US-30 over Portneuf River CMP Rehabilitation

May 15, 2019

BURNS McDONNELL

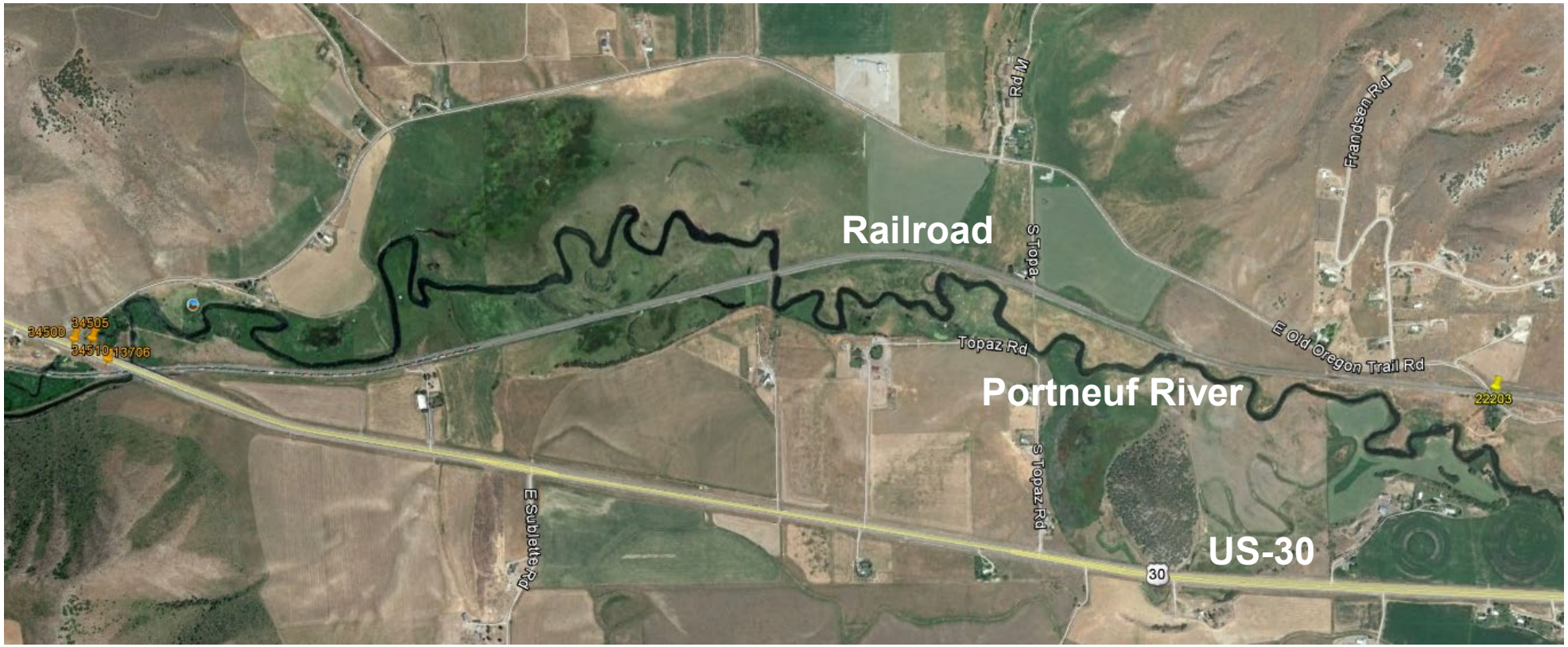
IDAHO TRANSPORTATION DEPARTMENT

entation Outline

- History
- Design Constraints
- Alternatives Analyses
- Design
- Construction

HISTORY

Highway US-30 History



ect Area Water Conveyance

- Three, 10-foot diameter CMPs
- Marsh Valley Canal

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- Built in 1947
- One-gage structural plate pipe
- 239 feet long, under 2-lane highway
- Culvert supports 45 feet of fill

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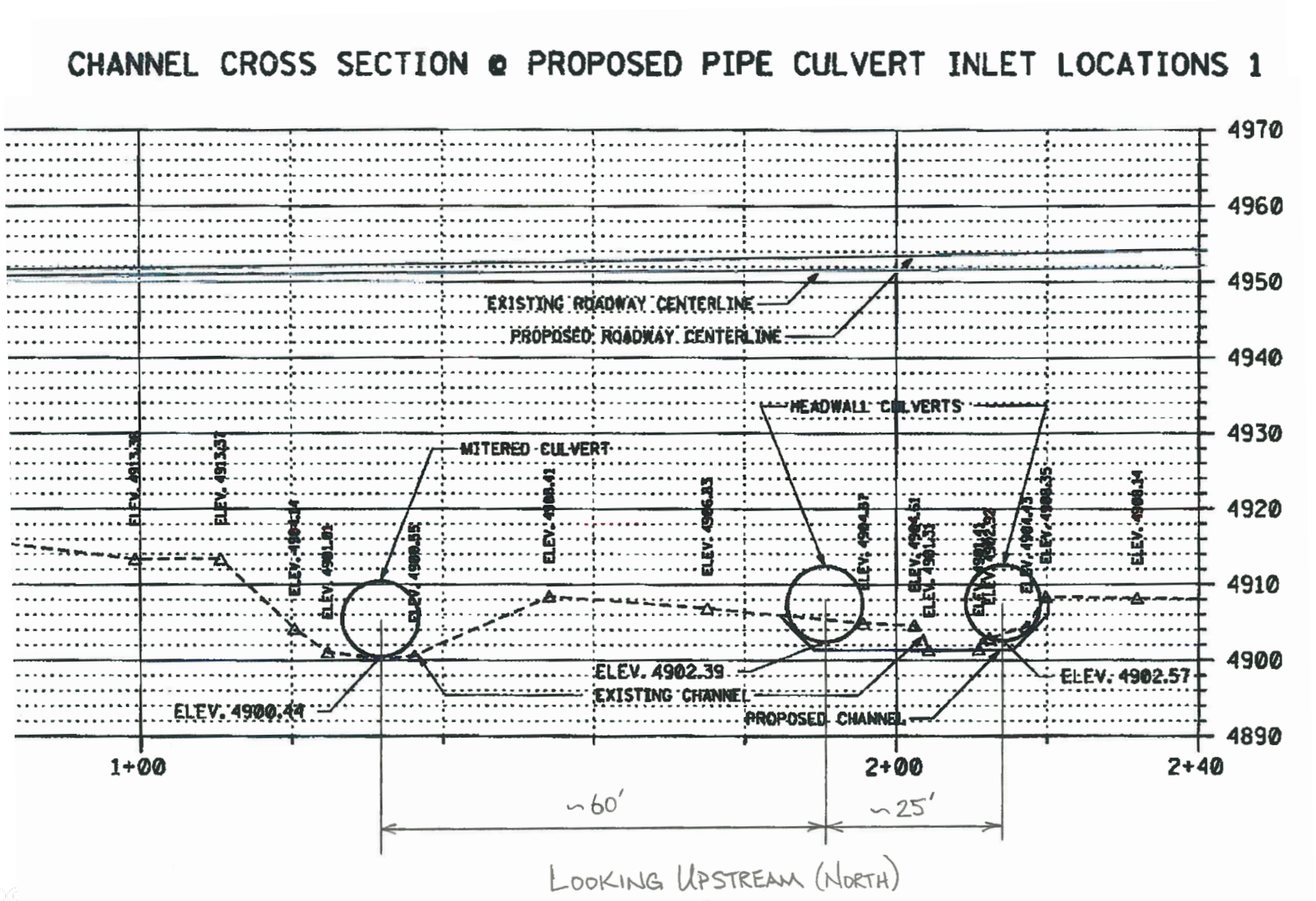
d of 1962


