

KENDALL YOUNG PARK, WEBSTER CITY: NORTH ACCESS BRIDGE

Boone River

Kendall
Young Park

Mitchell Allenback - Project Manager
Guadalupe Munoz Rocha
Shelby Humes



Project Team

Mitchell Allenback, Project Manager

Design of Bridge and Abutments



Guadalupe Munoz, Editor

Design of Parking Lot and Ecological Risk Analysis



Shelby Humes, Technical Services

Hydraulic Analysis of Creek



OUTLINE



Scope of the Project



Design Methods/Constraints



Proposed Designs



Project Cost Estimate



Questions



One of many parks in Webster City, Kendall Young Park has provided this community with recreation for many years, but access has been limited by the stream flowrate over the pictured spillway.

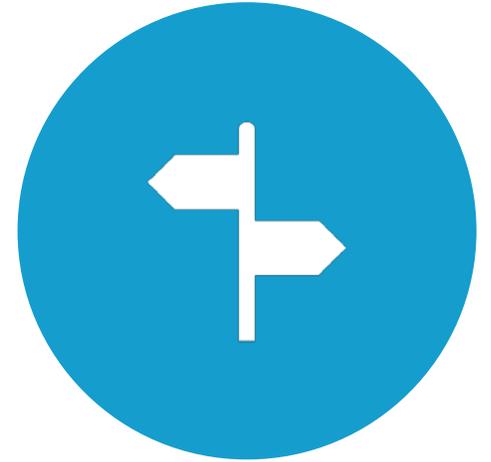




PROVIDE **ALTERNATE
ACCESS ROUTE** TO THE
NORTH END OF THE PARK



**MINIMIZE THE ECOLOGICAL
IMPACT** OF THE PROJECT



PROVIDE **PARKING** ON THE
SOUTH END OF THE PARK

DESIGN METHODS

Design Standards

- AASHTO LRFD Bridge Design Specifications
- Iowa DOT LRFD Bridge Design Manual
- SUDAS
- Iowa DNR
- ADA



Design Tools

- Autodesk Civil 3D 2019
- ArcMap GIS
- Autodesk InRoads
- HEC-RAS
- HEC-HMS



DESIGN CONSTRAINTS AND CHALLENGES

Constraints

- Tree preservation
- ADA compliance
- Bridge location
- Rapid construction

Challenges

- Long span length
- Minimal environmental impact
- Maintaining “Rustic” Aesthetics

