THE NOTE WAS REMOVED ON REVISION 10-2021.
Approval of details is not required for projects that follow the Standard Details as outlined in the Plan Set. Contractor's use of "Nonstandard" Precast Box Options and "Nonstandard" End Section options including the use of details and construction not outlined in the Plans shall be submitted as Shop Drawings, certified by a licensed Engineer in the State of Iowa. The Contractor shall allow 30 working days for the Engineer's review and shall not begin fabrication until the Shop Drawing review is completed.

POSSIBLE QUANTITIES NEEDED
REMOVAL OF EXISTING STRUCTURE
EXCAVATION, CLASS 20
PRECAST CONCRETE BOX CULVERT, _____
PRECAST CONCRETE BOX CULVERT STRAIGHT END SECTION, _____
ENGINEERING FABRIC
REVETMENT, CLASS E
MOBILIZATION
GRANULAR BACKFILL
POROUS BACKFILL
FLOWABLE MORTAR
SUBDRAIN
TRAFFIC CONTROL

Revised 01-2023: Added Granular Leveling Material requirements Section 4117 of Standard Spec. and note to burr threads of Concrete Box Ties. Moved Granular Leveling Material Detail onto the sheet. Removed Granular Leveling Material Specifications details outside of sheet border. Corrected typos.
ENGLISHPRECASTCULVERTS.DGN - 1043P - THIS SHEET ISSUED 01-13.

General Notes:

It is the intent of this design to extend the existing _____ with a _____ precast reinforced concrete box culvert.

Electronic copies of original design plans are available to the Contractor as part of the E-files supplied with the contract documents. Dimensions shown on these plans are based on design plans (original Design No. ___).

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.

The precast R.C.B. Culvert sections are designed for HL-93 live load and earth fills of ___ feet.

The precast R.C.B. barrel and end sections shall conform to Iowa D.O.T. Single Precast R.C.B. Culvert Standards. At the Contractor's option, precast barrel sections may conform to ASTM C1577.

Excess Class 20 Excavation material suitable for backfilling shall be stockpiled at the construction site, as directed by the Engineer.

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

The bid item "Removals as Per Plan" shall include all costs for removals of portions of the existing culvert, and the setting of the dowel bars into existing concrete. Removals shall be in accordance with Section 2401 of the Standard Specifications.

All removals shall be carefully accomplished and any concrete damaged by the Contractor that is not to be removed shall be repaired by the Contractor at no extra cost to the State.

The length in linear feet of precast reinforced concrete box culvert will be based on the plan quantity. For the number of linear feet given on the plan, the Contractor will be paid the contract unit price per linear foot. The payment shall be full compensation for furnishing all material, labor and equipment necessary to complete the work except for bid items "Precast Concrete Box Culvert Straight End Section", "Class 20 Excavation", "Class E Revetment", "Reinforcing Steel", "Structural Concrete", and _____.

For each precast concrete box culvert straight end section installed the Contractor will be paid the contract price per each. The payment shall be full compensation for furnishing all material (including lintel beams and curtain walls), labor and equipment necessary to complete the work except for bid items "Precast Concrete Box Culvert", "Class 20 Excavation", "Class E Revetment", "Reinforcing Steel", "Structural Concrete", and ___.

The curtain wall and the Type 3 lintel beam or Type 1 parapet shall be precast.

The Contractor shall furnish and install culvert ties for all precast joints. The main section joints will have one tie on each side of the barrel and the last barrel section will be attached to the end sections with two ties per side. The end section joints will have two ties per side.

Culvert ties shall be included in the cost for precast concrete box culvert. Tie rods will be 1 inch diameter steel and shall meet requirements of ASTM A709 Grade 36 or equal.

Culvert tie assemblies shall be galvanized after fabrication.

The limits for excavation for the precast concrete box culvert shall be as shown on the "Granular Leveling Material Detail".

A minimum of 6 inches of Granular Leveling Material shall be used as bedding for the precast box culvert. The bedding shall be shaped to a flat base using a template. All costs including material and labor associated with providing and installing the Granular Leveling Material shall be included in the bid items "Precast Concrete Box Culvert" and "Precast Box Culvert Straight End Section".

The Granular Leveling Material shall meet the requirements of Section 4117 of the Standard Specifications.

The precast box culvert and extension shall be built to the dimensions and specifications shown in these plans.

The Contractor shall submit details (i.e. Shop Drawings) of the proposed precast concrete box sections for this project. The details shall include the following information as found on Standard Sheet 1089P:

A. A Situation Plan drawing showing the back to back parapet dimension for the line of the culvert sections.
B. Dimension the number of precast sections and section lengths.
C. A detail of the precast barrel sections showing a cross section view of the section, steel locations, dimensions, etc.
D. A detail of the precast concrete culvert end section showing a cross section view of the sections, steel locations, dimensions, etc. similar to the end section details shown in the Iowa D.O.T. Standards.

The Contractor shall provide all information shown on Standard Sheet 1089P.

The Contractor shall allow 30 working days for the Engineer's Shop Drawing review.

The culvert shall be backfilled with flowable mortar. For flowable mortar details and other road work see road sheets in these plans.

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

Removal of the existing C.I.P. culvert shall be as shown in these plans. The walls shall be cut normal to the barrel walls. The removal line shall be initiated with a 2"± deep saw cut on the top and both sides of each wall, and across the top of the floor. This saw cut should cut thru any existing longitudinal reinforcing thereby facilitating a neat non-spalled break line.

The proposed culvert shall be placed 1'-2" away from the concrete removal line shown in these plans.

5z1 x 1'-10" dowel reinforcing bars with a 10 inches minimum embedment into existing concrete shall be set around the entire periphery of the existing culvert. The 5z1 x 1'-10" dowel reinforcing bars shall be centered in the existing slab, walls and floor. The 6w2 and 6w3 dowel reinforcing bars shall be set along the top slab and down the sides with a 6 inches minimum embedment of the existing culvert. All dowels shall be at 1'-0" maximum spacing C-C of dowels. Dowels shall be set with polymer grout in accordance with Article 2301.03, E, of the Standard Specifications, and current Supplemental Specifications of the Iowa D.O.T. Highway Division.

The roadway will be open to traffic during construction.

Since the highway will not be closed to traffic during this construction, the Contractor may decide temporary shoring (sheet pile or other) is necessary to ensure that the shoulder will not slough in while culvert is being extended. However, if for any reason such shoring is deemed necessary, the Contractor will submit the shoring plan to the Engineer for approval. Cost of shoring, if required, will be considered incidental to construction and no direct payment will be made. All material used for shoring shall remain the property of the Contractor. All temporary shoring work shall be in accordance with Article 1107.07 of the Standard Specifications.

Traffic control adjacent to the culvert will be the responsibility of the Contractor constructing the culvert and is to coordinate construction of the culvert with the Contractor doing the grading.

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

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. See Standard Sheet PES 11-20 for details.

Since precast concrete box culvert end sections have the foreslope located at the bottom of the parapet instead of the top (as in the case of cast in place R.C.B. culverts) the main barrel section has been lengthened.

Installation Notes:

Precast concrete box culvert sections shall be laid with the groove end of each section up-grade, and the sections shall be tightly joined. Concrete ties to be used only to hold box sections together, not for pulling sections tight. Joint openings between sections should be as tight as practicable and limited to a maximum of ¾ inch openings. The joint on the bottom of the culvert shall be sealed with a flexible water tight 1 inch butyl rope gasket as per Materials I.M. 491.09.

Butyl rope gasket shall be installed in accordance with the recommendations of the Manufacturer and shall extend vertically 6 inches above the bottom fillet. All joints shall be trimmed clean on the inside after sealing.

Burr threads of Concrete Box Ties without damaging galvanizing to prevent nut rotation after tightening is complete.

The Contractor shall place a 2'-0" wide piece of engineering fabric around the top and sides of each precast joint. The fabric shall be centered with 1'-0" on each side of the joint, the fabric shall be attached to the walls and top of each section to prevent the fabric from slipping off the joint during backfilling operations. Attachment methods shall be approved by the Engineer.

The Granular Leveling Material shall be installed in accordance with Article 2402.03, H, 4, of the Standard Specifications. If larger granular material is installed below the Granular Leveling Material, the Contractor shall place engineering fabric below the Granular Leveling Material to separate the layers. The fabric shall be oversized by a minimum of 1 foot on all edges to contain the granular leveling material.

All costs including material and labor associated with providing and installing the engineering fabric as described above for the joints and underlayment of the Granular Leveling Material shall be included in the bid items "Precast Concrete Box Culvert" and "Precast Box Culvert Straight End Section". The engineering fabric shall be in accordance with Article 4196.01, B, 3, of the Standard Specifications.

Class E revetment will be placed around both precast concrete box culvert end sections, as shown in these plans.

