FAYETTE COUNTY PROJECT NUMBER: HDP-CO33(166)--71-33

RCB CULVERT REPLACEMENT - TWIN BOX

Letting Date: 12/15/2026

| SECTION 404 PERMIT AND CONDITIONS |
|---|
| Construct this project according to the requirements of U.S. Army Corps of Engineers Nationwide Permit No. 14. A Copy of this permit is available from the Iowa DOT website at (http://envpermits.iowadot.gov/CMEPortalENV/Home.aspx). The U.S. Army Corps of Engineers reserves the right to visit the site without prior notice. |

| UTILITY CONTACTS |
|---|
| Alliant Energy<br>Attn: Alliant Energy Field Engineer<br>(800) 255-4268<br>locate_ipl@alliantenergy.com<br><br>Alpine Communications<br>Attn: Chad Ruegnitz<br>(563) 245-4471<br>cruegnitz@alpine-communications.com<br><br>Windstream Communications<br>Attn: Locate Desk<br>(800) 289-1901<br>locate.desk@windstream.com |

# IOWA
# DEPARTMENT OF TRANSPORTATION
## HIGHWAY DIVISION
## PLANS OF PROPOSED IMPROVEMENTS ON THE
# SECONDARY ROAD SYSTEM
# FAYETTE COUNTY
# RCB CULVERT REPLACEMENT - TWIN BOX

Refer to the Proposal Form for list of applicable Specifications.

See Sheet C.1 for applicable Standard Plans

Scales: As Noted

## HDP-CO33(166)--71-33

## Twin 12'-0 x 8'-0 x 35'-0
## Reinforced Concrete Box Culvert
## with Flared Wing Headwalls, 0° Skew

## On 147TH ST, Over UNAMED CR, S26 T93 R07

Project Number: HDP-CO33(166)--71-33

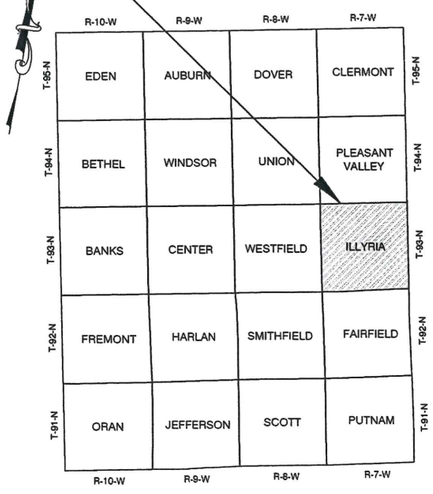
| INDEX OF SHEETS (9 Sheets) | |
|---|---|
| No. | Description |
| A.1 | Title Sheet, Location Map and Mileage Summary |
| C.1 | Estimated Project Quantities and Estimate Reference Notes |
| D.1 | Plan and Profile |
| U.1-U.5 | Flared Wing Headwall Details |
| V.1 | Bridge Plan and Hydraulic Data |
| | |
| | |

| MILEAGE SUMMARY | | | |
|---|---|---|---|
| Div. | Location | Lin. Feet | Miles |
| 1 | Station 17+50.00 to 22+50.00 | 500.00 | 0.095 |
| | TOTAL | 500.00 | 0.095 |

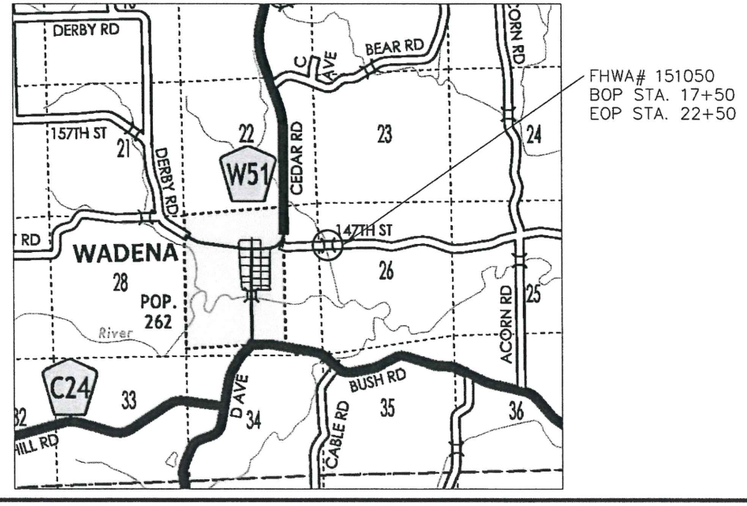
Approved by the Fayette County Board of Supervisors

Illyria Township

Fayette County, Iowa




LOCATION MAP
(Not to Scale)




FHWA# 151050
BOP STA. 17+50
EOP STA. 22+50

| | | 101-4 |
|---|---|---|
| DESIGN DATA RURAL | | |
| 2024 AADT | 15 | VPD |
| 2044 AADT | 16 | VPD |
| Trucks | | % |

DO NOT SCALE

LICENSED PROFESSIONAL ENGINEER
LUKE B. BOWDISH
24108
IOWA

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

LUKE B. BOWDISH Lic. No. 24108 Date 8/5/2026

My license renewal date is December 31, 2026

Pages or sheets covered by this seal:

ALL – SEE INDEX OF SHEETS

## ESTIMATED QUANTITIES
### Twin 12'x8'35' RCB

| Item No. | Item Code | Item | Unit | Total | As Built Qty |
|---|---|---|---|---|---|
| 0010 | 2401-6745625 | Removal of Existing Bridge | LS | 1 | |
| 0020 | 2402-2720000 | Excavation, Class 20 | CY | 670 | |
| 0030 | 2403-0100020 | Structural Concrete (RCB Culvert) | CY | 148.0 | |
| 0040 | 2404-7775005 | Reinforcing Steel, Epoxy Coated | LB | 24,685 | |
| 0050 | 2418-0000010 | Temporary Stream Diversion | EACH | 1 | |
| 0060 | 2528-2518000 | Safety Closures | EACH | 4 | |
| 0070 | 2528-8445110 | Traffic Control | LS | 1 | |
| 0080 | 2533-4980005 | Mobilization | LS | 1 | |

## ESTIMATED REFERENCE INFORMATION

| Item No. | Item Code | Description |
|---|---|---|
| 0010 | 2401-6745625 | Removal of Existing Bridge |
| | | Removal included in the contract consists of removing the existing 25' concrete arch culvert that has been extended on the North end with cmp multiplate with concrete headwall and reinforced concrete inlet weir. Contractor is responsible for disposal of demolition materials. There was no suspect asbestos or lead detected on this structure. |
| 0020 | 2402-2720000 | Excavation, Class 20 |
| | | Excess materials to be wasted on site. No payment for overhaul or fuel adjustments shall be made on this project. |
| 0030 | 2403-0100020 | Structural Concrete (RCB Culvert) |
| | | All concrete shall consist of a Class "C" mix. The Contractor shall provide certified plant inspection. |
| 0040 | 2404-7775005 | Reinforcing Steel, Epoxy Coated |
| | | Culvert barrel reinforcing quantities were estimated using the fill=2' formula. |
| 0050 | 2418-0000010 | Temporary Stream Diversion |
| 0060 | 2528-2518000 | Safety Closure |
| | | See Sheet C.1 for tabulation. |
| 0070 | 2528-8445110 | Traffic Control |
| | | All traffic control devices shall be in accordance with the current Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways as adopted by the Iowa Department of Transportation per 761 of the Iowa Administrative Code (IAC), Chapter 130. |
| 0080 | 2533-4980005 | Mobilization |

