

A wide river flows under a concrete bridge. The background is filled with lush green trees under a blue sky with light clouds. The water is calm with some ripples. The bridge has two visible piers. The overall scene is a natural landscape with a man-made structure.

River Channel Mitigation

Client: Keokuk County
University of Iowa

QCC Project Team



Corey O'Brien, Editor



Quinn Conroy, Project Manager



Charles Nash, Tech Support

Presentation Outline

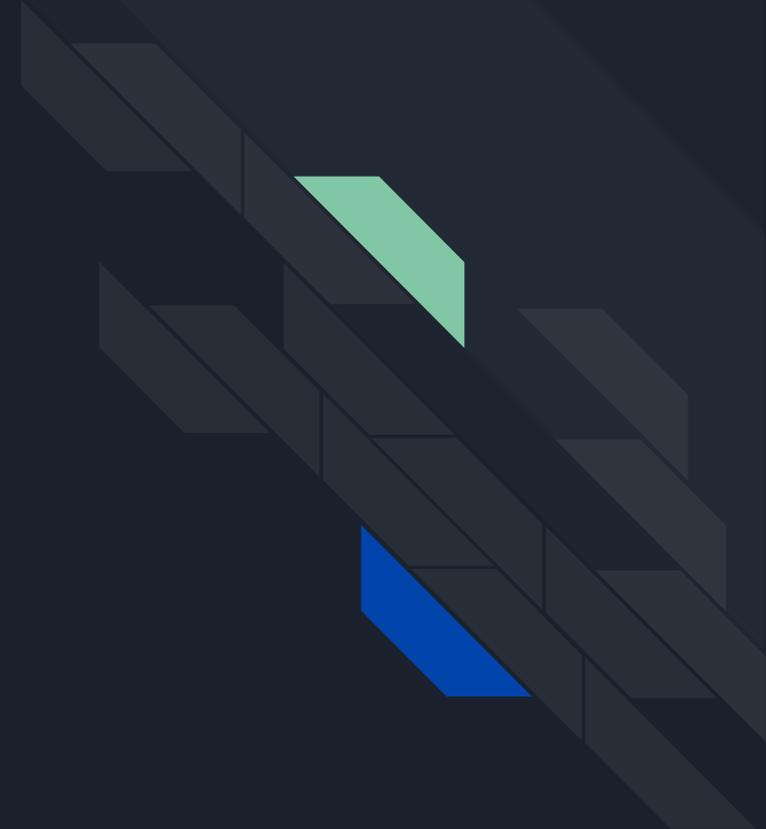
Scope of the Project

River Forecast

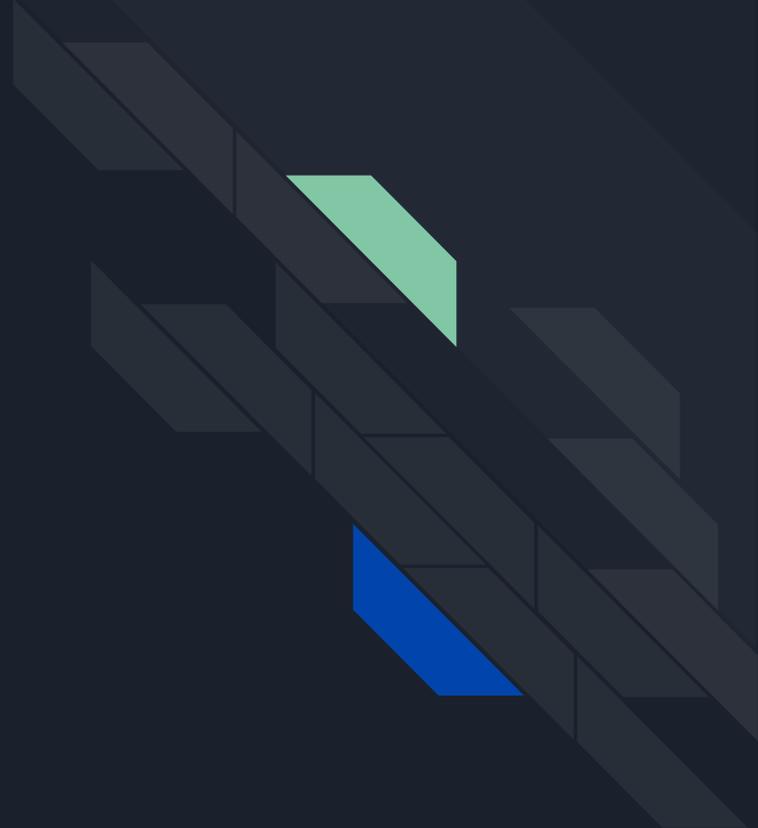
Considered Designs

Final Design

Cost Estimate

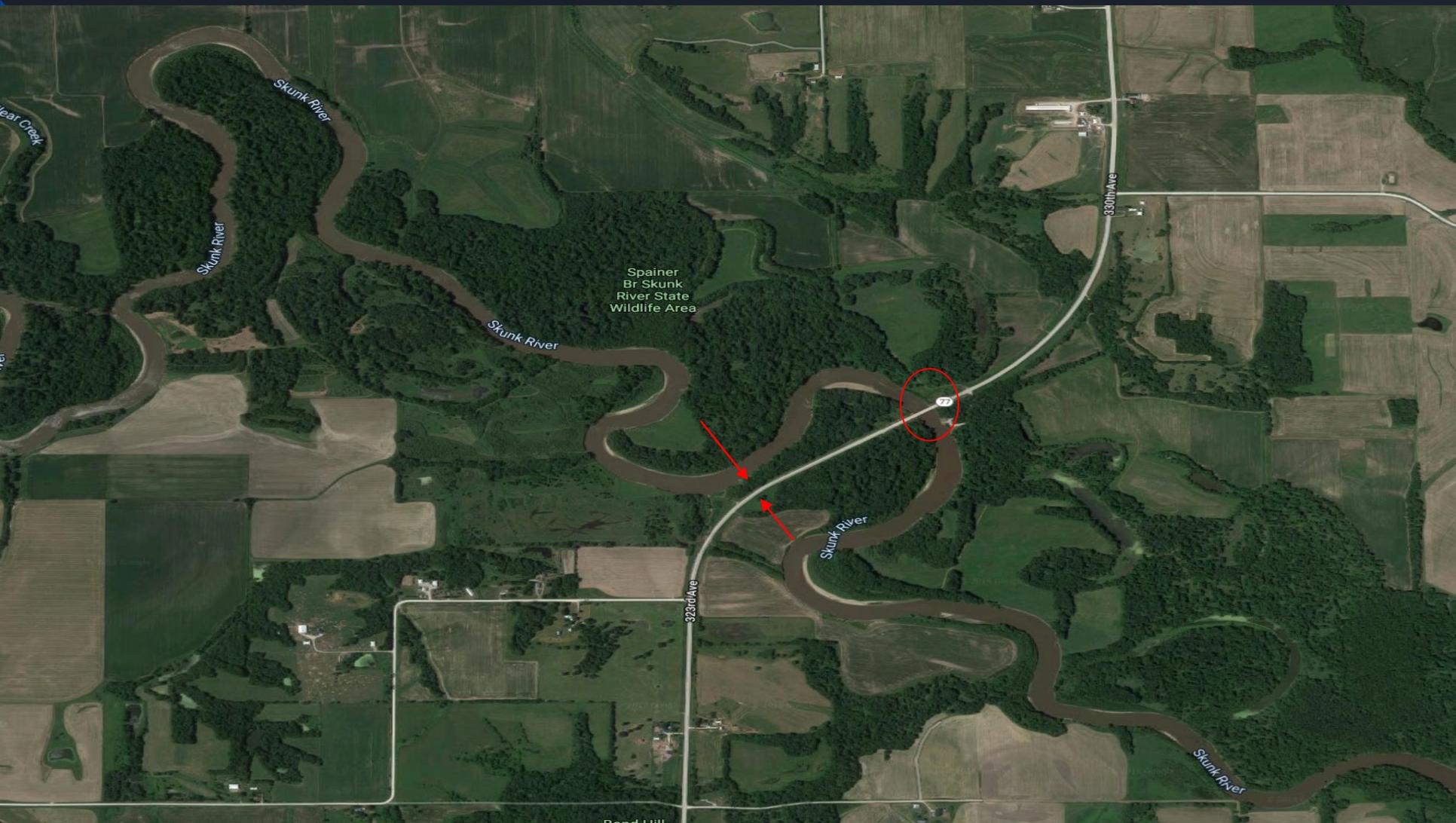


Scope of the Project



Site Location





Skunk River

Skunk River

Skunk River

Spainer
Br Skunk
River State
Wildlife Area

Skunk River