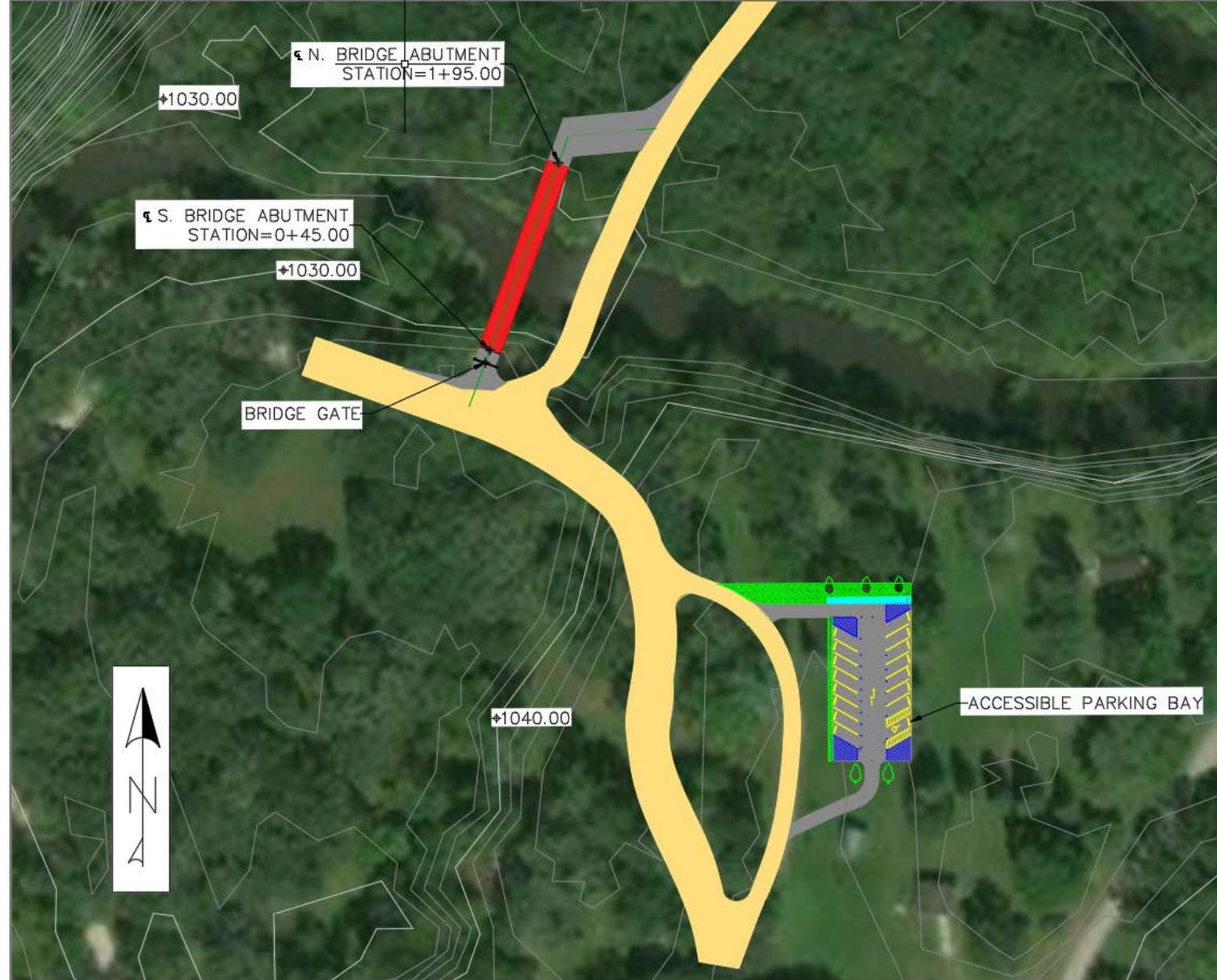


ADA Compliant

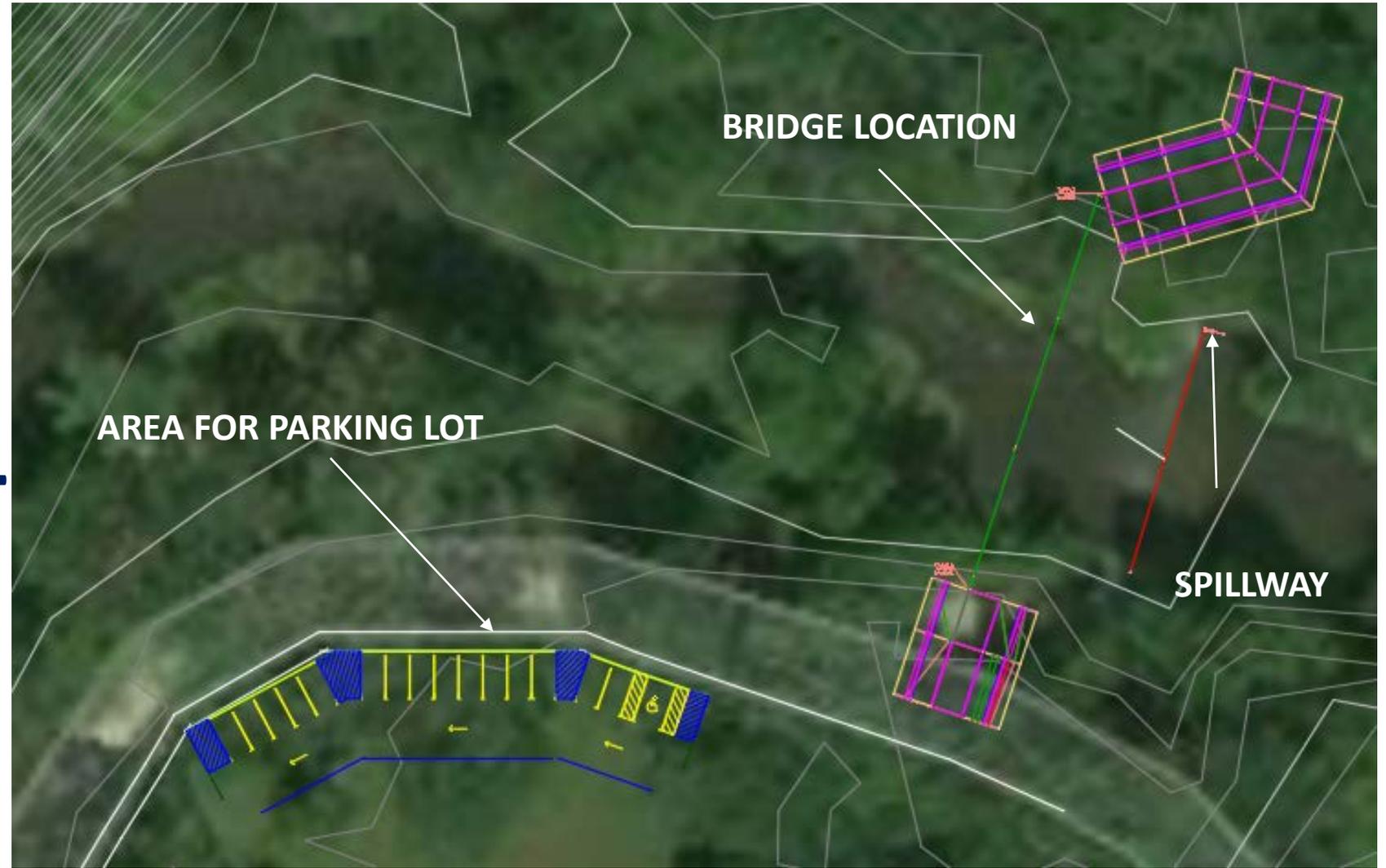


SITE PLAN

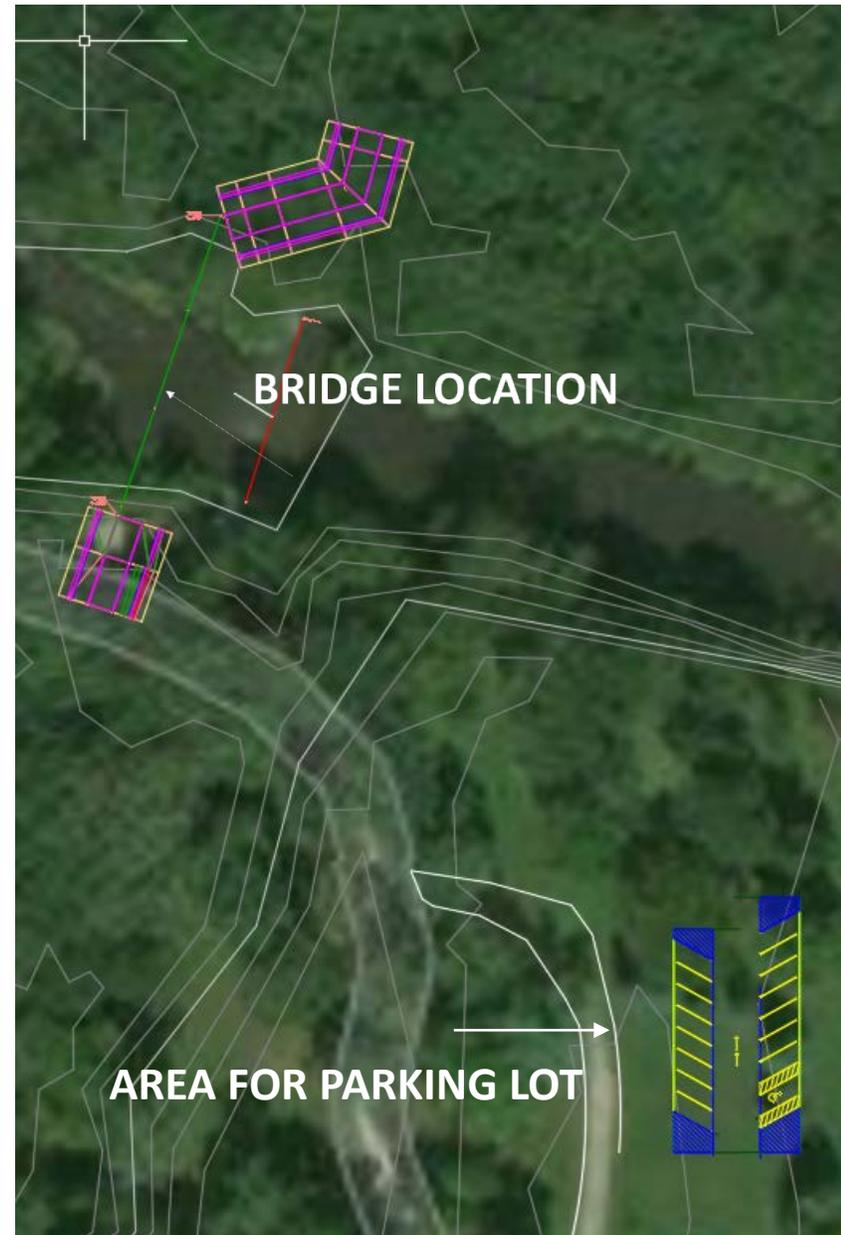
Legend	
Existing Road	
Existing Structures	
Proposed Parking Lot	
Proposed Access Roads	
Proposed Bridge	



