

travel is 10 miles. The District Office requested that the pavement markings be updated on the detour route prior to placing traffic on it. A county agreement will be required for the use of this detour route.

It appears that right of way will be required to construct and maintain this project.

Urban seed mixture should be used for properties on the north side of the roadway.

No plans are included in this submittal; however plan sheets may be viewed as pdf files at PW:\projectwise.dot.int.lan:PWMain\Documents\Projects\760031013\Design\D2Submittal\D2_76003049_Plan.pdf

This project is currently scheduled for a November 2017 letting. The final concept cost estimate for this project was \$652,000. The current cost estimate is now approximately \$702,700 (\$418,000 for bridge items and \$284,700 for roadway costs).

Machine Guidance Electronic Files Checklist

Add information to address any incomplete items below:

| Yes | N/A | No | |
|-------------------------------------|--------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Horizontal and Vertical Alignments Complete |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Typical Templates showing proposed Pavement, Shoulder, Foreslope design |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Correct Feature Naming for Roadway Breaklines and Components |

KKP:

| | | |
|------------------|------------------|-------------------|
| M. J. Sankey | S. J. Gent | M. J. Kennerly |
| D. A. Widick | W. A. Sorenson | D. L. Maifield |
| T. L. Gettings | E. C. Wright | B. R. Smith |
| J. Holst | N. L. Cuva | J. P. Rost |
| K. D. Nicholson | K. Brink | J. E. Laaser-Webb |
| T. Crouch | V. A. Brewer | D. R. Tebben |
| M. D. Masteller | M. Wright | M. A. Swenson |
| C. B. Brakke | D. E. Sprengeler | N. L. McDonald |
| D. A. Popp | B. Bradley | G. A. Novey |
| D. R. Claman | J. McCollough | S. P. Anderson |
| B. Hofer | B. Kimble | S. Tymkowicz |
| D. Bishop | K. Clute | S. McElmeel |
| D. Manly | P. C. Keen | T. Hamski |
| J. R. Schoenrock | Z. T. Bitting | Local FHWA |
| W. N. Cameron | J. Garton | T. Bowman |
| M. Carlson | A. Schleier | |



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

**PRIMARY ROAD SYSTEM
POCAHONTAS COUNTY
BRIDGE REPLACEMENT**

IA 3, BRANCH 19, 0.3 MILES W OF IA 4

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.14 of the Specifications.



Field Exam 9/24/15

*Tony Lazarowicz
Darwin Bishop
Mark Wright* } *District 3*

Chris King - Bridge

*Jason Holst
Amy Schleier
Kevin Patel* } *Design*

| DESIGN DATA RURAL | | | |
|--------------------|-------|--------|--|
| 2019 AADT | 2,800 | V.P.D. | |
| 2039 AADT | 3,400 | V.P.D. | |
| 20-- DHV | -- | V.P.H. | |
| TRUCKS | 22 | % | |
| Total Design ESALs | -- | | |

| INDEX OF SEALS | | |
|----------------|------|-------------------------|
| SHEET NO. | NAME | TYPE |
| A.1 | X | Primary Signature Block |
| X | X | X |
| | | |
| | | |
| | | |

PRELIMINARY PLANS

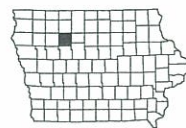
Subject to change by final design.

D2 PLAN - Date: 9/24/2015

D3 PLAN - Date: 9-01-2015
B1 PLAN - Date: 11-20-2015
D5 PLAN - Date: 12-18-2015
D4 PLAN - Date: 9-20-2017

| INDEX OF SHEETS | |
|-----------------|--|
| No. | DESCRIPTION |
| A Sheets | Title Sheets |
| A.1 | Title Sheet |
| A.2 | Field Exam Questions |
| A.3 - 9 | Final Concept |
| A.10 - 12 | Design Criteria |
| A.13 | Bridge As-Built |
| A.14 | Road As-Built |
| B Sheets | Typical Cross Sections and Details |
| B.1 - 3 | Typical Cross Sections and Details |
| D Sheets | Mainline Plan and Profile Sheets |
| * D.1 | Plan & Profile Legend & Symbol Information Sheet |
| * D.2 | "Mainline Name" |
| G Sheets | Survey Sheets |
| G.1 | Reference Ties and Bench Marks |
| G.2 | Horizontal Control Tab. & Super for all Alignments |
| J Sheets | Traffic Control and Staging Sheets |
| * J.1 | Traffic Control Plan |
| V Sheets | Bridge and Culvert Situation Plans |
| V.1 | Bridge and Culvert Situation Plans |
| W Sheets | Mainline Cross Sections |
| W.1 - 6 | Mainline Cross Sections |
| | * Color Plan Sheets |

| REVISIONS | | TOTAL |
|-------------------------------|--|-------|
| PROJECT IDENTIFICATION NUMBER | | |
| 13-76-003-010 | | |
| PROJECT NUMBER | | |
| BRFN-003-3(49)--3976 | | |
| R.O.W. PROJECT NUMBER | | |
| NHSN-003-3(50)--2R-76 | | |



Clearing and Grubbing by area or unit?
If by unit, need District to provide count.

*Maint. to trim lower
branches of trees*

Are there any endangered species in the area? *NA ?*

Trailing side guardrail next to Entrance? Not
needed for clearzone of opposing traffic, but
guardrail exists out there today.

*Install guardrail on
NW quadrant*

Are there any wetland impacts or any other
environmental issues? *NA ?*

If want barrier on NW corner shortest length of guardrail
will run into existing entrance. Will check with Methods if
shorter length could be used. *Review with Methods*

Is sight distance a problem? *No*

Who will be doing offsite detour? District? Contractor? Any
details on what to put in plans? *District will sign
detour. Contractor will
refresh pavement markings*

Are there existing drainage problems? *No*

Should a 6:1 & 3:1 be used or a 3:1 for the
foreslopes? *4:1*

Is special erosion control needed (riprap, silt
ditches, silt dikes, silt curtain, etc.)?

*Use urban seed mixture for properties
on North side of roadway*

Is anything special needed for the GRS Abutments?

Tile Lines other than those noted in the plans? *Yes, see sheet D.2*

Note any special features not shown on plans. *Tile line*

Note condition of existing culverts.

Note existing guardrail lengths and number of posts. *Requested from District*

Do any of the utilities need to be relocated
(power/telephone poles)? Permanently or temporarily? *Fiber*

Disposition of the existing structure, guardrail, signs, etc.?
213-1 or the District Office? *Contractor to dispose of existing guardrail, sign etc
• Maint will be responsible for "work zone speeding"
sign (removing & replacing it)*

Are there any historical items within the project? *NA*

FINAL PROJECT CONCEPT STATEMENT

IA 3 Bridge over Branch 19, 0.3 miles west of IA 4

Pocahontas County
BRFN-003-3(49)--39-76
PIN: 13-76-003-010
Maint. No. 7606.0S003
FHWA No. 40100

Highway Division
Office of Design

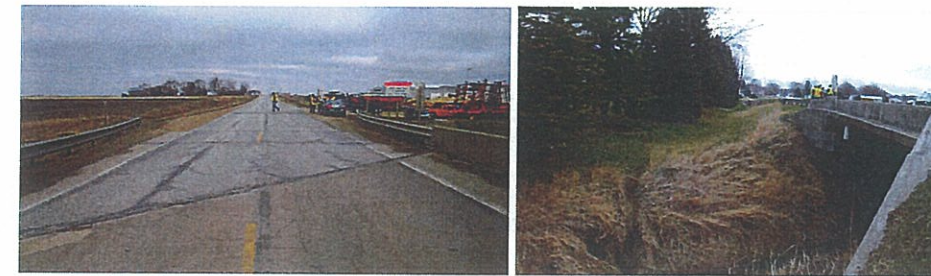
Kevin K. Patel, P.E.
515-239-1540

April 9, 2015

Pocahontas County
BRFN-003-3(49)--39-76
PIN: 13-76-003-010
Page 2

B. Need for Project

This is a 36' x 30' steel I-beam bridge which was constructed in 1949 and overlaid in 1987. The bridge is classified as structurally deficient due to the poor deck condition. The deck, deck overlay, superstructure and substructure are all at the end of their service life and deteriorations are found in all the components. The structure was designed for H20-44 load and needs to be strengthened to an HS20 standard. Also the bridge needs to be widened to 40' to satisfy highway traffic requirement. Provided with the size and age of the bridge, the bridge widening in conjunction with bridge strengthening and bridge repair would not be cost effective. Therefore, the bridge should be replaced.



I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 3 bridge (Maint No. 7606.0S003) over Branch 19, 0.3 miles west of IA 4.

The three alternatives considered were:

1. Replace the existing 36 ft. x 30 ft. I-beam bridge with a 60 ft. x 40 ft. concrete box beam bridge with GRS abutments. Traffic will be maintained utilizing an off-site detour for approximately 6 weeks. The preliminary cost estimate for this alternative is \$652,000.
2. Replace the existing 36 ft. x 30 ft. I-beam bridge with a 120 ft. x 43 ft. continuous concrete slab bridge. Traffic will be maintained via staged construction. The preliminary cost estimate for this alternative is \$1,006,900.
3. Replace the existing 36 ft. x 30 ft. I-beam bridge with a twin 8 ft. x 8 ft. x 120 ft. reinforced concrete box culvert. Traffic will be maintained using the flowable mortar method of construction. The preliminary cost estimate for this alternative is \$378,100.

