



Innovative Bridge Designs – Buried Bridges

Steel Bridge Essentials – 6 Part Summer Webinar Series

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Chair of TRB AKB70-1



Buried Bridge Design Innovations - Outline

- Design standards in AASHTO LRFD Bridge Design Specifications Section 12.8.9
 - Buried Bridges are not proprietary – all info needed for design, manufacturing, & construction is available in ASTM & AASHTO standards.
 - Design involves Finite Element Analysis with inputs for foundation & site soils, backfill, structure shape & material properties, and loading conditions.
 - Design innovation happens on almost every project - Most innovations are driven by developing custom geometries to meet project specific clearance requirements & site limitations and optimizing to best fit site & loading conditions.
 - Many project innovations occur after design when working with contractors to address construction challenges
- Innovations to accommodate modular construction
 - Pre-assembly of large sections of structure, setting on foundation, and connecting sections to each other
 - Limited space for material staging & equipment
 - Limited access to inside of structure
 - Time limitations for road / track closure
 - Size of modules is driven by lifting equipment capacity & site constraints

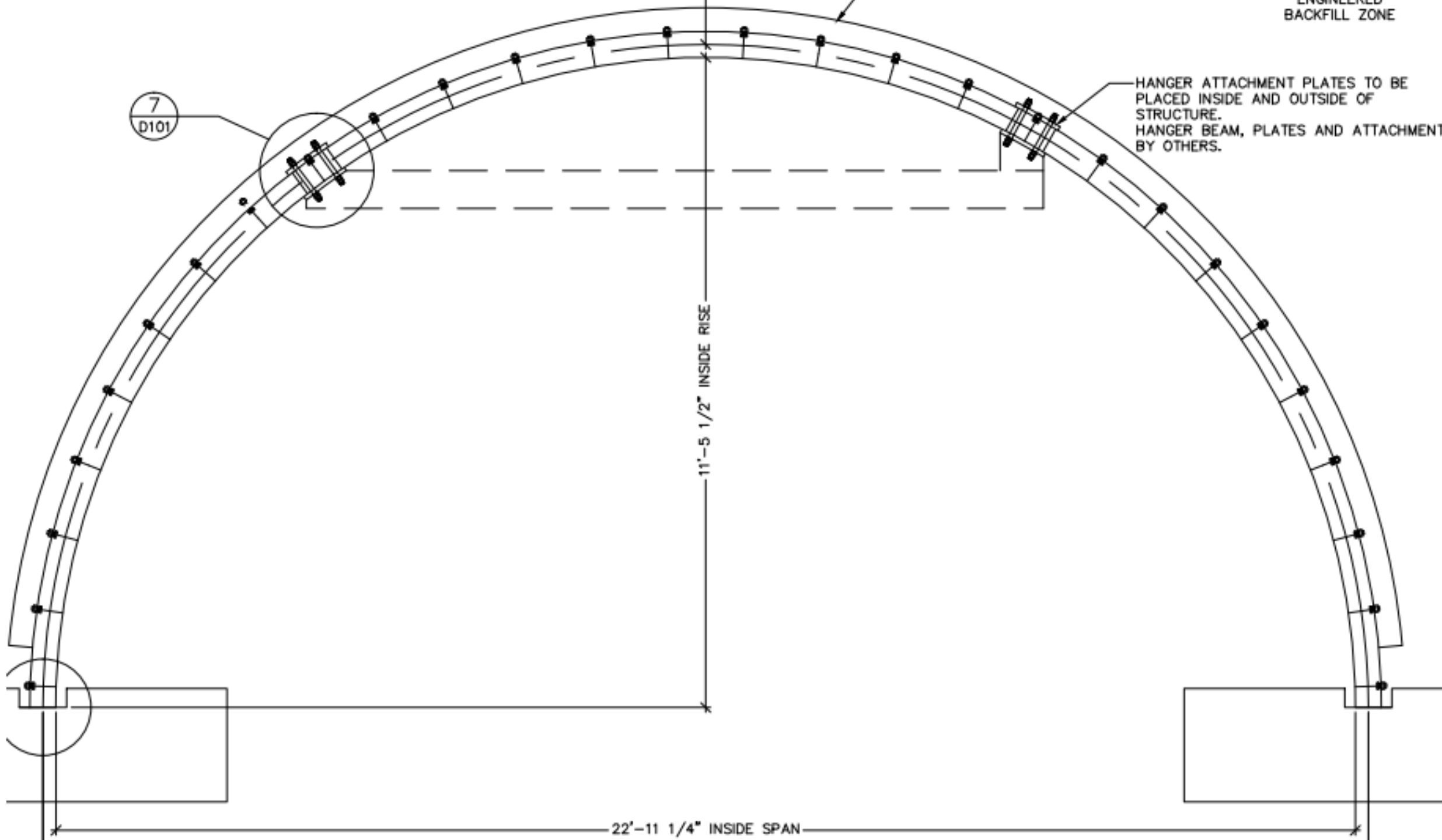
M5 Conveyor Cover South Jordan, Utah

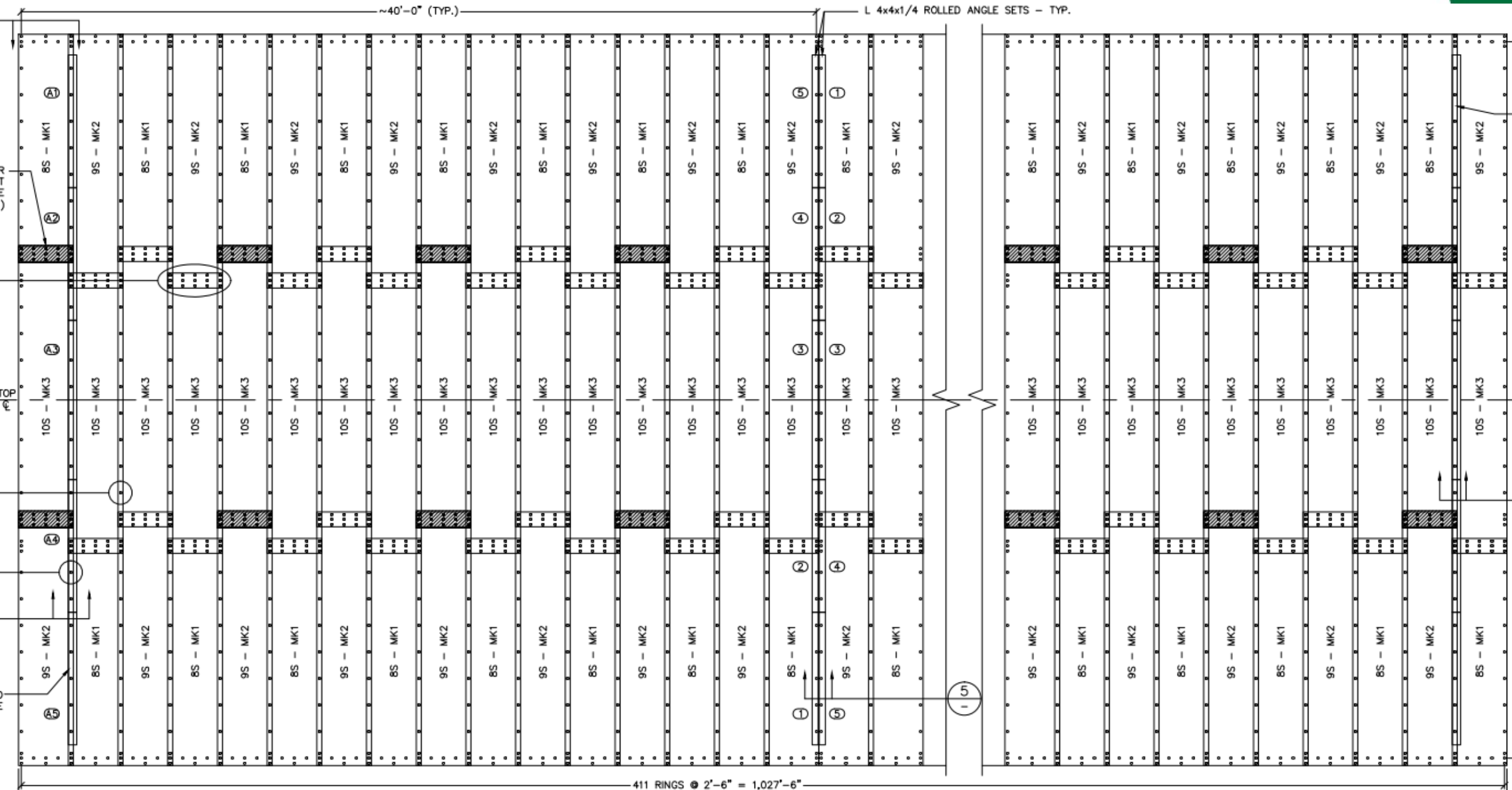
23' span x 11.5' rise single radius arch & 32.2' span x 19.9' rise Dual Radius Arch (~1200 ft combined length)