## IOWA DEPT. OF TRANSPORTATION BRIDGE STANDARDS
(May be obtained at the Iowa Department of Transportation Electronic Reference Library)

| Standard | Date Issued | Latest Revision | Standard | Date Issued | Latest Revision |
|---|---|---|---|---|---|
| TWRCB G1-20 | July 2020 | | | | |
| TWRCB G2-20 | July 2020 | | | | |
| TWRCB G3-20 | July 2020 | | | | |
| TWRCB 12-8-20 | July 2020 | | | | |
| TWFWH G1-21 | February 2021 | | | | |
| | | | | | |

## GENERAL NOTES

1. This culvert is designed for HL-93 live loading and shall be constructed in accordance with IDOT Culvert Standard Plans as listed on Sheet C.1.
2. It is the Contractor's responsibility to provide waste areas or disposal sites for material(s) which are not desirable for incorporation in the project. Contractor provided waste areas or disposal sites shall not impact wetlands or "Waters of the United States".
3. The Contractor shall use caution when working over and around tile lines. Breaks in a tile due to Contractor's carelessness will be replaced at the Contractor's expense. Any tile line disturbed or broken due to cuts will be replaced as directed by the Engineer and paid as extra work.
4. Contractor is to use due caution when working around ROW pins and survey control points which are marked with an oak hub and crossing lathe. Any pins disturbed by the Contractor will be replaced at the Contractor's expense.
5. Fayette County will perform all seeding and mulching, granular surfacing, erosion control, construction staking for use by Contractor, and all earthwork (except class 20).
6. The Contractor shall confine all work to within the ROW as shown on the project plans. If the Contractor obtains permission from property owners for storage of equipment and/or materials on private property, copies of written agreements with the property owners will be provided to the Engineer for approval.

## RCB Culvert Quantities

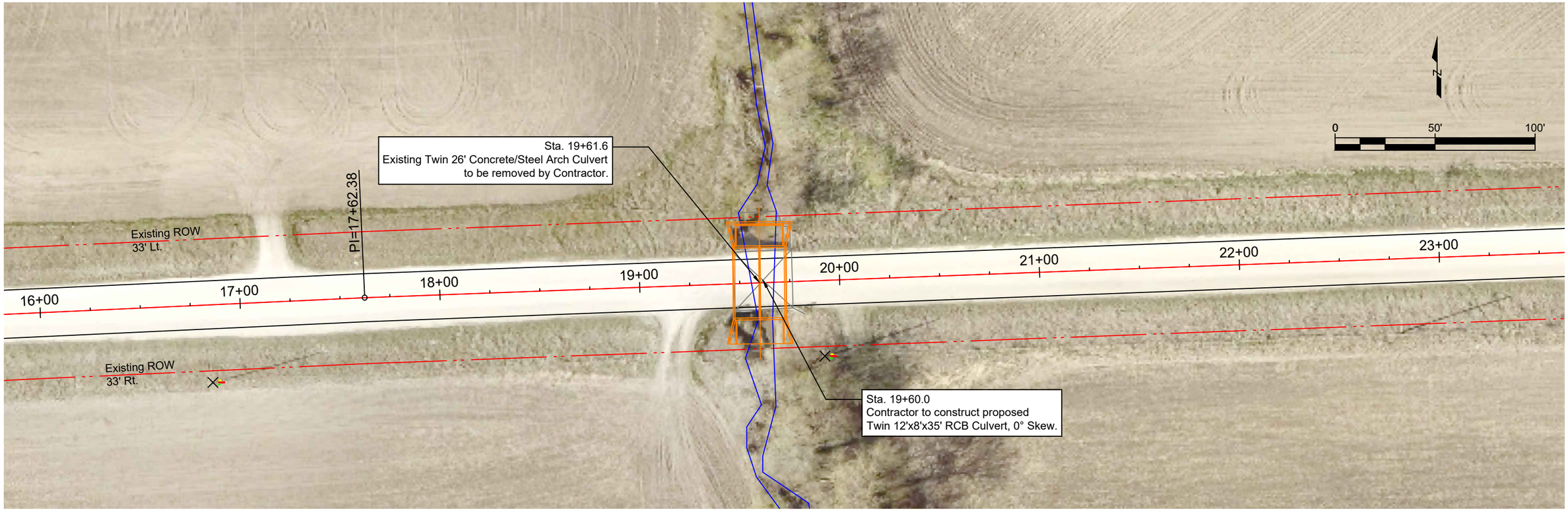
| Location | Concrete CY | | | | Rein. Steel |
|---|---|---|---|---|---|
| | Slab | Walls | Floor | Total | |
| Twin 12'x8' Inlet; 0° Skew ; With Weir | 2.0 | 8.0 | 23.1 | 33.1 | 4,804 |
| 35'-0 Barrel Section (Fill=2') | 30.3 | 22.1 | 32.4 | 84.8 | 15,689 |
| Twin 12'x8' Outlet; 0° Skew | 2.0 | 5.0 | 23.1 | 30.1 | 4,097 |
| 5r1 Constr. Joint Bars (1 Joints) | - | - | - | - | 95 |
| | | | Totals: | 148 | 24,685 |