Alternative 1 is the preferred alternative because it minimizes impacts to the traveling public during construction and eliminates any perceived public perception concerns with replacing the existing bridge with a smaller RCB. Additional right of way may be required. Traffic will be maintained utilizing an off-site detour for approximately 6 weeks.

C. Present Facility

The existing structure is a 36 ft. x 30 ft. I-beam bridge constructed in 1949. The structure is located on the west side of the City of Pocahontas.

IA 3 in the project area is 24' wide PCC pavement with 8' wide granular shoulders and 3:1 foreslopes, constructed in 1956. HMA resurfacing was accomplished in 1975 and 1991.

D. Traffic Estimates

The 2019 construction year and 2039 design year average daily traffic estimates are 2,800 ADT with 21% trucks and 3,400 ADT with 22% trucks, respectively.

E. Sufficiency Ratings

IA 3 is classified as an "area development" route and is a maintenance service level "B" road. The federal bridge sufficiency rating is 45.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

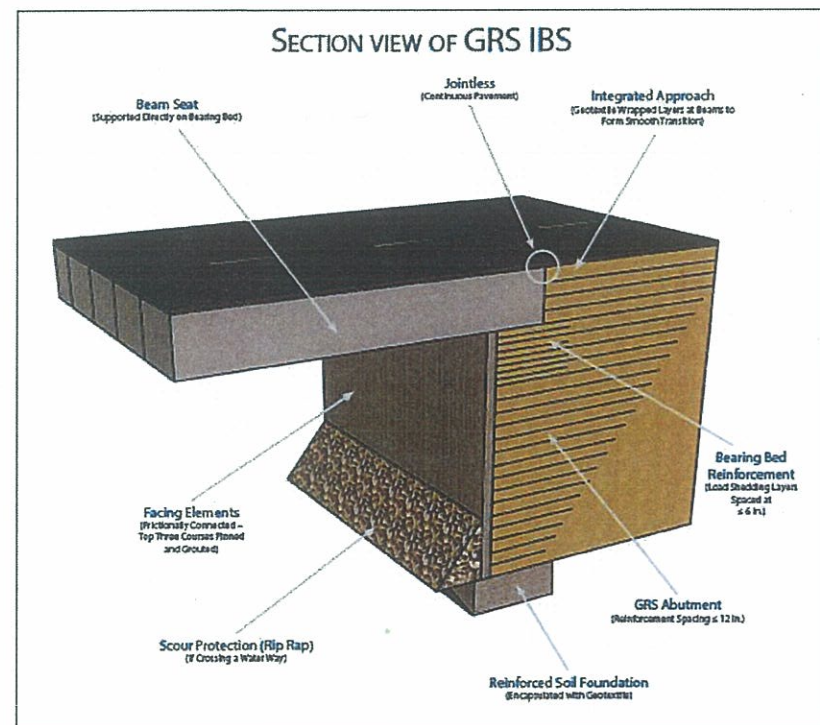
During the five-year study period from January 1, 2009 through December 31, 2013, there were no crashes at the project location.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a concrete box beam bridge with GRS abutments, detouring traffic 6 weeks

Replace the existing 36 ft. x 30 ft. bridge with a 60 ft. x 40 ft. concrete box beam bridge with Geosynthetic Reinforced Soil-Integrated (GRS) abutments.



The concrete box beam bridge will be constructed at a 42 degree right ahead skew.

The typical section adjacent to the bridge will consist of a 24 ft. roadway (32 ft. wide pavement) with an 8 ft. effective shoulders (4 ft. outside paved and 4 ft. granular).

This bridge will be constructed on the existing vertical and horizontal alignment. Construct new bridge approaches. Replace the existing guardrail with new guardrail and pave the shoulders 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Place class E revetment for scour and abutment protection under the bridge and adjacent to the levee slopes. Construct bridge end drains on each end of the bridge.

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

Right of way will be required for this project.

Traffic will be maintained utilizing an off-site detour. The detour will be in place approximately 6 weeks. See Section B for details of the proposed detour.

| Bridge Items | Estimated Costs |
|---------------------|-------------------|
| New Bridge | \$ 245,000 |
| Bridge Removal | 11,000 |
| Revetment | 60,000 |
| Mobilization - 10% | 32,000 |
| M & C - 20% | 70,000 |
| Bridge Costs | \$ 418,000 |

| Roadway Items | Estimated Costs |
|---------------------------------|-------------------|
| Bridge Approaches | \$ 82,100 |
| Removal of Pavement | 3,300 |
| Excavation Class 13 Waste | 1,700 |
| Guardrail (Includes Removal) | 23,500 |
| Paved Shoulder for Guardrail | 18,400 |
| Class 10 for Guardrail Blisters | 11,800 |
| Bridge End Drains | 13,200 |
| Erosion Control | 5,000 |
| Traffic control - 5% | 8,000 |
| Mobilization - 5% | 8,000 |
| ROW | 5,000 |
| M & C - 30% | 54,000 |
| Roadway costs | \$ 234,000 |

Project Total \$652,000

Alternative #2 - Replace with a bridge, using staged construction

Replace the existing 36 ft. x 30 ft. bridge with a 120 ft. x 43 ft. continuous concrete slab bridge, constructed at a 42 degree right ahead skew.

One lane of traffic will be maintained at all times via stage construction. In order to stage construct this bridge, it will need to be constructed 3 ft. wider than in alternative one (43 ft. versus 40 ft.).

The typical section adjacent to the bridge will consist of a 24 ft. roadway (32 ft. wide pavement) with an 8 ft. effective shoulder (4 ft. outside paved and 4 ft. granular) on the north side and an 11 ft. effective shoulder (11 ft. paved) on the south side. The paved shoulder on the south side will be 8" thick HMA to accommodate traffic. The paved shoulder thickness on the north side will be the standard thickness paved shoulder used when paving adjacent to the guardrail.

This bridge will be constructed on the existing vertical and horizontal alignment. Construct new bridge approaches. Replace the existing guardrail with new guardrail and pave the shoulders 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Place class E revetment for slope protection under the bridge. Construct bridge end drains on each end of the bridge.

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

Right of way will be required for this project. West of the bridge, a farm implement dealership's eastern entrance will need to be relocated. It appears that there will be several trees located in the north east quadrant of the bridge that will need to be removed.

One lane of traffic in each direction will be maintained via staged construction utilizing temporary traffic signals, temporary barrier and floodlights.

| Bridge Items | <u>Estimated Costs</u> |
|--------------------------|------------------------|
| New Bridge | \$ 476,000 |
| Bridge Removal | 11,000 |
| Revetment | 60,000 |
| Mobilization - 10% | 55,000 |
| M & C - 20% | <u>120,300</u> |
| Bridge Costs | \$ 722,300 |
| Roadway Items | |
| Bridge Approaches | \$ 84,300 |

| | |
|---------------------------------|--------------------|
| Removal of Pavement | 3,000 |
| Excavation Class 13 Waste | 4,400 |
| Guardrail (Includes Removal) | 23,500 |
| Paved Shoulder for Guardrail | 18,400 |
| Paved Shoulder for Staging | 4,300 |
| Class 10 for Guardrail Blisters | 11,800 |
| Bridge End Drains | 13,200 |
| Clearing and Grubbing | 2,400 |
| Temporary concrete barrier rail | 8,100 |
| Temporary traffic signals | 8,700 |
| Temporary floodlighting | 7,400 |
| Erosion Control | 5,000 |
| Traffic Control - 5% | 9,700 |
| Mobilization - 5% | 9,700 |
| ROW | 5,000 |
| M & C - 30% | <u>65,700</u> |
| Roadway costs | \$ 284,600 |
| Project Total | \$1,006,900 |

Alternative #3 - Replace with a RCB utilizing the flowable mortar method

The new twin 8 ft. x 8 ft. x 120 ft. reinforced concrete box will be placed under the existing bridge at a 45 degree right ahead skew using the flowable mortar method of construction. The typical cross section will consist of a 24 ft. roadway (32 ft. wide pavement) with 8 ft. effective shoulders (4 ft. outside pavement and 4 ft. granular) and 6:1/3:1 foreslopes.

The existing vertical and horizontal alignment will be used as constructed. The flow line of the box will be buried to provide the minimum headroom needed to construct the culvert. Class E revetment will be place at the ends of the RCB.

The new RCB can be built under the existing bridge without disturbing the bridge. After the culvert has been constructed, flooded backfill and flowable mortar will be used to fill the void between the RCB and bridge deck. Once the new 6:1/3:1 foreslopes have been placed adjacent to the bridge, the existing concrete bridge barrier, curb, and guardrail can be removed.

As this location is on the edge of Pocahontas and close to some houses, a twin 8 ft. x 8 ft. RCB was selected over a single RCB to utilize more of the available space under the existing bridge and to provide public perception that a more appropriate RCB structure was selected.

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

Right of way will be required for this project. It appears there will be several trees located in the northeast quadrant of the existing bridge that will need to be removed.

