

Standard Road Plans

Standard Road Plans are listed on tied road plans, Project No. STP-006-7(098)--2C-52.

Design Data Urban

2025 AADT	11,600	V.P.D.
2045 AADT	16,800	V.P.D.
20 - DHV	—	V.P.H.
TRUCKS	7	%
Total Design ESALs	—	

Index of Seals

Sheet No.	Name	Type
A.1	Julia Zehner*	Structural Design
V.3	Marie Amundson*	Hydraulic Design
SPS.1	Mark Dell**	Geotechnical Design

* Provided by MSA Professional Services, Inc.
** Provided by Iowa DOT

Structural 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.

Signature Julia Zehner Date May 28, 2026

Printed or Typed Name

My license renewal date is December 31, 2027

Pages or sheets covered by this seal: A.1, A.2, V.1-V.6

Index of Sheets	
No.	Description
Sheets	Culvert Plan
A.1	Title Sheet
A.2	Location Map Sheet
V.1	Estimated Quantities - Design No. 0527
V.2 - V.6	Design No. 0527
SPS Sheets	Culvert Plan Soils Sheet
SPS.1	Culvert Plan Soils Sheet



PLANS OF PROPOSED IMPROVEMENT ON THE
PRIMARY ROAD SYSTEM
JOHNSON COUNTY
RCB Culvert Replacement - Twin Box
US 6 over Drainage
0.2 mi E of Kimberlite St in Tiffin

Refer to the Plan Sheets for list of applicable specifications.

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



Revisions to this Design Plan and/or Project Specifications should be submitted by _____

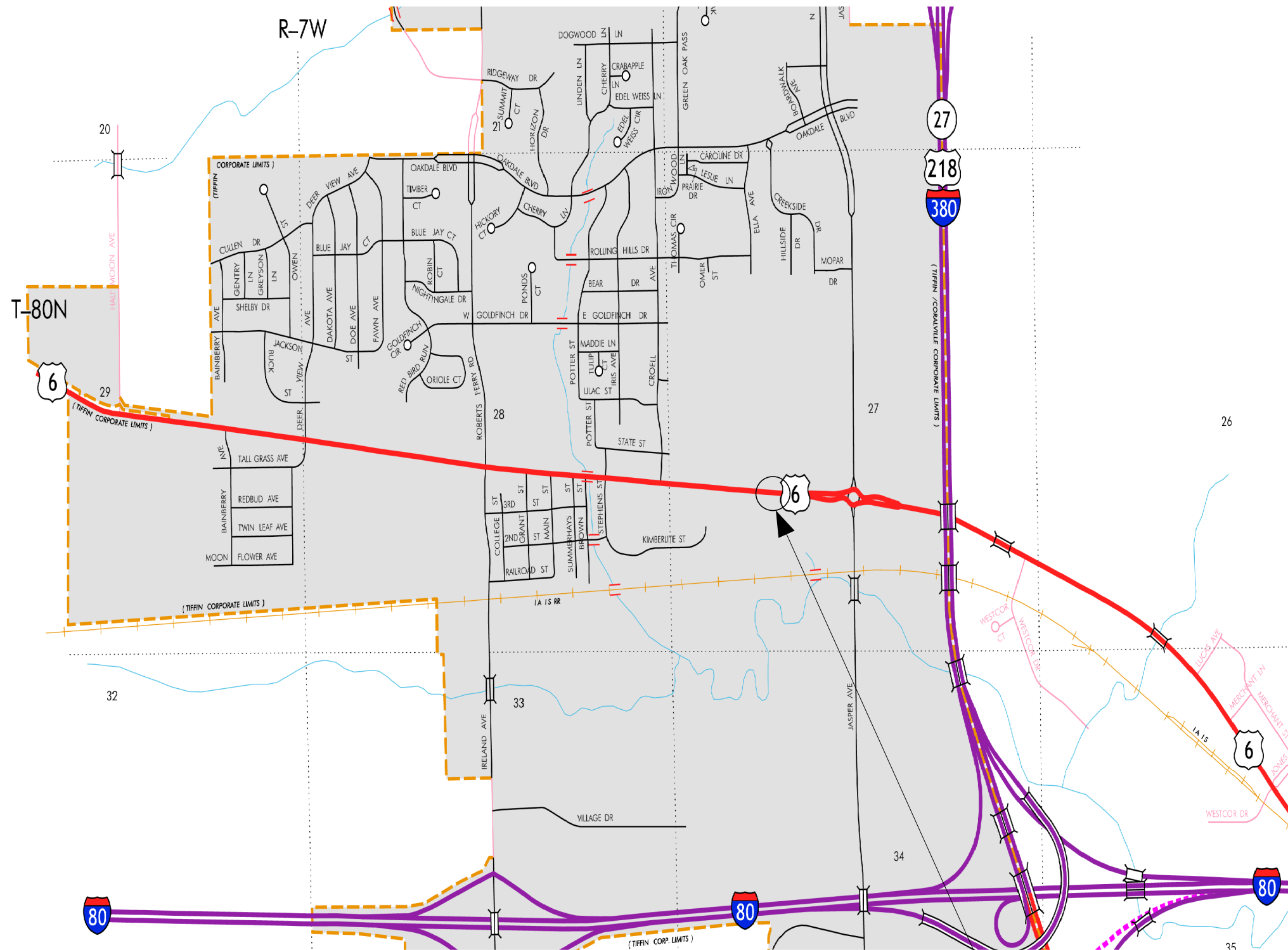
Structural Design
Consultant Coordinator
Michael Nop

Revisions

TOTAL
9
PROJECT IDENTIFICATION NUMBER
24-52-006-040
PROJECT NUMBER
BRF-006-7(102)--38-52
R.O.W. PROJECT NUMBER
PROJECT DIRECTORY NUMBER
5200604024

English Culvert Standards

Standard	Issued	Revised
TWRCB G1-20	07-2020	--
TWRCB G2-20	07-2020	--
TWRCB G3-20	07-2020	--
TWRCB 10-6-20	07-2020	--
TWPWH 0-1-20	07-2020	--
TWPWH 0-2-20	07-2020	08-2022
TWPWH 0-3-20	07-2020	--
TWPWH 0-4-20	07-2020	--
TWPWH 0-5-20	07-2020	--
TWPWH 0-7-20	07-2020	--