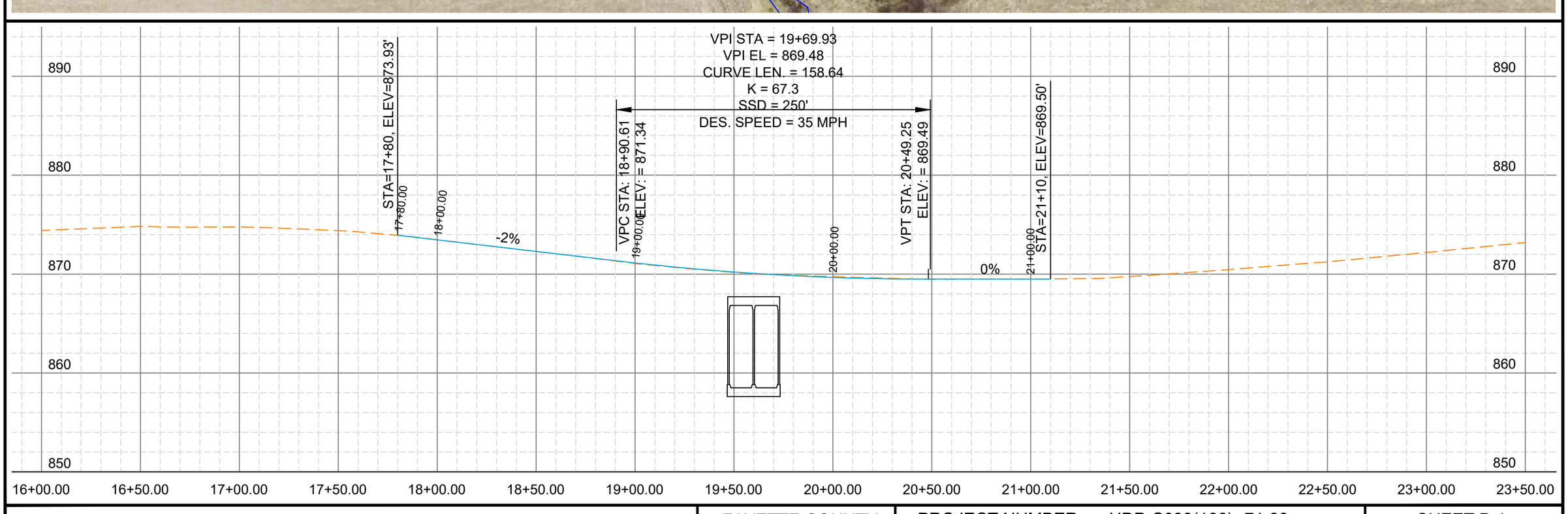
## STANDARD ROAD PLANS
The following Standard Road Plans apply to construction work on this project.

| Number | Date | Title |
|---|---|---|
| EW-402 | 4-18-17 | Temporary Stream Diversion |
| TC-252 | 10-20-26 | Routes Closed to Traffic |
| | | |

## SAFETY CLOSURES

| Station | Closure Type | | Remarks |
|---|---|---|---|
| | Road Qty. | Hazard Qty. | |
| 1+00 | 1 | | West End |
| 17+50 | | 1 | West End of Bridge |
| 22+50 | | 1 | East End of Bridge |
| 52+00 | 1 | | East End |
| TOTALS | 2 | 2 | Locations to be Field Verified |



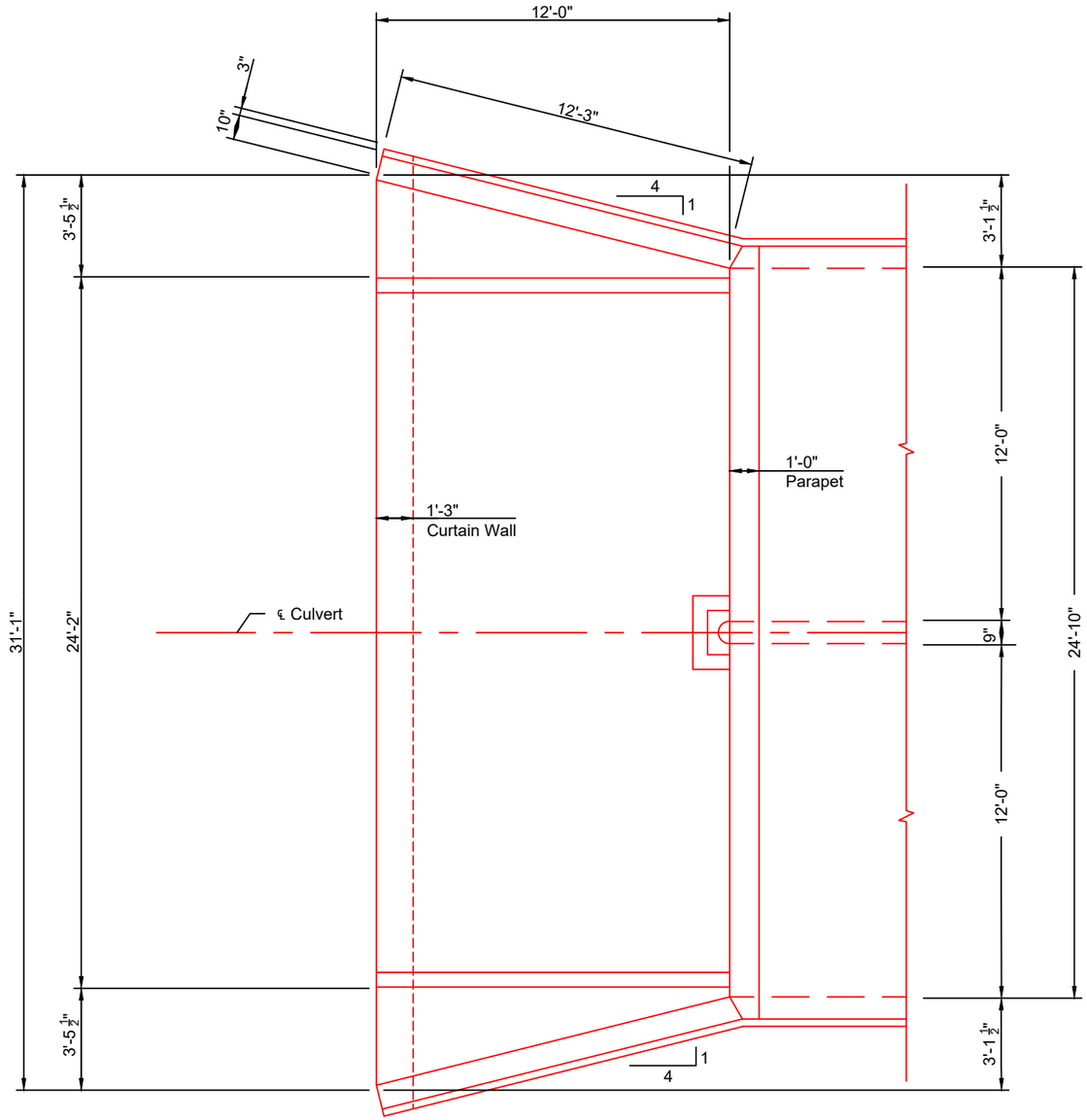




S:\ENGINEERING\PROJECTS\BRIDGES\2024 RAISE\(166) - 151050 - ILLYRIA 26 - 147TH ST\DESIGN\151050 DESIGN - TWIN 12X8 RCB.DWG, D1, 7/27/2026 2:18:45 PM

FAYETTE COUNTY

PROJECT NUMBER: HDP-C033(166)--71-33

SHEET D.1




Plan View

Notes:

1. See Sheet TWFWH G2-21 for General Notes, Specifications, and Design Stresses.

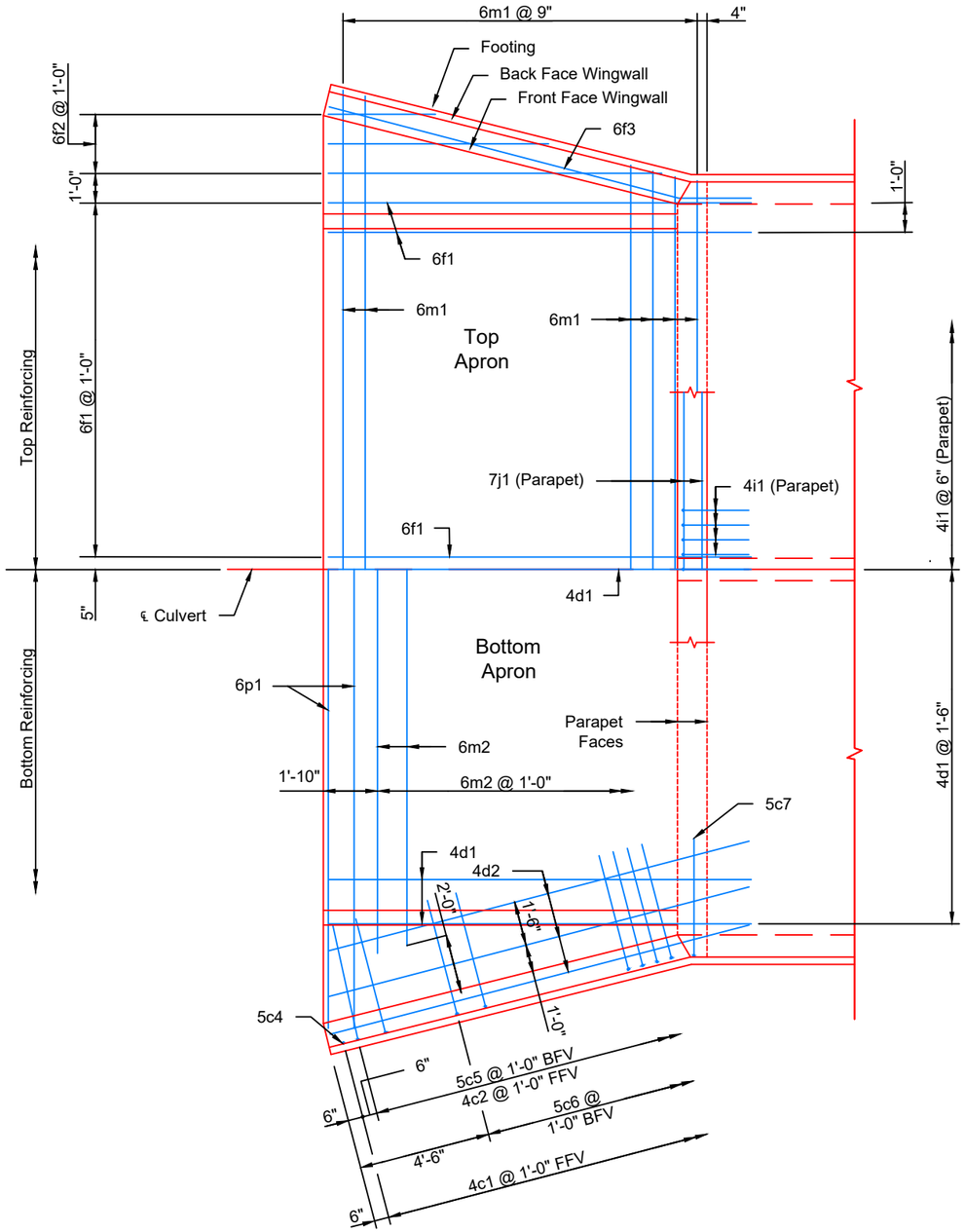
Modifications:
1. Length of apron shortened.
2. Wingwall slopes adjusted.

# Modified

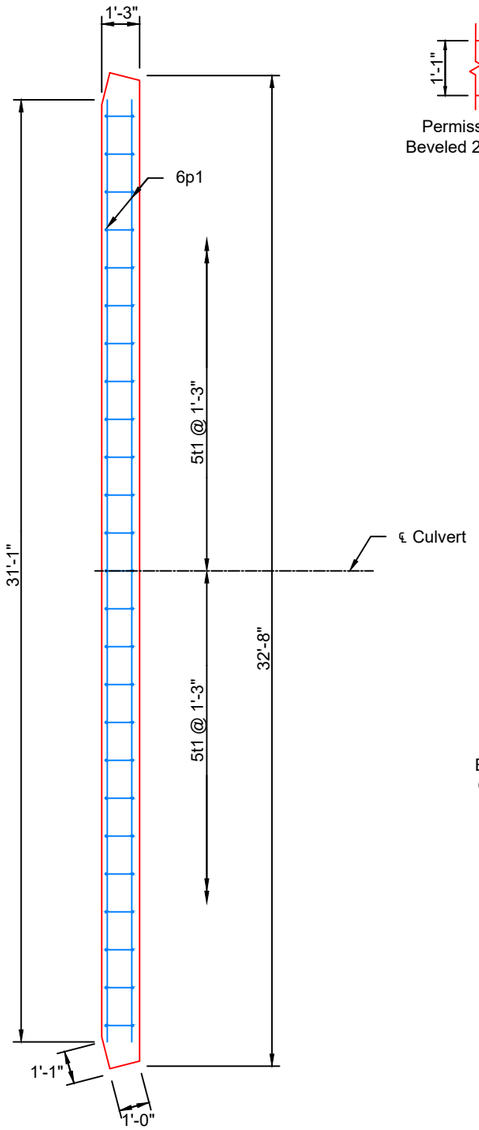
Standard Design - Single Reinforced Concrete Box Culverts

Flared Wing Headwalls

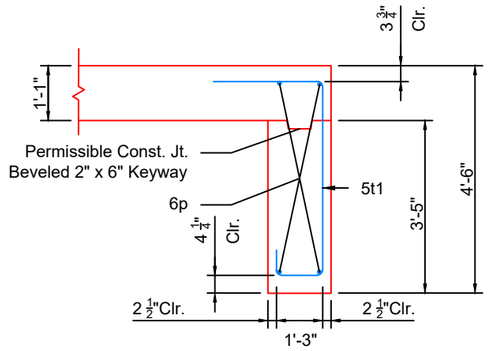
| Dimension Plan<br>0° Skew | TWFWH<br>0-1-21 |
|---|---|



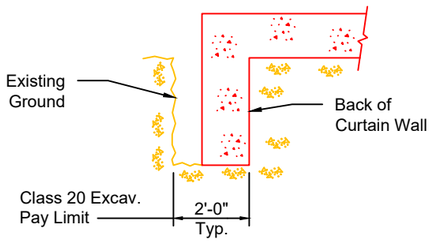

Plan View - Top & Bottom of Apron Reinforcing




Curtain Wall Plan




Curtain Wall Details




Curtain Wall
Class 20 Excavation

Notes:

1. See Sheet TWFWH G1-21 for General Notes, Specifications, and Design Stresses.
2. Wingwall bars consistently referenced from end of wing.

Modifications:
1. Length of apron shortened.
2. Wingwall slopes adjusted.
3. Interior wingwall removed from apron and rounded at parapet.