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail and placement of the flowable mortar.

| Bridge Items | <u>Estimated Cost</u> |
|---------------------|-----------------------|
| New Culvert | \$ 168,000 |
| Revetment | 60,000 |
| Mobilization - 10% | 23,000 |
| M & C - 20% | <u>51,000</u> |
| Bridge Total | \$ 302,000 |

| Roadway Items | |
|-----------------------|------------------|
| Class 13 waste | \$ 3,200 |
| Floodable backfill | 200 |
| Flowable mortar | 28,000 |
| Embankment in place | 3,800 |
| Granular Shoulders | 2,000 |
| Paved shoulders | 1,400 |
| Erosion Control | 5,000 |
| Guardrail removal | 1,500 |
| Clearing and grubbing | 2,400 |
| Traffic Control @ 5% | 2,300 |
| Mobilization @ 5% | 2,300 |
| Right of Way | 5,000 |
| M&C @ 30% | <u>16,400</u> |
| Roadway Total | \$ 76,100 |

Project Total **\$ 378,100**

B. Detour Analysis

In Alternative #1, IA 3 will be closed and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 6 weeks. The detour would follow IA 4 south for 5 miles, then County Road C49 west for 3 miles, and County

Road H41 north 5 miles to the junction with IA 3. Out of distance travel is 10 miles. The total distance user cost is anticipated to be \$334,000 for a 6 week detour. The cost for county road maintenance will be \$16,000 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000.

There will be no off-site detour for Alternatives 2 and 3.

C. Recommendations

It is recommended that the present structure be replaced, as described in Alternative 1.

D. Construction Sequence

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

E. Accelerated Bridge Construction Analysis

An initial first stage accelerated bridge construction (ABC) rating score of 36 was calculated for this bridge. Typically in order to be considered a good candidate for accelerated bridge construction, an ABC score greater than 50 is required. Therefore, based upon the first stage rating score, this bridge will be dismissed from further ABC consideration.

F. ADA Accommodations

There are no bike paths or sidewalks adjacent to IA 3; therefore, no ADA accommodations are planned in conjunction with this project.

G. Special Considerations

There is an existing 100 ft. long crest vertical curve within the bridge and bridge approach sections. This vertical curve does not meet the minimum length requirement of 150 ft. This vertical curve should be extended if possible; however, the reconstruction should be limited to the bridge and bridge approach sections only. Good sight distance is provided through the crest vertical curve and the minimum rate of vertical curvature (K value) is met.

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

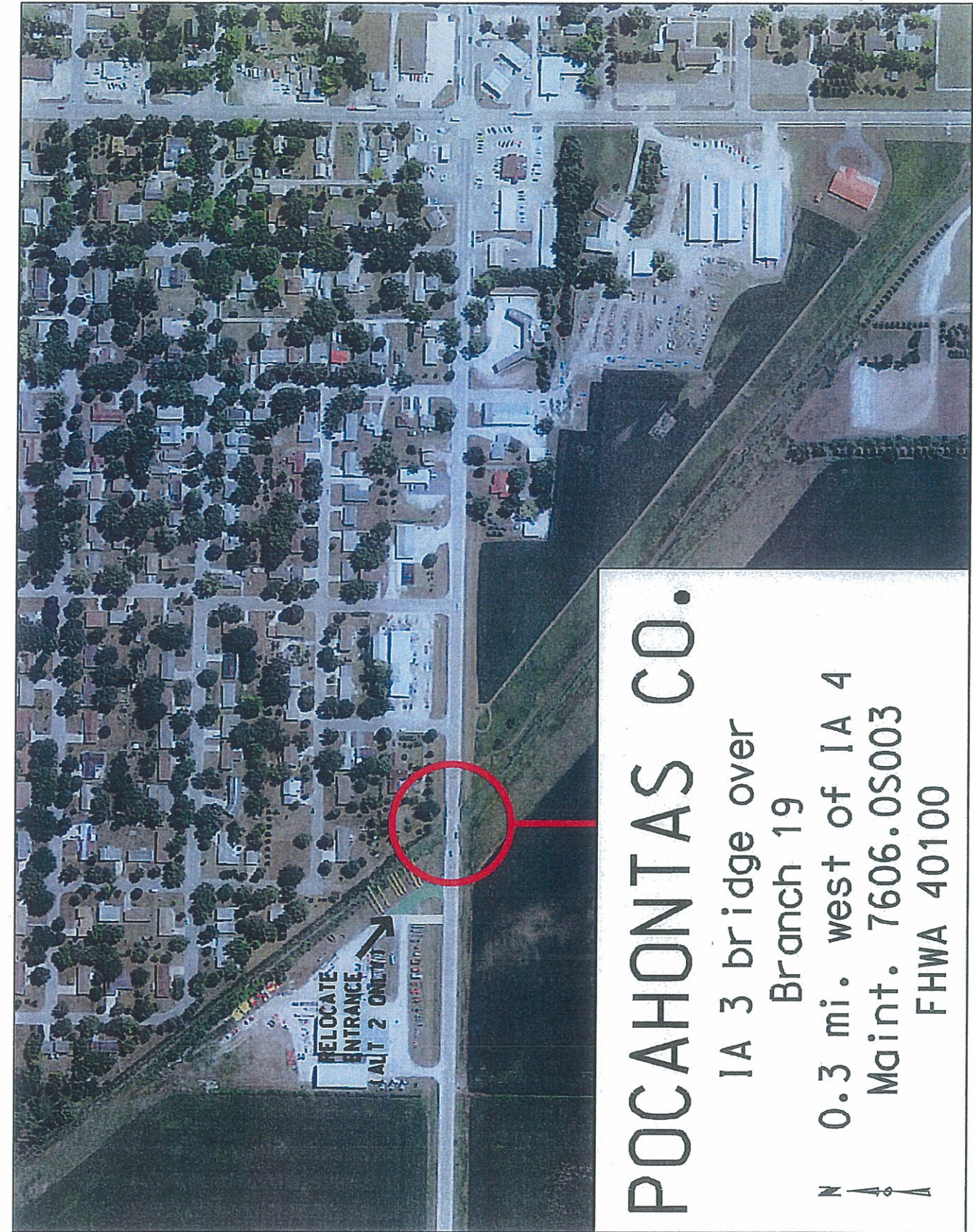
Right of Way may be required for this project.

The Office of Location and Environment has reviewed this project and no special concerns were noted. A routine Nationwide Permit will be required without any need for wetland mitigation. An asbestos removal project is scheduled for April 2015 so there will be no asbestos issues when the bridge is removed.

H. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2015-2019 Iowa Transportation Improvement Program, with \$800,000 for replacement in FY 2018. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

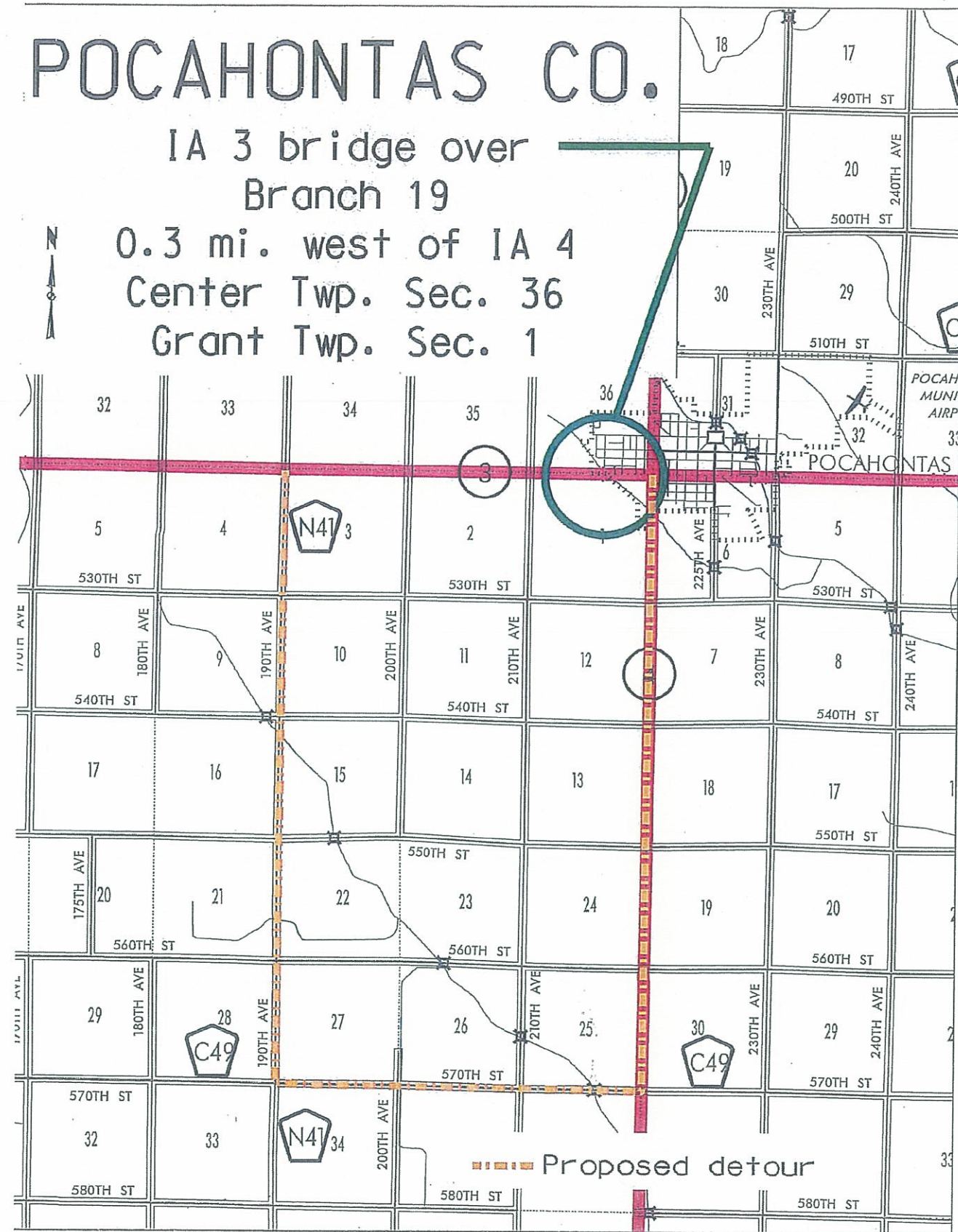
KKP: als



POCAHONTAS CO.

