

Micropile Rescue to a Drilled Shaft Problem North America



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ISM 14TH INTERNATIONAL
WORKSHOP FOR MICROPILES

GOLD COAST AUSTRALIA - AUGUST 21-23 2019

Beautiful Heron, MT



Purpose of Project



Existing Bridge

- 695-ft long / 18-ft wide
- 9 timber approach spans & 3 steel truss spans
- Functionally obsolete



Key Agencies

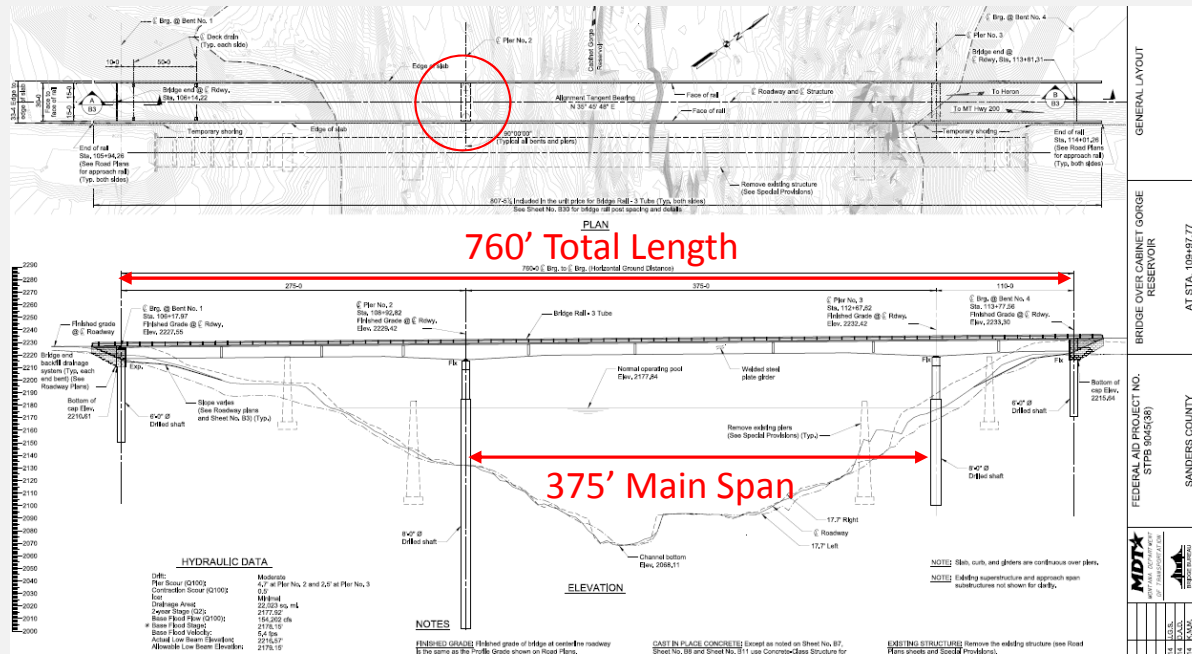
- **Owner: Montana Department of Transportation**
- **General Contractor: Dick Anderson Construction**
- **Bridge Designer: Morrison-Maierle**
- **Specialty Foundation Engineer: Dan Brown & Associates***
- **Micropile Contractor: Condon-Johnson & Associates***

