IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE:	District 3	**DATE:**	August 13, 2019
ATTENTION:	Tony Lazarowicz	**PROJECT:**	Monona County BRFN-175-1(75)--39-67
FROM:	John Bartholomew		PIN: 17-67-175-020
OFFICE:	Design		
SUBJECT:	Project Concept Statement; (Final, D0)		

This project involves the replacement of the Hwy 175 bridge (Maint No. 6727.6S175) over the Maple River, 1.1 mi W of E Jct. IA 141.

A concept review was held on 11/14/2018. Those present included Tony Lazarowicz and Darwin Bishop from the District 3 Office; Bill Kaufman and Matthew Erickson from the Bridges and Structures Bureau; and Kevin Patel, John Bartholomew and Sis Henning from the Design Bureau.

The two alternatives considered were:
1. Replace with a 299'-0 x 44'-0 prestressed beam bridge with an off-site detour. The estimated cost for this alternative is $2,602,800.
2. Replace with a 299'-0 x 49'-0 prestressed beam bridge with staged construction. This alternative was discussed and dismissed.

Alternative 1 is the preferred alternative due to shorter construction time and reduced costs. Additional right of way/right of entry will not be required. Traffic will be maintained by an off-site detour.

The Draft Project Concept Statement was sent out for review on August 1st, comments and concerns to be resolved by August 12th. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2020. The Bridges and Structures Bureau will coordinate plan preparation with assistance from the Design Bureau.

JEB:sh

Attach.
cc:

C. Purcell
S. J. Megivern
M. Nop
D. R. Tebben
J. W. Laaser-Webb
E. C. Wright
N. M. Miller
B. E. Azeltine
S. J. Gent
J. Selmer
D. R. Claman
M. E. Khoda
D. Bishop
B. Dolan
D. Schultz
M. Wright
FHWA

M. J. Kennerly
J. S. Nelson
M. A. Swenson
K. Brink
W. A. Sorenson
M. E. Ross
C. C. Poole
B. D. Hofer
S. Anderson
K. K. Patel
J. Hauber
K. Olson
V. Brewer
T. Huju
M. K. Solberg

K. D. Nicholson
B. Walls
R. A. Younie
D. L. Newell
D. E. Sprengeler
A. A. Welch
M. J. Sankey
T. D. Crouch
P. C. Keen
S. Godbold
A. Abu-Hawash
S. Neubauer
M. Carlson
D. Manley
S. Tymkowicz

FINAL PROJECT CONCEPT STATEMENT

IA 175 Bridge over Maple River, 1.1 Mi. W. of IA 141

Monona County
Proj. # BRFN-175-1(75)--39-75
PIN:17-67-175-020
Maint. No. 6727.6S175
FHWA No. 37080

Highway Division
Design Bureau

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

August 13, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 175 bridge (Maint. No 6727.6S175) over the Maple River, 1.1 miles west of IA 141.

The two alternatives considered were:
1. Replace with a 299'-0 x 44'-0 prestressed beam bridge with an off-site detour. The estimated cost for this alternative is $2,602,800.
2. Replace with a 299'-0 x 49'-0 prestressed beam bridge with staged construction. This alternative was discussed and dismissed.

Alternative 1 is the preferred alternative due to a shorter construction time and reduced costs.

B. Need for Project

This is a 240' x 26' steel beam bridge that was built in 1955. An overlay was added in 1988 with epoxy injections in 2013 and has reached the end of its service life. Both the top and bottom deck have delamination, hollows and wide cracks. The steel beams and bearings have heavy corrosion and section loss with deterioration accelerating due to leaking joints. Erosion at the abutment has led to undermining, exposing two wood piles. Due to the condition of the overall structure, it is recommended the bridge be replaced.

C. Present Facility

The existing structure is a 240’ x 26’ continuous I-beam bridge constructed in 1955.

IA 175 in the project area is 22’ wide HMA pavement with 6’ to 8’ wide granular shoulders and 3:1 foreslopes, constructed in 1955. HMA resurfacing was accomplished in 1974 and 2008.