IA 3 bridge over
Branch 19

0.3 mi. west of IA 4
Center Twp. Sec. 36
Grant Twp. Sec. 1



| | | | |
|------------------------|---|------------------------------------|--|
| Roadway | IA 3 | | |
| PIN Number | 13-76-003-010 | Submittal Date | |
| Project Number | BRFN-003-3(49)-39-76 | Approval Date | |
| District | District 3 | Assistant District Engineer | |
| County | Pocahontas (76) | or | |
| Route | IA 3 | Office Director | |
| Location | Bridge over Branch 19, 0.3 miles west of IA 4 | | |
| Work Type | Bridge replacement | | |
| Segment Manager | | | |
| Designer | | | |

Design Manual Section [1C-1](#)
last update: 05-06-14

Rural Two-Lane Highways (Rural Arterials)

| Design Element | Preferred | Acceptable | Project Values |
|---|---|--|---|
| Design speed (mph) | 60 | 50 | 50 (signed at 45) |
| Maximum superelevation rate (Refer to Section 2A-2) | 6% | 8% | 6% |
| Design lane width (ft) | 12 | 12 | 12 |
| Full depth paved width (ft) | 14 | 12 | 12 |
| Right turn lane (ft) | 12 | 10 | |
| Climbing Lane (ft) | 12 | 12 | |
| Left turn lane (ft) | 12 | 10 | |
| Pavement cross-slope (on tangent sections) | Through lanes | 1.5% minimum, 2% maximum | 2% |
| | Auxiliary and turn lanes | 3% maximum | |
| | Crown break at centerline | 4% maximum | 4% |
| Shoulder cross-slope (on tangent sections) | 4% | Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders | 4% |
| Curb type (Refer to Section 3C-2) | Design speed = 50 or 55 mph | 6-inch sloped | |
| | Design speed ≥ 60 mph | 4-inch sloped | |
| Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance) | Adjacent to shoulder | 10:1 for 4' then 6:1 | 6:1 |
| | Beyond standard ditch depth and design clear zone | 3.5:1 | 3:1 |
| | Curbed roadways | 2% | not steeper than 3:1 |
| Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.) | 3:1 | 2.5:1 | |
| Transverse Slopes | w/ drainage structures | 8:1 | 6:1 |
| | w/o drainage structures | 10:1 | 6:1 |
| Ditches (Refer to Section 3G-1) | Outside ditch (depth x width) (ft) | 5 x 10 | - |
| Bridge width—new | Bridge length ≤ 200 ft | design lane widths + effective shoulder widths | design lane widths + effective shoulder widths |
| | Bridge length > 200 ft | design lane widths + effective shoulder widths | design lane width + 4' right and left of the design lane widths |
| Bridge width—existing | design lane widths + no less than 2 ft left and right | design lane widths + 2 ft. offset left and right | 40' Alt 1, 43' Alt. 2 |
| Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks) | Over primary | 16.5 | 16 |
| | Over non-primary | 16.5 at interchange locations, 15 at all other locations | 14 |
| | Over railroad | 23.3 | 23.3 |
| | Sign trusses and pedestrian bridges | 17.5 | 17 |
| Structural Capacity | Contact Office of Bridges and Structures | Contact Office of Bridges and Structures | |
| Level of Service | B | B | |

Rural Two-Lane Highways (Rural Arterials)

| Roadway Design Speed (mph) = | | 50 (signed at 45) | | | | | | | | | | | | | | |
|--|--|--|-----------------------|------|------|------|------|---|-----|------|------|------|------|----------------|------|-------|
| Design Manual Section 1C-1 last update: 05-06-14 | | Design Criteria for High Speed Roadways | | | | | | | | | | | | | | |
| Design Element | | Preferred Criteria | | | | | | Acceptable Criteria | | | | | | Project Values | | |
| | | Design Speed, mph | | | | | | Design Speed, mph | | | | | | | | |
| | | 50 | 55 | 60 | 65 | 70 | 75 | 50 | 55 | 60 | 65 | 70 | 75 | | | |
| Stopping sight distance (ft) (Refer to Section 6D-1) | | 425 | 495 | 570 | 645 | 730 | 820 | 425 | 495 | 570 | 645 | 730 | 820 | > 425' | | |
| Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3) | Method 5 superelevation and side friction distribution | e _{max} = 6% | 833 | 1060 | 1330 | 1660 | 2040 | 2500 | 833 | 1060 | 1330 | 1660 | 2040 | 2500 | NA | |
| | | | e _{max} = 8% | -- | -- | -- | -- | -- | -- | 758 | 960 | 1200 | 1480 | 1810 | 2210 | |
| Minimum vertical curve length (ft) (Refer to Section 2B-1) | | 150 | 165 | 180 | 195 | 210 | 225 | 150 | 165 | 180 | 195 | 210 | 225 | 150 (1) | | |
| Minimum rate of vertical curvature (K) (Refer to Section 2B-1) | crest vertical curves | | 84 | 114 | 151 | 193 | 247 | 312 | 84 | 114 | 151 | 193 | 247 | 312 | > 84 | |
| | sag vertical curves | roadways without fixed source lighting | 96 | 115 | 136 | 157 | 181 | 206 | 96 | 115 | 136 | 157 | 181 | 206 | NA | |
| | | roadways with fixed-source lighting | 96 | 115 | 136 | 157 | 181 | 206 | 54 | 66 | 78 | 91 | 106 | 121 | | |
| Minimum gradient (%) | (Refer to Section 2B-1) | 0.5 | | | | | | 0.3% with a curb, 0.0% without a curb | | | | | | 0% | | |
| Maximum gradient (%) | (Refer to Section 2B-1) | Urban roadways | | 3 | | | | | | 7 | 6 | 6 | -- | -- | -- | 0.53% |
| | | Rural roadways | | 4 | | | | | | 5 | 5 | 4 | 4 | 4 | 4 | |
| | | Interstates | | 4 | | | | | | 5 | 5 | 4 | 4 | 4 | 4 | |
| Clear zone | | See "Preferred Clear Zone" table in Section 8A-2 | | | | | | See "Acceptable Clear Zone" table in Section 8A-2 | | | | | | 18' | | |

Rural Two-Lane Highways (Rural Arterials)

| | | | | | | |
|---|--------------------------|--|--|--------------------------|----------------|--|
| Design year ADT = 3,400 | | | | | | |
| Design Manual Section 1C-1 last update: 05-06-14 | | Effective Shoulder Width and Type for Two-Lane Highways | | | | |
| Preferred (values shown in feet) | | | Acceptable (values shown in feet) | | Project Values | |
| | Rural Roadways | Urban Roadways | | Rural Roadways | | Urban Roadways |
| Turn lanes with shoulders | 6 | 6 | Turn lanes with shoulders | 6 | 0 | NA |
| Turn lanes with curbs | 6 | See Section 3C-2 | Turn lanes with curbs | 6 | 0 | NA |
| | Effective Shoulder Width | Paved Width | | Effective Shoulder Width | Paved Width | |
| Climbing Lanes | 6 | 4 | Climbing Lanes | 4 | 0 | NA |
| Two-Lane Highways | Effective Shoulder Width | Paved Width | Two-Lane Highways | Effective Shoulder Width | Paved Width | |
| Routes where bicycles are to be accommodated | 10 | 10 | Design year ADT > 2000 vpd | 8 | 2* | 8' effective, 4' paved and 4' granular (2) |
| On roadways approaching urban areas (due to increased bike traffic) | 10 | 10 | | | | |
| On all curves with a superelevation rate of 7.0% or greater | 10 | 10 | | | | |
| On roadways with design year ADT > 5000 | 10 | 6 | Design year ADT between 400 - 2000 vpd | 6 | 2* | |
| On all other NHS | 10 | 4 | | | | |
| On non-NHS routes with design year ADT > 3000 | 10 | 4 | Design year ADT < 400 vpd | 4 | 2* | |
| On non-NHS routes with design year ADT < 3000 | 8 | 2* | | | | |

*Requires safety edge-Refer to Section [3C-6](#)

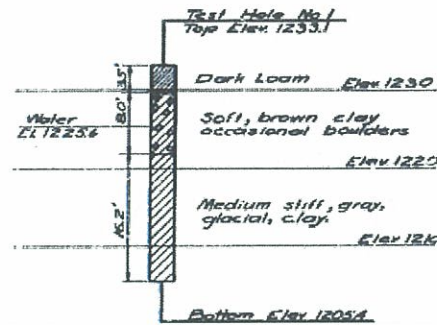
Curbs should be located beyond the outer edge of the effective shoulder width in rural areas

