

LETTING DATE  
 05-21-2019  
**REVETMENT**  
**STPN-010-2(36)--2J-71**

**OBRIEN CO.**



**Highway Division**

PLANS OF PROPOSED IMPROVEMENT ON THE

**PRIMARY ROAD SYSTEM**  
**OBRIEN COUNTY**  
**REVTMENT**

**Mill Creek 2.5 mi W of W Jct US 59**

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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



REVISIONS

TOTAL

13

PROJECT IDENTIFICATION NUMBER

19-71-010-010

PROJECT NUMBER

STPN-010-2(36)--2J-71

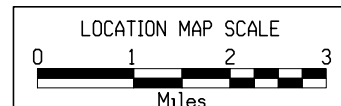
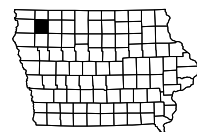
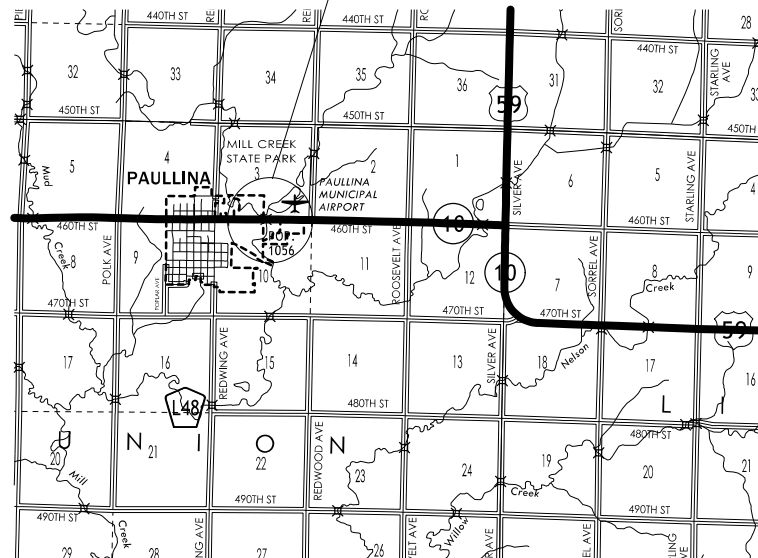
R.O.W. PROJECT NUMBER

STPN-010-2(37)--2J-71

**INDEX OF SHEETS**

No.	DESCRIPTION
<b>A Sheets</b>	<b>Title Sheets</b>
A.1	Title Sheet
A.1	Location Map Sheet
<b>G Sheets</b>	<b>Survey Sheets</b>
G.1	Reference Ties and Bench Marks
G.2	Control Point Vicinity Map
G.3	Horizontal Control Tab. & Super for all Alignments
<b>J Sheets</b>	<b>Traffic Control and Staging Sheets</b>
J.1	Traffic Control Plan
<b>V Sheets</b>	<b>Bridge and Culvert Situation Plans</b>
* V.1 - 8	Bridge and Culvert Situation Plans
	* Color Plan Sheets

STA. 499+67.67  
 Project Location  
 Ref. Loc. 46.10  
 FHWA Number 38360



**DESIGN DATA RURAL**

2016 AADT	2100	V.P.D.
20-- AADT	--	V.P.D.
20-- DHV	--	V.P.H.
TRUCKS	18 %	
Total Design ESALs	--	

**INDEX OF SEALS**

SHEET NO.	NAME	TYPE
A.1	X	Primary Signature Block
X	X	X

**PRELIMINARY PLANS**

Subject to change by final design.

**D5 PLAN - Date: 02-13-2019**

## Survey Information

O'Brien County  
STPN-010-2(36)--2J-71  
Mill Creek 2.5 mi W of W Jct us 59  
PIN 19-71-010-010  
Sap-8892

### Party Personnel

Jeffrey Duncan- Party Chief  
Kris Bliven- Party Chief

### Date(s) of Survey

Begin Date 11/21/2018  
End Date 01/27/2019

### General Information

Measurement units for this survey are US survey feet. This survey is for proposed revetment work on Mill Creek along Iowa Highway 10. Project datum and control information is provided by Design Survey Office. This project is a Full DTM without Photo control.

### Vertical Control

The vertical datum is NAVD88. Vertical Control was established on 3 monuments designated as points CP1, CP2, and CP3. These monuments are expected to hold vertical reasonably well. Datum was transferred from Iowa RTN reference stations to the projects monuments by using concurrent 6-hour static measurements and post processing connecting vectors. Geoid 12 B was used in processing.

### Horizontal Control

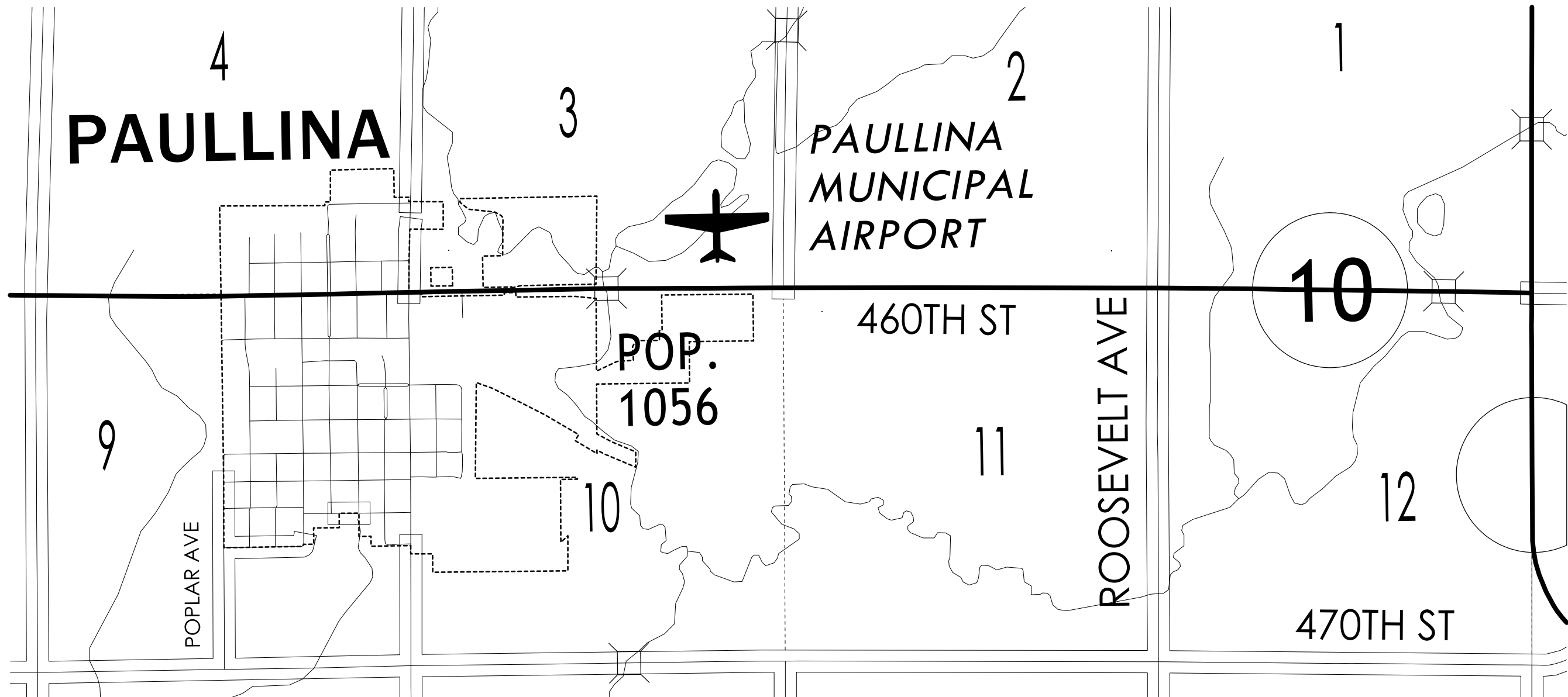
The project coordinate system for this survey is Iowa RCS Zone 1 (U.S. Survey Feet). This survey control is relative to IaRTN reference stations. IaRTN Reference Station coordinate are relative to the National Reference Station network datum NAD83 (2011) for Epoch 2010.00. Coordinates were determined by using concurrent 6-hour static measurements and post processing connecting vectors. Additional control points were placed throughout the project using a GNSS Base-Rover setups.

### Alignment Information

The horizontal alignment for this survey is provided by District 3 ROW.

### 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 2010.00

VERT. DATUM: NAVD88

1a. Regional Coordinate System Zone 1

Coordinate listing from next sheet will be used with 1aRTN for monument  
recovery. No other reference ties are given.

