IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 5

DATE: Aug. 1, 2019

ATTENTION: James V. Armstrong

PROJECT: Mahaska County
BRFN-092-7(52)--39-62
Pin: 17-62-092-010

FROM: John Bartholomew

OFFICE: Design

SUBJECT: Project Concept Statement; (Final, D0)

This project involves the replacement of the IA 92 bridge FHWA No. 35030, Maint. No. 6293.3S092 over the North Skunk River, 2.6 miles east of the east junction of County Road V13.

A concept review was held on April 03, 2019. Those present included Mark Van Dyke, Jay Ridlen, and Daniel Clawson from the District 5 Office; Patricia Schwarz from the Bureau of Bridges and Structures; and John Bartholomew, from the Design Bureau.

There are 2 Alternatives to replace the existing 385 ft. x 30 ft. continuous I-beam bridge. Alternative #1 is to replace with a 3 span, 469 ft. x 44 ft. pretensioned prestressed concrete beam bridge. Alternatives #2 is to replace with a 3 span, 440 ft. x 44 ft. continuous welded girder bridge.

A flowage easement of approximately 39 acres will be required for areas upstream of both alternatives for the proposed bridge that exceed 1.5' of backwater. The existing 2 girder bridge cannot be removed in stages. It is recommended that traffic be maintained by off-site detour.

This Draft Project concept was sent out for review and comment with concerns to be resolved by Thursday July 18, 2019. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2022. The office of Bridges and Structures will coordinate plan preparations with assistance from the Office of Design.

JB: DES

cc:

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DRAFT PROJECT CONCEPT STATEMENT

IA 92 bridge over the North Skunk River, 2.6 miles east of the east junction of County Road V13.

Mahaska County
BRFN-092-7(52)--39-62
PIN: 16-44-034-010
Maint. No. 6293.3S092
FHWA No. 35030

Highway Division
Design Bureau

John Bartholomew, P.E.
515-239-1540

July 03, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 92 bridge (Maint. No. 6293.3S092) over the North Skunk River, 2.6 miles east of the east junction of County Road V13.

The two options considered were:

1. Replace bridge with a 469 ft. x 44 ft. 3 span, pretensioned prestressed concrete beam bridge, using an off-site detour. The estimated cost for this alternative is **$ $ 5,356,000**.
2. Replace bridge with 440 ft. x 44 ft. 3 span continuous welded girder bridge, using an off-site detour. The estimated cost for this alternative is **$ 5,937,000**.

Alternative No. 1 is the preferred alternative because of its less complex structure. It is recommended to replace the existing bridge with a 469 ft x 44 ft. Traffic detour will be off-site.

Looking East

Looking West


North Profile


South Ditch

B. Need for Project

IA 92 is a two-lane roadway. The existing structure is a 3 span, 385 ft. x 30 ft., continuous I-beam bridge constructed in 1964. A bridge deck repair was done in 1994 which a 1.5-inch deck overlay was added. With a curb to curb width of 30 ft. the bridge does not meet the standard design width of the highway lanes plus shoulder widths which is 44 ft. The bridge deck and structure show signs of deterioration. The District advised that the North Skunk River has potential for large amounts of flood debris in the channel. Deck spalling was reported. PC concrete deck patching is needed. An area in the top of deck - wearing surface is starting to break up. Both near abutment pedestals have spalled areas with exposed rebars and bearing loss. Due to this, the district has requested the new piers be located outside the channel.

Present Facility

The project area was 24 ft. wide 15” thick composite pavement, with 10 ft. wide shoulders. Shoulders are 4 ft. HMA and 6 ft. granular with 3:1 foreslopes.