Refer to Section [3C-2](#) for curb offsets in urban areas

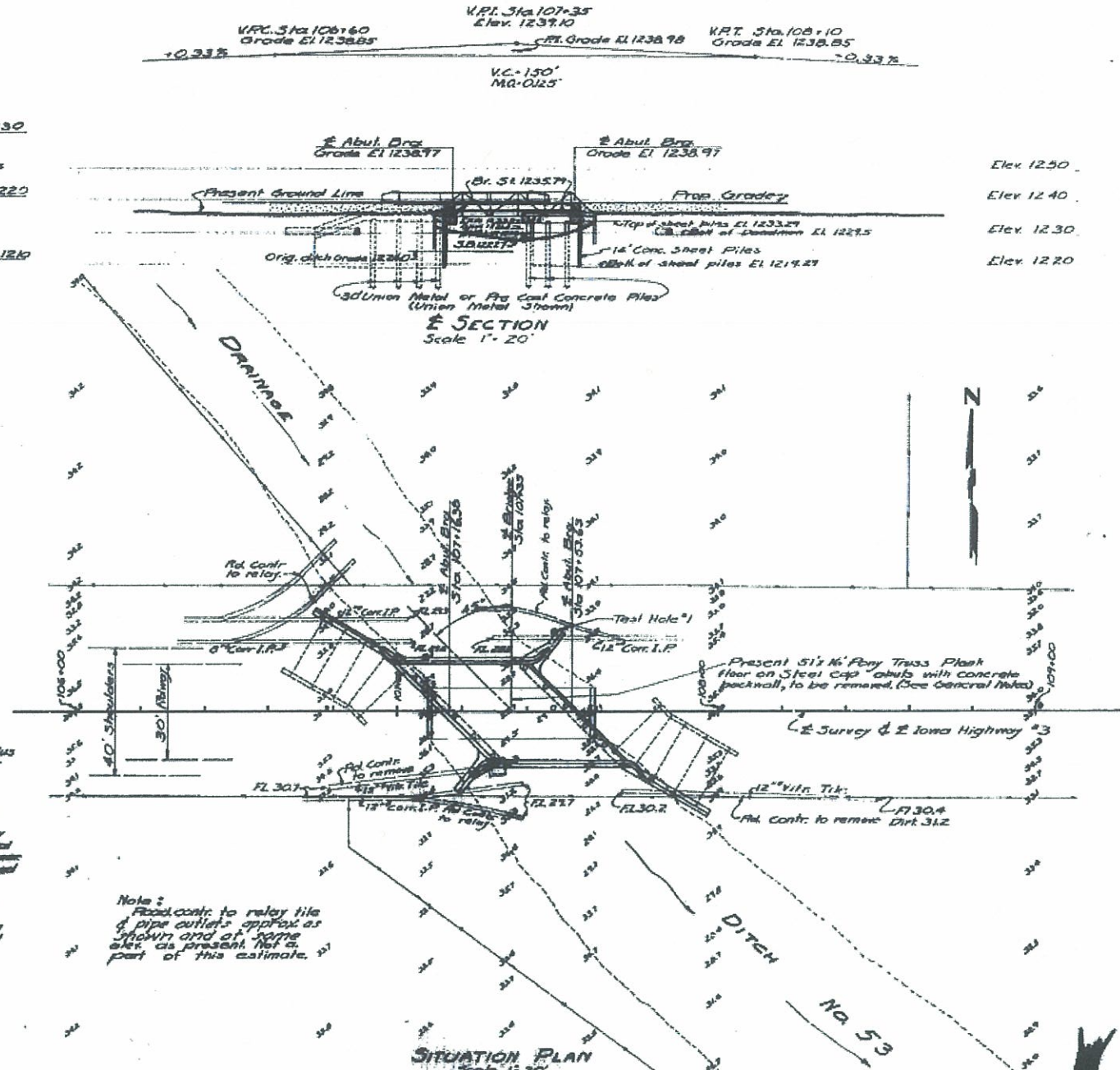
Notes:

1. There is an existing 100 ft. long crest vertical curve within the bridge and approach sections. This does not meet the minimum length requirement of 150 ft. However, the intent of this project is to replace the bridge and bridge approaches only. Good sight distance is provided through the crest vertical curve and the minimum K value is met.
2. In Alternative 2 only, the should shoulder will be increased to 11 ft. wide pavement to accomodate staged construction.

Bench Mark #2 Sta. 108+39 21' R/L Two 60" Spikes south side telephone pole Elev 1236.12



SOUNDING DATA Scale 1"=10'

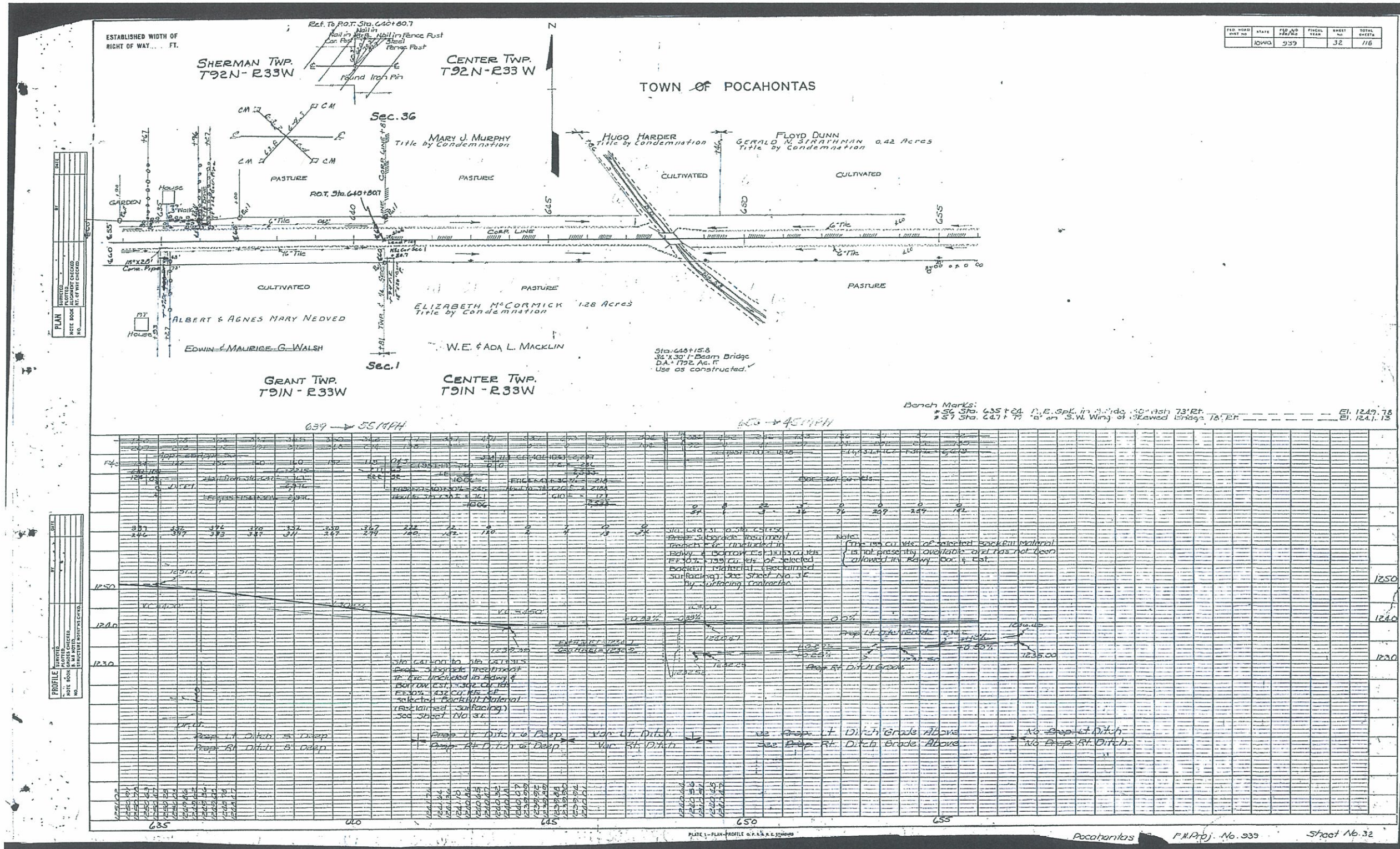


GENERAL NOTES:
 This bridge is designed for H-20-44 loading plus modifications as noted on sheet 4. See sheet 3 for notes and details covering alternate sections for bearing piles and sheet piles.
 Provision is made in abutment design for cleaning out the drainage ditch to its original grade of about El. 1224.0.
 Bridge contractor is to remove present pony truss bridge (See Situation Plan) and pile material neatly within 200' of site as directed by the engineer. This bridge will not be re-erected and may be removed in any manner desired.
 Abutments are not to be backfilled, either by contractor or others, before superstructure is in place.
 Soundings as shown are for design, estimating and bidding purposes only and not guaranteed for construction.