During backfilling the compaction adjacent to the bottom corner radii or chamfer shall be accomplished with a mechanical hand compactor.

The Contractor shall furnish and install lifting hole plugs for each section. Lifting holes shall be plugged with a precast concrete plug or plastic plug approved by the Engineer, sealed and covered with 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.

Specifications:

Design:
AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017.

Construction:
Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, current series, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions

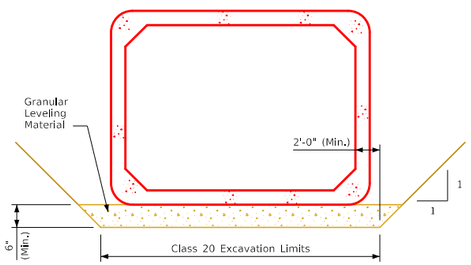
Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017:
Reinforcing steel in accordance with AASHTO LRFD Section 5, Grade 60.
Welded wire reinforcement in accordance with AASHTO LRFD Section 5.
Concrete in accordance with AASHTO LRFD Section 5, f'c for barrel sections as noted on Culvert Barrel Detail Standards, for End Section Design f'c = 5.0 ksi.

Standards:
For details and notes not shown refer to the following Iowa D.O.T. - Highway Standards:

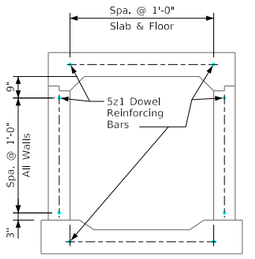
Standard	Issued	Revised
?	?	?

Note to Detailer:
Incorporate CADD Cell E65 for Working Drawing and Calculations Submittals table into plan set.



Granular Leveling Material Detail

Granular Leveling Material shall terminate 3'-0" short of the precast curtain wall.



Section Near Extension

(Showing spacing of 5z1 dowel bars)

Design History at This Site
(Includes This Design)

Des. No.	Type of Work
X	X
X	X
X	X
X	X

Traffic Control Plan

General Notes & Quantites

IOWA DEPARTMENT OF TRANSPORTATION
DESIGN SHEET NO. ___ OF ___ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	Precast Culvert Extension General Notes	Standard Sheet 1043P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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Traffic Control Plan
Note: The roadway will be open to thru traffic. Refer to the Traffic Control Plan shown elsewhere in these plans.

Traffic Control Plan
Note: The roadway will be open to thru traffic. Refer to the Traffic Control Plan on Design Sheet ___.

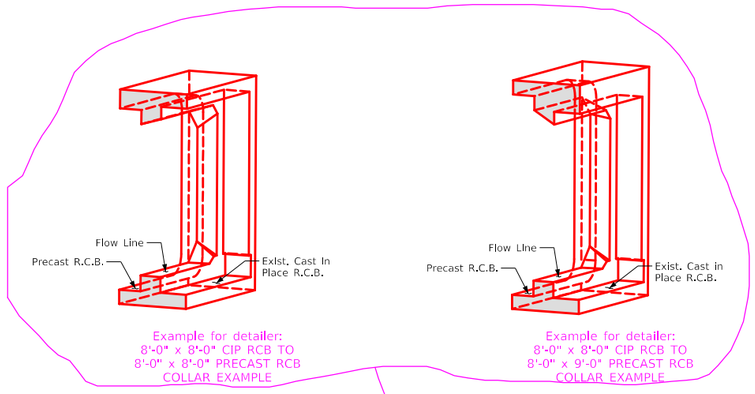
Traffic Control Plan
Note: The roadway will be open to thru traffic. Refer to the Traffic Control Plan on the road plan in these plans.

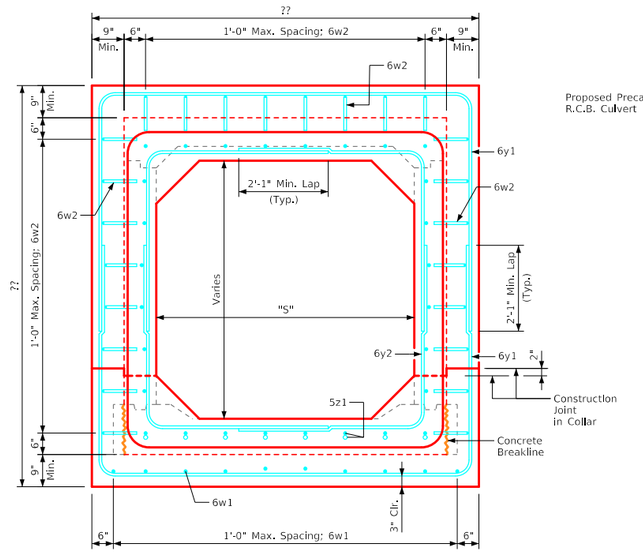
Traffic Control Plan
Note: The roadway will be closed to thru traffic. Road closure will be the responsibility of the road Contractor as shown on the road plans.

Traffic Control Plan
Note: The roadway will be closed to thru traffic. Refer to the Traffic Control Plan shown elsewhere in these plans.

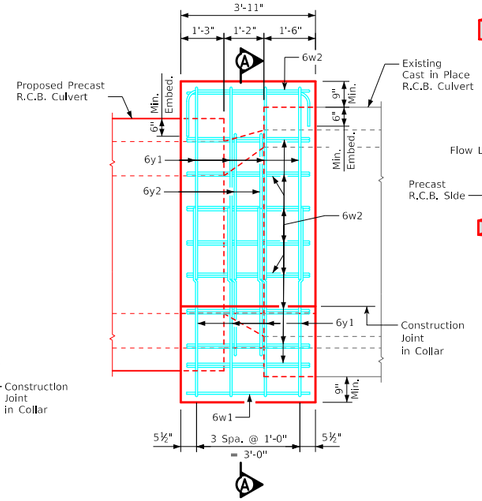
Traffic Control Plan
Note: The roadway will be closed to thru traffic. Refer to the Traffic Control Plan on the road plan in these plans.

Traffic Control Plan
Note: this structure is being constructed on a relocation and the road will not be open to traffic until after completion of construction.

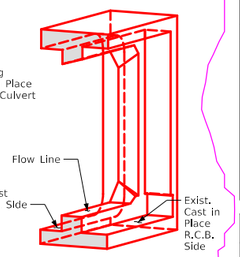




Section A-A



Part Elevation
(Showing Collar Reinforcing)



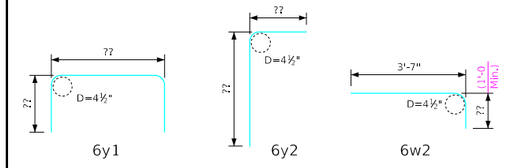
Collar
Part 3D Section
Illustration

(Example for detailer, see outside of sheet border for example of taller Precast RCB ext. to shorter CIP RCB COLLAR EXAMPLE)

Reinforcing Bar List - One Collar

Bar	Location	Shape	No.	Length	Weight
6w1	Longitudinal, Bottom			3'-7"	
6w2	Longitudinal, Sides, Dowel				
6y1	Vertical & Horizontal, Outside Face				
6y2	Vertical & Horizontal, Inside Face				
5z1	Longitudinal, Dowel			1'-10"	
				Total (LB)	

Bent Bar Details



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

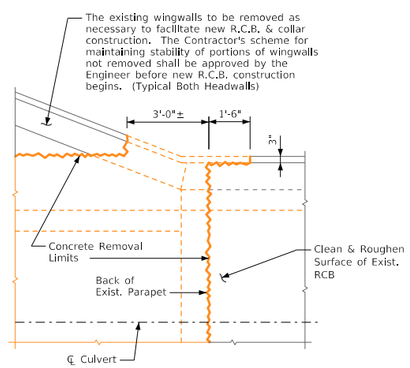
Note:
The 5z1 & 6w2 bars shall be set as dowels in drilled holes. Holes for 5z1 bars are to be 10 inches deep. Holes for 6w2 bars are to be 6 inches deep. The dowels shall be installed in accordance with the Manufacturer's recommendations using a polymer grout system in accordance with Article 2301.03, E, of the Standard Specifications. All bar lengths are to be 2 inches clear from concrete edge to outside of bar, except as noted.

① Barrel reinforcing extended by the Manufacturer may replace dowel bars in proposed precast section. Threaded inserts and threaded bars may also be used as an alternate in the precast section.

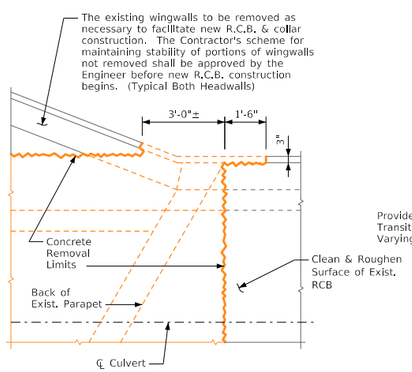
② End of precast section shall be flat but roughened. Omit the tongue and groove joint for this connection.

