**IOWA DEPARTMENT OF TRANSPORTATION**

**TO OFFICE:** District 4

**DATE:** March 16, 2018

**ATTENTION:** Wes Mayberry

**REF.:** Pottawattamie County
IMX-029-4(112)72--02-78
BRFIMX-029-4(113)72--14-78
PIN: 16-78-029-070

**FROM:** Alfred Benesch & Company

**OFFICE:** Design

**SUBJECT:** Field Exam (D-2)

A field exam was held on Thursday, February 1, 2018, to review the proposed plan for the bridge replacement at County Road G12 over I-29 in Pottawattamie County.

Those present for the field exam included the following: Tom Janicke and Sylvan Popovici from Alfred Benesch & Company, Nate Thede from the Project Management Office, Wes Mayberry, Orest Lechnowsky, Dave Dorsett and Dan Hinman from District 4, Mike Bonnet from Pottawattamie County, and John Clute from the Office of Bridges and Structures.

I-29 is a divided highway facility, consisting of a 6 ft. inside shoulder, 12 ft. inside lane, 14 ft. outside lane, a varying width auxiliary lane and a 6 ft. outside shoulder

County Road G12 (Desoto Avenue) is 22 ft. wide with HMA pavement and no shoulders. The existing posted speed limit on County Road G12 is 50 miles per hour.

The interchange of I-29 at County Road G12 is a partial cloverleaf folded diamond

The 2014 average daily traffic estimates for I-29 are 21,000 AADT with 24% trucks. The 2016 ADT on County Road G12 is 410.

The existing bridge has a low vertical clearance of 15 ft. 4 in. This low clearance has caused the multiple instances of impact damage to the superstructure. The existing beams have sustained impact damage from traffic on I-29 that required replacements and repairs in 1987, 2003, and 2015.

The existing 223 ft. 9 in. x 24 ft. pre-tensioned pre-stressed concrete beam bridge on County Road G12 will be replaced with a 2-span, 252 ft. – 0 in. x 36 ft. pre-tensioned, pre-stressed bulb tee concrete beam bridge on a new vertical alignment.

The vertical alignment for this bridge will be raised approximately 3.2 ft. to meet minimum vertical clearance requirement of 16.75'. The revised vertical profile for G12 will require portions of the existing partial clover leaf interchange ramps to be reconstructed. Driveways and portions of gravel roads 145$^{th}$ Street and 150$^{th}$ Street will be reconstructed to tie in with the new profile.

The Pre-Field Exam Plans were submitted using the existing G12 alignment and the preferred criteria design speed of 55 mph which requires the ramp terminals to be raised more than 7'. This creates constructability issues if the ramp traffic is to be maintained with staged construction as

stated in the concept report. Detour pavement runarounds were submitted as a possible solution to adhere to the Project Concept Statement that was prepared before survey was completed and the required grade raises could be determined at the ramp terminals.

The estimated cost of the Pre-Field Exam Plans was $3,379,300, inclusive of a roadway cost of $1,901,000. The earthwork, detour pavement, and traffic control costs combined to be 40% of the roadway costs. During the field exam, alternatives were discussed to improve the value of the proposed construction, especially the relative detour pavement costs and earthwork costs.

During the Field Exam, it was determined to change the construction limits on the west end of G12 to match the adjacent ongoing bridge construction project over the Boyer River. Changing the logical termini to match the new Boyer River Bridge project will add $50,000 to the project, and G12 will need to be detoured briefly for the tie-in construction at the west end

During the Field Exam, it was decided the design speed of G12 will be revised from the preferred criteria to the acceptable criteria of 50 mph. The 50 mph K values and clear zones reduce the roadway costs by $140,000 after accounting for the revised Boyer River Bridge limits.

145$^{th}$ Street will be realigned to reduce the intersection skew at a negligible cost impact.

If pavement is reconstructed, culverts will be replaced also. If pavement is widened, then culverts will be extended. This change was noted at the Field Exam since the concept called for replacement of all culverts.

In addition to notes on sheet V.1, 5’ offset on shoulder for snow storage as shown on 2-span grading details will be included

During the Field Exam, it was recommended to reevaluate the concept of realigning G12 so that the bridge could be constructed offline. Reverse curves are required to achieve the offset alignment within the project footprint. The reverse curves and superelevation transitions cannot fit entirely interior within the ramp terminals. If the alignment is offset to the north the vertical profile raise would need to be increased to maintain clearance over I-29, increasing earthwork costs. The ramp reconstruction limits would also be increased, adding roadway and earthwork costs. If the alignment is offset to the south, the alignment will be constrained by the existing gas station in the southeast quadrant. All combinations of reverse curve radii and superelevation rates would require either full superelevation at the ramp terminals, which increases ramp reconstruction limits due to intersection rollover, or superelevation runoff extending onto the G12 Bridge.

The temporary advantages of constructing the G12 bridge on an offset alignment and avoiding the G12 detour during bridge construction do not justify the permanent disadvantages of suboptimal intersection geometry, superelevation transitions on the bridge, and added ramp reconstruction limits. Additionally, the detour pavement costs and earthwork costs are not reduced. Benesch recommends using the existing G12 alignment.

If lighting is added to the Ramp C intersection, design criteria allows the use of a lower K value on sag curves. Earthwork savings would only be about $25,000, since the potential larger cost reductions discussed during the field exam have already been realized by using the 50 mph design speed. Although adding lighting increases substantive safety, there are no indications the new lighting warrants per Iowa DOT policy 630.03, *Interchange and Freeway Lighting,* are met. Benesch does not recommend adding lighting.

The Pre-Field Exam Plans used 75’ and 100’ radius returns at the ramp intersections for a WB-67 truck turning movement. During the meeting it was suggested to consider using 60’ radius returns to reduce earthwork and shorten culverts. Since the existing radii are 75’ and the Design Manual lists 75’raidd, Benesch recommends using 75’ radii to avoid potentially introducing a new safety hazard with lane encroachments.

During the Field Exam, Benesch was asked to estimate costs of resurfacing the ramps. The 3” scarification and HMA overlay would cost about $350,000. Since this work is outside the Need for the Project as outlined in the Final Concept Statement, the cost is not currently included in cost estimates.

Benesch was requested at Field Exam meeting to evaluate reducing the superstructure depth by using shallower steel plate girders instead of concrete bulb tee beams. Per Iowa preliminary bridge design manual, the estimated cost difference between a 2-span steel Continuous Welded Plate Girder (CWPG) bridge and a 2-span concrete BTD bridge would be about $25/SF or $250,000 for G12 over I-29 with typical design parameters.

The Iowa bridge manual preferred beam depth for a 2-span CWPG with 126'-0 spans is nearly the same as a BTD beam (50" versus 54") for typical design. In cases of constrained vertical clearance, Iowa prefers to stay within the AASHTO minimum CWPG depth to span ratio which would mean using a 41" beam depth or about a 1-foot shallower superstructure than a BTD for this bridge. Designing outside these preferred limits increases the weight and cost of the structural steel due to the inefficiency of the beam depth.

Based on these requirements and other comparative cost investigations of similar bridge projects, the cost premium for a 1-foot shallower 2-span steel bridge would likely be higher than the $250,000 after final design. The estimated earthwork cost savings for a 1-foot grade drop at the bridge is estimated to be about $100,000.

Note that a 4-span steel bridge option was also investigated in the concept phase and found to reduce the structure depth up to 2 feet compared to a BTD beam. However, the construction of 2 additional piers adjacent to the interstate would not provide the significant improvement of increased safety. Additional pier construction also adds to the construction time and negates much of the cost savings of the shallower superstructure.

For the steel bridge options, the minimal grade raise reductions and earthwork cost savings are outweighed by the higher bridge construction costs. In addition to upfront cost, the long-term life cycle costs of maintaining a steel structure are also higher than concrete bulb tees. Benesch recommends to maintain the replacement with 2-span BTD bridge per the Project Concept Statement.

During the Field Exam, Traffic Control alternatives were discussed for further consideration to reduce the disproportionate detour pavement costs required to adhere to the Project Concept Statement traffic control. All traffic control alternatives use the decisions and recommendations described above in this letter. All the alternatives that were evaluated below maintain I-29 traffic at all times except for short term closures for bridge demolition and beam placement.

**Traffic Control Option 1 – All Ramps Open**

All ramps are open at all times using detour pavement. G12 is closed and detoured for bridge construction.

Stage 1

- Traffic: G12 traffic over I-29 is detoured. All ramps are open on existing pavement.
- Construction: Detour pavement runarounds are constructed at the ramp terminals. G12 Bridge over I-29 construction begins.

Stage 2

- Traffic: G12 traffic over I-29 is detoured. All ramps are open and use the detour pavement runarounds.
- Construction: G12 Bridge construction continues. Ramps B and C are constructed. The east leg of G12 is constructed in substages to maintain access to one gas station driveway.

Stage 3

- Traffic: G12 traffic over I-29 is open. G12 traffic west of Ramp C is detoured. Construction: The west leg of G12 is constructed. The shoulders are completed.

**Traffic Control Option 2 (recommended) – Southbound Ramps Detoured**

Ramp B is open at all times and access to the gas station is maintained from the east. Ramp C is closed. G12 is closed and detoured for bridge construction.

Stage 1

- Traffic: G12 is detoured and closed between the Boyer River Bridge and Ramp B. Ramp C is closed and detoured. Ramp B is open on existing pavement.
- Construction: G12 is constructed over I-29. Ramp C is constructed. The west leg of G12 is constructed. The Detour pavement runaround is constructed at Ramp B.

Stage 2

- Traffic: G12 traffic over I-29 is detoured. Ramp C is open on new pavement. Ramp B is open using the runaround
- Construction: G12 bridge construction continues. The east leg of G12 is constructed in substages to maintain access to one gas station driveway.

Stage 3

- Traffic: All traffic is on new pavement
- Construction: Shoulder construction is completed

**Traffic Control Option 3Full interchange closure**

The G12 interchange is closed for the duration of construction. All traffic is detoured.

- Traffic: G12 is closed and detoured. The interchange ramps are closed and detoured Trucks will not be allowed on the detour due to height restrictions. 150th Street will remain accessible
- Construction: All construction occurs under full closure, except 150’ of the east leg of G12 is staged to maintain access to the east driveway of the gas station and 150$^{th}$ Street at all times

**Traffic Control Alternative Recommendation:**

Option 1 has the highest cost with $267,000 for detour pavement. Option 2 has detour pavement costs of $172,000 to maintain the northbound I-29 ramp. Option 3 has no detour pavement costs, and only 150' of G12 is stage constructed.

Benesch recommends Option 2. Close the southbound ramps, close G12 over I-29, and maintain traffic on the northbound ramps. Although Option 1 provides full access, the detour pavement costs are disproportionality high for the traffic counts. Since G12 over I-29 is closed in all 3 alternatives, the gas station would not be accessible from the west in any scenario. Option 3 would likely force the closure of the gas station and restricts trucks from using the detour routes. Option 2 maintains access to the gas station and the detour for the southbound ramp closures has no truck restrictions or gravel roads. The plans should restrict the allowable durations of the southbound ramp closures and coordinate so that the ramps open at the same time the G12 bridge opens.

Permanent and temporary right of way will be required. Access control rights will be acquired if a permit for the third gas station driveway exists.

The project scheduling system (PSS) has the following the event finish dates: D3 – 4/27/2018, B1 – 7/27/2018, and D5 – 9/28/2018.

No plan sheets are included in this submittal; however, plan sheets may be viewed on the network at:

pw:\\projectwise.dot.int.lan:PWMain\Documents\Projects\7802907016\Design\Design Events\D2\

The revised Post Field Exam estimated total cost of the project is $2,993,500 (including contingency and total bridge cost). Note that during the concept phase it was requested that the "new bridge" line item cost be revised from $838,800 ($84/sf) to $1,100,000 ($110/sf) to be based on total deck area per Iowa Bridge Manual guidelines. The Pre-Field Exam plans used the old value for the cost estimate on Sheet A.16, but this has been corrected in the Post-Field Exam Plans.

Exclusive of contingency, the Concept Statement Roadway cost estimate was $832,300, the Pre-Field Exam Roadway cost estimate was $1,520,800, and the Post Field Exam Roadway cost estimate is now $1,212,100. The $308,700 roadway cost reduction from the Pre-Field Exam estimate is primarily due to the following:

- -$171,800 Detour pavement reductions
- -$140,100 50 MPH Design Speed (includes revised west limits)

<u>Action Items:</u>

- An agreement with Pottawattamie county will be needed for road closure and detour routes.
- Iowa DOT will provide ADT for ramps. (Traffic counts have already been provided).
- Iowa DOT will provide pavement design for G12, Ramps and detour pavement. (Preliminary pavement determination has been provided).

- Pottawattamie County will provide plans for the Boyer River Bridge and As-builts for the roadway construction to the east. (Plans have already been provided).
- Iowa DOT and Pottawattamie County will check to see if a permit for the third driveway at the gas station exists or if it can be eliminated.
- Benesch will look into re-aligning the gravel road at the west intersection in order to eliminate skew.

BRIDGE REPLACEMENT
POTTAWATTAMIE Co. IMX-029-4(112)72--02-78
LETTING DATE

## INDEX OF SHEETS

105-3
10-18-05

| No. | Description |
|---|---|
| **A Sheets** | **Title Sheets** |
| A.1 | Title Sheet |
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| A.6-A.8 | Ramp Design Criteria |
| A.9 | Clear Zone Criteria |
| A.10-A.15 | Concept Report |
| A.16 | Field Exam Cost Estimate |
| A.17 | Questions |
| **B Sheets** | **Typical Cross Sections and Details** |
| B.1 - B.3 | Typical Sections and Details |
| **D Sheets** | **Typical Sections** |
| *D.1 | Legend |
| *D.2-D.5 | G12 Plan and Profile |
| **F Sheets** | **Detour Pavement** |
| *F.1-F.2 | Detour Pavement Details |
| **G Sheets** | **Survey Sheets** |
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| **J Sheets** | **Traffic Control and Staging Sheets** |
| *J.1 - J.2 | Detour Plan |
| *J.3 - J.8 | Staging Detail Sheets |
| *J.9 | Detour Plan |
| **K Sheets** | **Interchange Sheets** |
| *K.1 - K.2 | Plan and Profile Sheets - Ramps |
| **U Sheets** | **Misc.** |
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| **V Sheets** | **Bridge Plans** |
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| **Y Sheets** | **Ramp Cross Sections** |
| Y.1-Y.15 | Cross Section Sheets - Ramps |

* COLOR PLANS

IOWA DOT
Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

INTERSTATE ROAD SYSTEM

# POTTAWATTAMIE COUNTY

## BRIDGE REPLACEMENT

**BRIDGE OVER INTERSTATE 29 ON COUNTY ROAD G12**

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.15 of the Specifications.

**PROJECT NEED = 49,416 CY**

| REVISIONS |
|---|
| |

| | TOTAL 111 |
|---|---|
| PROJECT IDENTIFICATION NUMBER | |
| 16-78-029-070 | |
| PROJECT NUMBER | |
| IMX-029-4(112)72--02-78 | |

- CHECK OFF ALIGNMENT BRIDGE IMPACTS
- 50 MPH DESIGN SPEED.

For Project Location Map
Refer to Sheet No. A.2

**PROJECT EVENT DATES**

**D02 - MARCH 16, 2018**
**D03 - APRIL 27, 2018**
**D05 - SEPTEMBER 28, 2018**

### INDEX OF SEALS

| SHEET NO. | NAME | TYPE |
|---|---|---|
| | | |
| | | |
| | | |
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| | | |
| | | |

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WHAT IS TRAFFIC ON RAMPS? — NAZIE WILL PROVIDE.

| 04-30-02 | G12 | 101-5 |
|---|---|---|
| DESIGN DATA URBAN | | |
| 2016 AADT | 410 | V.P.D. |
| 2035 AADT | | V.P.D. |
| 2035 DHV | | V.P.H. |
| TRUCKS | | % |
| Total Design ESALs | -- | |

| 04-30-02 | I-29 | 101-5 |
|---|---|---|
| DESIGN DATA URBAN | | |
| 2016 AADT | 21,700 | V.P.D. |
| 2035 AADT | | V.P.D. |
| 2035 DHV | | V.P.H. |
| TRUCKS | | % |
| Total Design ESALs | -- | |

**PRELIMINARY PLANS**

D-02 Date: 02-01-2018

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER A.1 |
|---|---|---|---|---|---|

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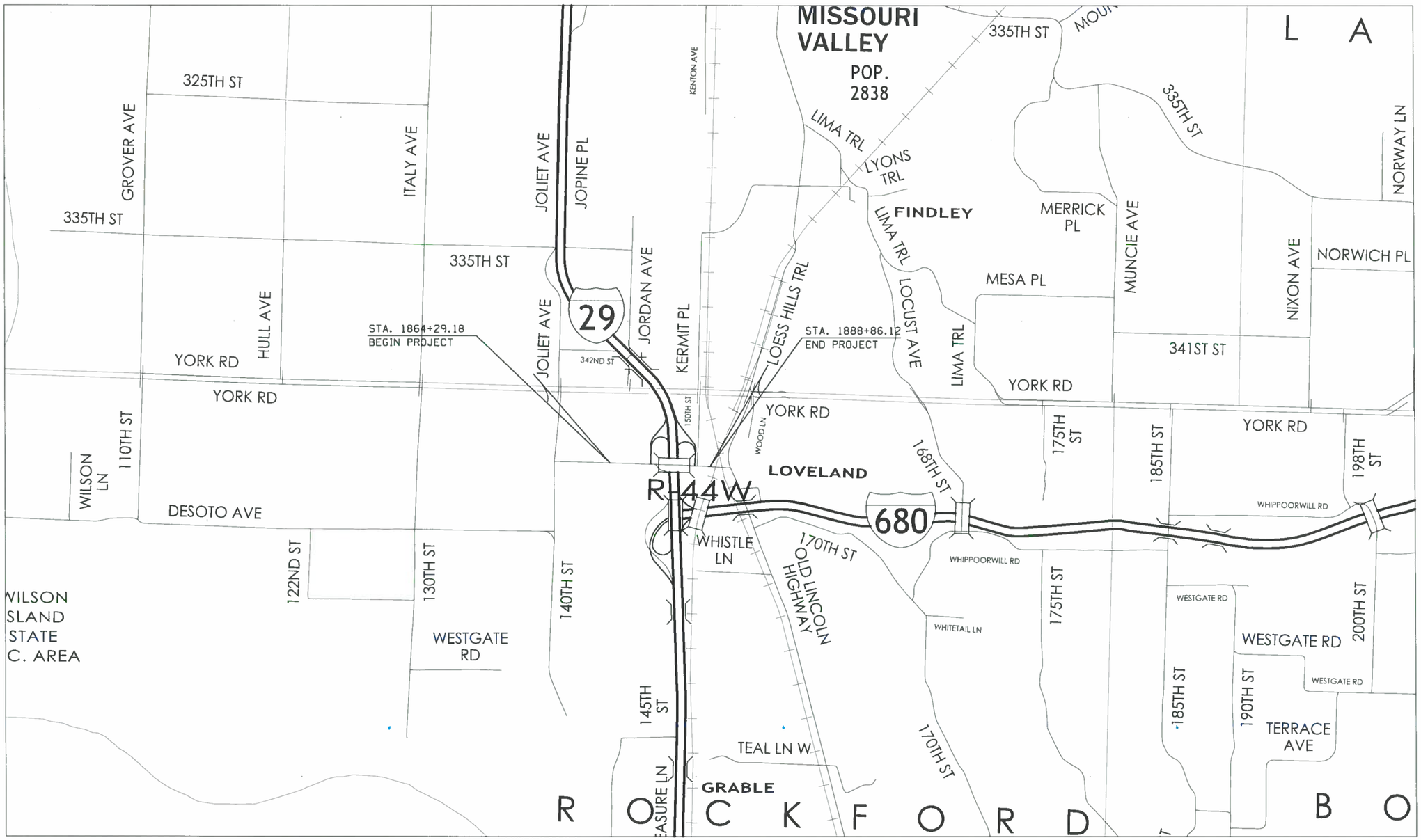