SPECIFICATIONS:
 Design - AASHTO Specifications (UMS) for H-20-44 loading with modifications shown or noted.
 Construction - Standard Specifications of the Iowa State Highway Commission Series 1937.
 Special Provisions for Construction - Part II dated 10-16-45.
 Special Provisions for Piles dated 3-17-47.
 Special Provisions for Concrete or Union Metal bearing piles and concrete sheet piles dated April 15, 1947.

| Part | Quantity | Unit | Total |
|--------------------|----------|---------|----------|
| Concrete Cl. A | 32.9 | TL. L | 1224.24 |
| Concrete Cl. C | 51 | TL. L | 1871.51 |
| Reinforcing Steel | 2975 | TL. L | 10775.75 |
| Structural Steel | 2230 | TL. L | 7806.00 |
| Cast Steel Piles | | | 2232.00 |
| Cast Steel Piles | 16350 | WT. LB. | 60150.00 |
| Excavation Class I | 165 | CU. YD. | 105.00 |

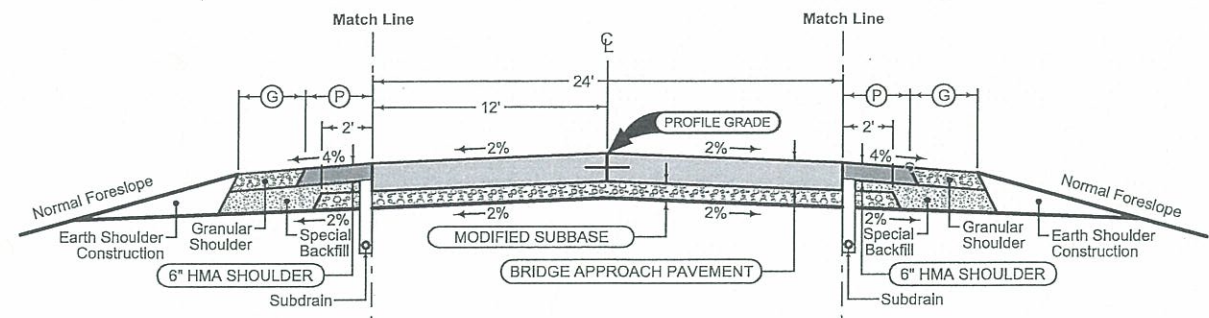
Design For
36' x 30'-45" NEW I BEAM BRIDGE
 Abutments, Floor, Substructure & Rail
 SITUATION PLAN
 Station 107+35
 POCAHONTAS COUNTY
 Iowa State Highway Commission
 March 1948
 Sheet 1 of 6
 Design 148 Pocahontas Co. File No 13173
 Detailed & Traced By J.L. Checked By



Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

| STATION TO STATION | | (P) Feet | (G) Feet |
|--------------------|-----------|-------------|-------------|
| 646+98.01 | 649+31.27 | 4 | 4 |
| | | | |
| | | | |



Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

| STATION TO STATION | | (P) Feet | (G) Feet |
|--------------------|-----------|-------------|-------------|
| 646+98.01 | 649+31.27 | 4 | 4 |
| | | | |
| | | | |

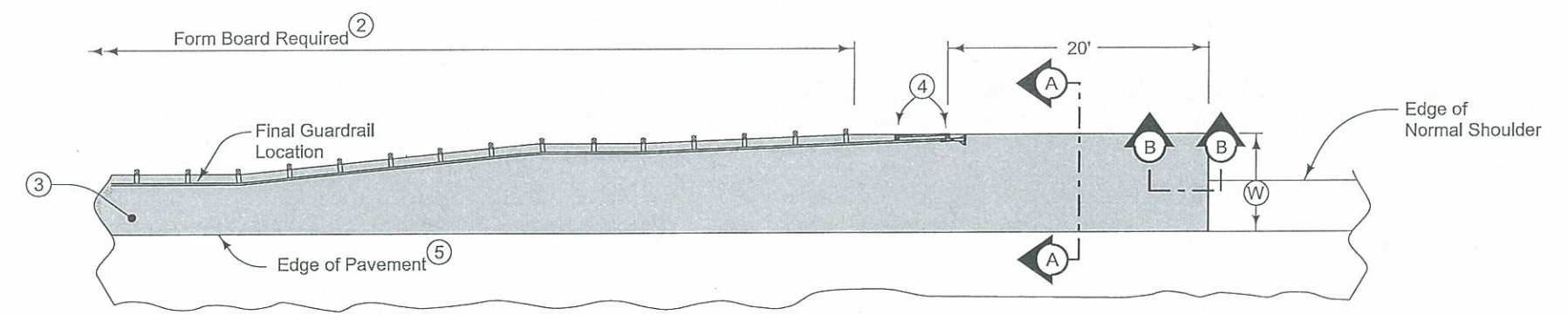
Bridge Approach Jointing:
See BR-203 for Jointing

| STATION TO STATION | |
|--------------------|-----------|
| 646+98.01 | 649+31.27 |
| | |
| | |

*All shoulders will be paved
as per detail 7156*

See Tab 100-24 or 100-25 for pavement quantities.
See Tab 112-9 for shoulder quantities.

IA 3

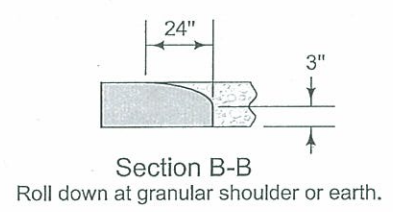
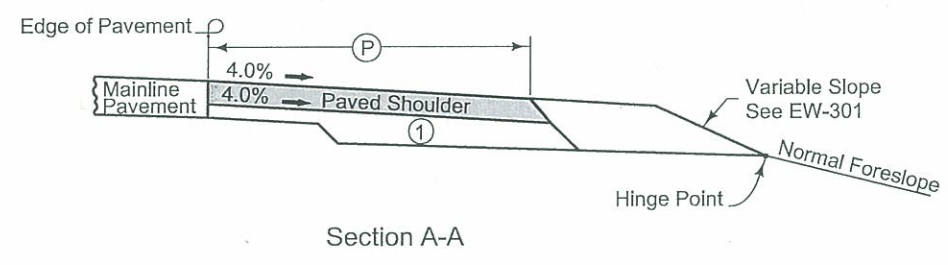
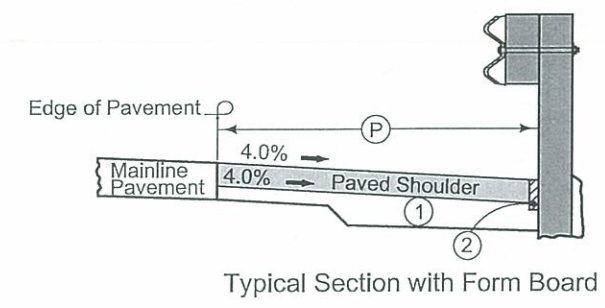


6" HMA Paved Shoulder at guardrail. 7" PCC may be substituted with the following jointing layout:

Match mainline pavement joint spacing. When mainline pavement is 8" or greater in thickness, place additional transverse 'C' joints in shoulder at mid-panel of the mainline pavement. Place longitudinal 'C' joint at W/2 from edge of mainline pavement when W is greater than 10' wide. Terminate longitudinal joint at transverse joint less than 10' in length.

Compaction of HMA is required to face of guardrail post. Hand compaction will be allowed under guardrail. Removal & reinstallation of guardrail will be allowed with no additional payment.

Refer to Shoulder tabulation (112-9) for quantities.



- ① 6" subgrade treatment.
- ② When guardrail posts are installed prior to construction of paved shoulder, nail 1" x 6" untreated form boards along the face of guardrail posts for the length shown. This board is to prevent shoulder material from contacting the sides of the posts and altering the function of the guardrail. Form board not required for final 2 posts.
- ③ Continue paved shoulder to existing paved shoulder or 20' beyond the end of guardrail.
- ④ Shoulder may be notched for final 2 posts or post sleeves may be installed through pavement.
- ⑤ 'KT-1' joint for PCC shoulder.
'B' joint for HMA shoulder.

PAVED SHOULDER AT GUARDRAIL

SURVEY SYMBOLS

- GDL Guard Rail Steel
- BRG Bridge
- BLD Building or Foundation
- SIGN SI Sign
- Tile TIL Tile Line
- OUT Tile Outlet
- RET Retaining Walls
- EB EB Electrical Box
- LUM Luminaire
- MM Mile Marker Post
- PIP Pipe Culvert
- TDC Tree Deciduous
- TP TPD Telephone Pedestal
- WV WW Water Valve
- FHD Fire Hydrants
- * TEV Evergreen Tree
- Ⓛ LP L.P. Tank
- PR Electric Riser Pole
- SHR Shrub
- E1 EL1D Electric Line Co. 1 - Quality D
- W WL1D Water Line Co. 1 - Quality D
- St.S. ST1D Storm Sewer Co. 1 - Quality D
- IN Storm Sewer Intake
- LIN Miscellaneous Line
- EP Edge of Paved Roads (ML or SR)
- SNP Unpaved Shoulder
- ENU Edge Unpaved Entrance & Parking
- ENT Centerline BL of Entrance
- EG Edge of Gravel Road
- D Centerline Draw or Stream (Down)
- DU Centerline Draw or Stream (Up)
- BNK Stream Bank
- CON Concrete or A/C Slab
- ***** RIP Rip-Rap
- CU Back of Curb
- GU Gutter In Front of Curb
- EW Edge of Water
- ENP Edge Paved Entrance & Park Lot
- FD FO1D Fiber Optic Co. 1 - Quality D
- G GL1D Gas Line Co. 1 - Quality D
- C Centerline BL of Road (ML or SR)
- BL Topo Breakline

UTILITY LEGEND

This is NOT a POINT 25 Project and is not subject to the provisions of IAC 761-115.25.