PARKING LOT LOCATION #1



PARKING LOT LOCATION #2





PARKING LOT MATERIALS CHOICE #1



PARKING LOT MATERIALS CHOICE #2



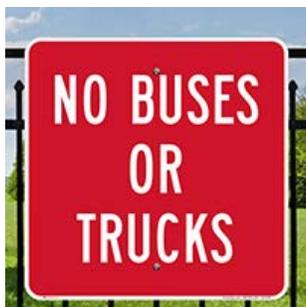
PARKING LOT MATERIALS CHOICE #3

DECISION MATRIX

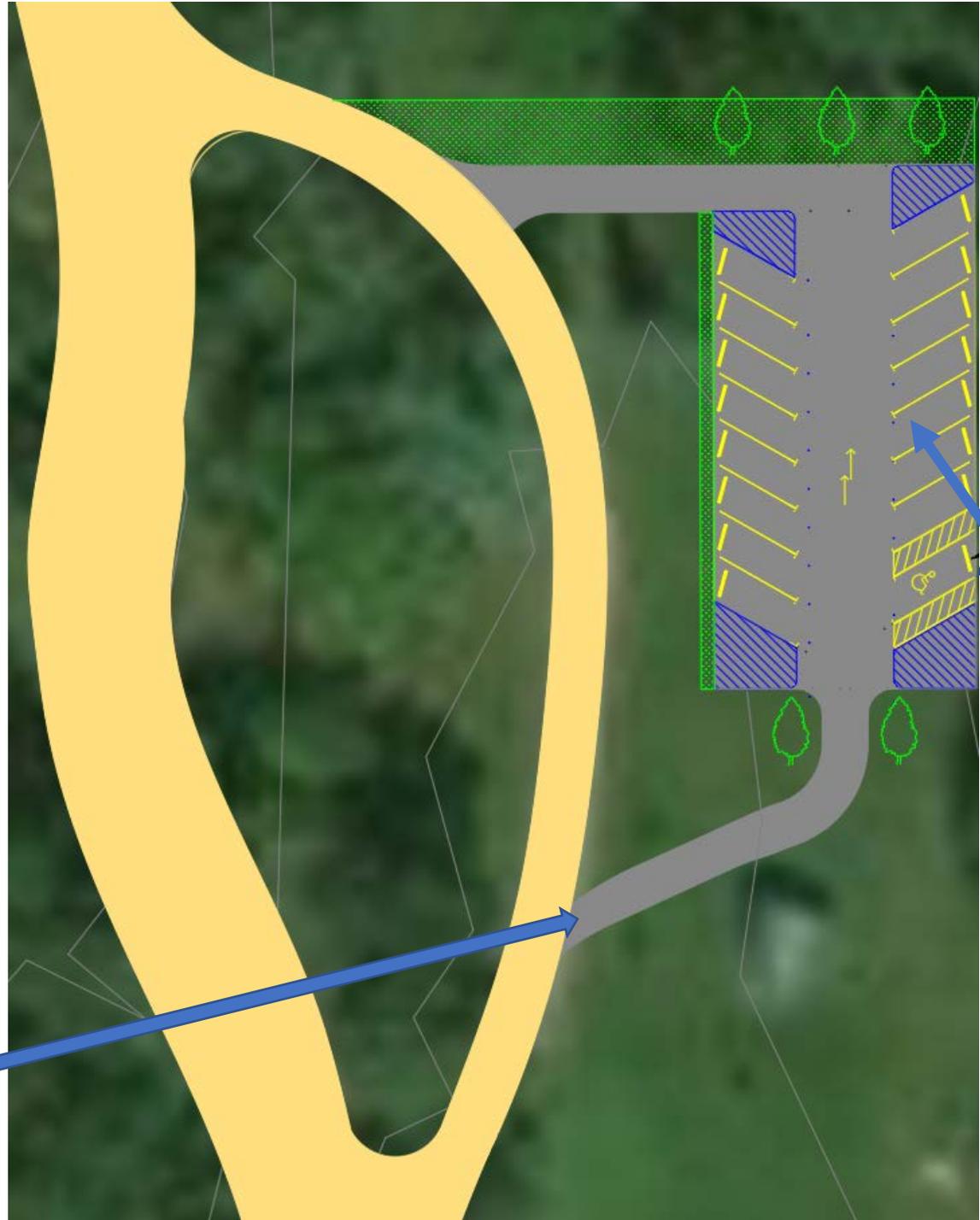
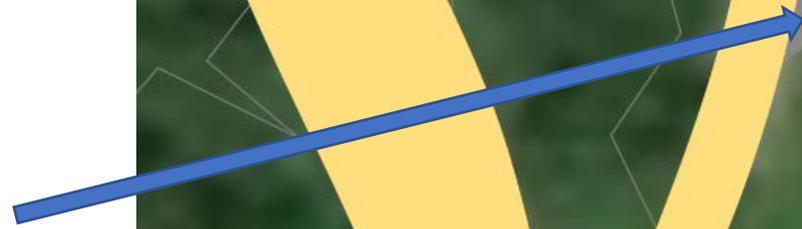
Pavement Material Decision Matrix											
Criteria	Weight	Amount				Rank			Score		
		PCC	Asphalt	Gravel	Total	PCC	Asphalt	Gravel	PCC	Asphalt	Gravel
Costs(\$/sq.ft)	3.0	10.0	6.0	2.0	18.0	0.6	0.3	0.1	1.7	1.0	0.3
Lifespan	2.0	30.0	20.0	5.0	55.0	0.5	0.4	0.1	1.1	0.7	0.2
Construction Time(weeks)	3.0	2.0	1.0	1.0	4.0	0.5	0.3	0.3	1.5	0.8	0.8
Climate	2.0	2.0	3.0	3.0	8.0	0.3	0.4	0.4	0.5	0.8	0.8
Aesthetics *	-1.0	4.0	3.0	1.0	8.0	0.5	0.4	0.1	-0.5	-0.4	-0.1
Operation and Maintenance*	-3.0	4.0	4.0	2.0	10.0	0.4	0.4	0.2	-1.2	-1.2	-0.6
Environmental Impact*	-3.0	4.0	4.0	5.0	13.0	0.3	0.3	0.4	-0.9	-0.9	-1.2
* Numbers assigned for aesthetics is a rank from 1-5 where 5 is the most aesthetically pleasing								Total	2.1	0.7	0.1