D. Traffic Estimates

The 2022 construction year and 2042 design year average daily traffic estimates are 1300 ADT with 16 % trucks and 1500 ADT with 17 % trucks, respectively.

E. Sufficiency Ratings

IA 175 is classified as an “access” route and is a maintenance service level “C” road. The federal bridge sufficiency rating is 54.2.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2014 through December 31, 2018, there was 1 personal property crash.

II. PROJECT CONCEPT

A. Feasible Alternative

Alternative #1 - Replace with a bridge with off-site detour.

The existing 240’ x 26’ continuous I-beam bridge will be replaced with a 3 span, 299’ x 44’ pretensioned prestressed concrete beam bridge.

This bridge will be constructed on the existing vertical and horizontal alignment. New bridge approaches will be constructed. The existing guardrail will be replaced with new guardrail and the shoulders will be paved 20’ beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Class E revetment will be placed under the bridge for slope protection. New bridge end drains will be constructed on both ends of the bridge.

The bridge approaches will be 44’ wide, with 12’ lanes painted at 11’ to be consistent with the roadway and include 10’ shoulders. There will be no additional reconstruction beyond the bridge approaches.

An inspection revealed there is asbestos in the expansion joint material between the top of the abutments and the bridge deck/diaphragms. The bridge contractor will need to have a licensed asbestos abatement contractor on site to wet and bag the material as it is exposed during demolition. The asbestos contractor may have to pick through some concrete debris to clean up the waste. The cost for this should be around $5000.

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

It appears that no right of way will be required for this project.

Traffic will be maintained by an off-site detour.

Bridge Items	Estimated Costs
New Bridge	$ 1,499,200
Bridge Removal	54,700
Cofferdams – 2	50,000
Revetment	55,000
Mobilization - 10%	165,900
M & C - 15%	365,000
Bridge Costs	**$ 2,189,800**

Roadway Items	
Bridge Approaches	$73,900
Removal of Pavement	10,600
Guardrail (Includes Removal)	11,700
Paved Shoulders for Guardrail	65,100
Class 10 for Guardrail Blisters	29,800
Bridge End Drains	40,000
Removal of Asbestos	5,000
Seeding and Fertilizing	2,500
Erosion Control	14,800
Traffic Control - 5%	1,900
Mobilization - 5%	33,800
M & C - 30%	123,000
Roadway costs	**$ 413,000**
Project Total	**$2,602,800**

B. Detour Analysis

State Highway 175 will be closed, and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 210 days. The detour would follow E34 east 6 miles to L32. Go north on L32 to Iowa 141 for 6.6 miles, and Iowa 141 to Iowa 175 for 1.1 miles. Out of distance travel is 4.2 miles. The total distance user cost is anticipated to be $283,784. The cost for county road maintenance will be $35,877 as calculated by the Gas Tax Method. Detour signing costs will be $10,000. Poor sight distance may exist at the E34 and L32 intersection, advanced warning signs may be needed.

C. Recommendations

It is recommended that the present structure be replaced, as described in Alternative No. 1.

D. Construction Sequence

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

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to Iowa 175; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

This will not be a traffic critical project.

The ABC Rating Score of 27 is less than the first stage filter threshold of 50, however was considered per District's request but not advanced to project concept statement.

No bike path or sidewalk will be required as part of this project.

There is a USGS (United States Geological Survey) stream gauge that will need removed and replaced. There is also an RWIS (Roadway Weather Information System) that will be removed and replaced.

It was also discussed that a deck overlay may be considered on the adjacent bridge just to the north east (FHWA 37091, Maint no. 67027.8S175) while the detour is in place for the bridge replacement. District 3 will discuss this with the Bridges and Structures Bureau.

Right of Way does not appear to be required for this project.