- FO - CenturyLink
Pat Cairns
2103 E University Ave
Des Moines, IA 50317
515-263-7305
Pat.Carins@centurylink.com
- G-HP - Black Hills Energy
Brad Fleming
1102 East First street
Papillion, NE 68046-7641
402-221-2714
brad.fleming@blackhillscorp.com
- St.S. - City of Pocahontas
- E1 - City of Pocahontas

PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

| LINEWORK | Design Color No. | |
|------------------|------------------|--|
| Green | (2) | Existing Topographic Features and Labels |
| Blue | (1) | Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation |
| Magenta | (5) | Existing Utilities |
| SHADING | | |
| Design Color No. | | |
| Yellow | (4) | Highlight for Critical Notes or Features |
| Red | (3) | Delineates Restricted Areas |
| Lavender | (9) | Temporary Pavement Shading |
| Gray, Light | (48) | Proposed Pavement Shading |
| Gray, Med | (80) | Proposed Granular Shading |
| Gray, Dark | (112) | Proposed Grade and Pave Shading "In conjunction with a paving project" |
| Brown, Light | (236) | Grading Shading |
| Tan | (8) | Proposed Sidewalk Shading |
| Blue, Light | (230) | Proposed Sidewalk Landing Shading |
| Pink | (11) | Proposed Sidewalk Ramp Shading |

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

| LINEWORK | Design Color No. | |
|-------------|------------------|---------------------------------|
| Green | (2) | Existing Ground Line Profile |
| Blue | (1) | Proposed Profile and Annotation |
| Magenta | (5) | Existing Utilities |
| Blue, Light | (230) | Proposed Ditch Grades, Left |
| Black | (0) | Proposed Ditch Grades, Median |
| Rust | (14) | Proposed Ditch Grades, Right |

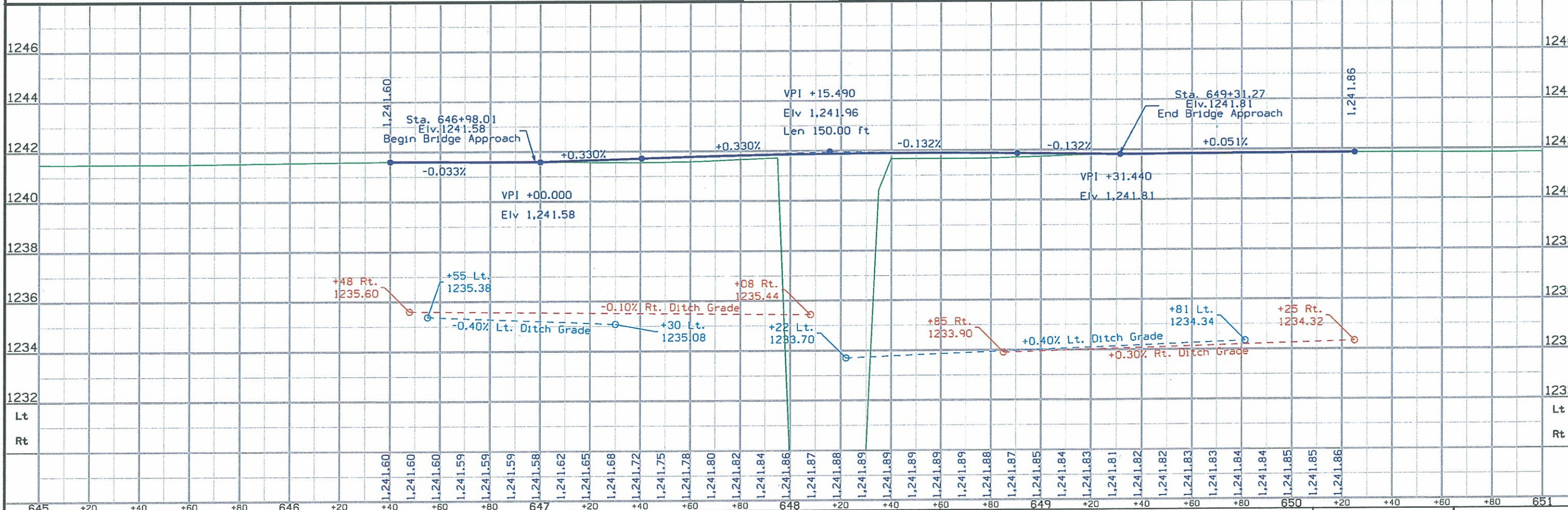
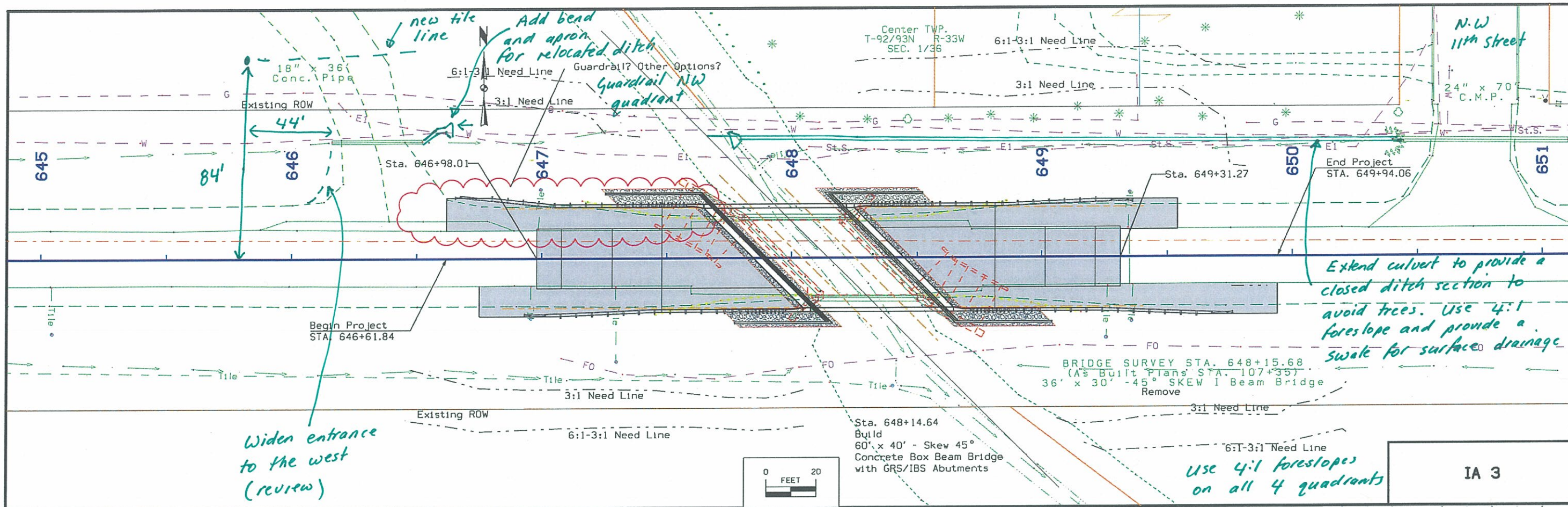
- Reference Point
- Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

- ▲ Proposed Right-of-Way
- △ Existing Right of Way
- ▲△ Existing and Proposed Right-of-Way
- △△ Easement and Existing Right-of-Way
- Easement (Temporary)
- Easement
- C/A Access Control
- Property Line

PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES D, E, F, & K)



Survey Information

Pocahontas County
BRFN-003-3(49)--39-76
Over Tributary of Lizard Creek
0.3 Miles W. of Ia. 4
PIN 13-73-003-010
Sap-0833

General Information

Measurement units for this survey are US survey feet. This survey is for proposed Bridge reconstruction along Iowa Highway 3. Project datum and control information is provided by Design Survey Office. This project is a Full DTM with Photo control.

Vertical Control

Project ellipsoidal height was established at Pt.1 by averaging a minimum of two Iowa RTN RTK observations with 4 hours or greater time span between each observation. NAVD88 height was computed at Pt. 1 using Geoid 12A. The relative network error of height observations was less than 0.02 ft. at 95% confidence level. Additional benchmarks were placed throughout the project using a GNSS Base-Rover setup at Pt. 1. A minimum of three observations were collected with 1 hour or greater time span between each observation. The local error of these observations relative to Pt.1 was less than 0.02 ft. at 95% confidence level.

This survey also observed 1 As built plan height benchmark to compare with observed survey height: BM 57 is located inside the project limits.
BM 57 plan height = 1241.13 (Plan datum is not specified)
NAVD88 height computed using Geoid 12A = 1241.965
The local error of the height observations relative to Pt. 1 was less than 0.02 ft. at 95% confidence level.

Horizontal Control

The project coordinate system is Modified Iowa State Plane North Zone (U.S. Survey Feet) scaled around Pt. 1 at 3732233.704 N, 4601987.569 E, 1240.899 (Height). IaRTN datum is adjusted to NAD83 (2011) (Epoch 2010.00). Project coordinates were established at Pt. 1 by averaging a minimum of two Iowa RTN RTK observations with 4 hours or greater time span between each observation.