Mainline Pavement history: US 92 MP 191.72 to MP 193.61 (Mahaska County)

1930 Original Construction: “FA-70”. 10” – 7” – 10” concrete pavement.
1961 Project: “FN-70”. 3” HMA resurfacing.
1976 Project: “FN-92-7(17)—21-62”. 2” HMA overlay.
2016 Project: “NHSX-092-7(48)--3H-62”. Shoulder Widening. 8” subbase, 2” base, 2” surface. 3” HMA overlay. Leveling course 1.5” intermediate, 1.5” surface

C. Traffic Estimates

The 2022 and 2042 average daily traffic estimates are 2,829 ADT with 15% trucks and 3,250 ADT with 15% trucks, respectively.

D. Sufficiency Ratings

IA 92 is classified as a maintenance service level “B” roadway. IA 92 is part of the National Highway System. The federal bridge sufficiency rating is 61.7.

E. Access Control

Access rights will not be acquired for this project.

F. Crash History

During the five-year study period from Jan. 1, 2014 through Dec. 31, 2018, there were no crashes.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternate #1 -The existing 3 span, 385 ft. x 30 ft. continuous girder and floor beam system bridge will be replaced with a 3 span, 469 ft. x 44 ft. pre-tensioned prestressed concrete beam bridge with a skew of 35 degrees. Conflicts with existing abutments would need to be minimized to the greatest extent practicable. New bridge approaches will be constructed.

The typical cross section adjacent to the bridge will consist of a 24 ft. wide roadway. Shoulders are 10 ft. effective, 4 ft HMA and a 6 ft. granular and 4:1 foreslopes.

The existing grade will need to be raised a minimum of 1.5 ft. at the center channel which will require approximately 1,140 ft. of roadway reconstruction. The existing guardrail will be replaced and updated with new guardrail and the shoulders will be paved 20 ft. beyond the ends of the guardrail.

Class 10 will be necessary to flatten the existing foreslopes to 4:1 and to construct the new guardrail blisters.

Class E revetment will be placed under the bridge and at the north pier for slope protection. Two new bridge end drains will be constructed on the east end of the bridge.

Two entrances are located within the reconstruction limits, both are on the west side of the bridge. The entrances will need to be raised to tie in with the new roadway alignment.

Apply erosion control and rural seeding and fertilizing to all disturbed areas.

A flowage easement of approximately 39 acres will be required for areas upstream of both the proposed bridge alternatives that exceed 1.5 ft. of backwater.

Right of Way will be required for this project.

The existing 2 girder bridge cannot be removed in stages. Off-site detour will be required.

Alternate #1

Bridge Items	Qty.	Unit	Est. Cost
New Bridge	22,262	SF	$ 2,449,000
Bridge Removal	14,100	SF	$ 141,000
Erosion Stone	5,425	TON	$ 199,000
Coffer Dams	2	EACH	$ 50,000
Mobilization	10%		$ 284,000
M & C	20%		$ 625,000
Bridge Costs			**$ 3,748,000**

Roadway Items	Qty.	Unit	Est. Cost
Clear & Grubb	0.5	ACRE	$2,700
Bridge Approaches	450	SY	$ 83,200
Embank-In-Place (Contractor Furnish)	9,180	CY	$ 111,200
Excavation Class 10 Waste	1,000	CY	$ 10,900
Excavation Class 13 Waste	500	CY	$ 5,400
HMA Pavement	2,190	TON	$ 306,600
Modified Subbase	850	CY	$ 35,300
Granular Shoulder Type A	600	TON	$ 12,600
Paved Shoulders for Guardrail	450	SY	$ 28,300
Removal of Pavement	4,700	SY	$ 41,000
Culvert, 54” RCP W/ Gate	206	LF	$ 40,300
MH SW-402	1	EACH	$ 4,700
Subdrain & Outlets	600	LF	$ 11,100
Guardrail (Includes Removal)	340	LF	$ 25,500
Class 10 for Guardrail Blisters	2	EACH	$ 26,300
Bridge End Drains	2	EACH	$ 5,000
Flowage Easement Cost	39	Acres	$ 273,000
Debris Removal	1	LS	$ 5,000
Wetland Mitigation	1	LS	$ 50,000
Erosion Control	1	LS	$ 50,000
Traffic Control	1	LS	$ 50,000
Mobilization	5 %		$ 58,900
M & C	30 %		$ 371,100
Roadway costs			$ 1,608,000
Project Total			**$ 5,356,000**