CHANNEL CROSS SECTION @ PROPOSED PIPE CULVERT INLET LOCATIONS 1
4970
4960
4950
4940
4930
4920
4910
4900
4890
EXISTING ROADWAY CENTERLINE
PROPOSED ROADWAY CENTERLINE
HEADWALL CULVERTS
MITERED CULVERT
ELEV. 4902.39
EXISTING CHANNEL
PROPOSED CHANNEL
ELEV. 4900.44
ELEV. 4902.57
1+00
2+00
2+40
~60'
~25'
LOOKING UPSTREAM (NORTH)

30 widened to four lanes in 2010


KOMATSU
DEERE

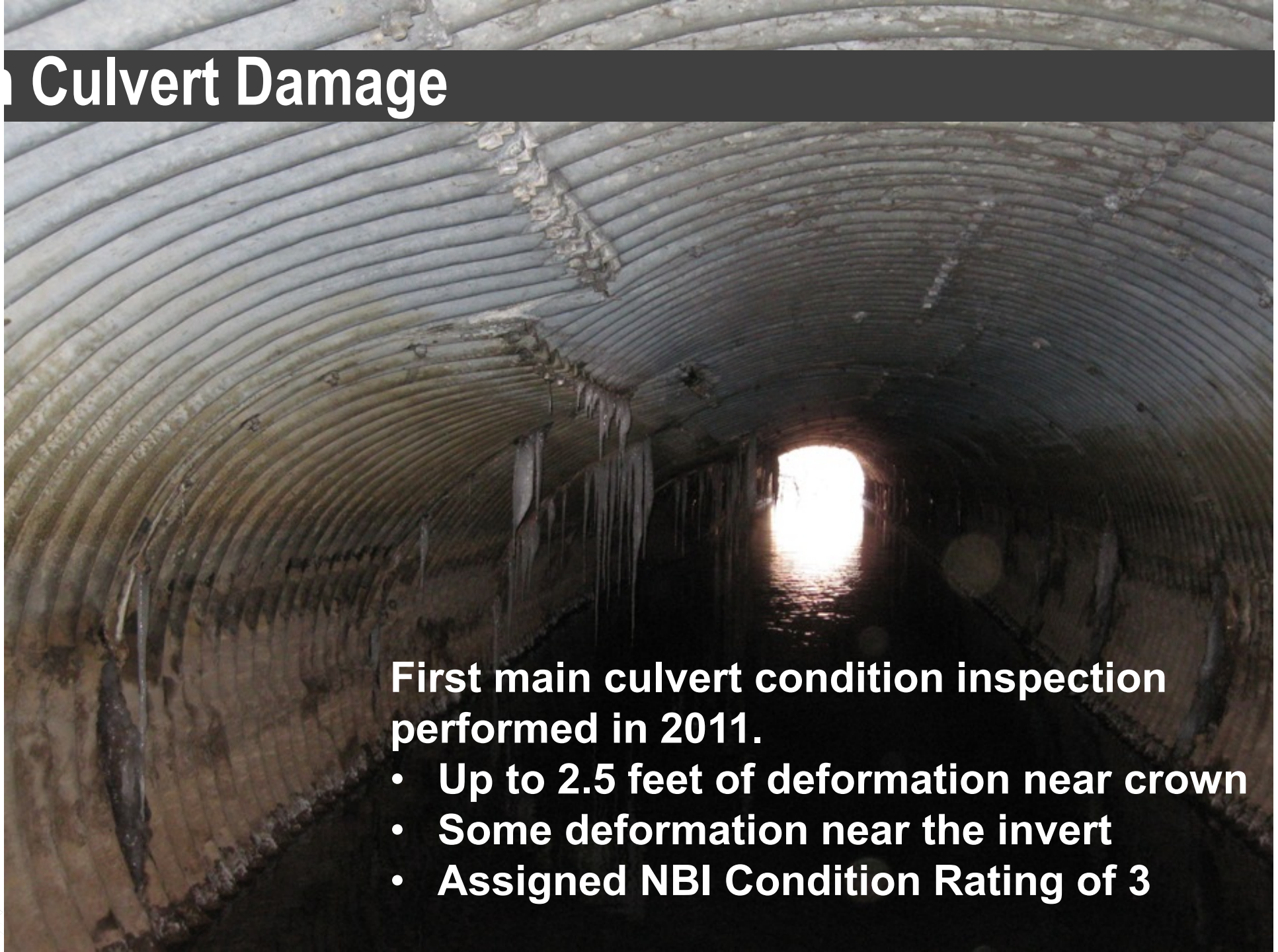
Idaho Transportation Department
Bridge Field Inspection Report Photos
District No. 05

Bridge Key: 13705
Structure Name: 03020N 365.28
Features: UPRR & CANAL;TOPAZ OP

Date: 08/26/10
Administrative Jurisdiction: District 5

New bridge next to the old bridge.

Culvert Damage



First main culvert condition inspection performed in 2011.

- Up to 2.5 feet of deformation near crown
- Some deformation near the invert
- Assigned NBI Condition Rating of 3