LEGEND

INTERSTATE ROUTE

FREEWAY OR EXPRESSWAY ROUTE

U.S. NUMBERED ROUTE

BUSINESS ROUTE

STATE NUMBERED ROUTE

UNSIGNED ROUTE

COUNTY NUMBERED ROUTE

SECONDARY ROAD OR ADJOINING CITY STREET

CITY STREET

PARK, INSTITUTION, OR FEDERAL ROAD

RAILROAD

CORPORATION LINE

SECTION LINE

CUL-DE-SAC

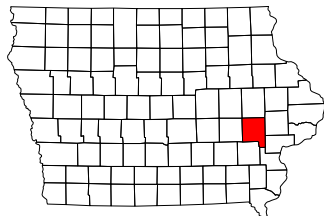
SECTION, TOWNSHIP & RANGE NUMBERS

9, T-81N, R-30W

Part City of Tiffin Location Map

Not To Scale

Design No. 0527
FHWA No. 701286



ESTIMATED CAST IN PLACE CULVERT QUANTITIES - DESIGN 0527				
ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL
1	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	CY	191
2	2401-6745650	REMOVAL OF EXISTING STRUCTURES	LS	1
3	2402-2720000	EXCAVATION, CLASS 20	CY	878
4	2402-3825025	GRANULAR MATERIAL FOR BLANKET	CY	123
5	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT)	CY	244.1
6	2404-7775000	REINFORCING STEEL	LB	36,100
7	2414-6444100	STEEL PIPE PEDESTRIAN HAND RAILING	LF	119
8	2507-3250005	ENGINEERING FABRIC	SY	288
9	2507-6800061	REVETMENT, CLASS E	TON	286
10	2526-8285040	CONSTRUCTION SURVEY, LOCATION SURVEY	LS	1
11	2533-4980005	MOBILIZATION	LS	1

ESTIMATE REFERENCE INFORMATION - DEISGN 0527		
ITEM NO.	ITEM CODE	ITEM DESCRIPTION
1	2104-2710020	EXCAVATION, CLASS 10, CHANNEL Includes excavation involved in channel to shape berms and placement of revetment from proposed grading surface to bottom of revetment. All waste must be removed from the project site.
2	2401-6745650	REMOVAL OF EXISTING STRUCTURES Includes all work for removal and off-site disposal of the existing culvert. Removal of scheduled items shall be in accordance with Section 2401, of the Standard Specifications. Any damage to material not to be removed shall be the responsibility of the Contractor and repaired at no extra cost to the state.
3	2402-2720000	EXCAVATION, CLASS 20 Includes filling and compacting low areas around proposed culvert. Includes 123 CY of excavation to place 1'-0" Granular Material for Blanket.
4	2402-3825025	GRANULAR MATERIAL FOR BLANKET 1'-0" granular material shall be in accordance with Section 4118 of the Standard Specifications. Includes 123 CY for a working blanket. The working blanket may be deleted if determined to be unnecessary at the time of construction.
5	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT) Includes all resilient joint filler required. The contractor is responsible for certified plant inspection.
6	2404-7775000	REINFORCING STEEL - -
7	2414-6444100	STEEL PIPE PEDESTRIAN HAND RAILING Includes furnishing all material, including anchor bolts and shims, and all of the equipment and labor required to erect the rail. Measurement is in linear feet from end to end of the railing measured along the top of the rail, including slopes.
8	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.
9	2507-6800061	REVETMENT, CLASS E Estimated at 1.49 ton/cu yd. Class E revetment shall meet requirements of Article 4130. Broken concrete and granite is not allowed. Revetment is to be placed at a minimum thickness of 2'-0".
10	2526-8285040	CONSTRUCTION SURVEY, LOCATION SURVEY - -
11	2533-4980005	MOBILIZATION - -

Roadway quantities are included in the tied road plans, Project No. STP-006-7(098)--2C-52.

Design For 0° Skew

Twin 10'-0" X 6'-0" X 95'-0"

Cast-In-Place RCB Culvert

Estimated Quantities

STA. 204+92.77 (US 6)

Turn-In Date: August 2026

Johnson County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 0527

Design Sheet No. 1 of 6

FHWA No. 701286

General Notes

It is the intent of this design to construct a twin 10'-0" x 6'-0" x 95'-0" (FHWA No. 701286 Maintenance No. 5244.3S006) cast-in-place reinforced concrete box culvert skewed 0° at Station 204+92.77. This design is for the replacement of the existing 8'-0" x 5'-0" reinforced concrete box culvert flanked by two 60" diameter concrete barrels with a 24'-0" x 5'-0" concrete headwall skewed at 0° originally constructed in 1948 and extended in 1960 (Design No. 2760, FHWA No. 701285). Electronic plans of the existing structure are available to the Contractor as part of the E-Files supplied with the contract documents.

The RCB culvert sections are designed for HL-93 live load and earth fills of 6 feet.

The lump sum bid for “Removal of Existing Structures” shall include all costs associated with removing the existing multi-cell concrete culvert. Removal of scheduled items shall be in accordance with Section 2401 of the specifications. Any damage to material not to be removed shall be the responsibility of the contractor and repaired at no extra cost to the state.

Faint lines on plans indicate existing structure.

Utility companies and municipalities whose facilities are shown on the plans or known to be within the construction limits shall be notified by the contractor of the construction starting date.

When de-watering presents a problem for placing the curtain walls as detailed, alternate methods such as steel sheet pile and precast concrete walls may be approved but at no additional cost. The culvert contractor is to submit complete drawings of the proposed curtain wall alternate to the engineer for approval before beginning construction.

The roadway will be closed to traffic during construction. The culvert will be constructed during stage 2A shown on the J sheets included in the tied road plans, Project No. STP-006-7(098)--2C-52. See traffic control plan note.

The Class 20 excavation quantity is based on the assumption that, at the start of culvert construction, the existing groundline shown on Design Sheet 3 for this design has remained undisturbed and no roadway fill has been placed.

Class 20 excavation material unsuitable for backfilling shall be disposed of in a manner that will leave the site in a neat condition.

It shall be the Culvert Contractor's responsibility to provide sites for excess excavated material. No payment for overhaul will be allowed for material hauled to these sites.

All dimensions and details shown on these plans pertinent to new construction shall be verified in the field by the contractor before starting construction.

All reinforcing bars and bars noted as dowels supplied for this structure shall be deformed reinforcement unless otherwise noted or shown.

See Twin Reinforced Concrete Box Culvert Standards Sheet G2-20 for additional notes not shown on this sheet.

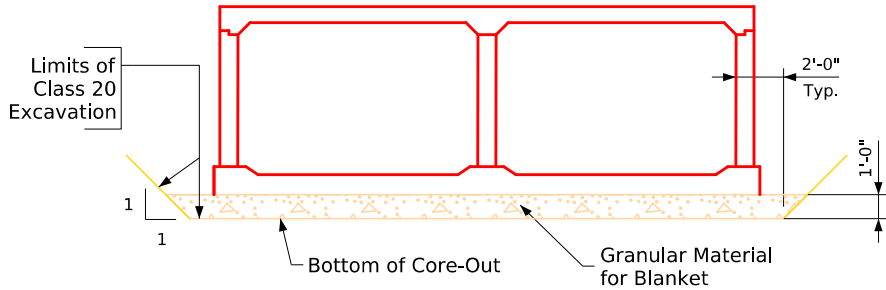
Specifications:

Design:
Refer to TWRCB G2-20.