Alternate #2 The existing 3 spans, 385 ft. x 30 ft. continuous girder and floor beam system bridge will be replaced with a 3 span, 440 ft. x 44 ft. continuous welded girder bridge. This Alternate was evaluated to provide a structure that could reduce potential for debris snagging on piers by completely spanning the channel. If this option was to be further considered, a roadway profile grade raise of about 3.4’ at center channel would be recommended to pass floating debris and to meet a 3’ minimum required for a flood plain permit.

Considering the continuous welded girder alternate bridge cost is $ 471,000 more than the pretensioned prestressed concrete beam, plus a 3.4 ft grade raise requiring additional mainline reconstruction, in addition to a longer detour time for construction. This would put Alternate #2 at a cost in an excess of $ 581,000 more than Alternate #1.

Alternate

Bridge Items	Qty.	Unit	Est. Cost
New Bridge	21,165	SF	$ 2,821,000
Bridge Removal	14,100	SF	$ 141,000
Erosion Stone	7,784	TON	$ 184,000
Coffer Dams	2	EACH	$ 50,000
Mobilization	10%		$ 320,000
M & C	20%		$ 703,000
Bridge Costs			$ 4,219,000

Roadway Items			
Clear & Grubb	.5	ACRE	$2,700
Bridge Approaches	450	SY	$ 83,200
Embank-In-Place (Contractor Furnish)	12,700	CY	$ 110,700
Excavation Class 10 Waste	1,217	CY	$ 13,000
Excavation Class 13 Waste	608	CY	$ 6,100
HMA Pavement	2,434	TON	$ 363,300
Modified Subbase	1,034	CY	$ 42,500
Granular Shoulder Type A	600	TON	$ 12,600
Paved Shoulders for Guardrail	450	SY	$ 28,300
Removal of Pavement	5,720	SY	$ 48,700
Culvert, 54" RCP W/ Gate	206	LF	$ 40,300
MH SW-402	1	EACH	$ 4,700
Subdrain & Outlets	800	LF	$ 18,000
Guardrail (Includes Removal)	340	LF	$ 25,500
Class 10 for Guardrail Blisters	2	EACH	$ 26,300
Bridge End Drains	2	EACH	$ 5,000
Flowage Easement Cost	39	Acres	$ 273,000
Debris Removal	1	LS	$ 5,000
Wetland Mitigation	1	LS	$ 50,000
Erosion Control	1	LS	$ 50,000
Traffic Control	1	LS	$ 50,000
Mobilization	5 %		$ 63,000
M & C	30 %		$ 396,600
Roadway costs			$ 1,718,000
Project Total			**$ 5,937,000**

B. Detour Analysis

U.S. 92 will be closed, and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 120 calendar days.

Detour from IA 92, the detour would follow IA 23 south approximately 16 miles to IA 149, then east approximately 4 miles to IA 21, then north approximately 13 miles back to U.S. 92. Out of distance travel is 18.5 miles. The eight bridges along the detour route have been reviewed and are not deficient, unrestricted and able to accommodate legal loads.

Off-site Detour for approximately 120 calendar days - The total distance user cost is anticipated to be $1,541,000. The cost for county road maintenance will be $ 0 as calculated by the Gas Tax Method.

C. Recommendations

It is recommended that the present structure be replaced as described in Alternate #1.

D. Construction Sequence

It is anticipated that all work on this project will be awarded to one prime contractor. The Office of Bridges & Structures will coordinate the plan preparation with assistance from the Office of Design.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to U.S. 34; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

The selected off-site detour has an out of distance travel length of 18.5 miles. The ABC Rating Score of 45 for this detour is less than the first stage filter threshold of 50, indicating that the bridge is a good candidate for traditional construction methods. Unless requested by the District or others, the project will not undergo further ABC evaluation

Existing overhead utility lines on the north side of bridge.

