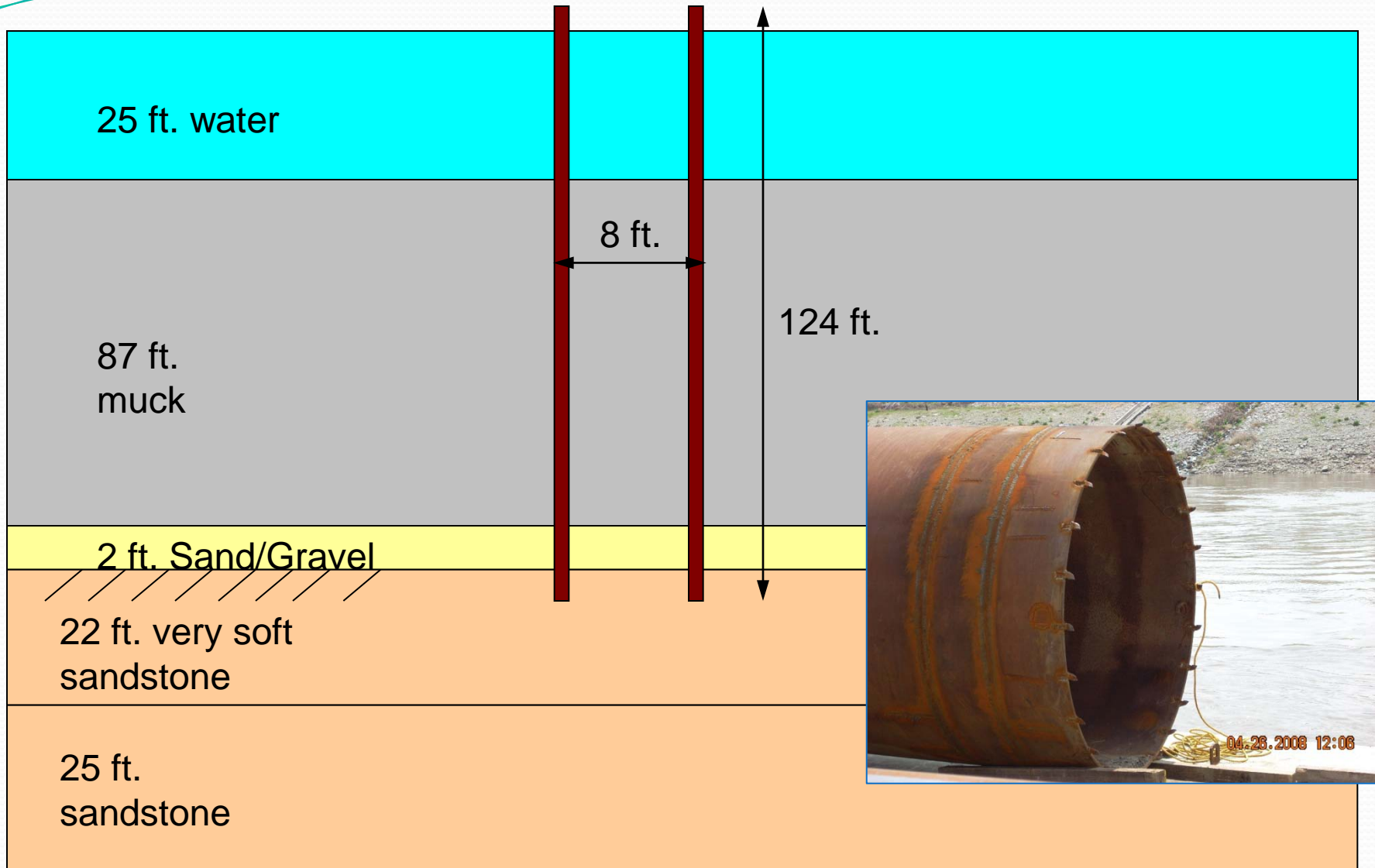


Drilled Shaft Load Test – Site A

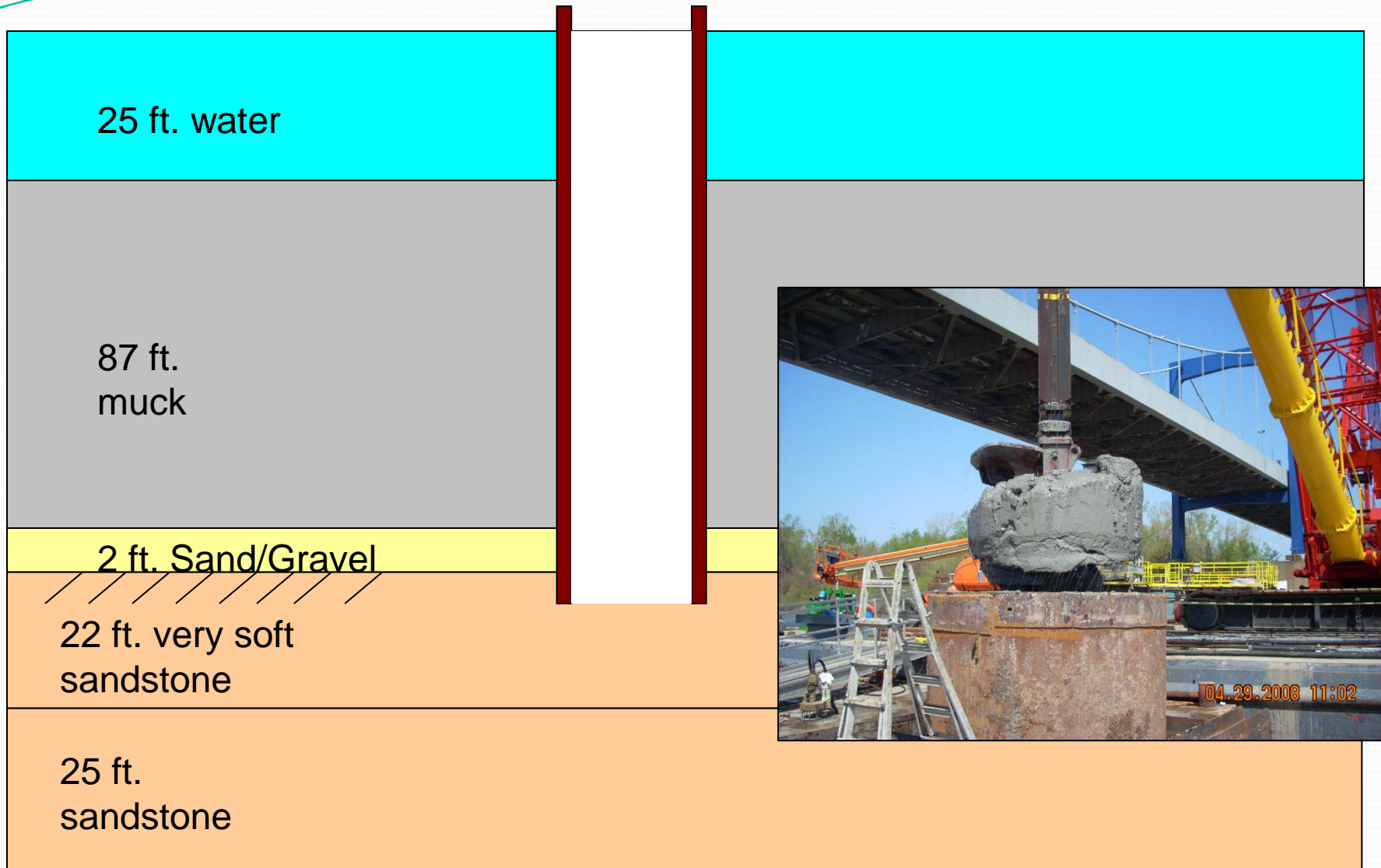