- Steel plate failure at the bolt line

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DESIGN CONSTRAINTS

straints

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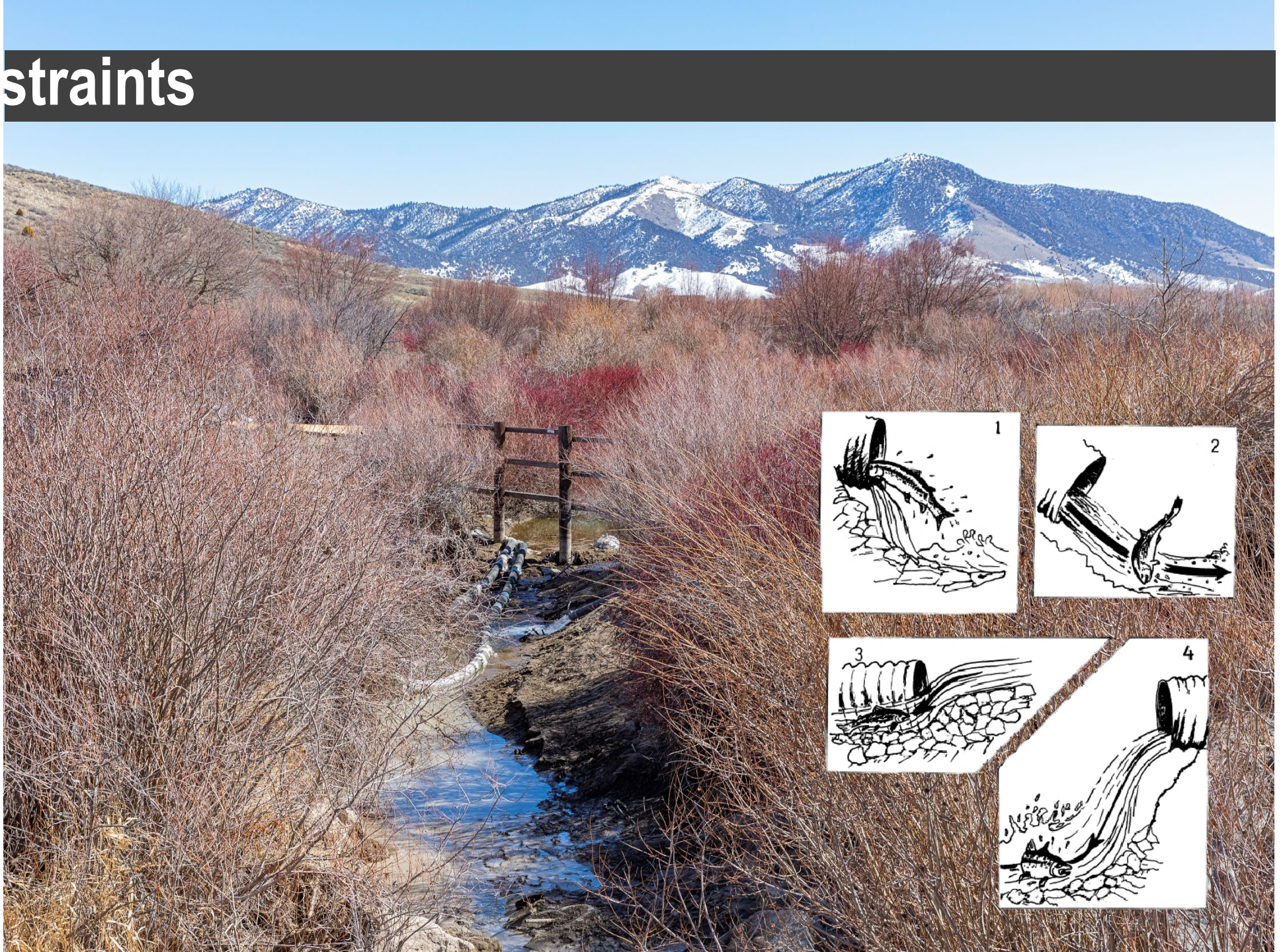
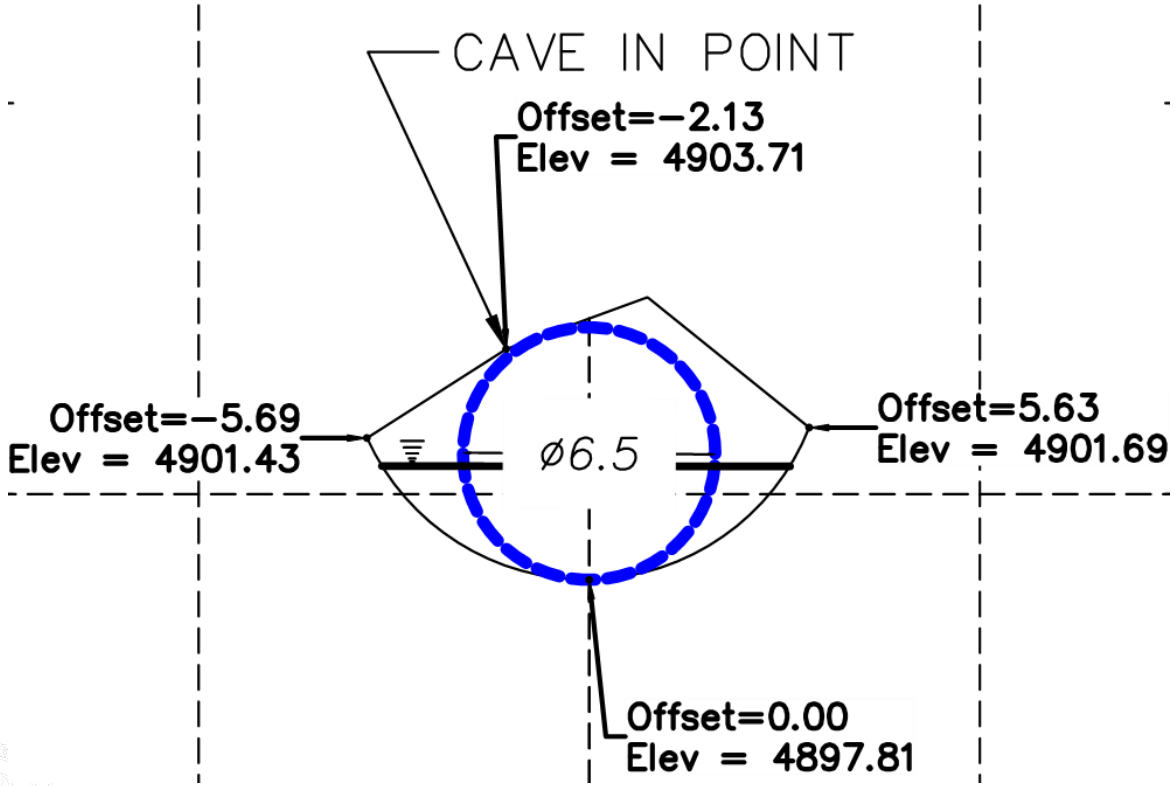


- No endangered species
- Burns & McDonnell Engineering selected to design repairs and explore remediation options