BEST CHOICE

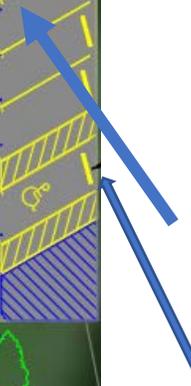
PARKING LOT DESIGN



Entrance



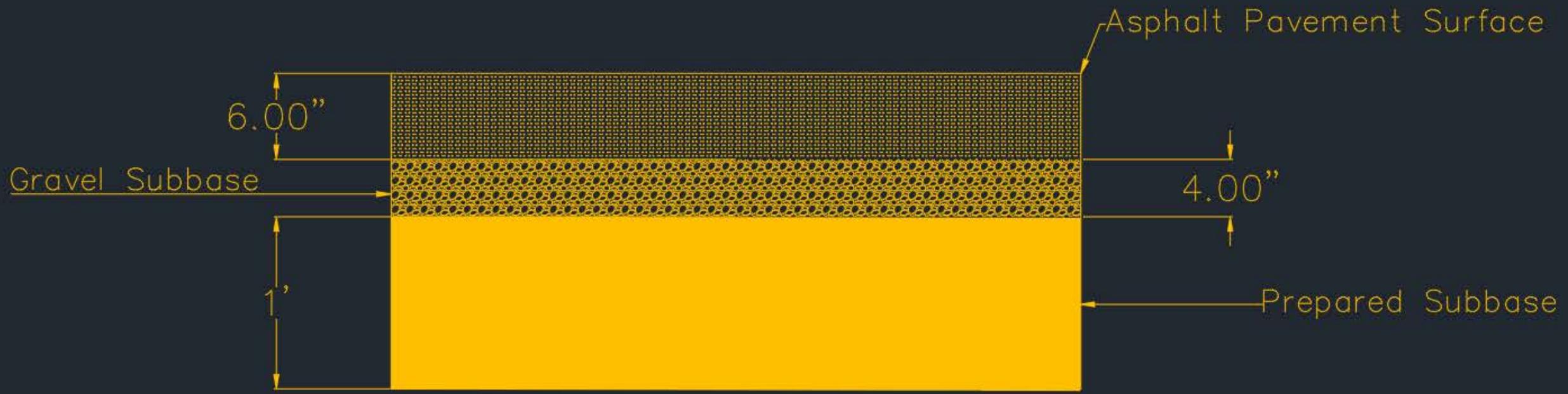
Direction of Flow



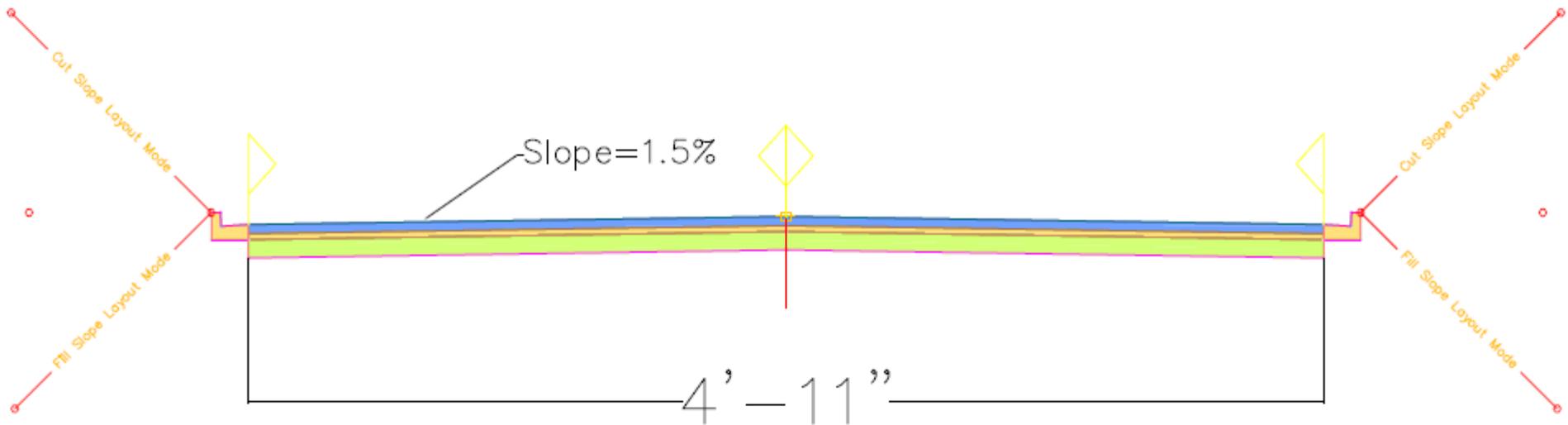
ADA Stall



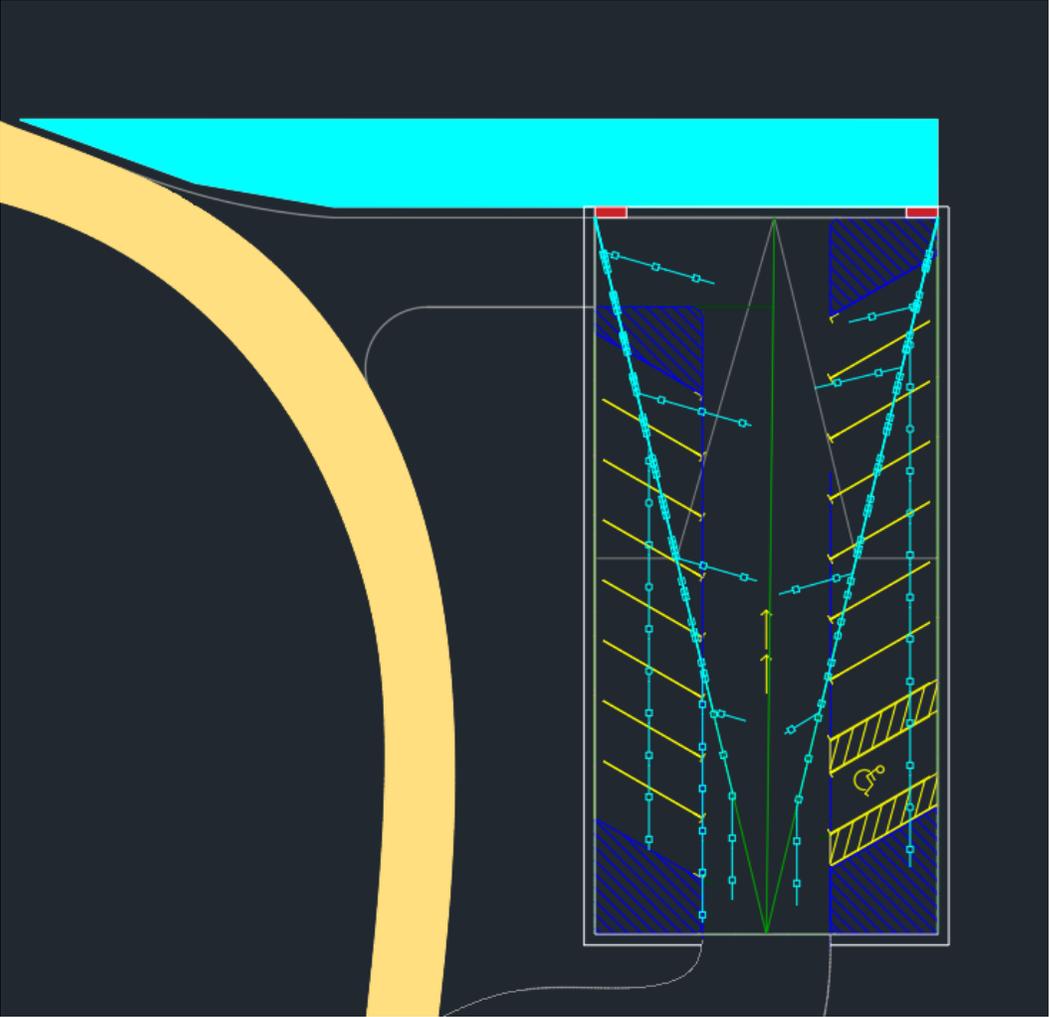
PARKING LOT DESIGN



PARKING LOT DESIGN

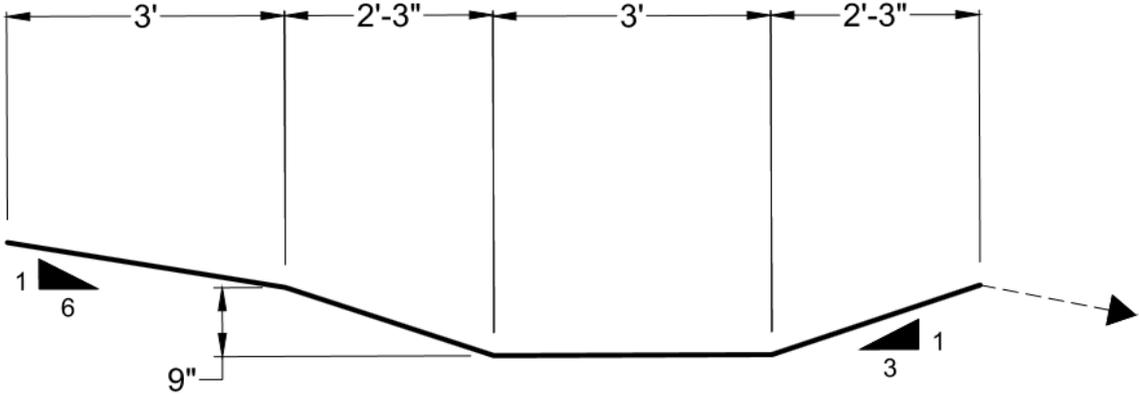


PARKING LOT DRAINAGE PLAN



Bio-Infiltration Swale

- Plant Lined
- Removes Pollutants



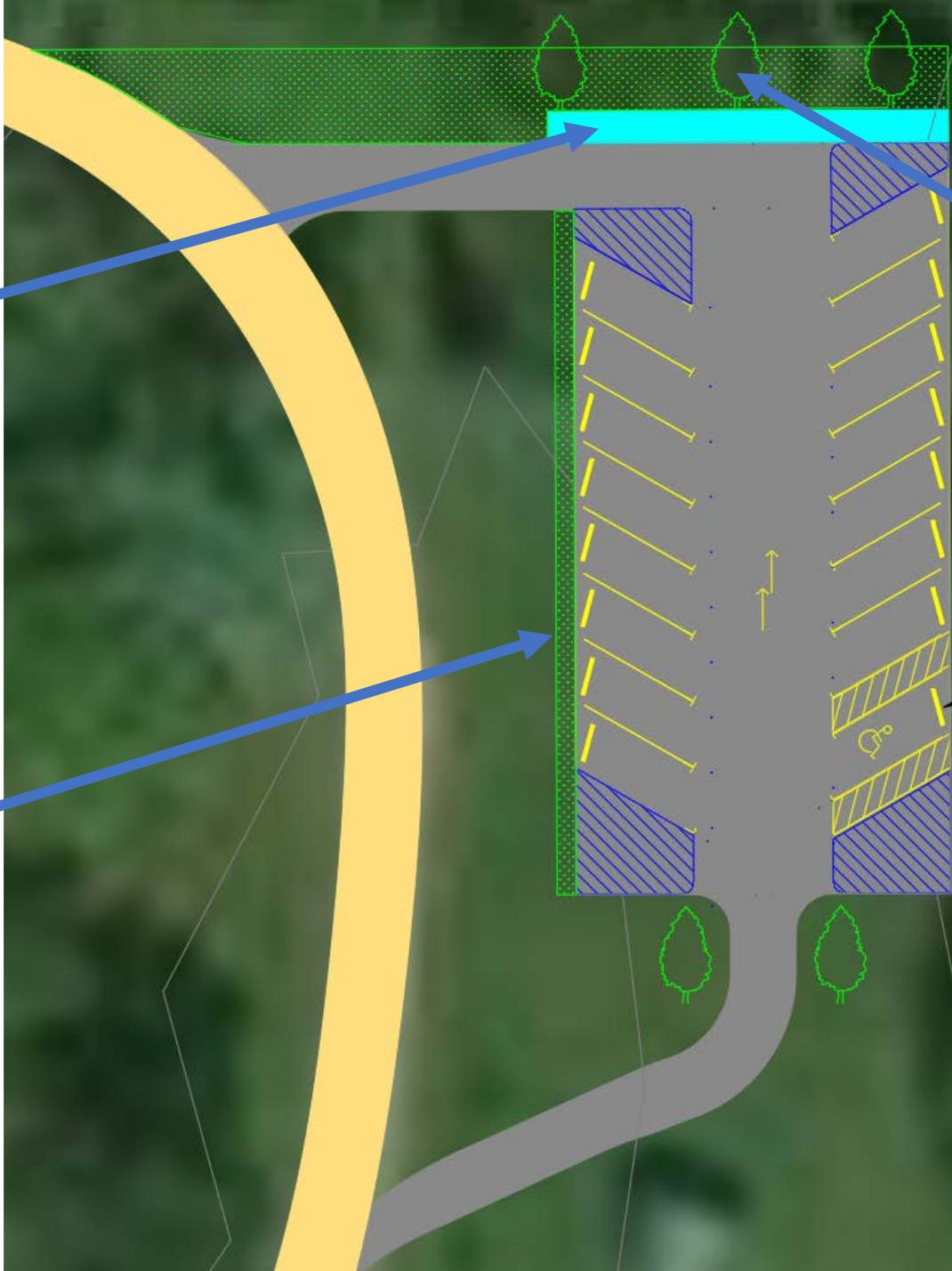
