Innovative Bridge Design Practices Using Galvanized Coating Systems

SSSBA / AGA Summer Bridge Series

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CONTECH ENGINEERED SOLUTIONS

Buried Bridge Innovations for Extension of Veterans Drive Through Tunnels Below I-5 Near Seattle-Tacoma Airport

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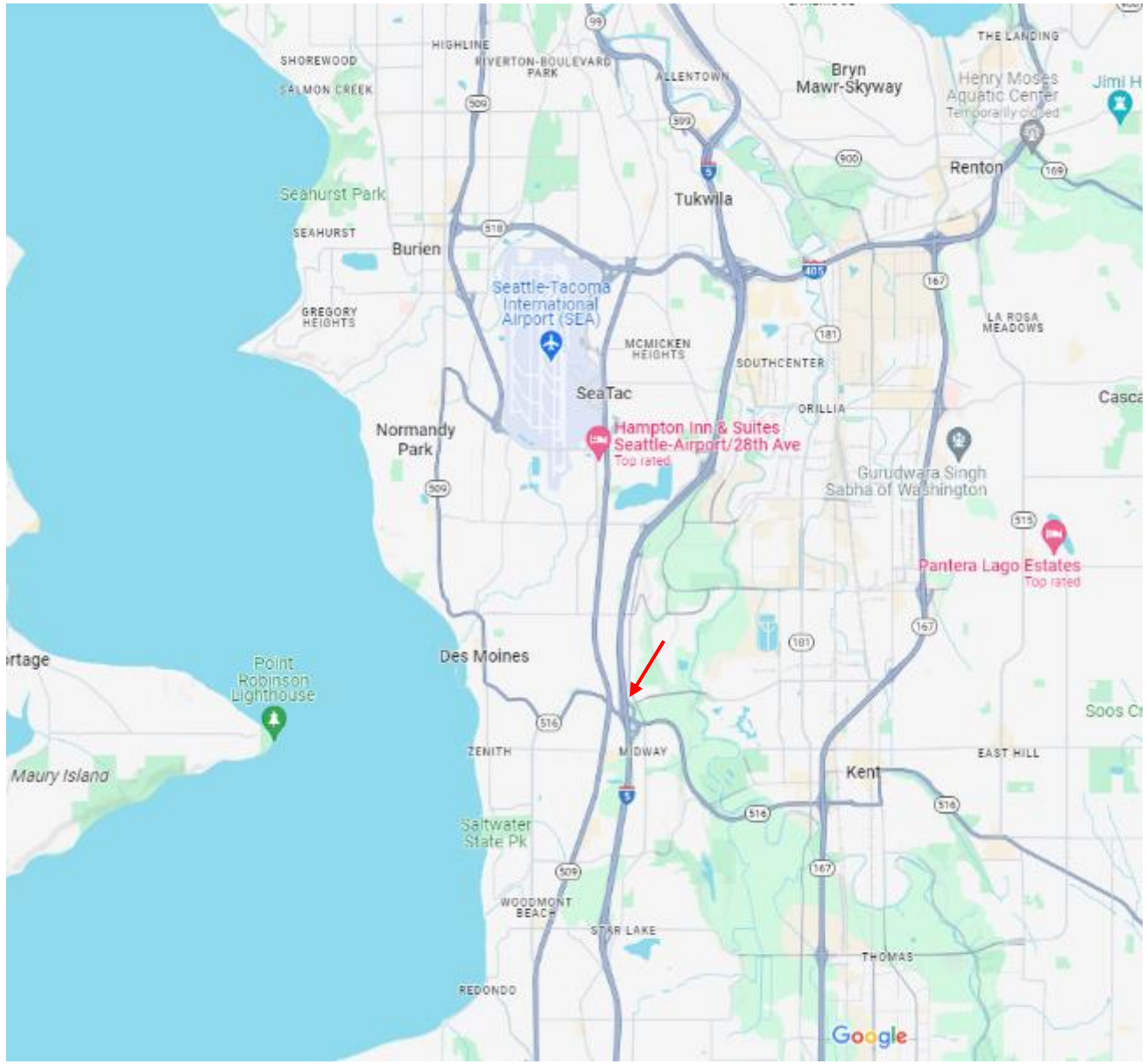
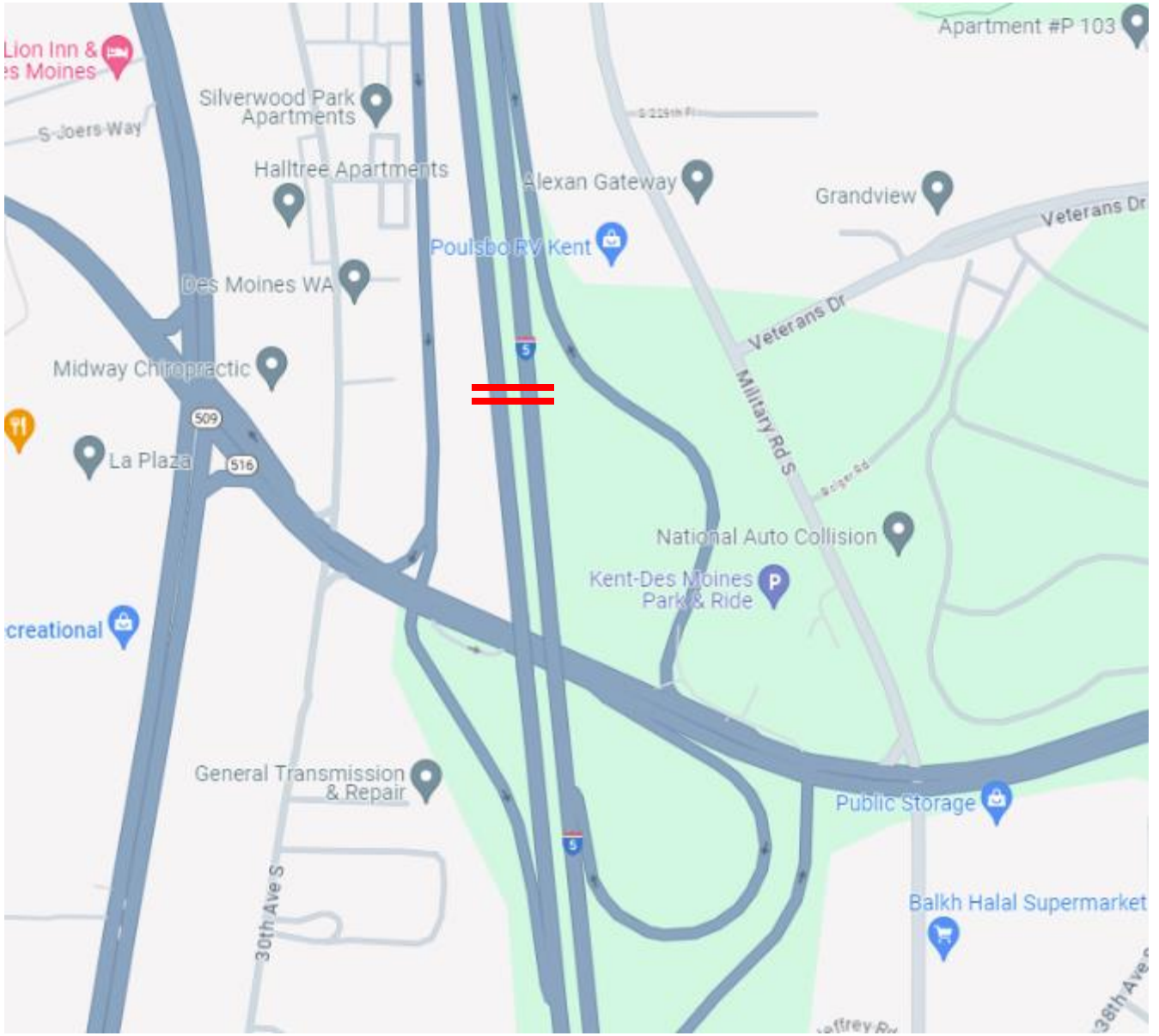
SR 509 Veterans Tunnels – Des Moines, Washington