The Location and Environment Bureau has reviewed this project and has noted that the replacement of the existing IA 175 bridge over the Maple River will require a 404 Permit. However, the bridge replacement project should be a routine Nationwide Permit #14 and not require any stream or wetland mitigation.

F. Program Status

Site data has been developed by the Design Bureau. This project is listed in the 2020-2024 Iowa Transportation Improvement Program, with $2,000,000 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.

JEB:sh

Bridge Cost Estimate for Concept Statement

Monona County IA 175 over Maple R., 1.1 Mi. W. of IA 141

By: W. Kaufman 11/14/18

Location - IA 175 Over Maple R. MP 27.6 (Project Site):

County: Monona
Proj. No.: BRFN-175-1(75)—39-67
Des. No.: 1654A
Pin No.: 17-67-175-020
Maint. No.: 6727.6S175
FHWA No.: 37080
On IA 175 over Maple R.
Sta.: 664+20.00
Section 23, T 85 N, R 43 W
Functional Class: Rural-Minor Arterial ADT: 1,190 vpd

- Existing Bridge(s):

Type: I-Beam
Length x Width: 240'-0 x 26'-0
Pier Type: Frame/Diaphragm
Abut. Type: Stub
Spans: 2@73'-3, 1@93'-6
Approach Pavement Width: 24'
Skew: 30 deg. L.A.
Design Loading: H-20
Drainage Area: 670 sq. mi.
Existing Bridge Width Acceptable: No
New/Reconstructed Roadway Width: 44'
Repair/Remodel by Staging Traffic: No

Commentary:

No grade raise required from a hydraulic standpoint. A minor grade raise may be desirable to better match approach grades.

Required bridge length based on 3:1 (effective) slope from thalweg elevation.

- Floodplain Development Regulatory Compliance / Hydraulic Analysis

The stream reach affected by the project falls within the study area of the following National Flood Insurance Program (NFIP) Flood Insurance Study (FIS): "Monona County, Iowa and Incorporated Areas", FIRM Panel 19133C0055C, Effective date May 2, 2002. The FIS for the effected stream reach is non-detailed (Zone A), therefore no floodway is designated or Base Flood Elevations (BFE) established. Backwater is limited to 1 foot or less from the BFE at insureable structures in the floodplain. The BFE is the 100 yr. event water surface for the NFIP base condition, assumed to be Existing condition.

The proposed bridge is compliant with NFIP and IADNR regulatory requirements.

- Accelerated Bridge Construction:

ABC Rating Score:

Chapter 8 of the IaDOT LRFD Bridge Design Manual was followed to determine whether or not the bridge replacement project is a good candidate for ABC construction.

The ABC Rating score of 27 is less than the first stage filter threshold of 50.

Structural design personnel were contacted regarding ABC characteristics at this site and provided the following guidance:

- Closure duration. For conventional ABC construction a four (4) week road closure required (Tier 3). Lateral slide of new superstructure, rolled steel assumed at this stage. Pier type could influence schedule, frame or drilled shaft/frame anticipated.
- ABC Cost Premium. Approximately 30% over conventional construction.
- Other Considerations:
  Right-of-Way: For the lateral slide technique a construction easement extending 75 ft.+ out from the edge of the existing structure will be required.

A preliminary ABC concept option (Option 3) has been developed.

Upon preliminary evaluation the concept team does not propose that the project undergo further ABC evaluation. Therefore the ABC bridge replacement option in this document is not advanced to the project concept statement.

Bridge Concept Statement

Monona County
BRFN-175-1(75)—39-67

Option 1 Off-Site Detour

Type: Prestressed Beam Bridge (BTD) Length x Width: 299'-0 x 44'-0
Pier Type: Tee Abutment Type: Integral
Spans: 2@86'-0, 1@127'-0 Skew: 30 deg. L.A.
Stage Traffic: **No. Off site detour.**
Costs:

Bridge - 302.5' x 47.2' o/o slab @ $105.00/sf	= $ 1,499,200
Remove Exist. Bridge - 244.0' x 32.0' @ $7.00/sf	= $ 54,700
Cofferdam - 2 EA @ $25,000/EA	= $ 50,000
Revetment - 550 T/Abut = 1,100 TON @ $50/TON	= $ 55,000
Subtotal Bridge Cost Option 1	$ 1,658,900
Mobilization (10%)	= $ 165,900
Base Bridge Cost Option 1	$ 1,824,800
Misc. and Contingency (D0) (20%)	= $ 365,000
Total Bridge Cost Option 1	$ 2,189,800

Comments: None

Option 2 Staged Construction

Type: Prestressed Beam Bridge (BTD) Length x Width: 299'-0 x 49'-0
Pier Type: Tee Abutment Type: Integral
Spans: 2@86'-0, 1@127'-0 Skew: 30 deg. L.A.
Stage Traffic: **Yes. One-way traffic Stage I. One-way traffic Stage II.**
Costs:

Bridge - 302.5' x 52.2' o/o slab @ $105.00/sf	= $ 1,658,000
Stage Construction @ 20% (per Blackhawk Des. 111)	= $ 331,600
Remove Exist. Bridge - 244.0' x 32.0' @ $7.00/sf	= $ 54,700
Cofferdam - 2 EA @ $25,000/EA	= $ 50,000
Revetment - 550 T/Abut = 1,100 TON @ $50/TON	= $ 55,000
Subtotal Bridge Cost Option 2	$ 2,149,300
Mobilization (10%)	= $ 214,900
Base Bridge Cost Option 2	$ 2,364,200
Misc. and Contingency (D0) (20%)	= $ 472,800
Total Bridge Cost Option 2	$ 2,837,000

Comments: None

Bridge Concept Statement

Monona County
BRFN-175-1(75)—39-67

Option 3 - ABC Tier 3, Four (4) Week Closure - Information Only

Type: Rolled Steel Beam Bridge — Length x Width: 300'-0 x 44'-0
Pier Type: Frame — Abutment Type: Integral
Spans: 2@86'-0, 1@128'-0 — Skew: 30 deg. L.A.

Stage Traffic: **No.** Off-Site detour.

Accelerated Bridge Construction (ABC), Tier 3. Superstructure lateral slide. Four (4) week traffic closure.

Superstructure substantially completed on temporary substructure adjacent to existing bridge, substructure (piers) partially completed. Traffic maintained on existing bridge during superstructure construction. Existing bridge removal, completion of substructure construction and lateral slide of superstructure performed during traffic closure. Four (4) week traffic closure assumed to complete this work.

Notes: Construction easement required, ABC, 100' Lt./Rt.

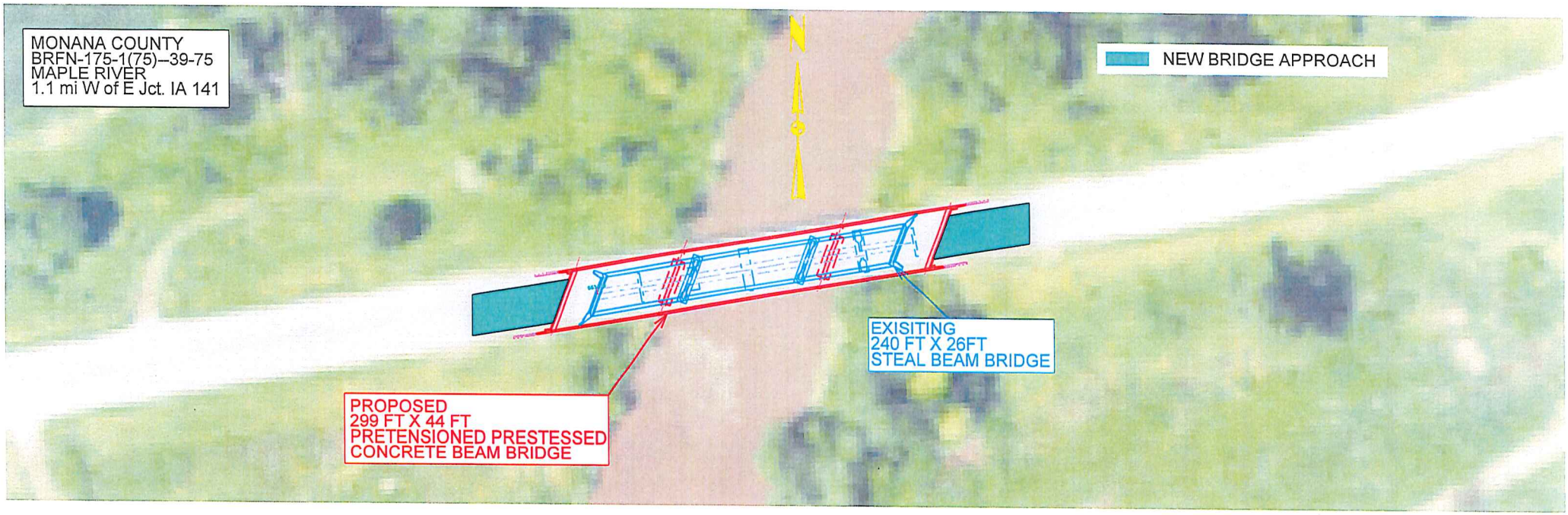
Costs:

Bridge - 303.5' x 47.2' o/o slab @ $105.00/sf	= $	1,504,100
ABC - Lateral Slide Tier 3 @ 30%	= $	451,200
Remove Exist. Bridge - 244.0' x 32.0' @ $7.00/sf	= $	54,700
Cofferdam - 4 EA @ $25,000/EA	= $	100,000
Revetment - 550 T/Abut = 1,100 TON @ $50/TON	= $	55,000
Subtotal Bridge Cost Option 3	$	2,165,000
Mobilization (10%)	= $	216,500
Base Bridge Cost Option 3	$	2,381,500
Misc. and Contingency (D0) (20%)	= $	476,300
Total Bridge Cost Option 3	$	2,857,800

Comments: Information only. ABC Option not advanced to project concept statement.
Addl. cofferdam construction to account for pier column construction both sides of existing bridge in advance of closure.

Revisions:

11/08/18 Original Document
11/14/18 Revised per Field Exam comments


MONANA COUNTY
BRFN-175-1(75)--39-75
MAPLE RIVER
1.1 mi W of E Jct. IA 141
N
NEW BRIDGE APPROACH
EXISITING
240 FT X 26FT
STEAL BEAM BRIDGE
PROPOSED
299 FT X 44 FT
PRETENSIONED PRESTESSED
CONCRETE BEAM BRIDGE