- 8 ft. diameter in soil
- 7 ft. 6 in. diameter in rock
- 125 ft. long, 100 ft. below river bottom
- Vertical load test
- Horizontal load test



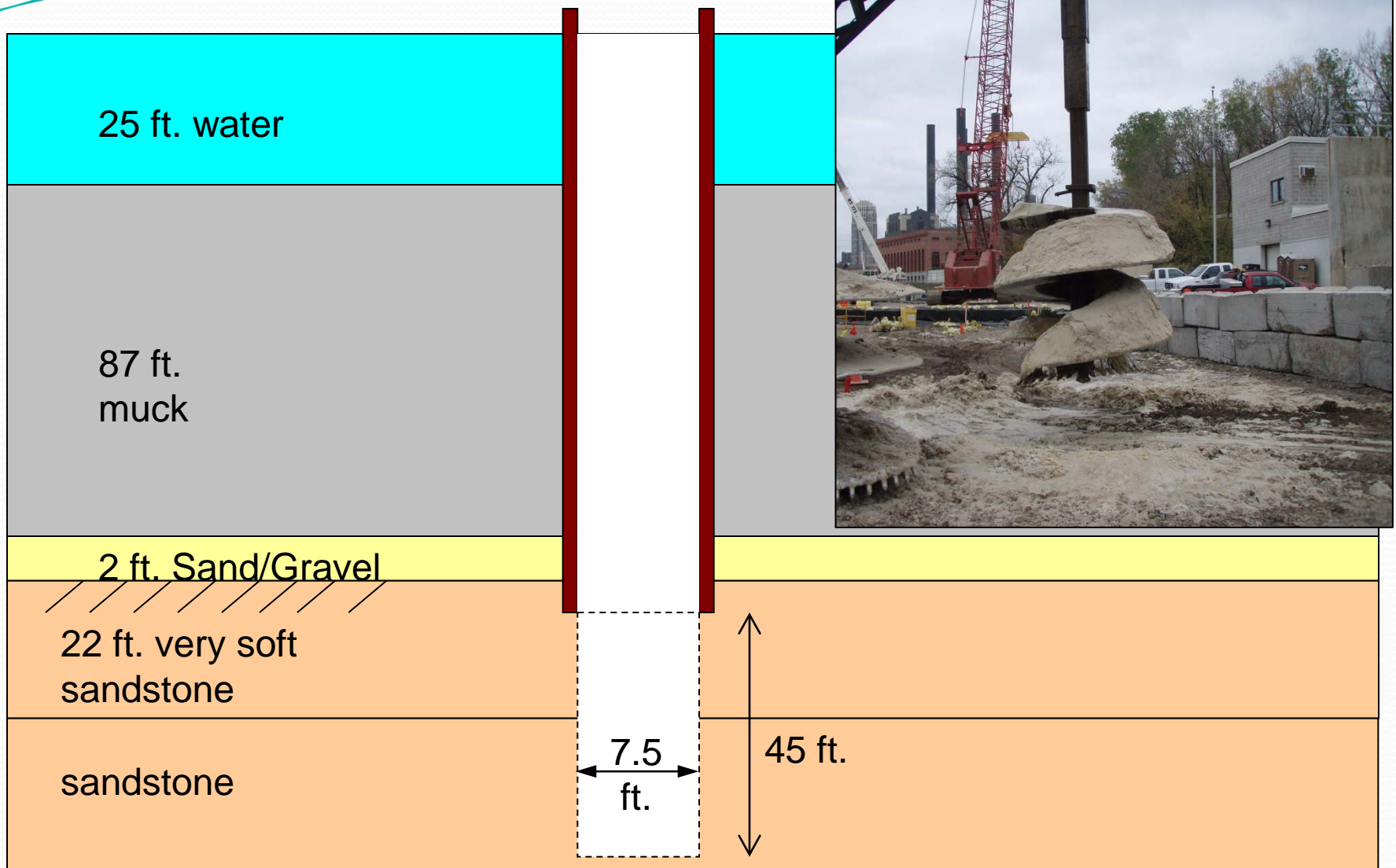
Install Steel Casing