- Design-Build Project south of Seattle
- New construction of Veterans Drive below I-5 (10 lanes)
- Non-Identical Side by Side Structures (EB & WB)
- Phased Construction
- Seismic Analysis
- Structural Fire Analysis



Project Scope

- EB & WB multi-lane roads with different inside clearance requirements (2 custom geometries)
- 10 drive lanes for I-5
- Phased construction (4 phases)
- Seismic racking analysis per WSDOT specifications
- 190 ft length required consideration of structural fire engineering analysis



TRB TRANSPORTATION RESEARCH BOARD

STRUCTURAL FIRE ENGINEERING ANALYSIS OF CORRUGATED STEEL BURIED BRIDGES

Shokoufeh Zargar
Project Consultant

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Project Director

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Senior Principal

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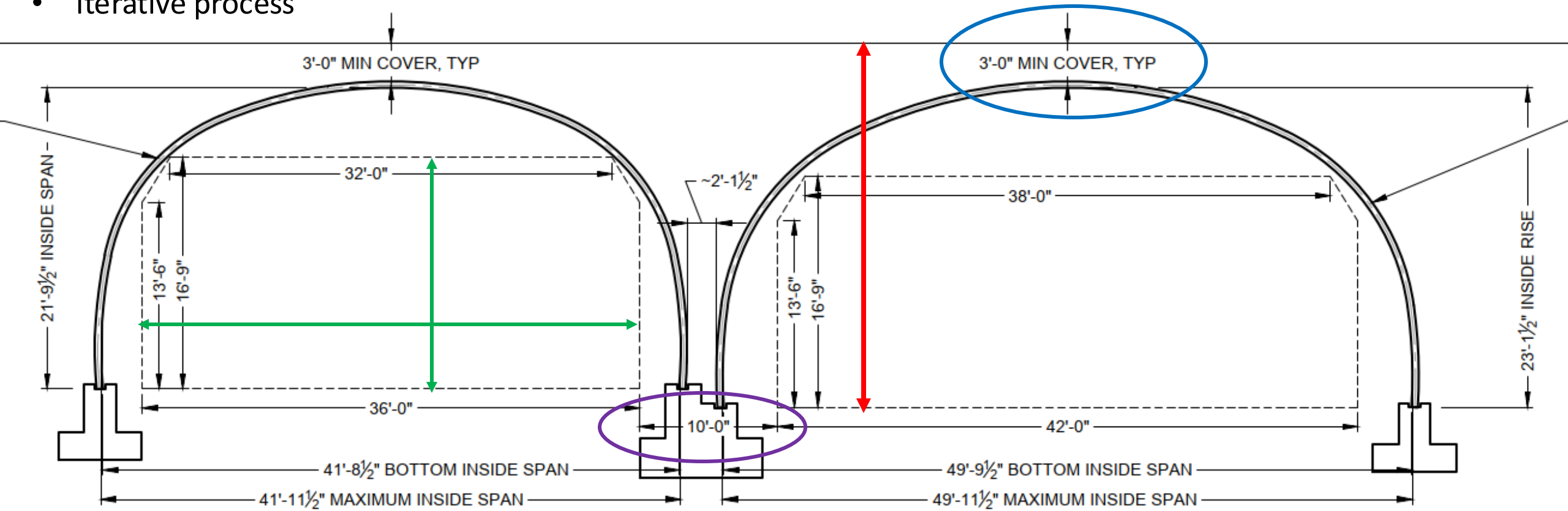
Senior Engineer