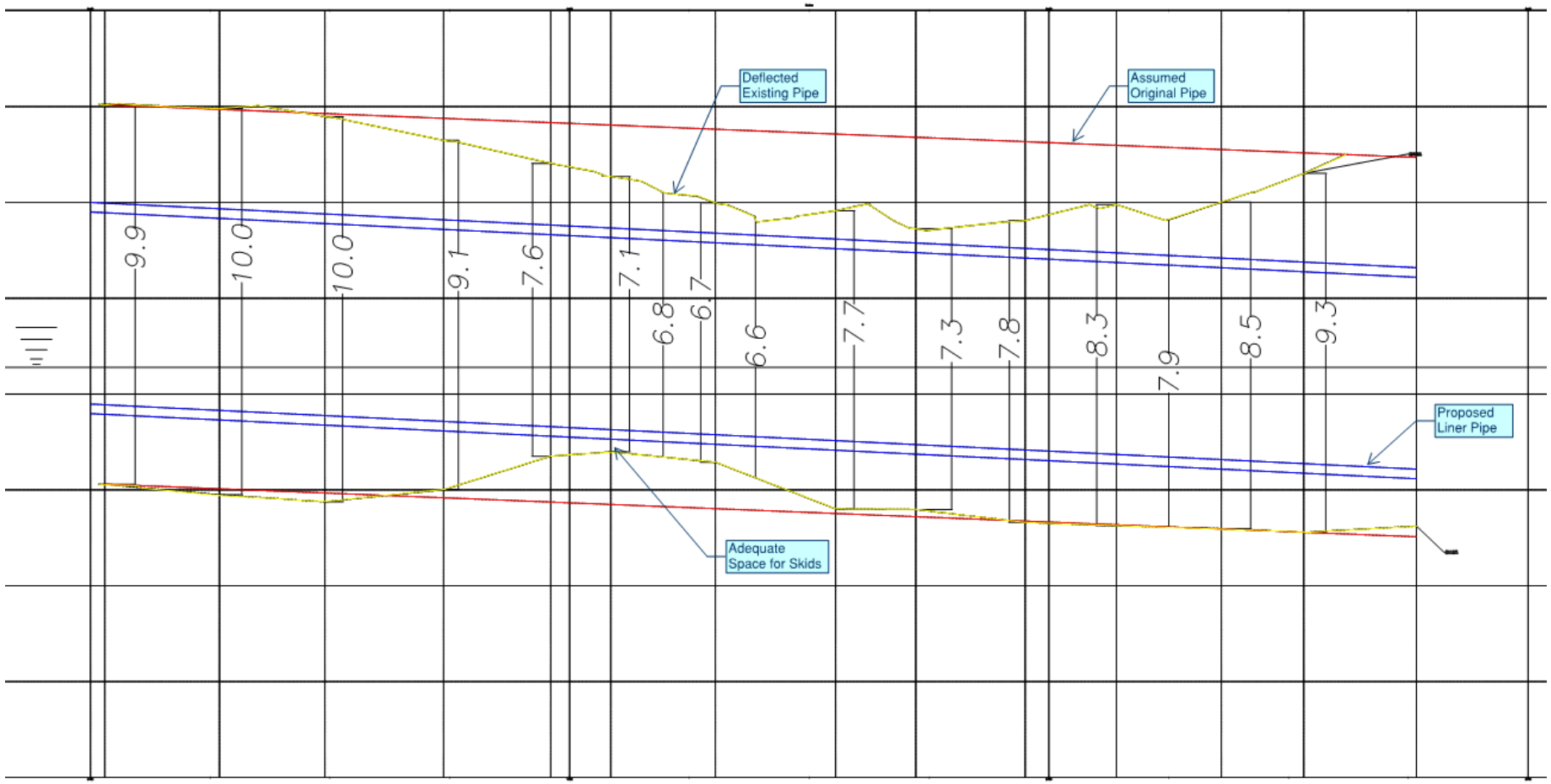
ALTERNATIVES ANALYSES

Liner Solution

- Conventional Liner Alternative
  - 5.0’ inside Φ HDPE liner in main culvert



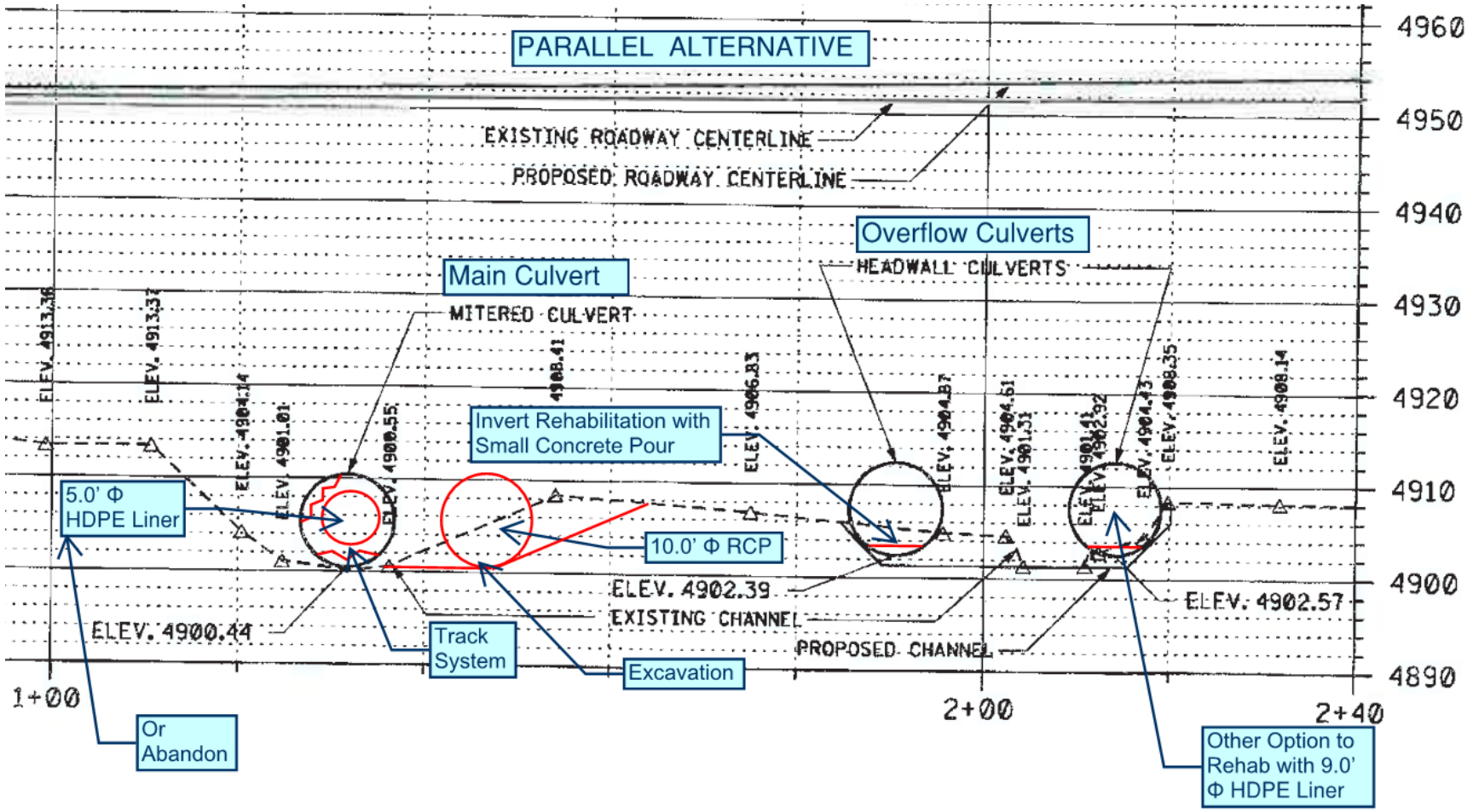
r Solution & Culvert Deformation



l Alternatives Analyses

- Parallel Alternative
- Pipe Consume Alternative
- Partial Tunnel Alternative
- All Alternatives Include
  - Beveled headwall retrofit
  - Paved inverts in overflow culverts