MONONA COUNTY

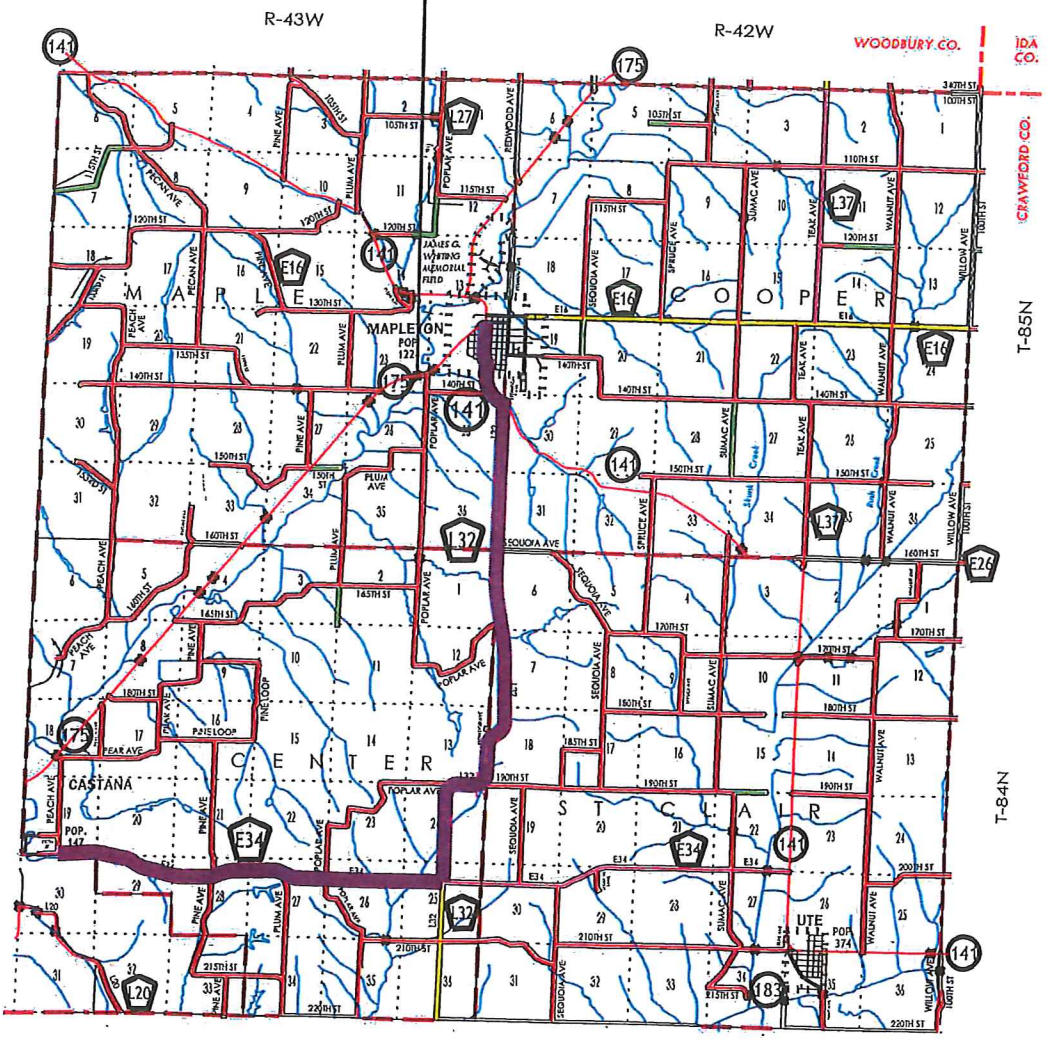
STA 664+20.00
FHWA 37080
MAINT. 6727.6S175
DESIGN 1654