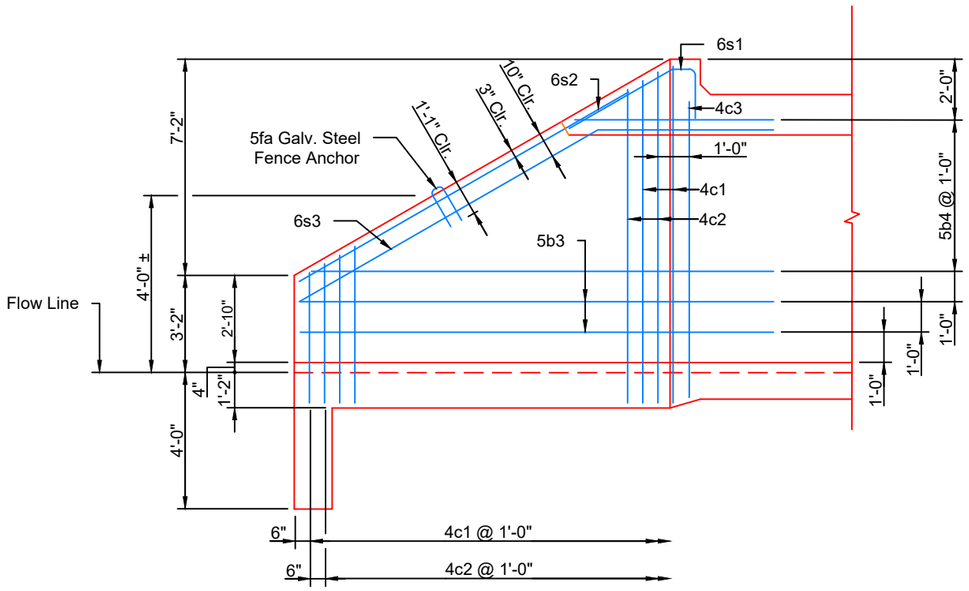
**Modified**

Standard Design - Single Reinforced Concrete Box Culverts

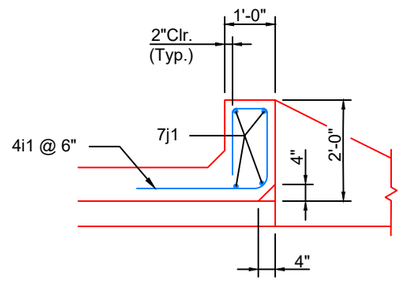
Flared Wing Headwalls

Apron & Curtain Wall Details 0° Skew

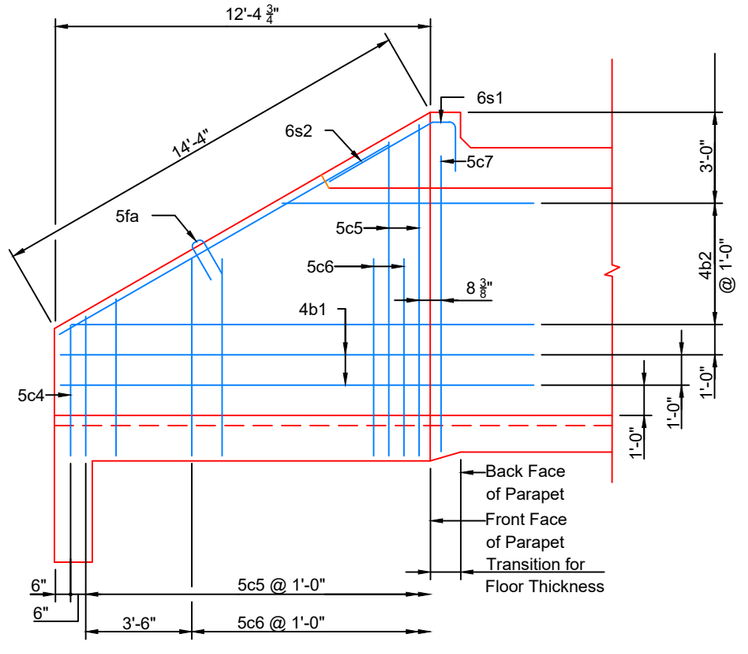
TWFWH 0-2-21



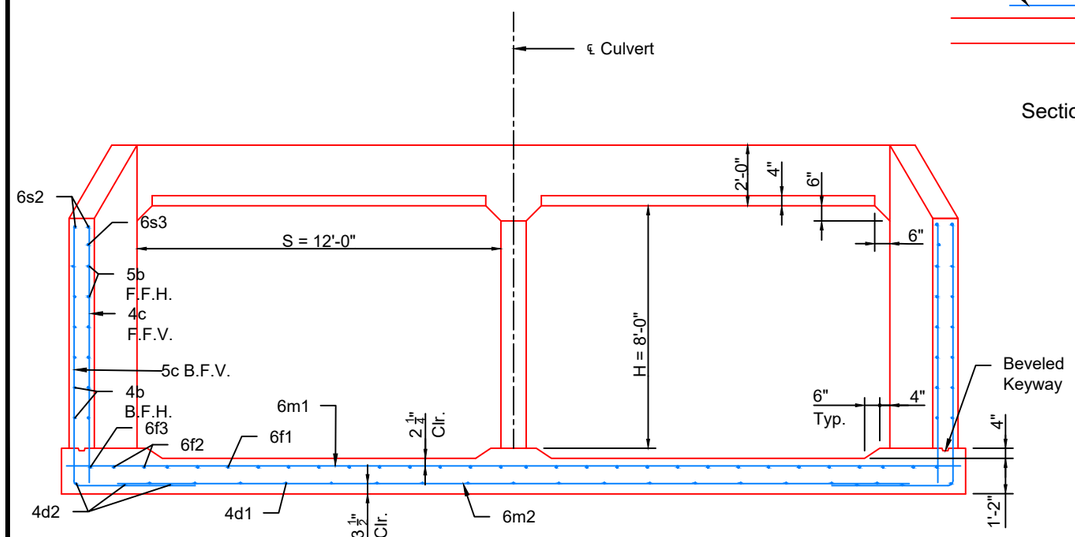

Typical View - Front Face Wingwall Reinforcing




Section thru Parapet



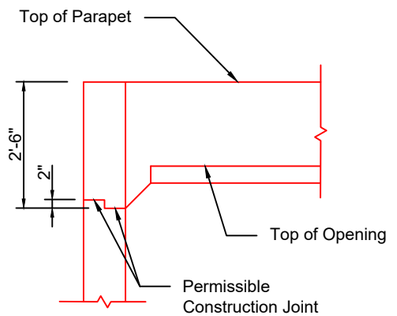

Typical View - Front Face Wingwall Reinforcing

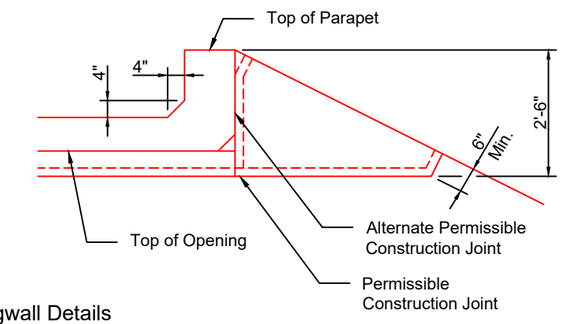



Typical Section - Near Center of Apron

Notes:

1. See Sheet TWFWH G1-21 for General Notes, Specifications, and Design Stresses.
2. Wingwall bars consistently referenced from end of wing.
3. For reinforcing in curtain wall see Curtain Wall Details on Sheet U.2.