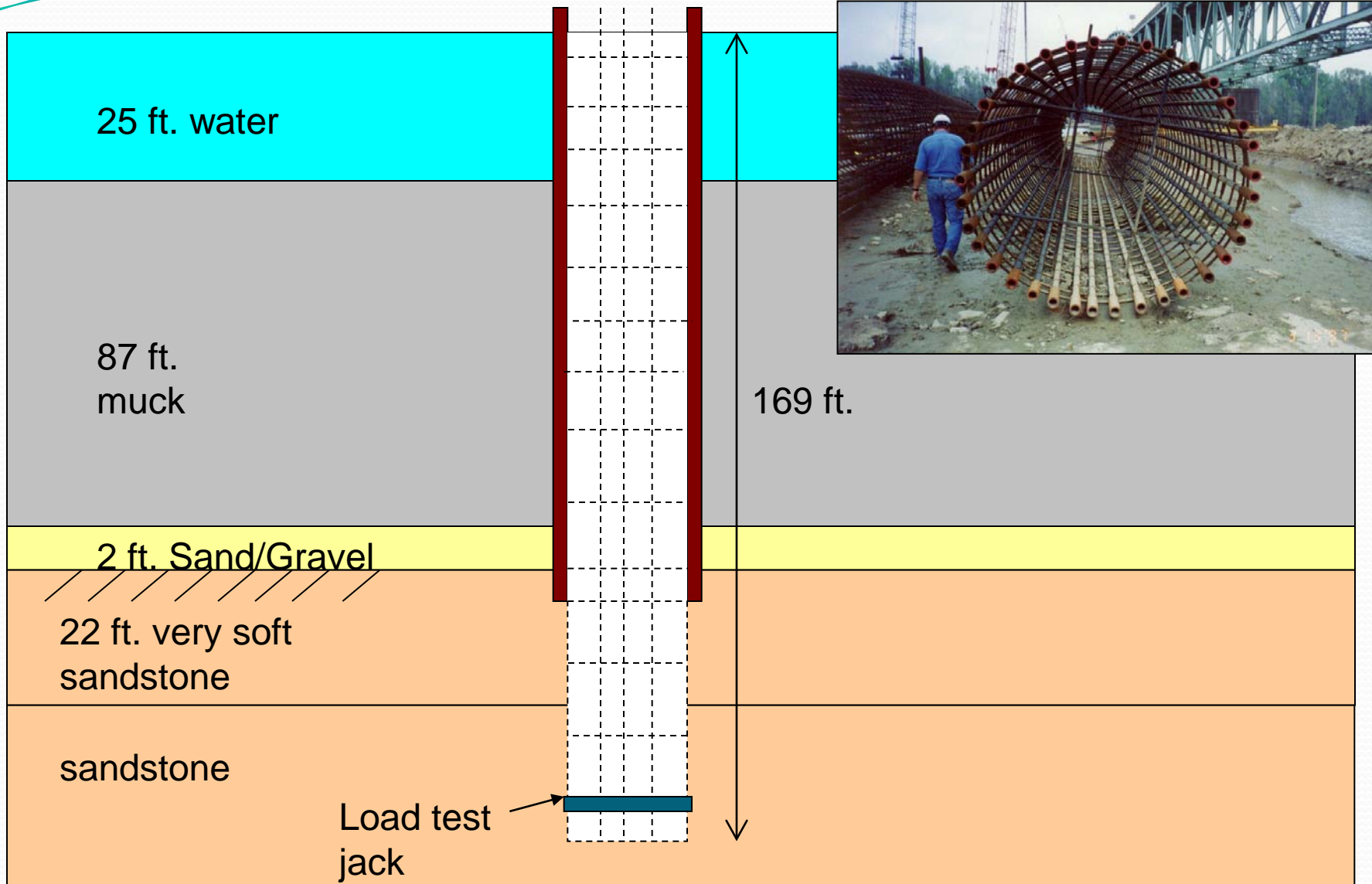
Excavate soil



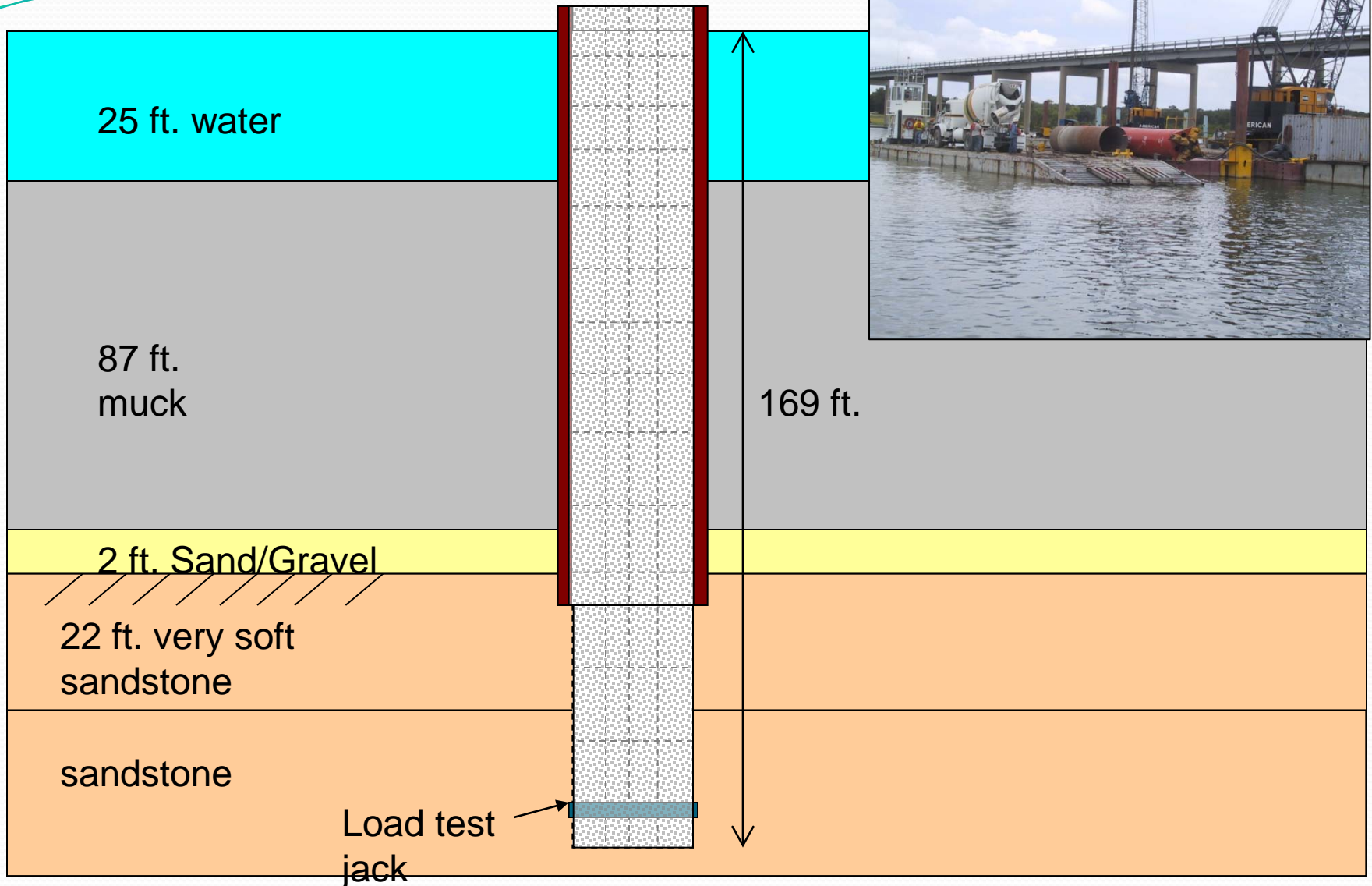