Debris removal adjacent to existing piers may be needed.

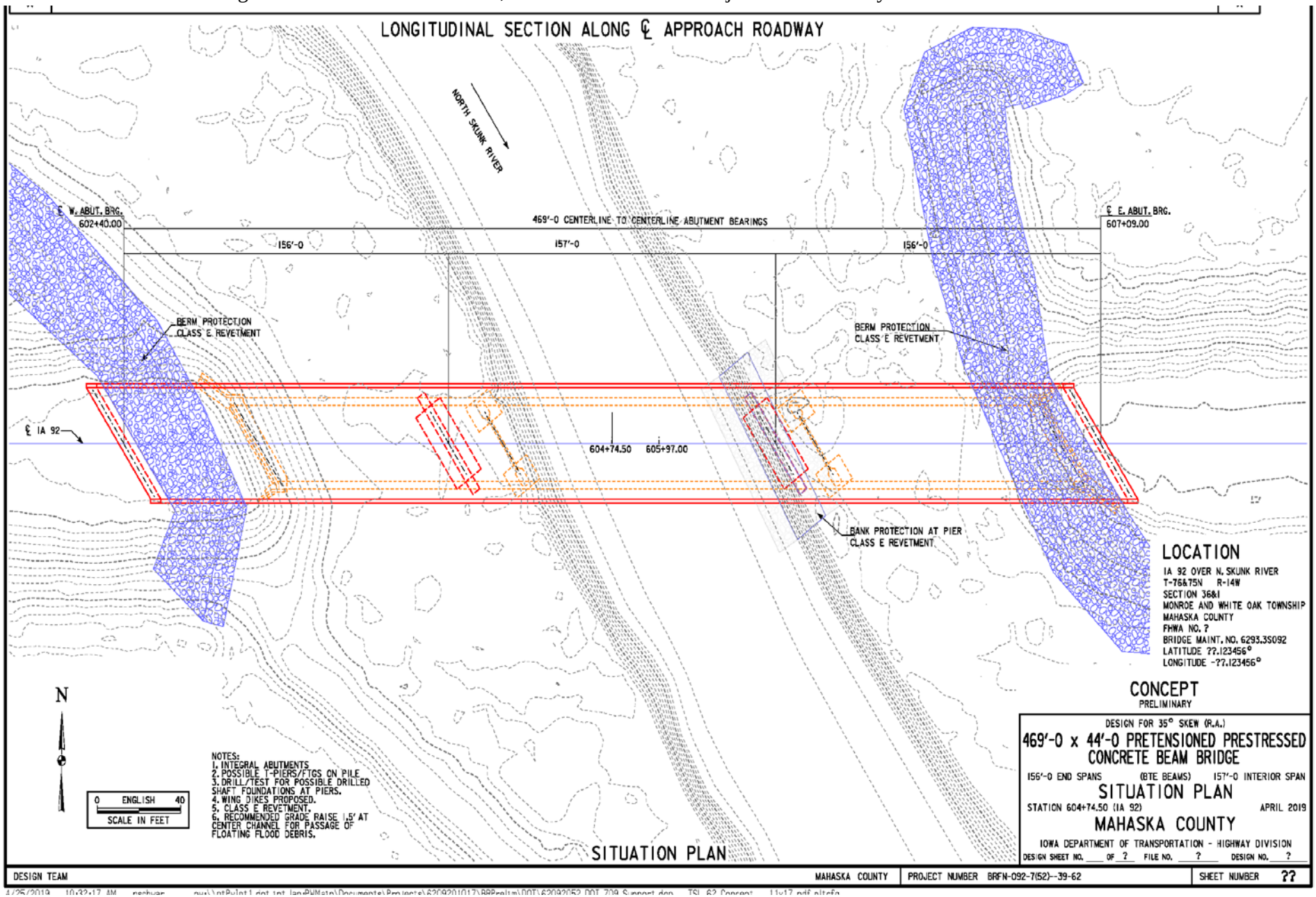
Right of Way will be required for this project.