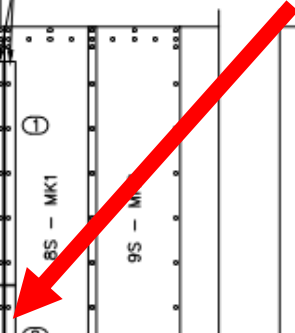
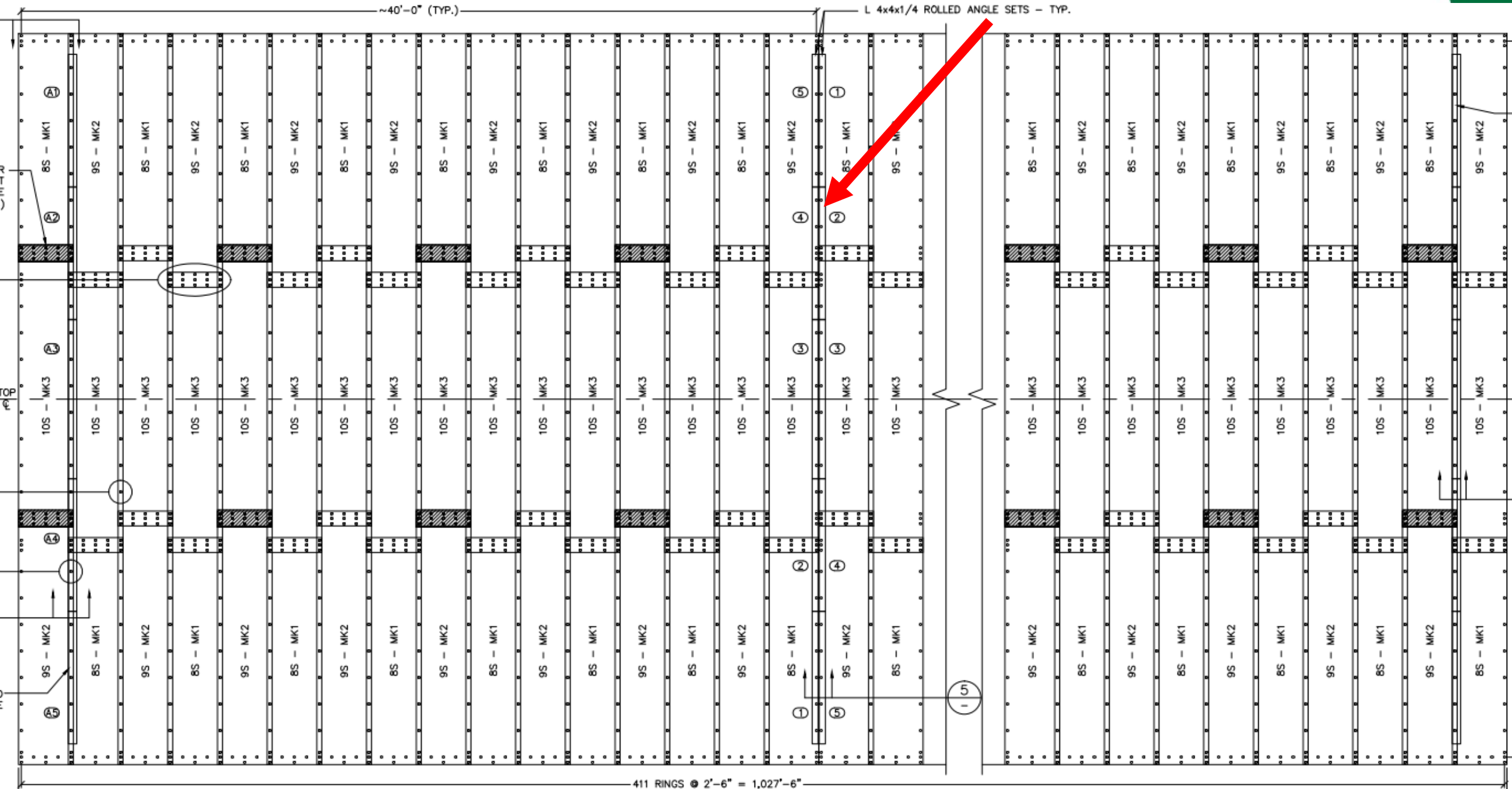
- Cover for active conveyor to allow for access to new mining area
- High cost to disruption or halting of conveyor operation
- Design for 4 million lbs mining shovel
- Built in 20', 25', and 40' sections (two different structure geometries) and transported ~1 mile to project location
- Modules connected from outside using a rolled angle flange connection
- Modular section weights ~24,000 – 30,000 lbs