Drill/Remove Rock



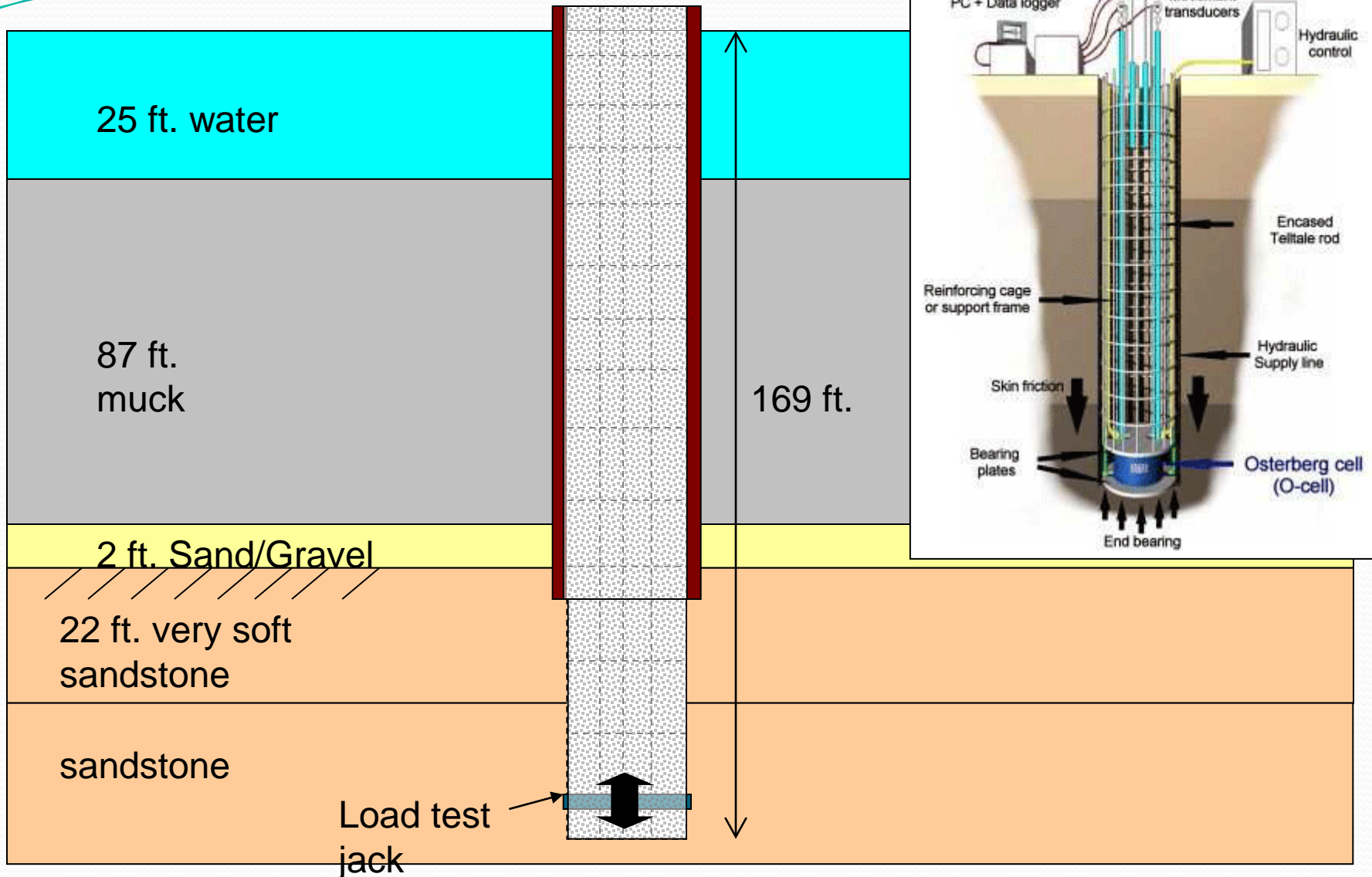
Install steel reinforcement