Note*: participation beginning after initial construction



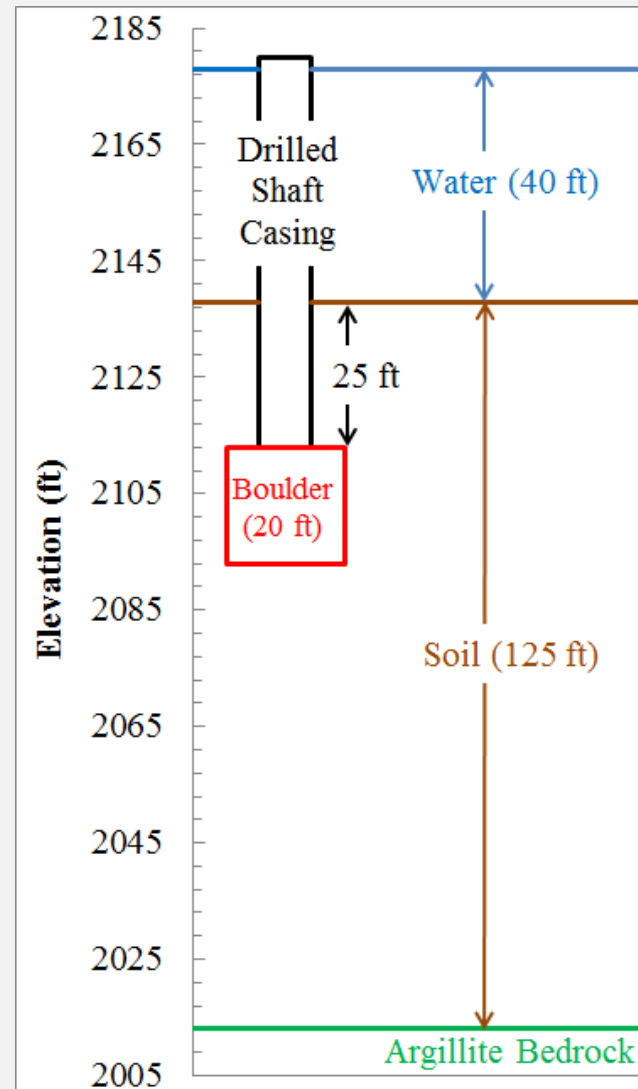
New Bridge Structure

- 8-ft diameter permanently cased shafts over 175-ft deep
- Bent 2 and 3 work from in-water trestle
- Mostly sand and gravel w/occasional cobbles (125-ft of soil overburden)
- Argillite bedrock (12 to 26 ksi)
- and (at least) one **BIG** boulder so Bent 2 was moved to try to avoid