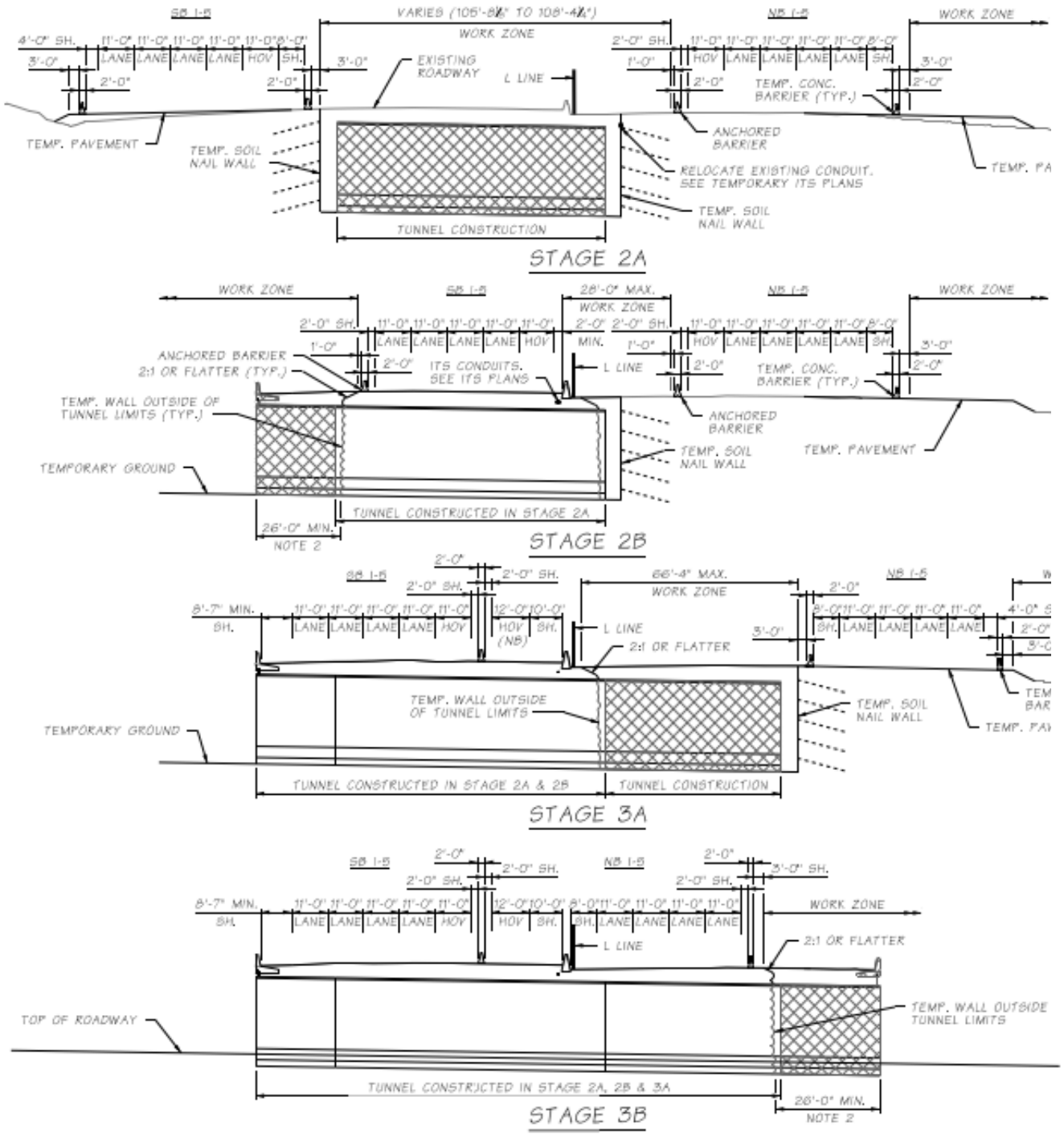
CONTECH® ENGINEERED SOLUTIONS

Solution Development, Phased Construction, and Design

Solution Development

- Inside clearance / size requirements
- Road alignment
- Spacing between structures
- Vertical limitations
- AASHTO cover requirements
- Iterative process





- Construction in 4 stages, maintaining 10 traffic lanes through every stage

- Stage 2A: Excavate in center & build temporary soil nail walls, assemble first section of structure. Build temporary MSE walls at both ends of structure.

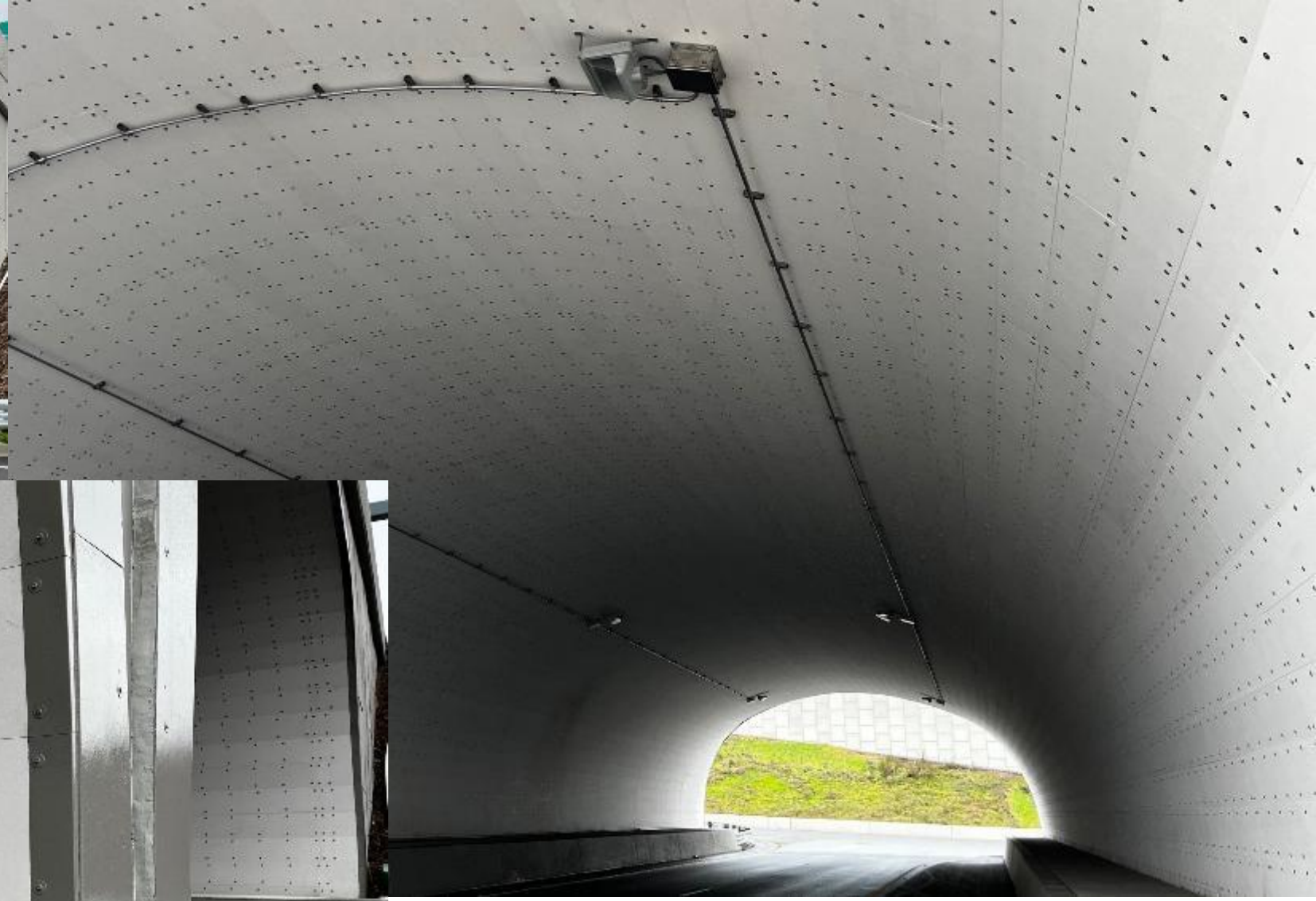
- Stage 2B: Shift SB traffic onto structure, excavate for installation of east end of structure, including permanent PCP MSE wall on west end.