The Office of Location and Environment has reviewed this project and based on preliminary desktop observations, has determined that a Section 404 Permit will be required. It is expected that the work will be covered by Nationwide Permit 14 or Regional Permit 7.

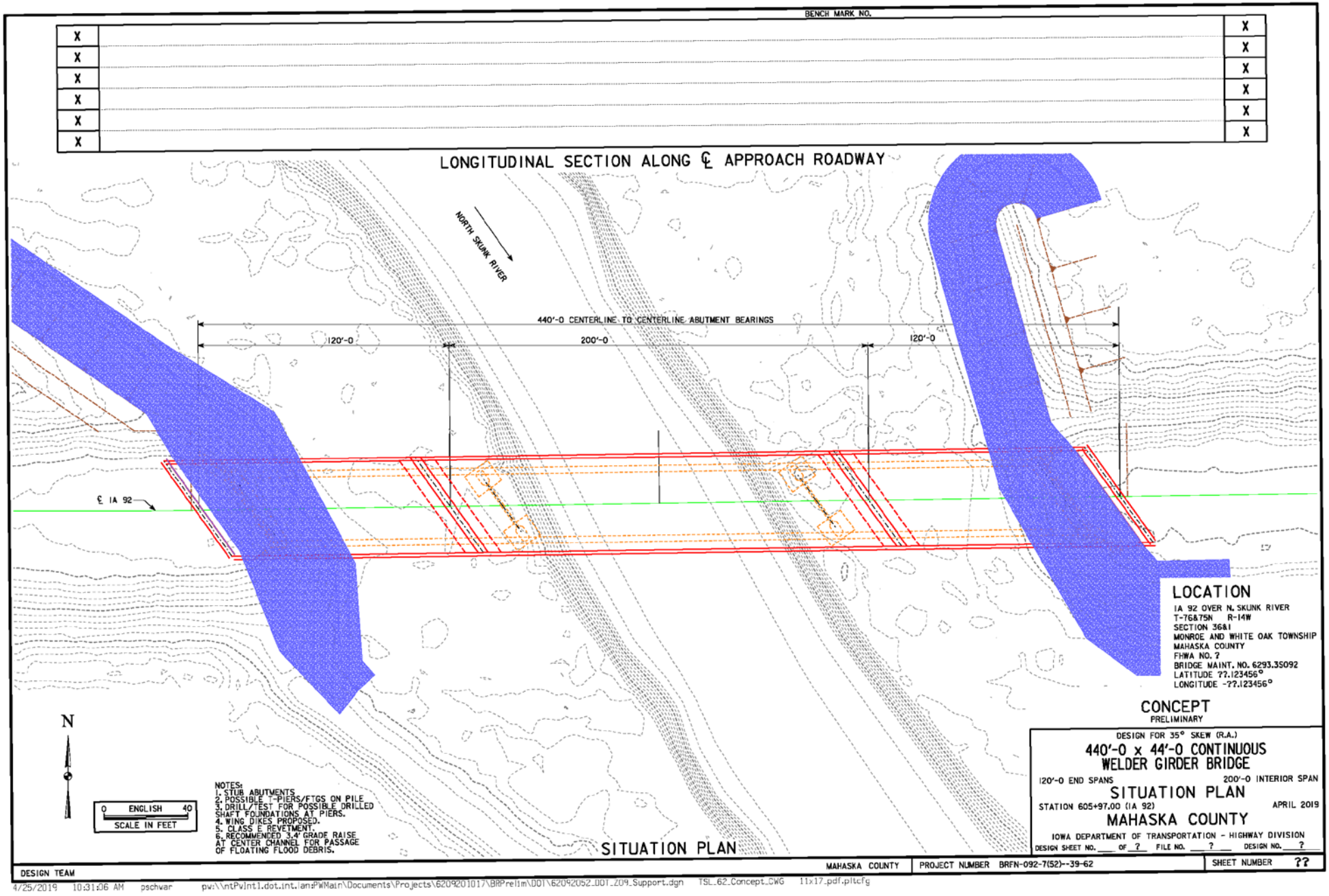
G. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2019-2023 Iowa Transportation Improvement Program, with $3,900,000 programmed for replacement in FY 2022. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