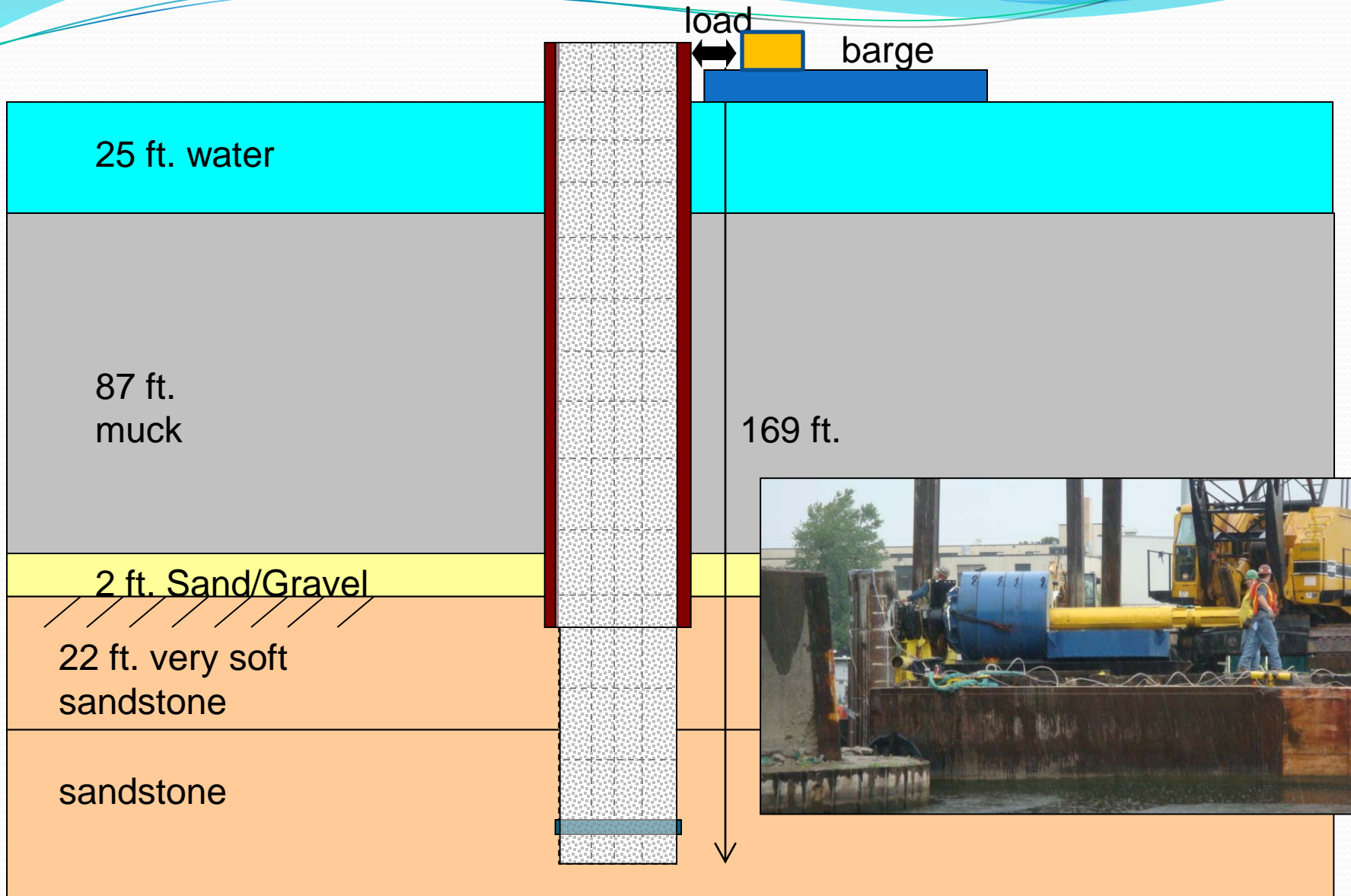
Install concrete



Perform Vertical Load Test



Perform Horizontal Load Test