- Stage 3A: Shift some NB traffic to completed section, extend structure to east, install temporary MSE wall.

- Stage 3B: Shift all traffic to completed section, finish east end of structure, build permanent PCP MSE wall on east end.

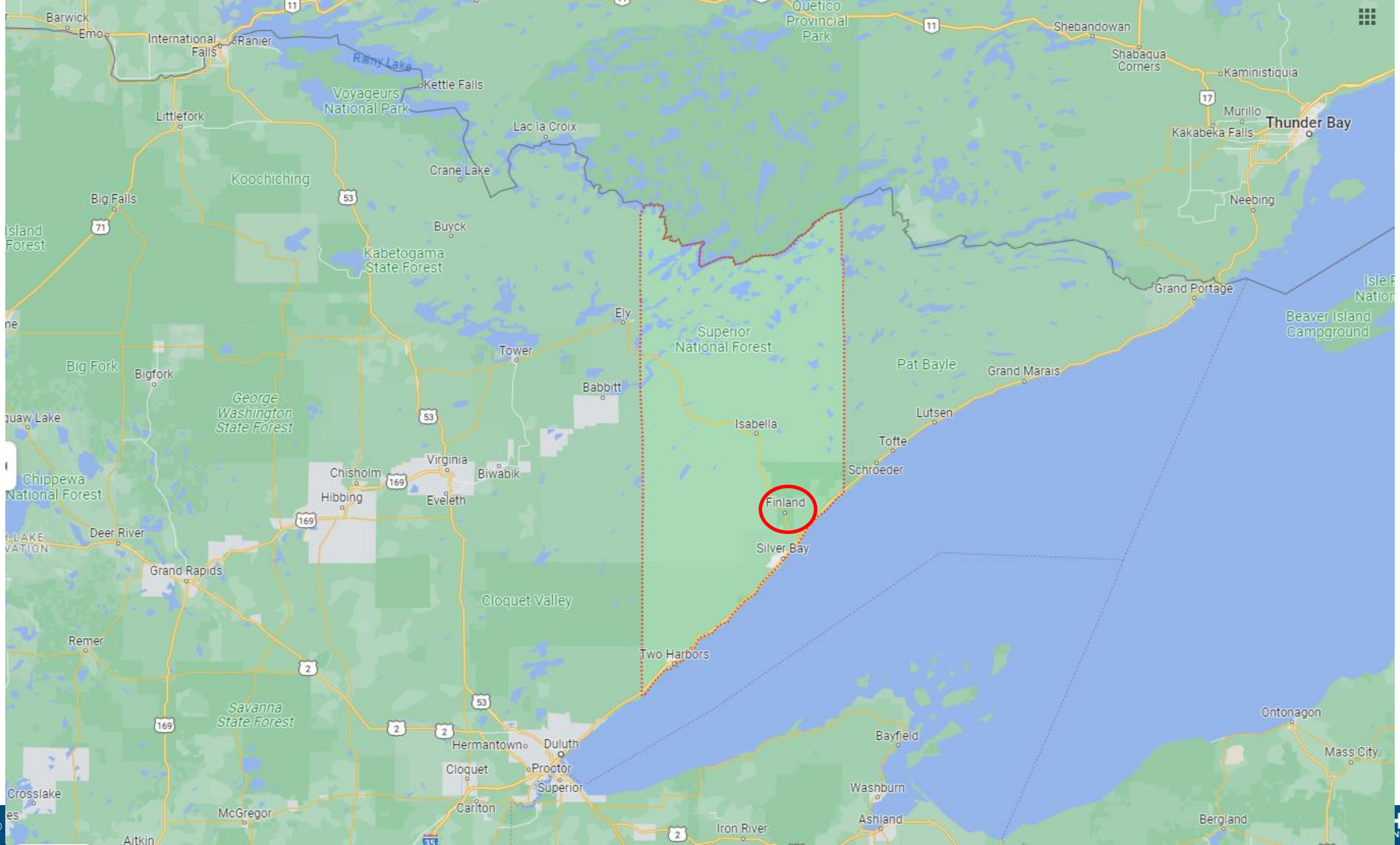

Genie GS-2669 RT


CAPITAL
KOMATSU
MHG
PC
290



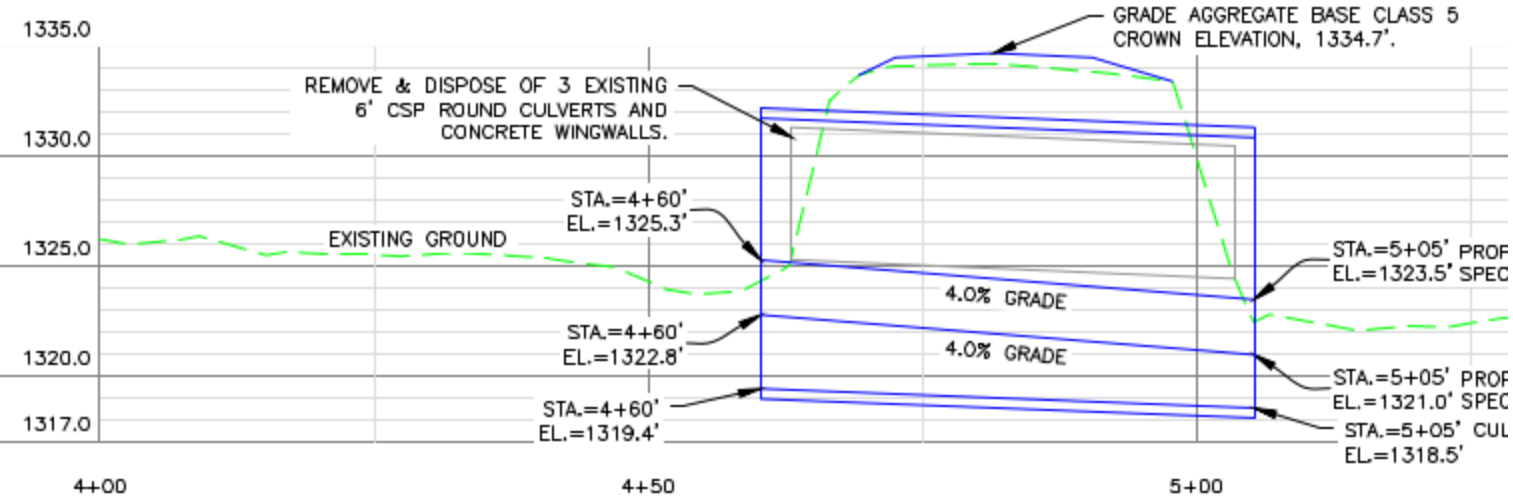
Hockamin Creek Culvert / AOP Replacements
Lake County, Minnesota

30’10 ” span x 12’4” rise Box Structure (Breezy Lane)
26’ span x 8’4” rise Low Profile Arch (Heffelfinger Road)

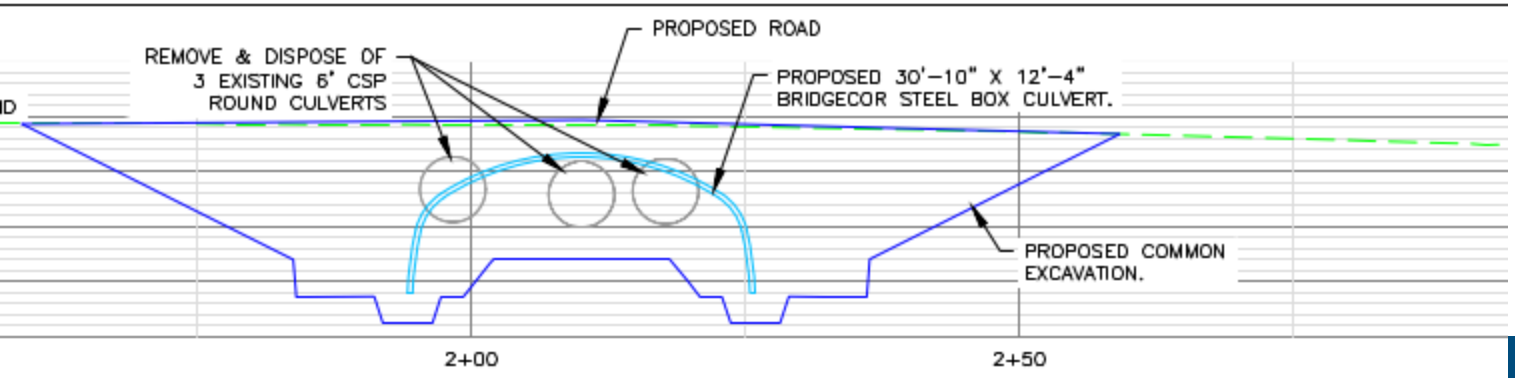

Barwick
Emo
International Falls
Ranier
Rainy Lake
Voyageurs National Park
Kettle Falls
Littlefork
Lac la Croix
Crane Lake
Koochiching
Big Falls
Buyck
Kabetogama State Forest
Island Forest
Ely
Tower
Superior National Forest
Big Fork
Bigfork
George Washington State Forest
Babbitt
Virginia
Biwabik
Chisholm
Hibbing
Eveleth
Chippewa National Forest
Deer River
Grand Rapids
Cloquet Valley
Remer
Savanna State Forest
Hermantown
Duluth
Proctor
Superior
Cloquet
Carlton
McGregor
Crosslake
Aitkin
Iron River
Ashland
Washburn
Bayfield
Two Harbors
Finland
Silver Bay
Isabella
Tofte
Schroeder
Lutsen
Grand Marais
Pat Bayle
Grand Portage
Beaver Island Campground
Neebing
Thunder Bay
Kakabeka Falls
Murillo
Kaministiquia
Shabaqua Corners
Shebandowan
Quetico Provincial Park
Ontonagon
Mass City
Bergland

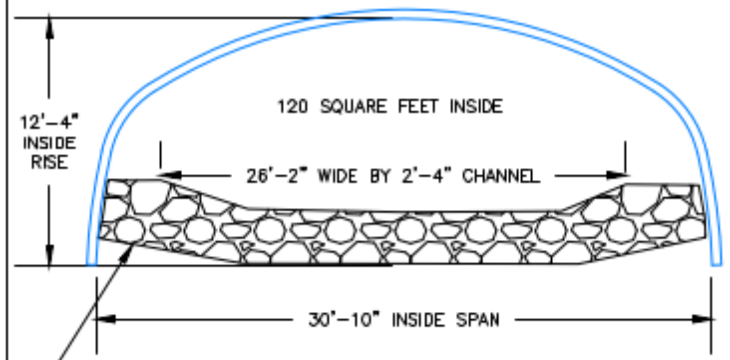
Breezy Point Lane

- Replace 3 culverts
- Maintain existing road grade
- Flexible foundations extended to frost depth
- Sloped grades to eliminate need for headwalls



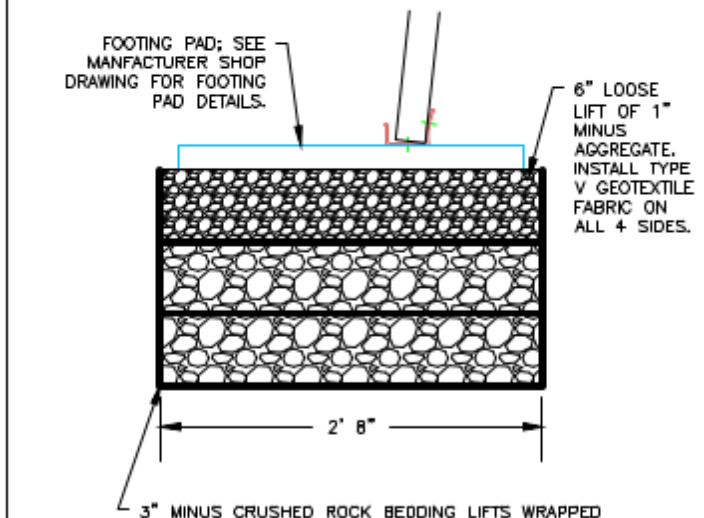
PROFILE OF HOCKAMIN CREEK THALWEG (2:
NOT TO SCALE





MEDIUM PROFILE STRUCTURAL PLATE ARCH
NOT TO SCALE

INSTALL RANDOM RIPRAP CLASS SPECIAL
(NATURAL BOTTOM CULVERT FILL MIX)
AT A 2.5' DEPTH WITH MINIMUM 3:1 SIDE SLOPES.
RIPRAP MIX SHALL BE A BLEND OF 50% MNDOT CLASS IV RIPRAP,
40% MNDOT CLASS I RIPRAP,
10% MNDOT 3142.9H COARSE FILTER AGGREGATE



FOOTING PAD BEDDING DETAIL
NOT TO SCALE

Breezy Lane

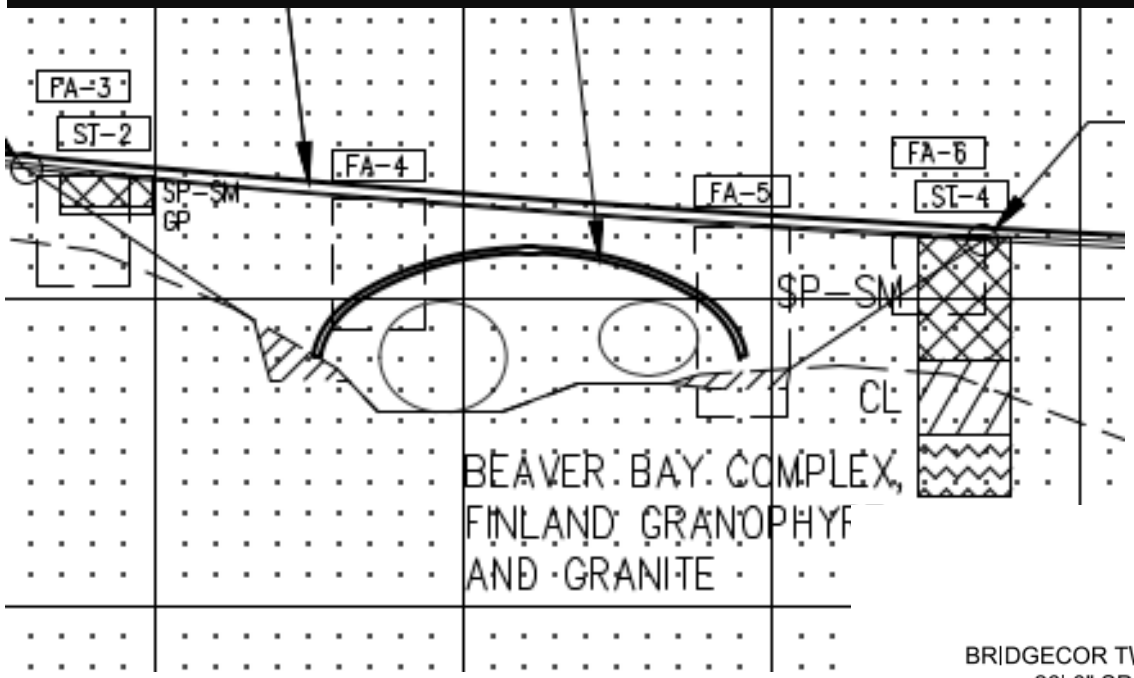
Breezy Lane

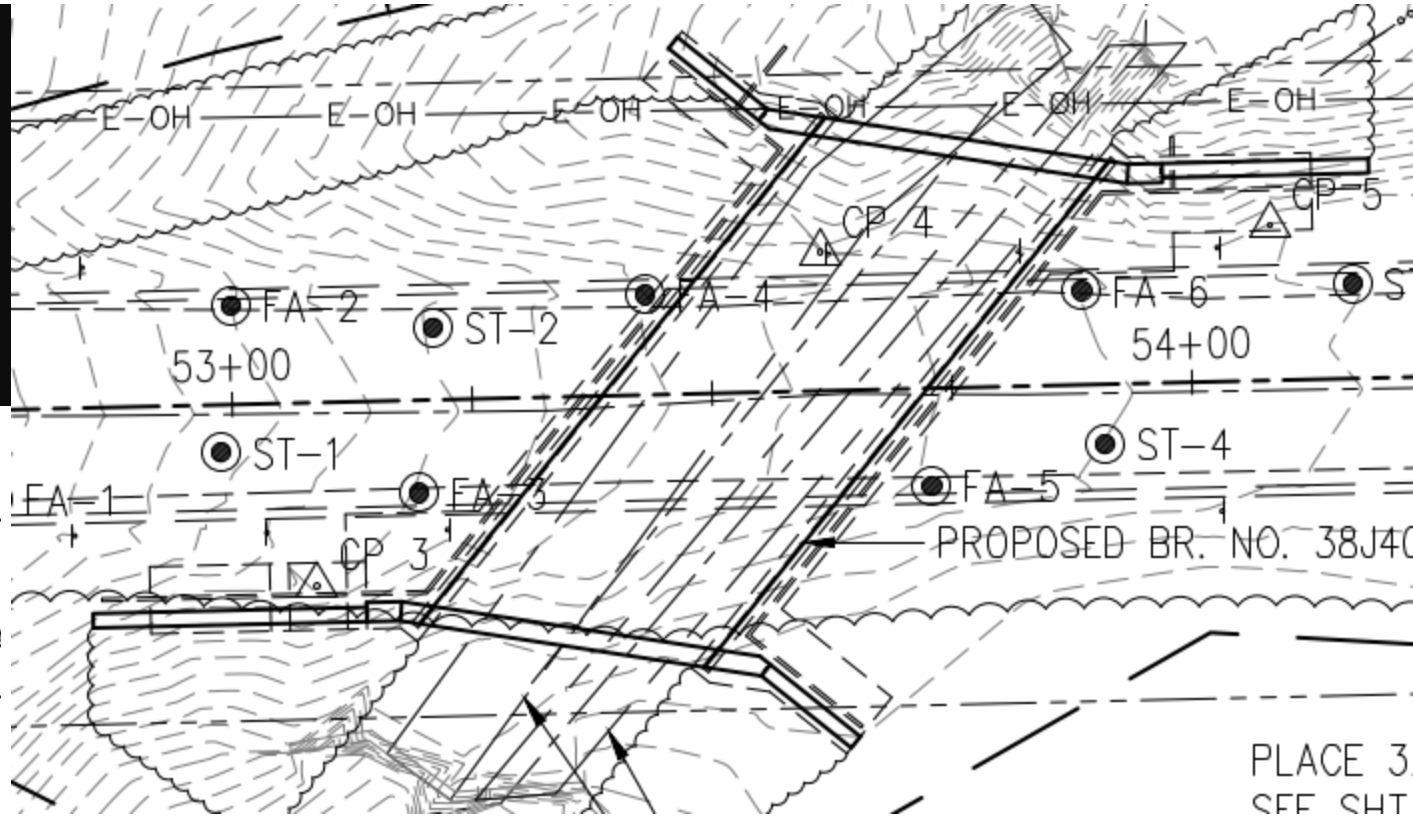
Breezy Lane

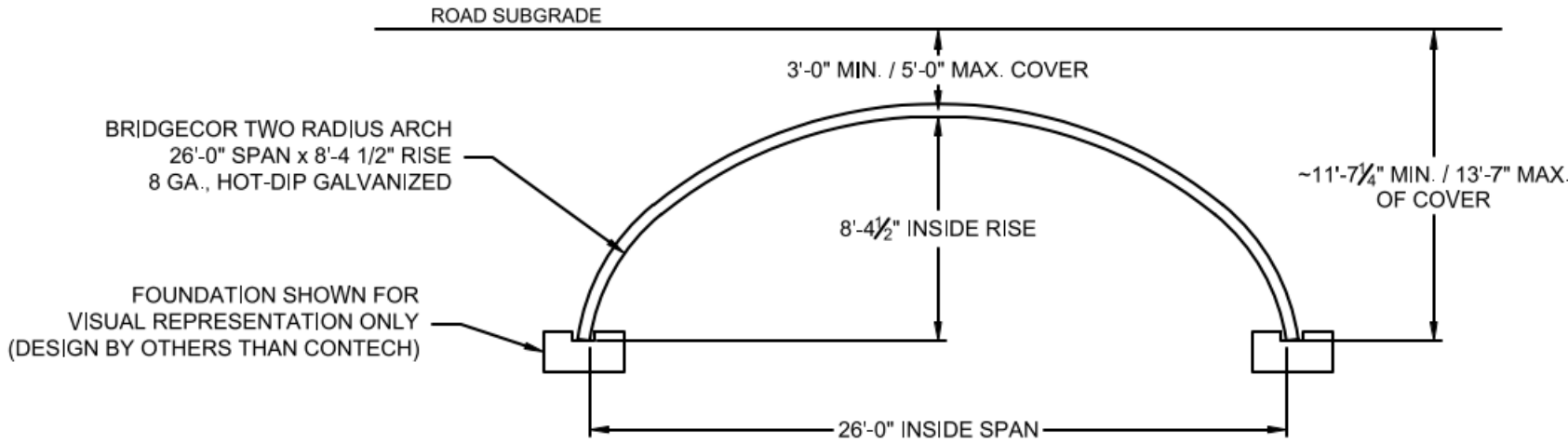
Breezy Lane

Hefflefinger Road

- Replace 2 culverts
- Raise road grade
- Skewed alignment with road grade
- Concrete headwalls to limit structure footprint & maintain stream alignment



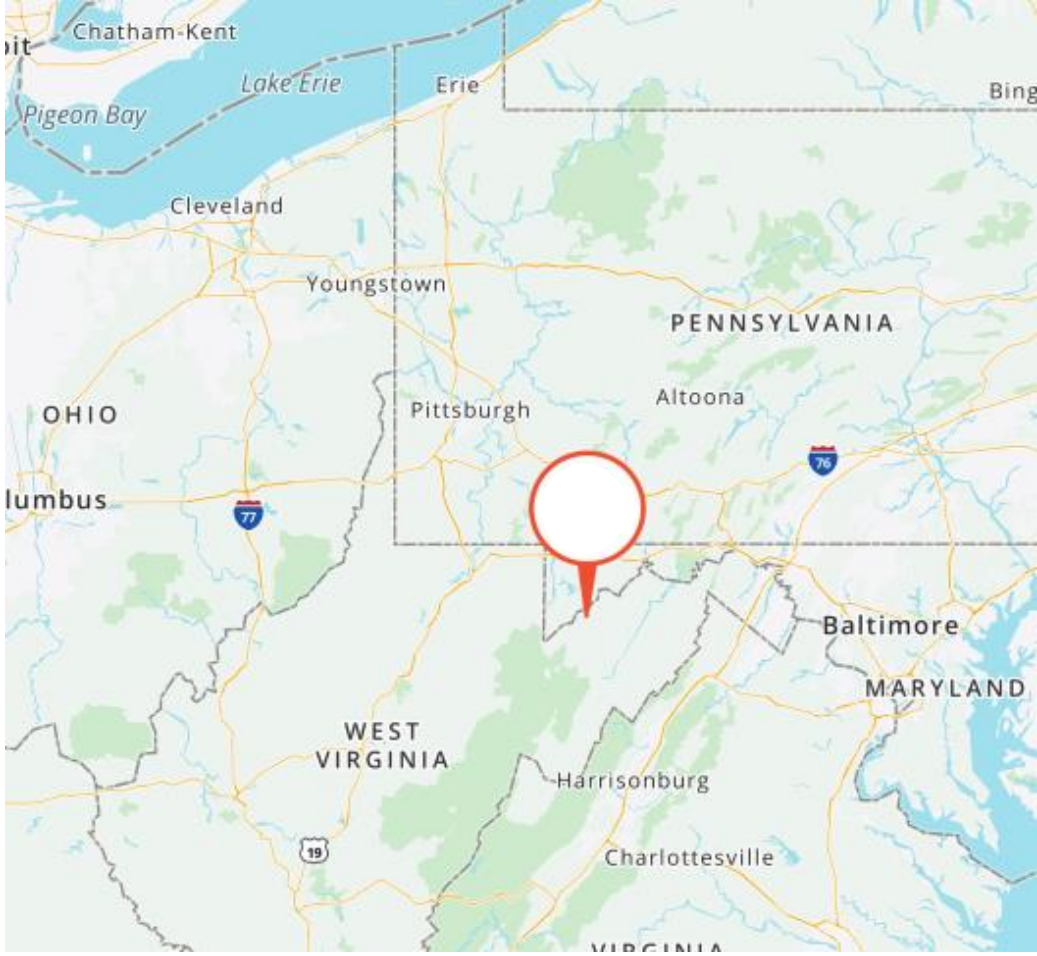




Hefflefinger Road

Hefflefinger Road

Hefflefinger Road



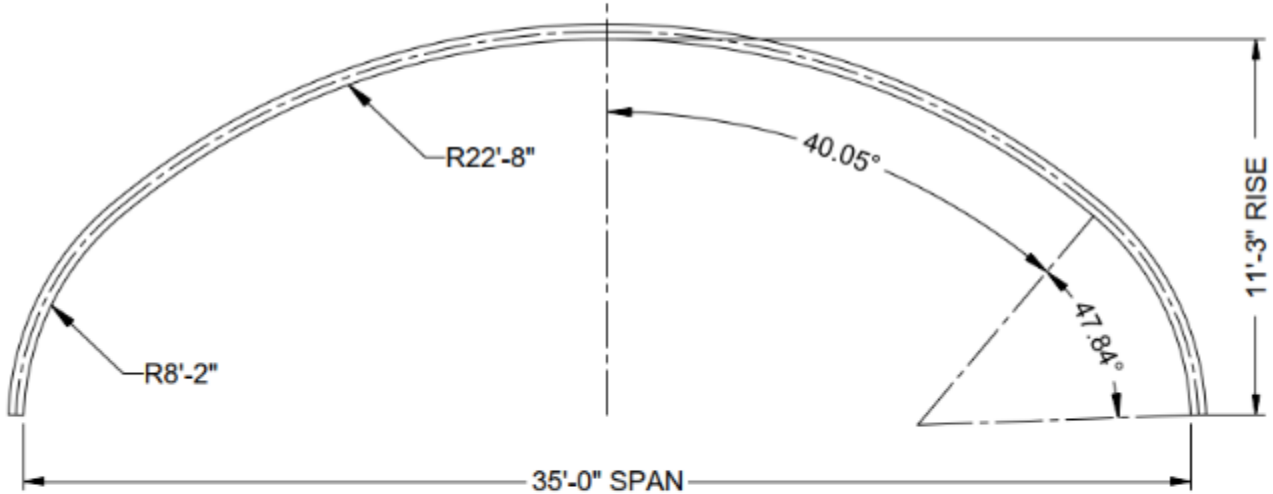
Shallmar road over Wolf Den Run

Garrett County, MD

Shallmar road over Wolf Den Run

- Restricted site access – minimal laydown area and utility conflicts
- Must accommodate existing gas line and future utilities
- To be installed by county bridge crews

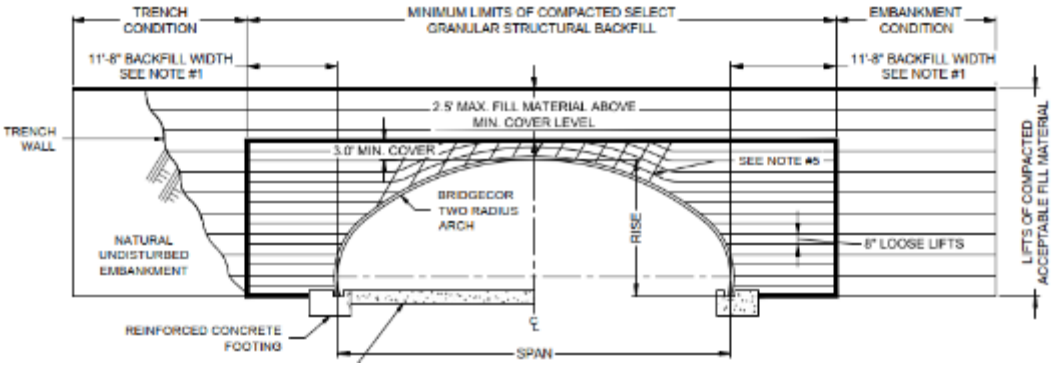
BRIDGECOR TWO RADIUS ARCH
TROUT UNLIMITED SHALLMAR ROAD
KITZMILLER, MD



BRIDGECOR TWO RADIUS ARCH
35'-0" SPAN x 11'-3" RISE

PLATE MAKE UP: 1 @11 S, 1 @13 S, 1 @10 S


690E


TRENCH CONDITION
MINIMUM LIMITS OF COMPACTED SELECT GRANULAR STRUCTURAL BACKFILL
EMBANKMENT CONDITION
11'-8" BACKFILL WIDTH SEE NOTE #1
11'-8" BACKFILL WIDTH SEE NOTE #1
2.5' MAX. FILL MATERIAL ABOVE MIN. COVER LEVEL
TRENCH WALL
3.0' MIN. COVER
SEE NOTE #5
BRIDGECOR TWO RADIUS ARCH
RISE
8" LOOSE LIFTS
NATURAL UNDISTURBED EMBANKMENT
LIFTS OF COMPACTED ACCEPTABLE FILL MATERIAL
REINFORCED CONCRETE FOOTING
℄
SPAN

Thank You!

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