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

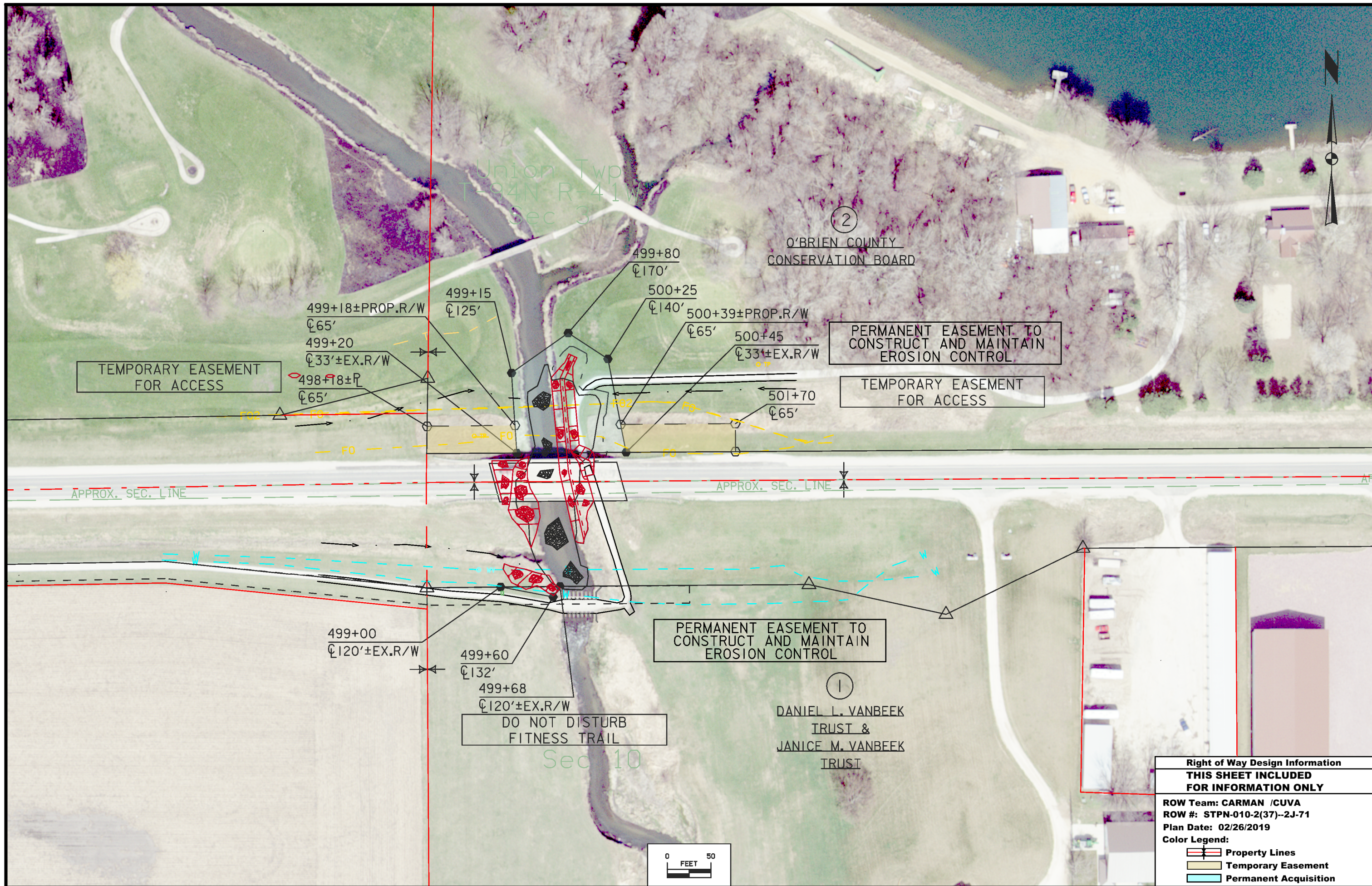
VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 1

Point	North	East	Elevation	Feature Code-Description
Name	Coordinate	Coordinate		
CP1	9521231.234	11384633.82	1370.63	CP ROW RAIL W/ CENTER PUNCH 75.5FT N CL HWY 10 75FT E TELEPHONE PEDESTAL 40FT NE TOP OF PIPE
CP2	9521288.633	11389224.5	1384.4	CP ROW RAIL W/CENTER PUNCH 79.5FT N CL HWY 10 71FT W CL REDWOOD AVE 40FT NW TOP OF PIPE
CP3	9521288.379	11394559.44	1417.22	CP CM W/CENTER PUNCH 80FT N CL HWY 10 61FT W CL ROOSEVELT AVE 39FT NW STOP SIGN

O'Brien	ROW: STPN-010-2(37)--2J-71					PIN	19-71-010-010														
	Mill Creek 2.5 mi W of W Jct US 59																				
PARCEL NO.	OWNER NAME	FEE	EASE	FEE	EASE	FEE	EASE	FEE	EASE	EXCESS	TEMP EASE	BORROW	FEE	T.E.	MITIGATION	OTHER	HOUSE	BUILDING(S)	A/C ONLY	TOTAL ACQ.	
1	DANIEL L. VANBEEK TRUST & JANICE M. VANBEEK TRUST - Fee		0.01 AC																		
2	O'BRIEN COUNTY CONSERVATION BOARD - Fee		0.32 AC								0.16 AC										
2 Parcels	"TOTALS	0 AC	0.33 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0.16 AC		0 AC	0 AC	0 AC						
		0 SF		0 SF	0 SF		0 SF	0 SF		0 SF	0 SF		0 SF								

NO ACCESS RIGHTS ARE TO BE ACQUIRED ON THIS PROJECT.



Right of Way Design Information	
<b>THIS SHEET INCLUDED FOR INFORMATION ONLY</b>	
ROW Team: CARMAN /CUVA	
ROW #: STPN-010-2(37)--2J-71	
Plan Date: 02/26/2019	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

108-23A 08-01-08
<b>TRAFFIC CONTROL PLAN</b>
IA 10 traffic to be maintained at all times.

111-01 04-17-12	
<b>COORDINATED OPERATIONS</b>	
Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.	
Project	Type of Work
None Provided	

108-25 10-21-14	<b>511 TRAVEL RESTRICTIONS</b>
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Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
			No travel restrictions expected.									



**ESTIMATED BRIDGE QUANTITIES**

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2102-2625001	EMBANKMENT-IN-PLACE, CONTRACTOR FURNISHED	CY	951	
2	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	CY	203	
3	2105-8425005	TOPSOIL, FURNISH AND SPREAD	CY	110	
4	2401-7207030	REMOVAL OF CONCRETE	LS	1	
5	2402-0425031	GRANULAR BACKFILL	TON	2,060	
6	2416-0100018	APRONS, CONCRETE, 18 IN. DIA.	EACH	1	
7	2435-0251224	INTAKE, SW-512, 24 IN.	EACH	1	
8	2503-0114218	STORM SEWER GRAVITY MAIN, TRENCHED, REINFORCED CONCRETE PIPE (RCP), 20000 (CLASS III), 18 IN.	LF	48	
9	2507-3250005	ENGINEERING FABRIC	SY	2,404	
10	2507-6800061	REVETMENT, CLASS E	TON	3,040	
11	2533-4980005	MOBILIZATION	LS	1	
12	2601-2639010	SODDING	SQ	47.0	
13	2601-2643110	WATERING FOR SOD, SPECIAL DITCH CONTROL, OR SLOPE PROTECTION	MGAL	28.2	
14	2601-2643300	MOBILIZATION FOR WATERING	EACH	5	

