Solutions for Emergency Bridge Repair

Milltown Dam Removal

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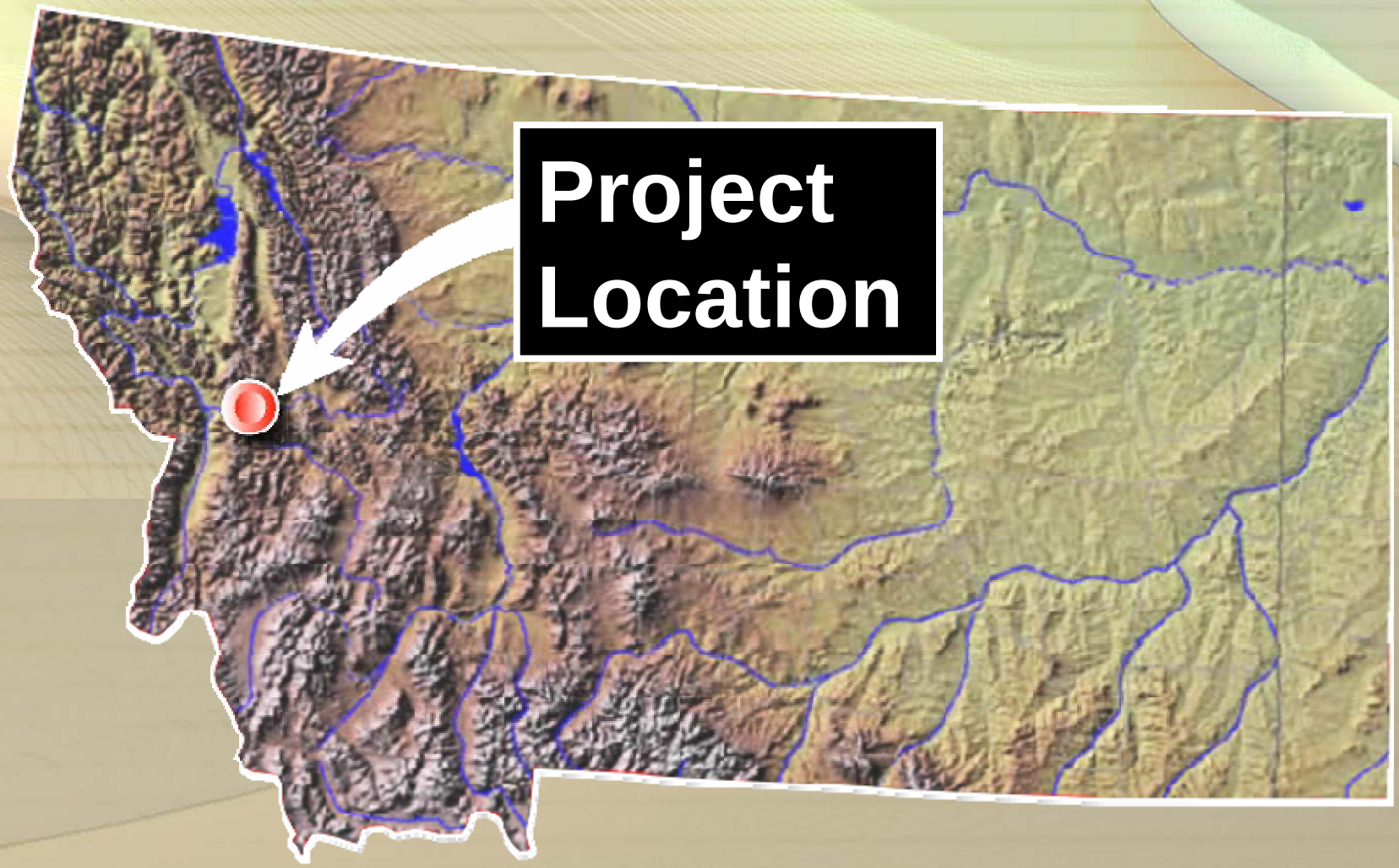
Milltown Dam Removal