Top of Wingwall Details

Modifications:
1. Length of apron shortened.
2. Wingwall slopes adjusted to 2:1.
3. Interior wingwall removed from apron and rounded at parapet.

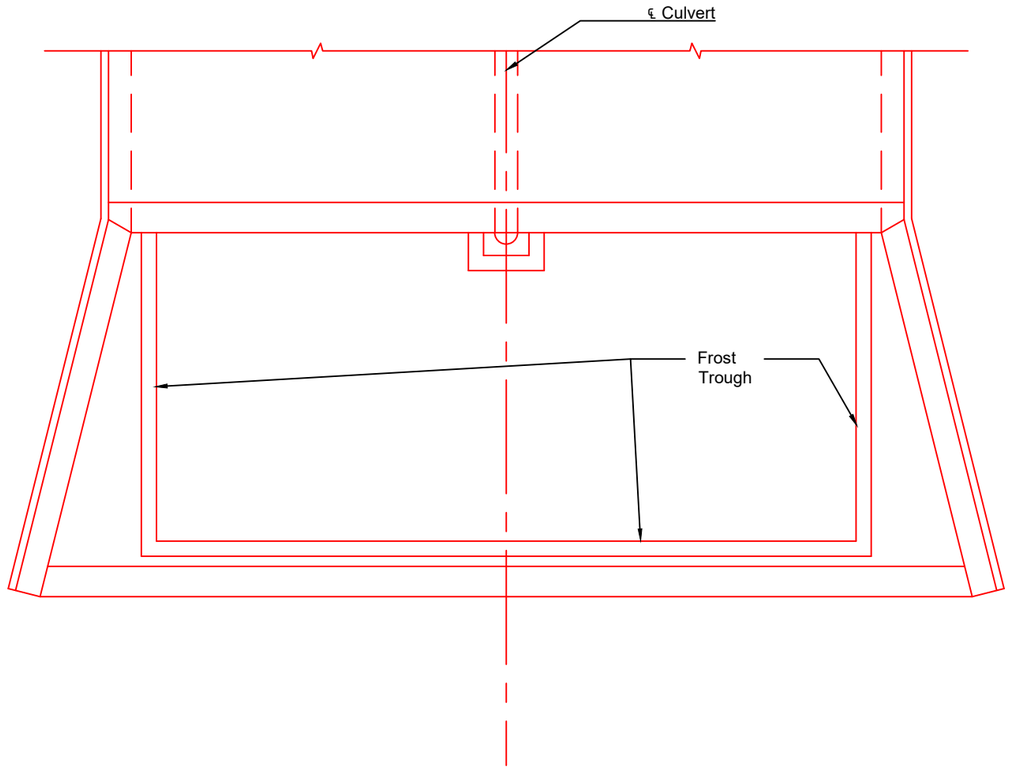
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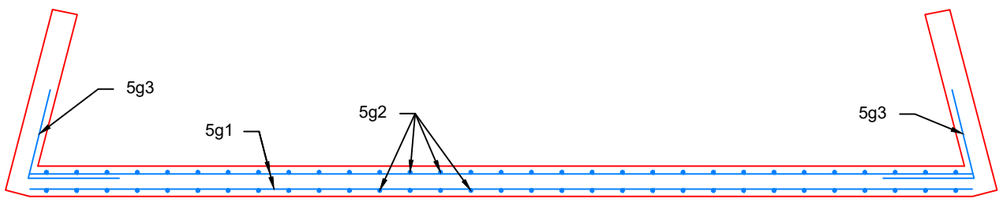
Standard Design - Single Reinforced Concrete Box Culverts