**ESTIMATE REFERENCE INFORMATION**

ITEM NO.	ITEM CODE	DESCRIPTION
1	2102-2625001	EMBANKMENT-IN-PLACE, CONTRACTOR FURNISHED QUANTITY INCLUDES A 25% SHRINKAGE FACTOR.
2	2104-2710020	EXCAVATION, CLASS 10, CHANNEL ALL EXCAVATED MATERIAL WILL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS USED FOR EMBANKMENT. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE DISPOSAL SITE FOR WASTE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT AREAS (INCLUDING HAUL ROADS) SELECTED FOR WASTE OR DISPOSAL NOT IMPACT 1) CULTURALLY SENSITIVE SITES OR GRAVES OR 2) WETLANDS OR "WATERS OF THE U.S.", INCLUDING STREAMS OR STREAM BANKS BELOW THE "ORDINARY HIGH WATER MARK", WITHOUT AN APPROVED U.S. ARMY CORPS OF ENGINEERS 404 PERMIT. NO PAYMENT FOR OVERHAUL WILL BE ALLOWED FOR MATERIAL HAULED TO THESE SITES.
3	2105-8425005	TOPSOIL, FURNISH AND SPREAD INSTALL MINIMUM 6 INCH THICK TOP SOIL AT ALL AREAS TO BE SODDED.
4	2401-7207030	REMOVAL OF CONCRETE PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY TO REMOVE DAMAGED TRAIL PAVEMENT AT LOCATIONS LISTED ON PLANS. DAMAGED TRAIL PAVEMENT INCLUDES SIDEWALK AND SUBSTRUCTURE WITHIN REMOVAL LIMITS.
5	2402-0425031	GRANULAR BACKFILL ESTIMATED AT 1.7 TON/CY. PERCENT PASSING THE NO. 200 SIEVE SHALL NOT EXCEED 5%.
6	2416-0100018	APRONS, CONCRETE, 18 IN. DIA. --
7	2435-0251224	INTAKE, SW-512, 24 IN. BID ITEM TO INCLUDE CONNECTION OF 18 INCH RCP TO INTAKE AND CASTING AS LISTED ON PLANS.
8	2503-0114218	STORM SEWER GRAVITY MAIN, TRENCHED, REINFORCED CONCRETE PIPE (RCP), 20000 (CLASS III), 18 IN. --
9	2507-3250005	ENGINEERING FABRIC ENGINEERING FABRIC SHALL BE MATERIAL AS SPECIFIED FOR EMBANKMENT EROSION CONTROL IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS.
10	2507-6800061	REVETMENT, CLASS E ESTIMATED AT 1.6 TON/CU YD.
11	2533-4980005	MOBILIZATION --
12	2601-2639010	SODDING --
13	2601-2643110	WATERING FOR SOD, SPECIAL DITCH CONTROL, OR SLOPE PROTECTION ESTIMATE BASED ON SIX WATERINGS OF SOD AT A RATE OF 100 GALLONS PER SQUARE.
14	2601-2643300	MOBILIZATION FOR WATERING --

**GENERAL NOTES:**

THIS DESIGN IS FOR SCOUR COUNTERMEASURES AT THE IOWA HIGHWAY 10 CROSSING OF MILL CREEK NEAR THE CITY OF PAULLINA.

PROJECT IS LOCATED APPROXIMATELY 2.5 MILES WEST OF THE WEST JUNCTION OF US HIGHWAY 59.

PROJECT SHALL CONSIST OF:

1. INSTALLATION OF SCOUR COUNTERMEASURES ALONG THE STREAMBED OF MILL CREEK.
2. INSTALLATION OF A LONGITUDINAL STONE TOE ALONG THE EAST BANK OF MILL CREEK.
3. INSTALLATION OF CLASS E REVETMENT WEDGES.
4. LINING OF THE WEST BRIDGE BERM WITH CLASS E REVETMENT.
5. INSTALLATION OF EARTH FILL AT THE ERODED EAST BANK.
6. INSTALLATION OF STORM SEWER AND INTAKE.

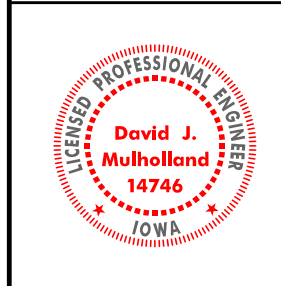
ROADWAY QUANTITIES SHOWN ELSEWHERE IN THESE PLANS.

NOTE: UTILITIES MAY BE EXPOSED WITHIN MILL CREEK CHANNEL; COORDINATE WORK ACTIVITIES WITH ANY UTILITY RELOCATION/PROTECTION WORK.

SPECIFICATIONS:

CONSTRUCTION: IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES OF 2015, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.

**HYDRAULIC DESIGN**



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

*David J. Mulholland* 2/11/2019  
Signature Date

**David J. Mulholland**  
Printed or Typed Name

My license renewal date is December 31, 2020

Pages or sheets covered by this seal: V.I THROUGH V.8

PRELIMINARY  
DESIGN FOR

**143'-0 X 44'-0 PRETENSIONED  
PRESTRESSED CONC. BEAM BRG.  
SCOUR COUNTERMEASURE  
QUANTITIES AND GENERAL NOTES**

STATION 499+67.05 FEBRUARY 2019

**O'BRIEN COUNTY**

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. 1 OF 8 FILE NO. 31683 DESIGN NO. 219

- |  |   |
|--|---|
| ① STA. 499+34.25, 28.8' LT, ELEV. 1347.00<br>N 9521221.61, E 11386758.90 | ⑧ STA. 499+30.00, 100.1' RT, ELEV. 1347.02<br>N 9521092.63, E 11386755.93 |
| ② STA. 499+32.12, 19.2' LT, ELEV. 1345.00<br>N 9521211.97, E 11386756.87 | ⑨ STA. 499+55.84, 107.7' RT, ELEV. 1345.00<br>N 9521085.23, E 11386781.80 |
| ③ STA. 499+35.20, 7.5' RT, ELEV. 1345.00<br>N 9521185.28, E 11386760.21  | ⑩ STA. 499+68.24, 122.6' RT, ELEV. 1347.80<br>N 9521070.52, E 11386794.31 |
| ④ STA. 499+44.10, 23.6' RT, ELEV. 1345.00<br>N 9521169.23, E 11386769.27 | ⑪ STA. 499+85.25, 143.6' LT, ELEV. 1347.00<br>N 9521336.85, E 11386808.91 |
| ⑤ STA. 499+46.16, 40.1' RT, ELEV. 1345.00<br>N 9521152.74, E 11386771.49 | ⑫ STA. 499+72.74, 117.1' LT, ELEV. 1350.00<br>N 9521310.22, E 11386796.61 |
| ⑥ STA. 499+35.48, 75.3' RT, ELEV. 1345.00<br>N 9521117.48, E 11386761.16 | ⑬ STA. 499+81.55, 11.2' LT, ELEV. 1350.00<br>N 9521204.42, E 11386806.39  |
| ⑦ STA. 499+04.59, 93.4' RT, ELEV. 1349.70<br>N 9521099.12, E 11386730.50 | ⑭ STA. 499+97.44, 62.3' RT, ELEV. 1350.00<br>N 9521131.04, E 11386822.91  |

NOTE: SEE DETAILS ON SHEETS V.5, V.6 AND V.7 FOR LOCATION OF ELEVATION REFERENCE POINTS.

EAST BERM REPAIR WITH  
CLASS E REVETMENT LOCATIONS

- |   |  |
|---|--|
| ⑭A STA. 499+95.28, 23.2' LT, ELEV. 1352.40<br>N 9521216.50, E 11386820.02 | ⑭C STA. 499+99.96, 6.3' LT, ELEV. 1352.22<br>N 9521199.64, E 11386824.84 |
| ⑭B STA. 500+03.62, 23.2' LT, ELEV. 1352.40<br>N 9521216.57, E 11386828.36 | ⑭D STA. 500+07.84, 8.1' LT, ELEV. 1352.35<br>N 9521201.54, E 11386832.71 |

NOTE: SEE DETAIL ON SHEET V.5 FOR LOCATION OF ELEVATION REFERENCE POINTS.

WEST BERM LINING WITH  
CLASS E REVETMENT LOCATIONS

- |  |  |
|--|--|
| ⑮ STA. 498+91.67, 24.5' LT, ELEV. 1360.04<br>N 9521216.87, E 11386716.34 | ⑰ STA. 499+03.05, 25.4' RT, ELEV. 1360.50<br>N 9521167.09, E 11386728.25 |
| ⑯ STA. 499+23.48, 24.6' LT, ELEV. 1350.75<br>N 9521217.26, E 11386748.17 | ⑱ STA. 499+10.74, 25.4' RT, ELEV. 1357.84<br>N 9521167.09, E 11386735.94 |

NOTE: ELEVATIONS REFERENCED TO TOP OF REVETMENT.  
NOTE: SEE DETAIL ON SHEET V.7 FOR LOCATION OF ELEVATION REFERENCE POINTS.

NOTE: REVETMENT WEDGE, LONGITUDINAL STONE TOE REVETMENT, KEY  
AND WEST BERM LINING DETAILS SHOWN ON SHEETS V.5, V.6, V.7 AND V.8.

- Ⓐ 18 INCH RCP STORM SEWER; SEE SHEET V.4 FOR DETAILS.
- Ⓑ SW-512 INTAKE; SEE SHEET V.4 FOR DETAILS.
- Ⓒ REMOVE DAMAGED TRAIL PAVEMENT STA. 500+03.66, 7.2' LT TO STA. 500+03.4, 18.7' LT.