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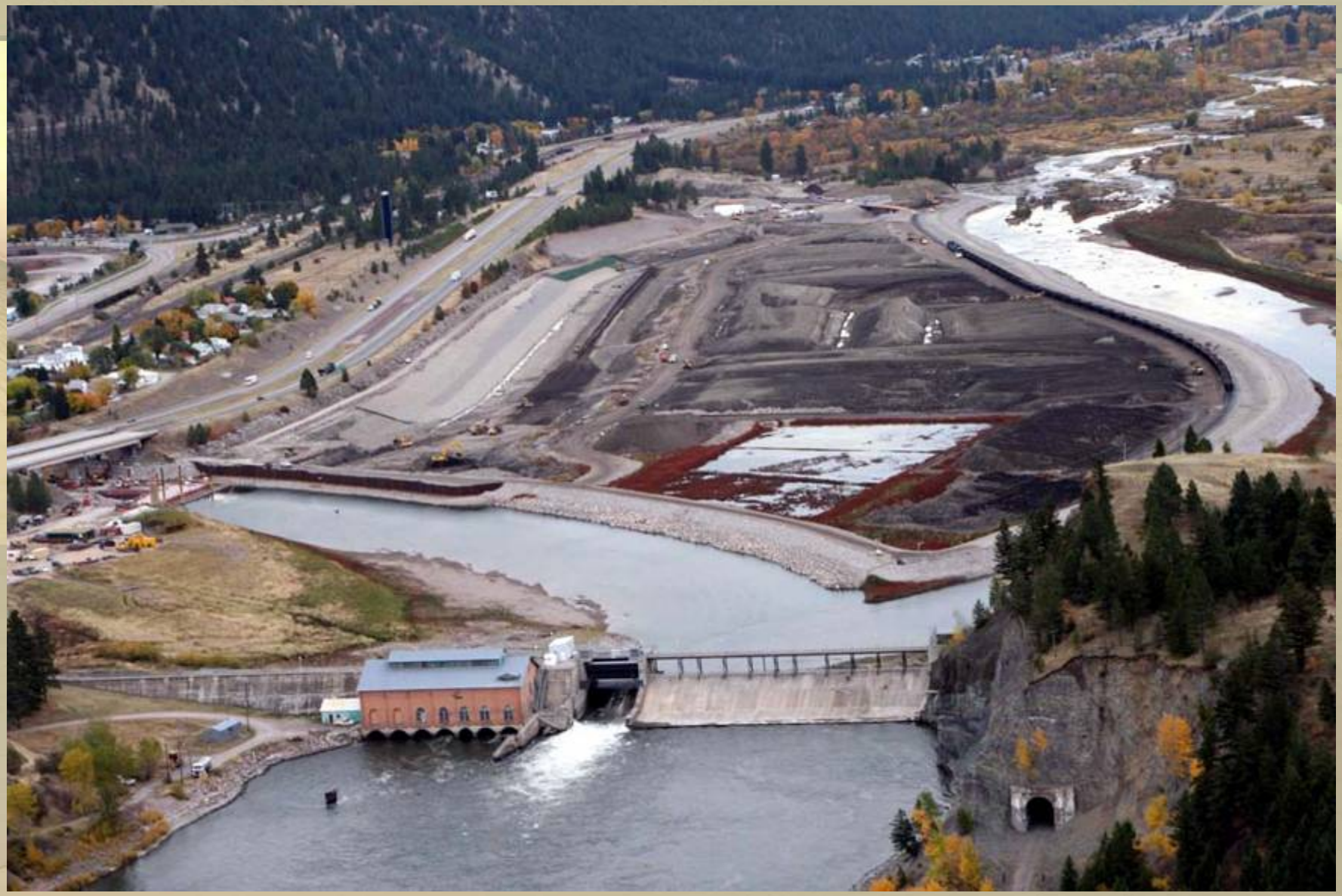
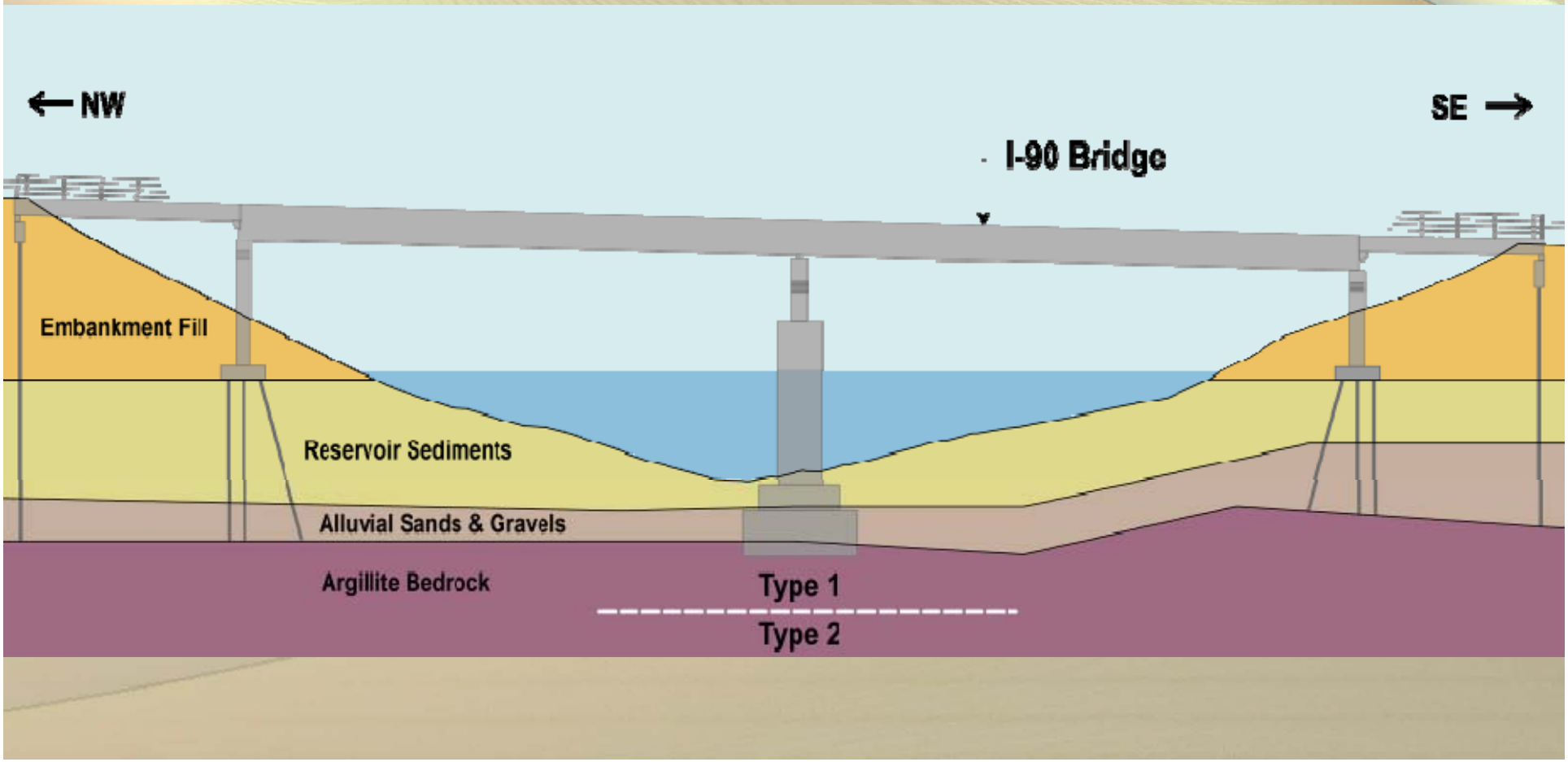