Alternate #1 - IA 92 bridge over the North Skunk River, 2.6 miles east of the east junction of County Road V13.



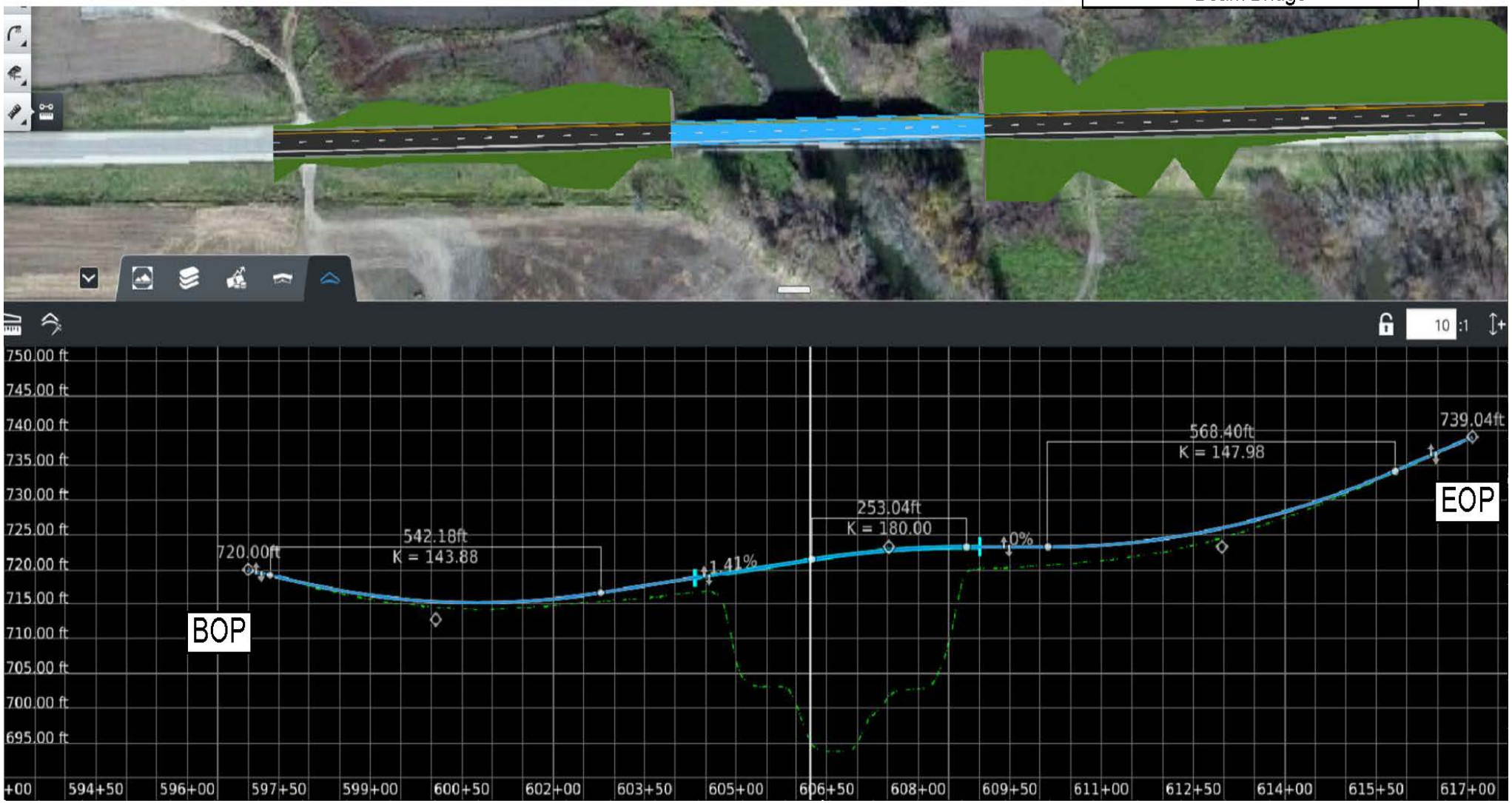
Alternate #2 - IA 92 bridge over the North Skunk River, 2.6 miles east of the east junction of County Road V13.

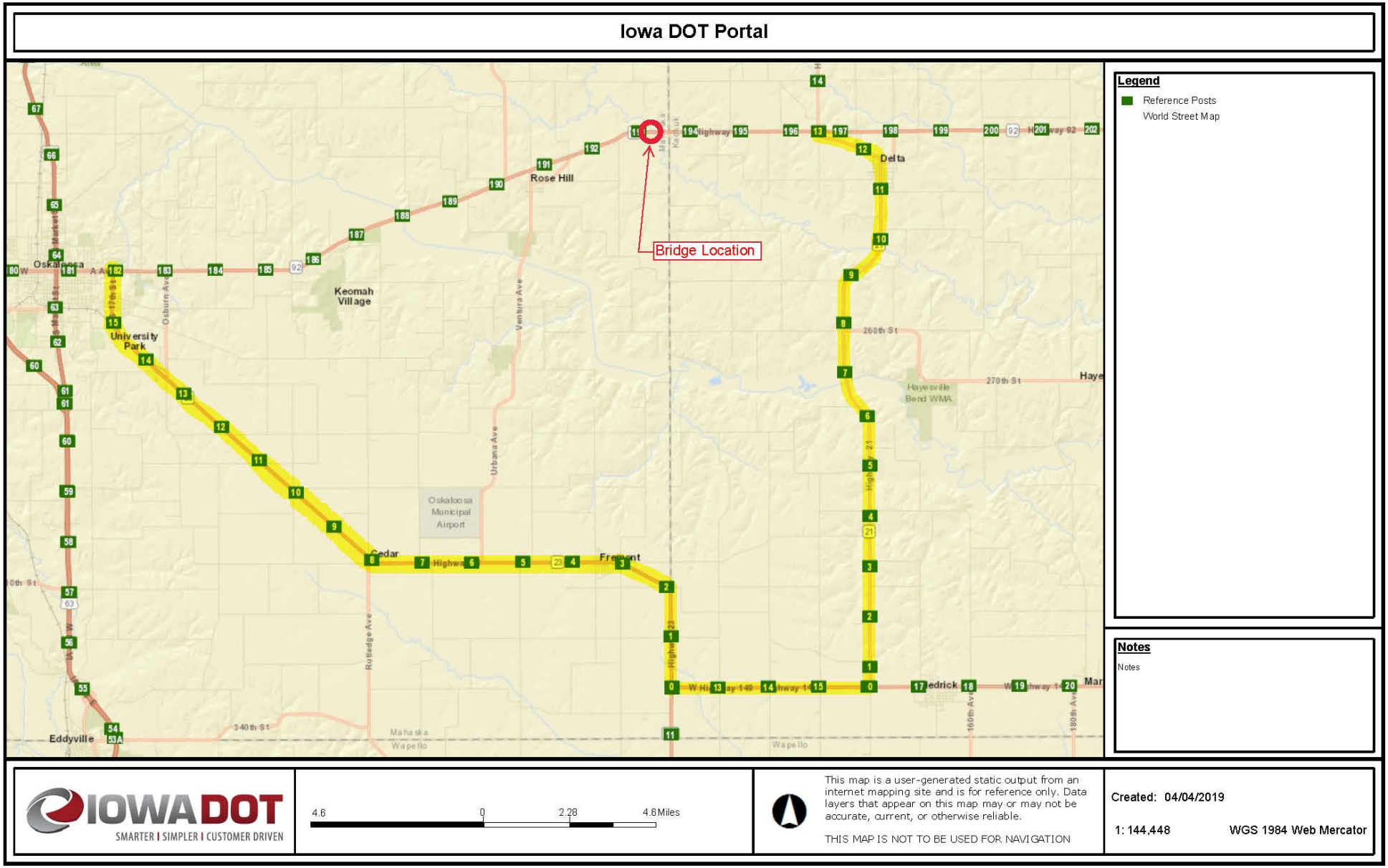


Mahaska County
PIN: 16-44-034-010
Project Number: BRFN-078-1(20)--39-54
Location: DME RR 8.8 mi E of IA 149
FHWA No.: 32690 Maint.
No.: 5408.8S078

EXISTING BRIDGE
385 ft. x 30 ft.
Continuous Welded Girder Bridge

PROPOSED BRIDGE
469 ft. x 44 ft.
Pretensioned Prestressed Concrete
Beam Bridge




Iowa DOT Portal
Bridge Location
Rose Hill
Delta
Keomah Village
University Park
Oskaloosa Municipal Airport
Hayesville Bend WMA
Eddyville
Cedar
Fremont
260th St
270th St
340th St
Legend
Reference Posts
World Street Map
Notes
Notes
IOWA DOT
SMARTER | SIMPLER | CUSTOMER DRIVEN
4.6 0 2.28 4.6 Miles
This map is a user-generated static output from an internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION
Created: 04/04/2019
1: 144,448
WGS 1984 Web Mercator

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Bridge Office Attachment for Concept Statement

Date: July 17, 2018
By: Patricia Schwarz
Location: IA 92 over North Skunk River

County: Mahaska
Project No.: BRFN-092-7(52)--39-62
Pin No.: 17-62-092-010

1. Regulatory/Coordination
   a. Iowa DNR Flood Plain permit = Yes
   b. Iowa DNR Sovereign Lands permit = No
   c. Local Record of Coordination = No
   d. Flood Insurance Study = Yes, Zone A (19123C0300C June 16, 2011)
   e. Drainage District = No (Per Mike Rodwell, Mahaska Co. 641-672-2897)
   f. Corps of Engineers Section 408 = No