Concrete Placement Summary

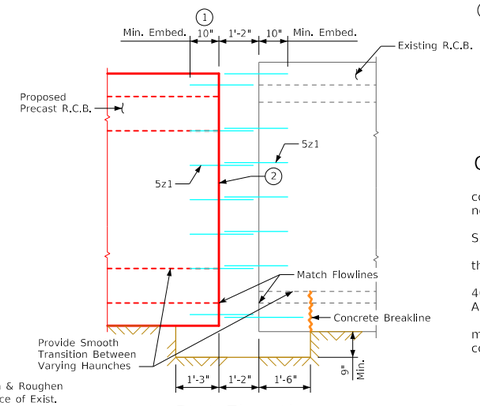
Location	Total
Collar xx @ xx.x CY	??
Total (CY)	??



Part Removal Plan
(Required for 0° Skewed Culverts)



Part Removal Plan
(Required for Skewed Culverts)



Part Elevation
(Showing 5z1 Installation)

Note:
The 5z1 dowels shall be set around the entire periphery of the existing and proposed culvert barrels. Dowels shall be centered in the slab, walls and floor. Dowels shall be at 1'-0" maximum spacing C-C of dowels.

Concrete Mix for Joint Floor:

To insure consolidation of concrete under box culverts, the following concrete mix shall be used in the floor between the existing culvert and the new precast box culvert.

Coarse aggregate shall be in accordance with Article 4112 of the Standard Specifications.

Maximum fly ash replacement shall not exceed 20% by weight (mass) of the cement.

Mix 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 D.

Mix design shall include enough water to produce a readily flowable mixture without exceeding the specified water to cement ratio for Class D concrete. Slump shall not exceed 8 inches.

Precast Culv. Exten. Details

IOWA DEPARTMENT OF TRANSPORTATION

DESIGN SHEET NO. ___ OF ___ FILE NO. _____ DESIGN NO. _____

Revised 04-2018: Updated "Collar Part Section Illustration".
Revised 01-2021: Revised 6w2 bars to "L" shape and removed 6w3 bar to now be the same as the 6w2.
Revised 07-2021: Corrected typos.
ENGLISHPRECASTCULVERTS.DGN - 1044P - THIS SHEET ISSUED 01-13.

DESIGN TEAM	Precast Extension of C.I.P. Culvert Details	Standard Sheet 1044P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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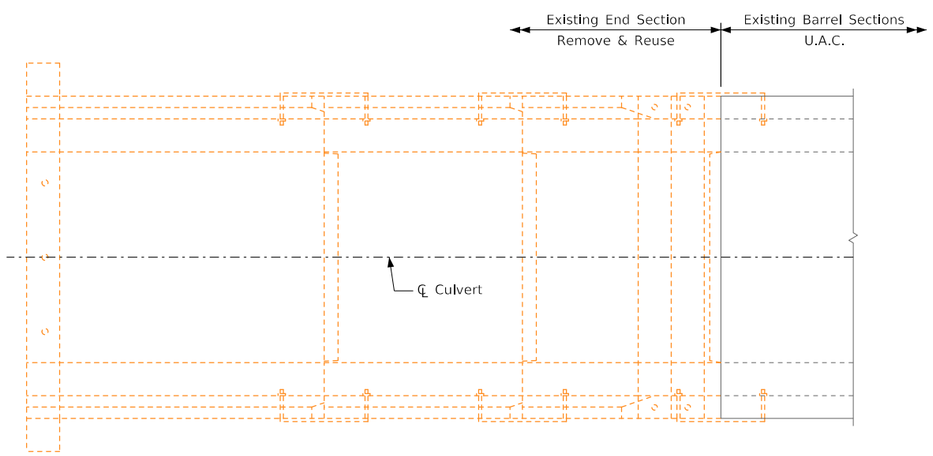
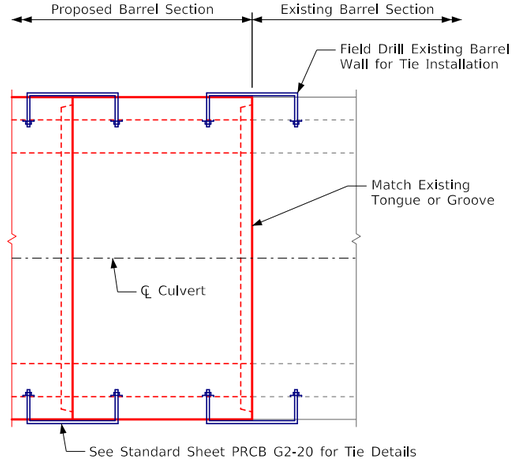
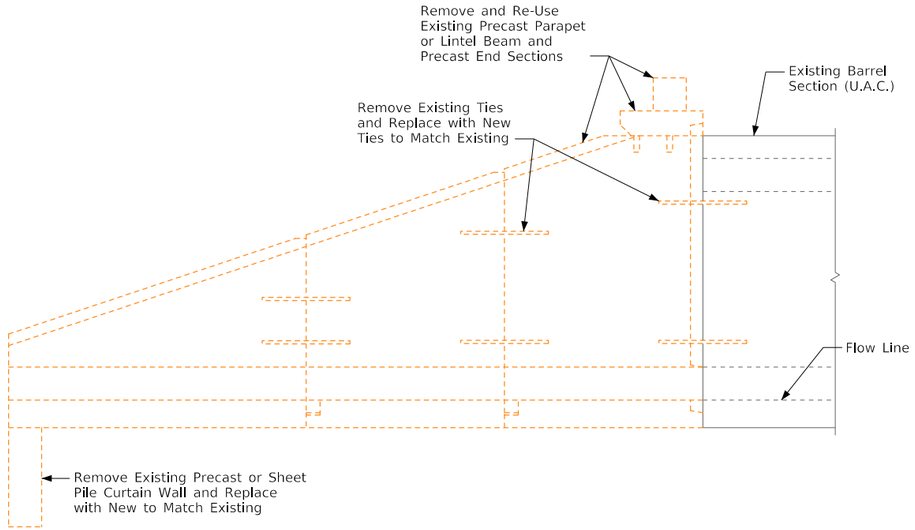


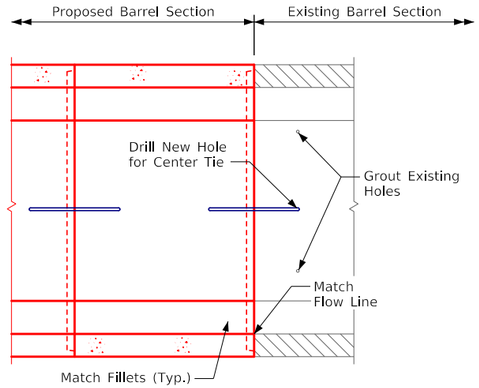
Removal Plan



Plan



Removal Extension



Part Longitudinal Section
(Along ℄ of Culvert)

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 reuse. 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.

Remove precast curtain wall and parapet/lintel beam from end section with 3 inch O.D. core drill. Core through end section floor thickness and parapet/lintel beam thickness at 3 inch Dia. grout locations. Do not core into end section walls and curtain wall. Clean grout from projecting dowel bars and prepare for reinstallation with new grout.

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 holes shall be plugged with a precast concrete plug or plastic plug approved by the Engineer, sealed and covered with 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 tie holes shall be filled with grout.

Tie hole locations for last new barrel section shall be coordinated with existing tie locations in first end section piece.

The lump sum bid item "Remove and Relay Existing End Section" shall include all costs associated with removing, storing, and relaying the existing precast end section, precast curtain wall, precast lintel beam, precast parapet, new box ties, butyl rope gasket and engineering fabric as noted and shown in these plans.

Existing butyl rope gasket and engineering fabric shall not be reused.

Since the highway will not be closed to traffic during this construction, the Contractor may feel temporary shoring (sheet pile or other) is necessary to ensure that the shoulder will not slough in while culvert is being extended. However, if for any reason such shoring is deemed necessary, the Contractor will submit the shoring plan to the Engineer for approval. Cost of shoring if required will be considered incidental to construction and no direct payment will be made. All material used for shoring shall remain the property of the Contractor. In addition to the requirements noted above, Article 1107.07 of the Standard Specifications, still applies.

Contractor shall verify that the tongue and groove joint of the proposed barrel section will allow for proper connection to the existing joint.

Burr threads of Concrete Box Ties without damaging galvanizing to prevent nut rotation after tightening is complete.