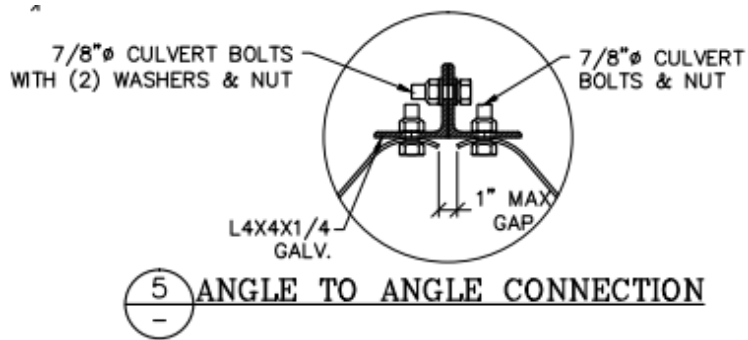
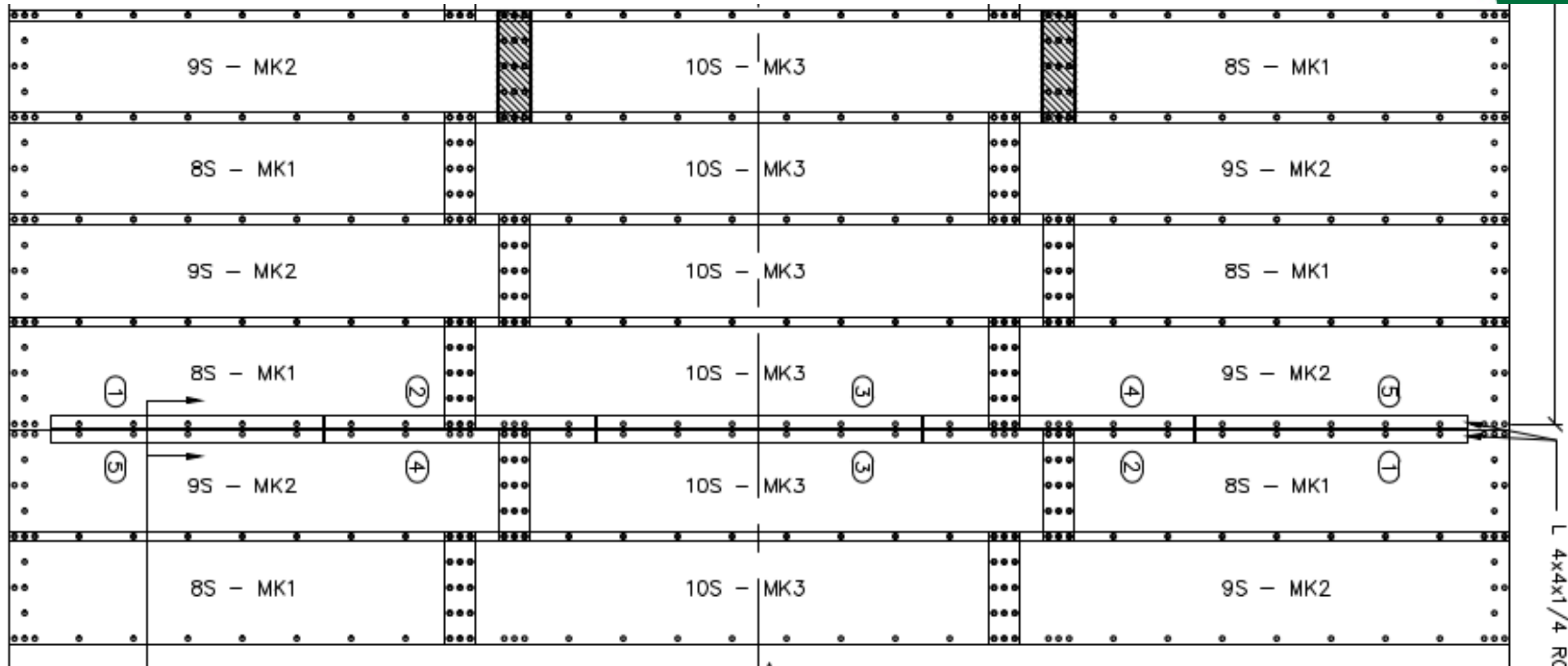