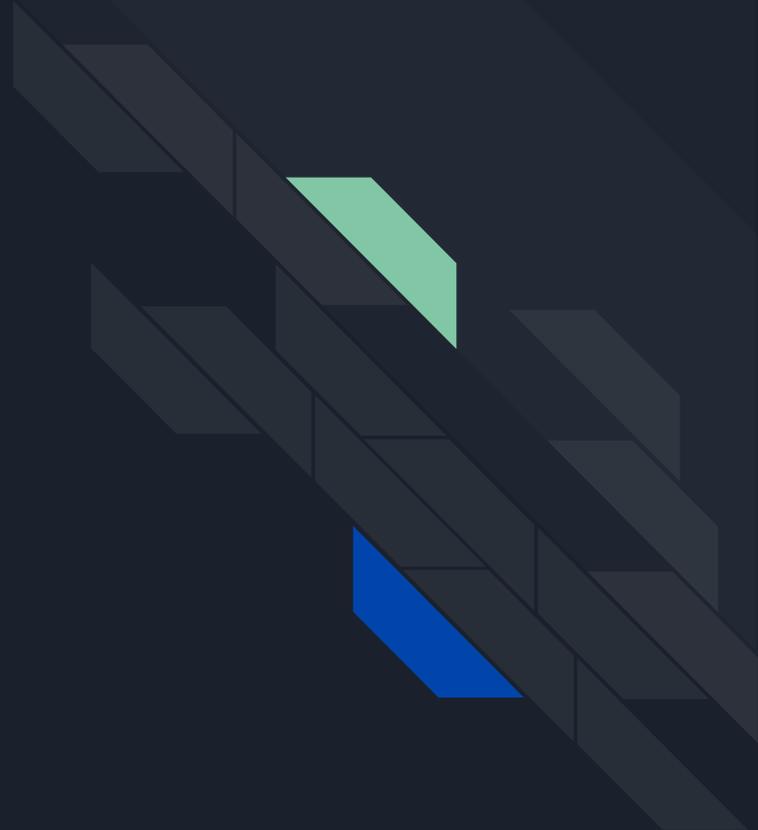
Skunk River

330th Ave

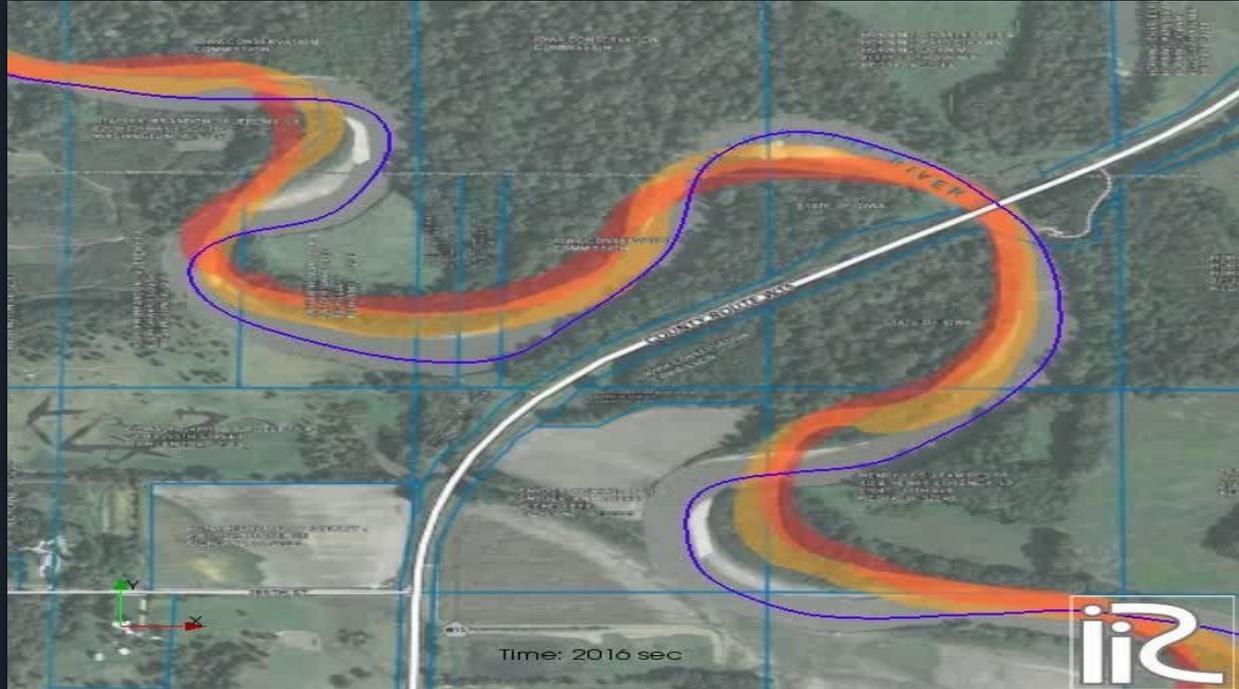
323rd Ave



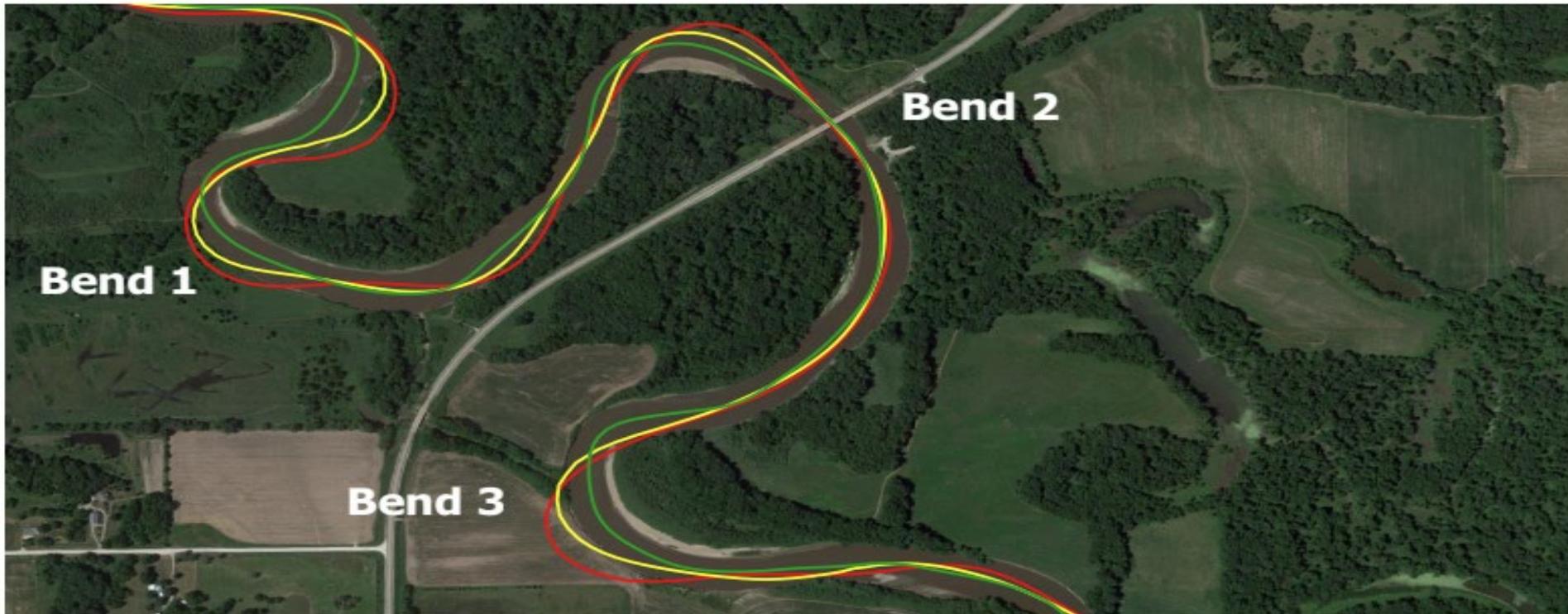
River Forecast



Forecasting River Meander Migration



50 Year Forecast

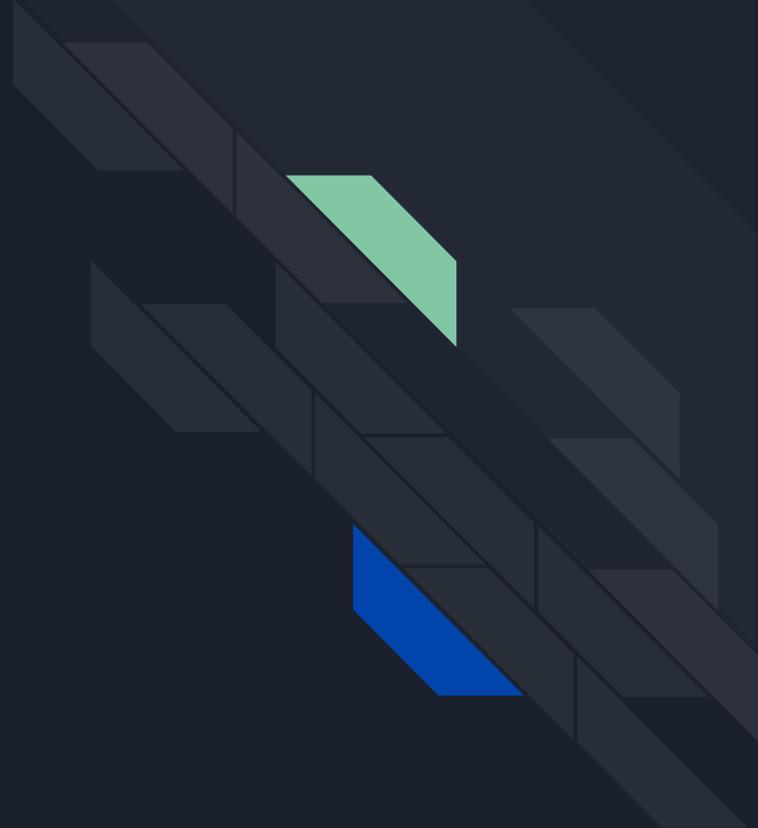


Legend

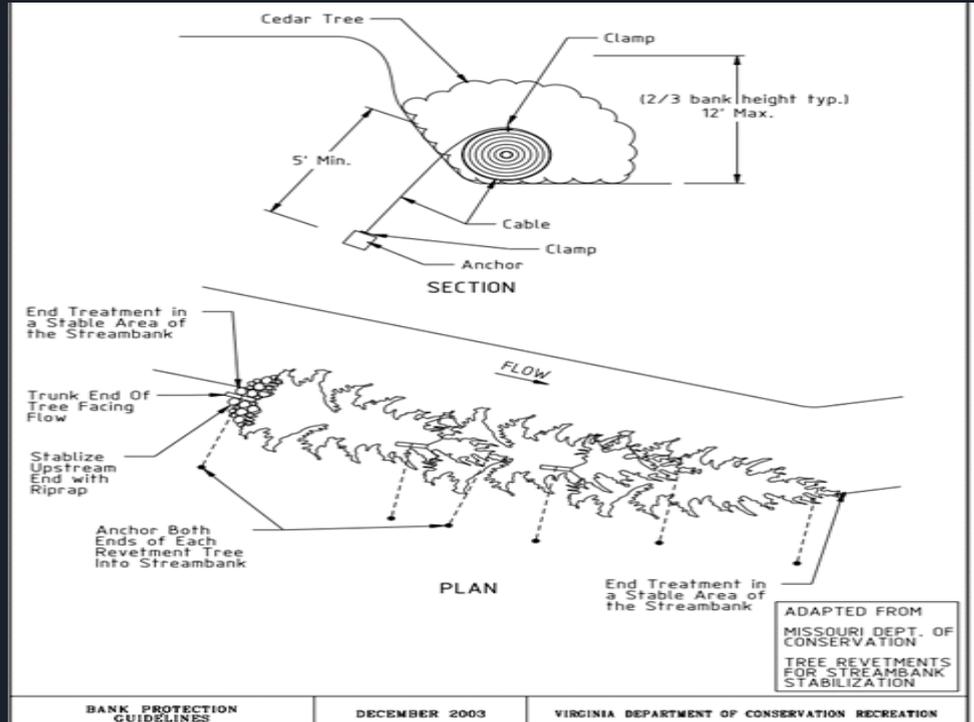
- Year 2016 Centerline
- Year 2041 Centerline
- Year 2066 Centerline



Considered Designs



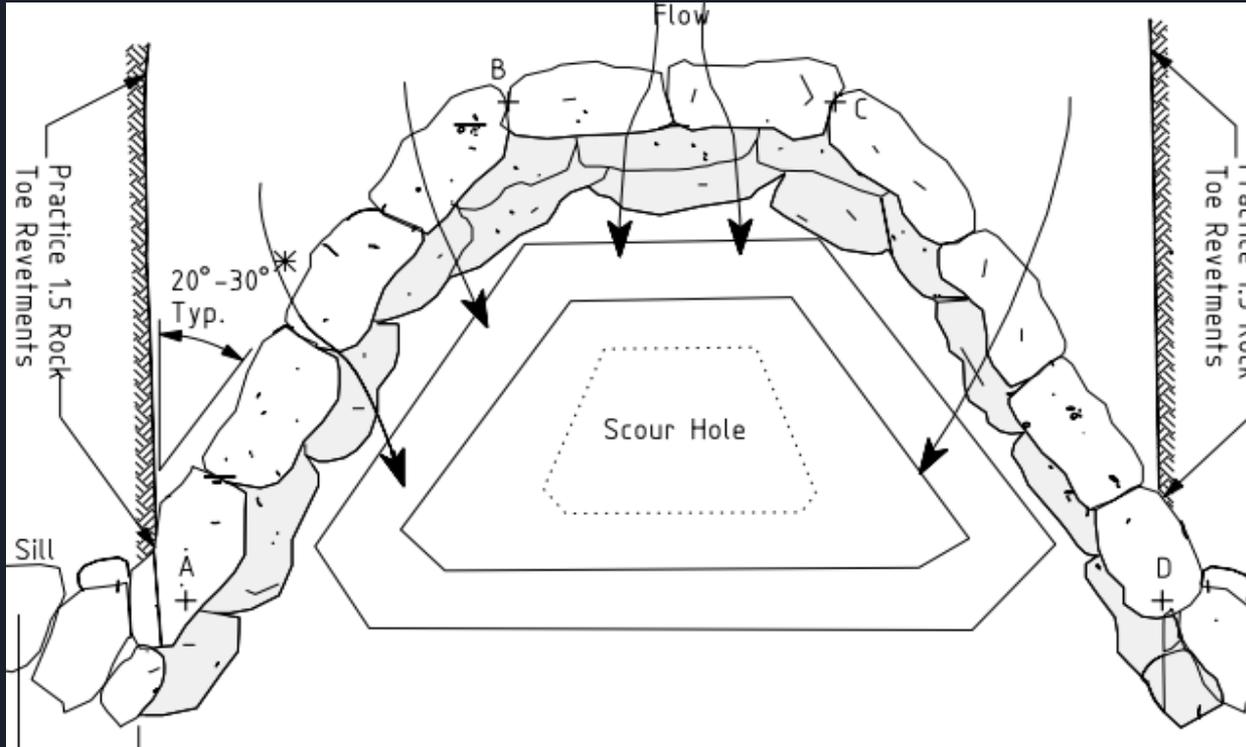
Cedar Tree Revetment



Brush Patches



V Shaped Weir



Riprap Installation on Both Sides of the Bends

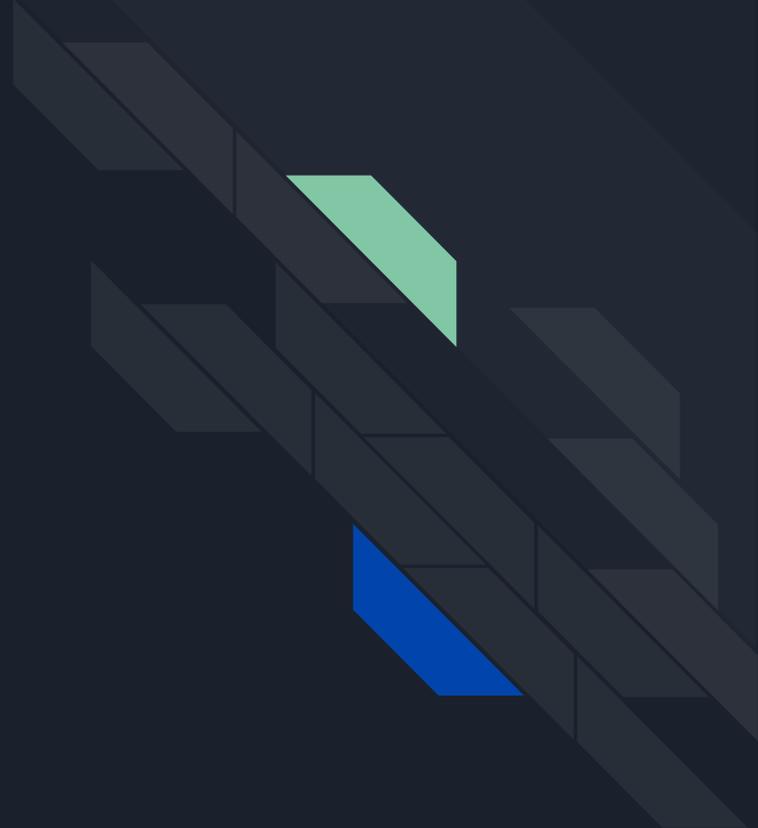


Ledgend

- - - Riprap



Final Design



Riprap On Bends



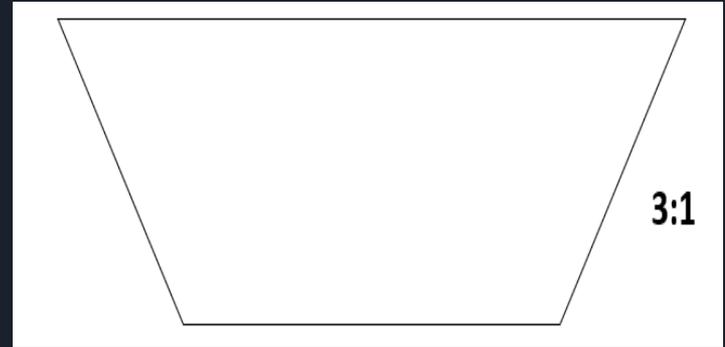
Obtaining Access & Grubbing



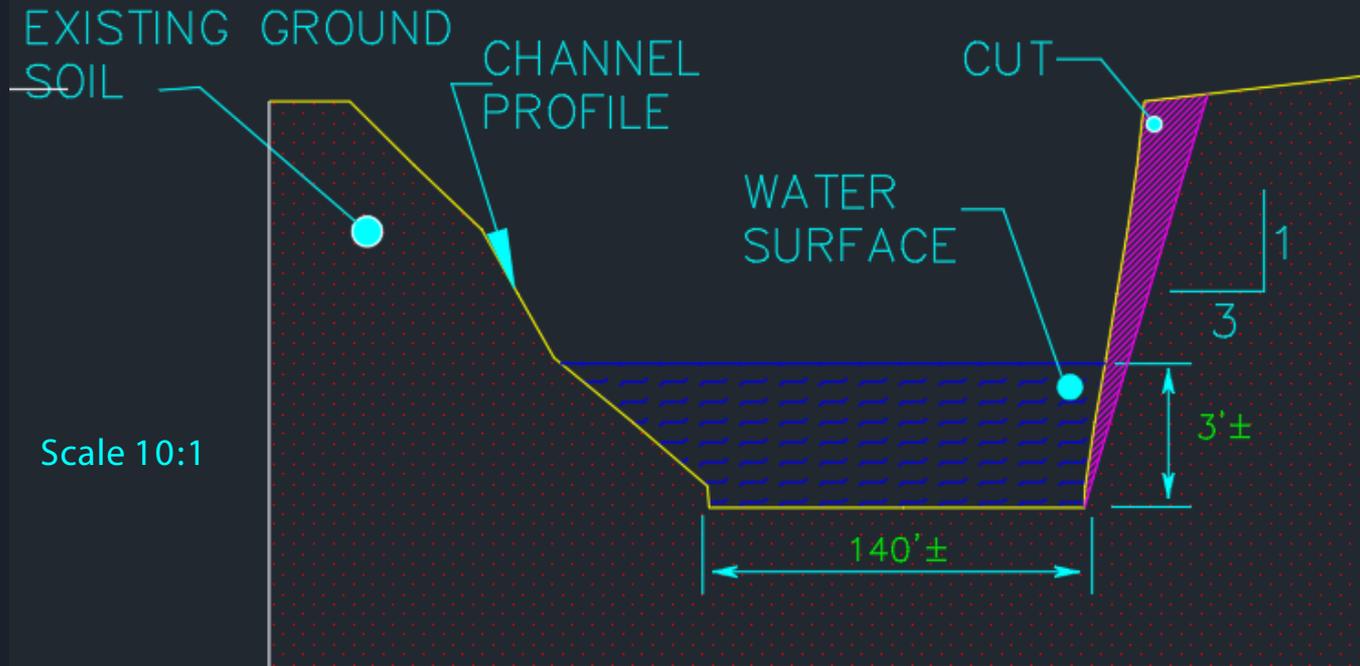
Reshaping the Banks

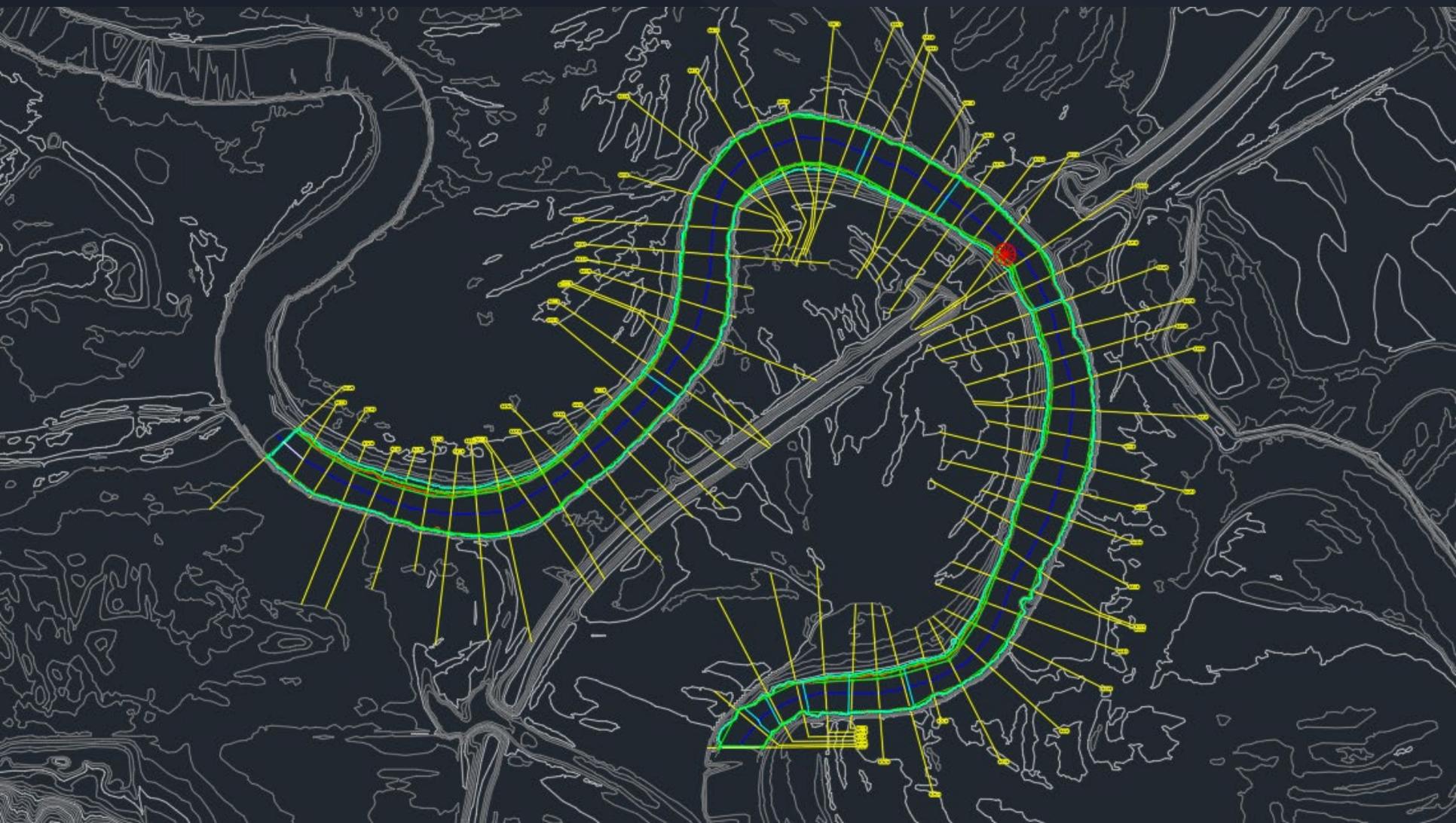


| Summary Table Turns | |
|-----------------------------|------------|
| Net C/F LB | -43.05 CY |
| Net C/F RB | -68.77 CY |
| Total | -111.82 CY |
| Total Cut/Fill = 111.82 Cut | |

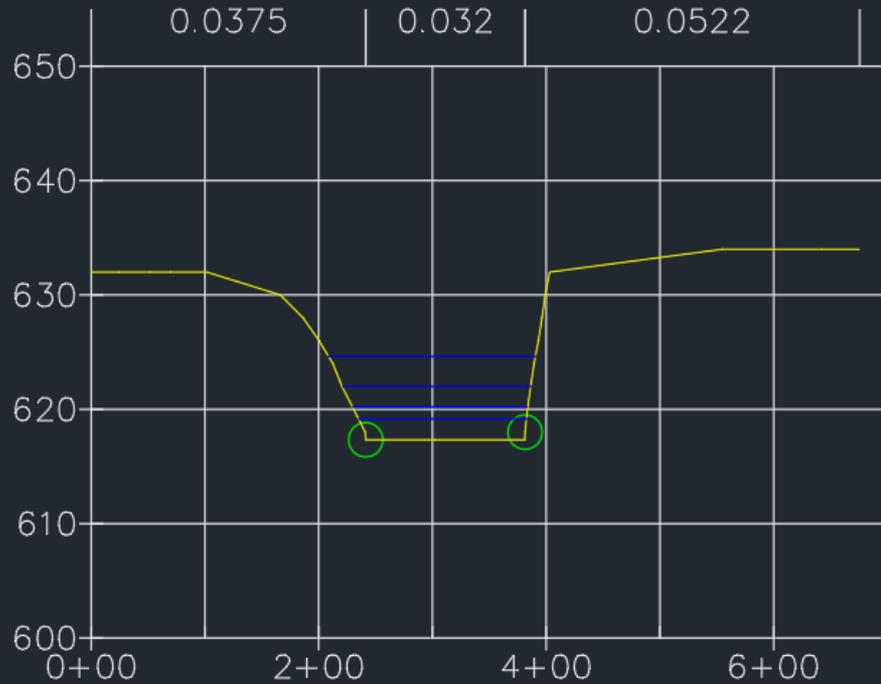


Channel Profile





HEC-RAS / River Analysis



165

| Average | | | | | | |
|----------------------|-----------|-----------|-------|----------|-----------|-----------|
| Flow Type | Min Ch El | W.S. Elev | Depth | Vel Chnl | Flow Area | Top Width |
| (ft ³ /s) | (ft) | (ft) | (ft) | (ft/s) | (sq ft) | (ft) |
| Low | 616.73 | 618.05 | 1.32 | 1.16 | 195.64 | 153.59 |
| Mean | 616.73 | 618.85 | 2.12 | 1.84 | 322.50 | 159.00 |
| High | 616.73 | 620.28 | 3.56 | 2.78 | 550.30 | 167.80 |

Sizing Riprap

Table 2. Recommended sizes for riprap

| Velocity of stream during high flow | Size range (diameter across longest part of rock) |
|--|--|
| Slow (2-4 ft/sec) | 3" - 6"; average 4" |
| Moderate (4-6 ft/sec) | 4" - 12"; average 8" |
| * Fast (6-12 ft/sec) | 5" - 18"; average 14" |

*This velocity is the most common cause of streambank erosion in Iowa.



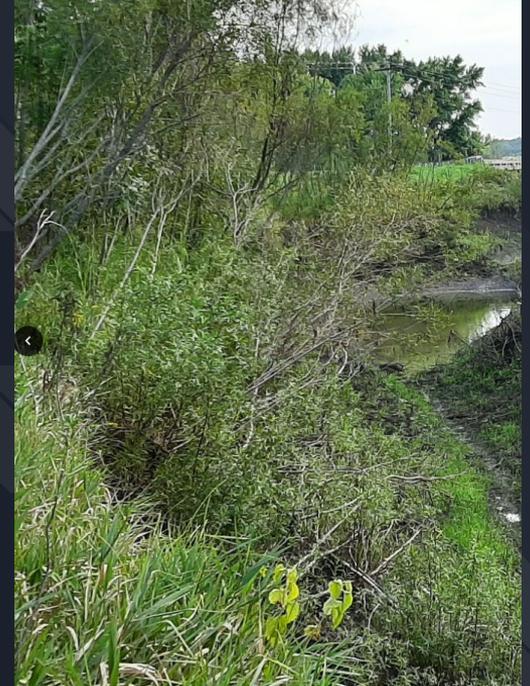
Riprap Installation



Gravel lining

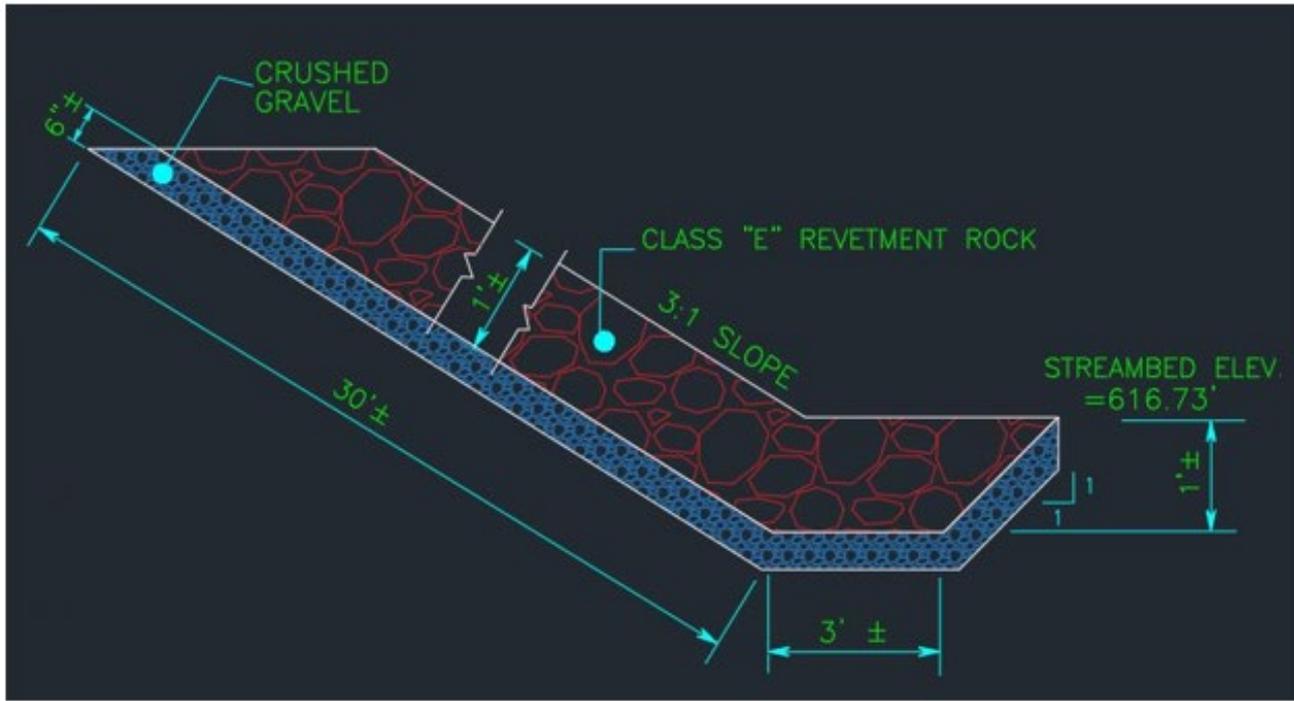


Riprap Installation

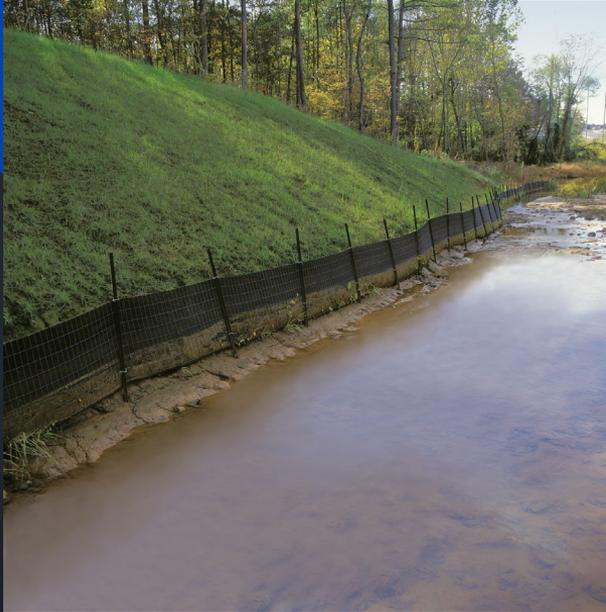


Restoration

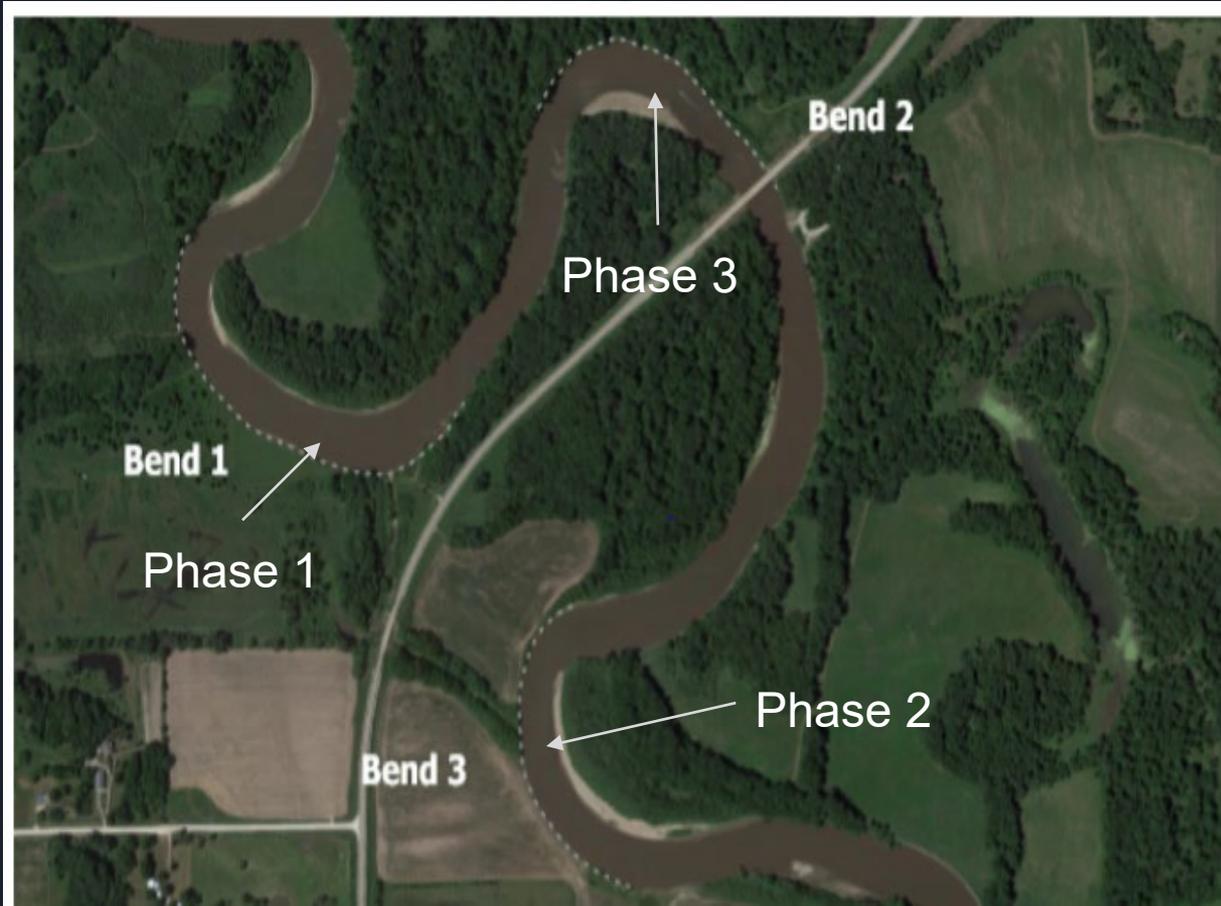
Riprap Layout



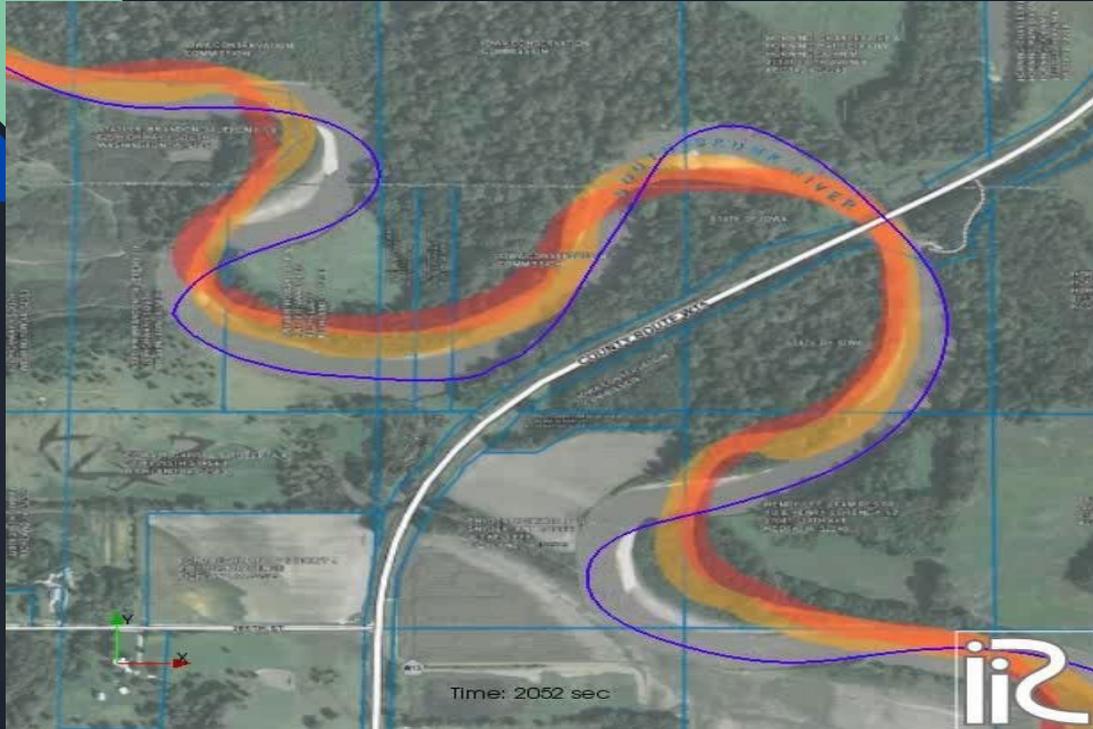
Sediment Control



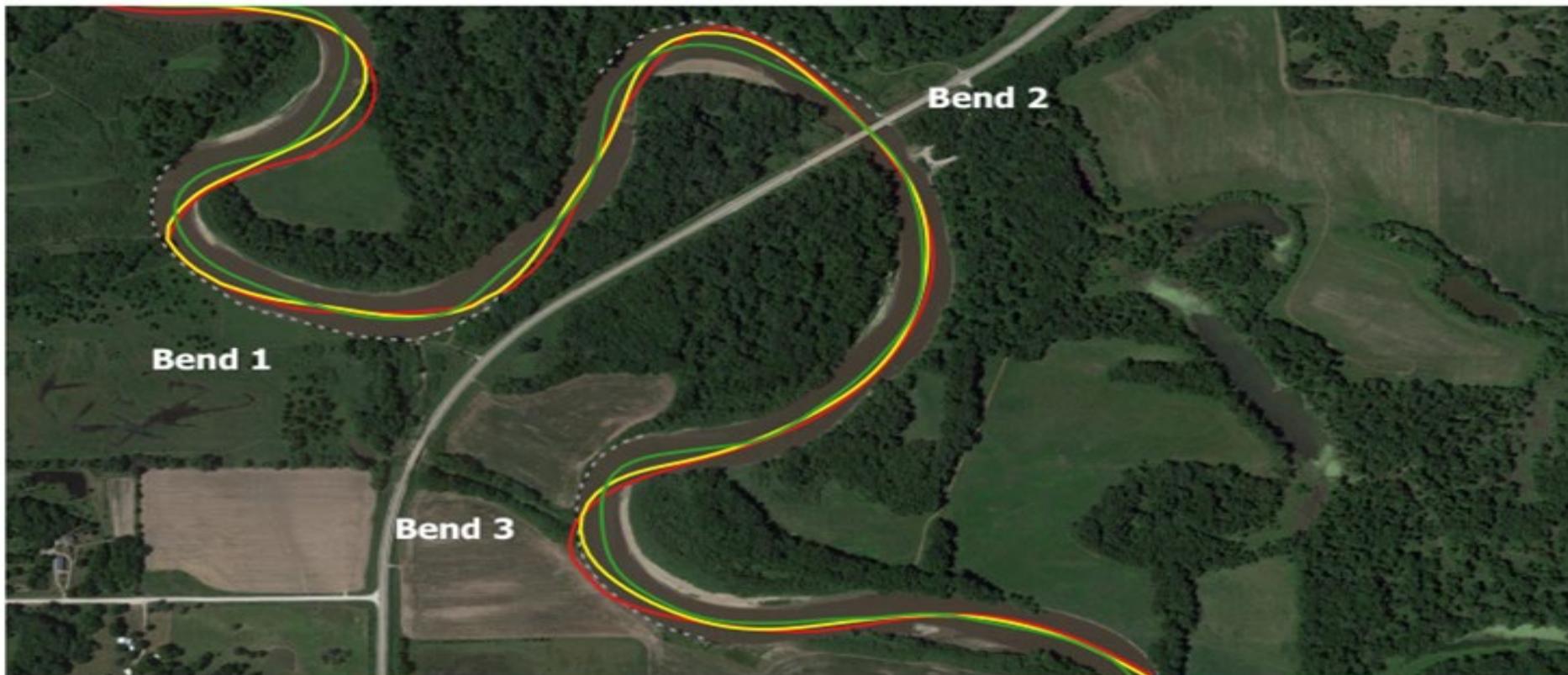
Proposed Phases



Forecasting River Meander Migration with Riprap



Forecasted River Migration with Riprap

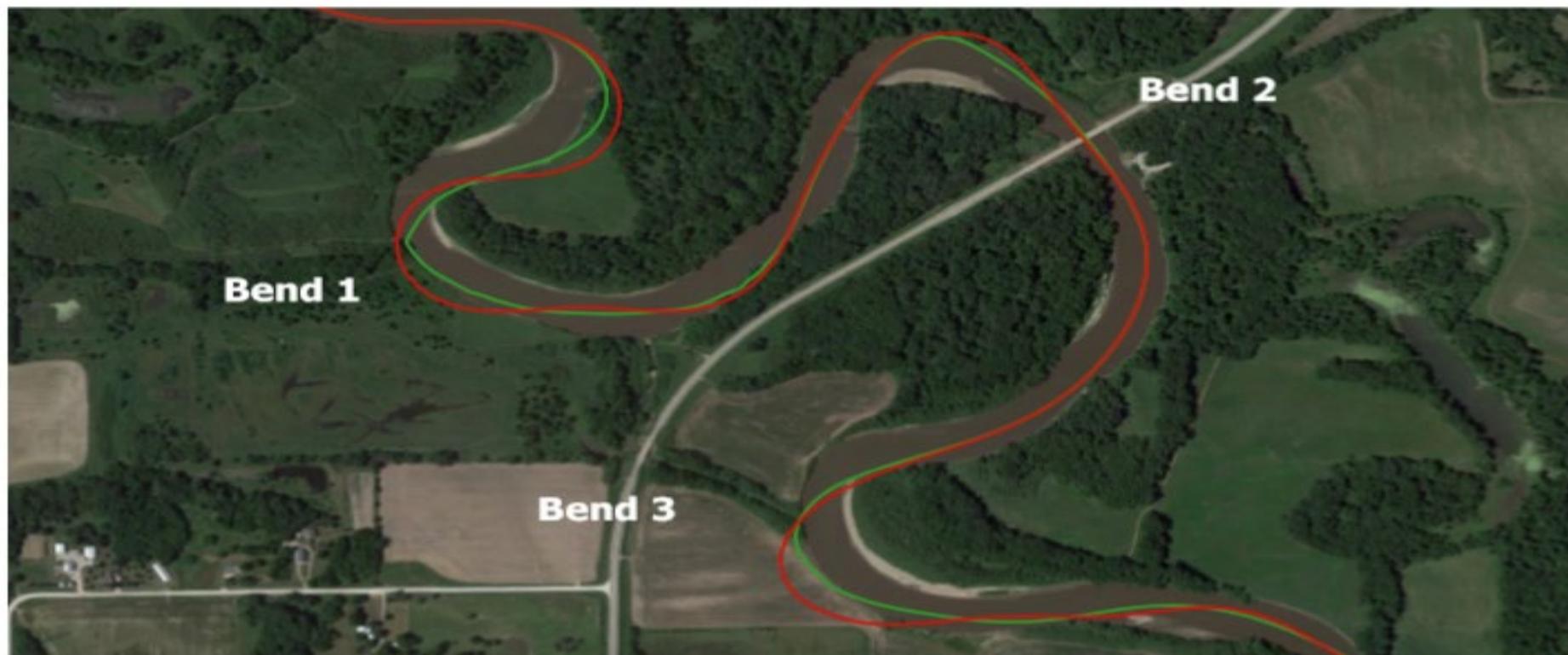


Legend

- Year 2016 Centerline
- Year 2041 Centerline
- Year 2066 Centerline
- - - Riprap



Forecasted River Migration with and without Riprap



Legend

- 2066 without Riprap
- 2066 with Riprap



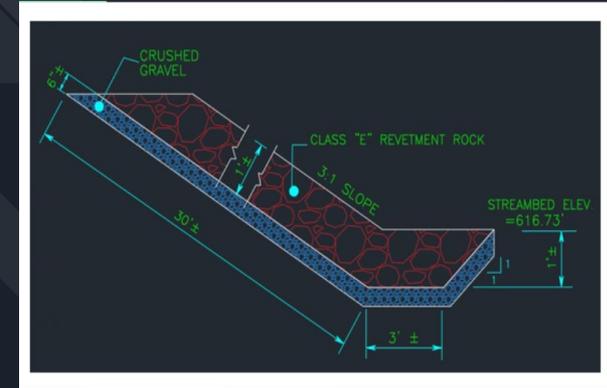
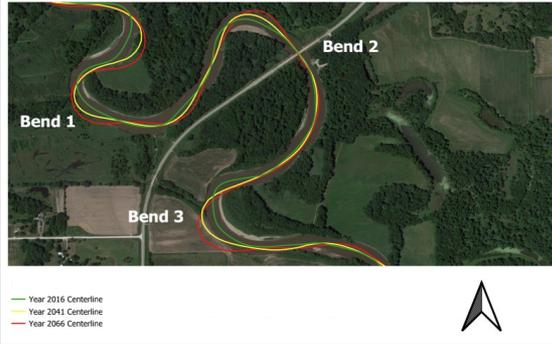


Project Cost

| | |
|------------------------------------|------------|
| Construction Subtotal | 245,000.00 |
| 10% Contingencies | 24,500.00 |
| 20% Engineering and Administration | 49,000.00 |
| Total Project Cost | 318,500.00 |

Conclusion

50 Year Forecast without Riprap





Questions?