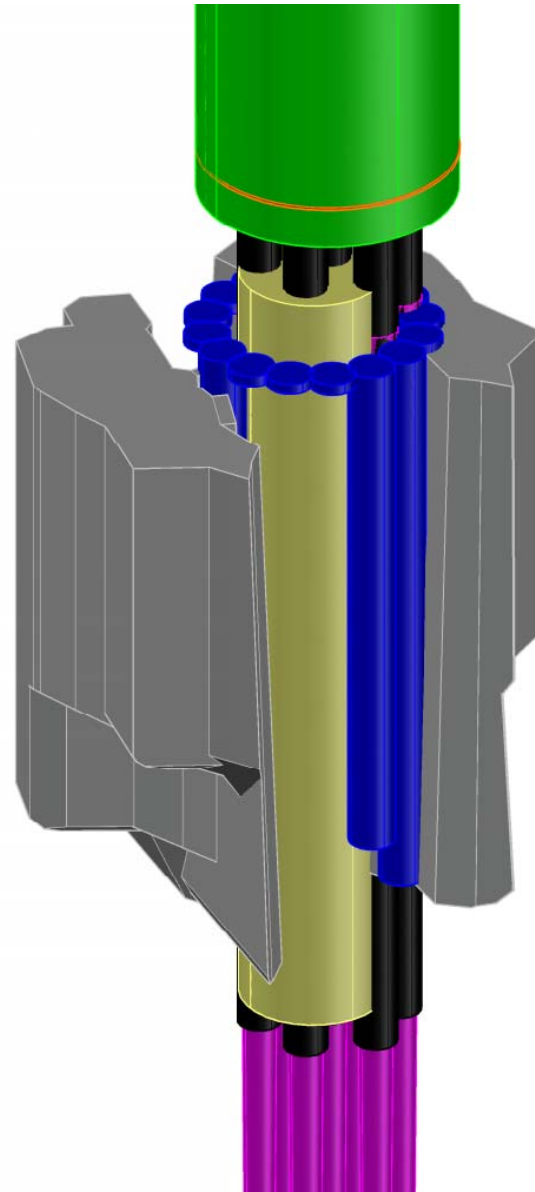
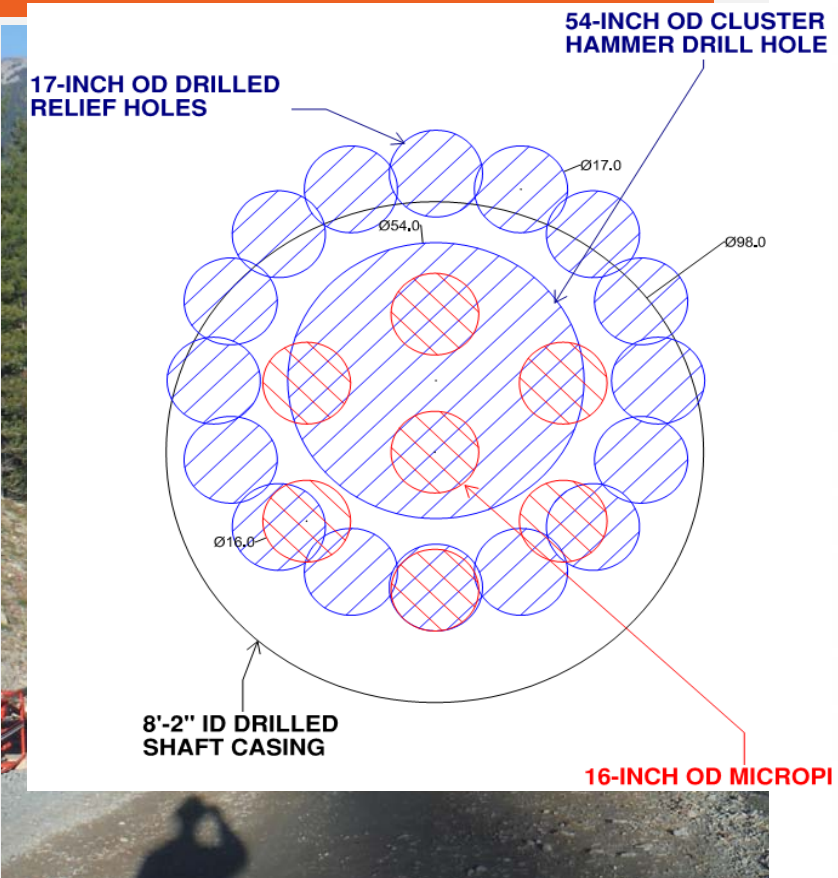


Houston There is a Problem

- Tried everything to continue casing advancement
- Concerns about trestle stability
- Verticality issue of casing observed