411 RINGS @ 2'-6" = 1,027'-6"
OUT TO OUT STEEL = ~1,036'-1"









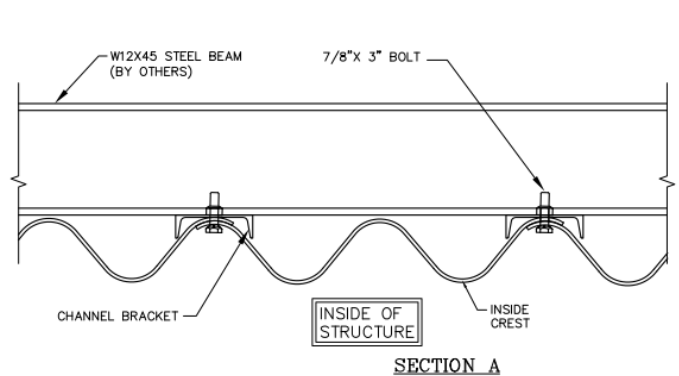
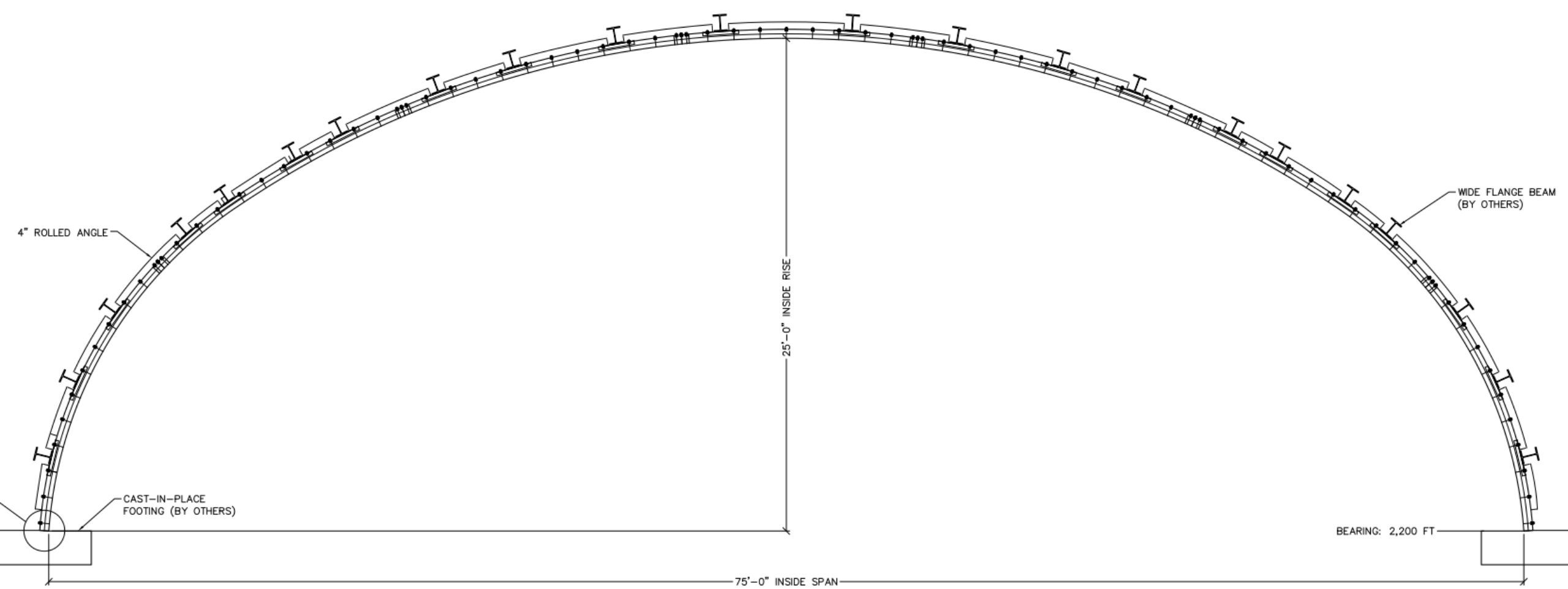


Captain William Henry Moore Bridge Skagway, Alaska

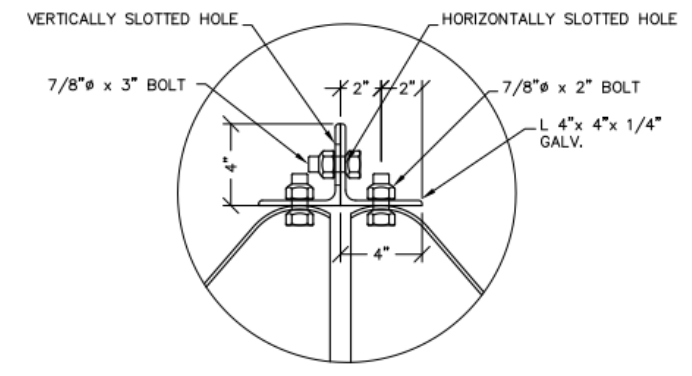
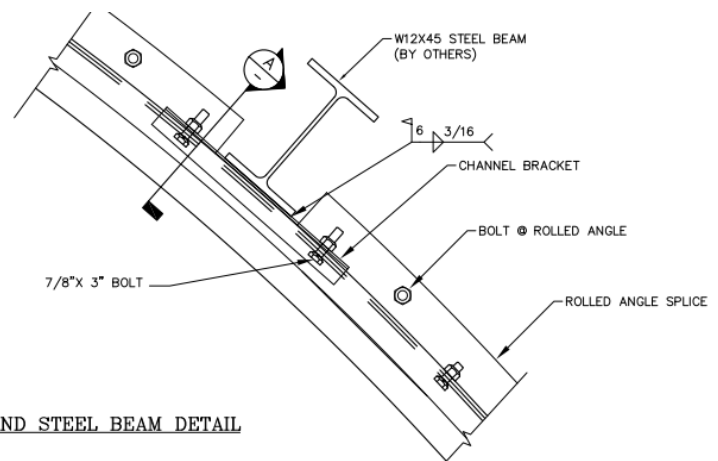
- Replacement for suspension bridge unable to support mining equipment loads
- Crossing deep ravine - ~100' from bottom of structure to top of road
- 18° skewed ends needed because of site constraints
- Backfilled with roller compacted concrete
- Assembled on foundation in 3 pieces