llel Alternative



llel Alternative

Source: Kansas Department of Transportation

Consume Construction

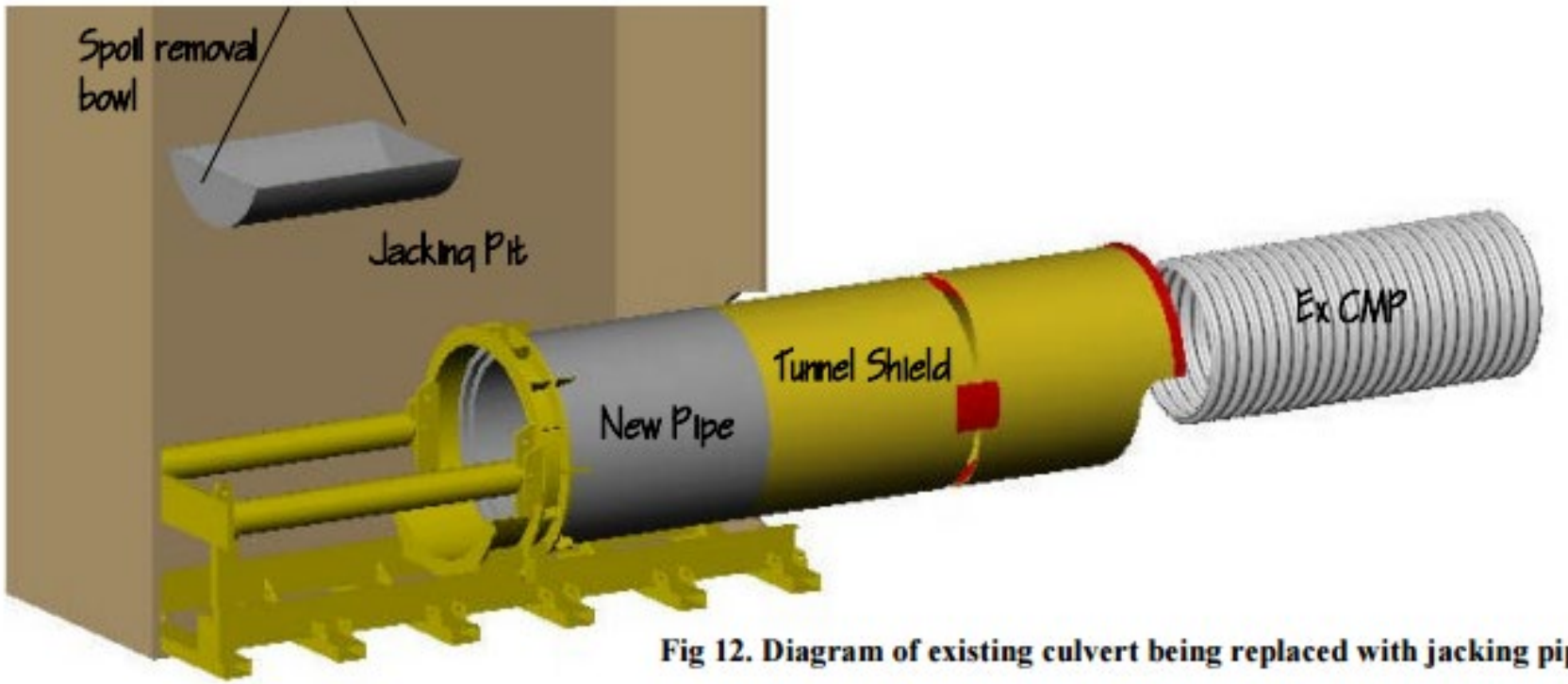


Fig 12. Diagram of existing culvert being replaced with jacking pipe.

Source: Tenbusch, A.A., Tenbusch, A.F. *Failing Culverts – Solutions Options: with special attention to the option of replacement by tunneling.* www.tenbusch.com, November 2008

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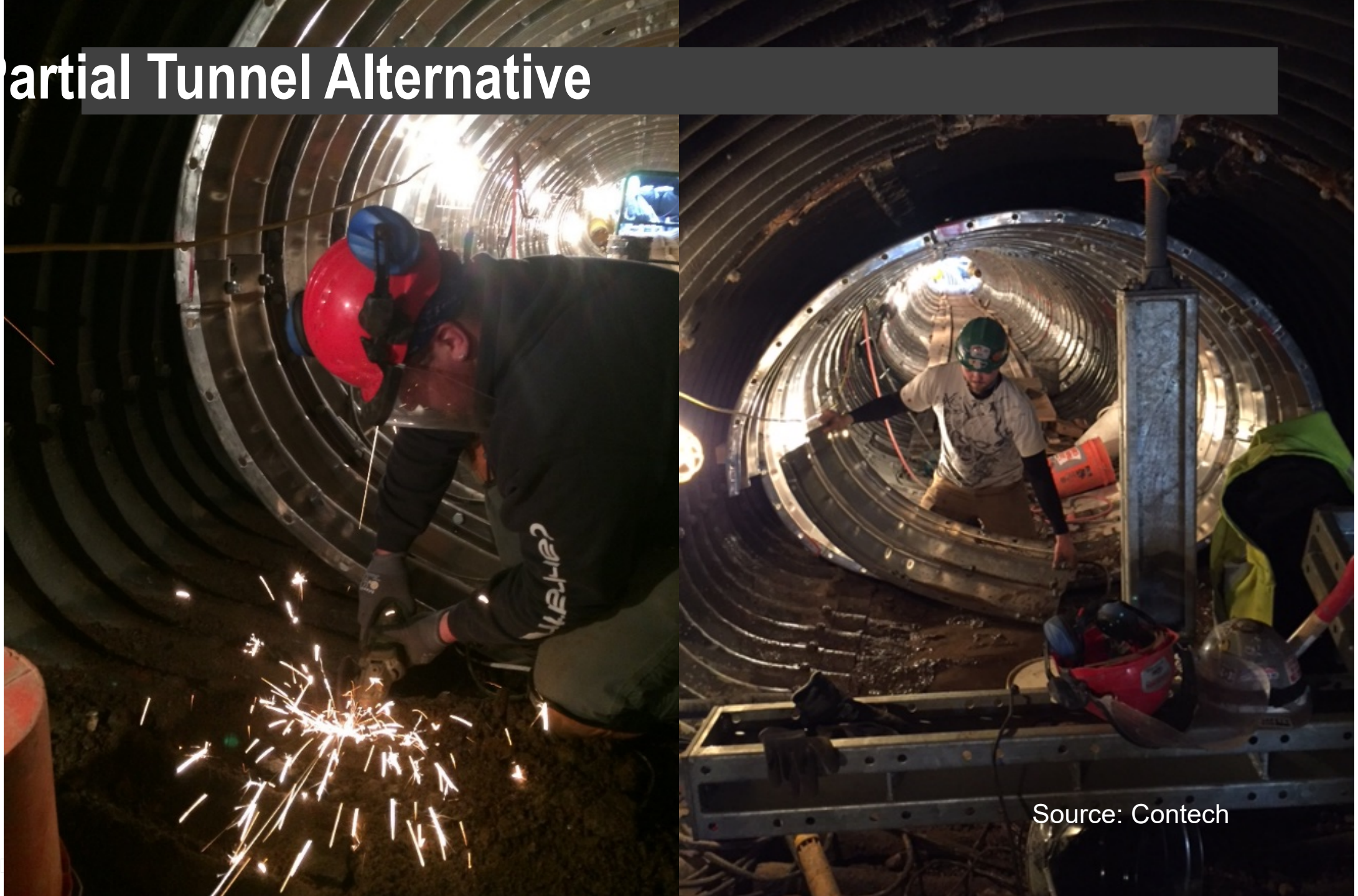
ial Tunnel Alternative

