**NOTES**

**Bar Steel Reinforcement**
- Bar steel reinforcement shall be embedded 2" clear unless otherwise shown or noted.
- The concrete in the cut-off wall may be placed under water if the excavation cannot be drained.
- The 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.
- Locate name plate on nearest wing wall traveling up station plane of grade.
- 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. The item shall be used for the top and bottom bars in the top slab.
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**Designer Notes**
- See standard 36.03 for additional notes.

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Notes:

Field cut bar steel reinforcement is not shown. Use the opening provided for median inlet. If height exceeds 8", field cut bar steel reinforcement is not shown. For median inlet, use 8" of mortar and brick. Adjustment of the cover to grade may be accomplished by the use of water and steel. Minimum adjustment shall be 8".

Design Notes:

Size and length of "A" bars to be determined by the designer.

Steel shown is adequate to depths of to clear the opening provided for median inlet. Steel shown is adequate to depths of up to 25'-0" assuming wind load of 50#/sq. ft. and a unit weight of soil of 0.120 kcf. General steel shown is adequate for depths of up to 25'-0" assuming wind load of 50#/sq. ft. and a unit weight of soil of 0.120 kcf.

Median inlet plan:

Inlet cover not shown.

Median inlet plan:

Grate elevation shown on plans.

SECTION A-A:

SECTION C-C:

SECTION B-B:

SECTION D-D:

Box culvert manhole for inlet type 8 & 9.
PRECAST ELEMENTS SHALL BE 2" UNLESS SHOWN OTHERWISE.

CONCRETE COVER ON ALL REINFORCEMENT IN THE PRECAST ELEMENTS SHALL BE 2" UNLESS SHOWN OTHERWISE.

STEEL REINFORCEMENT MAY BE EITHER GRADE 40 OR GRADE 60 DEFORMED BARS. WHEN DEFORMED BARS ARE USED, THE AREA OF REINFORCEMENT NOT IDENTIFIED ON THE SHOP DRAWINGS FOR APPROVAL. DETAILS MUST BE SHOWN ON THE SHOP DRAWINGS FOR APPROVAL.

THE ULTIMATE COMPRESSION STRENGTH OF THE PRECAST ELEMENTS SHALL BE 4,200 PSI.

THE PRECAST ELEMENTS SHALL BE PROCESSED WITH TEMPERATURE AND SHRINKAGE REQUIREMENTS OF A7, A8, A9, A10.

THE MAXIMUM SIZES OF ANCHOR BOLTS ARE 1" UNLESS SHOWN OTHERWISE. THE 1" DIAMETER ANCHOR BOLTS SHALL BE GALVANIZED.

PERIODIC CONCRETE BACKFILLING OF THE WINGWALLS. APRON SHALL BE POURED AND CURED PRIOR TO THE OPTION OF THE CONTRACTOR.

PRECAST CUT OFF WALLS MAY BE FIELD SPliced AT THE MID-PIVOT OR TOOL EDGED WITH A 1" MINIMUM RADIUS EDGER. THE SIDES OR TOOL EDGES SHALL BE ANCHORED AND CONFORM TO THE REQUIREMENTS OF A575.

THE ULTIMATE COMPRESSION STRENGTH OF THE PRECAST ELEMENTS SHALL BE 4,200 PSI.

FILL WITH CONCRETE AND HEADER.

PRECAST TOP SLAB AND HEADER.

CONCRETE IN THE PRECAST ELEMENTS SHALL BE 3,500 P.S.I. THE ULTIMATE COMPRESSIVE STRENGTH OF THE PRECAST ELEMENTS SHALL BE 65,000 P.S.I. DEFORMED - WIRE FABRIC OF EQUIVALENT AREA, GRADE 60 STEEL REINFORCEMENT MAY BE EITHER GRADE 60 OR GRADE 40 DEFORMED BARS, OTHER THAN THE A10 BARS, SHALL BE #5.

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CONCRETE IN THE PRECAST ELEMENTS SHALL BE 4,200 PSI.
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

PIPE OPENING IN CULVERT WALL

BILL OLIVA

APPROVED

STANDARD 36.07
### DESIGNER NOTES FOR PRECAST CONCRETE STRUCTURE

REDREW SHALL BE "THREE-SIDED PRECAST CONCRETE STRUCTURE".

PRECAST BRIDGES WILL BE LIMITED TO SPANS NOT TO EXCEED 42'-0".

SECURE BID ITEM SHALL BE "THREE-SIDED PRECAST CONCRETE STRUCTURE".

CHECK FOUNDATION PRESSURE, SCOUR AND SETTLEMENT TO ENSURE THAT NO FOUNDATION FAILURE OCCURS.

PRECAST WINGWALL TO 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 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.

**WALL BACKFILL REQUIREMENTS**

<table>
<thead>
<tr>
<th>BACKFILL STRUCTURE LIMITS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>FINISHED GRADE</td>
<td>FINISHED GRADE</td>
</tr>
<tr>
<td>EXCAVATION</td>
<td>COMPACTED MATERIAL</td>
</tr>
<tr>
<td>GRADE</td>
<td></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.*

**PRECAST THREE-SIDED BOX CULVERT DESIGN NOTES**

**LRFD DESIGN LOADS**

- **Live Load**
  - **Vertical Earth Pressure** Unit Weight = 100 psf
  - **Horizontal Earth Pressure** Unit Weight = 100 psf

**ILLUSTRATION**

**APPENDIX**

**TABLE**

<table>
<thead>
<tr>
<th>NUMBER OF ANCHORS PER WALL</th>
<th>LENGTH OF WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L = 14'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>L = 20'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>L = 24'-0&quot;</td>
</tr>
</tbody>
</table>

**BILL OLVIA**

**DATE:** 1-18

**BUREAU OF STRUCTURES**

**APPROVED:**

**STANDARD 36.10**
GENERAL NOTES:

- Materials and construction shall be in accordance with Wisconsin 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 WisDOT Bridge Manual, unless otherwise specified.
- Use grade A concrete in footing and wingwalls, 7% + 4 slump.
- Provide concrete cover on reinforcing bars as noted herein.
- Chamfer exposed concrete edges 3/4" to 1" except as noted.
- Provide designed reinforced concrete members meeting the requirements of AASHTO, without space as set forth in the standard specifications.
- If a cast-in-place option is shown and specifications allow for a precast substitution, precast structure system including bridgeworks and wingwalls and footers shall be designed by contractors.

DESIGNER NOTES:

All bar splices to be "Class C" design lap splices.

Precast Concrete Culvert Units

- Precast Concrete Culvert Units (TYP.)
- Plus 90° Joints 6" x 7" per joint x L

See Standard 36.10 for approximate number and type of anchors (N-1) joints @ 1'-0" to 1'-0" per joint = L

- Note: Connection plates (P-1) must be positioned with small quarter holes toward precast bridge unit.

TYPICAL JOINT SEAL DETAIL

- Place 1/2" x 1/2" x 1/2" butyl rope between precast units.

PLATE P-1

- Provide concrete cover on reinforcing bars as noted herein.
- Plate 1/2" x 1/2" x 1/2" butyl rope between precast units.

BUREAU OF STRUCTURES

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

Standard 36.11

Approved: Bill Oliva

Date: 7-18
**Typical Lift Point Sealing Detail**

**Lifting Holes**
- Lifting holes shall be provided on the precast bridge unit.
- Holes shall be square or round, depending on the design requirements.
- Holes shall be located on the top of the precast bridge unit to facilitate lifting.

**Lifting Inserts**
- Lifting inserts shall be used to secure the lifting points.
- Inserts shall be made of stainless steel or a similar material.
- Inserts shall be designed to accommodate the forces generated during lifting.

**Skewed Units**
- Skewed units may require additional lifting points.
- A typical skewed plan view is not shown for clarity.

---

**Lintel Details**

**Cast-in-Place Headwall Detail**
- Cast-in-place headwall detail shall be designed as per the project specifications.
- Details shall include lifting holes and inserts for ease of installation.

**Precast Headwall Detail with Collar**
- Precast headwall detail shall be designed with a collar for additional strength.
- Collar thickness shall be specified in the project drawings.

**LRFD Collar/Headwall Design Notes:**
- Collar/Headwall details shown here have only been designed for the following load cases:
  1) Earth pressure
  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.
- Precast units shall be designed to accommodate the specified collar thickness.
- Collar thickness shall be specified in the project drawings.

---

**Precast Three-Sided Box Culvert Headwall Details**

---

**Approved:**

**Scot Becker**

**Date:**
### Preceded Three-Sided Box Culvert Cross Sections

**Center of Gravity (C.G.)**

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>C.G. (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.3</td>
<td>12.6</td>
</tr>
</tbody>
</table>

**Area of Concrete Section**

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>Area (sq. ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.3</td>
<td>43.9</td>
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**Geometric Properties**

<table>
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<tbody>
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**Maximum Primary Reinforcing Dimensions**

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<thead>
<tr>
<th>Cover (sq. in/ft)</th>
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<th>12'-0&quot; to 13'-0&quot; Rise</th>
<th>14'-0&quot; to 15'-0&quot; Rise</th>
<th>16'-0&quot; to 17'-0&quot; Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
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<td>A2</td>
<td>A3</td>
<td>A4</td>
</tr>
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</table>

**NOTE:**

- All reinforcing dimensions are shown for cover of 1'-0" or less.
- These steel areas are shown for cover of 1'-0" or less.
- Arch units are marked with A1, A2, A3, A4.