LOCATION

IA 10 OVER MILL CREEK  
T-94N R-41W  
SECTIONS 3 AND 10  
UNION TOWNSHIP  
O'BRIEN COUNTY  
BRIDGE MAINT. NO. 7146.1S010  
FHWA NO. 38360  
LATITUDE 42.983011°  
LONGITUDE -95.673032°

HYDRAULIC DATA

DRAINAGE AREA = 96 SQ. MI.  
10.85 STREAM SLOPE = 6.1 FT./MI.  
Q<sub>50</sub> = 12,500 CFS  
Q<sub>100</sub> = 14,600 CFS

UTILITIES LEGEND:

FO - FIBER OPTIC - WINDSTREAM  
F02 - FIBER OPTIC - TCA  
T1 - TELEPHONE - WINDSTREAM  
W - WATER - CITY OF PAULLINA

TRAFFIC ESTIMATE

2015 AADT	2,040	V.P.D.
20__ AADT	_____	V.P.D.
20__ DHV	_____	V.P.H.
TRUCKS	_____	%
TOTAL DESIGN ESALS	_____	

NOTE: UTILITIES MAY BE EXPOSED WITHIN MILL CREEK CHANNEL; COORDINATE WORK ACTIVITIES WITH ANY UTILITY RELOCATION/PROTECTION WORK.

PRELIMINARY  
DESIGN FOR

143'-0 X 44'-0 PRETENSIONED  
PRESTRESSED CONC. BEAM BRG.  
SCOUR COUNTERMEASURE  
SITUATION PLAN

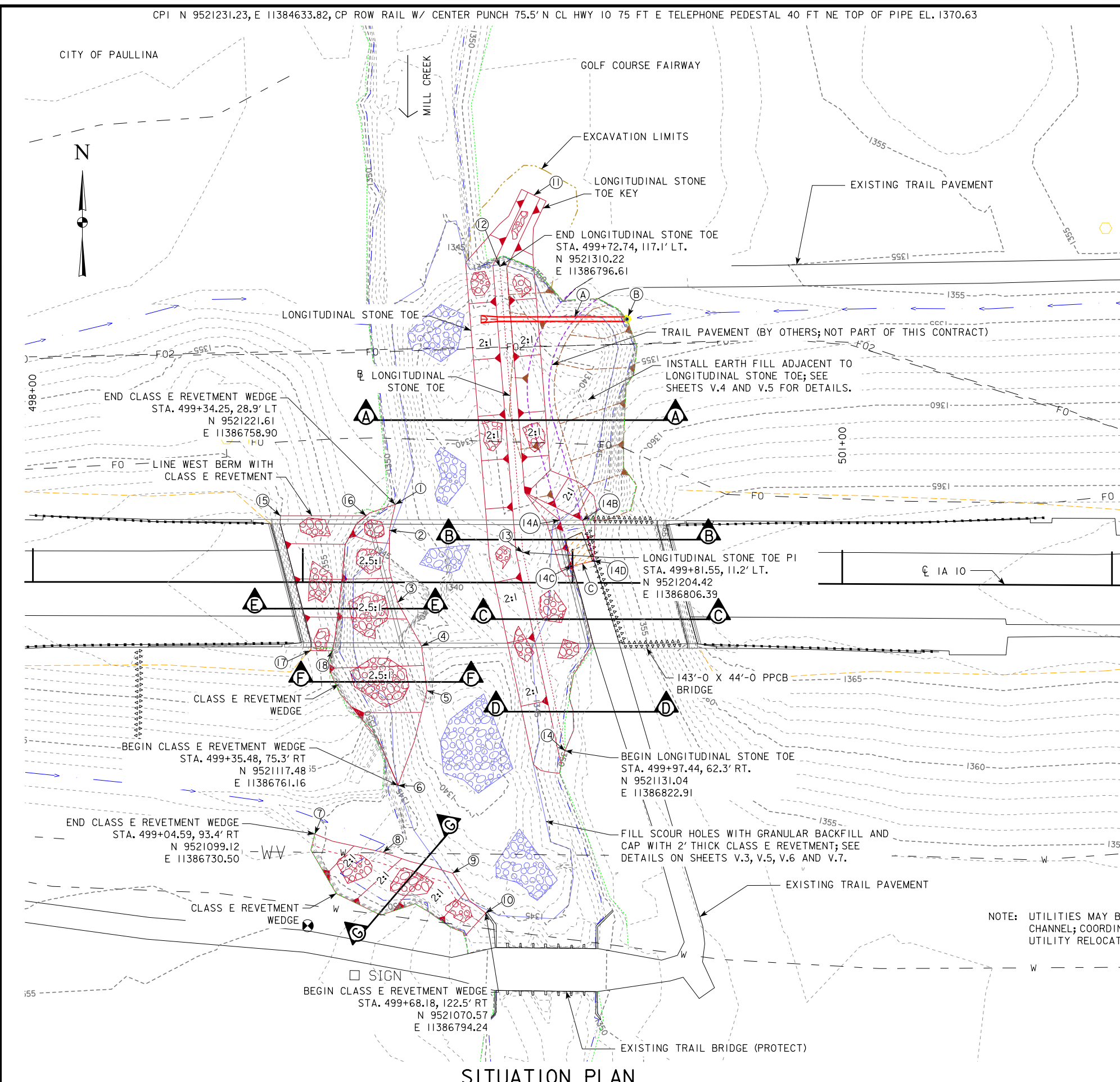
STATION 499+67.05 FEBRUARY 2019

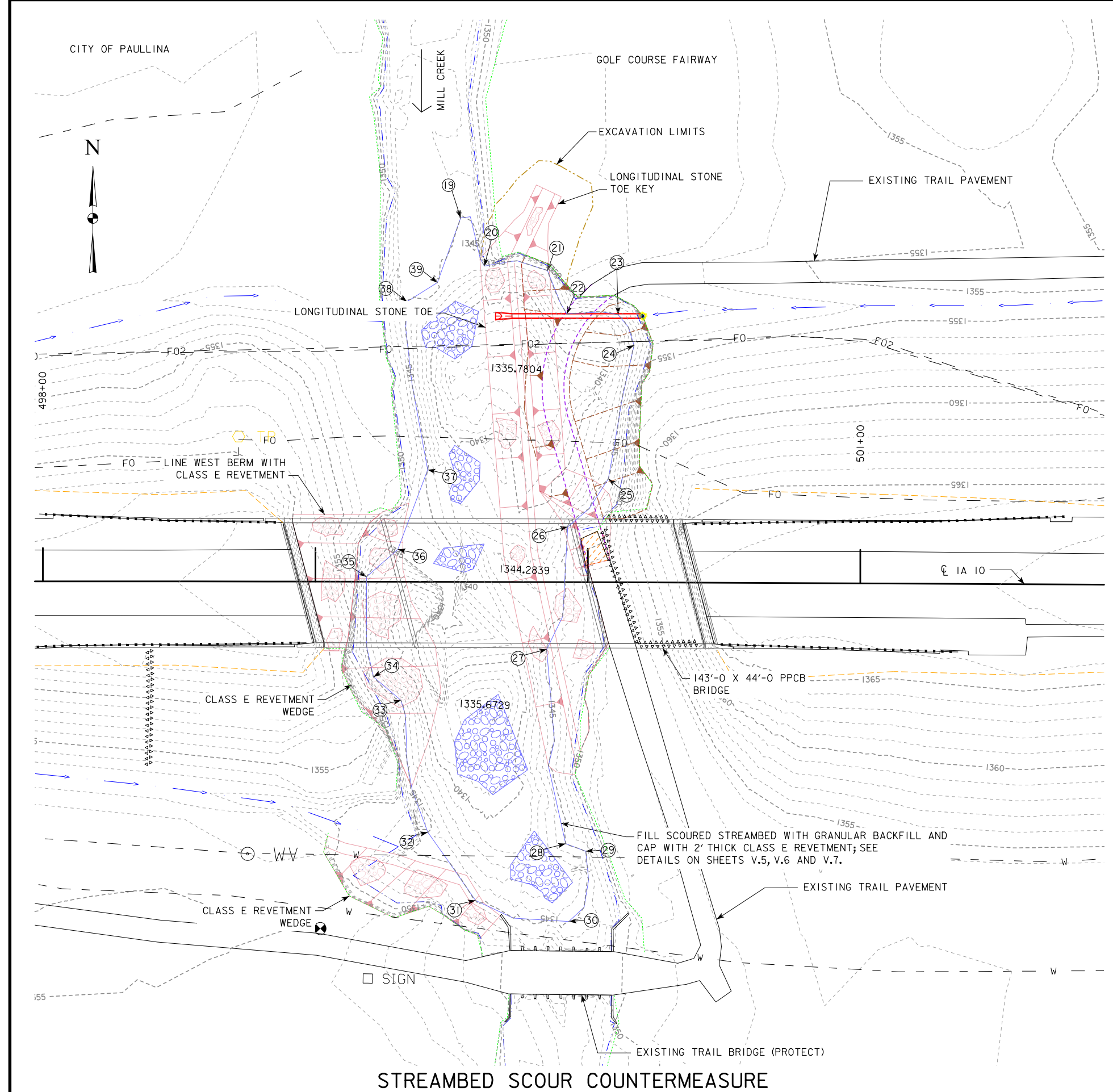
O'BRIEN COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. 2 OF 8 FILE NO. 31683 DESIGN NO. 219