Revised 01-2021: Updated notes.
Revised 07-2021: Corrected typos.
Revised 01-2023: Added note to burr threads of Concrete Box Ties.
ENGLISHPRECASTCULVERTS.DGN - 1045P - THIS SHEET ISSUED 01-13.

Precast Culv. Exten. Details

IOWA DEPARTMENT OF TRANSPORTATION
DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	Precast Extension of Precast Culvert Details	Standard Sheet 1045P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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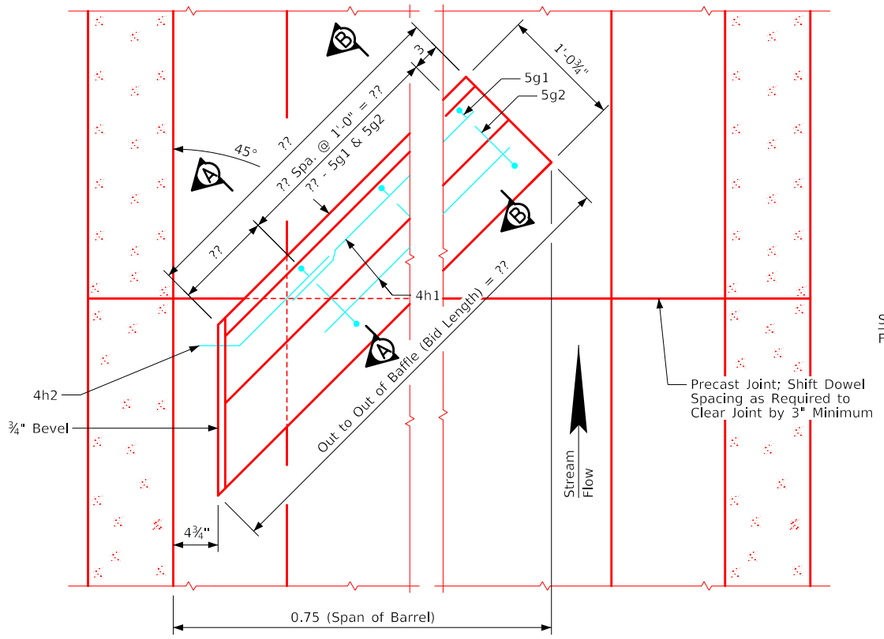
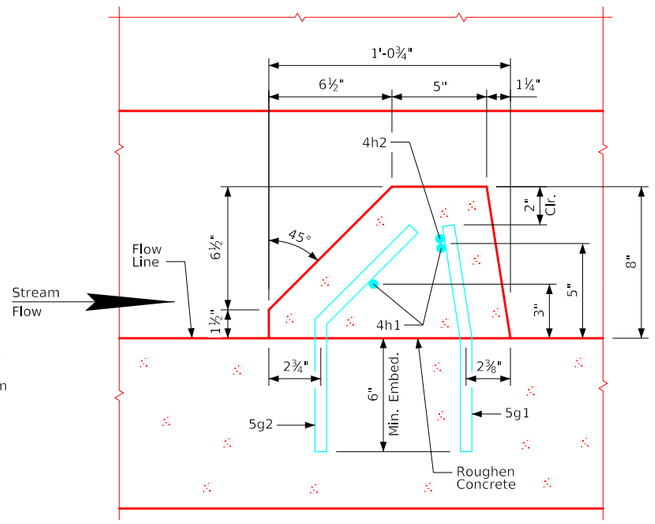
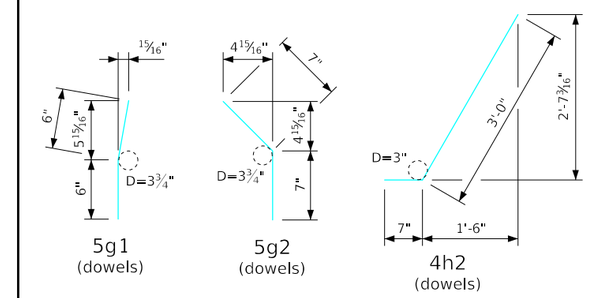


Baffle Plan



Section A-A

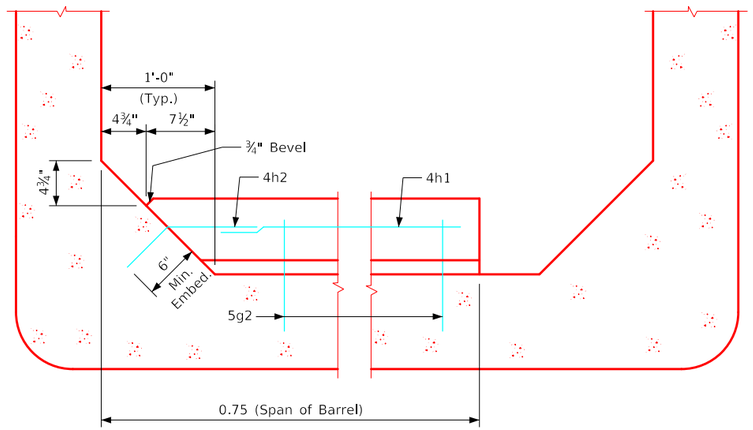
Bent Bar Details



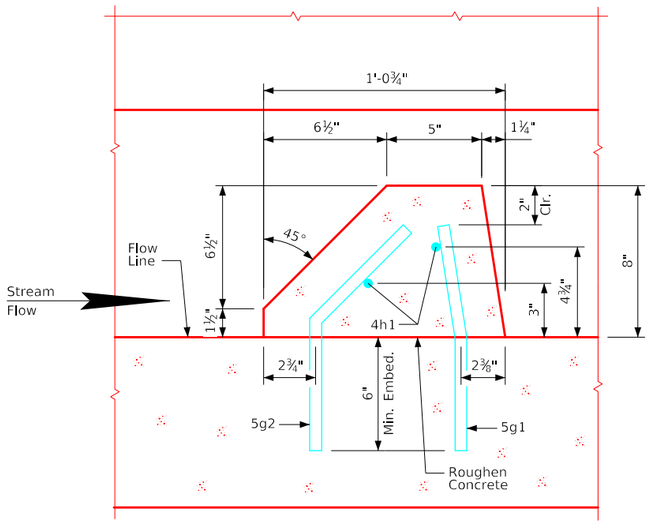
Note: All dimensions are out to out. D = pin diameter.

Baffle Notes:

1. ?? Baffles are to be placed within the precast reinforced concrete box culvert spaced as shown elsewhere 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 inches unless otherwise noted or shown.
3. All concrete is to be Class C.
4. Minimum splice length for the 4h1 and 4h2 bars is 15 inches.
5. The 5g1, 5g2 and 4h2 bars shall be set as dowels in drilled holes. Holes are to be 6 inches 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 should 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 material and all of the equipment and labor required to construct the Baffles in accordance with these plans and current specifications.
8. Cross sectional area of the Baffle is 0.53 square feet.



Baffle Elevation



Section B-B

Baffle Quantities

Item	Unit	Quantity
Baffle for RCB Culvert	L.F.	??

Precast Culv. Baffle Details

IOWA DEPARTMENT OF TRANSPORTATION

DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

Revised 01-2021: Updated 4h bar laps per AASHTO LRFD 8th Ed.
Revised 07-2021: Corrected typos.
ENGLISHPRECASTCULVERTS.DGN - 1060P - THIS SHEET ISSUED 01-13.

DESIGN TEAM	Precast Culvert Baffle Details	Standard Sheet 1060P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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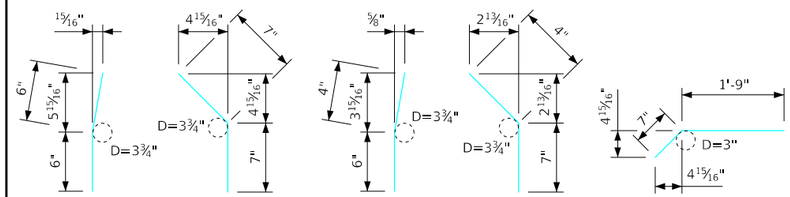
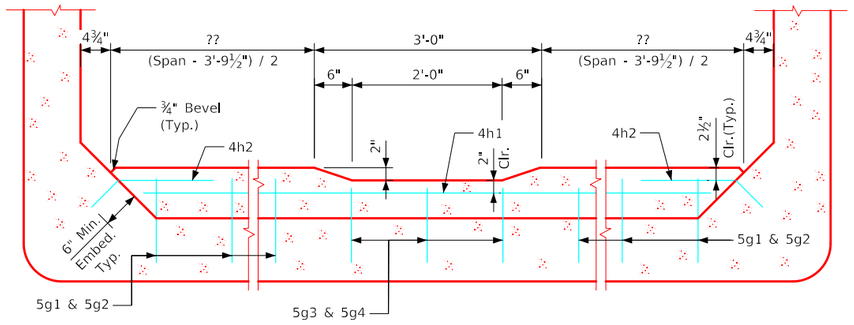
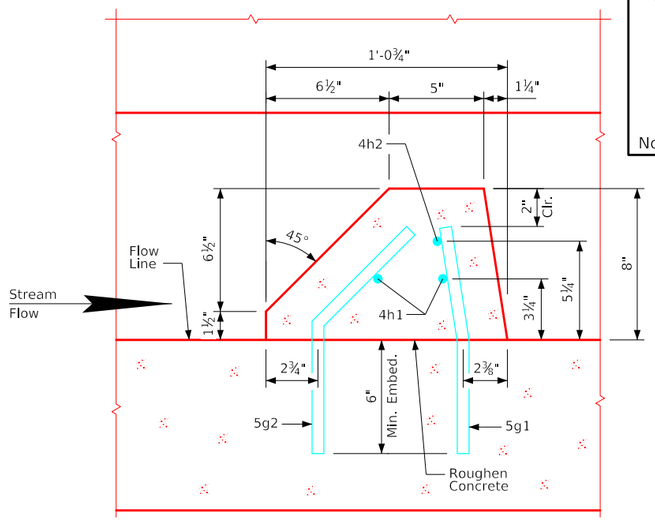
Bent Bar Details