Flared Wing Headwalls

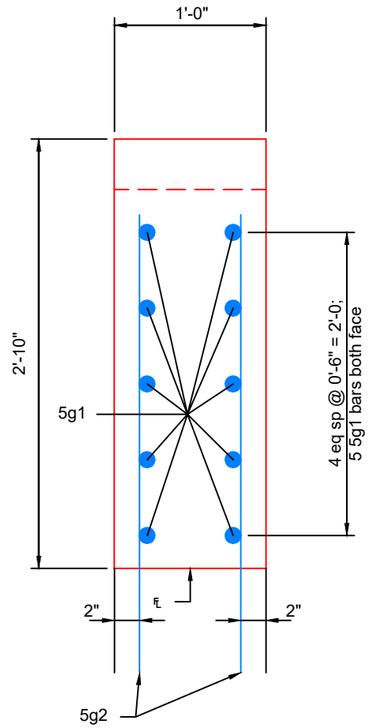
Wingwall & Parapet Details
0° Skew

TWFWH
0-3-21

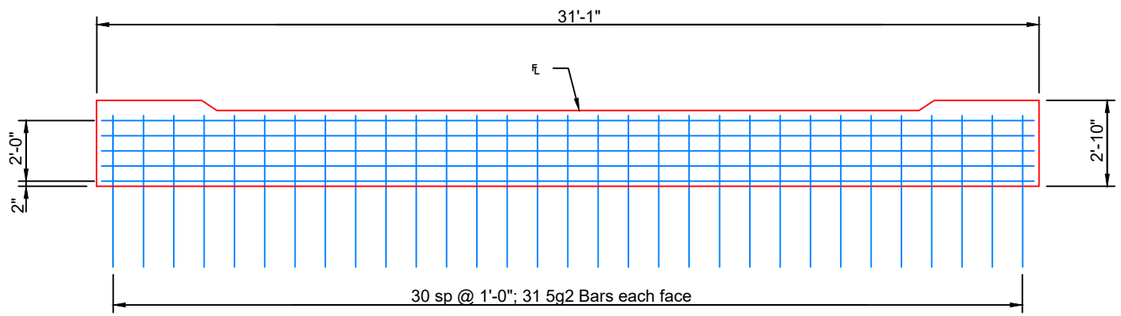



Plan View Inlet Section




Cut Away End View




End View Inlet Section

DESIGN FOR 0° SKEW

TWIN 12'-0 X 10'-0 X 35'-0

REINFORCED CONCRETE BOX CULVERT

INLET WEIR DETAIL

STA. 19+60.0 2026

FAYETTE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

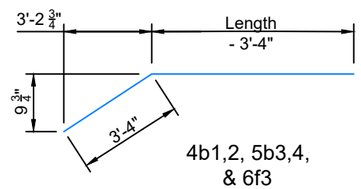
| Bill of Reinforcing for One Headwall 12'x8' | | | | |
|---|---|---|---|---|
| Bar | Location | 12' x 8' | | |
| | | No. | Length | Weight |
| 5fa | Fence Anchor (Galv.) | 2 | 2'-10 | 6 |
| 4b1 | Wingwall, BFH | 4 | 15'-7 | 42 |
| 4b2 | Wingwall, BFH | 10 Var. | 2 Each 8'-4 to 15'-3 | 79 |
| 5b3 | Wingwall, FFH | 4 | 15'-7 | 65 |
| 5b4 | Wingwall, FFH | 12 Var. | 2 Each 6'-6 to 15'-3 | 136 |
| 4c1 | Wingwall, FFV | 26 Var. | 2 Each 4'-3 to 11'-1 | 134 |
| 4c2 | Wingwall, FFV | 24 Var. | 2 Each 4'-7 to 10'-11 | 124 |
| 4c3 | Wingwall, FFV | 2 | 9'-9 | 13 |
| 5c4 | Wingwall, BFV | 2 | 4'-4 | 9 |
| 5c5 | Wingwall, BFV | 24 Var. | 2 Each 8'-7 to 14'-11 | 294 |
| 5c6 | Wingwall, BFV | 16 | 10'-6 | 175 |
| 5c7 | Wingwall, BFV | 2 | 13'-9 | 29 |
| 4d1 | Apron, Longit., Bott. | 17 | 14'-4 | 163 |
| 4d2 | Apron, Longit., Bott. | 6 | 14'-8 | 59 |
| 6f1 | Apron, Longit., Top | 26 | 14'-4 | 560 |
| 6f2 | Apron, Longit., Top | 6 Var. | 2 Each 3'-7 to 11'-4 | 68 |
| 6f3 | Apron, Longit., Top | 2 | 14'-8 | 44 |
| 4i1 | Parapet, Vertical | 49 | 6'-1 | 199 |
| 7j1 | Parapet, Horizontal | 4 | 26'-2 | 214 |
| 6m1 | Apron, Trans., Top | 17 Var. | 26'-4 to 32'-6 | 750 |
| 6m2 | Apron, Trans., Bott. | 11 Var. | 20'-9 to 26'-0 | 387 |
| 6p1 | Curtain, Horizontal | 4 | 31'-1 | 187 |
| 6s1 | Wing Slope, Both F. | 4 | 6'-2 | 37 |
| 6s2 | Wing Slope, Both F. | 4 | 12'-6 | 75 |
| 6s3 | Wing Slope, FF | 2 | 17'-2 | 52 |
| 5t1 | Curtain, Vertical | 25 | 7'-6 | 196 |

| Estimated Quantities One Headwall | | | | |
|---|---|---|---|---|
| | Reinf. Steel | | 4097 | |
| | Concrete | Parapet* | 2.0 | 30.1 CY |
| | | Wingwalls | 5.0 | |
| | | Apron | 23.1 | |

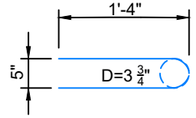
| Bill of Reinforcing for One Inlet Control Weir (One Required) | | | | |
|---|---|---|---|---|
| Bar | Location | No. | Length | Weight |
| 5g1 | Ext. Walls, FFV | 10 | 30'-9 | 321 |
| 5g2 | Int. Walls, Both FV | 62 | 5'-0 | 323 |
| 5g3 | Int. Walls, FFV | 10 | 6'-0 | 63 |

| Estimated Quantities One Weir | | |
|---|---|---|
| | Reinf. Steel | 707 |
| | Concrete | 3.0 CY |

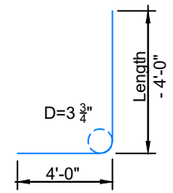
## Bent Bar Details



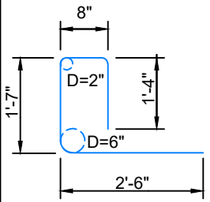
4b1,2, 5b3,4, & 6f3



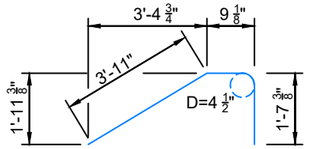
5fa



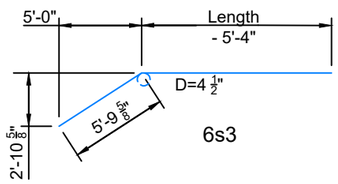
5c5,6,7



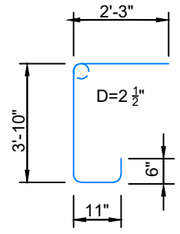
4i1



6s1



6s3



5t1

* Includes top of wingwall quantities.

Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap. Lengths shown for bars over 40'-0" long do not include lap.

### Headwall Notes:

1. See Sheet TWFWH G1-21 for General Notes, Specifications, and Design Stresses.
2. The sides of the apron are to be formed to ensure correct line and grade.
3. All apron reinforcing steel is to be supported by bar chairs at intervals of not more than 3'-0" in either direction as outlined in the Standard Specifications.
4. Clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown. Clearance to the bottom ends of vertical bars shall be 3 inches.
5. Concrete quantities are estimated from back of parapet.
6. Horizontal tails of bars "b" & "s" estimated to extend 2'-5" beyond back of parapet (into end of barrel). Longitudinal bars "d", "6f1", estimated to project into end section of barrel a minimum of 2'-5" beyond back of parapet. The "length" column reflects total number of feet necessary to meet these requirements.
7. Dimensions are in feet and inches unless otherwise noted.

Note:
All dimensions are out to out.
D = pin diameter.

Modifications:
1. Length of apron shortened.
2. Wingwall slopes adjusted.

**Modified**

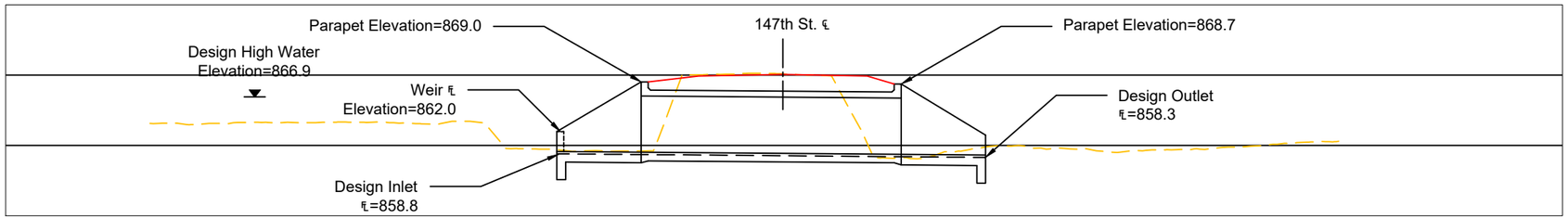
Standard Design - Single Reinforced Concrete Box Culverts