LOCATION MAP SCALE
0 0.5 1.0
Miles

# PROJECT LOCATION

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER A.2 |
|---|---|---|---|---|---|

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| | | | | |
|---|---|---|---|---|
| **Roadway** | G12 | | | |
| **PIN Number** | 16-78-029-070 | | **Submittal Date** | |
| **Project Number** | IMX-029-4(112)72--02-78 | | | **Approval Date** |
| **District** | District 4 | **Assistant District Engineer** | | |
| **County** | Pottawattamie (78) | **or** | | |
| **Route** | County Road G12 | **Office Director** | | |
| **Location** | over Interstate 29 | | | |
| **Work Type** | Bridge | | | |
| **Segment Manager** | | | | |
| **Designer** | | | | |

Design Manual Section 1C-1
last update: 12-08-16

## Rural Two-Lane Highways (Rural Arterials)

| Design Element | | Preferred | Acceptable | Project Values |
|---|---|---|---|---|
| Design speed (mph) | | 60 | 50 | 55 MPH |
| Maximum superelevation rate (Refer to Section 2A-2) | | 6% | 8% | NA |
| Design lane width (ft) | | 12 | 12 | 12 |
| Full depth paved width (ft) | | 14 | 12 | 12 |
| Right turn lane (ft) | | 12 | 10 | 12 |
| Climbing Lane (ft) | | 12 | 12 | 12 |
| Left turn lane (ft) | | 12 | 10 | 12 |
| Pavement cross-slope (on tangent sections) | Through lanes | 2% | 1.5% minimum, 2% maximum | 2% |
| | Auxiliary and turn lanes | 3% | 3% maximum | 3% |
| | Crown break at centerline | 4% | 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 | 6-inch standard | |
| | Design speed ≥ 60 mph | 4-inch sloped | 6-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 | 3:1 | 3:1 |
| | Beyond standard ditch depth and design clear zone | 3.5:1 | 3:1 | 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 | NA |
| Transverse Slopes | w/ drainage structures | 8:1 | 6:1 | NA |
| | w/o drainage structures | 10:1 | 6:1 | 6:1 |
| Ditches (Refer to Section 3G-1) | Outside ditch (depth x width) (ft) | 5 x 10 | -- | NA |
| Bridge width—new* | Bridge length ≤ 200 ft | design lane widths + effective shoulder widths | design lane widths + effective shoulder widths | NA |
| | Bridge length > 200 ft | design lane widths + effective shoulder widths | design lane width + 4' right and left of the design lane widths | 36" |
| Bridge width—existing* | | design lane widths + no less than 2 ft left and right | design lane widths + 2 ft. offset left and right | 24' |
| Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks) | Over primary | 16.5 | 16 | 16.5 |
| | Over non-primary | 16.5 at interchange locations, 15 at all other locations | 14 | NA |
| | Over railroad | 23.3 | 23.3 | NA |
| | Sign trusses and pedestrian bridges | 17.5 | 17 | NA |
| Structural Capacity | | Contact Office of Bridges and Structures | Contact Office of Bridges and Structures | |
| Level of Service | | B | B | |

*FHWA notification via email is required if acceptable critera is not met on the NHS system (No formal design exeption is required)

USE 50 MPH

WE USED PREFERRED - NEED CLEAR ZONE

Ramps and County Road G12 between the ramp terminals should have 6:1 foreslopes though the clear zone area.

G12 DESIGN CRITERIA

**Roadway Design Speed (mph) = 55**

Design Manual Section 1C-1
last update: 12-08-16

## Design Criteria for High Speed Roadways

| Design Element | | | Preferred Criteria, Design Speed, mph | | | | | | Acceptable Criteria, Design Speed, mph | | | | | | Project Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | 495 |
| 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 | NA |
| Minimum vertical curve length (ft) (Refer to Section 2B-1) | | | 150 | 165 | 180 | 195 | 210 | 225 | 150 | 165 | 180 | 195 | 210 | 225 | 165 |
| 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 | 114 |
| | sag vertical curves | roadways without fixed source lighting | 96 | 115 | 136 | 157 | 181 | 206 | 96 | 115 | 136 | 157 | 181 | 206 | 115 |
| | | roadways with fixed-source lighting | 96 | 115 | 136 | 157 | 181 | 206 | 54 | 66 | 78 | 91 | 106 | 121 | 115 |
| Minimum gradient (%) | (Refer to Section 2B-1) | | 0.5 | | | | | | 0.3% with a curb, 0.0% without a curb | | | | | | 0.5 |
| Maximum gradient (%) | (Refer to Section 2B-1) | Urban roadways | 4 | | 3 | | | | 7 | 6 | 6 | -- | -- | -- | NA |
| | | Rural roadways | | | | | | | 5 | 5 | 4 | 4 | 4 | 4 | 4.65% |
| | | Interstates | | | | | | | 5 | 5 | 4 | 4 | 4 | 4 | NA |
| Clear zone | | | See "Preferred Clear Zone" table in Section 8A-2 | | | | | | See "Acceptable Clear Zone" table in Section 8A-2 | | | | | | 18/22 |

44' USE 12' WHEN NECESSARY W/ 50 MPH DESIGN SPEED

SEE SHEET A.9

G12 DESIGN CRITERIA

| Design year ADT = | | | | | | | |
|---|---|---|---|---|---|---|---|

Design Manual Section 1C-1
last update: 12-08-16

## 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 | 6 |
| 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 | 6 |
| 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* | 6 |
| 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:

G12 DESIGN CRITERIA

| | | | | |
|---|---|---|---|---|
| **Roadway** | RAMP B AND C | | | |
| **PIN Number** | 16-78-029-070 | | **Submittal Date** | |
| **Project Number** | IMX-029-4(112)72--02-78 | | | **Approval Date** |
| **District** | District 4 | **Assistant District Engineer** | | |
| **County** | Pottawattamie (78) | **or** | | |
| **Route** | County Road G12 | **Office Director** | | |
| **Location** | over Interstate 29 | | | |
| **Work Type** | Bridge | | | |
| **Segment Manager** | | | | |
| **Designer** | | | | |

Design Manual Section 1C-1
last update: 12-08-16

## Ramps

| Design Element | | Preferred Values | Acceptable Values | Project Values |
|---|---|---|---|---|
| Design speed (mph) | | See Design Speed for Ramps Table Below | See Design Speed for Ramps Table Below | 30 |
| Design lane width (ft) | | | | |
| Turn-lane width (ft) | Interstate ramps | 12 | 12 | 12 |
| | Non-Interstate ramps | 12 | 10 | 12 |
| Pavement cross-slope (on tangent sections) | | 2% | 1.5% minimum, 2% maximum | 2% |
| 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% |
| 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 | 4:1 for interstates*, 3:1 for other roadways | TBD |
| | Beyond standard ditch depth and design clear zone | 3.5:1 | 3:1 | TBD |
| | Curbed roadways | 2% | not steeper than 3:1 | NA |
| Bridge width—new** | | design lane widths + effective shoulder widths | design lane widths + effective shoulder widths | NA |
| Bridge width—existing** | | design lane widths + effective shoulder widths | design lane widths + effective shoulder widths | NA |
| Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks) | Over primary | 16.5 | 16 | NA |
| | over non-primary | 16.5 at interchange locations, 15 at all other locations | 14 | NA |
| | over railroad | 23.3 | 23.3 | NA |
| | sign truss and pedestrian bridges | 17.5 | 17 | NA |
| Structural Capacity | | Contact Office of Bridges and Structures | Contact Office of Bridges and Structures | NA |

*Design Exception required for ramps on the Interstate system only
**FHWA notification via email is required if acceptable cirteria is not met on the Interstate or NHS systems (No formal design exception required)

RAMPS ARE AT 3:1 FOR D02

RAMPS ARE AT 3:1 FOR D02

Ramps and County Road G12 between the ramp terminals should have 6:1 foreslopes though the clear zone area.

RAMP DESIGN CRITERIA

**Ramp Design Speed (mph) =** 30

Design Manual Section 1C-1
last update: 12-08-16

## Design Speed for Ramps

| Design Element | Ramp Type | | | | | | | | | | Project Values |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Preferred | | | | | Acceptable | | | | | |
| | All curves near free flow terminals | Diagonal: Curves near at-grade terminals | Loop | Semi-Directional | Directional | All curves near free flow terminals | Diagonal: Curves near at-grade terminals | Loop | Semi-Directional | Directional | |
| Design speed (mph) | 60 | 40 | 30 | 50 | 60 | 50 | 35 | 25 | 40 | 40 | 30 |
| Maximum superelevation rate (Refer to Section 2A-2 for details) | 6% | 4% | 6% | | | 8% | | | | | NA |

RAMP DESIGN CRITERIA

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER A.7 | |
|---|---|---|---|---|---|---|

8:33:58 AM untitled c:\pw_work\pwmain\naseer.mohammed\d0874197\78029112-AB-A-01.sht

**Ramp Design Speed (mph) =** 30

Design Manual Section 1C-1
last update: 12-08-16

## Design Criteria for Ramps Based Upon Design Speed

| Design Element | | | Preferred Criteria Design Speed, mph | | | | | | | | Acceptable Criteria Design Speed, mph | | | | | | | | Project Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | |
| Stopping sight distance (ft) (Refer to Section 6D-1) | | | 155 | 200 | 250 | 305 | 360 | 425 | 495 | 570 | 155 | 200 | 250 | 305 | 360 | 425 | 495 | 570 | 200 |
| Minimum horizontal curve radius (ft) and superelevation rate (Refer to Sections 2A-2 and 2A-3) | Method 2 superelevation and side friction distribution | e = 4% max | See Table 10 in Section 2A-3 | | | | | -- | -- | -- | -- | | | | | | | | NA |
| | Method 5 superelevation and side friction distribution | $e_{max}$ = 6% | 144 | 231 | 340 | 485 | 643 | 833 | 1060 | 1330 | 144 | 231 | 340 | 485 | 643 | 833 | 1060 | 1330 | NA |
| | | $e_{max}$ = 8% | -- | -- | -- | -- | -- | -- | -- | -- | 134 | 214 | 314 | 444 | 587 | 758 | 960 | 1200 | NA |
| Minimum vertical curve length (ft) (Refer to Section 2B-1) | | | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 90 |
| Minimum Rate of Vertical Curvature (Refer to Section 2B-1) | crest vertical curves | | 12 | 19 | 29 | 44 | 61 | 84 | 114 | 151 | 12 | 19 | 29 | 44 | 61 | 84 | 114 | 151 | NA |
| | sag vertical curves | roadways without fixed-source lighting | 26 | 37 | 49 | 64 | 79 | 96 | 115 | 136 | 26 | 37 | 49 | 64 | 79 | 96 | 115 | 136 | 37 |
| | | roadways with fixed-source lighting | 26 | 37 | 49 | 64 | 79 | 96 | 115 | 136 | 14 | 20 | 27 | 35 | 44 | 54 | 66 | 78 | 37 |
| Minimum gradient (%) | (Refer to Section 2B-1) | | 0.5 | | | | | | | | 0.3% with a curb, 0.0% without a curb | | | | | | | | 0.5 |
| Maximum gradient (%) on ramps | (Refer to Sections 2B-1) | Upgrades | 4 | | | | | | | | 8 | 7 | 6 | 6 | 5 | 5 | 5 | 5 | 4% |
| | | Downgrades | | | | | | | | | Equal to the maximum upgrade gradient. In special cases, may be 2% greater but in no case greater than 8% | | | | | | | | 4% |
| Clear zone | | | See "Preferred Clear Zone" table in Section 8A-2 | | | | | | | | See "Acceptable Clear Zone" table in Section 8A-2 | | | | | | | | 10 |

Design Manual Section 1C-1
last update: 12-08-16

## Effective Shoulder Width and Type for Ramps

| Design Element | | Ramp Type: Preferred Diagonal one lane | Preferred Diagonal two lane | Preferred Loop | Preferred Semi-Directional one lane | Preferred Semi-Directional two lane | Preferred Directional one lane | Preferred Directional two lane | Acceptable Diagonal Radius*> 500 feet* one lane | Acceptable Diagonal Radius*> 500 feet* two lane | Acceptable Loop | Acceptable Semi-Directional Radius > 500 feet* one lane | Acceptable Semi-Directional Radius > 500 feet* two lane | Acceptable Directional Radius > 500 feet one lane | Acceptable Directional Radius > 500 feet two lane | Project Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full depth paved width (ft) | | 16 | 24 | 18 | 16 | 24 | 16 | 24 | 14 | 22 | 17 | 14 | 22 | 14 | 22 | 24 |
| Design lane width (ft) | | 16 | 12 | 18 | 16 | 12 | 16 | 12 | 14 | 11 | 17 | 14 | 11 | 14 | 11 | 12 |
| Paved shoulder width (ft) (in the direction of travel)** | Left | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | NA |
| | Right | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 6 |
| ***Granular shoulder width (ft) (in the direction of travel) | Left | 4 | - | - | - | - | - | - | 4 | - | - | - | - | - | - | NA |
| | Right | 6 | - | - | - | - | - | - | 6 | - | - | - | - | - | - | NA |
| Curb type | Interstate | 4-inch sloped | | | | | | | 4-inch sloped | | | | | | | 4 |
| | Non-Interstate | 4-inch sloped | | | | | | | 6-inch sloped | | | | | | | 4 |

*For radii less than 500 feet, refer to design widths of pavement for turning roadways in A Policy on Geometric Design of Highways and Streets
**Left and right shoulders widths may be reversed if needed to provide additional sight distance
***Non-Interstate interchanges only

Notes:

RAMP DESIGN CRITERIA

## Acceptable Clear Zone Distances (feet)
## (Based on AASHTO Roadside Design Guide, 4th edition)

| | | FORESLOPES | | | BACKSLOPES | | |
|---|---|---|---|---|---|---|---|
| design speed | design ADT | 6:1 or flatter | Steeper than 6:1, up to and including 4:1 | Steeper than 4:1 | Steeper than 4:1* | 4:1 or flatter, up to 6:1 | 6:1 or flatter |
| 40 mph or less | ADT < 750 | 7 | 7 | ** | 7 | 7 | 7 |
| | 750 ≤ ADT < 1500 | 10 | 12 | ** | 10 | 10 | 10 |
| | 1500 ≤ ADT < 6000 | 12 | 14 | ** | 12 | 12 | 12 |
| | ADT ≥ 6000 | 14 | 16 | ** | 14 | 14 | 14 |
| 45 – 50 mph | ADT < 750 | 10 | 12 | ** | 8 | 8 | 10 |
| | 750 ≤ ADT < 1500 | 14 | 16 | ** | 10 | 12 | 14 |
| | 1500 ≤ ADT < 6000 | 16 | 20 | ** | 12 | 14 | 16 |
| | ADT ≥ 6000 | 20 | 24 | ** | 14 | 18 | 20 |
| 55 mph | ADT < 750 | 12 | 14 | ** | 8 | 10 | 10 |
| | 750 ≤ ADT < 1500 | 16 | 20 | ** | 10 | 14 | 16 |
| | 1500 ≤ ADT < 6000 | 20 | 24 | ** | 14 | 16 | 20 |
| | ADT ≥ 6000 | 22 | 26 | ** | 16 | 20 | 22 |
| 60 mph | ADT < 750 | 16 | 20 | ** | 10 | 12 | 14 |
| | 750 ≤ ADT < 1500 | 20 | 26 | ** | 12 | 16 | 20 |
| | 1500 ≤ ADT < 6000 | 26 | 30 | ** | 14 | 18 | 24 |
| | ADT ≥ 6000 | 30 | 30 | ** | 20 | 24 | 26 |
| 65 – 70 mph | ADT < 750 | 18 | 20 | ** | 10 | 14 | 14 |
| | 750 ≤ ADT < 1500 | 24 | 28 | ** | 12 | 18 | 20 |
| | 1500 ≤ ADT < 6000 | 28 | 30 | ** | 16 | 22 | 26 |
| | ADT ≥ 6000 | 30 | 30 | ** | 22 | 26 | 28 |

* Backslopes as steep as 2.5:1 can be considered as part of the clear zone, as long as they are relatively smooth and do not contain any fixed objects. Refer to Section 8A-4 of the Design Manual for information regarding backslopes steeper than 2.5:1.

** Since a vehicle traveling on a slope steeper than 4:1 is likely to be diverted to the bottom of the slope, the width of any slope steeper than 4:1 cannot be counted in the clear zone determination. Refer to Section 8A-2 of the Design Manual for information on providing clear recovery areas at the base of steep slopes.

Chapter 8—Safety Design
Section 8A-2—Clear Zones
Revision Date: 01-05-17

## Preferred Clear Zone Distances (feet)
## (Based on AASHTO Roadside Design Guide, 4th Edition)

| | | FORESLOPES | | | BACKSLOPES | | |
|---|---|---|---|---|---|---|---|
| design speed | design ADT | 6:1 or flatter | Steeper than 6:1, up to and including 4:1 | Steeper than 4:1 | Steeper than 4:1* | 4:1 or flatter, up to 6:1 | 6:1 or flatter |
| 40 mph or less | ADT < 750 | 10 | 10 | ** | 10 | 10 | 10 |
| | 750 ≤ ADT < 1500 | 12 | 14 | ** | 12 | 12 | 12 |
| | 1500 ≤ ADT < 6000 | 14 | 16 | ** | 14 | 14 | 14 |
| | ADT ≥ 6000 | 16 | 18 | ** | 16 | 16 | 16 |
| 45 – 50 mph | ADT < 750 | 12 | 14 | ** | 10 | 10 | 12 |
| | 750 ≤ ADT < 1500 | 16 | 20 | ** | 12 | 14 | 16 |
| | 1500 ≤ ADT < 6000 | 18 | 26 | ** | 14 | 16 | 18 |
| | ADT ≥ 6000 | 22 | 28 | ** | 16 | 20 | 22 |
| 55 mph | ADT < 750 | 14 | 18 | ** | 10 | 12 | 12 |
| | 750 ≤ ADT < 1500 | 18 | 24 | ** | 12 | 16 | 18 |
| | 1500 ≤ ADT < 6000 | 22 | 30 | ** | 16 | 18 | 22 |
| | ADT ≥ 6000 | 24 | 32 | ** | 18 | 22 | 24 |
| 60 mph | ADT < 750 | 18 | 24 | ** | 12 | 14 | 16 |
| | 750 ≤ ADT < 1500 | 24 | 32 | ** | 14 | 18 | 22 |
| | 1500 ≤ ADT < 6000 | 30 | 40 | ** | 18 | 22 | 26 |
| | ADT ≥ 6000 | 32 | 44 | ** | 22 | 26 | 28 |
| 65 – 70 mph | ADT < 750 | 20 | 26 | ** | 12 | 16 | 16 |
| | 750 ≤ ADT < 1500 | 26 | 36 | ** | 16 | 20 | 22 |
| | 1500 ≤ ADT < 6000 | 32 | 42 | ** | 20 | 24 | 28 |
| | ADT ≥ 6000 | 34 | 46 | ** | 24 | 30 | 30 |

RAMPS

USE WHEN IT IS POSSIBLE

COUNTY ROAD G12

* Backslopes as steep as 2.5:1 can be considered as part of the clear zone, as long as they are relatively smooth and do not contain any fixed objects. Refer to Section 8A-4 of the Design Manual for information regarding backslopes steeper than 2.5:1.

** Since a vehicle traveling on a slope steeper than 4:1 is likely to be diverted to the bottom of the slope, the width of any slope steeper than 4:1 cannot be counted in the clear zone determination. Refer to Section 8A-2 of the Design Manual for information on providing clear recovery areas at the base of steep slopes.

CLEAR ZONE CRITERIA

**IOWA DEPARTMENT OF TRANSPORTATION**

| | | | |
|---|---|---|---|
| **To Office** | District 4 | **Date** | March 15, 2017 |
| **Attention** | S. Schram | **Project** | Pottawattamie County<br>IMX-029-4(112)72—02-78<br>BRFIMX-029-4(113)72—14-78<br>PIN 16-78-029-070<br>Maint. No. 7871.9O029<br>FHWA No. 45060 |
| **From** | Alfred Benesch & Company / R. Meyer | | |
| **Office** | Bridges and Structures | | |
| **Subject** | Project Concept Statement; Final, D0 | | |

## FINAL PROJECT CONCEPT STATEMENT

I. STUDY AREA

A. Project Description

This project involves the bridge replacement at County Road G12 over I-29 in Pottawattamie County.

The preferred alternative is to construct a 2-span, 252 ft. 0 in. x 36 ft. pre-tensioned pre-stressed bulb tee (BTD125) concrete beam bridge with integral abutments in the current location of the existing bridge. The bridge and county road would be raised approximately 3.2 ft. to provide the desirable clearance for interstate traffic. The new profile requires reconstruction of the county road for approximately 1920 ft. The work also entails the reconstruction of the interchange ramps, intersections, driveways and local roads and access points to accommodate the profile adjustment.

One additional alternative is to replace the existing bridge with a 2-span, 252 ft. 0 in. x 36 ft. continuous welded plate girder bridge with integral abutments in the current location of the existing bridge. Each span would be approximately 125 ft. The bridge profile raise & limits of county road reconstruction would be slightly less for the CWPG but comparable to the BTD beam alternative. The work also entails the reconstruction of the interchange ramps, intersections, driveways and local roads and access points to accommodate the profile adjustment.



In a previous draft of this concept, 4-span options for BT and CWPG were investigated, but they were omitted in order to avoid having piers in proximity to the outside shoulders. Another draft also proposed a 240' long 2-span BT alternative with 2-BTC120 spans, but additional bridge length was needed in order to accommodate a 12' outside shoulder with a 5' offset for snow storage at the request of the District.

B. Need for Project

The existing structure is considered functionally obsolete (unofficial per SIMS). The deck overlay has several existing patches, delaminations, spalled areas, and epoxy injection repairs. The south exterior beam, Beam 6, in Span 3 has been struck multiple times and was replaced in 1987. In 2003, Beams 1, 5, and 6 in Span 3 were replaced. During this replacement, portions of the deck and curbs at these beam locations were replaced. Beam 6 in Span 3 was damaged again in 2015 and repaired. There are many map cracks and deteriorated areas in the piers and abutments.

The bridge has a low vertical clearance (15 ft. 4 in. according to the inspection report). This low clearance has caused the multiple instances of impact damage to the superstructure. The vertical curve of the bridge is shorter than the standard and needs to be lengthened in order to meet standards for the roadway speed. Due to the age and condition of the bridge, the most practical solution to solve the vertical clearance and impact issues would be to do a complete bridge replacement.

C. Present Facility

The existing bridge is a 4-span 223 ft. 9 in. x 24 ft. pre-tensioned pre-stressed concrete beam bridge which was built in 1958 and overlaid with low slump concrete in 1977.

I-29, in the project area, is a divided highway facility, consisting of a 6 ft. inside shoulder, 12 ft. inside lane, 14 ft. outside lane, a varying width auxiliary lane and a 6 ft. outside shoulder with 4:1 foreslopes Northbound. The southbound direction consists of a 6 ft. inside shoulder, two 12 ft. lanes, a varying width merge lane and a six foot outside shoulder with 4:1 foreslopes. The median in the project area is approximately 74 ft. centerline to centerline. The original PGL elevation for northbound and southbound was 1001.78 according to the project I-920(4) bridge plans from 1958. In 1992 a PCC in-lay was performed raising the PGL by 4.5 inches to an elevation of 1002.16. HMA resurfacing on the northbound lanes was accomplished in 2012, however it was noted from 2016 imagery that the resurfacing

did not appear to include the area under the G12 bridge. For this concept, the assumed existing PGL elevation is 1002.16.

County Road G12 (Desoto Avenue) in the project area was constructed in 1958 and is 22 ft. wide with HMA pavement and no shoulders. The existing posted speed limit on County Road G12 is 50 miles per hour.

The interchange of I-29 at County Road G12 is a partial clover leaf with access to and from southbound I-29 on the west side of the G12 over I-29 bridge and access to and from northbound I-29 on the east side of the G12 bridge over I-29. The ramp intersections are stop controlled intersections with traffic on county road G12 having free flow. The ramps at the intersections are two lane, two way with 12 ft. lanes and 4 ft. shoulders. Construction on the I-29 northbound ramps was included in the 2012 resurfacing project for I-29.

The project area also includes the minor cross roads of 145th Street and 150th Street which are both approximately 20 ft. wide and composed of gravel roadway.

D. Traffic Estimates

The 2014 average daily traffic estimates for I-29 are 21,000 AADT with 24% trucks. The 2012 ADT on County Road G12 is 980. Truck traffic is 0% on County Road G12.

E. Sufficiency Ratings

I-29 is classified as an "interstate" route and is a maintenance service level "A" road with a sufficiency rating of 82 for the northbound and a 78.5 for the southbound. The federal bridge sufficiency rating is 33.6.

F. Access Control

Accesses east of the interchange do not meet the access spacing requirement.

G. Crash History



The existing beams have sustained impact damage from traffic on I-29 that required replacements and repairs in 1987, 2003, and 2015.

## II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 – Replace Bridge with Pre-tensioned Pre-stressed Precast Concrete Beam Superstructure, raise County Road G12 to minimum vertical clearance

Replace the existing 223 ft. 9 in. x 24 ft. pre-tensioned pre-stressed concrete beam bridge on County Road G12 with a 2-span, 252 ft. – 0 in. x 36 ft. pre-tensioned, pre-stressed bulb tee concrete beam bridge on a new vertical alignment. The typical cross section will consist of a 36 ft. bridge roadway width (39 ft. 2 in. deck) and a roadway width of 24 ft. traveled way with 6 ft. shoulders. The foreslopes are planned to be 6:1 to the clear zone then 3:1 until they tie into the existing county road foreslopes. The current concrete slope protection will be replaced with macadam stone slope protection.

The width of the bridge deck was increased an additional 12 feet (to 36 ft.) in order to meet bridge standards for roadway width.

The vertical alignment for this bridge will be raised approximately 3.2 ft. to meet minimum vertical clearance requirement of 16.75 ft. The new vertical alignment will require G12 to be reconstructed for approximately 1920 ft. See Figure 1 for an estimated profile of county road G12. (Note that elevations were extracted to the nearest foot from Google Earth imagery and the profile is not intended to be used as a preliminary base model.)

At the bridge approaches, the existing guardrail will be replaced with new guardrail. Class 10 excavation will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Revetment and bridge drainage will need to be installed to accommodate the new slopes and bridge construction.

The horizontal alignment remains unchanged. The revised vertical profile for G12 will require portions of the existing partial clover leaf interchange ramps to be reconstructed. The access west of I-29 which accommodates the Southbound I-29 exit and entrance ramps will require approximately 280 ft. of reconstruction. Likewise, the access east of I-29 which provides access to the Northbound I-29 entrance and exit ramps will require about 270 ft. of reconstruction. While there are no apparent issues with intersection sight distance or the stopping sight distance, the interchange improvements will require the removal and replacement for the interchange lighting and the drainage items at the ramp terminals. Sight distances

will need to be reviewed again after survey is completed. All the signing at the interchange will need to be replaced.

Further impacts of the adjustment in the G12 vertical profile will include driveway reconstruction and local road access reconstruction. It is recommended to close the middle entrance of the gas station on the southeast quadrant to reduce the driveways from three to two. 145th Street, a gravel road approximately 20 ft. in width, will need to be reconstructed from the intersection with G12 and the southbound ramps to about 300 ft. south of the intersection. Likewise, 150th Street, a gravel road approximately 20 ft. in width, will need to be reconstructed from the intersection with G12 to about 100 ft. north of the intersection. All existing drainage culverts will need to be removed and replaced.

The removal of the 4-span bridge and replacement with a 2-span bridge will allow the permanent removal of the guardrail along the outside shoulders of I-29. The abutments will be outside the clear zone. Cable guardrail along the median of I-29 should remain.

Traffic control will be implemented along I-29 to accommodate for Bridge construction. See Part IIB for Traffic Control Standards that will be included for construction staging. Short term closures of I-29 will be required for bridge demolition and beam erection. Shoulder closures and single lane closures may also be required during demolition and work near the travelled way.
Traffic along the county road G12 will be detoured to accommodate a full closure of the bridge during construction. Traffic traveling west along county road G12 will be detoured north on I-29 to Lincoln Highway/ US Routh 30 and then routed south on I-29 to return to county road G12. The total length of the G12 westbound detour is approximately 8 miles with a travel time of about 8 minutes. Traffic traveling east along county road G12 will be routed south onto I-29 to exit at Rosewood Road, then return going north on I-29 to exit at county road G12. The total length of the G12 eastbound detour is approximately 11.9 miles with a travel time of about 12 minutes. See Figure 2 for detour plan.

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



| Item | Estimated Cost |
|---|---|
| **Bridge Costs** | |
| New Bridge | $1,100,000 |
| Macadam Stone Slope Protection | $23,500 |
| Bridge Removal | $45,000 |
| Mobilization - 10% | $116,900 |
| M & C - 15% | $192,900 |
| **Bridge Total** | **$1,478,300** |
| | |
| **Roadway Costs** | |
| Bridge Approaches | $106,400 |
| Removal of Pavement | $41,300 |
| PCC Pavement, 10" (ramps) | $87,100 |
| PCC Pavement, 8" (G12) | $194,700 |
| Modified Subbase | $51,300 |
| Paved Shoulder | $82,200 |
| Class 10, Roadway and Borrow | $92,700 |
| Class 13, Waste | $7,700 |
| Steel Guardrail for 2-lane bridge (includes removal) | $21,000 |
| Interchange lighting | $2,000 |
| Driveway Reconstruction | $14,200 |
| Clearing and Grubbing | $800 |
| Seeding and Fertilizing | $1,400 |
| Erosion Control | $8,900 |
| Temporary Luminaires | $20,000 |
| Replace all signing through the interchange | $10,000 |
| Subdrain | $4,800 |
| Bridge End Drain | $10,000 |
| Traffic Control - 5% | $37,900 |
| Mobilization - 5% | $37,900 |
| **Subtotal** | **$832,300** |
| Staging – 15% | $124,900 |
| M & C - 30% | $249,700 |
| **Roadway Total** | **$1,206,900** |
| | |
| **Project Total** | **$2,685,200** |

ALT 1

Alternative #2 – Replace Bridge with Continuous Welded Plate Girder Superstructure, raise County Road G12 to minimum vertical clearance

Replace the existing 223 ft. 9 in. x 24' pre-tensioned pre-stressed concrete beam bridge on County Road G12 with a 2-span, 252 ft. 0 in. x 36 ft. continuous welded plate girder bridge on a new vertical alignment. The typical cross section will consist of a 36 ft. bridge roadway width (39 ft. 2 in. deck) and a roadway width of 24 ft. traveled way with 6 ft. shoulders. The foreslopes are planned to be 6:1 to the clear zone then 3:1 until they tie into the existing county road foreslopes. The current concrete slope protection will be replaced with macadam stone slope protection.

The width of the bridge deck was increased an additional 12 feet (to 36 ft.) in order to meet bridge standards for roadway width.

The vertical alignment for this bridge will be raised approximately 3.0 ft. to meet minimum vertical clearance requirement of 16.75 ft. The new vertical alignment will require G12 to be reconstructed for approximately 1900 ft. See Figure 1 for an estimated profile of county road G12. (Note that elevations were extracted to the nearest foot from Google Earth imagery and the profile is not intended to be used as a preliminary base model.)

At the bridge approaches, the existing guardrail will be replaced with new guardrail. Class 10 excavation will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Revetment and bridge drainage will need to be installed to accommodate the new slopes and bridge construction.

The horizontal alignment remains unchanged. The revised vertical profile for G12 will require portions of the existing partial clover leaf interchange ramps to be reconstructed. The access west of I-29 which accommodates the Southbound I-29 exit and entrance ramps will require approximately 270 ft. of reconstruction. Likewise, the access east of I-29 which provides access to the Northbound I-29 entrance and exit ramps will require about 260 ft. of reconstruction. While there are no apparent issues with intersection sight distance or the stopping sight distance, the interchange improvements will require the removal and replacement for the interchange lighting and the drainage items at the ramp terminals. Sight distances will need to be reviewed again after survey is completed. All the signing at the interchange will need to be replaced.

Further impacts of the adjustment in the G12 vertical profile will include driveway reconstruction and local road access reconstruction. It is recommended to close the middle entrance of the gas station on the southeast quadrant to reduce the driveways from three to two. 145th Street, a gravel road approximately 20 ft. in width, will



need to be reconstructed from the intersection with G12 and the southbound ramps to about 300 ft. south of the intersection. Likewise, 150th Street, a gravel road approximately 20 ft. in width, will need to be reconstructed from the intersection with G12 to about 100 ft. north of the intersection. All existing drainage culverts will need to be removed and replaced.

Traffic control will be implemented along I-29 to accommodate for Bridge construction. See Part IIB for Traffic Control Standards that will be included for construction staging. Short term closures of I-29 will be required for bridge demolition and beam erection. Shoulder closures and single lane closures may also be required during demolition and work near the travelled way.
Traffic along the county road G12 will be detoured to accommodate a full closure of the bridge during construction. Traffic traveling west along county road G12 will be detoured north on I-29 to Lincoln Highway/ US Routh 30 and then routed south on I-29 to return to county road G12. The total length of the G12 westbound detour is approximately 8 miles with a travel time of about 8 minutes. Traffic traveling east along county road G12 will be routed south onto I-29 to exit at Rosewood Road, then return going north on I-29 to exit at county road G12. The total length of the G12 eastbound detour is approximately 11.9 miles with a travel time of about 12 minutes. See Figure 2 for detour plan.

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

| Item | | Estimated Cost |
|---|---|---|
| **Bridge Costs** | | |
| New Bridge | | $1,350,000 |
| Macadam Stone Slope Protection | | $23,500 |
| Bridge Removal | | $45,000 |
| Mobilization - 10% | | $141,900 |
| M & C - 15% | | $234,100 |
| **Bridge Total** | | **$1,794,500** |
| | | |
| **Roadway Costs** | | |
| Bridge Approaches | | $106,400 |
| Removal of Pavement | | $40,100 |
| PCC Pavement, 10" (ramps) | | $84,500 |
| PCC Pavement, 8" (G12) | | $188,900 |
| Modified Subbase | | $49,800 |
| Paved Shoulder | | $79,800 |
| Class 10, Roadway and Borrow | | $90,000 |
| Class 13, Waste | | $7,500 |
| Steel Guardrail for 2-lane bridge (includes removal) | | $21,000 |
| Interchange lighting | | $2,000 |
| Driveway Reconstruction | | $14,200 |
| Clearing and Grubbing | | $800 |
| Seeding and Fertilizing | | $1,400 |
| Erosion Control | | $8,700 |
| Temporary Luminaires | | $20,000 |
| Replace all signing through the interchange | | $10,000 |
| Subdrain | | $4,800 |
| Bridge End Drain | | $10,000 |
| Traffic Control - 5% | | $37,000 |
| Mobilization - 5% | | $37,000 |
| **Subtotal** | | **$813,900** |
| Staging – 15% | | $122,100 |
| M & C - 30% | | $244,200 |
| **Roadway Total** | | **$1,180,200** |
| | | |
| | **Project Total** | **$2,974,700** |



B. Traffic Control and Detour Analysis

The Traffic Control Standards will include:

- TC-1 Work Not Affecting Traffic (Two-Lane or Multi-Lane)
- TC-252 Routes Closed to Traffic
- TC-402 Work Within 15 ft of Traveled Way
- TC-416 Partial Lane Closure on Ramps
- TC-418 Lane Closure on Divided Highway

The offsite detour will utilize I-29 to re-route traffic headed east and west across the bridge on county road G12. Traffic traveling north on I-29 exiting to travel west on county road G12 and traffic traveling west on county road G12 will be detoured as follows:

- Traffic will to go north on I-29
- Traffic will exit at Lincoln Highway/ US Route 30
- Traffic will go west (left) on Lincoln Highway/ US Route 30 and stay right to merge onto the southbound I-29 loop ramp.
- Traffic will continue south on I-29
- Traffic will exit at county road G1 with access west of the bridge.

The total length of the G12 westbound detour is approximately 8 miles with a travel time of about 8 minutes.

Traffic traveling south on I-29 exiting to travel east on county road G12 and traffic traveling east along county road G12 will be detoured as follows:

- Traffic is to go continue south on I-29 or use the loop ramp to go south on I-29.
- Traffic is to continue south until Rosewood Road
- Traffic is exit at Rosewood Road and go east (left).
- Traffic will go north (left) onto the northbound I-29 ramp.
- Traffic will continue north on I-29.
- Traffic will exit at county road G12 with access east of bridge.

The total length of the G12 eastbound detour is approximately 11.9 miles with a travel time of about 12 minutes.

See Figure 2 for detour plan.

C. Recommendations

It is recommended that the present structure and interchange be replaced as described in Alternative 1 utilizing a detour.

D. Construction Sequence

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

E. Special Considerations

There is no ADA work anticipated in this project given that there are no sidewalks adjacent to either I-29 or County Road G12.

The Accelerated Bridge Construction (ABC) Rating Score of 18 is less than the first stage filter threshold of 50, therefore this bridge will not be considered for further ABC evaluation.

F. Program Status

This project is listed in the 2017- 2021 Iowa Transportation Improvement Program with $2,181,000 programmed for replacement in FY 2021 (planned for December 2020 letting). The Office of Bridges and Structures intends to develop this bridge as an advancement candidate to be let for December 2019. A schedule of events will be developed following approval of the Project Concept.



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# Pre-Field Exam Cost Estimate (superseded)

**FIELD EXAM COST ESTIMATE**
(with Temporary Ramps)

| Item | Estimated Cost |
|---|---|
| **Bridge Costs** | |
| New Bridge | ~~$838,800~~ $1,100,000 |
| Macadam Stone Slope Protection | $23,500 |
| Bridge Removal | ~~$60,000~~ $45,000 |
| Mobilization - 10% | ~~$92,300~~ $116,900 |
| M & C - 15% | ~~$152,200~~ $192,900 |
| **Bridge Total** | ~~$1,166,800~~ $1,478,300 |
| | |
| **Roadway Costs** | |
| Bridge Approaches | $106,400 |
| Removal of Pavement | $47,400 |
| PCC Pavement, 10" (ramps) | $100,000 |
| PCC Pavement, 8" (G12) | $223,500 |
| Modified Subbase | $58,800 |
| Paved Shoulder | $94,400 |
| Class 10, Roadway and Borrow | $335,900 |
| Class 13, Waste | $8,900 |
| Steel Guardrail for 2-lane bridge (includes removal) | $21,000 |
| Interchange lighting | $2,000 |
| Driveway Reconstruction | $14,200 |
| Clearing and Grubbing | $900 |
| Seeding and Fertilizing | $1,600 |
| Erosion Control | $10,200 |
| Temporary Luminaires | $20,000 |
| Replace all signing through the interchange | $10,000 |
| Subdrain | $4,800 |
| Bridge End Drain | $10,000 |
| Detour Pavement | $343,800 |
| Traffic Control - 5% | $53,500 |
| Mobilization -5% | $53,500 |
| **Subtotal** | **$1,520,800** |
| Contingency - 25% | $380,200 |
| **Roadway Total** | **$1,901,000** |
| | |
| **Project Total** | ~~$3,067,800~~ $3,379,300 |

**FIELD EXAM COST ESTIMATE**
(with Detour)

| Item | Estimated Cost |
|---|---|
| **Bridge Costs** | |
| New Bridge | ~~$838,800~~ $1,100,000 |
| Macadam Stone Slope Protection | $23,500 |
| Bridge Removal | ~~$60,000~~ $45,000 |
| Mobilization - 10% | ~~$92,300~~ $116,900 |
| M & C - 15% | ~~$152,200~~ $192,900 |
| **Bridge Total** | ~~$1,166,800~~ $1,478,300 |
| | |
| **Roadway Costs** | |
| Bridge Approaches | $106,400 |
| Removal of Pavement | $47,400 |
| PCC Pavement, 10" (ramps) | $100,000 |
| PCC Pavement, 8" (G12) | $223,500 |
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| Class 10, Roadway and Borrow | $335,900 |
| Class 13, Waste | $8,900 |
| Steel Guardrail for 2-lane bridge (includes removal) | $21,000 |
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| Driveway Reconstruction | $14,200 |
| Clearing and Grubbing | $900 |
| Seeding and Fertilizing | $1,600 |
| Erosion Control | $10,200 |
| Temporary Luminaires | $20,000 |
| Replace all signing through the interchange | $10,000 |
| Subdrain | $4,800 |
| Bridge End Drain | $10,000 |
| Detour Pavement | $0 |
| Traffic Control - 5% | $53,500 |
| Mobilization -5% | $53,500 |
| **Subtotal** | **$1,177,000** |
| Contingency - 25% | $294,300 |
| **Roadway Total** | **$1,471,300** |
| | |
| **Project Total** | ~~$2,638,100~~ $2,949,600 |

FIELD EXAM COST ESTIMATE

Plan and Profile:
Is it beneficial to extend ramp reconstruction limits? Add resurfacing?

TC-416 yes, but limit scope creep

Confirm that we are elminating the middle of the three driveways for the gas station on the east end.

DISTRICT WILL LOOK INTO IT

Power poles will be located within ditch area. Discuss utility relocation.

- DONE BY UTIL. COMPANY

The County Road G12 bridge over Boyer River is being constructed or has been recently reconstructed.
Need to check limits of roadway construction and possible changes in roadway profile and widths.

- DISTRICT WILL GET PLANS

K value being used for G12 sag curve is 114 as required for sag curves in unlit conditions. For fixed lighting (as we have at the ramp intersections) the allowable K value is 66. We could reduce the construction limits as well as amount of fill by increasing the lighting limits.

- WILL LOOK @ WHERE SAG CURVES ARE
- EX. POLES ARE GOOD - REMOVE & REINSTALL.

Speed Limit on G12 is 50 mph and we are using a 55 mph Design Speed. If we can get an exception to reduce the design speed to 50 mph, this would reduce the earthwork as well as construction limits.

- WILL USE 50 MPH

Confirm PCC or HMA pavement.

IOWA WILL GIVE PAVEMENT DESIGN

MOT:
Is there a possibility of closing SB ramps? This would eliminate the need of temporary pavement.

POSSIBLY,

Detour date and time period limitations and or restrictions?

- NO DETOUR DURING THE HARVEST (EARLY FALL) OCT. 1

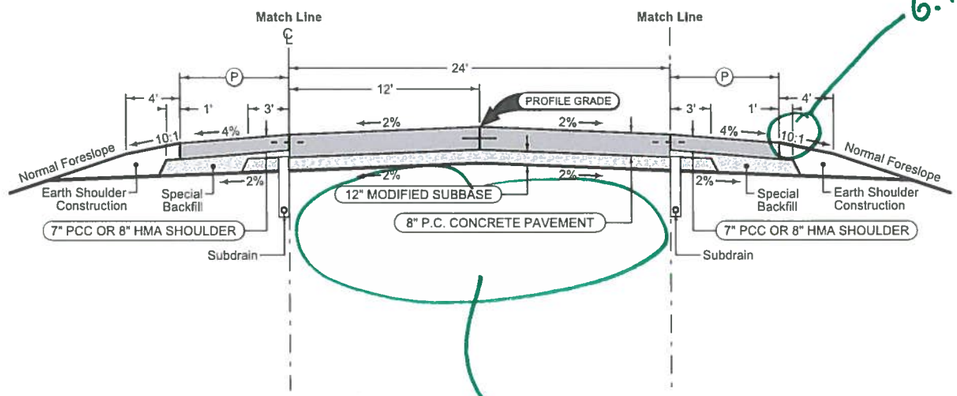
Do field entrances need access at all times during construction?

CHECK OTHER ACCESSES

Drainage Questions:
Reguarding drainage culverts that remain in the same location, should we extend drainage culverts or remove and replace drainage culverts?

REMOVE & REPLACE ALL CULVERTS

FIELD EXAM QUESTIONS




ELIMINATE 10:1 6:1 FOR

NATE WILL GET PAVEMENT DESIGN FOR G12 & RAMPS

Mainline Jointing:
Transverse joints: CD at 20' spacing
Longitudinal joint: L-2

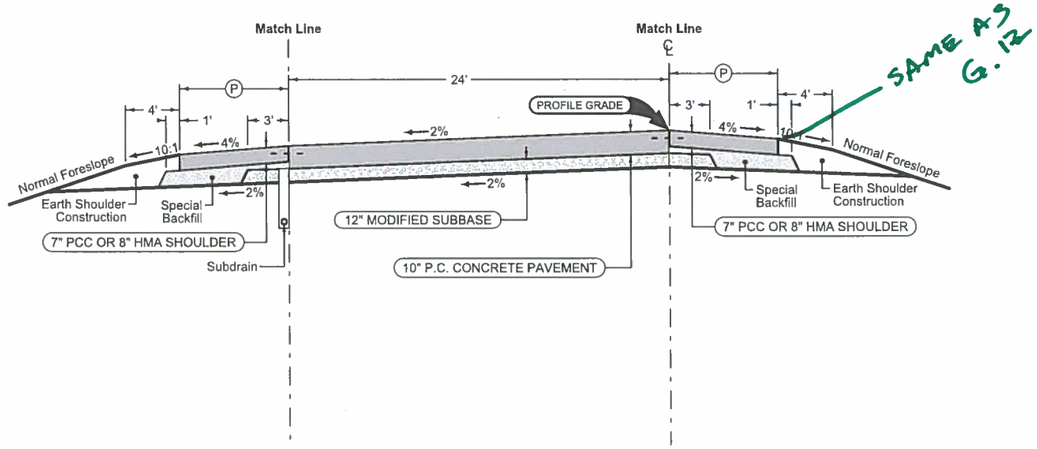
| | 2P_ MODIFIED |
|---|---|
| STATION TO STATION | |
| 1864+29.18 | 1888+86.12 |
| | |
| | |
| | |

## Paved Shoulder Alternates

PCC Shoulder Jointing:
Longitudinal joint: BT-1 or BT-5
Transverse joints: C at 20' spacing
HMA Shoulder Jointing:
Longitudinal joint: B

| | 2_P_ALT_ 10-21-14 | |
|---|---|---|
| STATION TO STATION | | (P) Feet |
| 1864+29.18 | 1888+86.12 | 6 |
| | | |
| | | |
| | | |

# TYPICAL SECTION G12




SAME AS G.12

Mainline Jointing:
Transverse joints: CD at 20' spacing
Longitudinal joint: L-2

| | 2P_ 10-19-10 |
|---|---|
| STATION TO STATION | |
| 2599+24.14 | 2602+25.67 |
| 3601+40.00 | 3604+73.26 |
| | |
| | |

## Paved Shoulder Alternates

PCC Shoulder Jointing:
Longitudinal joint: BT-1 or BT-5
Transverse joints: C at 20' spacing
HMA Shoulder Jointing:
Longitudinal joint: B

| | | 2_P_ALT_ 10-21-14 |
|---|---|---|
| STATION TO STATION | | (P) Feet |
| 2599+24.14 | 2602+25.67 | 6 |
| 3601+40.00 | 3604+73.26 | 6 |
| | | |
| | | |

# TYPICAL SECTION
## For Ramp B and Ramp C

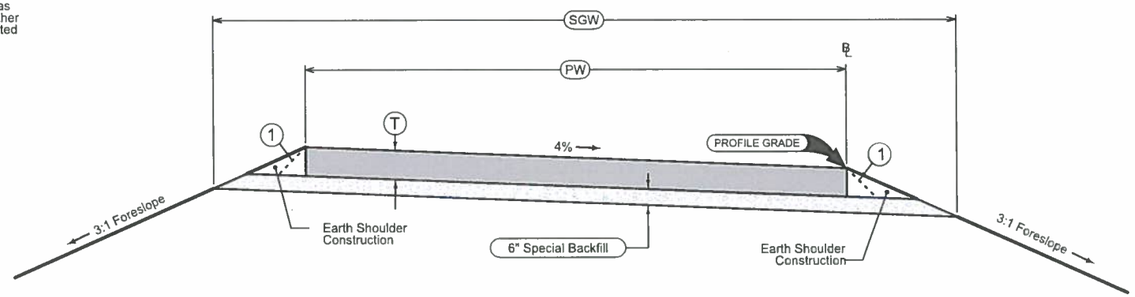
| LOCATION | | | DIMENSIONS | | | | | | 6" Special Backfill | Earth Shoulder Construction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | HMA | | | PCC | | | | |
| ROAD IDENTIFICATION | STATION TO STATION | | (PW) Feet | (T) Inches | (SGW) Feet | (PW) Feet | (T) Inches | (SGW) Feet | Tons/Station | Station |
| G12 | 1861+48 | 1884+19.44 | Var. | 10.5 | | Var. | 8.5 | | | |
| G12 | 1870+47.15 | 1887+76.81 | Var. | 10.5 | | Var. | 8.5 | | | |
| RAMP B | 2597+93.73 | 2602+21.17 | Var. | 10.5 | | Var. | 8.5 | | | |
| RAMP C | 3599+37.49 | 3604+69.97 | Var. | 10.5 | | Var. | 8.5 | | | |

NOTE WILL CONFIRM NECESSARY DETOUR PAVT DEPTHS

Quantity calculations based on vertical pavement edges.

Normal section shown may be modified appropriately in areas of superelevated curves or other locations specifically designated by the Engineer.

(1) Possible HMA 1:1 slope

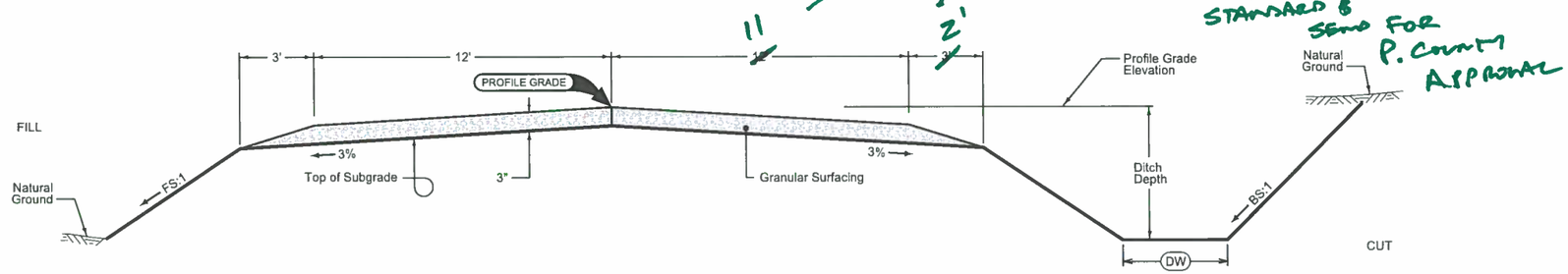



**DETOUR PAVING**

D_Detour
10-21-14

| LOCATION | | | DIMENSIONS | | |
|---|---|---|---|---|---|
| ROAD IDENTIFICATION | STATION TO STATION | | FS | BS | (DW) Feet |
| 143RD STREET | TBD | TBD | 6 | 6 | |
| 145TH STREET | TBD | TBD | 6 | 6 | |

MIKE FROM COUNTY LD RENSE W/ COUNTY STANDARD & SEND FOR P. COUNTY APPROVAL




**GRADING AND GRANULAR SURFACING**

Normal section shown may be modified appropriately in areas of superelevated curves or other locations specifically designated by the Engineer.

See plan & profile sheets and cross sections for additional details of ditches and backslopes.

G_2_GradeGran
10-17-17

## SURVEY SYMBOLS

- Interstate Highway Symbol
- U.S. Highway Symbol
- Iowa Highway Symbol
- County Road Highway Symbol
- Evergreen Tree
- Deciduous Tree
- Fruit Tree
- Shrub (Bushes)
- Timber
- Hedge
- Stump
- Swamp
- Rock Outcrop
- Broken Concrete
- Revetment (Rip Rap)
- Cemetery
- Grave
- Cave
- Sink Hole
- Board Fence
- Chain Link or Security Fence
- Wire Fence
- Terrace
- Earth Dam or Dike (Existing)
- Earth Dam or Dike (Proposed)
- Tile Outlet
- Edge of Water
- Existing Drainage
- Proposed Drainage
- Right of Way Rail or Lot Corner
- Concrete Monument
- Well
- Windmill
- Beehive Intake
- Existing Intake
- Proposed Intake
- Existing Utility Access (Manhole)
- Proposed Utility Access (Manhole)
- Fire Hydrant
- WH Water Hydrant (Rural)

- ST Septic Tank
- C Cistern
- LP L.P. Gas Tank (No Footing)
- UST Underground Storage Tank
- Latrine
- Luminaire
- Traffic Signal
- Traffic Signal with Luminaire
- TP Telephone Pedestal
- TVP Television Pedestal
- Telephone Pole
- Telephone Pole (Second Company)
- Telephone Pole (Third Company)
- Telephone Pole (Fourth Company)
- Telephone Pole (Fifth Company)
- Power Pole
- Power Pole (Second Company)
- Power Pole (Third Company)
- Power Pole (Fourth Company)
- Power Pole (Fifth Company)
- Electrical Highline Tower (Metal or Concrete)
- Telephone Riser Pole
- Power Riser Pole
- Telegraph Pole
- Satellite TV Dish
- Guardrail (Beam or Cable)
- GP Guard Post (one or two)
- Guard Post (over two)
- FP Filler Pipe
- GV Gas Valve
- WV Water Valve
- SL Speed Limit Sign
- MM Mile Marker Post
- SIGN Sign
- WHU Water Hook Up
- RT Radio Tower
- TA Tower Anchor
- EB Electric Box
- TCB Traffic Signal Control Box
- RRB Rail Road Signal Control Box
- TSB Telephone Switch Box

- FO — Existing Fiber Optics (Central Scott)
- FO2 — Existing Fiber Optics (Mcleod USA)
- FO3 — Existing Fiber Optics (Qwest)
- FO4 — Existing Fiber Optics (ATT)
- FO6 — Existing Fiber Optics (MediaCom)
- FO8 — Existing Fiber Optics (Bettendorf)
- FO9 — Existing Fiber Optics (IowaDOT)
- E — Existing Power Line (MidAmerican)
- E2 — Existing Power Line (MidAmerican)
- E2(B) — Existing Power for Street Light or Traffic Light (Bettendorf)
- E3 — Existing Power Line (MidAmerican)
- E4 — Existing Power Line (MidAmerican)
- E5 — Existing Power Line (IowaDOT)
- G — Existing Gas Line (MidAmerican)
- G-HP — Existing High Pressure Gas Line (MidAmerican)
- San. — Existing Sanitary Sewer Line (Bettendorf)
- San.2 — Existing Sanitary Sewer Line (Davenport)
- T — Existing Telephone Line (Qwest)
- TV — Existing Cable Television Line (MediaCom)
- TV2 — Existing Cable Television Line (MediaCom)
- W — Existing Water Line (IA American)

## PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS (ROAD)

| LINE WORK | 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) | Detour Pavement Shading |
| Gray, Light | (48) | Proposed Pavement and Bridge Shading |
| Gray, Med | (64) | Temporary Pavement Shading |
| Brown, Light | (236) | Grading Shading |
| Tan | (8) | Proposed Sidewalk Shading |
| Pink | (11) | Proposed Sidewalk Ramp Shading |

## PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS (ROAD)

| LINE WORK | 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 |

## CONVENTIONAL SIGNS

- Station — Reference Point — Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail

## RIGHT OF WAY LEGEND

- Proposed Right of Way
- Existing and Proposed Right of Way
- Easement and Existing Right of Way
- Borrow
- Easement (Temporary)
- Easement
- Excess
- A/C Access Control

# Legend And Symbol Information Sheet

**D, E, F, AND K SHEETS**

**(Symbols are Typical Only)**

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER D.1 |
|---|---|---|---|---|---|

1:58:57 PM untitled c:\pw_work\pwmain\naseer.mohammed\d0874197\78029112-AB-D-01.sht

Show proposed guardrail on the plan sheet.
Show the intersection angle between Ramp C and County Road G12.
Label sideroad to the south.
Show the shoulder transition from Proposed Ramp C to existing Ramp C.
Include existing and proposed pipe information.
Label "Remove" for pipes to be removed.

NATE WILL GET SURVEY CENTERLINE.

MIKE WILL GET LIMITS OF CURRENT BRIDGE CONSTRUCTION. → BUILD TO ROAD BRIDGE CONSTRUCTION LIMITS.

N

ROCKFORD TWP.
T-77 N R-44 W
SEC. 4

PT Sta 3599+27.11

PC Sta 3590+61.61

PI Sta 3599+82.19

3600

LOOK @ COST OF RESURFACING

LOOK @ TIGHTEN THE CORNERS → USE 60' RADII

I-29

I-29 RAMP C

12'12'

Curve SRG12_3 (G12)
PI Sta 1866+91.22
Δ = 2°44' 07.91" (LT)
D = 0°33' 26.88"
R = 10,277.91
T = 245.40
L = 490.66
E = 2.93
e = N.C.
L = NA
x = NA
m = NA

COUNTY ROAD G12

STA. 1864+29.18
BEGIN PROPOSED PAVEMENT CONSTRUCTION

POT Sta 1861+48.00

PC Sta 1864+45.81

1865

30" X 112' CULVERT

24" X 18' CULVERT

24" X 60' CULVERT

PT Sta 1869+36.52

1870

PI Sta 1870+71.59

PAINTED NO LONGER RAISED

1875

29

DESOTO AVE

PI Sta 1866+91.22

POT Sta 3604+82.39

TRANSITION WIDTH OF ROAD & SHOULDERS TO EXISTING

LABEL

REALIGN GRAVEL ROAD → DO NOT EXCEED ROW LIMITS

0 FEET 50

COUNTY ROAD G12

PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER D.2 |
|---|---|---|---|---|---|

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ROCKFORD TWP.
T-77 N R-44 W
SEC. 4

Label the beginning of project.
The existing and proposed profile at the right end of the sheet do not match up with Sheet D.5.
At the bottom of the sheet, show only the proposed profile grade elevations and at 25 foot intervals.
Add a ditch bar graph.
Label the ditch grades and the begin and end stations of the ditch grades along with the elevations of the beginning and end of the ditch grades.
Remove Section, Township and Range information.

1055 1050 1045 1040 1035 1030 1025 1020 1015 1010 1005 1000 995 990 985 980

1,004.83

Use 50 mph

Design Speed = 55 mph
VPI +36.566
Elv 995.32
K Value = 115
Len 789.46 ft

US 29 Ramp C Sta 3604+82.39

G12 PGL

-3.335%
+4.530%
0.717%
5.875%
0.200%
0.575%
2.251%
0.030%
2.058%
0.847%
0.787%
0.200%
Lt. Ditch
Rt. Ditch
0.233%
0.514%
2.477%
Rt. Ditch

| | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lt | 1,004.35 | 1,003.33 | 1,002.52 | 1,001.93 | 1,001.56 | 1,001.41 | 1,001.47 | 1,001.75 | 1,002.25 | 1,002.97 | 1,003.90 | 1,005.05 | 1,006.42 | 1,008.00 | 1,009.81 | 1,011.83 | 1,014.04 | 1,016.13 | 1,018.00 | 1,019.65 | 1,021.08 | 1,022.30 | 1,023.29 | 1,024.06 |
| Rt | 1,004.26 | 1,002.85 | 1,001.48 | 1,000.25 | 999.20 | 998.48 | 998.01 | 997.69 | 997.38 | 997.12 | 997.16 | 997.62 | 998.37 | 999.38 | 1,000.83 | 1,002.64 | 1,004.80 | 1,007.29 | 1,010.00 | 1,012.80 | 1,015.17 | 1,017.09 | 1,018.71 | 1,019.93 |

COUNTY ROAD G12
PROFILE

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER D.3 |
|---|---|---|---|---|---|

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Label the end of project.
Same comments as Sheet D.2.
Label Commercial Building at gas station.
Label entrance stations.
Label "Proposed Type B Entrances."
Label "Closed" on entrance to be closed.
Give station for existing and proposed bridge.

APPLY SAME COMMENTS AS D.2

N

ROCKFORD TWP.
T-77 N R-44 W
SEC. 4

2 SPAN GRADING

OWNED BY MOKA BROTHERS - AREA USED FOR CONTRACTOR STOCKPILE

ZABEL ROAD

COUNTY ROAD F33 FEEDS 1 HOUSE

FOR DETOUR THERE IS AN 11' HEIGHT RESTRICTION FOR TUNNEL

REMOVE EXISTING FOUR-SPAN 223'-9 X 24' PPC BEAM BRIDGE
BUILD NEW TWO SPAN 252'-0 X 36'-0 PPC BEAM BRIDGE

30" X 126' CULVERT

1880

1885

1890

PI Sta 2599+04.15

STA. 1888+86.12
END PROPOSED PAVEMENT CONSTRUCTION

12'12'

2600

US 29 RAMP B

PI Sta 1883+89.40

PI Sta 1885+49.33

PI Sta 1887+76.81

POT Sta 1890+46.22

NO RAISED ISLAND

29

DESOTO AVE

POT Sta 2602+37.67

DESOTO AVE

24" X 70' CULVERT

18" X 60' CULVERT

TRANSITION

18" X 41' CULVERT

REPAVED ABOUT 3 YEARS AGO

COUNTY ROAD G12

- DOT WILL CHECK PERMITS FOR 3-ACCESSES ON DW.
- COUNTY WILL PROVIDE RESURFACING PLANS FOR EAST SIDE OF G12

0 FEET 50

COUNTY ROAD G12

PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER D.4 |
|---|---|---|---|---|---|

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ROCKFORD TWP.
T-77 N R-44 W
SEC. 4

Label the end of project.
Same comments as Sheet D.3.
Show existing and proposed entrance profiles.

Bridge

Design Speed = 55 mph
VPI +54.920
Elv 1,036.92
K Value = 114
Len 1,039.53 ft

+4.530%
-4.589%
G12 PGL
16.3' Lateral
Vertical Clearance
35'
US 29 Ramp B Sta 2602+37.67

Change design speed to 50 mph

Design Speed = 55 mph
VPI +60.563
Elv 999.95
K Value = 115
Len 492.77 ft

-4.589%
-0.304%
998.96
0.200%
0.640%
Rt. Ditch
0.987%
0.383%
Lt. Ditch
0.244%
0.238%

1055 1050 1045 1040 1035 1030 1025 1020 1015 1010 1005 1000 995 990 985 980

| | 1876 | | 1877 | | 1878 | | 1879 | | 1880 | | 1881 | | 1882 | | 1883 | | 1884 | | 1885 | | 1886 | | 1887 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lt | 1,023.29 | 1,018.71 | 1,024.06 | 1,019.93 | 1,024.62 | 1,013.55 | 1,024.95 | 1,001.62 | 1,025.07 | 1,000.56 | 1,024.97 | 1,002.71 | 1,024.65 | 1,011.09 | 1,024.10 | 1,020.13 | 1,023.34 | 1,018.97 | 1,022.36 | 1,017.49 | 1,021.16 | 1,015.65 | 1,019.75 | 1,013.34 | 1,018.11 | 1,010.64 | 1,016.25 | 1,007.81 | 1,014.17 | 1,005.35 | 1,011.91 | 1,003.28 | 1,009.67 | 1,001.59 | 1,007.64 | 1,000.46 | 1,005.83 | 999.63 | 1,004.23 | 999.15 | 1,002.85 | 998.95 | 1,001.69 | 998.99 | 1,000.75 | 999.06 | 1,000.02 | 999.15 | 999.52 | 999.18 | 999.22 | 999.08 | 999.07 | 999.09 |
| Rt | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

COUNTY ROAD G12
PROFILE

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER D.5 |
|---|---|---|---|---|---|

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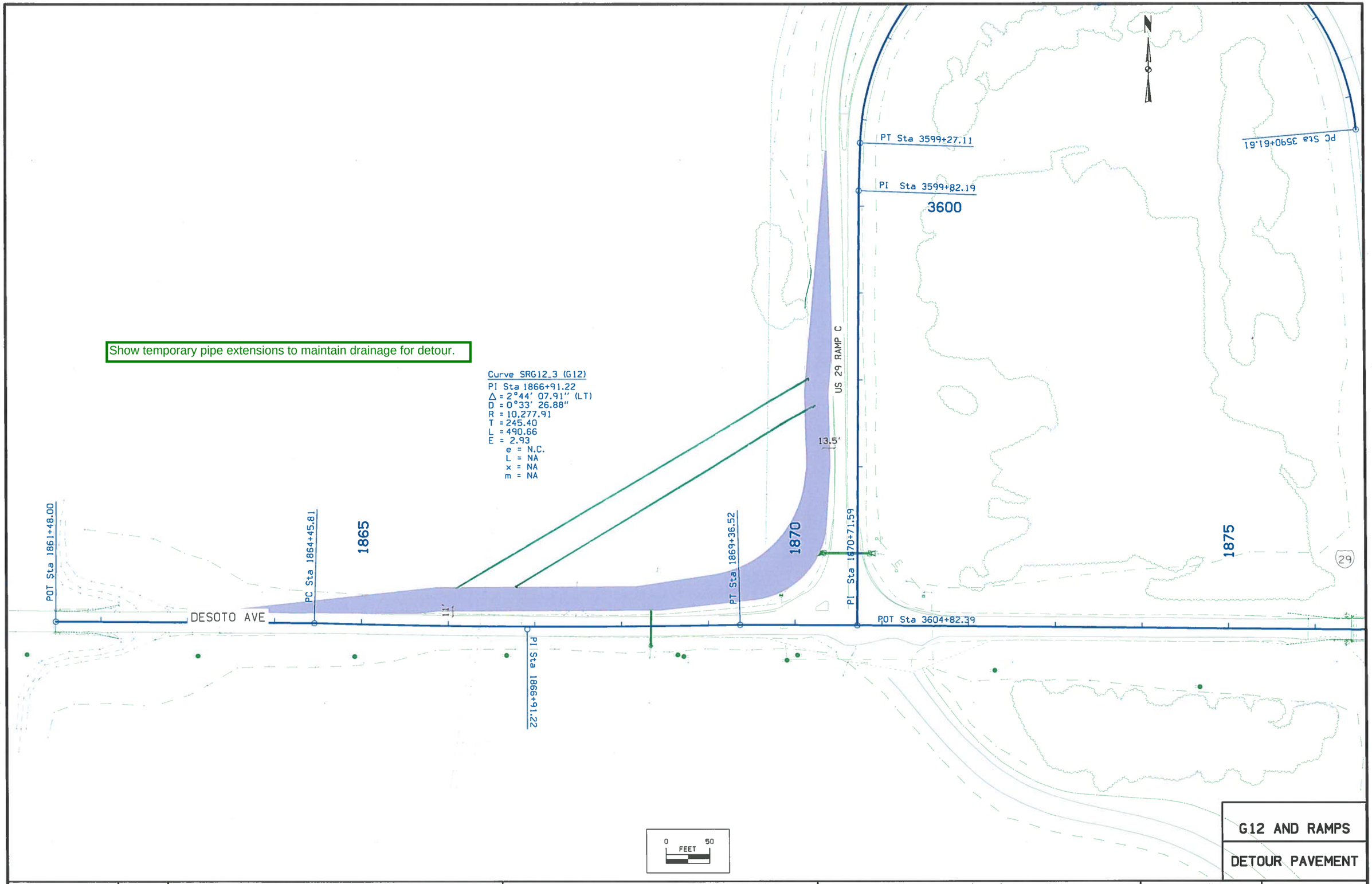
Show temporary pipe extensions to maintain drainage for detour.

Curve SRG12_3 (G12)
PI Sta 1866+91.22
Δ = 2°44' 07.91" (LT)
D = 0°33' 26.88"
R = 10,277.91
T = 245.40
L = 490.66
E = 2.93
e = N.C.
L = NA
x = NA
m = NA




G12 AND RAMPS

DETOUR PAVEMENT

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER F.1 |
|---|---|---|---|---|---|

SYSTEMTIME SYSTEMDATE untitled c:\pw_work\pwmain\naseer.mohammed\d0874197\78029112-AB-F-01.sht

Show temporary pipe under detour pavement to drain area between Ramp B and the detour.

PC Sta 3590+61.6

2590

890

PC Sta 2589+24.31

PT Sta 2597+97.07

PI Sta 2599+04.15

2600

9.0'

US 29 RAMP B

PI Sta 1883+89.48

1880

1885

PI Sta 1885+49.33

24'

12'

PI Sta 1887+76.81

1890

POT Sta 1890+46.22

29

29

885

POT Sta 884+80.30

DESOTO AVE

POT Sta 2602+37.67

DESOTO AVE

N

0 50 FEET

G12 AND RAMPS

DETOUR PAVEMENT

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER F.2 |
|---|---|---|---|---|---|

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# Survey Information

**County: Pottawattamie**
**PIN: 16-78-029-070**
**Project Number: IMX-029-4(112)72- -02-78**
**Location: CO Rd G12 Interchange 0.4 mi N of N Jct I-680**
**Type of Work: PCC Pavement Grade and Replace**
**Project Directory: 7802907016**
**SAP 803.2**

## General Information

Measurement units for this survey are US survey feet. This survey is for preliminary
engineering of County road G12 interchange I-29. This project is a combination of field
survey and aerial survey. The existing drainage structures and changes made after lidar and aerial were the only features field surveyed for this project. The rest was surveyed using aerial photography and lidar mapping.

## Vertical Control

Vertical Control was established on 5 monuments on the project designated as points
B 140, H 180, N 180, E 138 and R 138. These monuments are stable and are expected to hold vertical reasonably well. The vertical datum is NAVD88. Datum was transferred from the Iowa RTN reference station at Le Mars to the projects monuments mentioned above by using concurrent 6 hour static measurements and post processing connecting vectors. Geoid 12 A was used in processing. The Council Bluffs reference station orthometric height used is 1001.974 US Survey Ft.

This survey observed 5 NGS Control Monuments with published NAVD88 heights
to validate the reference station height used in computation of project heights. The
county control has a stated vertical accuracy of + or 0.10 ft. The survey heights
determined at the NGS monuments validate the NAVD 88 height used at the
Council Bluffs reference station and the positions of the project control monuments within acceptable tolerance.

This survey observed 5 NGS Control Monuments with published NAVD88 heights to compare to local ground control:

NGS 1st. order class II mark designated B 140 has a published Elev. Of 1008.83
Survey Elev. = 1008.894

NGS 1st. order class II mark designated H 180 has a published Elev. Of 987.35
Survey Elev. = 987.401

NGS 1st. order class II mark designated N 180 has a published Elev. Of 988.05
Survey Elev. = 988.07

NGS 1st. order class II mark designated E 138 has a published Elev. Of 997.29
Survey Elev. = 997.214

NGS 1st. order class II mark designated R 138 has a published Elev. Of 991.20
Survey Elev. = 991.189

## Horizontal Control

Horizontal Control was established on 5 monuments on the project designated as points
B 140, H 180, N 180, E 138 and R 138. These monuments are stable and are expected to hold vertical reasonably well. The horizontal datum is NAD83(2011) (EPOCH 2010.00). Datum was transferred from the Iowa RTN reference station at Council Bluffs to the projects monuments mentioned above by using concurrent 6 hour static measurements and post processing connecting vectors. Iowa Regional Coordinate System Zone 6 is used. The Zone 6 coordinates used at the Council Bluffs reference station are: N= 6954894.981, E= 16467018.172.

## Survey Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans Project No. I-29-4(22)73- -01-78. Survey stationing was equated to the plan at PI Sta. 793+25.5. and run ahead without equation throughout the survey. Alignment based off of station offsets splits of bridges.

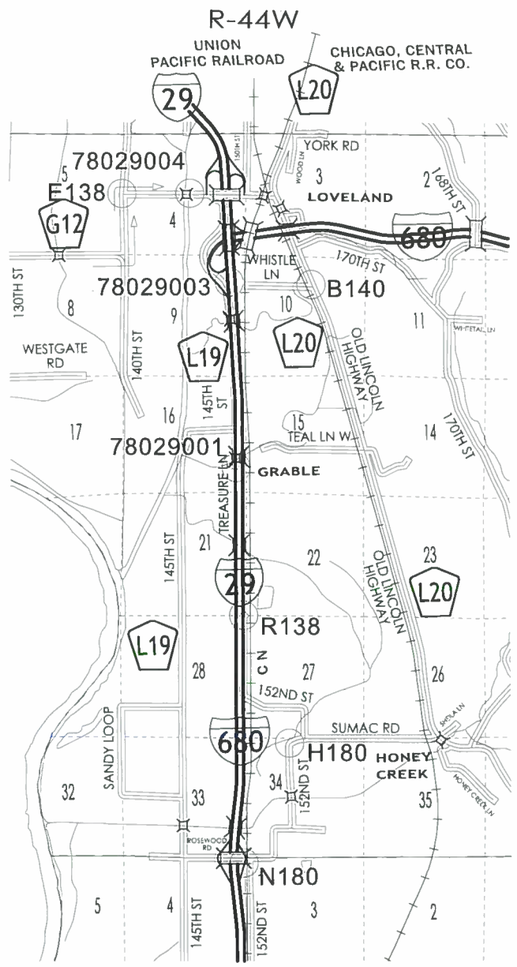
Survey stationing relates to as built plan stationing as follows:

PI Sta. 793+25.5 As-built Plans Project No. I-29-4(22)73- -01-78.
Survey PI Sta. 793+25.5

POT Sta. 884+80.30 As-built Plans Project No. I-29-4(22)73- -01-78.
Survey POT Sta. 884+76.74

## CONTROL POINT VICINITY MAP

This map is a guide to the vicinity of the primary project control points
Primary control is for use with RTK base stations and for RTN validation.
Future surveys will use primary project control to establish temporary control as needed for construction or other surveying applications.




HORIZ. DATUM: NAD83(2011) EPOCH 2013.00
VERT. DATUM: NAVD88
Ia. Regional Coordinate System Zone 6

Coordinate listing from next sheet will be used with IaRTN for monument recovery. No other reference ties are given.

# HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

## HORIZ. DATUM: NAD83(2011) EPOCH 2013.00

## VERT. DATUM: NAVD88

## Ia. Regional Coordinate System Zone 6

Point Name Northing Easting Elevation Feature Definition
Description

H180 7031139.63 16456582.35 987.4 CP
STAINLESS STEEL ROD 1.1 MI WEST OF CO. RD. L20 ON SUMAC RD 25' NE OF FIELD ENT 3' SW OF POWER POLE

N180 7025873.099 16454543.58 988.07 CP
STAINLESS STEEL ROD ALONG HONEY CREEK OFF RAMP FROM I29 NB EXIT 66 230' SOUTH CL CO. RD. L19 140' WEST OF CL RR TRACKS 51' EAST OF RAMP NEAR ROW FENCE

R138 7036755.905 16454583.77 991.19 CP
NGS DISK 1 MI WEST OF CO. RD. L20 ON SUMAC RD THEN 1.4 MI NORTH ON 152ND AVE IN RD DITCH 117' WEST OF CL RR TRACKS 12' WEST OF ELECTRIC METER PEDESTAL

B140 7051278.887 16457643.4 1008.89 CP
NGS DISK 4.8 MI SOUTH OF MISSOURI VALLEY ON CO. RD. L20 IN ROAD DITCH 93' SW MILE MARKER 17 45' EAST OF CL RR TRACKS 96' NORTH OF CL FIELD ENT

78029001 7043243.11 16454292.95 996.08 CP
FENO TYPE MONUMENT ALONG I29 SB IN BACKSLOPE 23' SOUTH OF ROW FENCE AND 36' EAST OF ROW FENCE 74' NW OF MILEPOST 69.65

78029003 7051391.748 16454031.43 997.65 CP
FENO TYPE MONUMENT ALONG I29 SB 41' NW OF MILEPOST 71.15

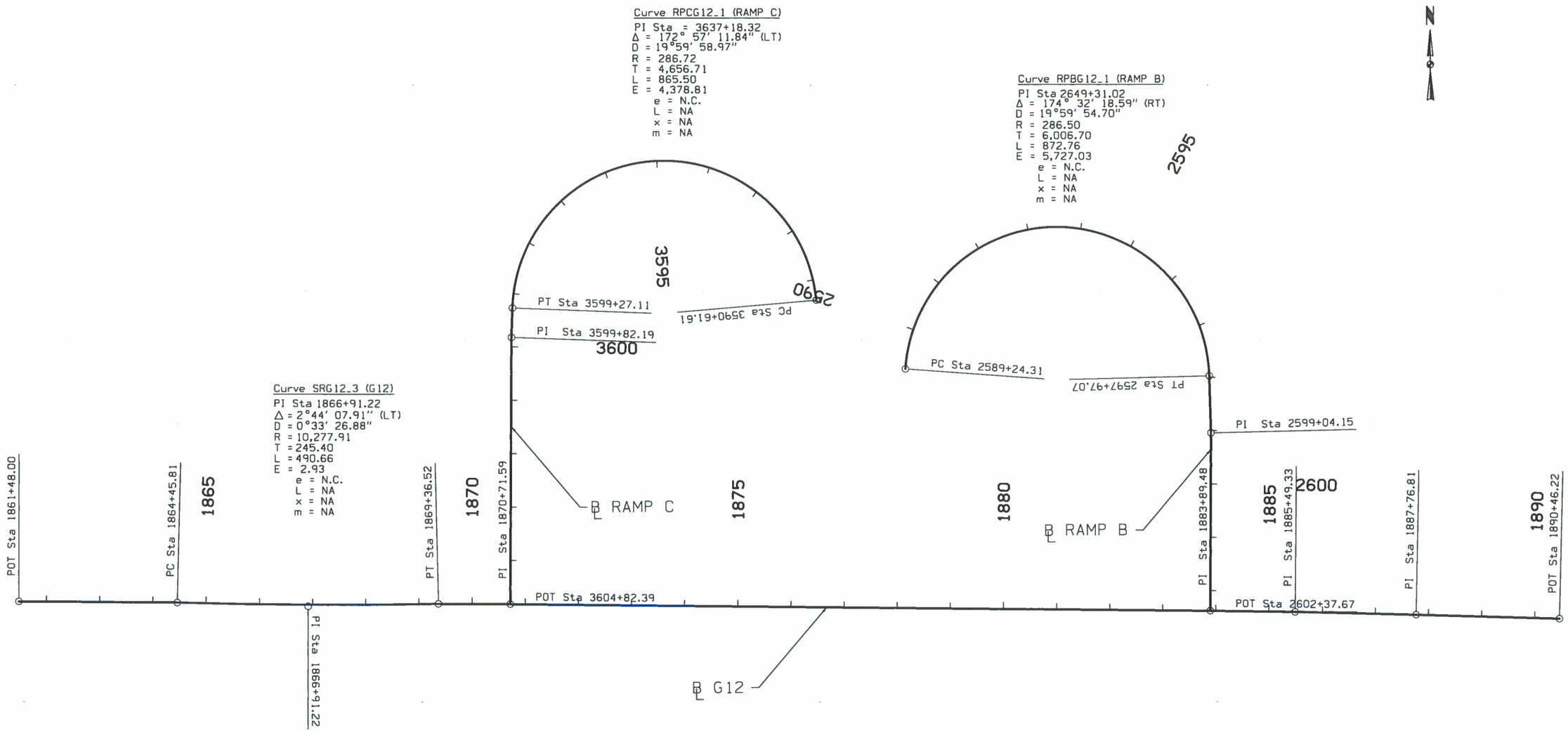
78029004 7055297.605 16452312.12 1005.57 CP
FENO TYPE MONUMENT FROM LOVELAND EXIT 72 I29 SB GO WEST 0.1 MI ON CO. RD. G12 38' NORTH OF NE CORNER OF BRIDGE OVER BOYER RIVER

E138 7055290.856 16449322.32 997.21 CP
NGS DISK FROM LOVELAND EXIT 72 I29 SB GO WEST 0.7 MI ON CO. RD. G12 AT INTERSECTION DISK IS LOCATED IN FIELD 71' NW OF DESOTO AVE. & 140TH ST. SIGN

Curve RPCG12_1 (RAMP C)
PI Sta = 3637+18.32
Δ = 172° 57' 11.84" (LT)
D = 19°59' 58.97"
R = 286.72
T = 4,656.71
L = 865.50
E = 4,378.81
e = N.C.
L = NA
x = NA
m = NA

Curve RPBG12_1 (RAMP B)
PI Sta 2649+31.02
Δ = 174° 32' 18.59" (RT)
D = 19°59' 54.70"
R = 286.50
T = 6,006.70
L = 872.76
E = 5,727.03
e = N.C.
L = NA
x = NA
m = NA

Curve SRG12_3 (G12)
PI Sta 1866+91.22
Δ = 2°44' 07.91" (LT)
D = 0°33' 26.88"
R = 10,277.91
T = 245.40
L = 490.66
E = 2.93
e = N.C.
L = NA
x = NA
m = NA




# ALIGNMENTS G12, RAMP B AND C

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER G.4 |
|---|---|---|---|---|---|

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# ALIGNMENT COORDINATES

101-16
10-20-09

| Name | Location | Point on Tangent | | | Begin Spiral | | | Begin Curve | | | Simple Curve PI or Master PI of SCS | | | End Curve | | | End Spiral | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Station | Coordinates | | Station | Coordinates | | Station | Coordinates | | Station | Coordinates | | Station | Coordinates | | Station | Coordinates | |
| | | | Y (Northing) | X (Easting) | | Y (Northing) | X (Easting) | | Y (Northing) | X (Easting) | | Y (Northing) | X (Easting) | | Y (Northing) | X (Easting) | | Y (Northing) | X (Easting) |
| SRG12 | MAINLINE | | | | | | | | | | | | | | | | | | |
| SRG121 | | 1861+48.00 | 7055245.56 | 16452314.71 | | | | | | | | | | | | | | | |
| SRG12_3 | | | | | | | | 1864+45.81 | 7055243.79 | 16452612.51 | 1866+91.22 | 7055236.78 | 16452857.81 | 1869+36.52 | 7055241.48 | 16453103.17 | | | |
| SRG126 | | 1870+71.59 | 7055240.86 | 16453238.24 | | | | | | | | | | | | | | | |
| SRG128 | | 1883+89.48 | 7055228.29 | 16454556.07 | | | | | | | | | | | | | | | |
| SRG1210 | | 1885+49.33 | 7055226.10 | 16454715.90 | | | | | | | | | | | | | | | |
| SRG1212 | | 1887+76.81 | 7055220.54 | 16454943.31 | | | | | | | | | | | | | | | |
| SRG1213 | | 1890+46.22 | 7055213.07 | 16455212.62 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| RAMP B | | | | | | | | | | | | | | | | | | | |
| RPBG12_1 | | | | | | | | 2589+24.31 | 7055682.07 | 16453984.42 | 2649+31.02 | 7061673.74 | 16454409.11 | 2597+97.07 | 7055668.85 | 16454556.62 | | | |
| RPBG124 | | 2599+04.15 | 7055561.80 | 16454559.25 | | | | | | | | | | | | | | | |
| RPBG125 | | 2602+37.67 | 7055228.29 | 16454556.07 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| RAMP C | | | | | | | | | | | | | | | | | | | |
| RPCG12_1 | | | | | | | | 3590+61.61 | 7055810.98 | 16453817.12 | 3637+18.32 | 7060449.87 | 16453410.03 | 3599+27.11 | 7055796.08 | 16453244.96 | | | |
| RPCG124 | | 3599+82.19 | 7055741.04 | 16453243.01 | | | | | | | | | | | | | | | |
| RPCG125 | | 3604+82.39 | 7055240.86 | 16453238.24 | | | | | | | | | | | | | | | |

# SPIRAL OR CIRCULAR CURVE DATA

101-17
04-19-11

| Name | Location | $\Delta_{scs}$ | Horizontal Alignment Data | | | | | | | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Spiral Data | | | | | | | | Curve Data | | | | | |
| | | | θs | Ls | Ts | Es | Xc | Yc | L.T. | S.T. | $\Delta_c$ | T | L | R | E | |
| SRG12 | MAINLINE | | | | | | | | | | | | | | | |
| SRG12_3 | | | | | | | | | | | 2°44'07.91" LT | 245.40' | 490.70' | 10277.90' | 2.92' | |
| RPBG12 | RAMP B | | | | | | | | | | | | | | | |
| RPBG12_1 | | | | | | | | | | | 174°32'18.59" RT | 6006.70' | 872.75' | 286.50' | 5727.03' | |
| RPCG12 | RAMP B | | | | | | | | | | | | | | | |
| RPCG12_1 | | | | | | | | | | | 172°57'11.84" LT | 4656.70' | 865.50' | 286.72' | 4378.80' | |

ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER G.5

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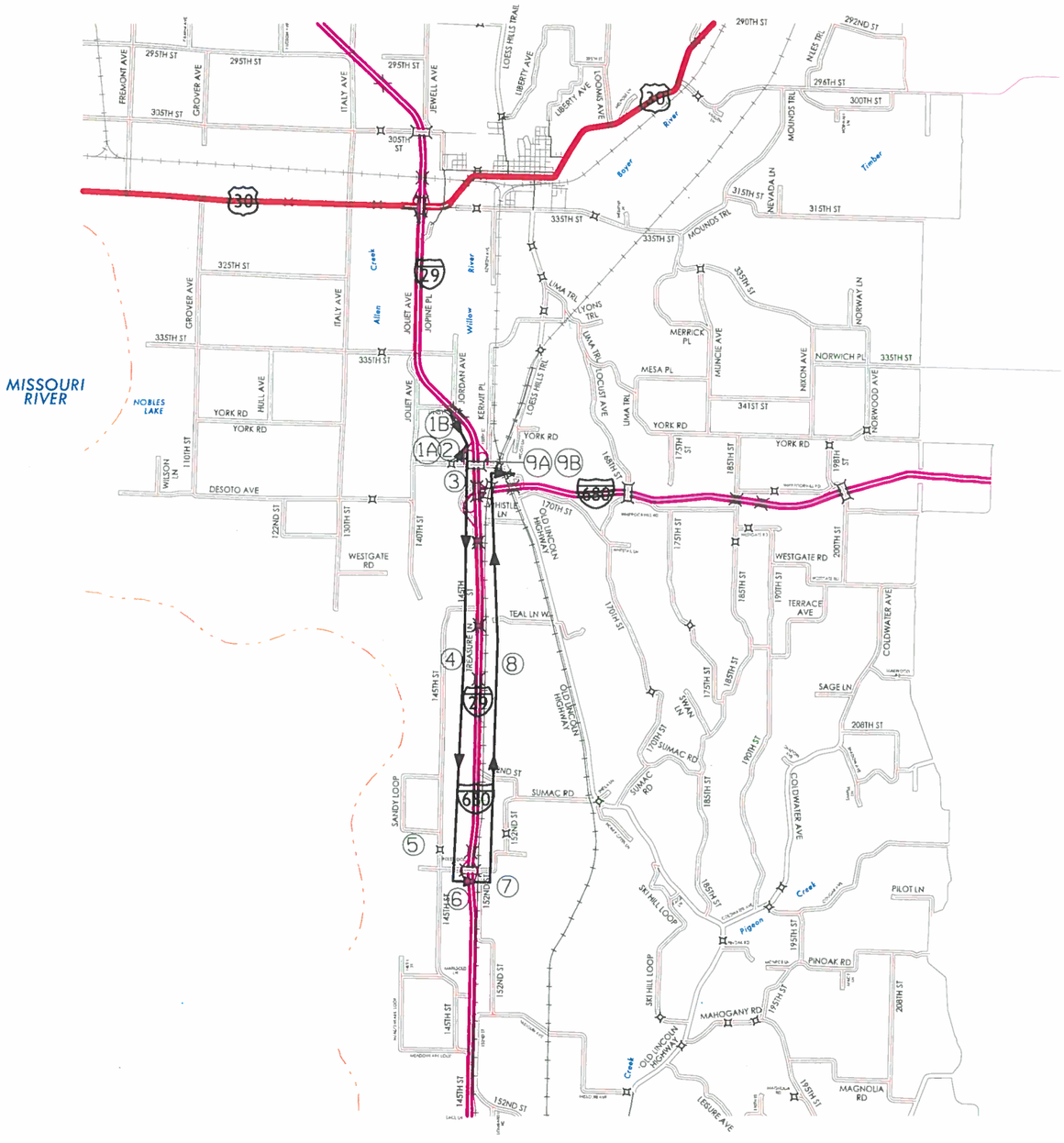



1A


1B


2


3


4


5


6


7


8


9A


9B

EB G12 DETOUR ROUTE

Note: All detour signs are to be provided, placed, maintained, and removed by the contractor.

NOT TO SCALE

height restrictions mean NO TRUCKS on detour

# STAGE 1 DETOUR ROUTE OF G12 EASTBOUND

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.1 |
|---|---|---|---|---|---|

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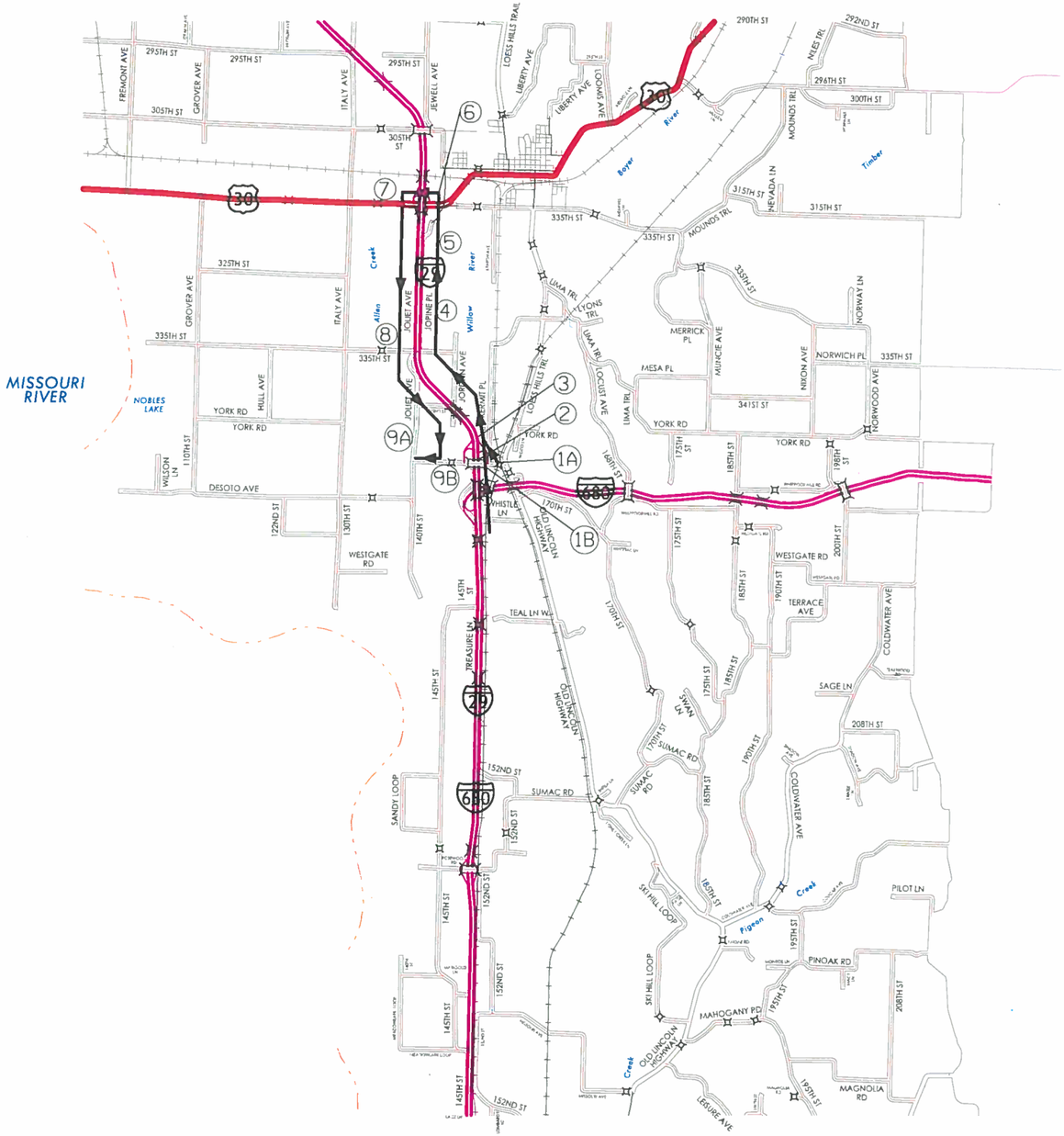




1A


1B


2


3


4


5


6


7


8


9A


9B

WB G12 ACCESS

Note: All detour signs are to be provided, placed, maintained, and removed by the contractor.

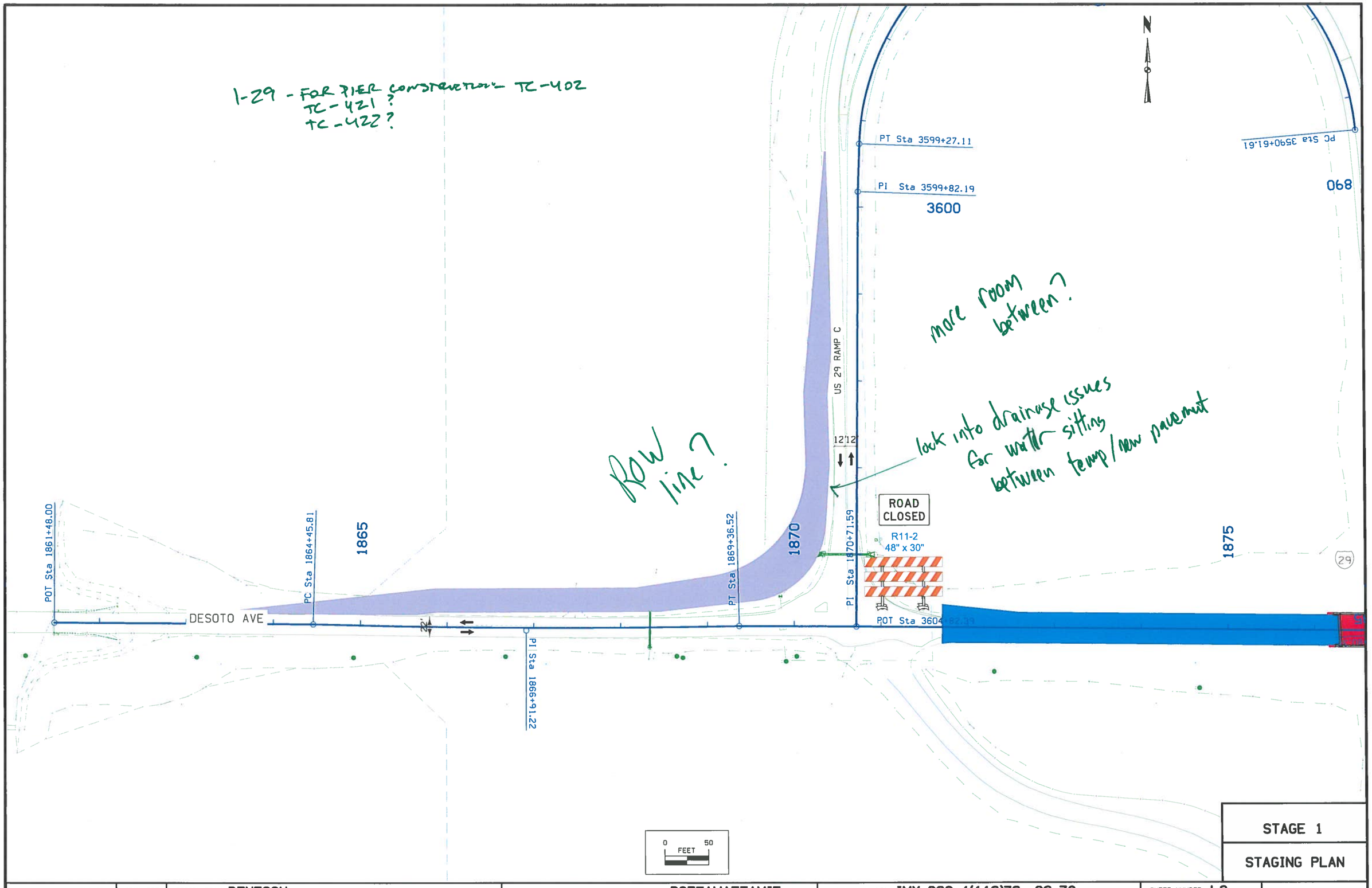
NOT TO SCALE

# STAGE 1
# DETOUR ROUTE
# OF G12 WESTBOUND

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.2 |
|---|---|---|---|---|---|

SYSTEMTIME USERNAME DGNSPEC

I-29 - FOR PIER CONSTRUCTION - TC-402
TC-421 ?
TC-422 ?




more room between?

look into drainage issues for water sitting between temp/new pavement

ROW line?

STAGE 1

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.3 |
|---|---|---|---|---|---|

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PC Sta 3590+61.6

2590

PC Sta 2589+24.31

PT Sta 2597+97.07

PI Sta 2599+04.15

12'12'

2600

US 29 RAMP B

drainage issue
water trapped here?
build temp
slightly higher?
need to
resolve.

ROAD CLOSED

R11-2
48" x 30"

1880

PI Sta 1883+89.48

1885

PI Sta 1885+49.33

PI Sta 1887+76.81

1890

POT Sta 1890+46.22

POT Sta 2602+37.67

DESOTO AVE

29

29

Look into off alignment
bridge construction.

0 FEET 50

N

STAGE 1

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.4 |
|---|---|---|---|---|---|

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N

SUBSTAGE CONSTRUCTION

NB

temp pavement

US 29 RAMP C

28'

POT Sta 1861+48.00

PC Sta 1864+45.81

1865

PT Sta 1869+36.52

1870

1875

29

28'

DESOTO AVE

NB

SUBSTAGE CONSTRUCTION

ROAD CLOSED

R11-2
48" x 30"

Road Closed

0 FEET 50

STAGE 2

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.5 |
|---|---|---|---|---|---|

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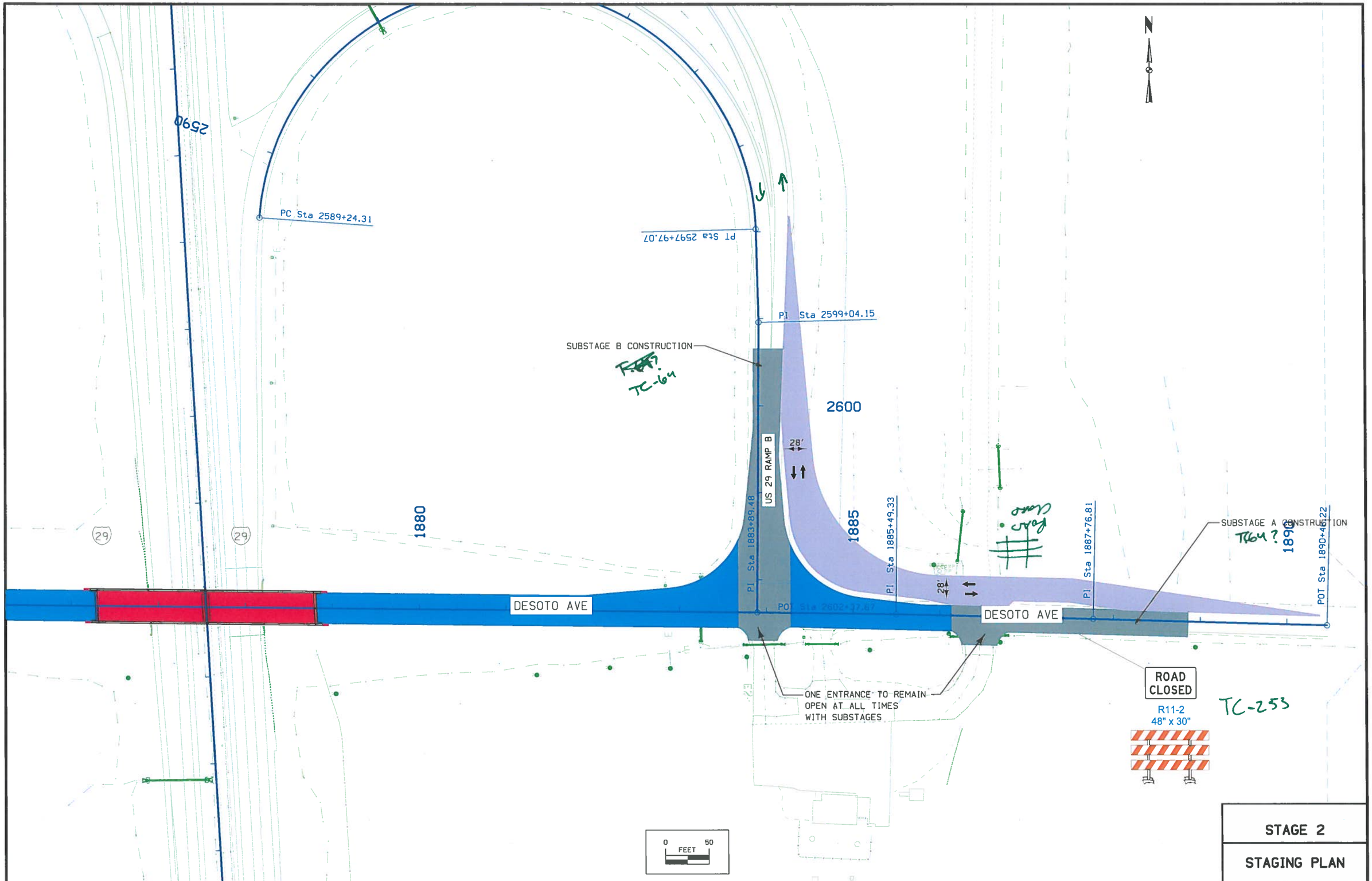


STAGE 2

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.6 |
|---|---|---|---|---|---|

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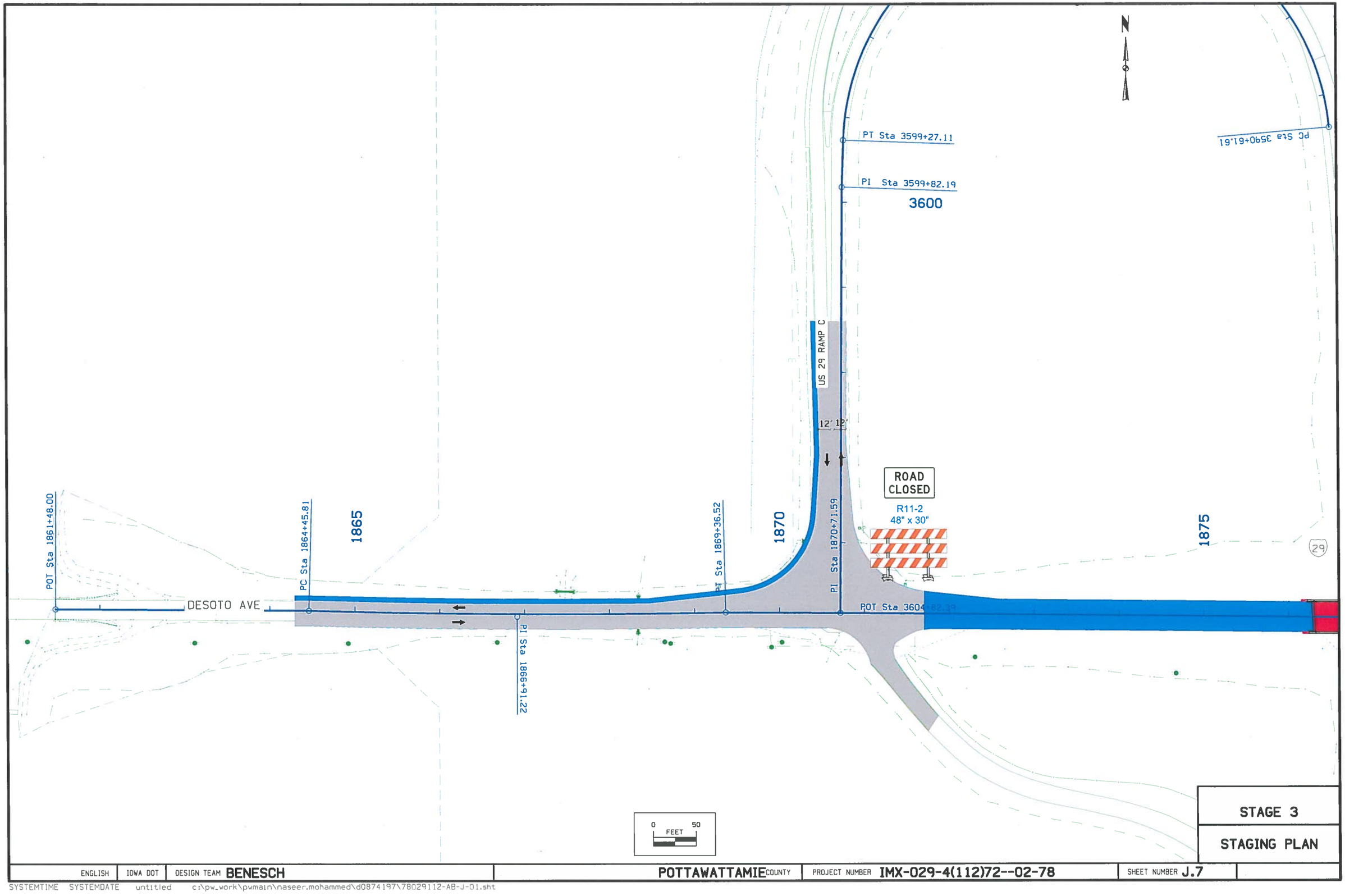


STAGE 3

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.7 |
|---|---|---|---|---|---|

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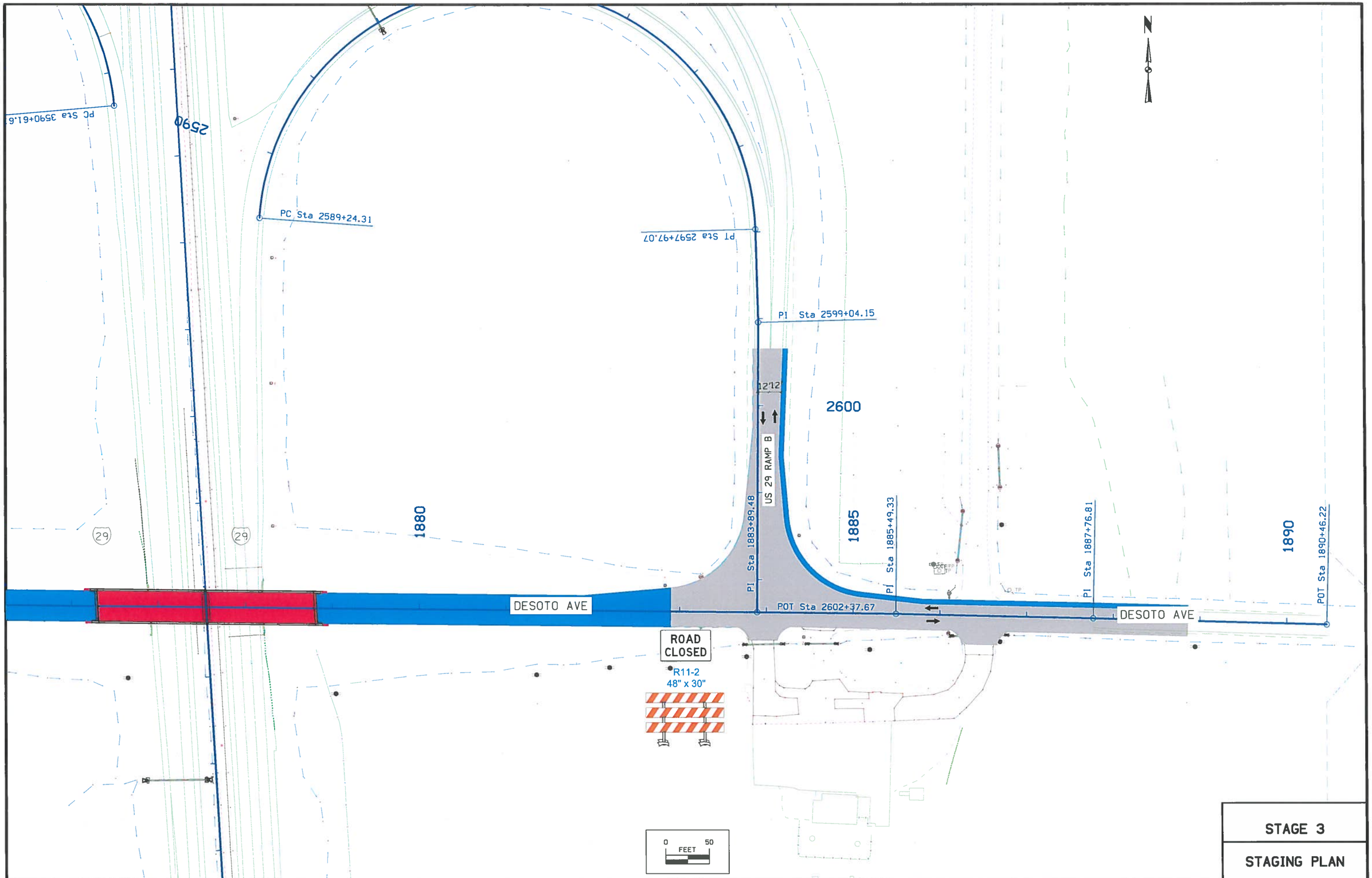


STAGE 3

STAGING PLAN

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.8 |
|---|---|---|---|---|---|

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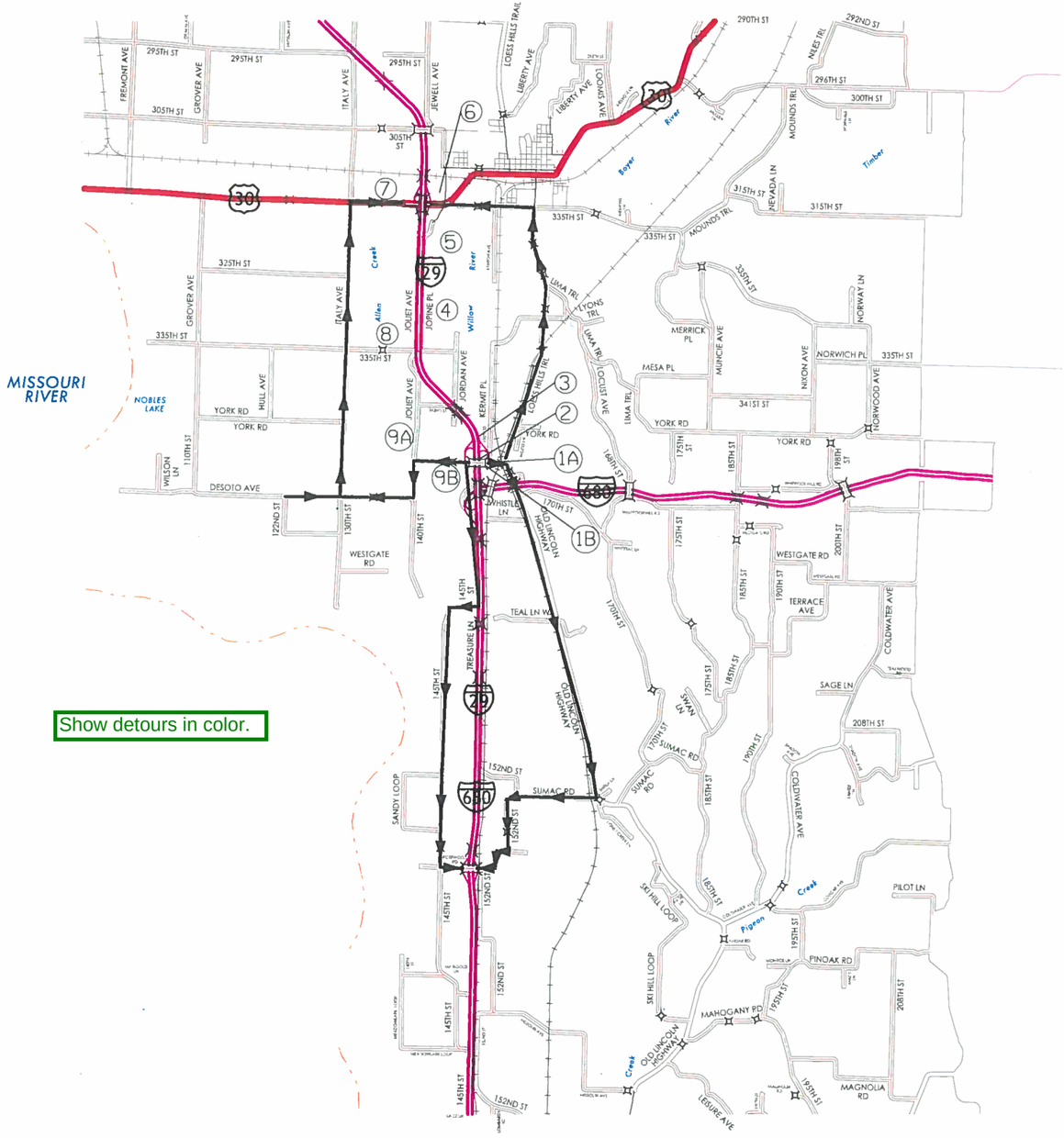


Show detours in color.

MOT Option 2:
- Close interchange for I-29 NB and SB access on G12.
- Reroute traffic north and south to next interchange.
- Impacts gas station on SE quadrant.

→ I-29 Access from West (7.1 miles/12 min.)

→ I-29 Access from East (5.7 miles/9 min.)

→ I-29 Access from West (7.9 miles/12 min.)

→ I-29 Access from West (6.6 miles/13 min.)

Note: All detour signs are to be provided, placed, maintained, and removed by the contractor.

N

NOT TO SCALE

# MOT OPTION 2 DETOUR ROUTE (CLOSE INTERCHANGE)

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER J.9 |
|---|---|---|---|---|---|

SYSTEMTIME USERNAME DGNSPEC

STA. 2599+34.14
RAMP CONSTRUCTION LIMITS

PI Sta 2599+04.15

PT Sta 2597+97.07

2600

1885

PI Sta 1885+49.33

24'

POT Sta 2602+37.67

12'
12'

US 29 RAMP B

PI Sta 1883+89.48

DESOTO AVE

2595

0 50
FEET

ROCKFORD TWP.
T-77 N R-44 W
SEC. 4

Same comments as D sheets.
Move 2.00% label over the profile.

US 29 RAMP B

PLAN AND PROFILE

Design Speed = 30 mph
VPI +14.023
Elv 1,000.55
K Value = 37
Len 150.00 ft

Design Speed = 30 mph
VPI +78.259
Elv 1,006.86
K Value = 49
Len 90.00 ft

1,008.05

1,000.71

US 29 RAMP B PGL

+2.001%

+3.841%

+3.841%

-0.203%

0.144%

0.235%

Lt. Ditch

Rt. Ditch

1,000.70 1,000.69 1,001.08 1,000.51 1,002.14 1,000.42 1,003.85 1,000.39 1,005.74 1,000.23 1,007.24 1,000.22

1025 1020 1015 1010 1005 1000 995 990

2595 2596 2597 2598 2599 2600 2601 2602 2603

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER K.1 |
|---|---|---|---|---|---|

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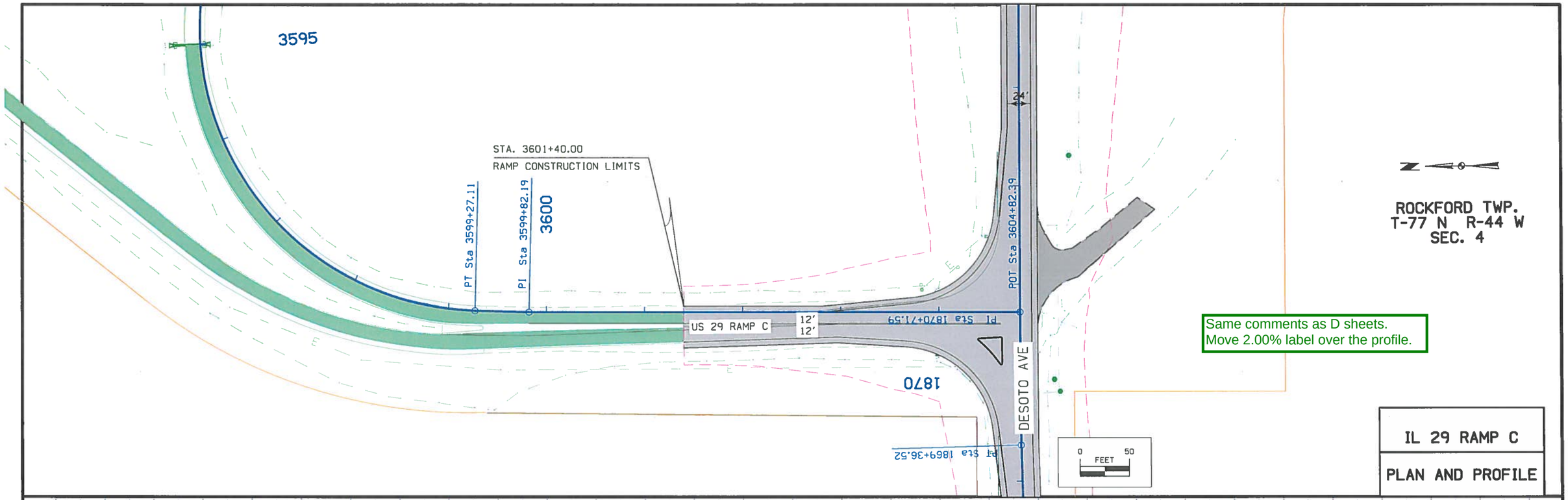


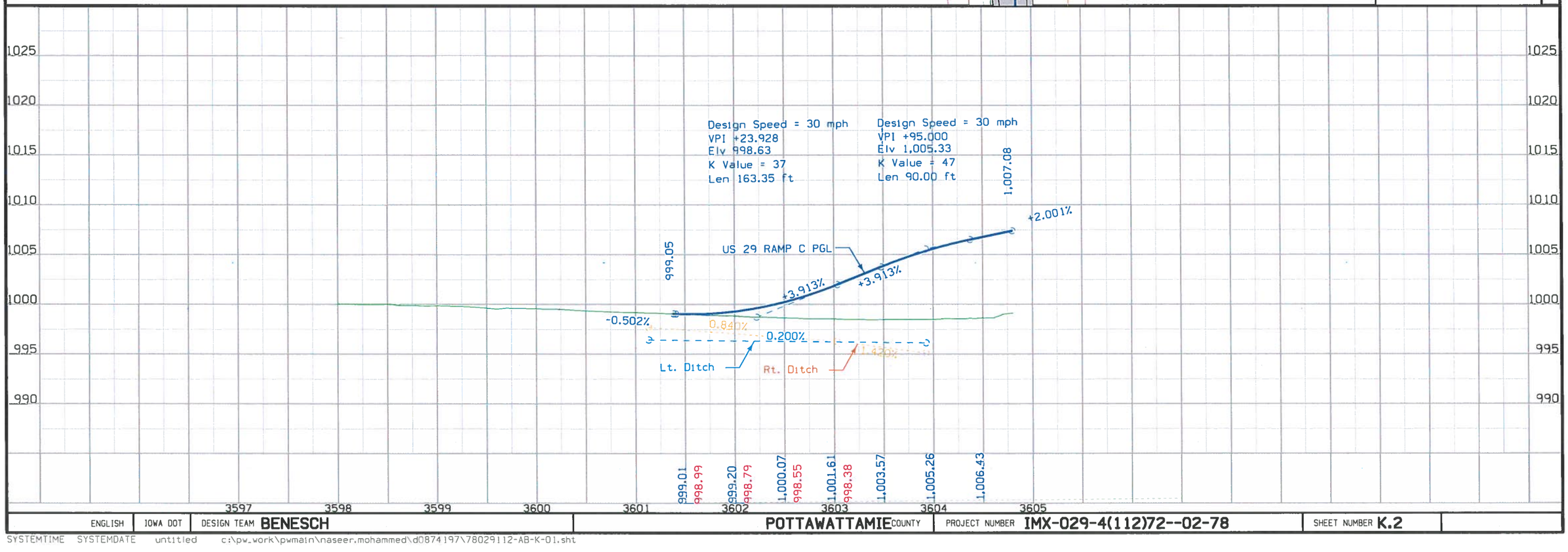


| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER K.2 |
|---|---|---|---|---|---|

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PT Sta 3599+27.11

PI Sta 3599+82.19

3600

PC Sta 3590+61.61

068

PAVEMENT REMOVAL

US 29 RAMP C

12'

12'

30" X 52' CULVERT REMOVAL

24" X 20' CULVERT REMOVAL

PAVEMENT REMOVAL

POT Sta 1861+48.00

PC Sta 1864+45.81

1865

PI Sta 1869+36.52

1870

PT Sta 1870+71.59

1875

29

DESOTO AVE

2%

2%

POT Sta 3604+82.39

PI Sta 1869+91.22

24" X 43' CULVERT REMOVAL

PAVEMENT REMOVAL

0 FEET 50

For Profile Details
Refer to Next Sheet

# COUNTY ROAD G12
# RAMP C

## REMOVAL PLANS

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER U.1 |
|---|---|---|---|---|---|

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N

PI Sta 2599+04.15

PAVEMENT REMOVAL

2'12'

2600

US 29 RAMP B

GUARDRAIL REMOVAL

30" X 74' CULVERT REMOVAL

1880

1885

PI Sta 1883+89.48

PI Sta 1885+49.33

24" X 57' CULVERT REMOVAL

PI Sta 1887+76.81

1890

POT Sta 1890+46.22

29

29

DESOTO AVE

POT Sta 2602+37.67

DESOTO AVE

PAVEMENT REMOVAL

18" X 60' CULVERT REMOVAL

PAVEMENT REMOVAL

18" X 41' CULVERT REMOVAL

GUARDRAIL REMOVAL

0 FEET 50

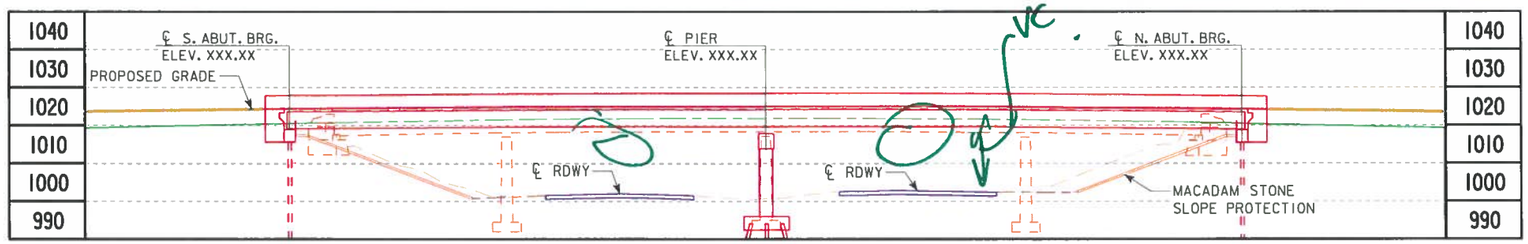
For Profile Details
Refer to Next Sheet

# COUNTY ROAD G12 RAMP B

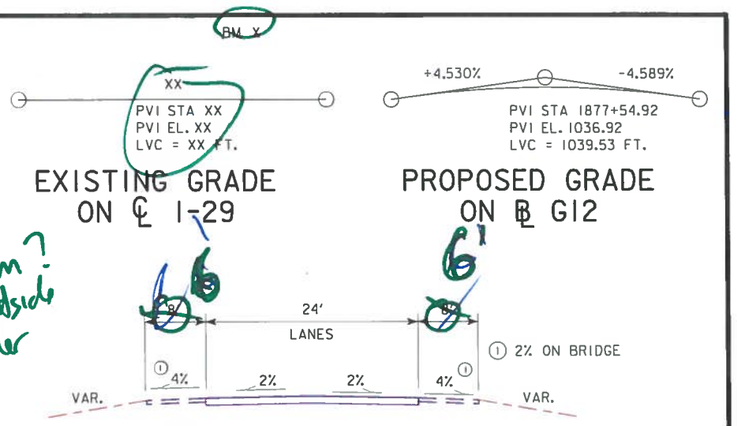
## REMOVAL PLANS

| ENGLISH | IOWA DOT | DESIGN TEAM BENESCH | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMX-029-4(112)72--02-78 | SHEET NUMBER U.2 |
|---|---|---|---|---|---|

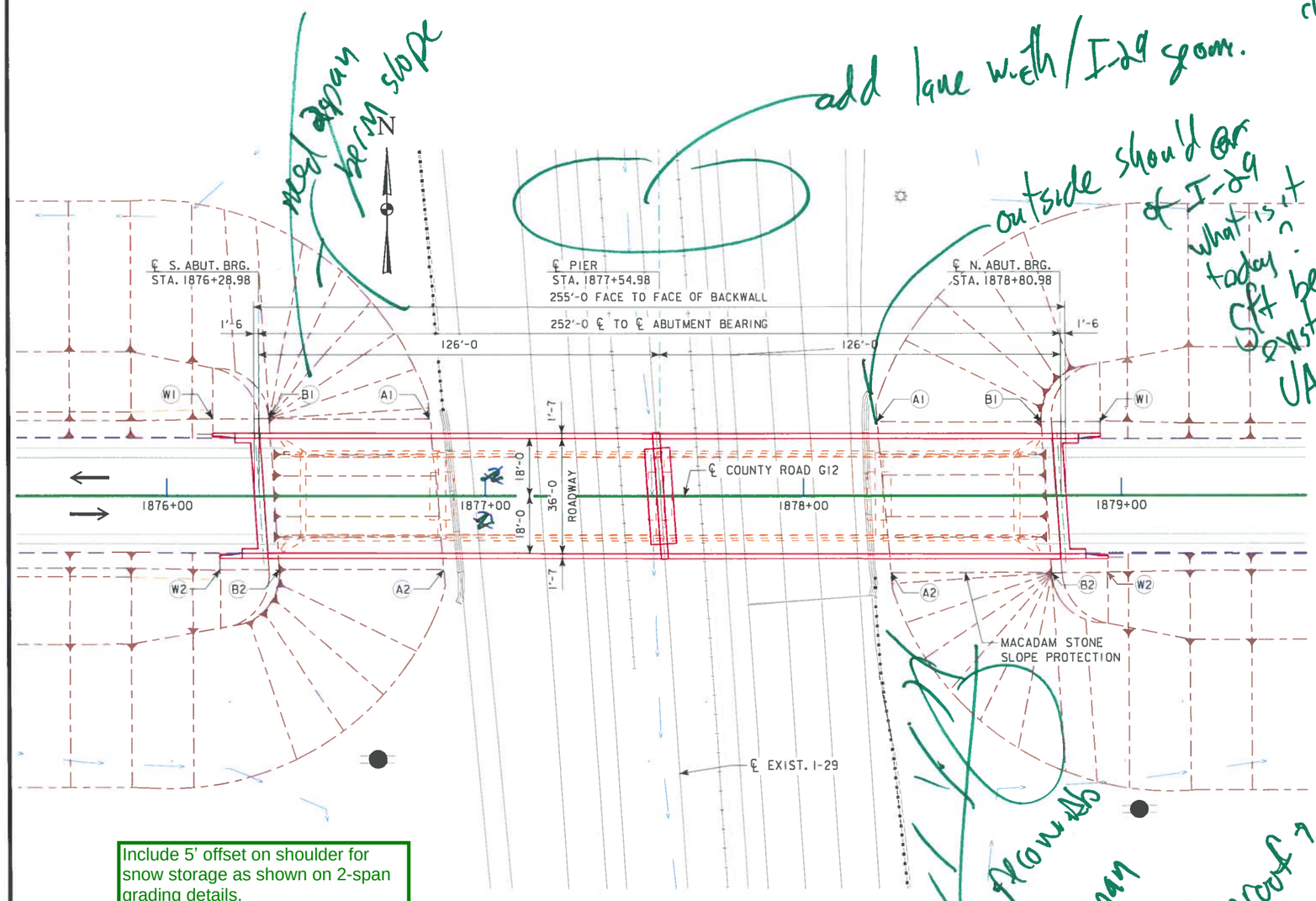
SYSTEMTIME SYSTEMDATE USERNAME DGNSPEC




LONGITUDINAL SECTION ALONG ℄ BRIDGE




TYPICAL APPROACH SECTION




SITUATION PLAN

Include 5' offset on shoulder for snow storage as shown on 2-span grading details.

## BERM SLOPE LOCATION TABLE

| POINTS | SOUTH ABUTMENT | | | NORTH ABUTMENT | | |
|---|---|---|---|---|---|---|
| | STATION | OFFSET | ELEV. | STATION | OFFSET | ELEV. |
| A1 | XX | XX | XX | XX | XX | XX |
| A2 | XX | XX | XX | XX | XX | XX |
| B1 | XX | XX | XX | XX | XX | XX |
| B2 | XX | XX | XX | XX | XX | XX |
| W1 | XX | XX | XX | XX | XX | XX |
| W2 | XX | XX | XX | XX | XX | XX |

BERM SLOPE ELEVATIONS REFLECT THE GRADING SURFACE

0 ENGLISH 40
SCALE IN FEET

## UTILITIES LEGEND:

SYMBOL - TYPE - COMPANY NAME
-OR-
NO KNOWN UTILITIES
-OR-
UTILITY SURVEY NOT CONDUCTED

## LOCATION

COUNTY ROAD G12 OVER I-29
T-77N R-44W
SECTION 4
ROCKFORD TOWNSHIP
POTTAWATTAMIE COUNTY
FHWA NO. X
BRIDGE MAINT. NO. X
LATITUDE 41.499308°
LONGITUDE -95.900158°

## TRAFFIC ESTIMATE

| | | |
|---|---|---|
| 200_ AADT | ____ | V.P.D. |
| 202_ AADT | ____ | V.P.D. |
| 202_ DHV | ____ | V.P.H. |
| TRUCKS | ____ | % |
| TOTAL DESIGN ESALs | ____ | |

DESIGN FOR 3°45'30" SKEW (LA)

# 252'-0 x 36'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE

125'-0 SPANS

## SITUATION PLAN

STATION

FEBRUARY 2018 (FIELD EXAM)

## POTTAWATTAMIE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 1 OF 1 FILE NO. 30169 DESIGN NO. XXX

benesch
Alfred Benesch & Company
205 North Michigan Avenue, Suite 2400
Chicago, Illinois 60601
312-565-0450 Job No. 10361

| DESIGN TEAM | POTTAWATTAMIE COUNTY | PROJECT NUMBER | BRFIMX-029-4(113)72--14-78 | SHEET NUMBER V.1 |
|---|---|---|---|---|