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



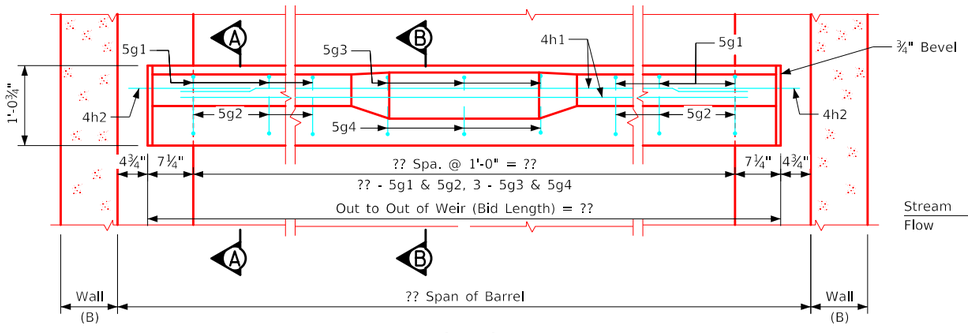
Weir Elevation



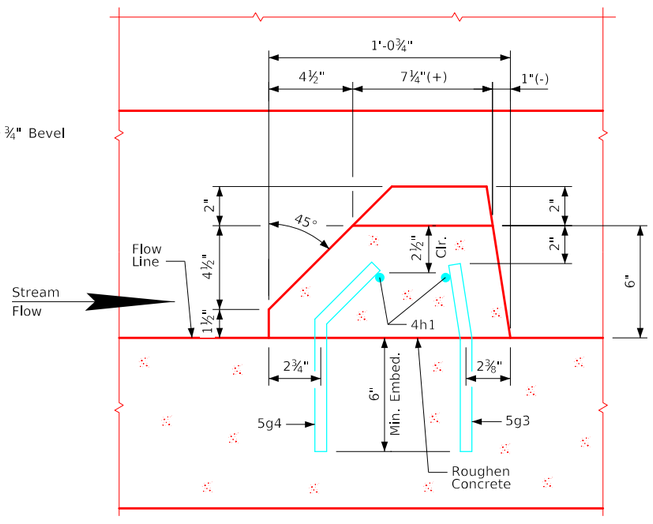
Section A-A

Weir Notes:

1. ??? Weirs are to be placed within the precast reinforced concrete box culvert spaced as shown elsewhere 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 inches unless otherwise noted or shown.
3. All concrete is to be Class C.
4. Minimum splice length for the 4h1 and 4h2 bars is 15 inches.
5. The 5g1, 5g2, 5g3, 5g4 and 4h2 bars shall be set as dowels in drilled holes. Holes are to be 6 inches 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 2403.03, I, of the Standard Specifications.
7. For 6'-0" barrel spans the 4h2 bars shall be field bent to provide 2 inches 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 weir 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 material 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 Plan



Section B-B

Stream Flow

Weir Quantities

Item	Unit	Quantity
Weir for RCB Culvert	L.F.	??

Revised 01-2021: Updated 4h bar laps per AASHTO LRFD 8th Ed.
Revised 07-2021: Corrected typos.
ENGLISHPRECASTCULVERTS.DGN - 1061P - THIS SHEET ISSUED 01-13.

Precast Culv. Weir Details

IOWA DEPARTMENT OF TRANSPORTATION
DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	Precast Culvert Weir Details	Standard Sheet 1061P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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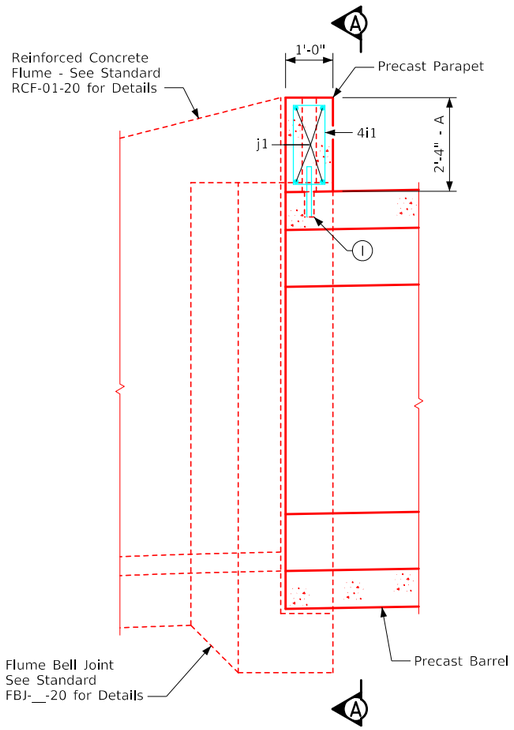
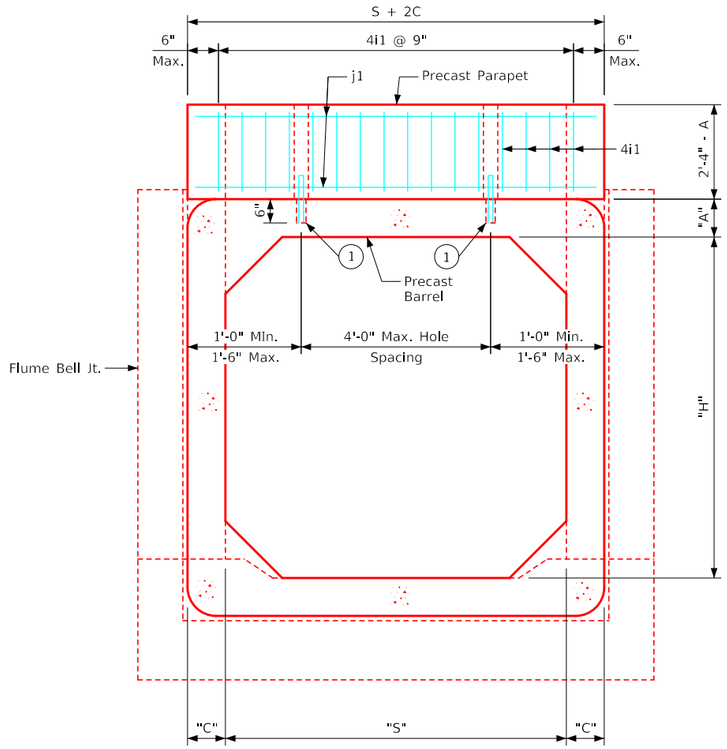


Part Elevation Section

(Section Along Culvert ℄)

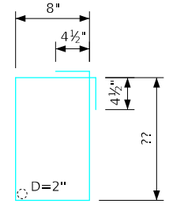


Section A-A

Reinforcing Bar List - One Precast Parapet

Bar	Location	Shape	No.	Length	Weight
4i1	Stirrup				
j1	Longitudinal		4		
				Total (LBS.)	

Bent Bar Details



4i1

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

Notes:

(1) Place No. 8 dowels, 1'-0" long into 2 inch diameter hole in the top of the barrel and 3 inch diameter hole in the precast parapet. Fill holes with grout.

j1 Bar

Span	j1 Bar Size
6'-0"	#5
8'-0"	#6
10'-0"	#6
12'-0"	#7
14'-0"	#7
16'-0"	#8

Revised 01-2021: Added 14'-0 and 16'-0 spans.
Revised 07-2021: Renamed sheet (was "Precast Parapet Details").
ENGLISHPRECASTCULVERTS.DGN - 1073P - THIS SHEET ISSUED 01-13.