Bridge Location

Foundation Conditions

Not all rock is created equal!



Foundation Conditions

Scour in Bedrock

- FHWA HEC-18 (Evaluating Scour at Bridges)
- HEC-18 → non-cohesive streambed materials
- Erodibility Index Method → George Annandale

Erodability Index Method

- Erodibility Index

$$K = M_s * K_b * K_d * J_s$$

M_s - Mass Strength

K_b - Block Size

K_d - Discontinuity Bond Shear Strength

J_s - Relative Ground Structure

Stream Power Threshold

Stream power required to cause scour is a function of the erodability index:

$$P = K^{0.75}$$

Predicted Scour Threshold

Function of scour depth from rock erodibility index analysis:

- Type 1 scour threshold – 100 watts
- Type 2 scour threshold – 10,000 watts

Type 1 Rock is OK for bearing, but will erode during extreme events

Approach Stream Power

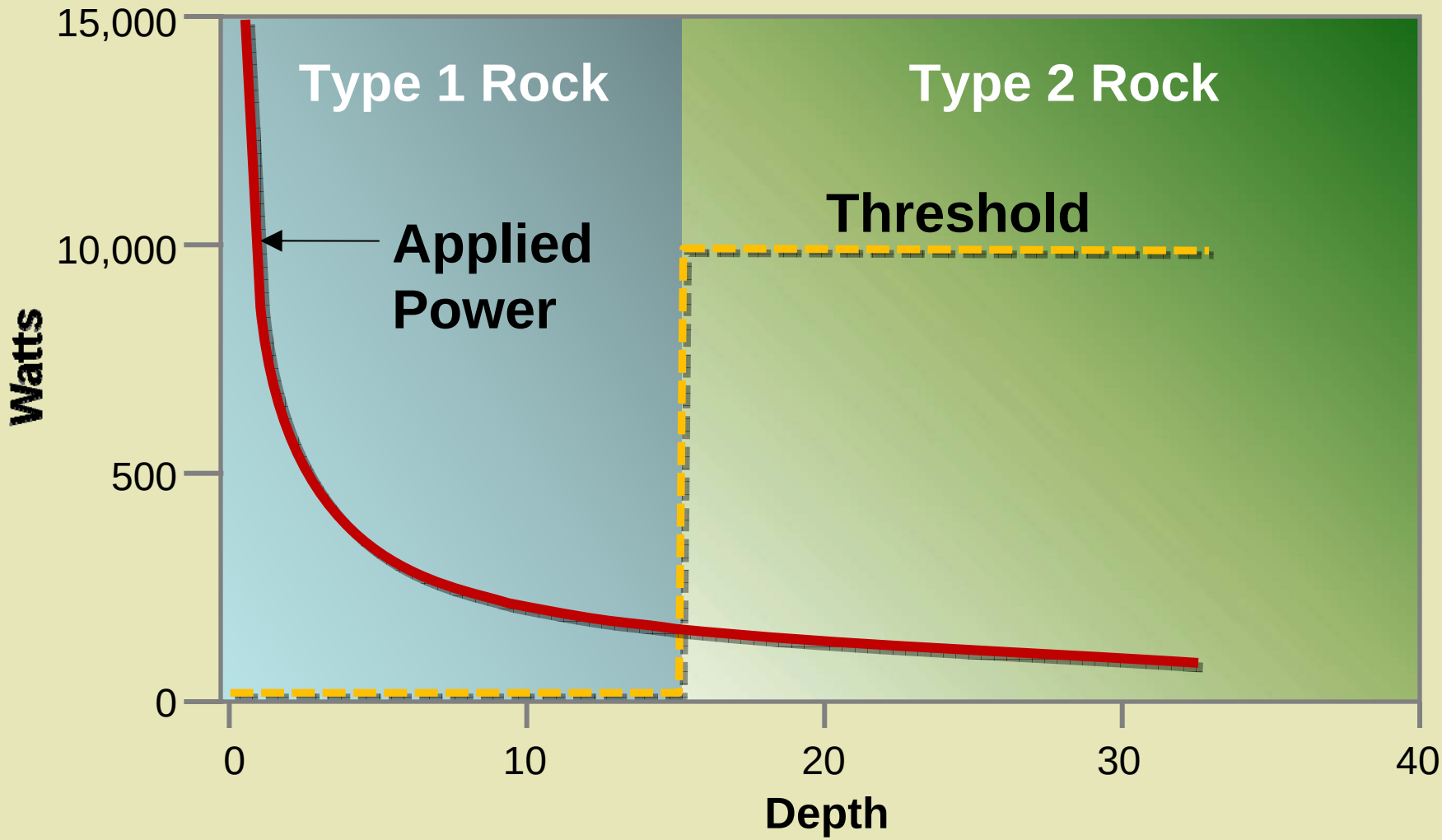
Approach stream power is a function of:

- Shear stress in approach channel
- Density of water

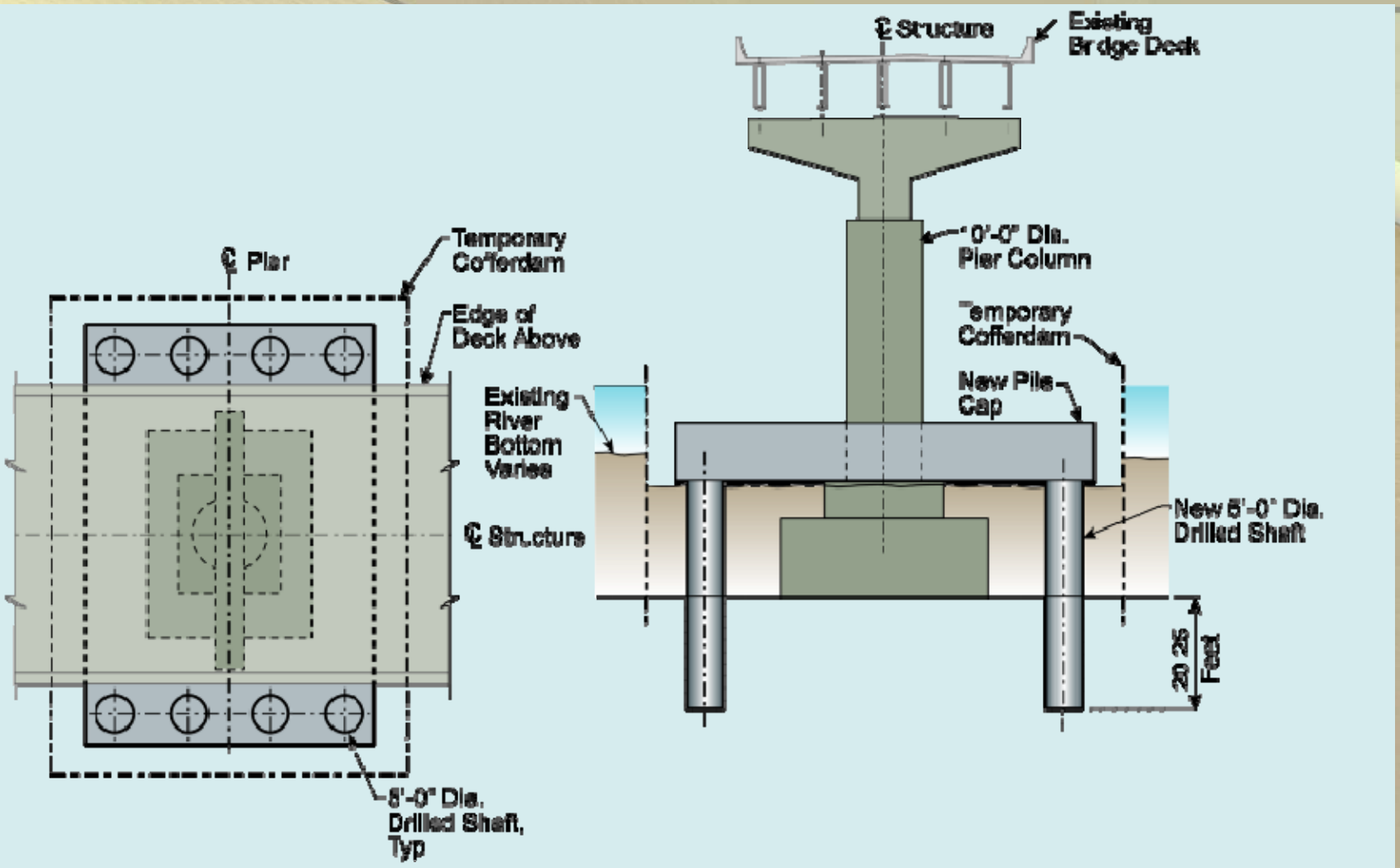
$$P_a = 7.853\, p\, (t_w/p)^{3/2}$$

- Applied stream power is a function of scour depth based on amplification at that depth.

Applied Stream Power vs Threshold

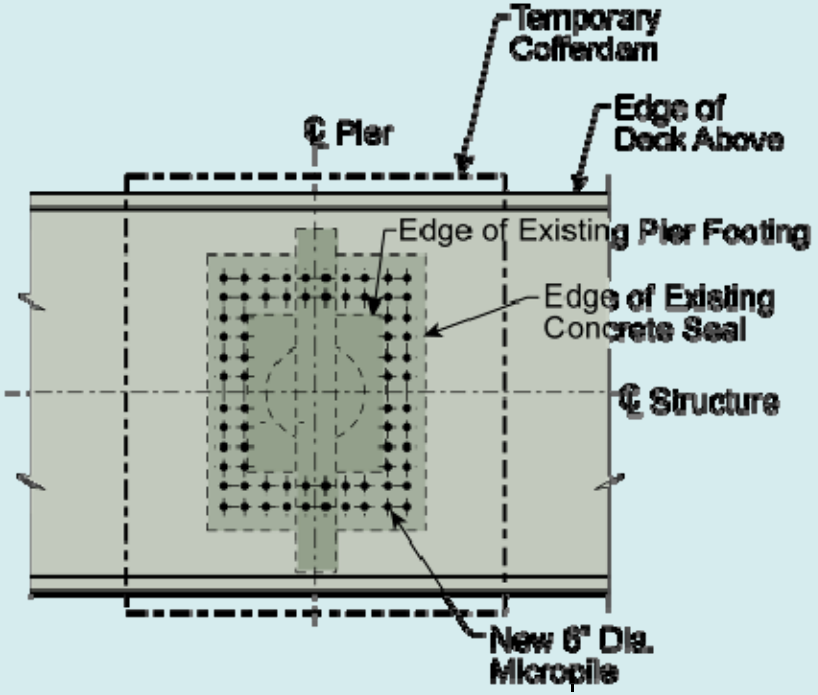


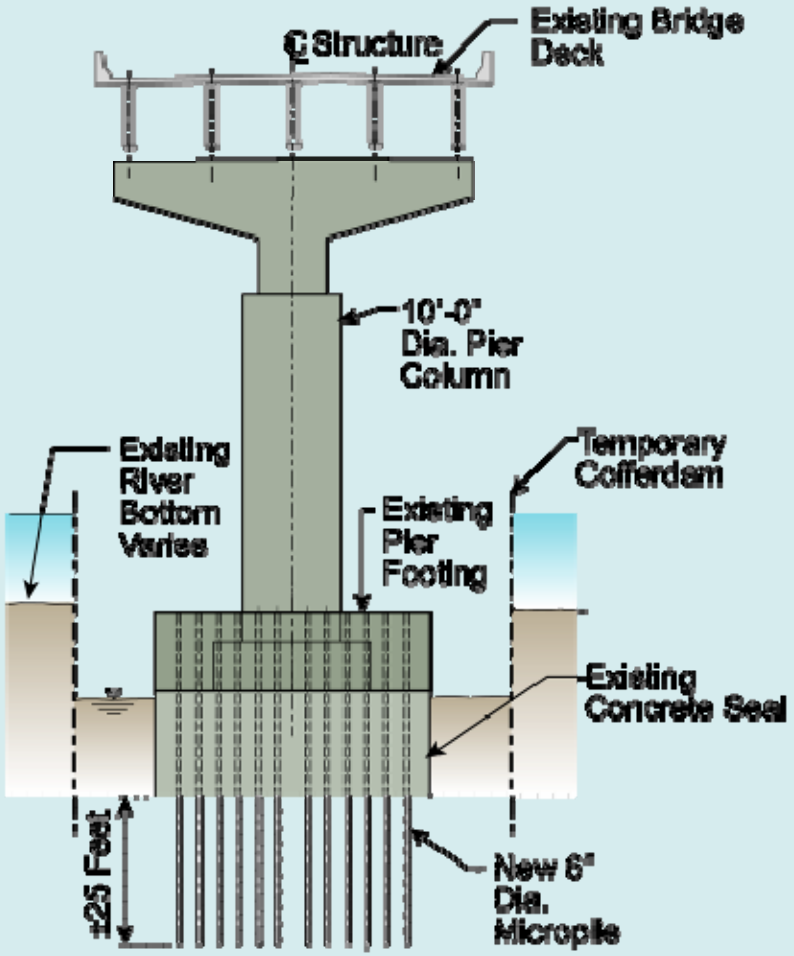
Underpinning Solutions



DRILLED SHAFT UNDERPINNING

Underpinning Solutions

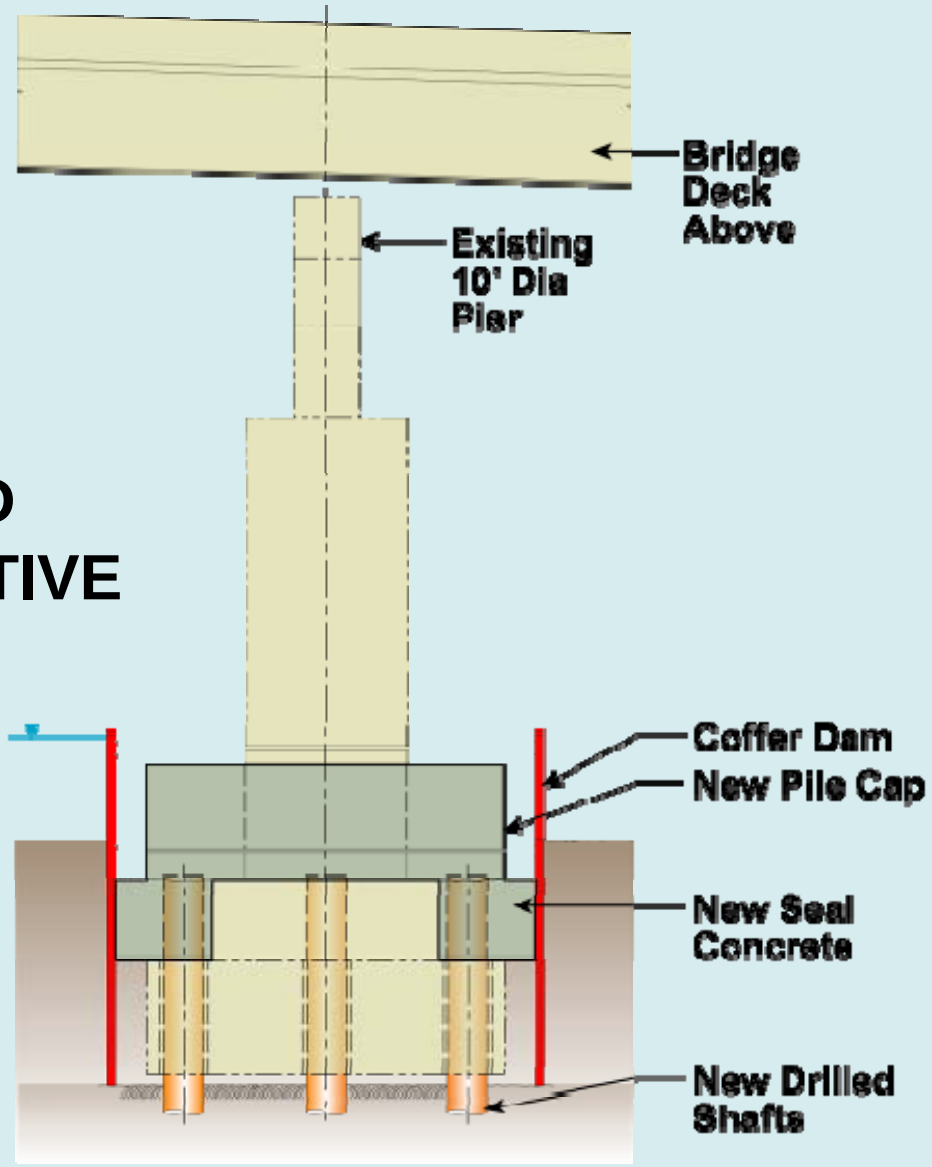




MICROPILE UNDERPINNING

Underpinning Solutions

SELECTED ALTERNATIVE



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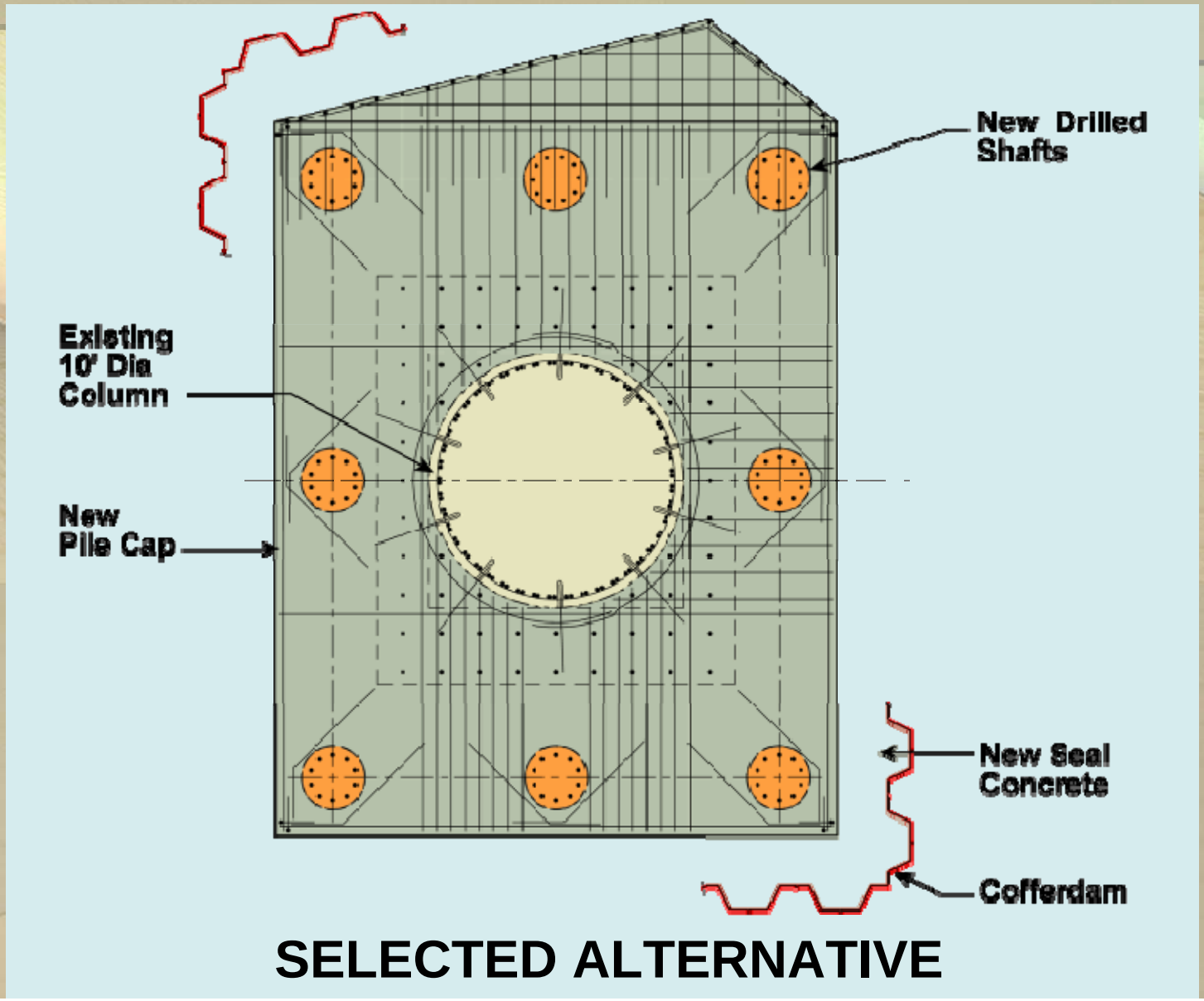

SELECTED ALTERNATIVE

Issues to Resolve

- Access to Foundations
- Clearance for Equipment

Before Construction

Access to the Site

Access to the Site

Access to the Site

Opening for the Foundations

Where is the River?

Cofferdam Installation

Limited Headroom

Coring for Piles

Obstructions in Seal

Obstructions in Seal

Placing Pile Casing

Placing Pile Casing

Placing Rebar in Piles

Filling Piles

Constructing New Pile cap

Ultimate Configuration

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