The relative network error of observations was less than 0.01 ft. at 95% confidence level. Additional control points were placed throughout the project using a GNSS Base-Rover setup at Pt. 1. A minimum of three observations were collected with 1 hour or greater time span between each observation. The local error of these observations relative to Pt. 1 was less than 0.02ft. at 95% confidence level.

1/Combined Scale Factor of project (State plane grid modified to ground) =
1.000108832316

The 1/Combined Scale Factor scaled at Pt. 1 will be used for GPS/GNSS stakeout and location survey in the Project Coordinate system. A scale factor of 1 will be used for total station stakeout and location survey in the Project Coordinate system.

Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans No. FN-939 Survey stationing was equated to the plan PI at STA 667+12.00 and run back without equation throughout the survey.

Survey stationing relates to as built plan stationing as follows:

POT Sta. 614+55.90 As-built Plans No. FN-939
Survey POT Sta. 614+54.88

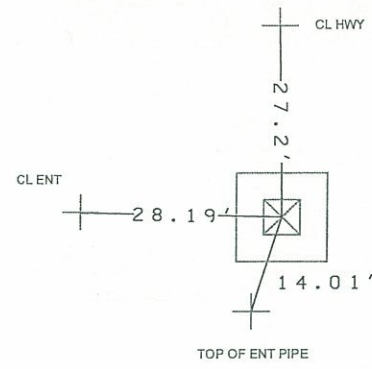
POT Sta. 640+80.70 As-built Plans No. FN-939
Survey POT Sta. 640+80.39

PI Sta. 667+12.00 As-built Plans No. FN-939
Survey PI STA 667+12.00

VERTICAL CONTROL

| Point | North | East | Elevation | Station | Offset | Feature | Description |
|-------|-------------|-------------|-----------|-----------|--------|---------|---------------|
| 1 | 3732233.704 | 4601987.569 | 1240.899 | 641+41.74 | 26.829 | FENO | CONTROL POINT |
| 57 | 3732234.444 | 4602654.266 | 1241.965 | 648+08.38 | 17.998 | BM | FD CUT SQUARE |
| 500 | 3732235.745 | 4602655.982 | 1244.365 | 648+10.08 | 16.676 | BM | FD CUT SQUARE |

C.P. STA. 641+41.74, RT 26.83
C.P. 1, SET FENO
N=3732233.704, E=4601987.569



108-23A
08-01-08

TRAFFIC CONTROL PLAN

IA 3 closed per TC-252. Offsite Detour will be used during construction.

| | | | |
|------|---------------|---------------|------|
| 1245 | FACE W. ABUT. | FACE E. ABUT. | 1245 |
| 1240 | ELEV. 1241.81 | ELEV. 1241.86 | 1240 |
| 1235 | | | 1235 |
| 1230 | | | 1230 |
| 1225 | | | 1225 |
| 1220 | | | 1220 |

BENCH MARK NO.

0.330% -0.132%

PI STA 648+15.49 VC = 150'
PI ELEV 1241.96

PROPOSED PROFILE GRADE ON IA 3

PROFILE GRADE LINE (PGL) IS AT \bar{C} OF LANES.
TOP OF BRIDGE DECK AT \bar{C} ROADWAY IS .03' BELOW THE PROFILE GRADE TO ACCOUNT FOR PARABOLIC CROWN.

TRAFFIC ESTIMATE

| | | |
|---------------------|---|--------|
| 20?? AADT | ? | V.P.D. |
| 20?? AADT | ? | V.P.D. |
| 20?? DHV | - | V.P.H |
| TRUCKS | ? | % |
| TOTAL DESIGN ESAL's | - | |

HYDRAULIC DATA

DRAINAGE AREA= 2.38 MI²
STREAM SLOPE= 8.34 FT./MI.

Q₅₀= 336 CFS
NATURAL STAGE= 1233.78
MAXIMUM BACKWATER= .02'
AVG. BRIDGE VELOCITY= 3.31 FT/SEC

Q₁₀₀= 405 CFS
NATURAL STAGE= 1234.36
MAXIMUM BACKWATER= .03'

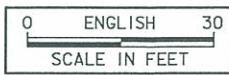
Q₂₀₀= 479 CFS
STAGE = 1234.88
CALCULATED DESIGN SCOUR= 1227.12 (STREAMBED)

Q₅₀₀= 560 CFS
NATURAL STAGE= 1235.37
CALCULATED CHECK SCOUR= 1227.12 (STREAMBED)

AVG. LOW WATER STAGE= 1228.50

LOCATION

IA 3 OVER BRANCH 19 OF DD #53
T-91/92N R-33W
SECTION 1/36
CENTER TOWNSHIP
POCAHONTAS COUNTY
FHWA NO.
BRIDGE MAINT. NO. 7606.OS003
LATITUDE ?° N
LONGITUDE ?° W

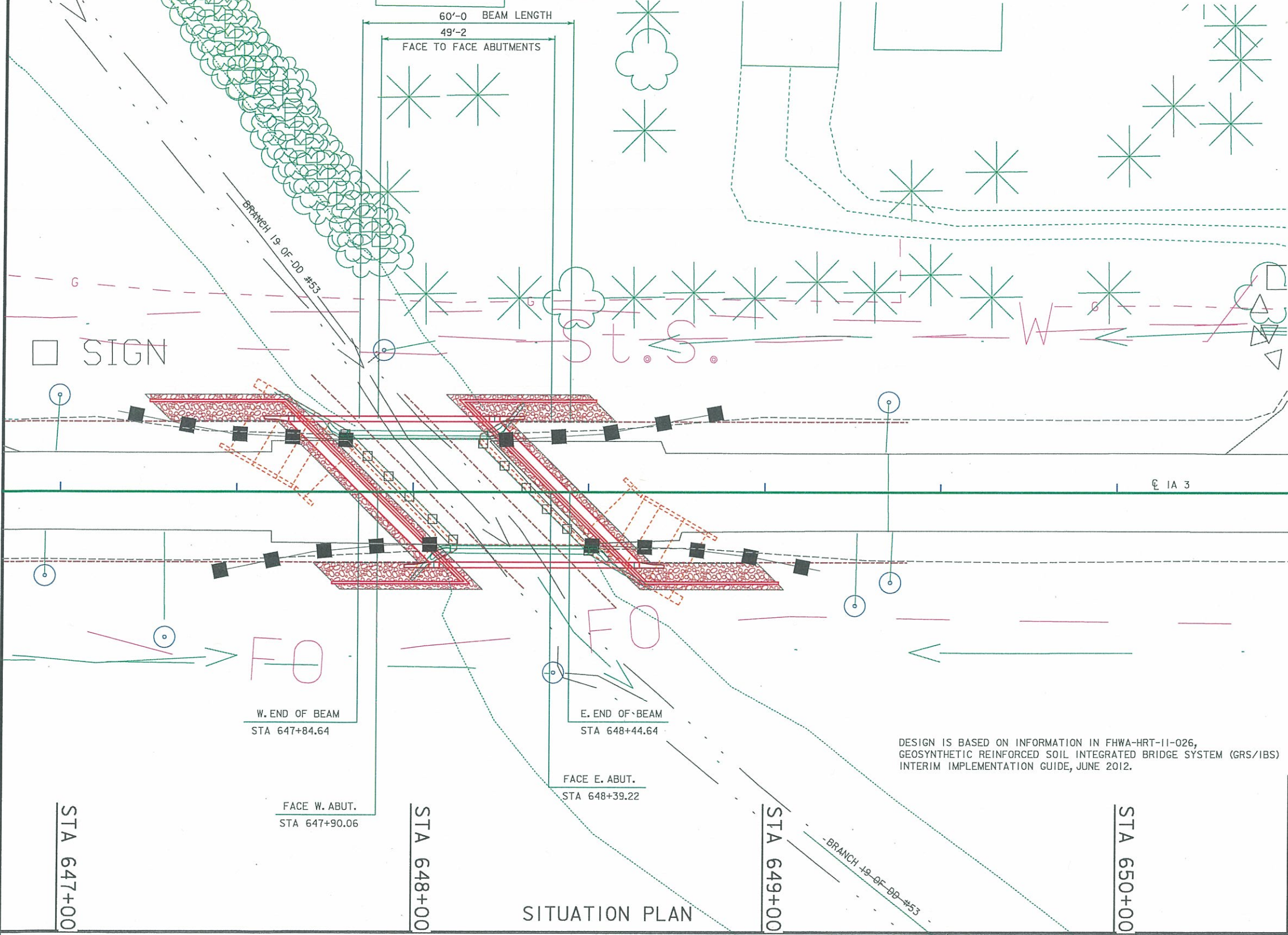


PRELIMINARY

DESIGN FOR 45° RA SKEW
60'-0 X 40' CONCRETE BOX BEAM BRIDGE WITH GRS/IBS ABUTMENTS AND APPROACHES
60'-0 BEAM SPAN

SITUATION PLAN
STATION: 648+14.64
POCAHONTAS COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____

LONGITUDINAL SECTION ALONG \bar{C} ROADWAY



DESIGN IS BASED ON INFORMATION IN FHWA-HRT-11-026, GEOSYNTHETIC REINFORCED SOIL INTEGRATED BRIDGE SYSTEM (GRS/IBS) INTERIM IMPLEMENTATION GUIDE, JUNE 2012.

SITUATION PLAN