Source: Contech

Partial Tunnel Alternative



Source: Contech

raulics

- No rise in headwater
- Parallel Alternative increased velocities

erred Alternative

- Partial Tunnel
  - 9’ tall x 11’ wide ellipse
  - No bulkhead required
  - No impacts to MSE walls or geofoam fill
  - Minimal environmental impacts
  - Acceptable hydraulics

DESIGN

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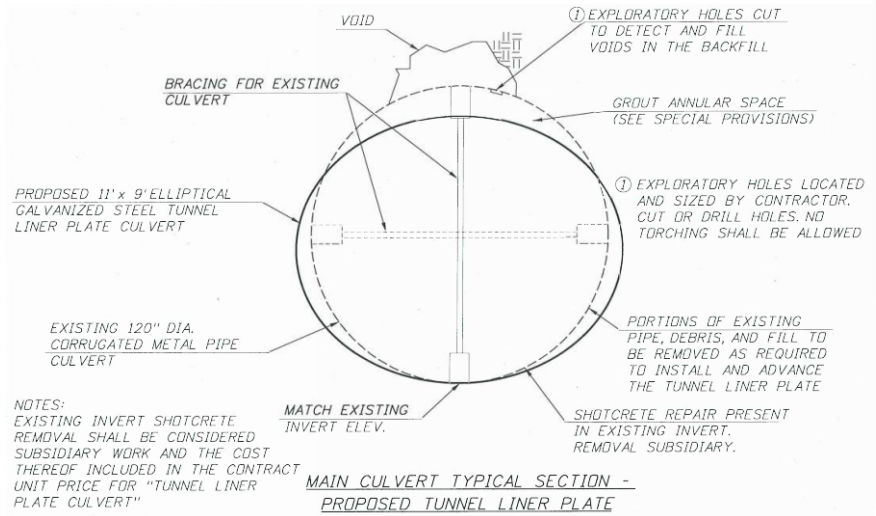
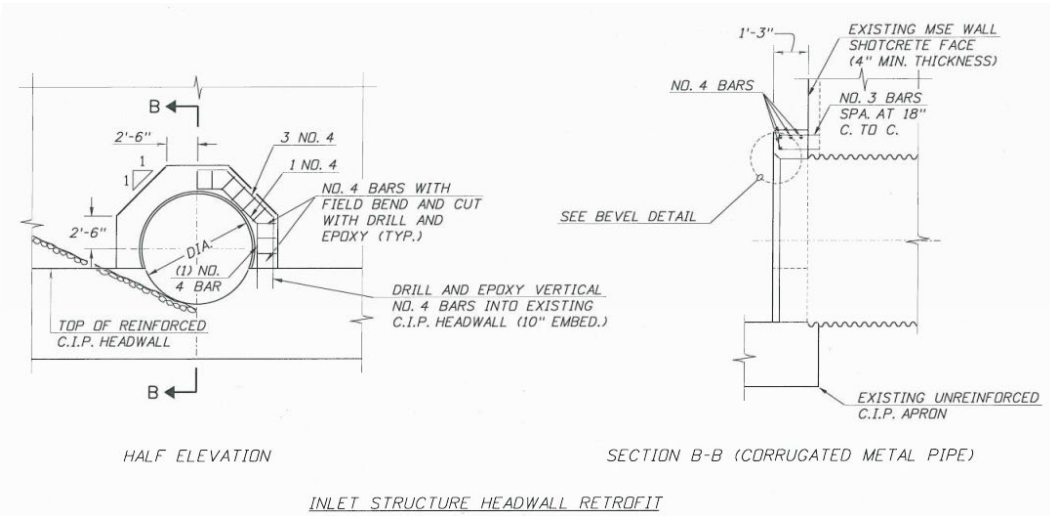
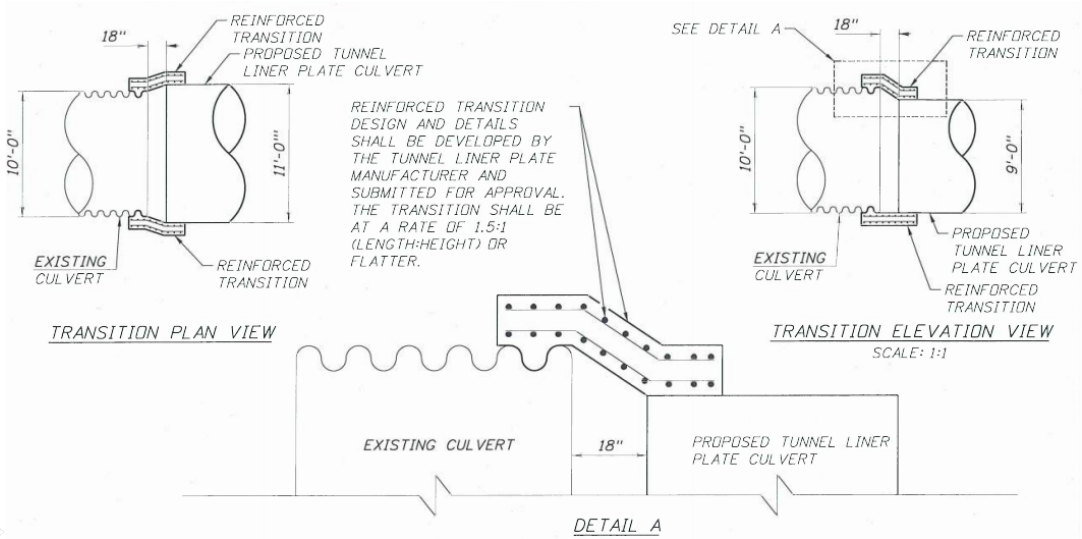
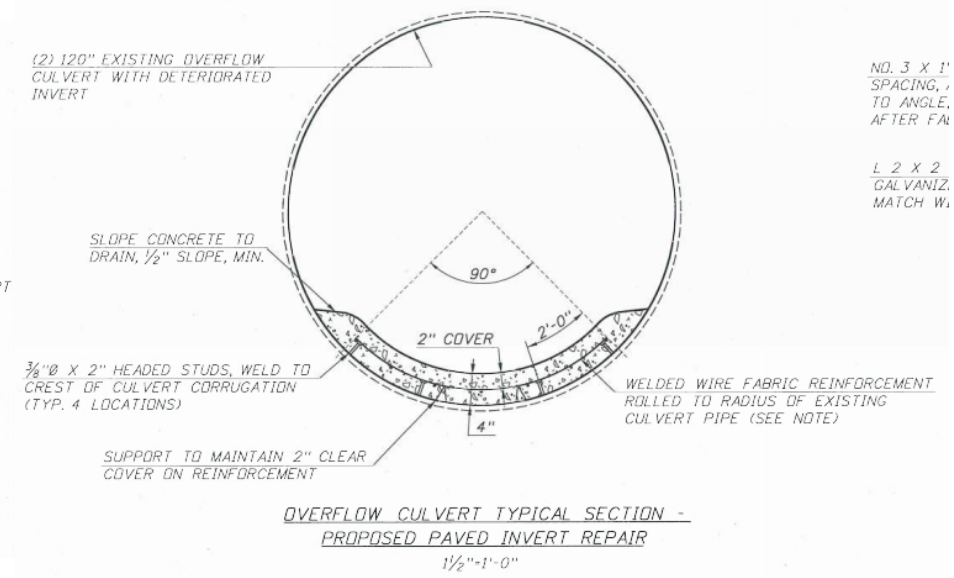