Horizontal Static Test

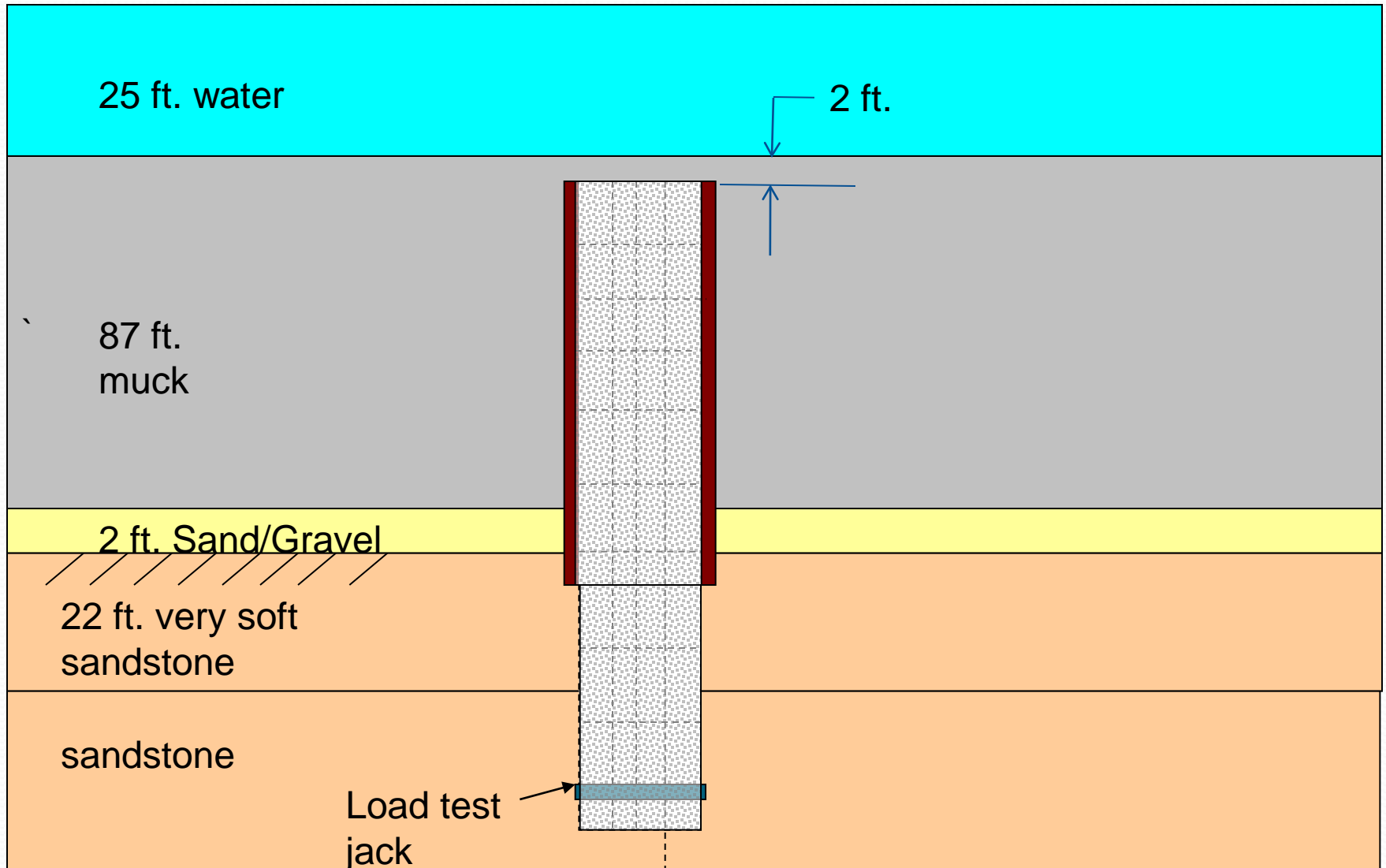


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St. Croix River Crossing Bridge - Foundation Load Test Project



Remove shaft



Thank You