SWALE CROSS SECTION

PARKING LOT DESIGN

Bio-Filtration Swale
Location

More area reserved
for plants

Trees (Oak)



LANDSCAPING AND ADDITIONAL ITEMS



Oak Tree



Wood Lily



False Indigo



Yellow Gentian



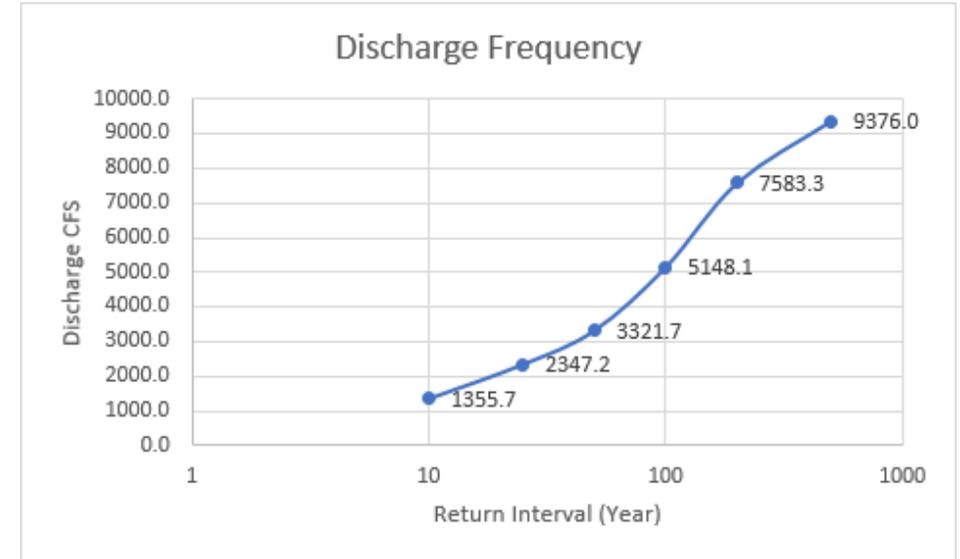
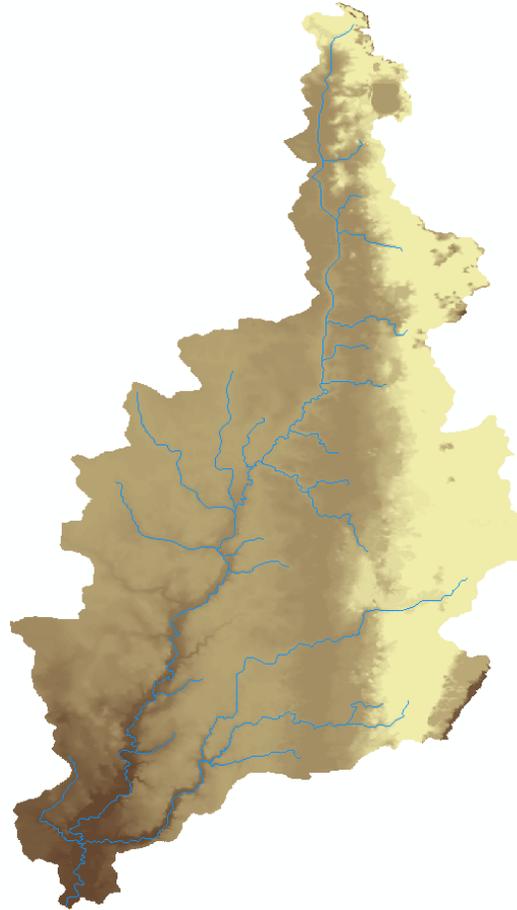
Green Needlegrass

Hydraulic Analysis

GIS data compiled in
ArcMap

Peak-Runoff Modeled in
HEC-HMS

Flood Elevations and Post-
Construction Modeled in
HEC-RAS



50-yr flood:

Flowrate - 3321.73 CFS

WSEL - 1032.77 feet above sea-
level

BRIDGE DESIGN ALTERNATIVES

Railroad Flat Car



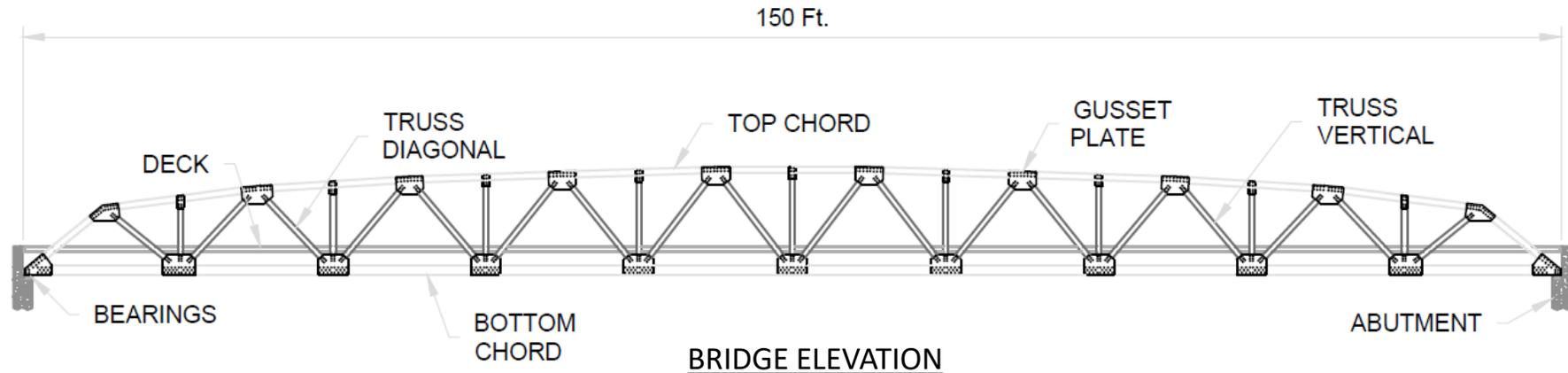
Prefabricated



FINAL BRIDGE DESIGN

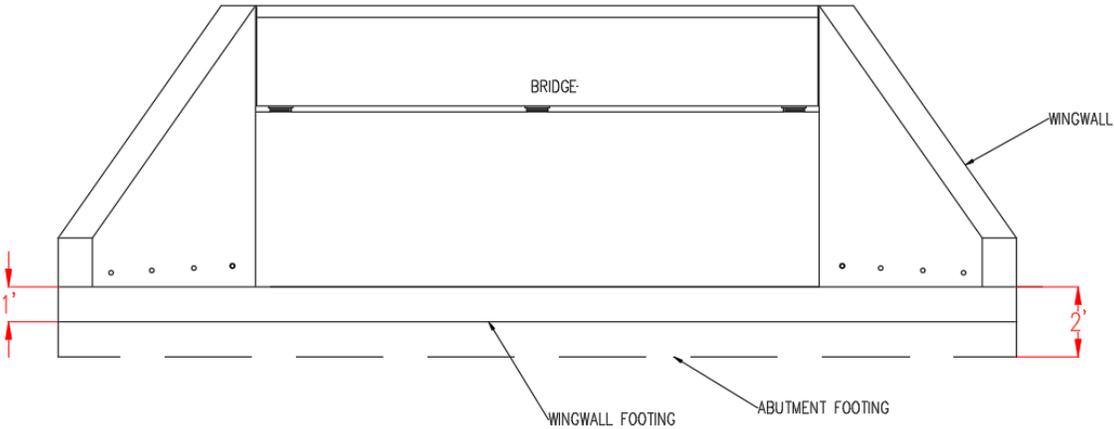
Prefabricated Vehicle Bridge

- Cambridge Series
 - Warren Truss
 - Steel girder
- Single Span – 150 ft.
- 16 ft. Width

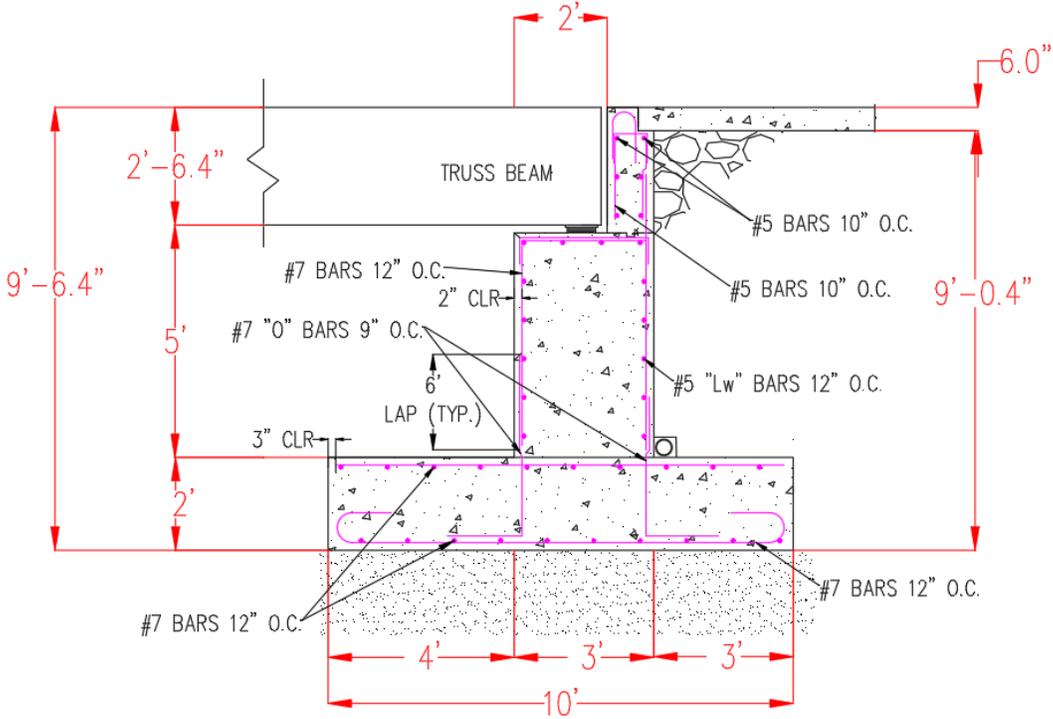


ABUTMENT DESIGN

- Non-Integral w/o Piles
- Cast-in-Place Concrete
 - Normal Weight

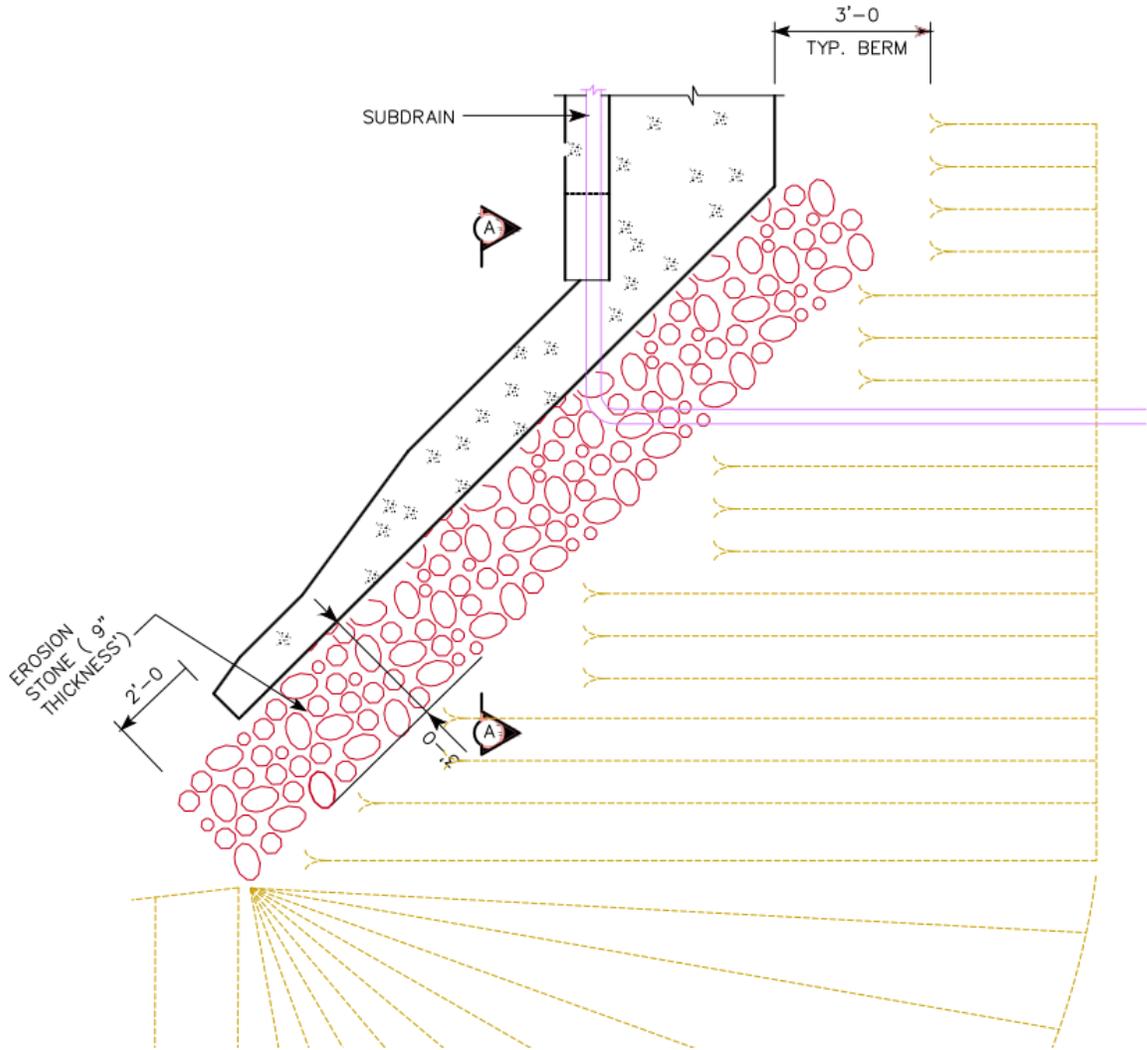


ABUTMENT ELEVATION

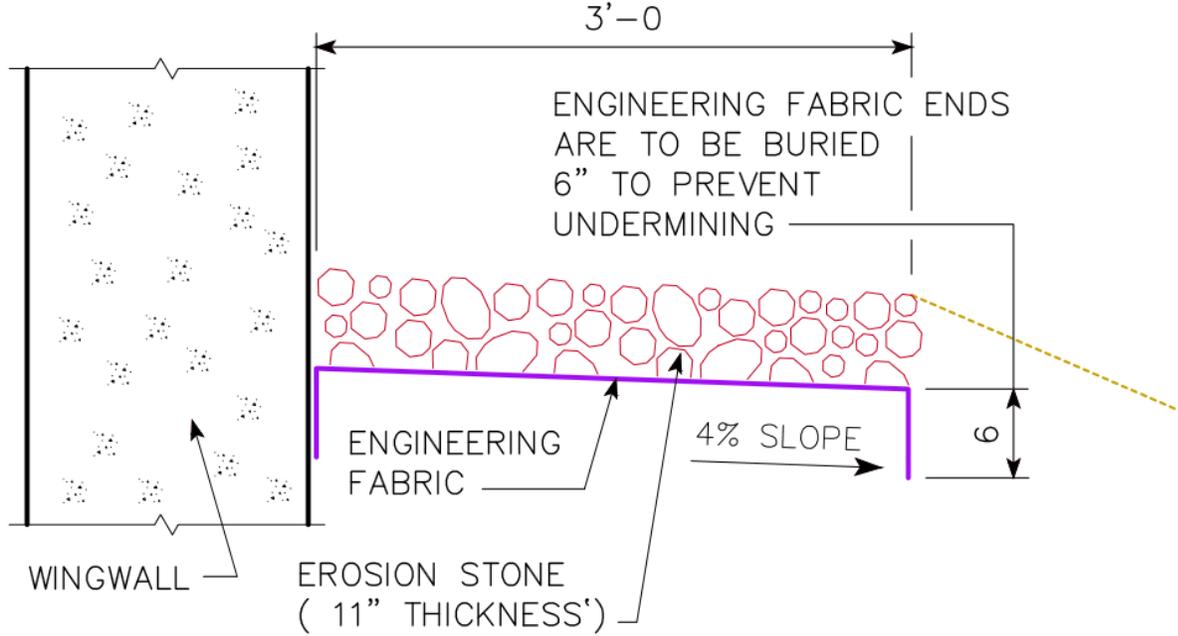


ABUTMENT DETAIL

WING ARMORING DESIGN

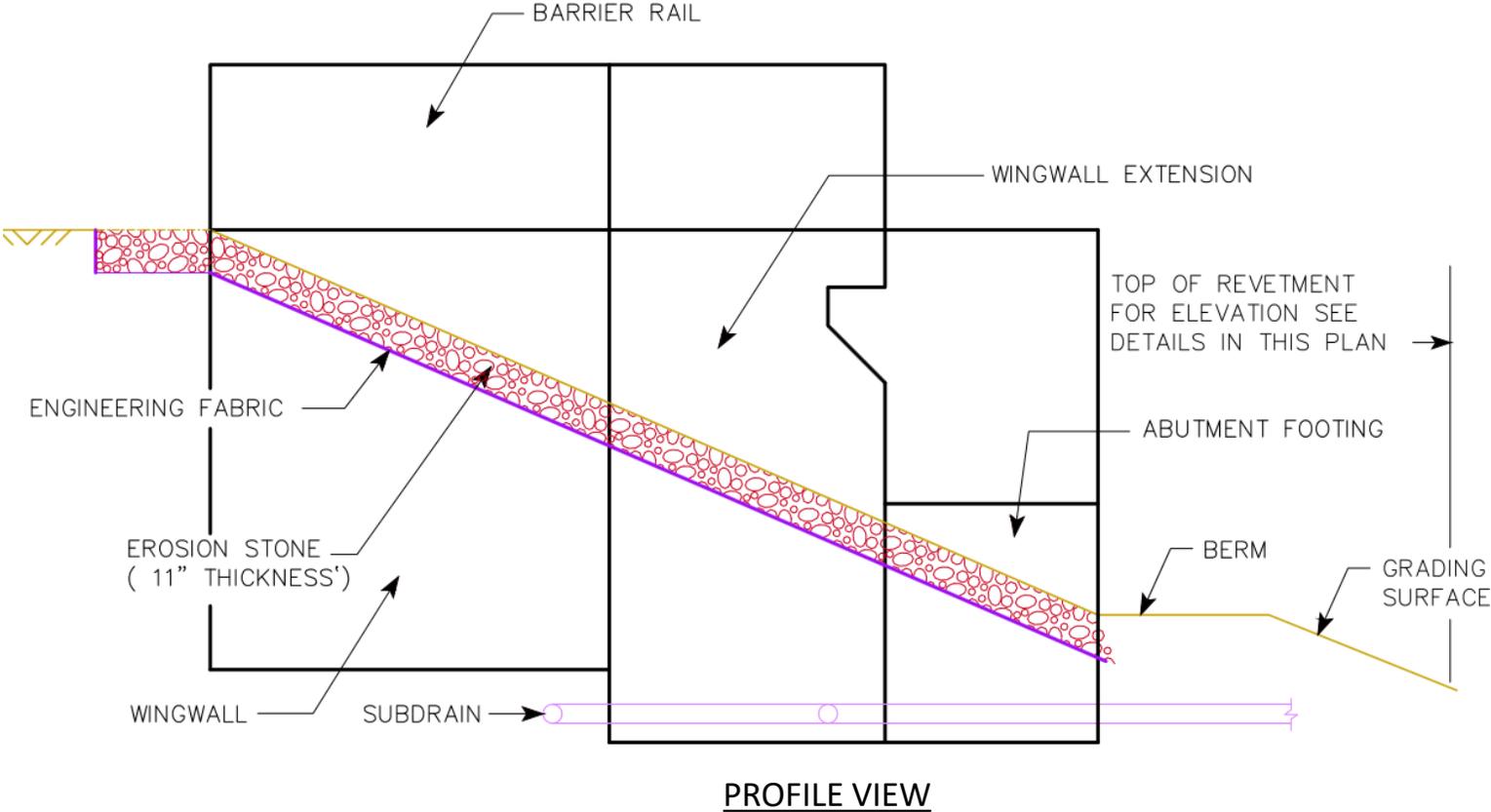


TOP VIEW

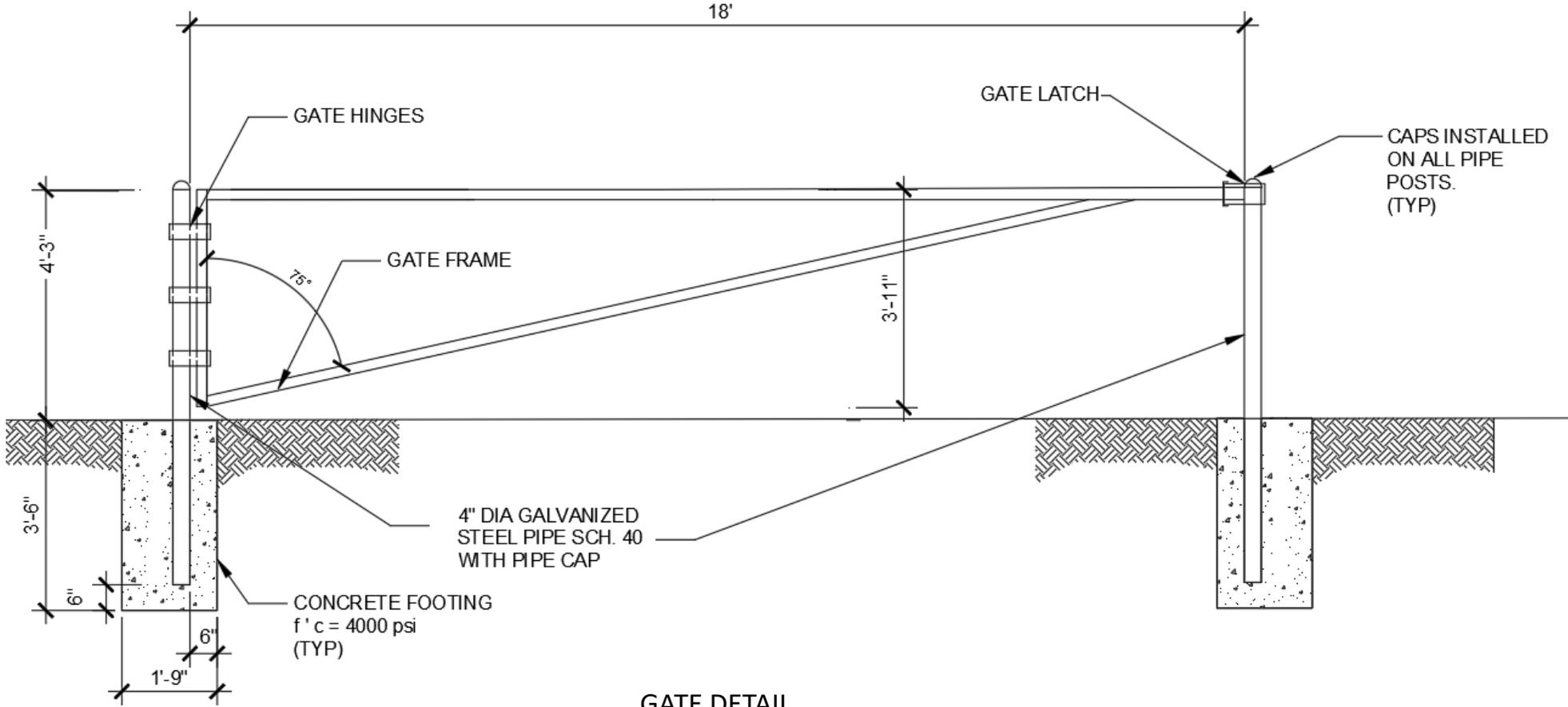


SECTION A-A

WING ARMORING DESIGN



GATE DESIGN



GATE DETAIL

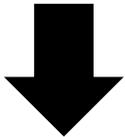
Ecological Assessment



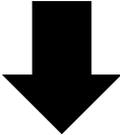
Prairie Bush
Clover



Western Prairie
Fringed Orchid



Oxbow Restoration and Missouri's
Department of Conservation
Recommendations



Preservation

COST ANALYSIS

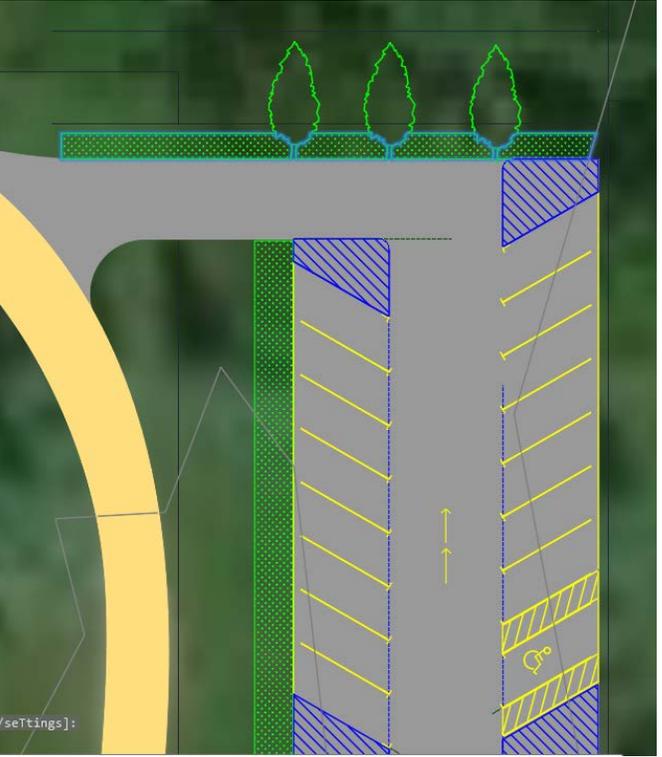
Project Item	Cost
Bridge/Abutment	\$545,000
Gate	\$795
Road/Parking/Signage	\$54,778
Aesthetics/ecological	\$6,440
Wing Armoring	\$675
TOTAL	\$607,688

CONCLUSION

150 ft Pre-Fab Bridge

16-stall parking lot located near bathroom with prairie plants installed

Preservation of species for now. Follow Missouri's Department of Conservation Guidelines



QUESTIONS