MAIN CULVERT TYPICAL SECTION - PROPOSED TUNNEL LINER PLATE



INLET STRUCTURE HEADWALL RETROFIT





es, Special Provisions, & Submittals

- Schedule
- Flood Emergency Control Plan
- Tunnel Liner Plate Culvert
- Pressure Grouting

CONSTRUCTION

Opening

- 3 Bids within 1.6%
- DL Beck: $3.3M

Staging

Staging

perature Control & Ventilation

ed Invert

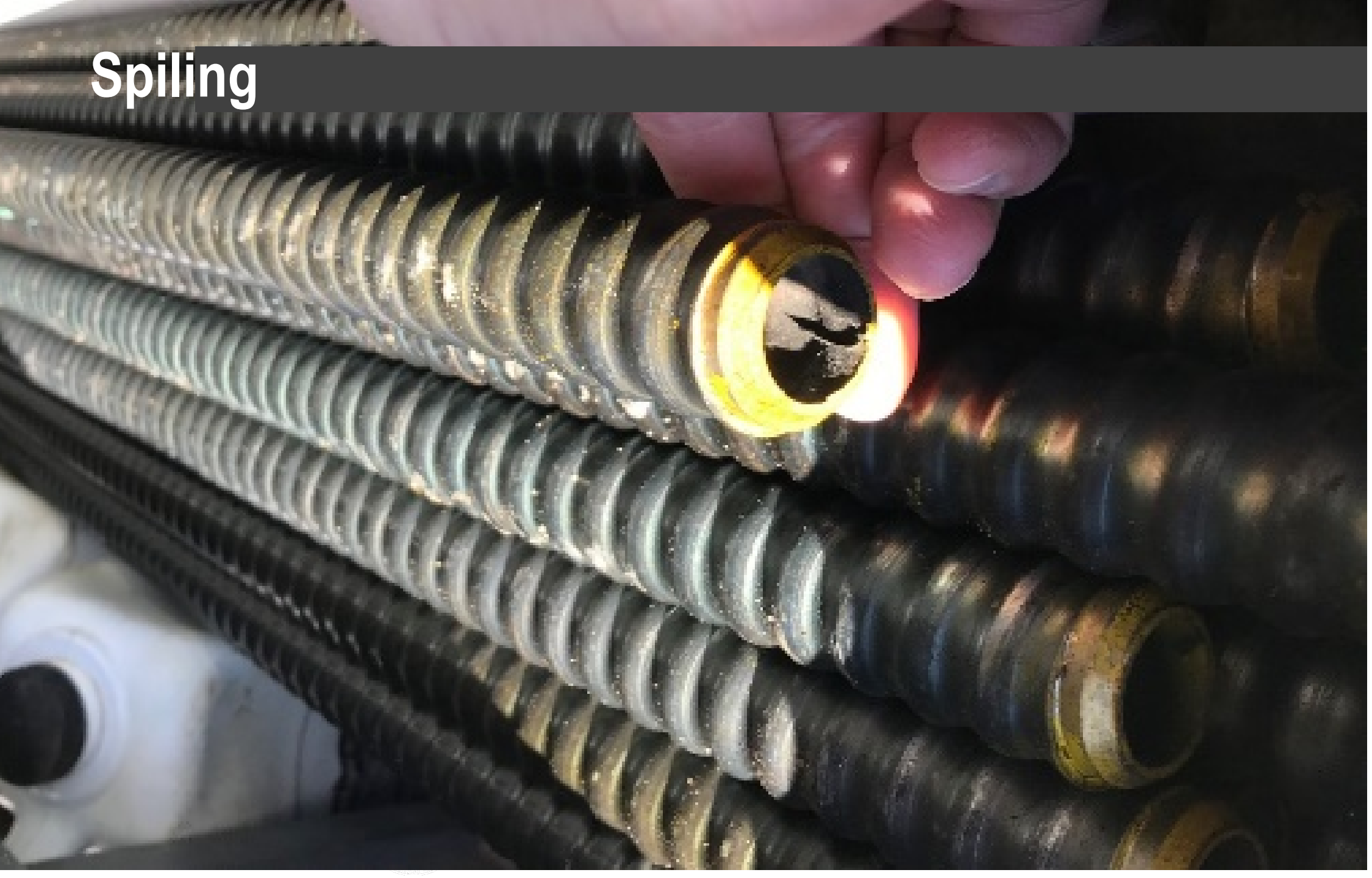