Flared Wing Headwalls

Quantity Tabulation
12'-0" Span
0° Skew

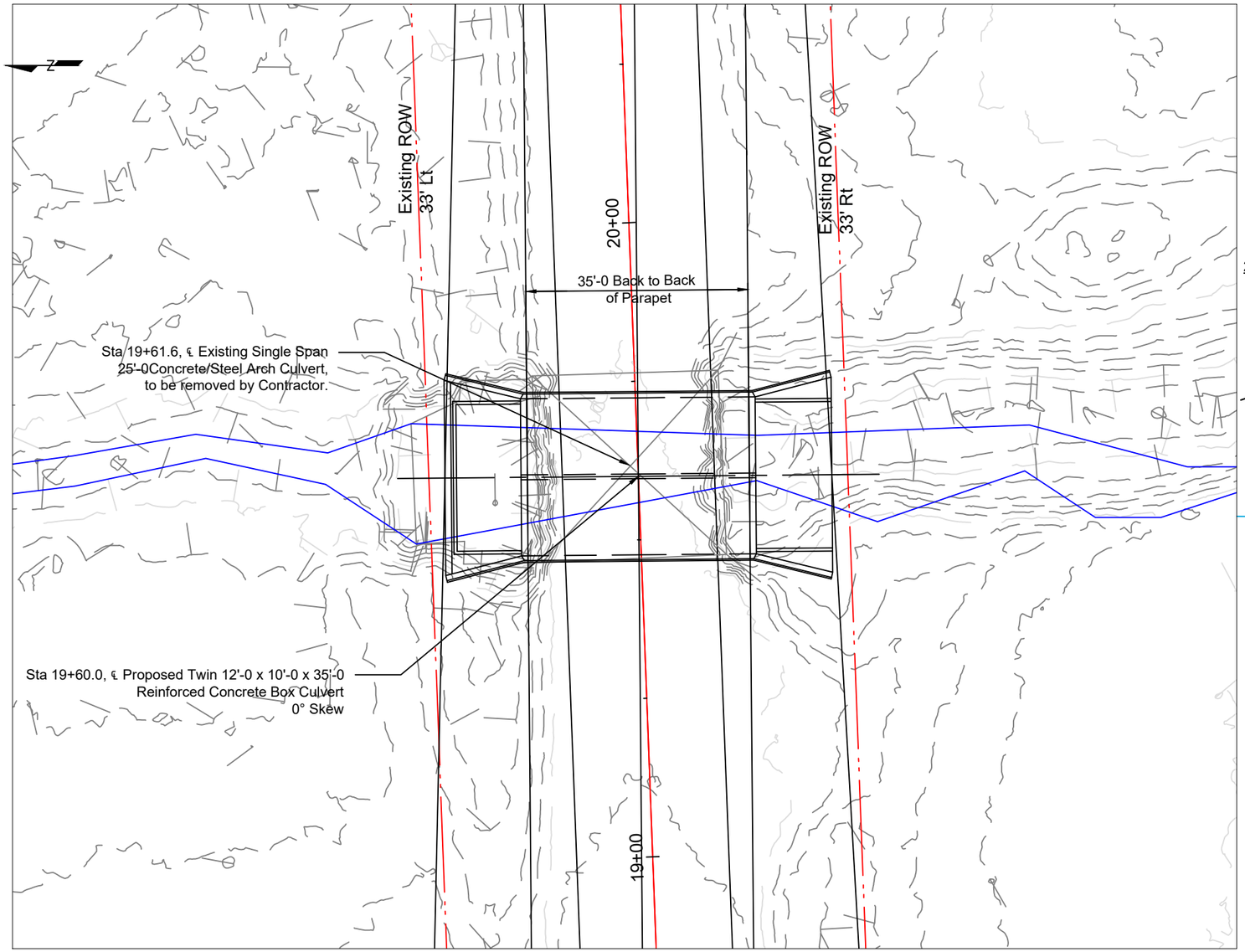
TWFWH
0-4-21

BENCH MARK: TO BE SET AT CONTRACTOR'S DESIRED LOCATION PRIOR TO CONSTRUCTION




LONGITUDINAL SECTION ALONG ℄ CULVERT

DESIGN FILL HEIGHT = 2 FOOT




SITUATION PLAN

## TRAFFIC ESTIMATE

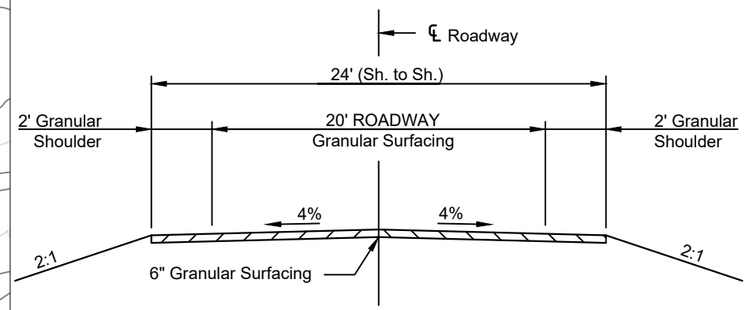
2024 ADT, 15 VPD

## HYDRAULIC DATA

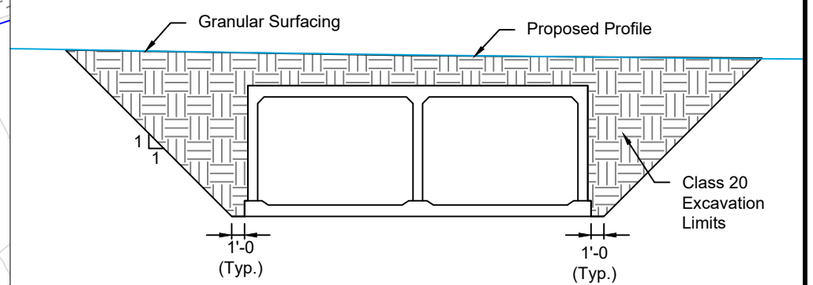
Drainage Area= 1.6 Sq. Mi.
Design Discharge, Q50= 1,304.0 CFS
Design High Water Elevation, Q50= 866.9
Stream Slope = 25.1 Ft./Mi.
Design Velocity = 20.5 Ft/s
Q25 = 1,055.0CFS Stage Elev. = 866.1
Q50 = 1,304.0 CFS Stage Elev. = 866.9
Q100 = 1,573.0 CFS Stage Elev. = 867.7
Q500 = 2,173.0 CFS Stage Elev. = 869.5
Anticipated Scour Elev. = 856.3

## LOCATION

On 147th St over Unnamed Creek
T-93-N, R-7-W
Section 26
Illyria Township
Fayette County
Latitude 42.84308946
Longitude -91.64546215




TYPICAL APPROACH SECTION




PROFILE CROSS SECTION
ALONG ROADWAY CENTERLINE

UTILITIES

IOWA ONE CALL

DESIGN FOR 0° SKEW
TWIN 12'-0 X 8'-0 X 35'-0
REINFORCED CONCRETE BOX CULVERT
SITUATION PLAN
STA. 19+60.0 2026
FAYETTE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION