**NOTES**

Bar steel reinforcement shall be embedded 2" clear unless otherwise shown or noted.

The concrete in the cut off wall may be placed underwater if the excavation cannot be stabilized.

For alternate cut off wall, may be used in lieu of the cast-in-place concrete cut off walls. Payment shall be based on concrete cut off walls.

Reinforcing plate on nearest side and spanning across main plate of span.

For the contractor may furnish a precast concrete box culvert in lieu of the cast-in-place box culvert with the acceptance of the shop drawings and shop drawings by the structures design section. The precast concrete box culvert shall be based on the quantities and prices listed in the "Total Estimated Quantities".

**DESIGNER NOTES**

See standard section for additional notes.

All bar steel for cast-in-place concrete box culverts shall be uncoated except when there is no fill over the culvert. Epoxy coated bars shall be used for the top and bottom bars in the top layer.

Bar steel for cast-in-place concrete aprons shall be uncoated and bar steel for normal girders and all normal bars shall be epoxy coated.

For precast concrete box culverts having their top surface at grade, hand held finishing machines may be used. Note this on plans where applicable.
NOTES
FIELD CUT BAR STEEL REINFORCEMENT BY TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIUM INLET. ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF WOODED AND STEEL. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED BY THE DESIGNER.
STEEL SHOWN IS ADEQUATE TO CLEARING UP TO 8" FOR INLET TYPE 8 & 9 PANELS. "A" BARS PROVIDING THE STEEL SHOWN IS A DEPTH OF 0.120 KCF, AND A UNIT WEIGHT OF 0.5, 0.20 KSF.
GENERAL STEEL ADEQUATE FOR DEPTH UP TO 10'-10" ASSUMING A WIND LOAD OF 50#/SQ. FT.

MAXIMUM ADJUSTMENT SHALL BE 8". ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. ADJUSTMENT OF THE COVER TO GRADE MAY BE TO CLEAR THE OPENING PROVIDED FOR MEDIUM INLET.

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MAXIMUM ADJUSTMENT SHALL BE 8". ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. ADJUSTMENT OF THE COVER TO GRADE MAY BE TO CLEAR THE OPENING PROVIDED FOR MEDIUM INLET.
NOTES
ALL BAR STEEL REINFORCEMENT SHALL BE CUT 2" CLEAR AROUND OPENING.

DESIGNER NOTES
DETAILS SHOWN ARE FOR CAST-IN-PLACE CULVERTS. PRECAST CULVERT DETAILS TO BE SIMILAR

PIPE OPENING IN CULVERT WALL

STANDARD 36.07
GUARDRAIL POST ANCHORS TYPE 1

USE FOR THICKNESS "T" OF POSTS OF MORE AND MINIMUM CONCRETE STRENGTH ( psi) OF 3,500 psi

GUARDRAIL POST ANCHORS TYPE 2

USE FOR THICKNESS "T" OF POSTS OF MORE AND MINIMUM CONCRETE STRENGTH ( psi) OF 4,000 psi

GUARDRAIL POST ANCHORAGE SYSTEM

Designer notes:

Check criteria to see if post anchorage system is required for alignment. Contact the roadway design section for alignment criteria. If required, then select which type of anchorage system will be used.

Applicable K CLASS 2 or MultiGuardrail System will be used. Post spacing is 3'-0" per FDM SDD 14 B 51-1. See FDM SDD 14 B 51-1 for minimum clearances from edges or obstructions to anchorage system. Type 2 anchorage may have some post plate that is not placed at the potted center between the wall and top edge location. This post plate is to be placed at the potted center between the wall and top edge location to meet space and clearance requirements.

Check details and pertinent notes found on this standard on the structure plans for the design anchor type. Show location of posts and spacing along C/L of posts in plan view of structure plans. Each post will extend from the post plate located at the top slab. Show thickness "T" of each post and the angle of each plate and post.

In the top slab provide a minimum of 12 bars at 1' on 24" o.c. for thickness "T" of posts and plate. Use for thickness "T" of 8 inches or more and minimum concrete strength ( psi) of 3,500 psi.

GUARDRAIL POST ANCHORAGE SYSTEM

.Visible items that are to be completed using the gas-metal arc welding process are 3/8" steel plate and anchor system or 1 1/2" cover concrete.

STANDARD 36.08

Approved: Bill Oliva

Date: 7-16
**Designer Notes for Precast Concrete Structure**

**No. of Anchors per Wall**

<table>
<thead>
<tr>
<th>Length of Wall</th>
<th>No. of Anchors</th>
</tr>
</thead>
<tbody>
<tr>
<td>L ≤ 14'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>L ≤ 20'-0&quot;</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 20'-0&quot;</td>
<td>MULTIPLE-TEE ANCHORS</td>
</tr>
</tbody>
</table>

*Note: Adjacent segments shall be attached to each other to keep front faces in alignment. Place a filler at these joints with a membrane along the joint at the back face.*

**Meadows will be three-sided precast concrete structure.**

**Steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the bending of reinforcement for precast bridge units - the outside and inside circumferential reinforcing steels for the corners of the bridge shall be bent to such an angle that is approximately equal to the configuration of the bridge's outside corner.**

**LRFD Design Loads**

- **Vertical Earth Pressure (Unit Weight):** 120 pcf
- **Horizontal Earth Pressure (Unit Weight):** 125 pcf
- **Live Load:** HL-93

---

**Backfill Requirements**

- **Compacted Material:**
  - **Surface:** Sand
  - **In-Situ:** Sand

---

**Wingwall**

- **Precast Segment:**
  - **Anchor:**
  - **Wall Height:**
    - **Minimum:** 1'-0" (@ Anchor)
    - **Max.:** 1'-0"

---

**Precast Box Culvert Design Notes**

- **Landing Grade:**
  - **Finished Grade:**
    - **Minimum:** 24'-0"< L

---

**Bill Oliva**

**Approved:**

**Date:**

**Standard:** 36.10

---

**VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF**

**HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF**

**LIVE LOAD: HL-93**

**Configuration of the bridge's outside corner.**

**Steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the bending of reinforcement for precast bridge units - the outside and inside circumferential reinforcing steels for the corners of the bridge shall be bent to such an angle that is approximately equal to the configuration of the bridge's outside corner.**

---

**WALL BACKFILL REQUIREMENTS**

**Approximate/Minimum Number of Anchors per Wall**

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*Note: Adjacent segments shall be attached to each other to keep front faces in alignment. Place a filler at these joints with a membrane along the joint at the back face.*

---

**Bill Oliva**

**Approved:**

**Date:**

**Standard:** 36.10
GENERAL NOTES:

- MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE CONTRACT SPECIAL PROVISIONS.
- DESIGN SPECIFICATIONS: DESIGN STRUCTURE BY CURRENT EDITION AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY WISCONSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. PRECAST CONCRETE CULVERT UNITS WILL BE DESIGNED IN ACCORDANCE WITH THE FDM STANDARDS.
- DESIGNER NOTES:
  - ALL JOINTS TO BE "CLASS C" DESIGN LAP SPLICES.
  - PRECAST BRIDGE UNIT (TYP.) PLUS 1'-0" JOINTS (2) "W" AND 1'-0" JOINTS (2) "L"
  - SEE STANDARD 36.9 AND STANDARD 36.10 FOR APPROXIMATE JUNCTIONS. SEE TABLE ON STANDARD 36.10 FOR APPROXIMATE JUNCTIONS.
  - NUMBER AND TYPE OF ANCHORS TO BE DESIGNED AND TO BEgeführt TO STANDARDS ACCORDING TO DESIGN.

DETAILED DESIGN:

- PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

PRECAST BRIDGE UNIT (TYP.) PLUS 1'-0" JOINTS (2) "W" AND 1'-0" JOINTS (2) "L"

NOTE: ALL JOINTS TO BE "CLASS C" DESIGN LAP SPLICES.

- PRECAST BRIDGE UNIT (TYP.)
  - SEE STANDARD 36.9 AND STANDARD 36.10 FOR APPROXIMATE JUNCTIONS.
  - SEE TYPICAL JOINT SEAL DETAIL.

DETAIL I

NOTE: CONNECTION PLATES P-1 AND P-2 MUST BE POSITIONED WITH SMALL DIAMETER HOLES TOWARD PRECAST BRIDGE UNIT.

DETAIL 2

NOTE: PLATE LENGTH AND THICKNESS SHALL BE AS SPECIFIED. USE GRADE A CONCRETE IN FOOTING AND WINGWALLS. f'c = 4 KSI (MIN.) PROVIDE CONCRETE COVER ON REINFORCING BARS AS NOTED HEREIN. PROVIDE GROUT 1" MIN.

NOTE ON STANDARD 36.10

DRAINAGE PIPE PER NOTE ON STANDARD 36.10.

NOTE: SEE STANDARD 36.10 FOR APPROXIMATE JUNCTIONS. SEE TABLE ON STANDARD 36.10 FOR APPROXIMATE JUNCTIONS.

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- PRECAST BRIDGE UNIT (TYP.)
  - SEE STANDARD 36.9 AND STANDARD 36.10 FOR APPROXIMATE JUNCTIONS.
  - SEE TYPICAL JOINT SEAL DETAIL.

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 36.11
PRECAST HEADWALL TYPE H-1 COUNTERFORT
NOT TO SCALE

PRECAST HEADWALL TYPE H-2 COUNTERFORT
NOT TO SCALE

PRECAST HEADWALL TYPE H-3 COUNTERFORT
NOT TO SCALE

PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

NOTE:
The actual number and type of precast headwall counterforts is to be determined. However, use the following chart as a general guide to feasibility of precast headwall counterforts.

<table>
<thead>
<tr>
<th>SPANS</th>
<th>MAX HEADWALL HEIGHT AT COUNTERFORT LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20' - 42'</td>
<td>H-1  min. 1'-0&quot;  max. 8'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>H-2  min. 1'-0&quot;  max. 7'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>H-3  min. 1'-0&quot;  max. 6'-0&quot;</td>
</tr>
</tbody>
</table>

NBED HEADWALL COUNTERFORTS
- Headwall details shown are only used for the following load cases:
  1) Earth pressure only
  2) Earth pressure + live load surcharge
These details are not to be used where a vehicle load can be transmitted through a barrier to the headwall.
- Assumed spacing of counterforts
  - 1'-0" headwall thickness min.
  - Assumed 4'-0" spacing of counterforts
- Soil behind headwall at same elevation as top of headwall
- Additional headwall height may be needed for closer counterfort spacing
- For designed headwall designs only

PRECAST BRIDGE UNIT
Installation of coil rod 3" dia. hole grout solid after bridge unit and precast headwall continuously between precast.

BUTYL ROPE, INSTALLED IN FIELD

PRECAST HEADWALL TYPE H-1 AGAINST CULVERT UNIT
TO BE MATCH CAST
PRECAST HEADWALL AGAINST CULVERT UNIT
TO BE MATCH CAST
PRECAST HEADWALL AGAINST CULVERT UNIT
TO BE MATCH CAST
NOTES:

** See Arch Unit Primary Reinforcing Chart on Standard-details for more information.

All reinforcing dimensions shown are for 10'-0" rise, and all steel lengths shall be reduced accordingly for rises other than 10'-0".

These steel areas, steel lengths and arch thickness are shown for cover of 12'-0" or less.

Three-span precast concrete structures shall be designed for cover greater than 12'-0" and can be designed for up to the limits of cover shown in the table below.

The cover of concrete over the outside circumferential reinforcement shall be 2 inches minimum.

The cover of concrete over the inside circumferential reinforcement shall be 1" inches minimum.

The clear distance of the end circumferential wires shall not be less than 2" nor more than 4" from the ends of each section.

An equivalent of welded wire fabric (WWF) shall be substituted for the reinforcement when approval of the Structures Development Section.

Table show for cover of 12'-0" or less.

<table>
<thead>
<tr>
<th>SPAN (FT)</th>
<th>APPROX. MAX./MIN. COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'</td>
<td>10&quot; - 12&quot;</td>
</tr>
<tr>
<td>20'-0&quot;</td>
<td>12&quot; - 15&quot;</td>
</tr>
<tr>
<td>28'-0&quot;</td>
<td>15&quot; - 18&quot;</td>
</tr>
<tr>
<td>36'-0&quot;</td>
<td>18&quot; - 20&quot;</td>
</tr>
</tbody>
</table>

Design data:

fy = 65,000 PSI for welded wire fabric (WWF)
fy = 60,000 PSI for steel reinforcing bars
f'c = 5000 PSI minimum for concrete

Shown, upon approval of the Structures Development Section.

Each section shall be designed for up to the limits of cover shown in the table below.

These steel areas, steel lengths and arch thickness are shown for cover of 12'-0" or less.

The clear distance of the end circumferential wires shall not be less than 2" nor more than 4" from the ends of each section.

An equivalent of welded wire fabric (WWF) shall be substituted for the reinforcement when approval of the Structures Development Section.

Table show for cover of 12'-0" or less.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>AREA REQ'D SPAN</th>
<th>LENGTH</th>
<th>LONGITUDINAL REINFORCEMENT (MINIMUM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1A</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1B</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>0.48</td>
<td>38'-4&quot;</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>0.24</td>
<td>28'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Approved:

Bill Oliva

Date: 7-14

Standard 36.16

Bureau of Structures