75' span x 25' rise Dual Radius Arch



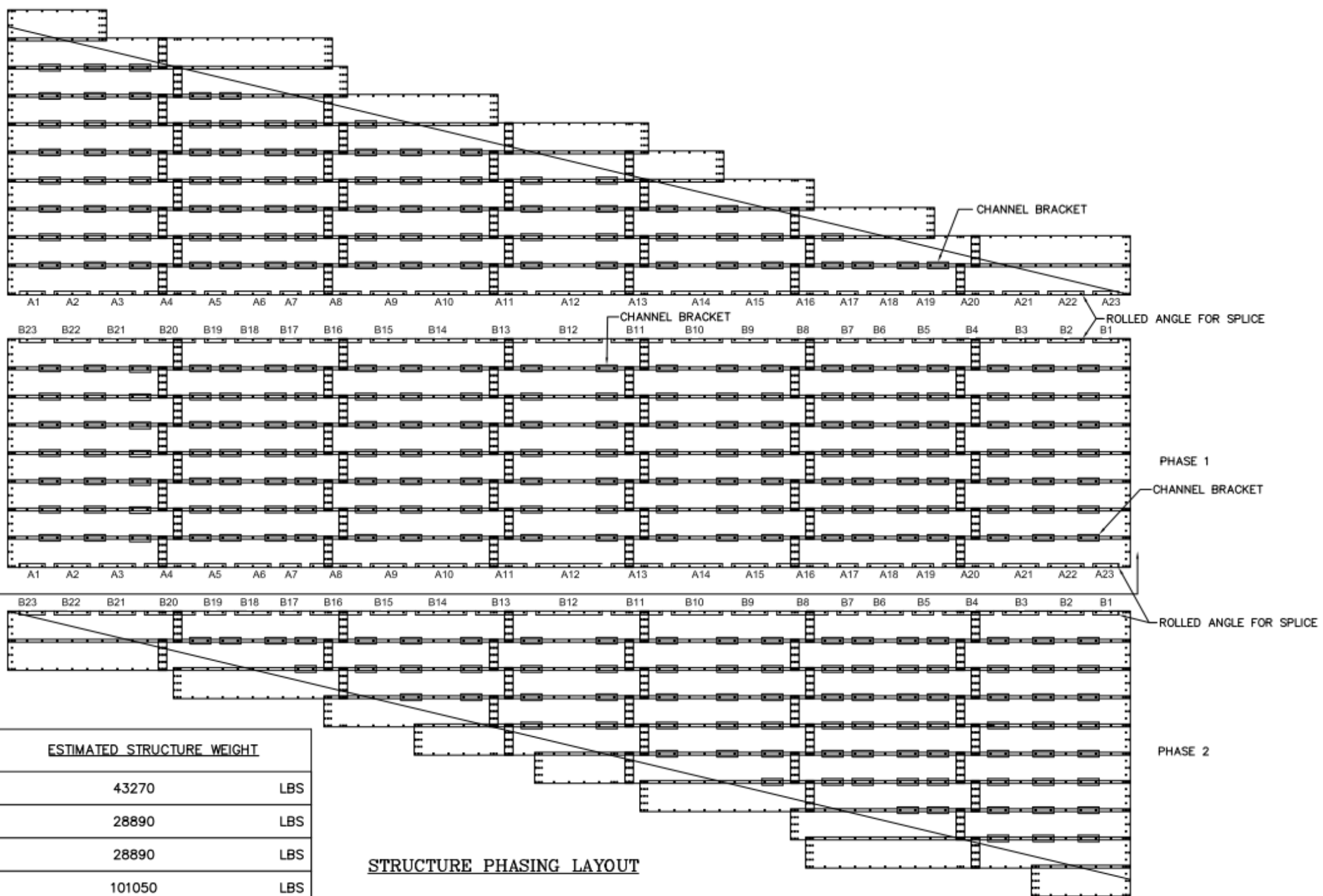


8 CHANNEL BRACKET AND STEEL BEAM DETAIL
S104



5 PLATE ANGLE CONNECTION DETAIL
S103

PHASE 3



PHASE	ESTIMATED STRUCTURE WEIGHT	
1	43270	LBS
2	28890	LBS
3	28890	LBS
TOTAL WEIGHT:	101050	LBS

STRUCTURE PHASING LAYOUT



















Thank You!

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