GENERAL NOTES:

1. FOOTINGS OF PRECAST BOX CULVERTS END SECTIONS SHALL BE DISCONNECTED FROM THE NEW CONSTRUCTION.
2. THE CONTRACTOR SHALL SUBMIT A DETAIL OF THE PRECAST WALL AND FLOOR TO THE ENGINEER FOR APPROVAL.
3. THE PRECAST WALL AND FLOOR SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
4. THE PRECAST WALL AND FLOOR SHALL BE PREPARED FOR INSTALLATION OF DOWELS.
5. THE CONTRACTOR SHALL SUBMIT A DETAIL OF THE PRECAST WALL AND FLOOR TO THE ENGINEER FOR APPROVAL.
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9. THE PRECAST WALL AND FLOOR SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
10. THE PRECAST WALL AND FLOOR SHALL BE PREPARED FOR INSTALLATION OF DOWELS.

TRAFFIC CONTROL PLAN:

NOTE: THE ROADWAY WILL BE CLOSED TO TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR MUST PROVIDE A TEMPORARY TRAFFIC CONTROL PLAN TO THE ENGINEER FOR APPROVAL.

SPECIAL BACKFILL BEDDING DETAIL:

NOTE: THE ROADWAY WILL BE CLOSED TO TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR MUST PROVIDE A TEMPORARY TRAFFIC CONTROL PLAN TO THE ENGINEER FOR APPROVAL.

INSTALLATION NOTES:

1. PRECAST CURTAIN WALL SECTIONS SHALL BE MODULES OF 12'-0" LONG.
2. THE CURTAIN WALL SECTIONS SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
3. THE CURTAIN WALL SECTIONS SHALL BE PREPARED FOR INSTALLATION OF DOWELS.
4. THE CONTRACTOR SHALL SUBMIT A DETAIL OF THE PRECAST CURTAIN WALL TO THE ENGINEER FOR APPROVAL.
5. THE PRECAST CURTAIN WALL SECTIONS SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
6. THE PRECAST CURTAIN WALL SECTIONS SHALL BE PREPARED FOR INSTALLATION OF DOWELS.
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8. THE PRECAST CURTAIN WALL SECTIONS SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
9. THE PRECAST CURTAIN WALL SECTIONS SHALL BE PREPARED FOR INSTALLATION OF DOWELS.
10. THE CONTRACTOR SHALL SUBMIT A DETAIL OF THE PRECAST CURTAIN WALL TO THE ENGINEER FOR APPROVAL.

SPECIFICATIONS:

1. THE PRECAST WALL AND FLOOR SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
2. THE PRECAST WALL AND FLOOR SHALL BE PREPARED FOR INSTALLATION OF DOWELS.
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DESIGN STRESSES:

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GENERAL NOTES & QUANTITIES:

1. THE PRECAST WALL AND FLOOR SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
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10. THE PRECAST WALL AND FLOOR SHALL BE ATTACHED TO THE EXISTING STRUCTURE WITH CONCRETE TIES.
### CONCRETE PLACEMENT SUMMARY

<table>
<thead>
<tr>
<th>Location</th>
<th>Total (CY)</th>
<th>Total (LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collar</td>
<td>xx # cubic</td>
<td>xx</td>
</tr>
</tbody>
</table>

**CONCRETE MIX FOR JOINT FLOOR:**

To ensure consolidation of concrete under box culverts, the following concrete may be used in the floor:

- For concrete floors between the existing culvert and the new precast box culvert, concrete aggregate shall be pea gravel or limestone chip. The concrete mix shall be in accordance with Article 1104 of the Standard Specifications.
- For replacement segment(s) of the culvert, the concrete mix shall be in accordance with Article 4112 of the Standard Specifications.
- Maximum fine aggregate replacement shall not exceed 20% by weight of the cement. All design shall include a mid-range water reducer listed in Materials I.M. 403, Appendix C, or a high range water reducer listed in Materials I.M. 403, Appendix C.

**REINFORCING BAR LIST - ONE COLLAR**

<table>
<thead>
<tr>
<th>Bar Type</th>
<th>Description</th>
<th>Size</th>
<th>Length</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>5z1</td>
<td>Bent bar, inside of sheet, for reinforcement of collar</td>
<td>10&quot;</td>
<td>6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>6w2</td>
<td>Bent bar, inside of sheet, for reinforcement of collar</td>
<td>2&quot;</td>
<td>6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>6w3</td>
<td>Bent bar, inside of sheet, for reinforcement of collar</td>
<td>2&quot;</td>
<td>6&quot;</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:**

1. Bars with a 4" bar shall be set as dowels in drilled holes. Holes for 6" bars are to be 6" dia., holes for 4" bars are to be 2" dia. Holes shall be installed 2'-1" min. lap from each joint.
2. Connections for a polymer grout system in accordance with Article 300-1.4 are recommended. Dowels shall be 1'-0" max. spacing C-C of dowels. All bar lengths shall be to 2'-1" from concrete edge to outside of bar, except as noted.
3. Bars with a 2" bar shall also be used as an alternate in the precast section.
4. End of precast section shall be flat but roughened. Remove the tongue and groove joint for this connection.

**BENT BAR DETAILS**

- Use of 5z1 reinforcing bars in proposed precast section. Use of threaded inserts and threaded bars may also be used as an alternate in the precast section.
- Use of bent bar reinforcing extended by the manufacturer may replace dowel bars in proposed precast section. Use of threaded inserts and threaded bars may also be used as an alternate in the precast section.

**PRECAST CULV. EXTEN. DETAILS**

- Use of collar cast in place as necessary to facilitate new R.C.B. collar construction.

**NOTES:**

- All dimensions are cut to cut, O.D. pin diameter.
- Use of collar cast in place as necessary to facilitate new R.C.B. collar construction.
NOTES:
The existing precast end section shall be disassembled. The end section is to be separated from the curtain wall. The lintel beam may be separated from the end section, care shall be taken to prevent damage to the end section pieces, curtain wall and lintel beam. Any damage to these pieces shall be the responsibility of the contractor and shall be repaired at no extra cost to the State. The end section pieces, curtain wall and lintel beam shall be stored on site for repair. Surface on which pieces are stored shall be smooth, level and sound. Storage area shall be approved by Engineer. All existing Culvert Tie Assemblies that are removed to permit removal of the end section pieces shall become the property of the contractor and shall not be reused. Contractor is responsible for the method of lifting the end section pieces and installation of any lifting devices. If lift holes are drilled or cored through the pieces, the contractor shall furnish and install lifting hole plugs for each section. Lifting hole plugs shall be placed with a precut concrete plug or plastic plug approved by the Engineer. Sockets shall be a 2'-0 x 2'-0 piece of engineering fabric centered over the hole and attached to the section to prevent the fabric from slipping.

The last existing barrel section will be attached to the first proposed barrel section with one tie per side. In order to accomplish this, new holes for the ties will need to be field drilled in the last existing barrel section, the existing ties shall be filled with concrete.

The tie locations for last new barrel section shall be coordinated with existing tie locations in first end section on which the last new section is to be installed. The tie sum and their length shall not exceed the existing tie length. Ties shall be attached to the section at the location of the proposed tie hole locations and at the locations of the existing tie holes, new tie holes shall be drilled and plugged with a precut concrete plug or plastic plug approved by the Engineer. Ties shall be centered over the hole and the tie holes shall be filled with concrete.

The proposed barrel section will allow for proper connection to the existing joint.
**BAFFLE NOTES:**

1. Baffles are to be placed within the precast reinforced concrete box culvert spaced at spacing elements shown in these plans. Baffles shall be constructed to the dimensions shown on this sheet.

2. Clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted on drawing.

3. **All concrete is to be class C.**

4. Minimum splice length for the 4h and 4h1 bars is 13".

5. The 5g1, 5g2, and 4h2 bars shall be set as dowels in drilled holes. Holes are to be 1'-0" deep. The dowels shall be installed in accordance with the manufacturer's recommendations. The dowels shall be installed using a polymer grout system in accordance with Article 2301.03, E, of the standard specifications.

6. All concrete admixtures shall be used and the bonding of the baffles to the barrel floor shall be in accordance with Article 2403.03, I. of the standard specifications.

7. The baffles are to be bid on a linear foot basis. The number of linear feet of baffle installed will be paid for at the contract price per linear foot for 'Baffle or Weir for Reinforced Concrete Box Culvert' based on plan quantity. Price bid for 'Baffle or Weir for Reinforced Concrete Box Culvert' shall be full compensation for furnishing all materials and all of the equipment and labor required to construct the baffles in accordance with these plans and current specifications. Cross sectional area of the baffle is 0.53 square feet.

**BAFFLE QUANTITIES**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baffle for RCB Culvert</td>
<td>L.F.</td>
<td>??</td>
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</table>

**PRECAST CULV. BAFFLE DETAILS**

*NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.*
WEIR NOTES:
1. 77 Weirs are to be placed within the precast reinforced concrete box culvert spaces as shown elevated in these plans. Weirs shall be constructed to the dimensions shown on this sheet.
2. Clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.
3. All concrete is to be Class C.
4. Minimum splice length for the 4h1 and 4h2 Bars is 2'4".
5. The 5g1, 5g2, 5g3, 5g4 and 4h2 Bars shall be set as dowels in drilled holes. Weirs are to be 8' deep. The dowels shall be installed in accordance with the manufacturer's recommendations. The dowels shall be installed using a polymer grout system in accordance with Article 2301.03, E, of the standard specifications.
6. A bonding agent shall be used and the bonding of the weirs to the barrel floor shall be in accordance with Article 2030.01, A, of the standard specifications.
7. For 5'-0 Barrels, spans the 4h2 Bars shall be field bent to provide 2' Min. clear distance from the top of the notch.
8. The Weirs are to be bid on a Linear Foot basis. The number of linear feet of weirs installed shall be paid for at the contract price per linear foot for "weir for reinforcement concrete box culvert based on plan quantity. Those bid for sufluge or weir for reinforced concrete box culvert shall be full compensation for furnishing all materials and all of the equipment and labor required to construct the weirs in accordance with these plans and current specifications.
9. Cross sectional area of the weir is 0.53 square feet.

WEIR QUANTITIES

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<thead>
<tr>
<th>Item</th>
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NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

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NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.
GENERAL NOTES:

IT IS THE INTENT OF THIS DESIGN TO REPLACE THE EXISTING ______ WITH A PRECAST CONCRETE BOX CULVERT. PRINTED COPIES OF THE PRELIMINARY DESIGN DOCUMENTS, SHEETS, SHAPES SHOWN ON THESE PLANS ARE BASED ON DESIGN PLANS SUPPLIED TO THE CONSTRUCTOR.

PREFABRICATED BOX CULVERTS THAT ARE IDENTIFIED AS STATISTICAL RETURNS SAME AS THE DESIGN OF THE PRECAST CONCRETE BOX CULVERTS. THE PRECAST CONCRETE BOX CULVERT 8 TIMES THE LENGTH OF THE PRECAST BOX CULVERT SECTIONS TO BE USED.

Eleventh, the concrete used in the construction of the box culvert shall be placed for a box culvert with a minimum dimension of 6 inches.

Prior to the start of construction, the design of the precast box culvert shall be reviewed by the engineer. The design of the precast box culvert shall be in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications. The design of the precast box culvert shall be reviewed by the engineer. The design of the precast box culvert shall be in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications.

The precast box culvert shall be placed for a box culvert with a minimum dimension of 6 inches.

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**SPECIAL BACKFILL BEDDING DETAILS / FLOWABLE MORTAR OPTION**

The porous backfill shall be placed between the precast barrel walls, as shown on the special backfill bedding detail. Porous backfill shall also be placed between the end sections up to 3 inches from the exterior side of the end section. The porous backfill shall be placed in accordance with Section 4131 of the Standard Specifications.

**FLOWABLE MORTAR OPTION NOTES:**

- Side-by-side precast culvert notes:
  1. Double welded pipe or double eye bolt type ties are required for the barrel wall adjacent to the first precast culvert structure placed at the site to allow the ties to be tightened from the top of the barrel and install the engineering fabric at the centerline of the culvert before the precast culverts are placed. All costs including material and labor associated with providing the engineering fabric and installing it as required shall be included in the bid items precast concrete box culvert and precast concrete box culvert straight end sections.
  2. The 4” diameter perforated subdrain shall terminate and be capped at the upstream end 2’ from the top of the end section wall. The subdrain shall outlet downstream at the centerline of the culvert before the precast culverts are placed. All costs including material and labor associated with providing the engineering fabric and installing it as required shall be included in the bid items precast concrete box culvert and precast concrete box culvert straight end sections.

**FLOWABLE MORTAR OPTION NOTES:**

- At the contractor’s option, the porous backfill and concrete cap may be replaced with flowable mortar bedding as shown in the flowable mortar notes. The flowable mortar including material and labor is included in the bid items precast concrete box culvert and precast concrete box culvert straight end sections.

**FLOWABLE MORTAR OPTION NOTES:**

- The type 1 barrel section shall be increased so the adjoining ends will abut against each other at the centerline of the precast barrel section. The type 2 barrel section shall be increased so the adjoining ends will abut against each other at the centerline of the precast barrel section. The type 3 barrel section shall be increased so the adjoining ends will abut against each other at the centerline of the precast barrel section.

**FLOWABLE MORTAR OPTION NOTES:**

- The 4” diameter perforated subdrain shall be placed in accordance with Article 4196.01, B, 3 of the Standard Specifications. All costs including material and labor associated with providing the engineering fabric and installing it as required shall be included in the bid items precast concrete box culvert and precast concrete box culvert straight end sections.
### Barrel Section

- **As6 (Top Slab Inside)**
- **As7 (Side Wall Inside)**
- **As8 (Bottom Slab Inside)**
- **As9 (Top Slab Outside)**
- **As10 (Bottom Slab Outside)**
- **As11 (Side Wall Outside)**
- **As12 (Top Slab Insulation)**

### Type 1 End Section (Near Joint)

- **As1 (Side Wall Outside & Bottom Slab Outside)**
- **As2 (Top Slab Outside)**
- **As3 (Bottom Slab Outside)**
- **As4 (Side Wall Inside)**
- **As5 (Top Slab Inside)**
- **As13 (Bottom Slab Insulation)**

### Type 1 and 3 End Sections

- **As14 (Top Slab Insulation)**
- **As15 (Bottom Slab Insulation)**

### Loading, Design Methods, and Materials

- Any precast box culvert designs submitted that vary from the ASTM C1577 or IDOT standards shall be designed and sealed by a professional engineer currently registered in the State of Iowa. Nonstandard designs shall be based on the design criteria used for the boxcar and end sections.

### Covers

- Use 1" cover for ASTM design, 1 1/4" cover for IDOT standard and non-standard boxcar design.

### Circumferential Reinforcement

- **Bar Size**
- **Spacing (in)**
- **Area (in²/ft²)**

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>SPACING (in)</th>
<th>AREA (in²/ft²)</th>
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<tr>
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<td>12</td>
<td>1.5</td>
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<tr>
<td>3/8&quot;</td>
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<td>4.5</td>
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<td>1/2&quot;</td>
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### Barrel Section

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<tbody>
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<td>1</td>
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<tr>
<td>2</td>
<td>2</td>
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<tr>
<td>3</td>
<td>3</td>
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### End Section

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>SPACING (in)</th>
<th>AREA (in²/ft²)</th>
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<tr>
<td>1/4&quot;</td>
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</tr>
<tr>
<td>1/2&quot;</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

### Bar Size and Cover

- **As0**: Use 1" cover for ASTM design, 1 1/4" cover for IDOT standard and non-standard boxcar design.