MAPLE RIVER
1.0 MI W OF E JCT IA 141
BRFN-175-1(75)—39-67
PIN: 17-67-175-020

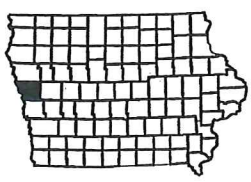
MONONA COUNTY

STA 664+20.00
FHWA 37080
MAINT. 6727.6S175
DESIGN 1654

DETOUR



MAPLE RIVER
1.0 MI W OF E JCT IA 141
BRFN-175-1(75)--39-67
PIN: 17-67-175-020



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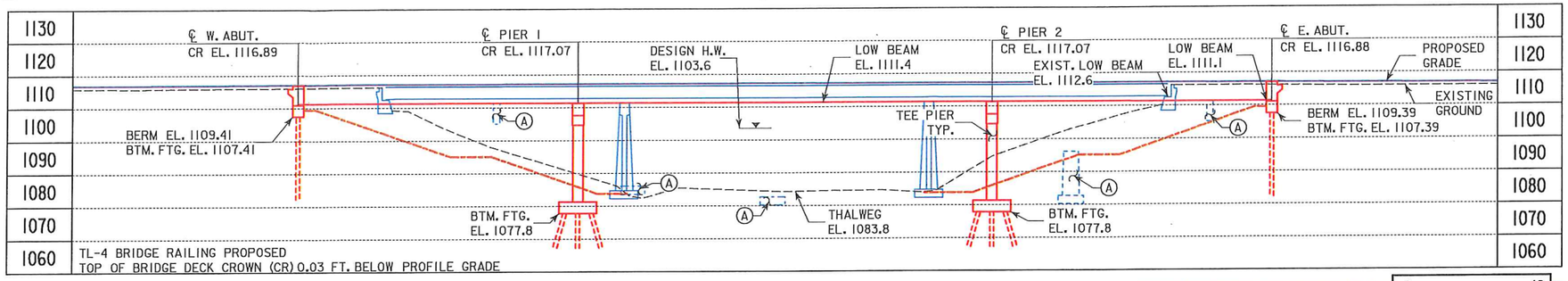
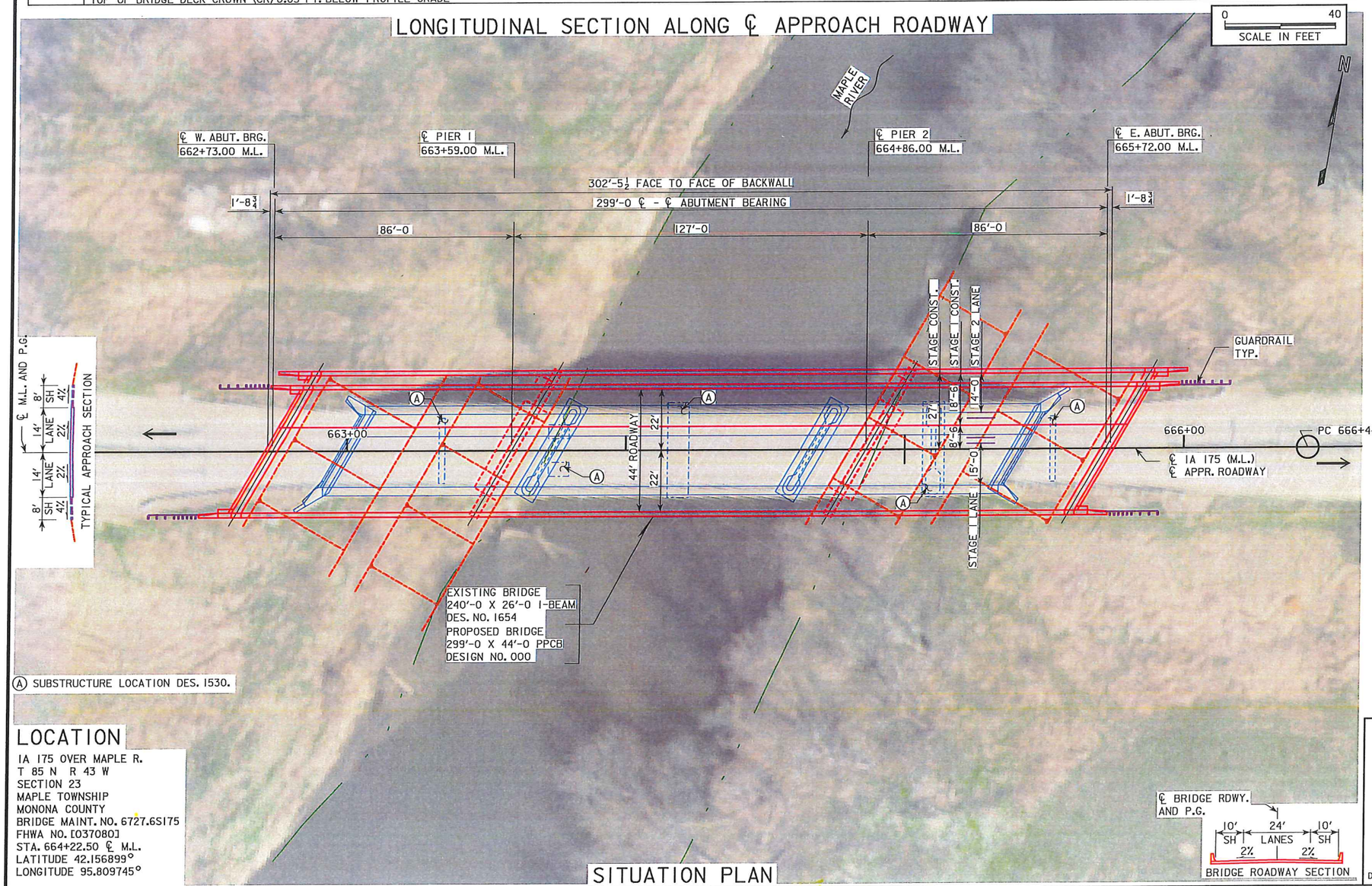
Utility Name	Utility Type	Contact Name	Phone	E-Mail
Centurylink	Fiber	Tom Sturmer	720.578.8090	Thomas.sturmer@centurylink.com
MidAmermican Energy - Electric	Electric	Ryan Boell	712.792.7055	rdboell@midamerican.com
MidAmermican Energy - Gas	Gas	Ryan Boell	712.792.7055	rdboell@midamerican.com
Windstream Communications	Fiber	Locate Desk	800.289.1901	LOCATE.DESK@WINDSTREAM.COM
USGS Water Level Monitor	Permit 67A-10	Matt Noon	712.250.0832	mjnoon@usgs.gov
U of I Water Quality Monitor	67A-2016-003	Caroline Davis	319.329.9245	caroline-davis@uiowa.edu



