



I15 Capitol/Cedar Interchange

Steel Bridge Essentials

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Acknowledgements:



Montana Department of Transportation



Federal Highway Administration



Montana Rail Link (MRL)



City of Helena



HDR



Tetra Tech



Sletten Construction

Special thanks to Stephanie Brandenberger, PE, MDT Bridge Engineer, for her contributions to the presentation.

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Front-End Planning Reduces Risk During Construction



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Site Description

- Helena, MT
- Between Capitol & Cedar Street
- Steep grades
- High traffic volumes and weaving

Existing Bridge Crosses

- MRL Rail yard - 14 tracks
- Boulder Avenue

Project Purpose

- Increase Capacity – Need 3 lanes
- Improve Safety – High crash rate
- Replace Bridges



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Project Challenges:

- Railroad



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Project Challenges:

- Railroad
- Maintenance of Traffic



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Project Challenges:

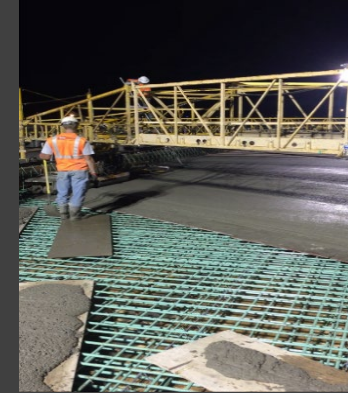
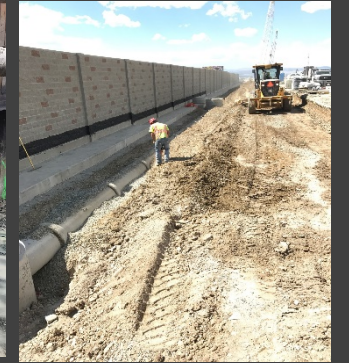
- Railroad
- Maintenance of Traffic
- Winter Shutdown



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Project Challenges:

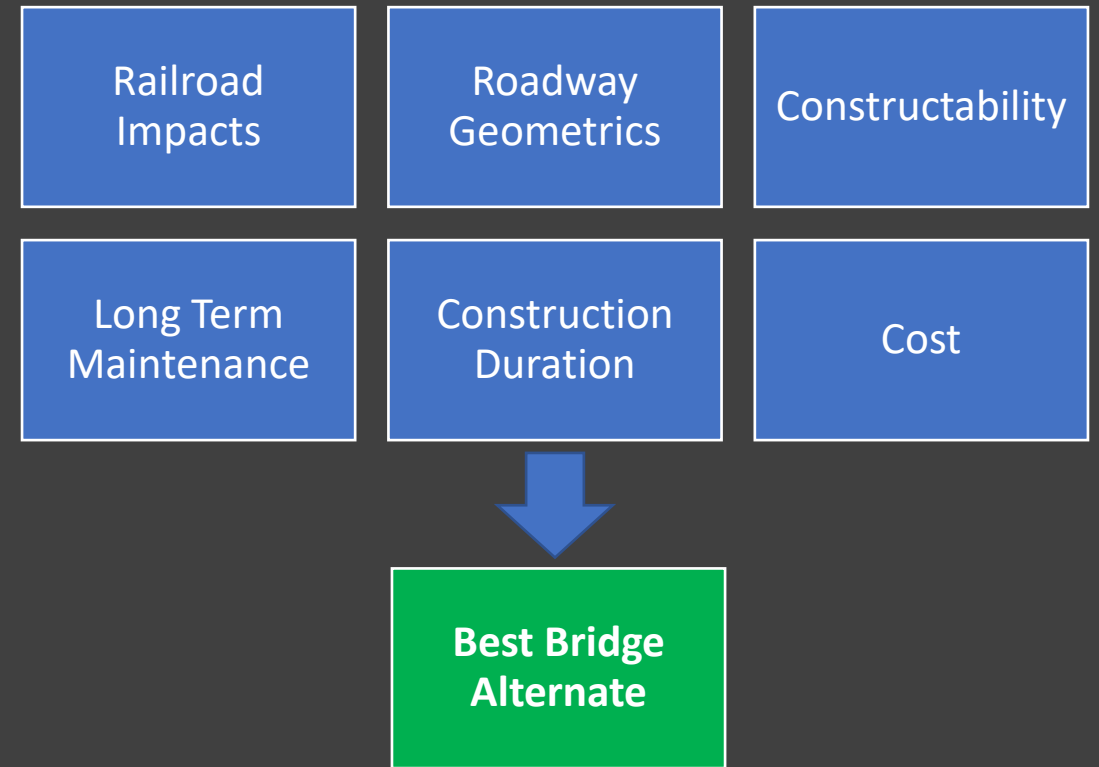
- Railroad
- Maintenance of Traffic
- Winter Shutdown
- Right of Way
- Storm water challenges
- Noise
- Utilities
- City coordination
- Seismic & Geotechnical Issues
- Oversized loads
- Contaminated soils
- State Capitol



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Selecting the Right Bridge Type:

- Comprehensive evaluation of bridge types, risks, and cost.
- Developed set of criteria to evaluate bridge options.
- Phase 1: Initial screening of 23 bridge options
- Phase 2: Detailed evaluation of 6 probable options
- Long Span vs. Short Span options
- Two options prevailed:
 - ❖ Spliced PS/PT Concrete Girder
 - ❖ Welded Steel Plate Girder



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Risk Management & Upfront Planning

Railroad Coordination

- Develop a partnership with MRL early in project development
- Understand Railroad Operations
- Determine Construction Constraints
- Reduced Risk by predetermining requirements during the design phase.



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Risk Management & Upfront Planning

Bridge Foundations

- Bridge foundation construction was a critical element.
- Early Geotechnical Recommendations needed to appropriately evaluate bridge alternatives.
- Pile Capacity Testing during the Design Phase - \$3M project cost savings.



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Risk Management & Upfront Planning

Construction Sequencing & Estimating

- Maintenance of Traffic – Need to build one bridge in a single season
- Detailed review of construction sequencing and scheduling.
- Production Based Cost Estimating



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Conclusions

- Total Project Cost = \$32M
- Bids were within 1% of each other
- Total weight of structural steel = 2,000 tons
- Steel Price ~ \$1.10/ lb
- Early investments to mitigate risk resulted in successful construction.