Background and Concept



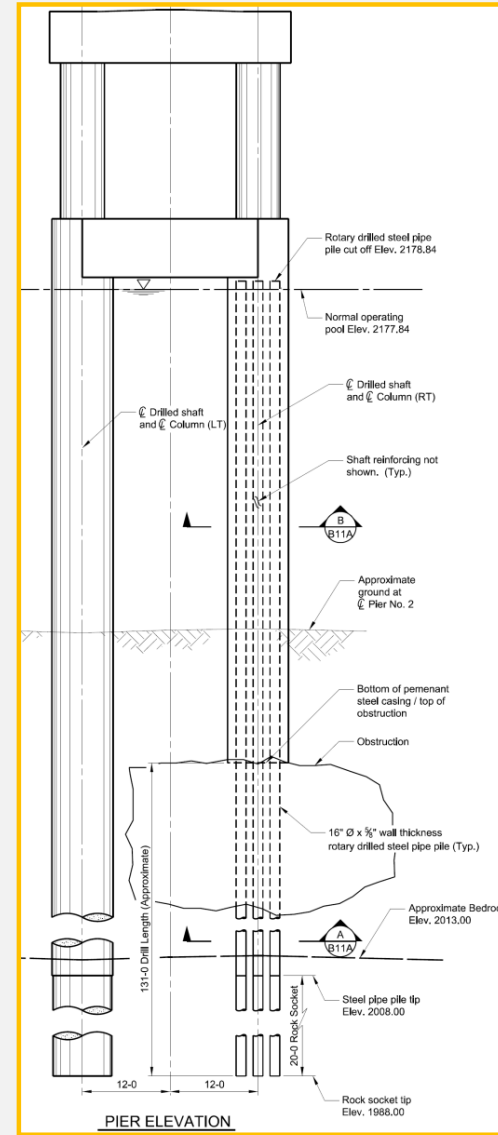
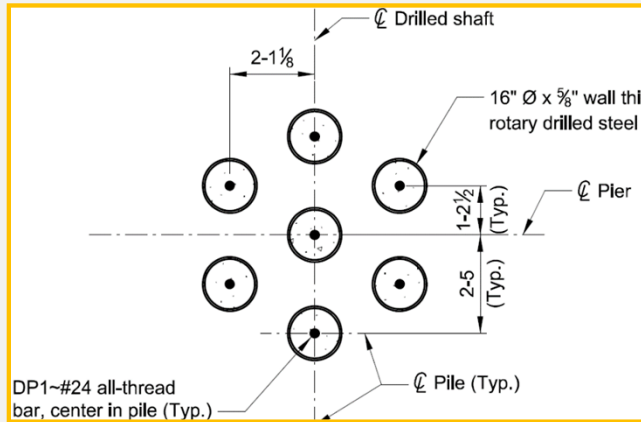
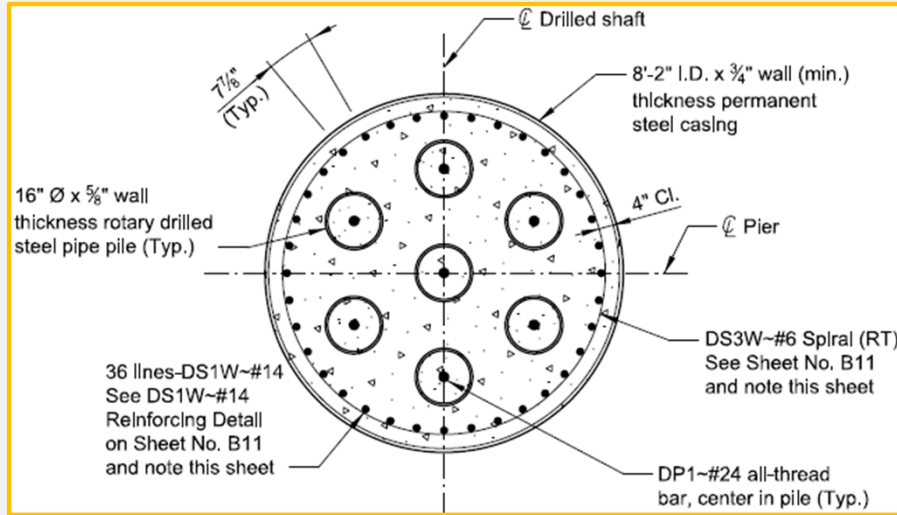