Precast Parapet to CIP Flume Details

IOWA DEPARTMENT OF TRANSPORTATION

DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	Precast Culvert Parapet to CIP Flume Details	Standard Sheet 1073P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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Revised 01-2023: Added Granular Leveling Material requirement of Section 4117 of Standard Spec. and note to burr Concrete Box Ties. Removed Granular Leveling Material Spec. details and tables.
ENGLISHPRECASTCULVERTS.DGN - 1081P - THIS SHEET ISSUED 01-13.

General Notes:

It is the intent of this design to construct a ____ x ____ x ____ precast reinforced concrete box culvert skewed ____°____ ahead at stations ____+____.

Electronic copies of original design plans are available to the Contractor as part of the E-files supplied with the contract documents. Dimensions shown on these plans are based on design plans (original Design No. ___).

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.

The precast R.C.B. Culvert sections are designed for HL-93 live load and earth fills of ___ feet.

The precast R.C.B. barrel and end sections shall conform to Iowa D.O.T. Single Precast R.C.B. Culvert Standards. At the Contractor's option, precast barrel sections may conform to ASTM C1577.

Excess Class 20 Excavation material suitable for backfilling shall be stockpiled at the construction site, as directed by the Engineer.

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

When de-watering presents a problem for placing the curtain walls as detailed, alternate methods such as steel sheet pile may be approved but at no additional cost. See Standard Sheet PES 11-20 for details.

The bid item "Removal of Existing Structures" shall include all costs associated with removing the _____. Removals shall be in accordance with Section 2401 of the Standard Specifications.

The length in linear feet of precast reinforced concrete box culvert will be based on the plan quantity. For the number of linear feet given on the plan, the Contractor will be paid the contract unit price per linear foot. The payment shall be full compensation for furnishing all material, labor and equipment necessary to complete the work except for bid items "Precast Concrete Box Culvert Straight End Section", "Class 20 Excavation", "Class E Revetment", and ___.

For each precast concrete box culvert straight end section installed the Contractor will be paid the contract price per each. The payment shall be full compensation for furnishing all material (including lintel beams and curtain walls), labor and equipment necessary to complete the work except for bid items "Precast Concrete Box Culvert", "Class 20 Excavation", "Class E Revetment", and ___.

The curtain wall and the Type 3 lintel beam or Type 1 parapet shall be precast.

The Contractor shall furnish and install culvert ties for all joints. The main section joints will have one tie on each side of the barrel and the last barrel section will be attached to the end sections with two ties per side. The end section joints will have two ties per side.

Culvert ties shall be included in the cost for precast concrete box culvert. Tie rods will be 1 inch diameter steel and shall meet requirements of ASTM A709 Grade 36 or equal. See Standard Sheet G2-20 for details.

Culvert tie assemblies shall be galvanized after fabrication.

The limits for excavation for the precast concrete box culvert shall be as shown on the "Granular Leveling Material Detail".

A minimum of 6 inches of Granular Leveling Material shall be used as bedding for the precast box culvert. The bedding shall be shaped to a flat base using a template. All costs including material and labor associated with providing and installing the Granular Leveling Material shall be included in the bid items "Precast Concrete Box Culvert" and "Precast Box Culvert Straight End Section".

The Granular Leveling Material shall meet the requirements of Section 4117 of the Standard Specifications.

The precast box culvert shall be built to the dimensions and specifications shown in these plans.

The Contractor shall submit details (i.e. Shop Drawings) of the proposed precast concrete box sections for this project. The details shall include the following information as found on Standard Sheet 1089P:

A. A Situation Plan drawing showing the back to back parapet dimension for the line of the culvert sections.
B. Dimension the number of precast sections and section lengths.
C. A detail of the precast barrel sections showing a cross section view of the section, steel locations, dimensions, etc.
D. A detail of the precast concrete culvert end section showing a cross section view of the sections, steel locations, dimensions, etc. similar to the end section details shown in the Iowa D.O.T. Standards.

The Contractor shall provide all information shown on Standard Sheet 1089P.

The Contractor shall allow 30 working days for the Engineer's Shop Drawing review.

Since precast concrete box culvert end sections have the foreslope located at the bottom of the parapet instead of the top (as in the case of cast in place RCB culverts) the main barrel section has been lengthened.

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

Installation Notes:

Precast concrete box culvert sections shall be laid with the groove end of each section up-grade, and the sections shall be tightly joined. Concrete ties to be used only to hold box sections together, not for pulling sections tight. Joint openings between sections should be as tight as practicable and limited to a maximum of ¾ inch openings. The joint on the bottom of the culvert shall be sealed with a flexible water tight 1 inch butyl rope gasket as per Materials I.M. 491.09.

Butyl rope gasket shall be installed in accordance with the recommendations of the Manufacturer and shall extend vertically 6 inches above the bottom fillet. All joints shall be trimmed clean on the inside after sealing.

Burr threads of Concrete Box Ties without damaging galvanizing to prevent nut rotation after tightening is complete.

The Contractor shall place a 2 foot wide piece of engineering fabric around the top and sides of each precast joint. The fabric shall be centered with 1 foot on each side of the joint, the fabric shall be attached to the walls and top of each section to prevent the fabric from slipping off the joint during backfilling operations. Attachment methods shall be approved by the Engineer.

The Granular Leveling Material shall be installed in accordance with Article 2402.03, H, 4, of the Standard Specifications. If larger granular material is to be installed below the Granular Leveling Material, the Contractor shall place engineering fabric below the Granular Leveling Material to separate the layers. The fabric shall be oversized by a minimum of 1 foot on all edges to contain the Granular Leveling Material.

All costs including material and labor associated with providing and installing the engineering fabric as described above for the joints and underlayment of the Granular Leveling Material shall be included in the bid items "Precast Concrete Box Culvert" and "Precast Box Culvert Straight End Section". The engineering fabric shall be in accordance with Article 4196.01, B, 3, of the Standard Specifications.

Class E revetment will be placed around both precast concrete box culvert end sections, as shown in these plans.

During backfilling the compaction adjacent to the bottom corner radii or chamfer shall be accomplished with a mechanical hand compactor.

The Contractor shall furnish and install lifting hole plugs for each section. Lifting holes shall be plugged with a precast concrete plug or plastic plug approved by the Engineer, sealed and covered with 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.

Specifications:

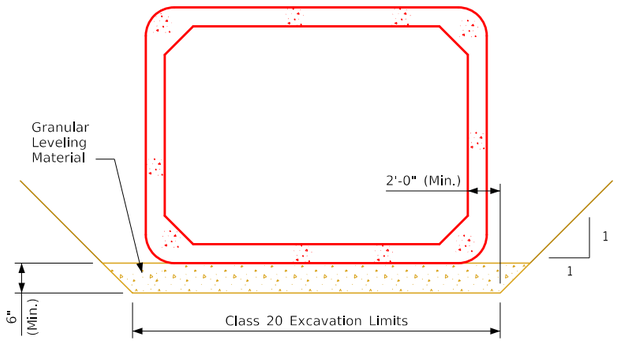
Design:
AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017.

Construction:
Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, current series, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions

Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017:
Reinforcing steel in accordance with AASHTO LRFD Section 5, Grade 60.
Concrete in accordance with AASHTO LRFD Section 5, f'c for barrel sections as noted on Culvert Barrel Detail Standards, for End Section Design f'c = 5.0 ksi.

Note to Detailer:
Incorporate CADD Cell E65 for Working Drawing and Calculations Submittals table into plan set.



Granular Leveling Material Detail

Granular Leveling Material shall terminate 3'-0" short of the precast curtain wall.

Standards:
For details and notes not shown refer to the following Iowa D.O.T. - Highway Standards:

Standard	Issued	Revised
?	?	?

Traffic Control Plan

General Notes & Quantites

IOWA DEPARTMENT OF TRANSPORTATION
DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	Precast Culvert General Notes	Standard Sheet 1081P	COUNTY	PROJECT NUMBER	SHEET NUMBER

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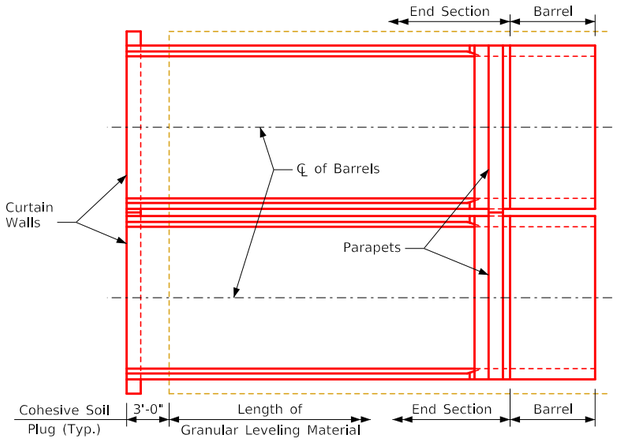
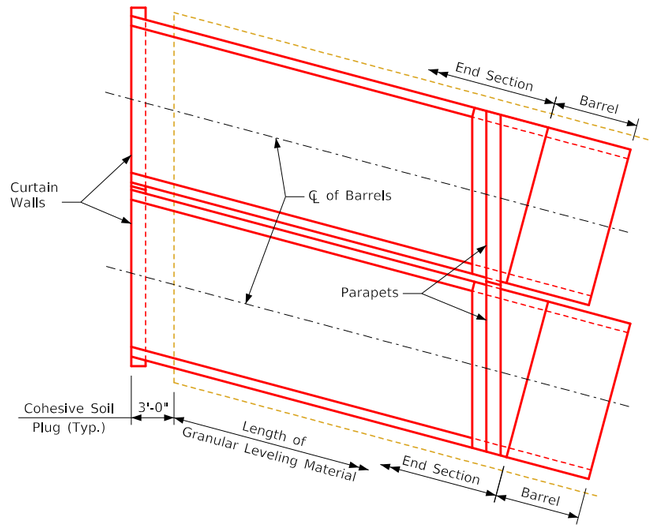


Typical Plan View - 0° Skew Example

Granular Leveling Material shall terminate 3'-0" short of the precast curtain wall.



Typical Plan View - Skewed Example

Granular Leveling Material shall terminate 3'-0" short of the precast curtain wall.

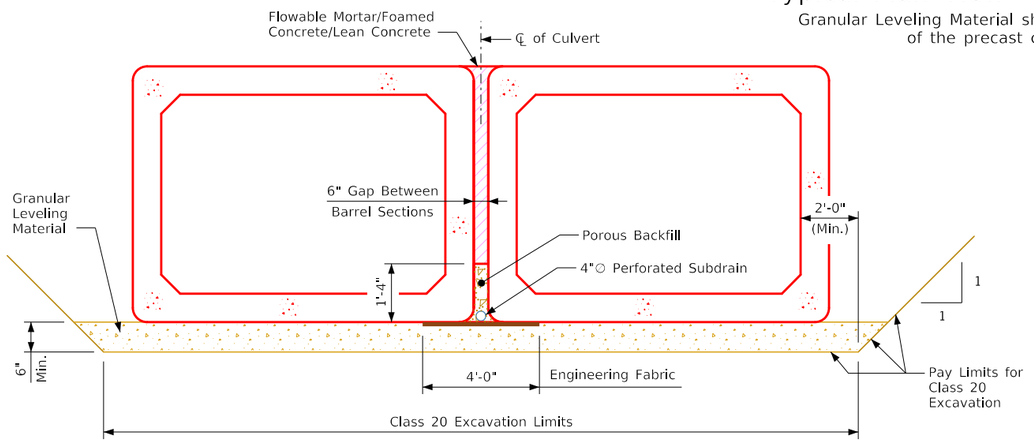
Side-by-Side Precast Culvert Notes:

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 inside of the barrel wall.
2. Burr threads of Concrete Box Ties without damaging galvanizing to prevent nut rotation after tightening is complete.
3. The Type 1 parapets length shall be increased so the adjoining ends will abut against each other at the centerline of culvert for side-by-side precast culvert structures.
4. The Type 3 lintel beams and parapets length shall be increased so the adjoining ends will abut against each other at the centerline of culvert for side-by-side precast culvert structures.
5. The curtain walls length shall be shortened so the adjoining ends will abut against each other at the centerline of culvert for side-by-side precast culvert structures.
6. Engineering fabric shall be in accordance with Article 4196.01, B, 3, of the Standard Specifications. A 4'-0" wide strip of engineering fabric shall be placed on top of the granular leveling material and the cohesive soil. Engineering fabric shall be placed the full length of the precast culvert. The engineering fabric shall be centered over the centerline of culvert and pinned or otherwise secured in place 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 Section".
7. The 4 inch diameter perforated subdrain shall terminate and be capped at the upstream end 3'-0" short of the end of the apron of the end section. The subdrain shall outlet downstream at the end of the apron of the end section. The subdrain shall be surrounded by porous backfill in accordance with Section 4131 of the Standard Specifications. No compaction of the porous backfill is required. All costs including material and labor associated with providing the 4 inch diameter perforated subdrain and installing it as required shall be included in the bid items "Precast Concrete Box Culvert" and "Precast Concrete Box Culvert Straight End Section".

Flowable Mortar/Foamed Concrete/Lean Concrete Option Notes:

At the Contractor's option, the porous backfill and concrete cap may be replaced with flowable mortar backfill as shown in the flowable mortar option details. Only the options and materials designated on this sheet are allowed. All other options and materials are prohibited.

The flowable mortar including material and labor is included in the bid items "Precast Concrete Box Culvert" and "Precast Concrete Box Culvert Straight End Section".

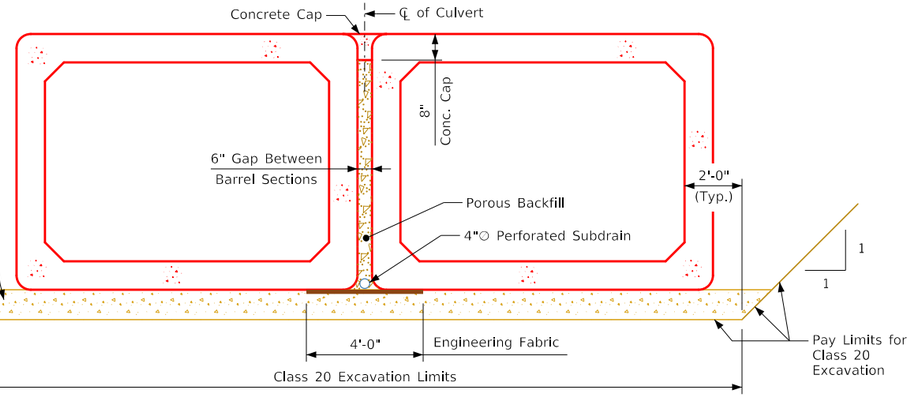


Granular Leveling Material Details / Flowable Mortar Option

Barrel section displayed. End section details not shown.

The porous backfill shall be placed between the precast barrel walls as shown on the Granular Leveling Material Detail. Porous backfill shall also be placed between the end sections up to 1'-4" from the bottom of the end sections and 3'-0" short of the end of the apron of the end section. The porous backfill shall be in accordance with Section 4131 of the Standard Specifications.

Flowable mortar shall be placed on top of the porous backfill between the precast culverts to the top of the barrel slabs, the top of the end section walls, and to a 3'-0" depth at the ends of the apron end sections.

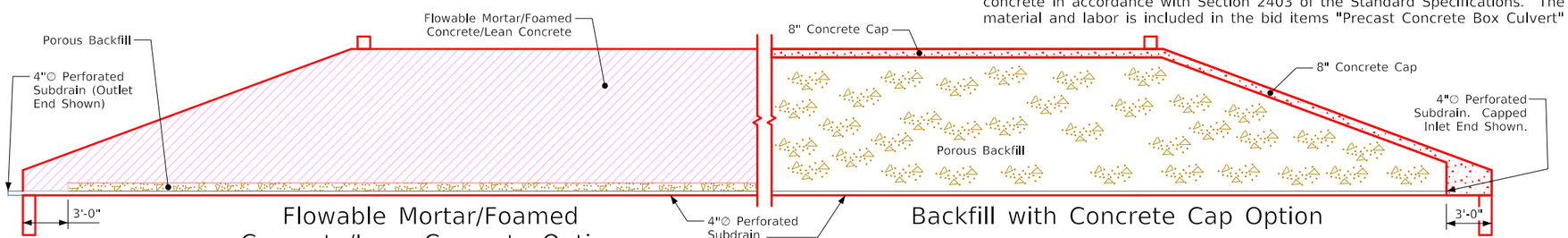


Granular Leveling Material Details / Concrete Cap Option

Barrel section displayed. End section details not shown.

Porous backfill shall be placed between the precast barrel walls up to 8 inches from the top of the barrel slabs. Porous backfill shall also be placed between the end sections up to 8 inches from the top of the walls and 3'-0" short of the end of the apron of the end section. The porous backfill shall be in accordance with Section 4131 of the Standard Specifications.

A concrete cap shall be placed on top of the porous backfill between the precast culverts for a depth of 8 inches from the top of the barrel slabs, the top of the end section walls, and to a 3'-0" depth at the ends of the apron of the end sections. The concrete shall be Class C concrete in accordance with Section 2403 of the Standard Specifications. The concrete cap, approximately 0.03 Cu. Yds. per foot, including material and labor is included in the bid items "Precast Concrete Box Culvert" and "Precast Concrete Box Culvert Straight End Section".