LONGITUDINAL SECTION ALONG ℄ APPROACH ROADWAY

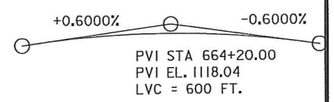
0 40
SCALE IN FEET



SITUATION PLAN

LOCATION

IA 175 OVER MAPLE R.
T 85 N R 43 W
SECTION 23
MAPLE TOWNSHIP
MONONA COUNTY
BRIDGE MAINT. NO. 6727.6SI75
FHWA NO. I037080
STA. 664+22.50 ℄ M.L.
LATITUDE 42.156899°
LONGITUDE 95.809745°



PROPOSED PROFILE GRADE IA 175

HYDRAULIC DATA

DRAINAGE AREA = 670 SQ. MI.
STREAM SLOPE = 3.78 FT./MI.
AVG. LOW WATER STAGE = EL. 1087.3

Q_{50} = 22,900 CFS
STAGE = EL. 1103.6
REGULATORY LOW BEAM = 1111.4
BACKWATER = 0.18 FT.
AVG. BRIDGE VELOCITY = 7.3 FPS

Q_{100} = 26,100 CFS
STAGE = EL. 1104.3
OPERATIONAL LOW BEAM = 1111.1
BACKWATER = 0.21 FT.
AVG. BRIDGE VELOCITY = 7.9 FPS

Q_{200} = 30,400 CFS
STAGE = EL. 1105.1
AVG. BRIDGE VELOCITY = 8.8 FPS
CALCULATED DESIGN SCOUR = EL. XXXX.X

Q_{500} = 33,700 CFS
STAGE = EL. 1105.7
AVG. BRIDGE VELOCITY = 9.4 FPS
CALCULATED CHECK SCOUR = EL. XXXX.X

ROADWAY OVERTOP >500 YR. EVENT
ROADWAY OVERTOP EL. 1108.1
STA. 626+50 (MP 26.9)

PRELIMINARY

DESIGN FOR 30° SKEW (L.A.)

299'-0 X 44'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE

86'-0 END SPANS BTD BEAMS 127'-0 INT. SPANS

SITUATION PLAN

STATION 664+22.50 IA 175 OCT. 2021

MONONA COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 1 OF 1 FILE NO. XXXXX DESIGN NO. 0000

DESIGN TEAM	MONONA COUNTY	PROJECT NUMBER BRFN-I75-1(75)--39-67	SHEET NUMBER