   g. Railroad = No

2. Hydrologic/Hydraulic Analysis/RIDB Dataset
   a. The site hydrology has been determined (Alternate regression-weighted estimate per USGS Bk 4, Chapter 6, Page 9). Gage 05472500.
   b. A 2-D model utilizing SRH-2D has been developed to the concept level.
   c. RIDB Dataset is required (Site ID = SkunkR_N_041.3). RIDB data for the existing bridge has been previously collected.

3. Structure/Roadway Layout Considerations
   a. It is proposed to “Use as Constructed” the existing roadway profile grade.
   b. Wing dikes are proposed on the upstream side.
   c. T-Piers with pile foundations are concepted. However, the drilling plan should include completion of borings and lab testing for consideration of drilled shaft foundations at the piers.
   d. The proposed skew exceeding 30 degrees for BTE beams was discussed and accepted by the Preliminary Bridge Section Engineer and the Assistant Bridge Engineer on July 16, 2018.

4. Special construction/ROW issues
   a. A flowage easement of approximately 39 acres will be required for areas upstream of the proposed bridge that exceed 1.5’ of backwater.

5. Aesthetic enhancements = No

6. Other
   a. The existing 2 girder bridge cannot be removed in stages. Traffic is proposed to be detoured off site during construction of the new bridge.

7. Special survey
   a. The normal survey content and limits are anticipated to be sufficient.