Construction:
Refer to TWRCB G2-20.

Design Stresses:

Refer to TWRCB G2-20.



Class 20 Excavation

(Typical Section Normal to $\varnothing$ Culvert)

Granular material shall terminate 3'-0" short of the outside face of the curtain wall.
Note: Refer to Sheet SPS.1 for additional information about the working blanket.

Standards		
For details and notes not shown refer to the following Iowa D.O.T. Culvert Standards:		
Standard	Issued	Revised
TWRCB G1-20	07-2020	--
TWRCB G2-20	07-2020	--
TWRCB G3-20	07-2020	--
TWRCB 10-6-20	07-2020	--
TWPWH 0-1-20	07-2020	--
TWPWH 0-2-20	07-2020	08-2022
TWPWH 0-3-20	07-2020	--
TWPWH 0-4-20	07-2020	--
TWPWH 0-5-20	07-2020	--
TWPWH 0-7-20	07-2020	--

Concrete Placement Quantities

Location	Footing	Walls	Slab	Total
35'-0" Barrel Section (1 Req'd)	1 @ 26.7	1 @ 16.3	1 @ 21.2	64.2
26'-0" Barrel Section (1 Req'd)	1 @ 19.8	1 @ 12.1	1 @ 15.8	47.7
17'-0" Barrel End Section (2 Req'd)	2 @ 12.9	2 @ 7.9	2 @ 10.3	62.2
Standard Twin 0° Skew Parallel Wing Headwall (2 Req'd)	2 @ 26.3	2 @ 6.5	* 2 @ 2.2	70.0
Total (c.y.)				244.1

*Includes parapet and top of wingwall.

Summary of Reinforcing Steel

Location	Quantity	Total
35'-0" Barrel Section (1 Req'd)	1 @ 10,169	10,169
26'-0" Barrel Section (1 Req'd)	1 @ 7,555	7,555
17'-0" Barrel End Section (2 Req'd)	2 @ 4,939	9,878
Standard Twin 0° Skew Parallel Wing Headwall (2 Req'd)	2 @ 4,249	8,498
Total (lbs)		36,100

Design History at this Site

(Includes This Design)

Des. No.	Type of Work
Unknown	Original Design
2760	Extension
0527	RCB Culvert Replacement - Twin Box

Traffic Control Plan

The roadway will be closed to thru traffic. Refer to the traffic control plan included in the tied road plans, Project No. STP-006-7(098)--2C-52.

404 permit information and the Pollution Prevention Plan are included in the tied road plans, Project No. STP-006-7(098)--2C-52

Design For 0° Skew
Twin 10'-0" X 6'-0" X 95'-0"
Cast-In-Place RCB Culvert

General Notes

STA. 204+92.77 (US 6)

Turn-in Date: August 2026

Johnson County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 0527

Design Sheet No. 2 of 6

FHWA No. 701286

FILE NO. 32668

ENGLISH

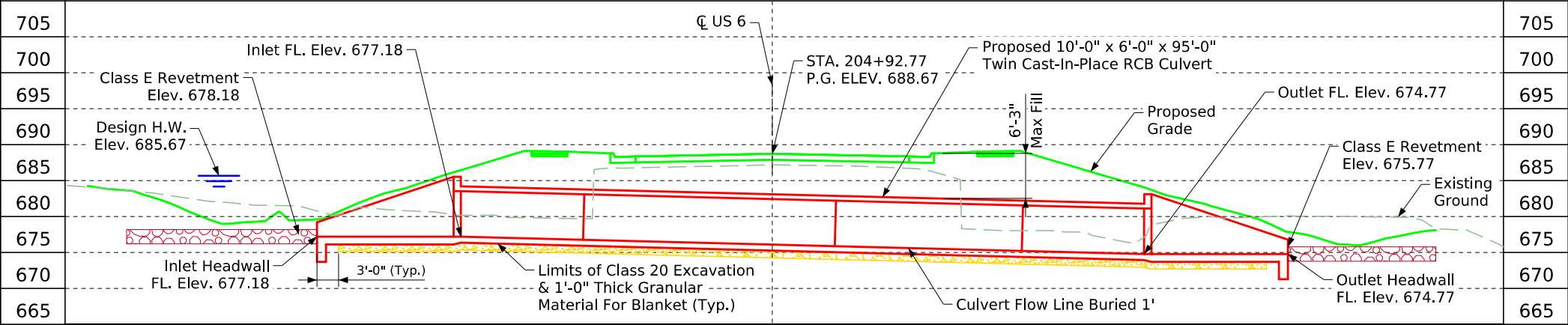
DESIGN TEAM MSA Professional Services, Inc.

Johnson COUNTY

PROJECT NUMBER BRF-006-7(102)--38-52

SHEET NUMBER V.2

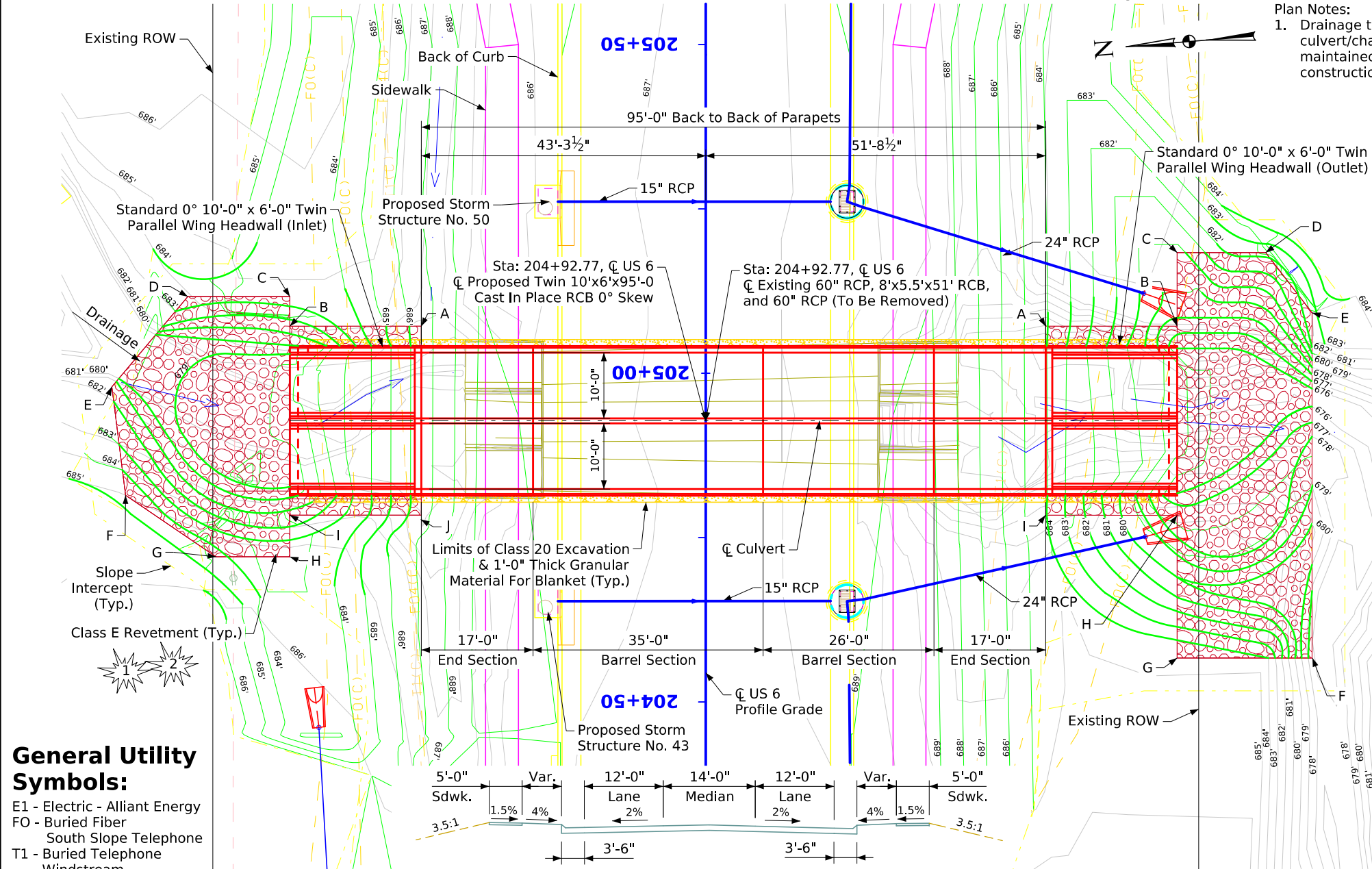
Benchmark No. 104, N: 7953741.4520, E: 20505278.9200, Bonnet Bolt on Hyd. Arrow Points to NW Corner HWY 6/Park Road, Elev. 686.454
Benchmark No. 105, N: 7953760.8000, E: 20504174.2500, RR Spike in PP Just E. of Drive at House #2852 N. Side US 6, Elev. 686.912
Control Point No. 15, N: E: CP 3/4" Rebar MSA Cap, Elev. 685.37
Control Point No. 16, N: CP 3/4" Rebar MSA Cap, Elev. 687.14



Longitudinal Section Along Centerline of Culvert

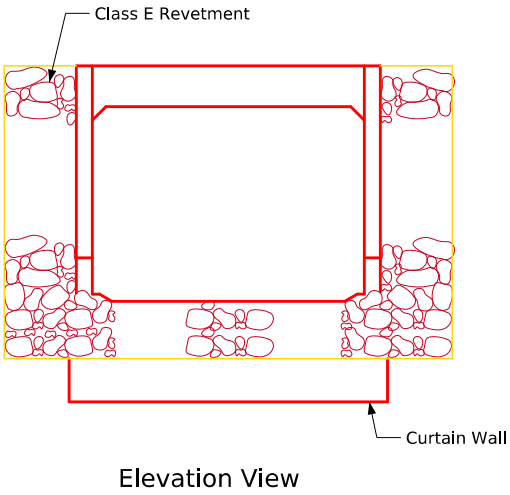
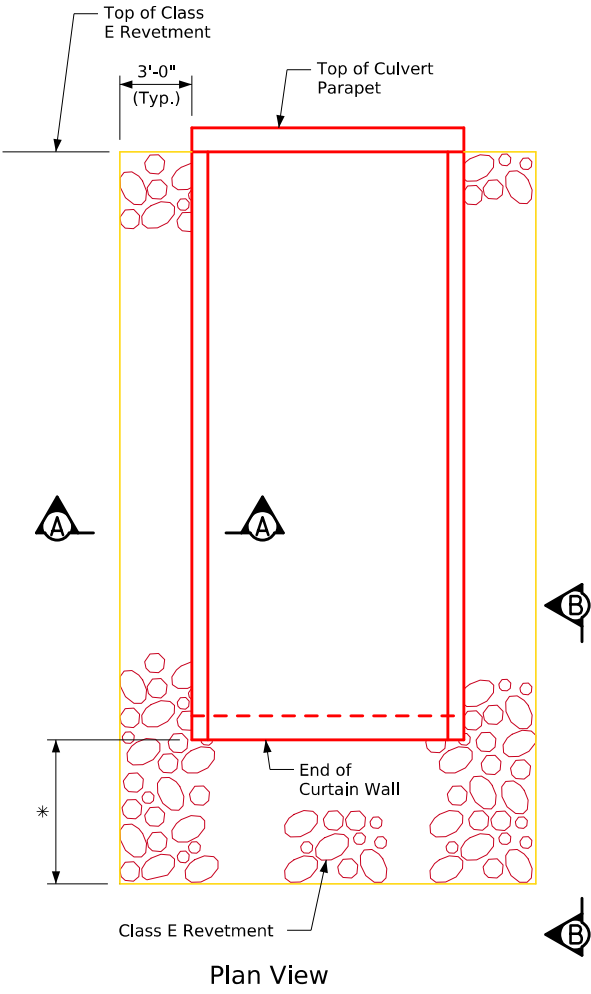
Design Fill Height = 6'-0"
Anticipated Settlement = 0.09'
NBI Structure Length = 20.8'

Plan Notes:
1. Drainage through the culvert/channel must be maintained throughout construction.



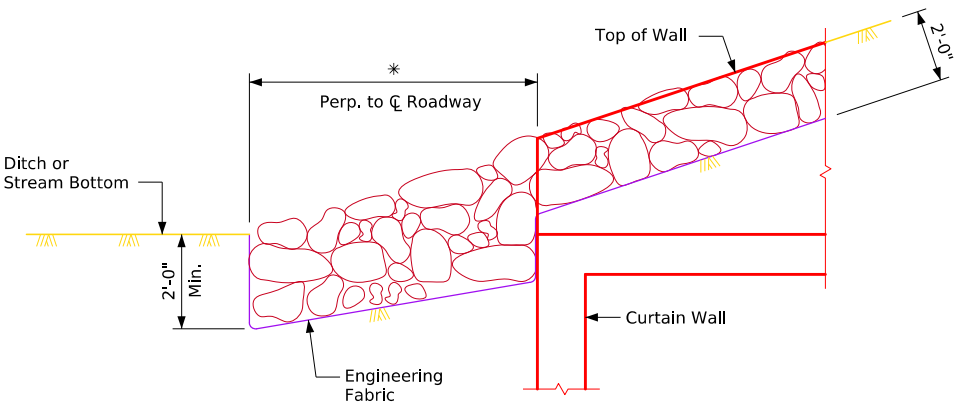
REVISED 1-2016 - ADDED NOTE "SEE CULVERT PLANS FOR LIMITS OF REVETMENT AND ENGINEERING FABRIC."
REVISED 02-2017 - ADDED SECTION DIRECTORS "A-A" TO ZERO SKEW PLAN VIEW DETAIL.
REVISION 01-2021 - CHANGED DESIGN SPECIFICATIONS TO AASHTO LRFD 8TH ED.
ENGLISH SINGLE CULVERTS.DGN - 1092 - THIS SHEET ISSUED 04-12.

* = See Design Sheet 3 for limits of
revetment and engineering fabric.

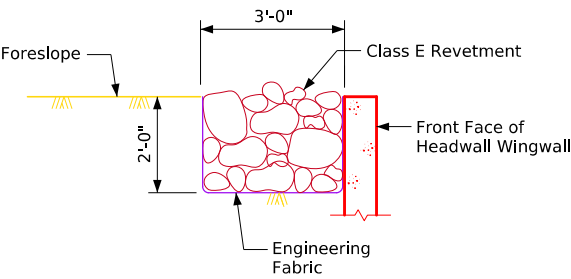


0° Skew Headwalls

* = See Design Sheet 3 for limits of
revetment and engineering fabric.



View B-B



Section A-A

Typical Details

Construction Notes:

Class E Revetment shall be used and placed according to Article 2507.03, of the Standard Specifications. The engineering fabric shall meet the material requirements in accordance with Article 4196.01,B,3, of the Standard Specifications.

Design For 0° Skew

Twin 10'-0" X 6'-0" X 95'-0"

Cast-In-Place RCB Culvert

Revetment Protection Details

STA. 204+92.77 (US 6)

Turn-In Date: August 2026

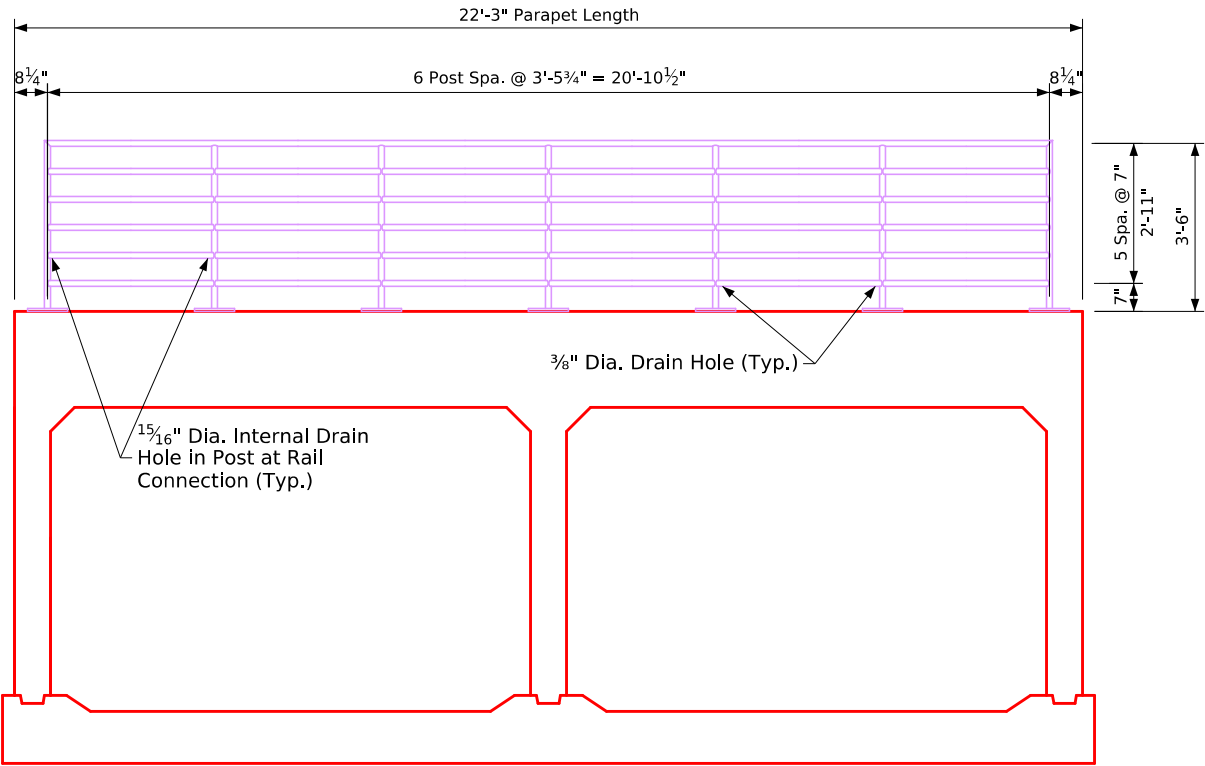
Johnson County

IOWA DEPARTMENT OF TRANSPORTATION

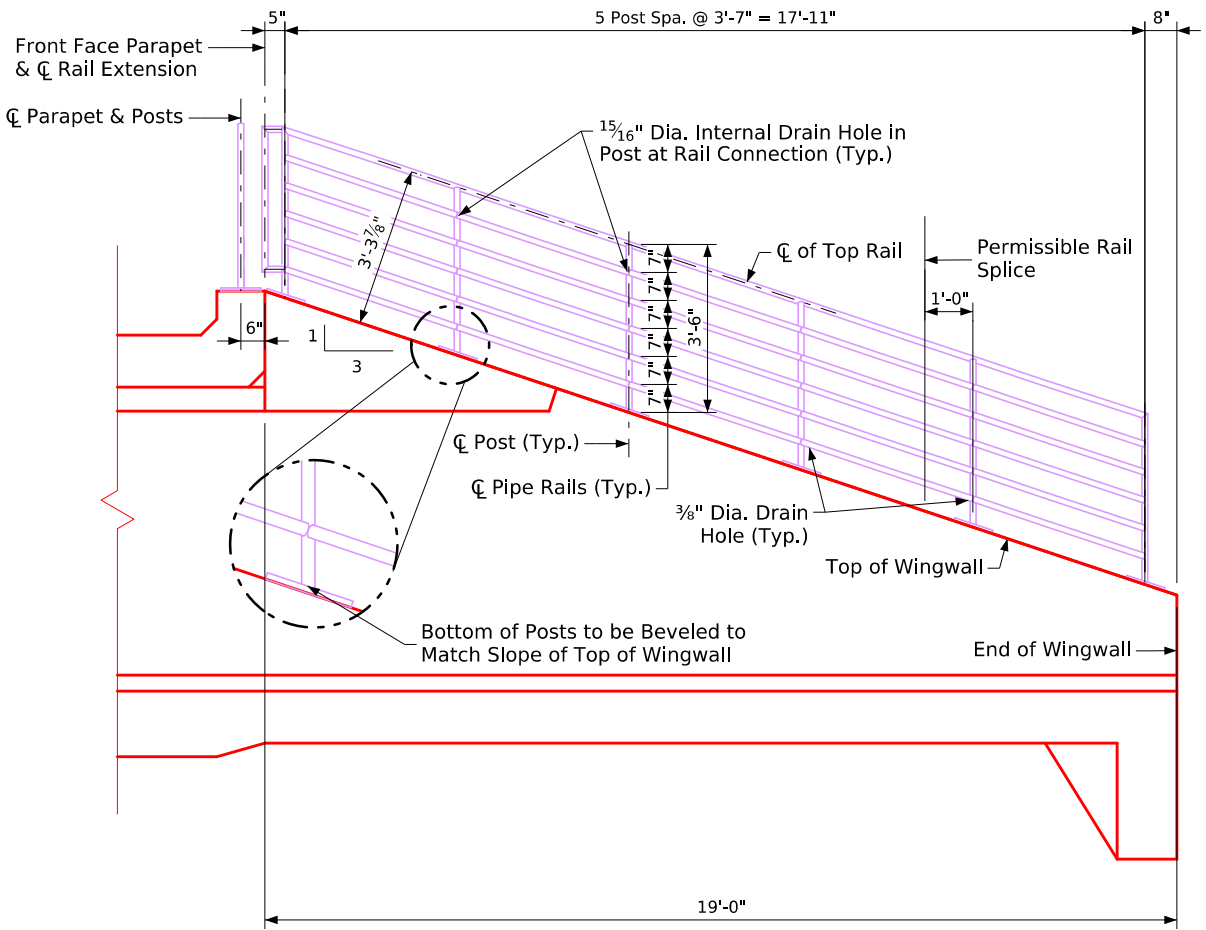
Design No. 0527

Design Sheet No. 5 of 7

FHWA No. 701286



Partial End View of Parapet and Headwall



Elevation View of Wingwall

Steel Pipe Pedestrian Hand Railing Quantities		
Location	Unit	Quantity
North Extension	LF	59.5
South Extension	LF	59.5
Total (LF)		119.0

Notes:

1. Post bases to be installed, centered on top of wingwalls and parapet and spaced as shown.
2. Safety rail to be provided on both north and south outlet headwall and wingwalls.

Design For 0° Skew

Twin 10'-0" X 6'-0" X 95'-0"

Cast-In-Place RCB Culvert

Safety Rail

STA. 204+92.77 (US 6)

Turn-in Date: August 2026

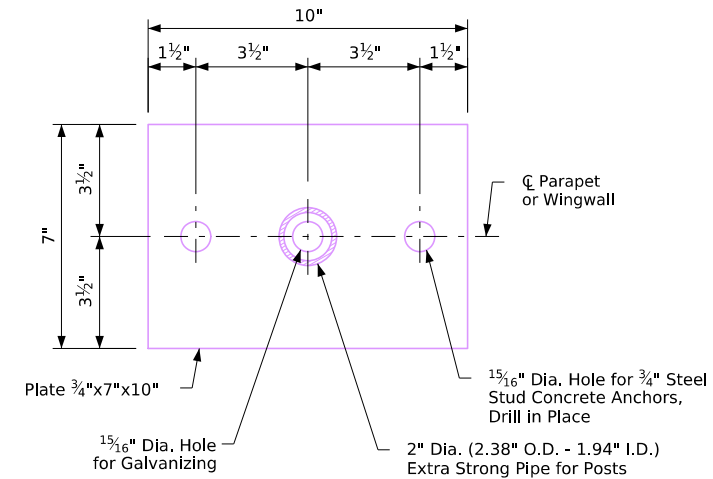
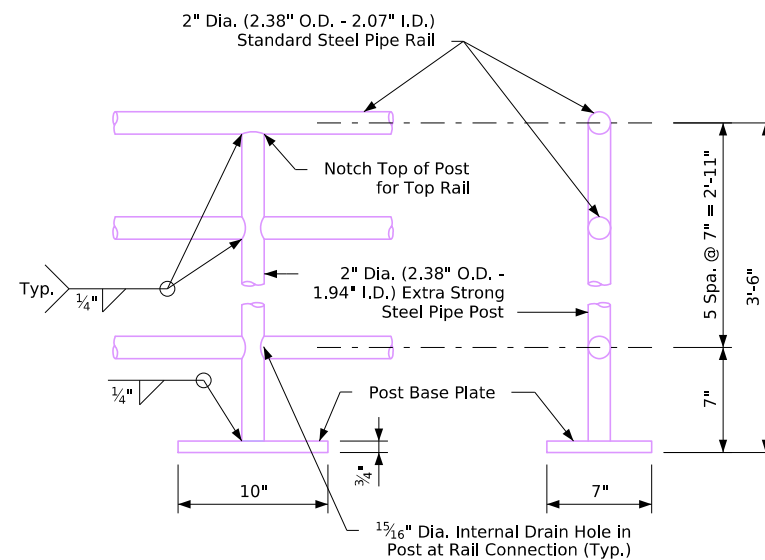
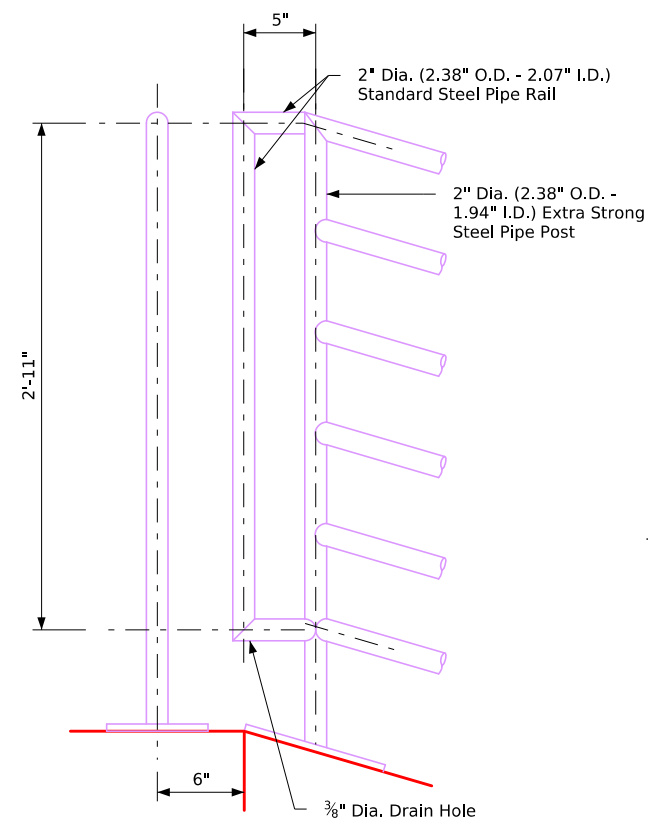
Johnson County

IOWA DEPARTMENT OF TRANSPORTATION

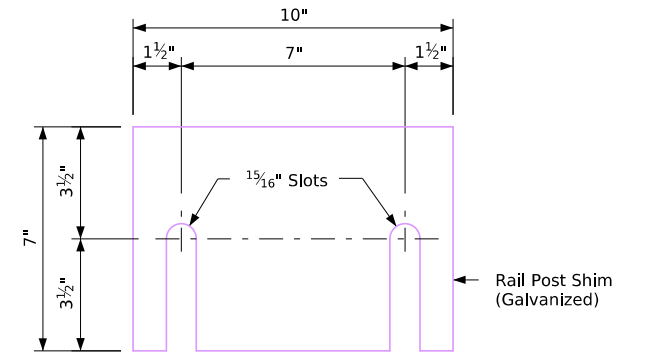
Design No. 0527

Design Sheet No. 5 of 6

FHWA No. 701286

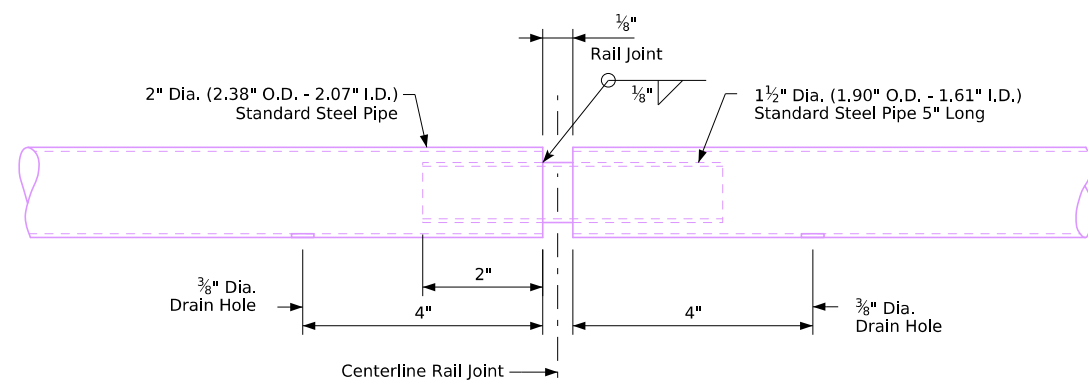


Note:
Provide $\frac{1}{16}$ " galvanized steel
shim at each rail post. Use
as required.



Pedestrian Hand Rail Notes

1. The steel pipe pedestrian hand rail is to be bid on a linear foot basis measured end to end of rail. The price bid for "Steel Pipe Pedestrian Handrail" shall be full compensation for furnishing all material, including anchor bolts and shims, and all of the equipment and labor required to erect the rail in accordance with these Plans and Specifications.
2. The material for tube rails, posts and splice tubes shall be standard and extra strong steel pipe meeting the requirements of ASTM A53, Type E or S, Grade B. Base plates and shims shall meet the requirements of ASTM A36. Panels and end sections shall be galvanized, after fabrication, in accordance with the requirements of ASTM A123.
3. Ends of rail sections are to be sawed or milled. All cut ends are to be true, smooth, and free of burrs or ragged edges.
4. No painting will be required.
5. The stud concrete anchors shall be galvanized and have a minimum pull out strength of 8000 pounds based on 4000 PSI concrete.
6. Rail is to be centered along the $\mathcal{C}$ of wingwalls and parapets.
7. Posts shall be set plumb.



Rail Joint Details

Design For 0° Skew
Twin 10'-0" X 6'-0" X 95'-0"
Cast-In-Place RCB Culvert

Safety Rail Details

STA. 204+92.77 (US 6)

Turn-in Date: August 2026

Johnson County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 0527

Design Sheet No. 6 of 6

FHWA No. 701286

FILE NO. 32668

ENGLISH

DESIGN TEAM **MSA Professional Services, Inc.**

Johnson COUNTY

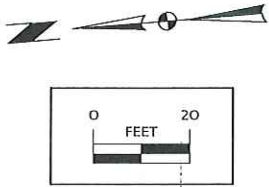
PROJECT NUMBER **BRF-006-7(102)--38-52**

SHEET NUMBER

THIS SHEET IS INCLUDED TO SHOW SOIL INFORMATION. DETAILS AND NOTES SHOWN ELSEWHERE IN THESE PLANS SHALL BE USED FOR STRUCTURE CONSTRUCTION.

Location

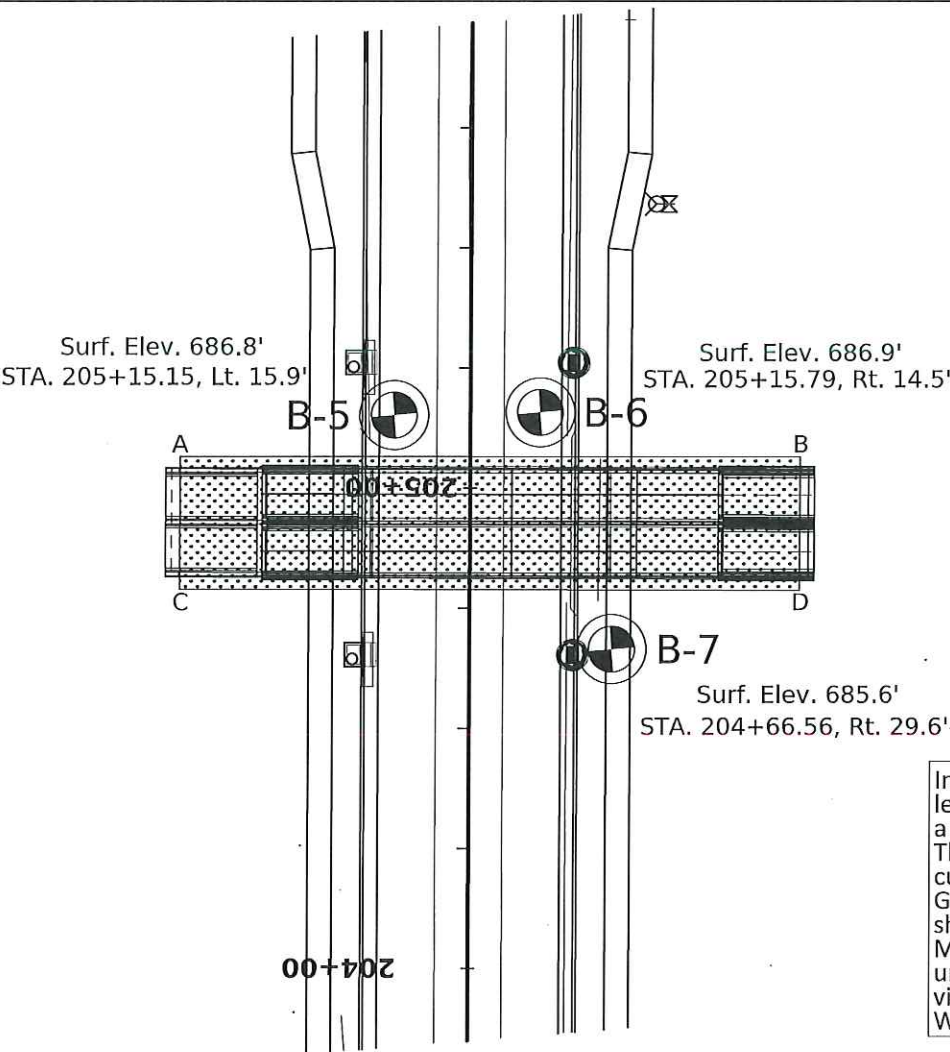
US 6 Over Drainage
In City of Tiffin
T-80N R-7W
Section 27
Johnson County
FHWA No. 701285
Bridge Maint. No. 5244.3S006
Latitude 41.706241°
Longitude -91.651313°



Water Level Observations (Ft.)				
Boring No.	Date Drilled	While Drilling	Immediately after Drilling	After Drilling
B-5	4/30/2025	19.5	19.0	NA
B-6	4/30/2025	19.5	18.0	NA
B-7	4/29/2025	13.5	NA	12.0 on 4/30/2025

SHELBY TUBE CORE DATA

CORE NO.	B-5, B1	B-5, C1	B-6, B1	B-7, B1
DEPTH IN FEET	4.0-6.0	9.0-11.0	4.0-6.0	4.0-6.0
CLASSIFICATION (AASHTO)	---	A-6 (7)	---	A-6 (10)
COEFF. CONSOL. (SQ. FT / DAY)	---	0.206	---	0.521
TRIAxIAL COMPRESSION	---	---	---	---
COHESION - PSF	---	---	---	---
FRICTION COEFF.	---	---	---	---
MOISTURE CONTENT %	29.2	23.4	27.4	26.3
DRY DENSITY - PCF	92	99	96	93
CU-CONSOLIDATED UNDRAINED	---	---	---	---
UU-UNCONSOLIDATED UNDRAINED	---	---	---	---
UC-UNCONFINED COMPRESSION (c=1/2 Qu)	---	---	---	---



GEOTECHNICAL 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.

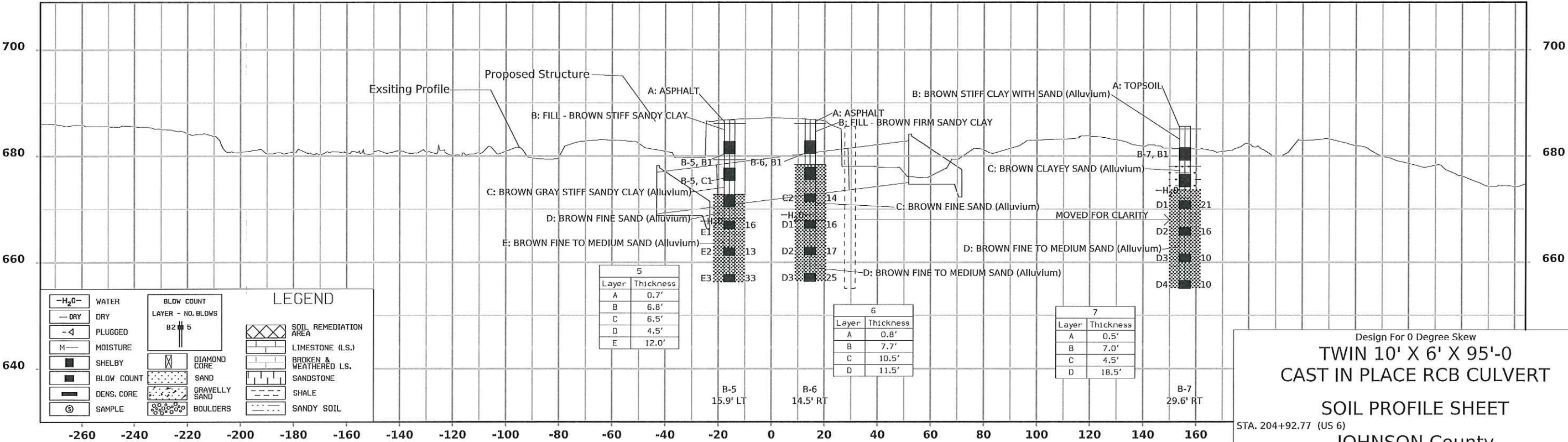
Signature: *Mark A. Dell* Date: *4/20/26*
Mark A. Dell
Printed or Typed Name
My license renewal date is December 31, 2027

Pages or sheets covered by this seal: SPS.1

Working Blanket Coordinate Table

Corner	Station	Offset (Ft.)
A	205+06.46	LT 60.29
B	205+06.70	RT 68.72
C	204+78.87	LT 60.29
D	204+78.85	RT 68.72

Install a 1-foot thick Working Blanket directly below the RCB culvert extending the entire length of the culvert barrel to within 3 feet of the outside face of each curtain wall and to a width of 2 feet beyond the sides of the proposed culvert, as measured from inside face. The Working Blanket shall consist of Granular Material for Blanket. With a precast culvert alternate, the 1-foot thick Working Blanket shall be placed directly below the Granular Leveling Material having the same plan limits stated above. Engineering Fabric shall be used as a separator between the Working Blanket and Granular Leveling Material. The Working Blanket may also be altered or deleted if determined to be unnecessary at the time of construction. The Working Blanket is not shown in profile view. Refer to the "Working Blanket Coordinate Table" for approximate plan limits of the Working Blanket.



Design For 0 Degree Skew
TWIN 10' X 6' X 95'-0
CAST IN PLACE RCB CULVERT
SOIL PROFILE SHEET
STA. 204+92.77 (US 6)
JOHNSON County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 0527 Design Sheet No. 1 of 1 FHWA/Asset 701285