SITUATION PLAN





STREAMBED SCOUR COUNTERMEASURE PERIMETER LOCATIONS

- |  |  |
|--|--|
| 19 STA. 499+52.99, 133.5' LT, ELEV. 1345.00<br>N 9521326.49, E 11386776.66 | 30 STA. 499+93.41, 124.6' RT, ELEV. 1345.00<br>N 9521068.73, E 11386819.44 |
| 20 STA. 499+61.69, 115.9' LT, ELEV. 1345.00<br>N 9521308.92, E 11386785.55 | 31 STA. 499+59.09, 116.9' RT, ELEV. 1345.00<br>N 9521076.07, E 11386785.13 |
| 21 STA. 499+84.82, 114.4' LT, ELEV. 1345.00<br>N 9521307.59, E 11386808.74 | 32 STA. 499+41.48, 92.0' RT, ELEV. 1345.00<br>N 9521100.88, E 11386767.31  |
| 22 STA. 499+91.99, 98.4' LT, ELEV. 1345.00<br>N 9521291.73, E 11386816.06  | 33 STA. 499+31.53, 43.6' RT, ELEV. 1345.00<br>N 9521149.16, E 11386756.90  |
| 23 STA. 500+10.79, 98.2' LT, ELEV. 1345.00<br>N 9521291.65, E 11386834.90  | 34 STA. 499+21.39, 35.0' RT, ELEV. 1345.00<br>N 9521157.66, E 11386746.68  |
| 24 STA. 500+16.68, 87.0' LT, ELEV. 1345.00<br>N 9521280.51, E 11386840.89  | 35 STA. 499+18.76, 1.8' LT, ELEV. 1345.00<br>N 9521194.37, E 11386743.68   |
| 25 STA. 500+07.40, 38.0' LT, ELEV. 1345.00<br>N 9521231.41, E 11386832.02  | 36 STA. 499+30.23, 11.8' LT, ELEV. 1345.00<br>N 9521204.55, E 11386755.05  |
| 26 STA. 499+92.57, 20.3' LT, ELEV. 1345.00<br>N 9521213.62, E 11386817.33  | 37 STA. 499+41.13, 41.1' LT, ELEV. 1345.00<br>N 9521233.91, E 11386765.66  |
| 27 STA. 499+85.00, 24.7' RT, ELEV. 1345.00<br>N 9521168.55, E 11386810.16  | 38 STA. 499+33.38, 102.8' LT, ELEV. 1345.00<br>N 9521295.54, E 11386757.30 |
| 28 STA. 499+92.17, 96.0' RT, ELEV. 1345.00<br>N 9521097.29, E 11386817.94  | 39 STA. 499+44.53, 109.8' LT, ELEV. 1345.00<br>N 9521302.66, E 11386768.40 |
| 29 STA. 499+99.59, 98.8' RT, ELEV. 1345.00<br>N 9521094.60, E 11386825.34  |  |

NOTE: ELEVATIONS REFERENCED TO TOP OF REVETMENT.

NOTE: REVETMENT WEDGE, LONGITUDINAL STONE TOE REVETMENT, KEY AND WEST BERM LINING DETAILS SHOWN ON SHEETS V.5, V.6, V.7 AND V.8.

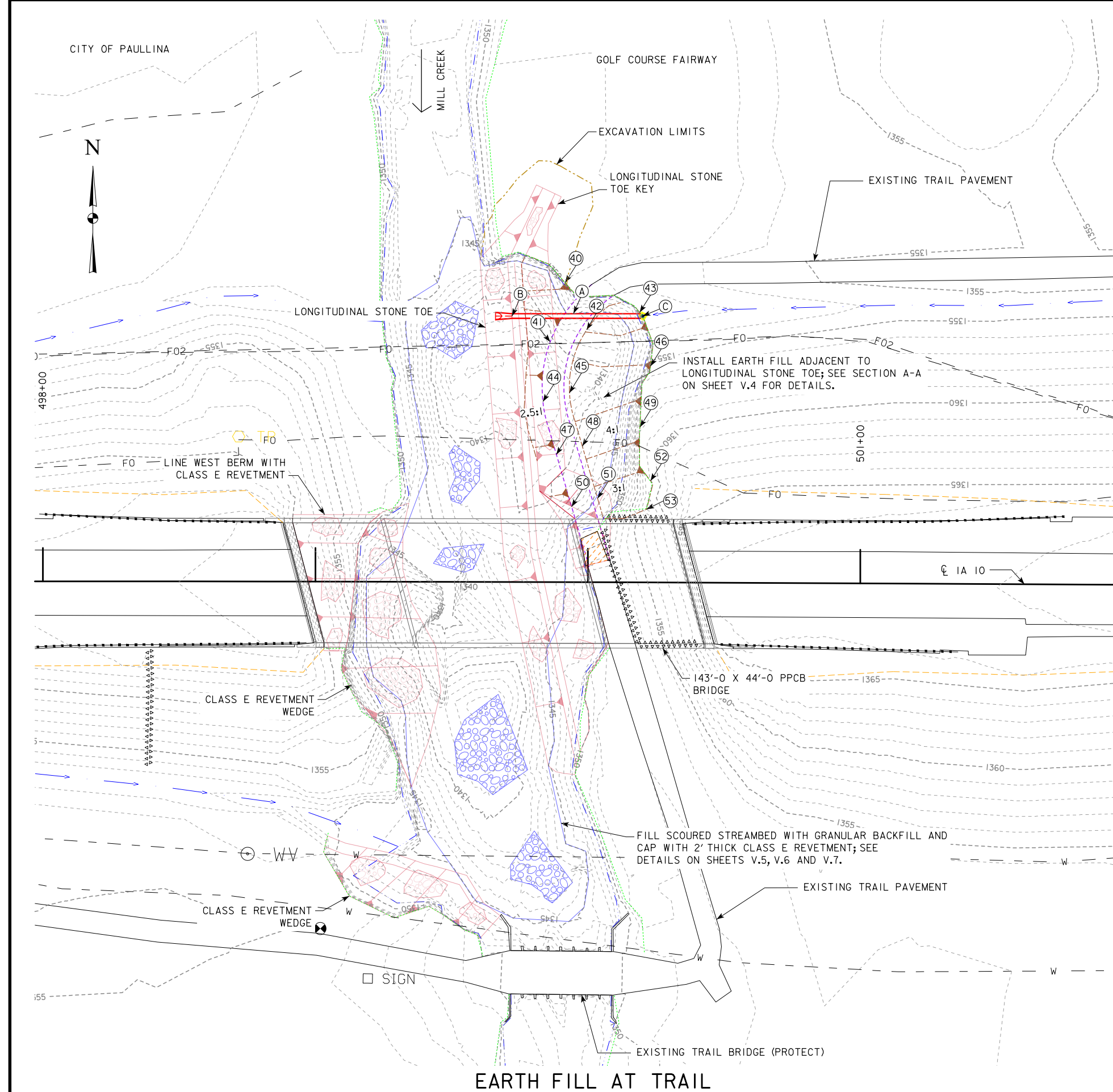
WEDGES, LONGITUDINAL STONE TOE, WEST BANK LINING AND CONTOURS SHADED BACK FOR CLARITY.

1335.7804-SPOT ELEVATION

STREAMBED SCOUR COUNTERMEASURE



PRELIMINARY  
DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
PRESTRESSED CONC. BEAM BRG.  
STREAMBED SCOUR  
COUNTERMEASURE**  
STATION 499+67.05      FEBRUARY 2019  
**O'BRIEN COUNTY**  
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. 3 OF 8      FILE NO. 31683      DESIGN NO. 219



EARTH FILL AT TRAIL GRADING LOCATIONS

- |    |   |    |  |
|----|---|----|--|
| ④① | STA. 499+91.33, 109.9' LT, ELEV. 1352.09<br>N 9521303.21, E 11386815.31 | ④⑧ | STA. 499+97.79, 50.0' LT, ELEV. 1352.66<br>N 9521243.33, E 11386822.29 |
| ④② | STA. 499+85.93, 88.2' LT, ELEV. 1352.98<br>N 9521281.43, E 11386810.08  | ④⑨ | STA. 500+18.90, 57.0' LT, ELEV. 1357.81<br>N 9521250.55, E 11386843.37 |
| ④③ | STA. 499+99.26, 92.6' LT, ELEV. 1352.98<br>N 9521285.99, E 11386823.40  | ④⑩ | STA. 499+93.97, 27.6' LT, ELEV. 1352.52<br>N 9521220.94, E 11386818.66 |
| ④④ | STA. 500+18.66, 99.1' LT, ELEV. 1352.20<br>N 9521292.63, E 11386842.78  | ④⑪ | STA. 500+03.46, 30.8' LT, ELEV. 1352.52<br>N 9521224.19, E 11386828.13 |
| ④⑤ | STA. 499+83.29, 66.2' LT, ELEV. 1352.81<br>N 9521259.45, E 11386807.64  | ④⑫ | STA. 500+22.87, 37.3' LT, ELEV. 1358.90<br>N 9521230.82, E 11386847.50 |
| ④⑥ | STA. 499+93.04, 69.5' LT, ELEV. 1352.81<br>N 9521262.78, E 11386817.37  | ④⑬ | STA. 500+21.45, 26.8' LT, ELEV. 1359.04<br>N 9521220.37, E 11386846.16 |
| ④⑦ | STA. 500+22.70, 79.4' LT, ELEV. 1355.35<br>N 9521272.93, E 11386846.99  |    |  |
| ④⑧ | STA. 499+88.30, 46.8' LT, ELEV. 1352.66<br>N 9521240.09, E 11386812.83  |    |  |

NOTE: ELEVATIONS REFERENCED TO TOP OF GRADING SURFACE.