Flowable Mortar/Foamed Concrete/Lean Concrete Option

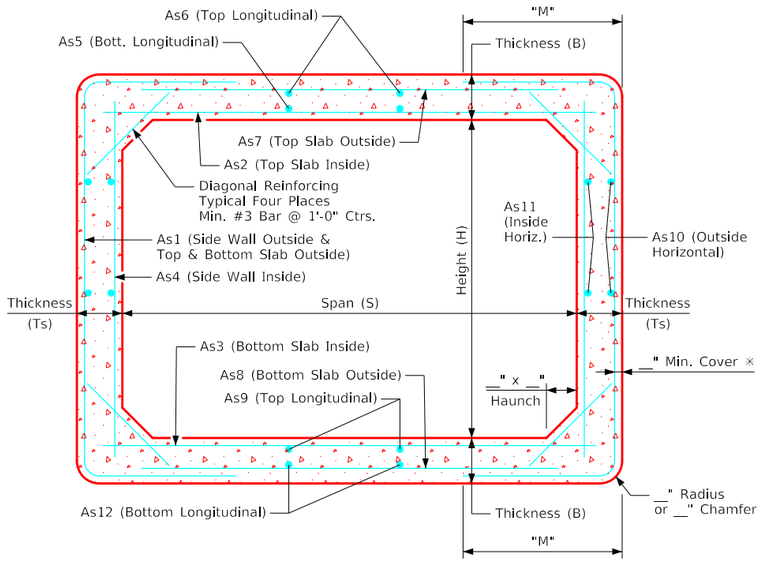
Engineering Fabric not Shown

Backfill with Concrete Cap Option

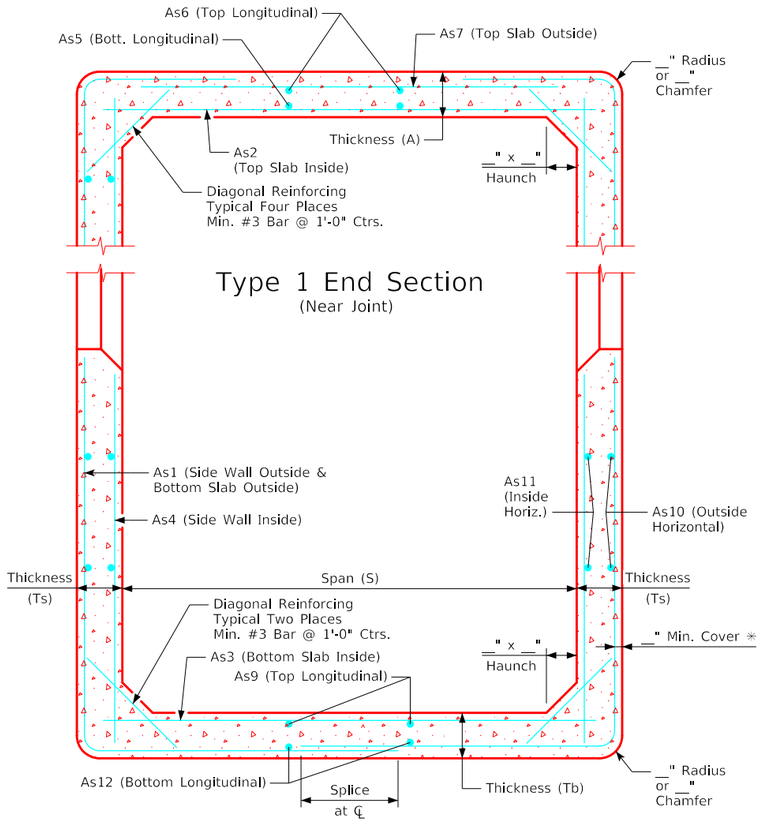
Bedding and Gap Backfill Details

Revised 08-2022: Added statement to the Flowable Mortar/Foamed Concrete/Lean Concrete Option notes regarding "only the options and materials designated on the sheet are allowed. All other options and materials are prohibited".
Revised 01-2023: Added Note 2 stating to burr threads of Concrete Box Ties. Note 3, 4, 5, 6 and 7 were 2, 3, 4, 5 and 6 respectively. Adjusted details to fit additional note.
ENGLISHPRECASTCULVERTS.DGN - 1082P - THIS SHEET ISSUED 02-13.

DESIGN TEAM	Side-by-Side Precast Culvert Details	Standard Sheet 1082P	COUNTY	PROJECT NUMBER	SHEET NUMBER



Barrel Section



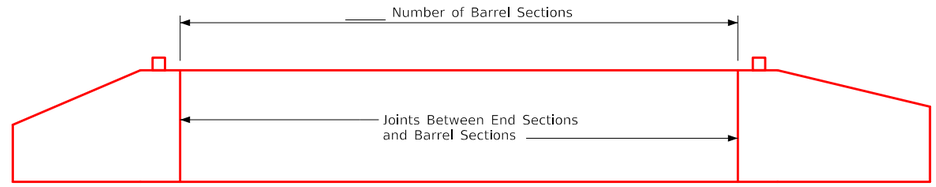
Type 1 End Section
(Near Joint)

Type 1 and 3 End Sections

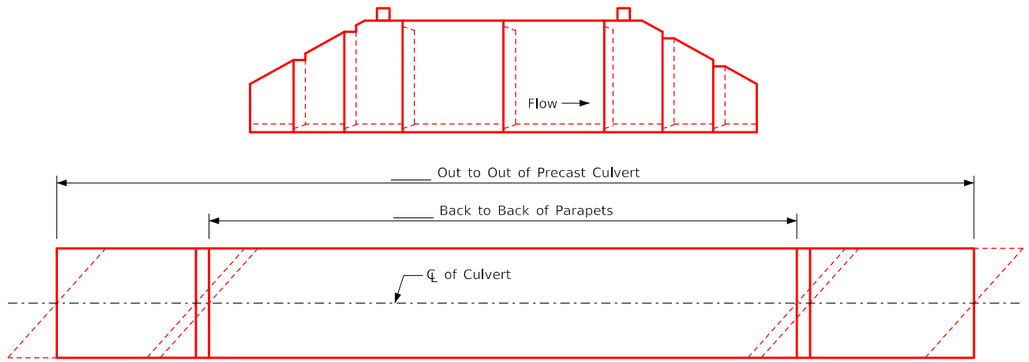
Note:
Dimension "M" begins at the outside edge of the wall for Iowa D.O.T. Single Precast R.C.B. Culvert Standards. The "M" dimension for the ASTM Standards begins at the reinforcing clear distance from the outside edge of the wall.

Minimum laying length shall be 4'-0".

✳ Use 1 inch cover for ASTM design, 1½ inch cover for Iowa D.O.T. standard and non-standard design.



Elevation View
(Show the Number of Barrel and End Sections)



Plan View for Barrel Section
(Show Overall Length and Back to Back of Parapets)

____ ft. x ___ ft. x ____ ft. Culvert

Barrel Section

Design Earth Cover, ft	f'c ksi	A in.	B in.	C in.	M in.	Circumferential Reinforcement	As1 L1	As1 L2	As2 L1	As2 L2	As3 L1	As3 L2	As4 L1	As4 L2	As5 L1	As5 L2	As6 L1	As6 L2	As7 L1	As7 L2	As8 L1	As8 L2	As9 L1	As9 L2	As10 L1	As10 L2	As11 L1	As11 L2	As12 L1	As12 L2
						Bar Size																								
						Spacing (in.)																								
						Area (in.²/ft)																								

End Section

f'c ksi	Ts in.	Tb in.	A in.	Circumferential Reinforcement	As1 L1	As1 L2	As2 L1	As2 L2	As3 L1	As3 L2	As4 L1	As4 L2	As5 L1	As5 L2	As6 L1	As6 L2	As7 L1	As7 L2	As9 L1	As9 L2	As10 L1	As10 L2	As11 L1	As11 L2	As12 L1	As12 L2	Length of Splice @ ℄
				Bar Size																							
				Spacing (in.)																							
				Area (in.²/ft)																							

Precast Box Option - Check If Applicable: Astm C1577 Standard ☐

Reinforcement Type - Check One: Plain WWR (65 ksi) ☐ Deformed WWR (70 ksi) ☐
ASTM Standard Reinforcing Bars (60 ksi) ☐

End Section Type - Check One: Type 1 ☐ Type 3 ☐

Revised 07-2021: Correct typos.
Revised 10-2021: Removed note referring to Loading, Design Methods and Materials. Added minimum laying length note. Removed "check boxes" in table for Iowa DOT Standard or Non-Standard Precast Box Option.
ENGLISHPRECASTCULVERTS.DGN - 1089P - THIS SHEET ISSUED 01-13.