Micropile Challenges

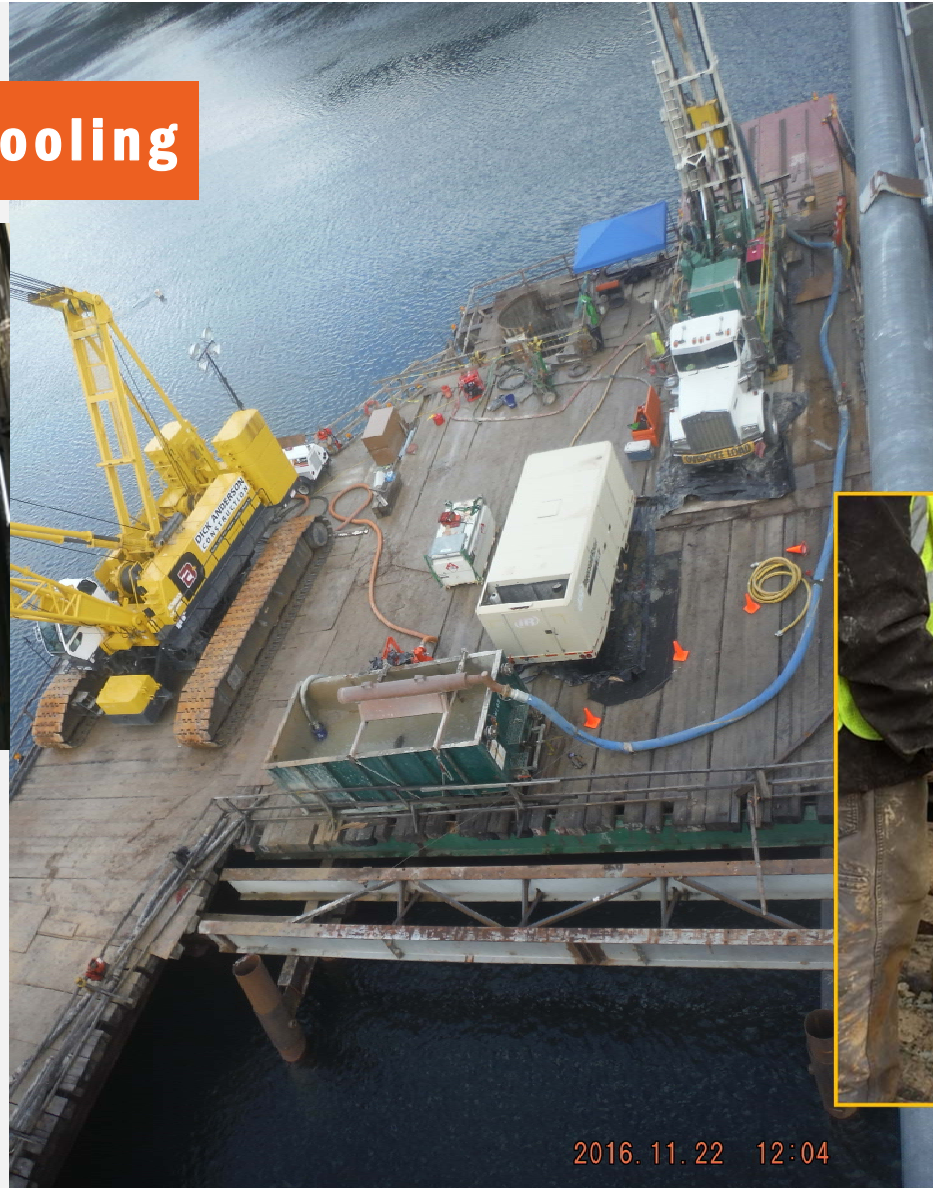
- 2” Horizontal Tolerance down 65-ft
- 5 of 7 Micropiles half on rock half on backfill
- Remote location
- Work being performed during middle of winter in Montana
- GC ordered all the casing
- Unknown conditions at boulder
- Full penetration welds for casing
- Second time for MDOT using micropiles
- When was the last time micropiles were used to rescue a drilled shaft?



Micropile Remediation Design



Jobsite and Tooling



2016. 11. 22 12:04

The Gatling Gun



Verticality is Crucial



Micropile Casing



(some) Metal Obstructions

Big Hole Drillers Love to
Throw Metal into the Drill
Hole



Sheared Micropile Casing



Baby, It's Cold Outside



Micropiles are Complete



Thanks for Listening

**NORTH AMERICA WORLD CUP
ENTRY**