NOTE: REVETMENT WEDGE, LONGITUDINAL STONE TOE REVETMENT, KEY AND WEST BERM LINING DETAILS SHOWN ON SHEETS V.5, V.6, V.7 AND V.8.

DO NOT PLACE EARTH FILL UNDER BRIDGE; BUTT SOUTH END OF FILL AGAINST CLASS E REVETMENT.

INSTALL SOD OVER ALL EARTH FILL AREAS.

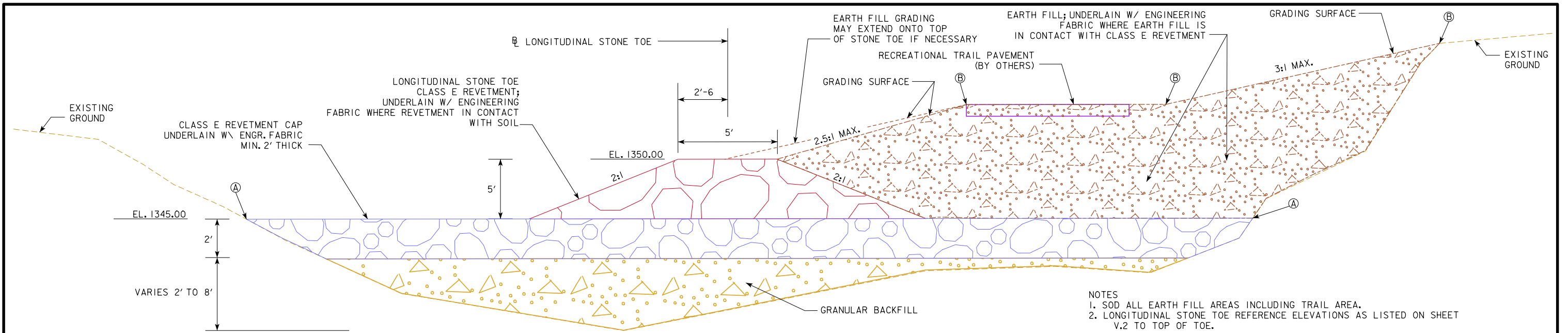
WEDGES, LONGITUDINAL STONE TOE, WEST BANK LINING AND CONTOURS SHADED BACK FOR CLARITY.

- Ⓐ 18 INCH RCP STORM SEWER @ 2.09%
- Ⓑ OUTLET 18 INCH STORM SEWER PIPE  
STA. 499+71.90, 97.51' LT  
N 9521290.72  
E 11386795.95  
INV. 1347.00  
INSTALL FLARED END SECTION AT END OF PIPE
- Ⓒ SW-512 AREA INTAKE (CASE I)  
STA. 500+19.80, 97.76' LT  
N 9521291.30  
E 11386843.93  
INLET ELEVATION 1352.00  
W. FLOWLINE INV. 1348.00  
PROVIDE SW-604 TYPE 3B CASTING  
CONNECT 18 INCH RCP STORM SEWER TO INTAKE

EARTH FILL AT TRAIL

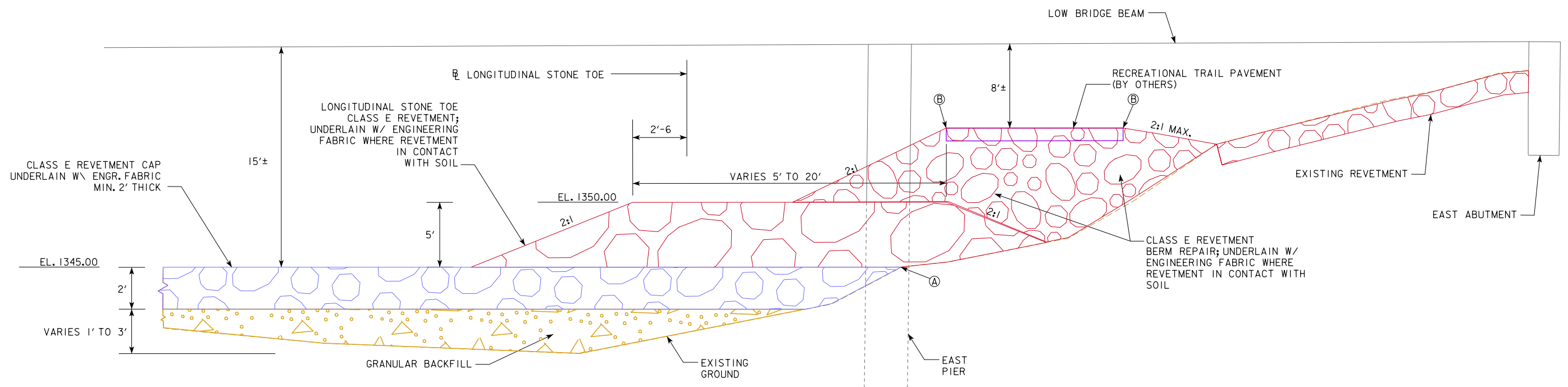


PRELIMINARY  
DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
PRESTRESSED CONC. BEAM BRG.  
SCOUR COUNTERMEASURE  
EARTH FILL AT TRAIL**  
STATION 499+67.05      FEBRUARY 2019  
**O'BRIEN COUNTY**  
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. 4 OF 8      FILE NO. 31683      DESIGN NO. 219



**TYPICAL SECTION A-A**  
 STA. 499+79.74, 33.0' LT TO STA. 499+72.74, 117.1' LT  
 NOT TO SCALE

- NOTES  
 1. SOD ALL EARTH FILL AREAS INCLUDING TRAIL AREA.  
 2. LONGITUDINAL STONE TOE REFERENCE ELEVATIONS AS LISTED ON SHEET V.2 TO TOP OF TOE.
- Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.  
 Ⓑ EARTH FILL POINT LOCATIONS; SEE SHEET V.4.

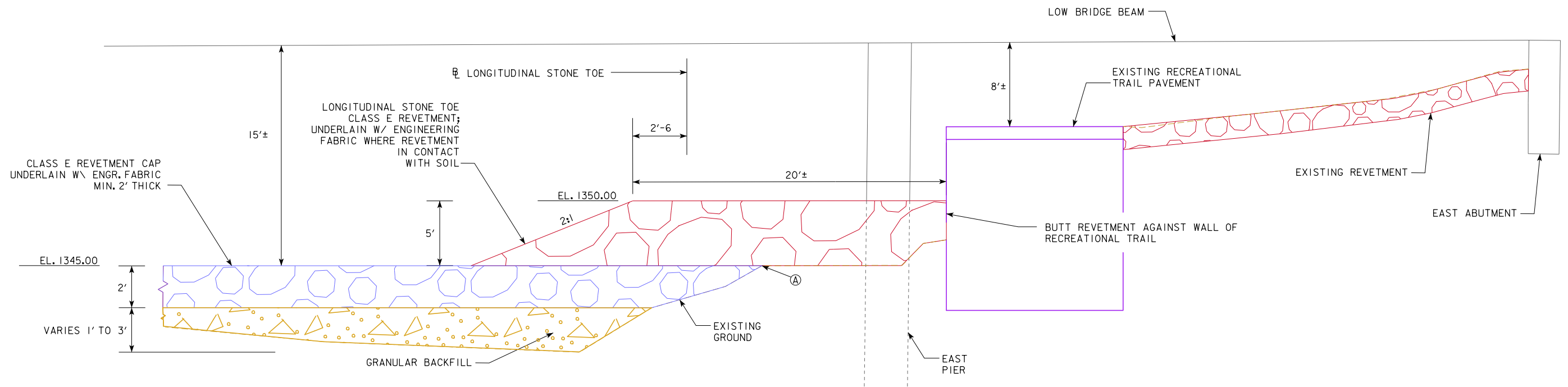


**TYPICAL SECTION B-B**  
 STA. 499+82.62, 6.3' LT TO STA. 499+79.74, 33.0' LT  
 NOT TO SCALE

- NOTE  
 1. LONGITUDINAL STONE TOE REFERENCE ELEVATIONS AS LISTED ON SHEET V.2 TO TOP OF TOE.

- Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.  
 Ⓑ POINTS 14A, 14B, 14C AND 14D; SEE SHEET V.2.

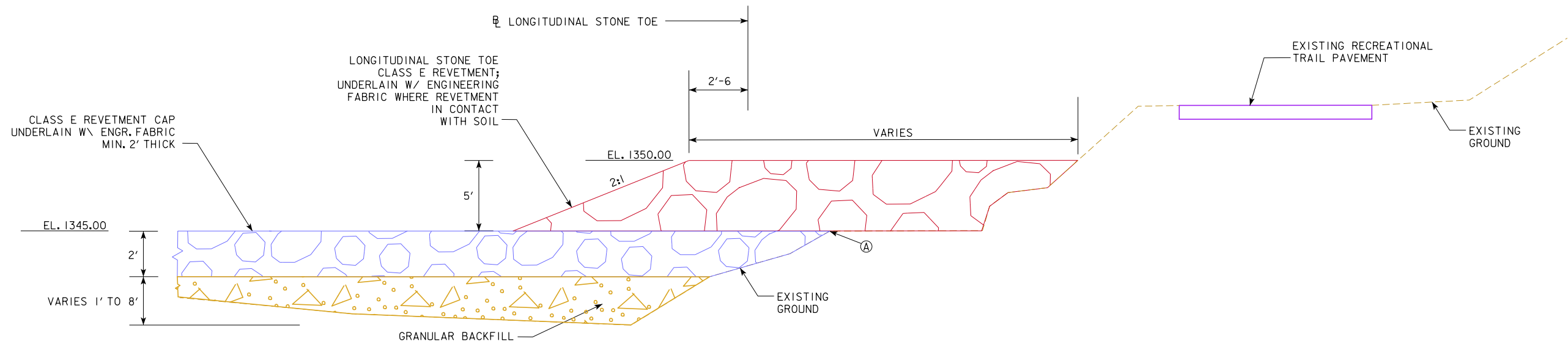
PRELIMINARY  
 DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
 PRESTRESSED CONC. BEAM BRG.  
 SCOUR COUNTERMEASURE  
 TYPICAL SECTIONS**  
 STATION 499+67.05 FEBRUARY 2019  
**O'BRIEN COUNTY**  
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
 DESIGN SHEET NO. 5 OF 8 FILE NO. 31683 DESIGN NO. 219



NOTE  
 1. LONGITUDINAL STONE TOE REFERENCE ELEVATIONS AS LISTED ON SHEET V.2 TO TOP OF TOE.

**TYPICAL SECTION C-C**  
 STA. 499+89.36, 24.2' RT TO STA. 499+82.62, 6.3' LT  
 NOT TO SCALE

Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.

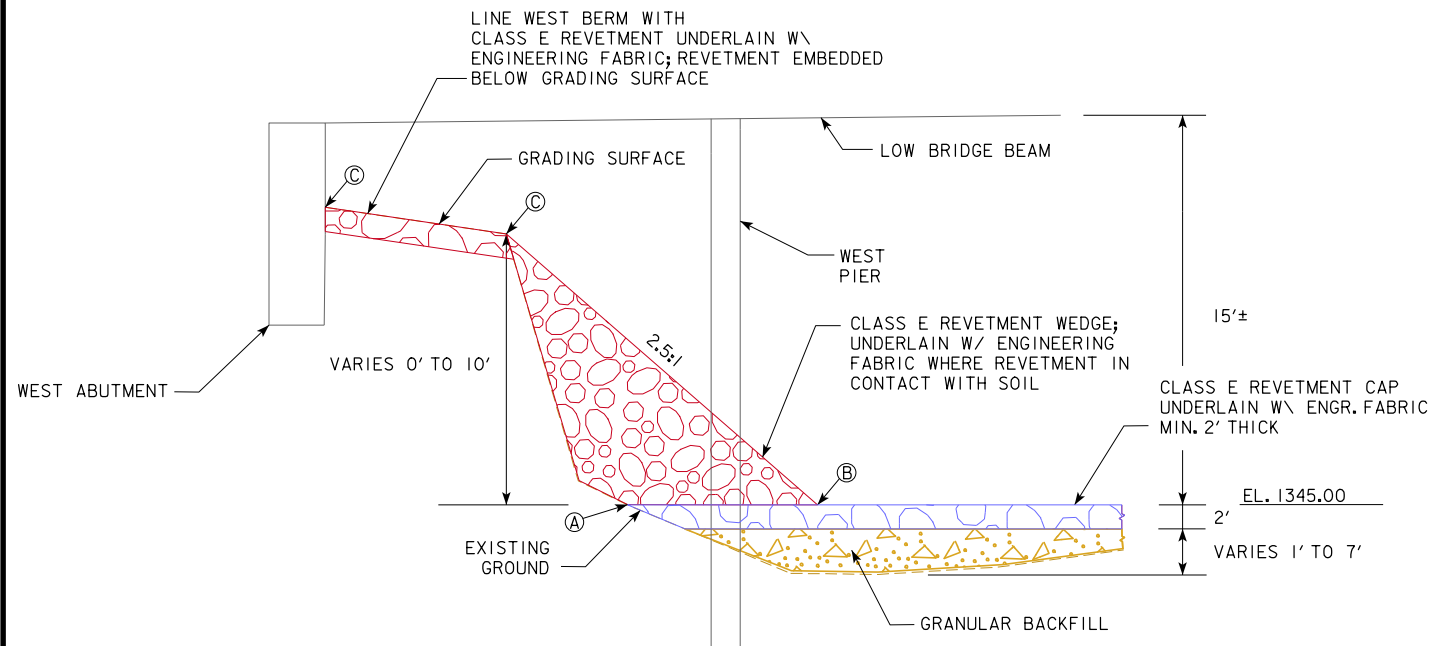


NOTE  
 1. LONGITUDINAL STONE TOE REFERENCE ELEVATIONS AS LISTED ON SHEET V.2 TO TOP OF TOE.

**TYPICAL SECTION D-D**  
 STA. 499+97.44, 62.3' RT TO STA. 499+89.36, 24.2' RT  
 NOT TO SCALE

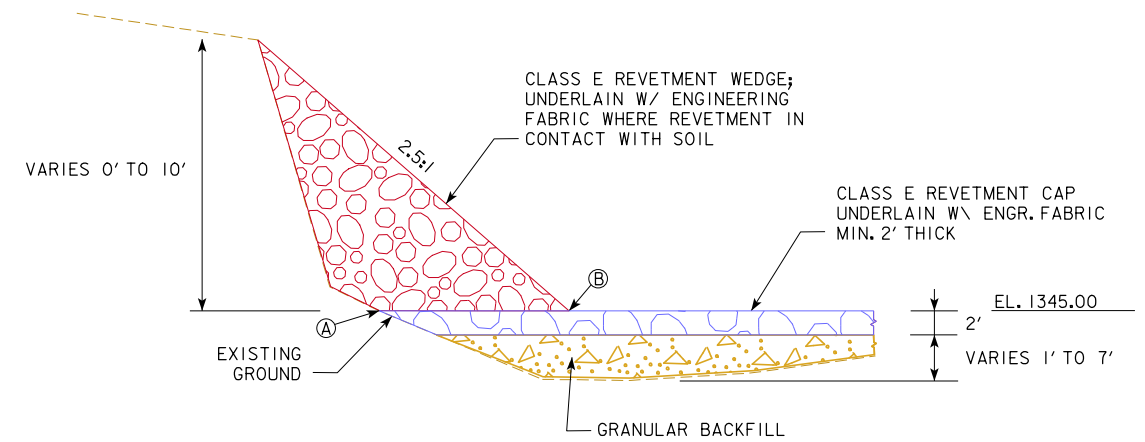
Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.

PRELIMINARY  
 DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
 PRESTRESSED CONC. BEAM BRG.  
 SCOUR COUNTERMEASURE  
 TYPICAL SECTIONS**  
 STATION 499+67.05      FEBRUARY 2019  
**O'BRIEN COUNTY**  
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
 DESIGN SHEET NO. 6 OF 8    FILE NO. 31683    DESIGN NO. 219



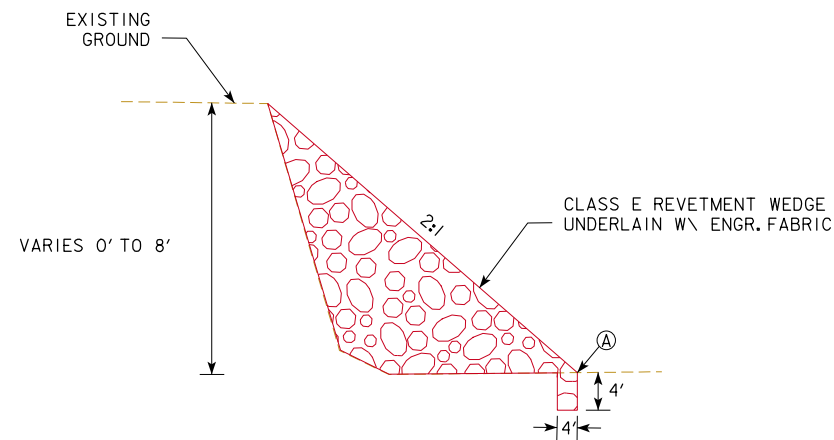
- Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.
- Ⓑ REVETMENT WEDGE BASE POINT LOCATIONS; SEE SHEET V.2.
- Ⓒ WEST BERM LINING POINT LOCATIONS; SEE SHEET V.2.

**TYPICAL SECTION E-E**  
 STA. 499+44.17, 24.2' RT TO STA. 499+34.25, 28.8' LT  
 NOT TO SCALE



- Ⓐ STREAMBED SCOUR COUNTERMEASURE POINT LOCATIONS; SEE SHEET V.3.
- Ⓑ REVETMENT WEDGE BASE POINT LOCATIONS; SEE SHEET V.2.

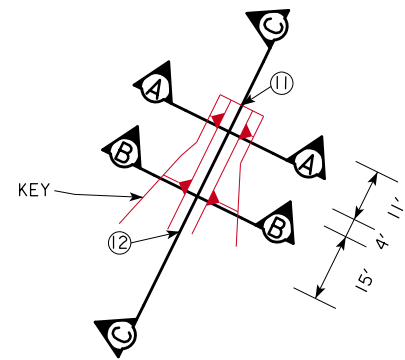
**TYPICAL SECTION F-F**  
 STA. 499+35.48, 75.3' RT TO STA. 499+44.17, 24.2' LT  
 NOT TO SCALE



- Ⓐ REVETMENT WEDGE BASE POINT LOCATIONS; SEE SHEET V.2.

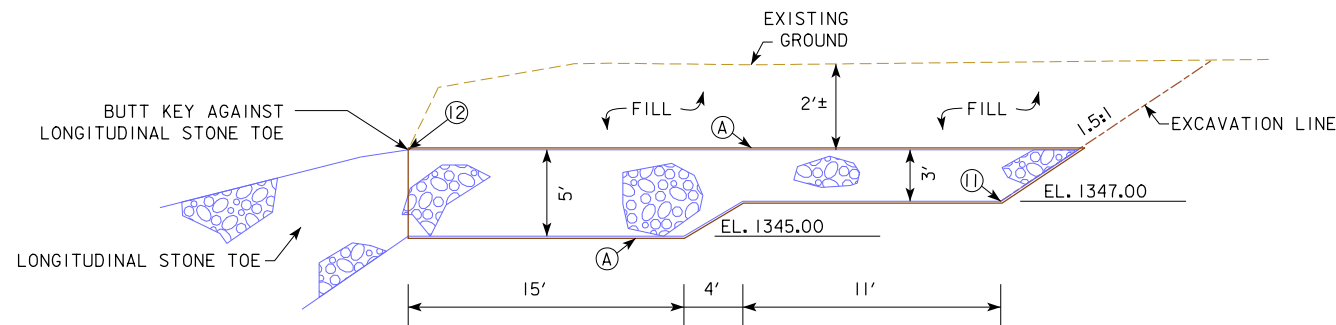
**TYPICAL SECTION G-G**  
 STA. 499+04.59, 93.4' RT TO STA. 499+68.18, 122.5' RT  
 NOT TO SCALE

PRELIMINARY  
 DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
 PRESTRESSED CONC. BEAM BRG.  
 SCOUR COUNTERMEASURE  
 TYPICAL SECTIONS**  
 STATION 499+67.05      FEBRUARY 2019  
**O'BRIEN COUNTY**  
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
 DESIGN SHEET NO. 7 OF 8    FILE NO. 31683    DESIGN NO. 219

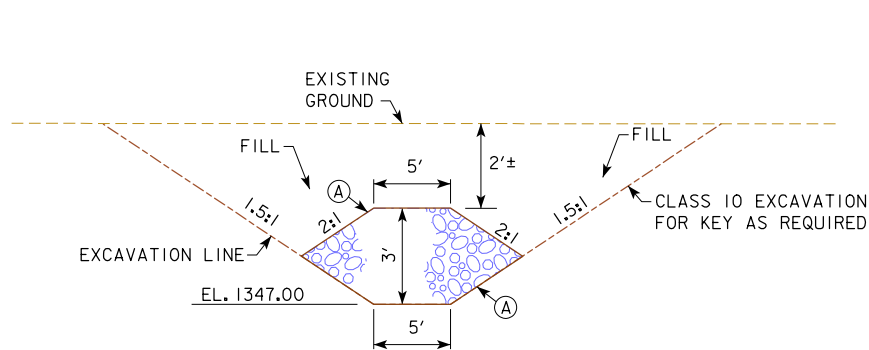


PLAN KEY

NOTE: SEE KEY LOCATION TABLE ON SHEET V.2 FOR POINTS 11 AND 12 STATIONS AND OFFSETS



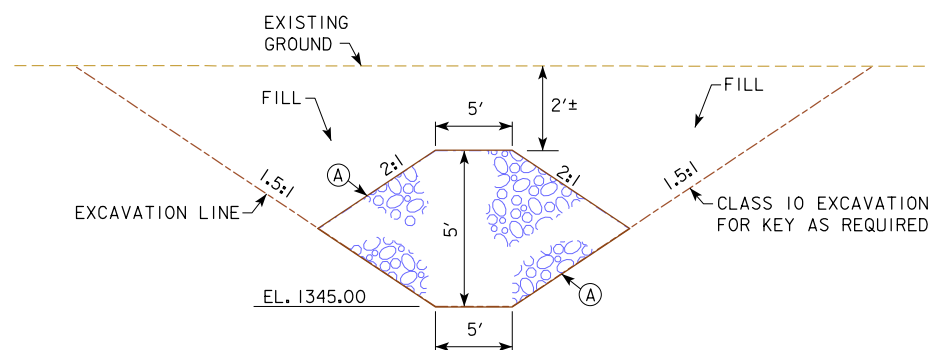
SECTION C - C KEY



SECTION A - A KEY

NOTE: INSTALL SOD AT TOP OF FILL

(A) CLASS E REVET. OVERLAIN AND UNDERLAIN W/ ENGR. FABRIC



SECTION B - B KEY

REVETMENT\GRADING\SURFACE RESTORATION QUANTITIES							
ELEMENT	EMBANKMENT (FILL) (CY)	CL. 10 CHANNEL EXCAVATION (CY)	REVETMENT CL. E (TON)	ENGR. FABRIC (SY)	TOP SOIL (CY)	GRANULAR BACKFILL (TON)	SOD (SQ.)
EARTH FILL AT TRAIL	951	-	-	114	81	-	35
STREAMBED SCOUR COUNTERMEASURE	-	-	1,530	1,609	-	2,060	-
LONGITUDINAL STONE TOE	-	-	770	157	-	-	-
KEY	-	96	63	90	29	-	12
WEST BERM REVETMENT LINING	-	64	104	95	-	-	-
EAST BERM REVETMENT REPAIR	-	-	33	53	-	-	-
REVETMENT WEDGES	-	43	540	286	-	-	-
TOTALS	951	203	3,040	2,404	110	2,060	47

NOTE: CLASS 10 CHANNEL EXCAVATION MATERIAL MAY BE USED FOR EMBANKMENT (FILL) MATERIAL. REMAINDER OF MATERIAL NOT USED FOR EMBANKMENT (FILL) SHALL BECOME THE PROPERTY OF THE CONTRACTOR. ALL EMBANKMENT (FILL) AND TOP SOIL QUANTITIES INCLUDE A 25% SHRINKAGE FACTOR.

PRELIMINARY  
DESIGN FOR  
**143'-0 X 44'-0 PRETENSIONED  
PRESTRESSED CONC. BEAM BRG.  
SCOUR COUNTERMEASURE  
KEY DETAILS AND QUANTITIES**  
STATION 499+67.05      FEBRUARY 2019  
**O'BRIEN COUNTY**  
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
DESIGN SHEET NO. 8 OF 8    FILE NO. 31683    DESIGN NO. 219