ed Invert

atering

n Culvert Access

cing

Spiling



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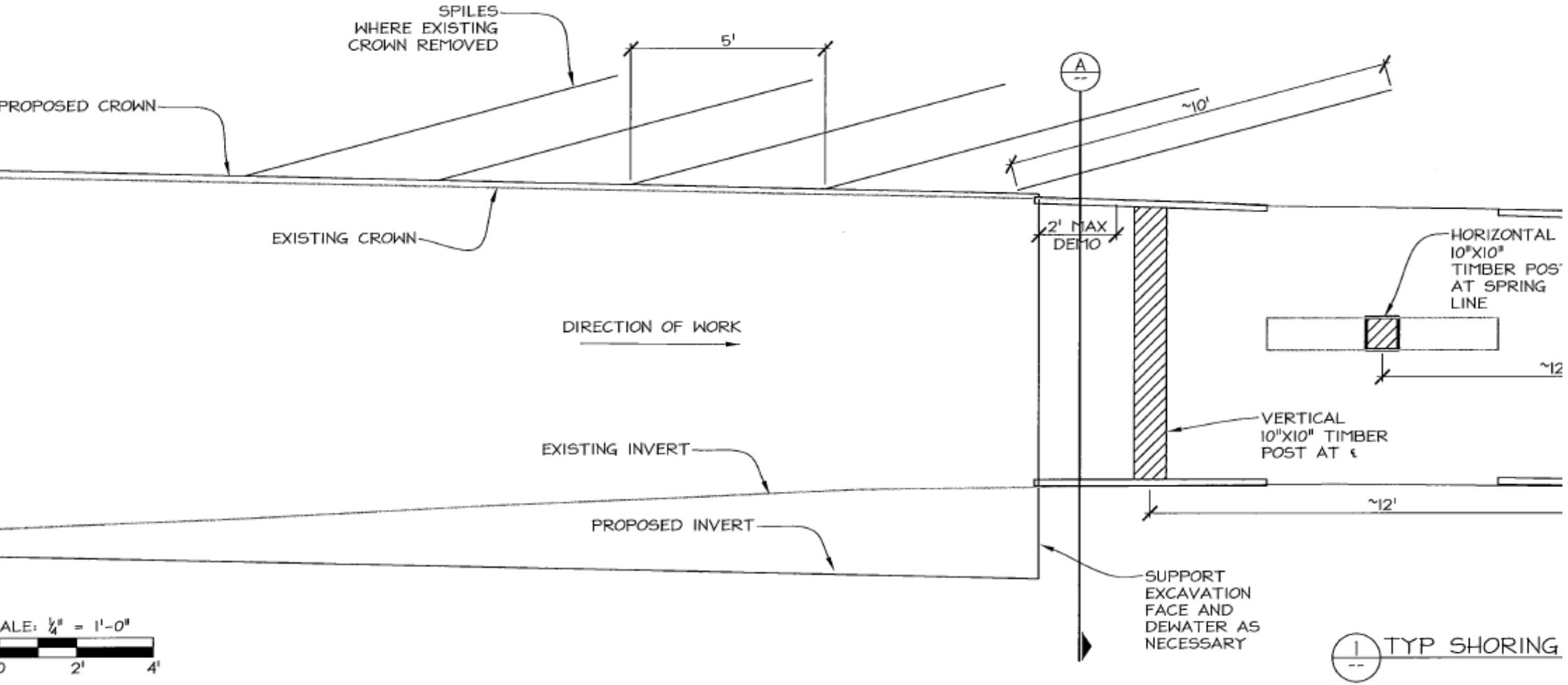

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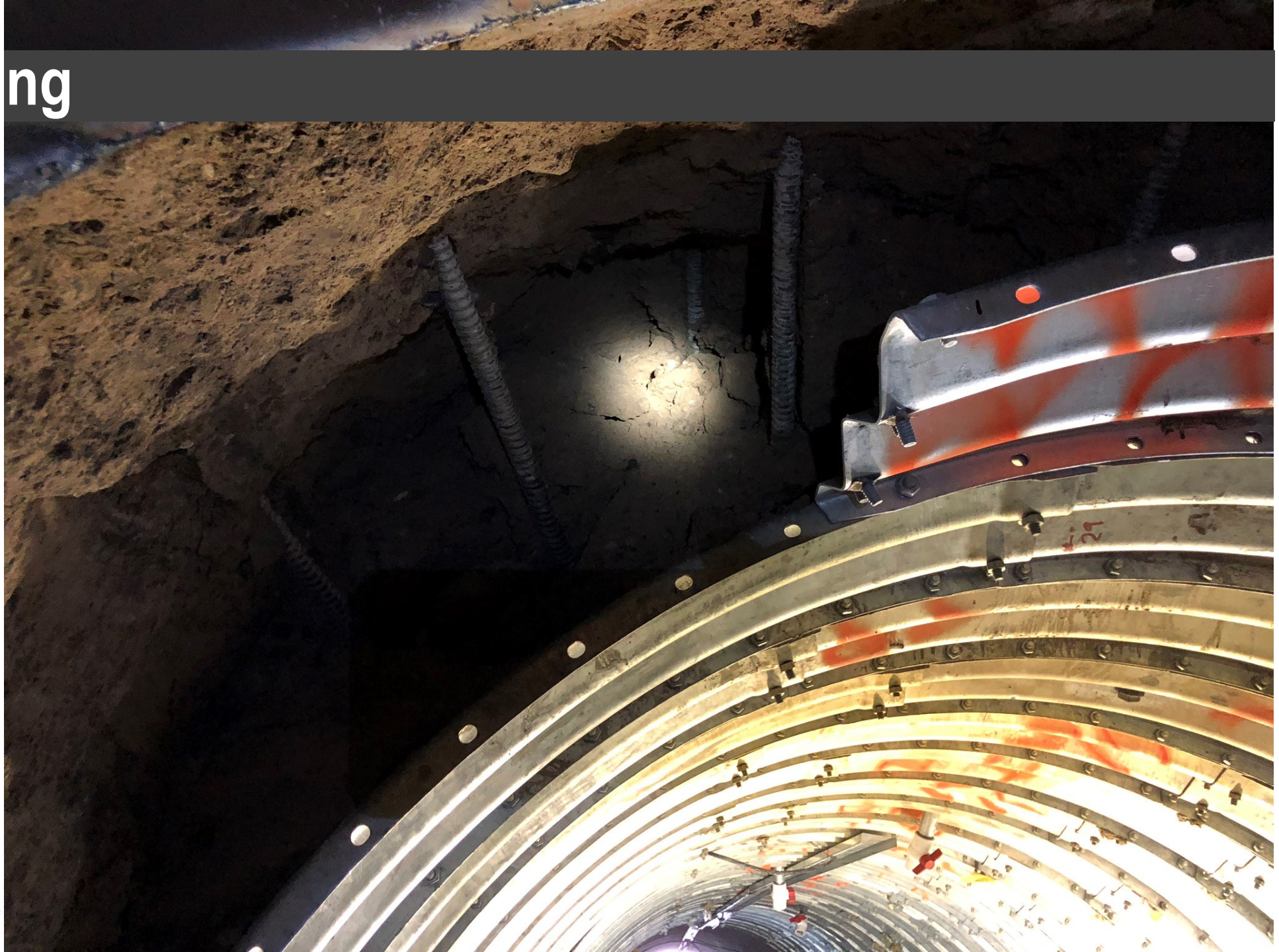

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r Assembly


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Thank You