Metal Culvert Sloped End Section and Connection to Circular Concrete Pipe

**End View**

- **Reinforced Edge (Typ.):**
- **Toe Plate Extension:**
- **Hole Spacing for Attaching Toe Plate Extension:** 12" Max.
- **Overall Width:**

**Side View**

- **Longitudinal Tube:**
- **Cross Tube (Typ.):**
- **Tapered Sleeve:**
- **MDOT:**
- **Outfall Label Stamped into Steel:** (Label placed on the inside of the end section at the springline of the pipe) (Lettering: 1½" High x 1" Wide x ½" Deep)
- **See Notes:**

**Metal Culvert Sloped End Section for Elliptical Concrete Pipe**

**End View**

- **Reinforced Edge (Typ.):**
- **Toe Plate Extension:**
- **Hole Spacing for Attaching Toe Plate Extension:** 12" Max.
- **Overall Width:**

**Side View**

- **Longitudinal Tube:**
- **Cross Tube (Typ.):**
- **Tapered Sleeve:**
- **MDOT:**
- **Outfall Label Stamped into Steel:** (Label placed on the inside of the end section at the springline of the pipe) (Lettering: 1½" High x 1" Wide x ½" Deep)
- **See Notes:**

**Metal Culvert Sloped End Section and Connection to Circular Concrete Pipe**
TAPERED SLEEVE FOR ELLIPTICAL PIPE
(METAL END SECTION)

TAPERED SLEEVE FOR CIRCULAR PIPE
(METAL END SECTION)

NOTE:
TAPERED SLEEVE SHALL BE MADE TO FIT TONGUE OR GROOVE END
OF PIPE.
THE CONNECTION JOINT BETWEEN THE EXISTING PIPE AND THE
METAL SLOPED END SECTION MUST BE WRAPPED WITH GEOTEXTILE
BLANKET 36" WIDE WITH A 12" OVERLAP.

TOP VIEW OF TAPERED SLEEVE FOR
CONNECTING METAL CULVERT SLOPED END SECTION
TO CONCRETE PIPE OR CORRUGATED POLYETHLYNE PIPE
MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT

STANDARD PLAN FOR

CULVERT

SLOPED END SECTIONS

(CONCRETE AND METAL)

CONNECTOR STRAP LENGTH AS NEEDED

0.109" MINIMUM THICKNESS

CROSS TUBE

LENGTH AS NEEDED

1" x 3/8" SLOTTED HOLE
FOR 1/4" DIA.
HEX HEAD BOLT
(TYP.)

MATCH SLOPED END SECTION SIDES.

FLATTEN END THEN BEND OUTSIDE 4" TO
MATCH SLOPED END SECTION SIDES.

DIAMETER BOLT

DIAMETER HOLE FOR

0.109" THICKNESS

MINIMUM

DIAMETER SQUARE NECK BOLT

CONNECTOR STRAP

MATCH SLOPED END SECTION SIDES.

FLATTEN END THEN BEND OUTSIDE 4" TO
MATCH SLOPED END SECTION SIDES.

CONNECTOR STRAP

CONNECTOR STRAP

LONGITUDINAL TUBE

48" MAX.

PIPE OR TAPERED SLEEVE

SLEEVE PIPE OR TAPERED

CONNECTOR STRAP

CONNECTOR STRAP

SLEEVE PIPE OR TAPERED

CONNECTOR STRAP

TYPE 1A CONNECTOR

FOR USE ON CIRCULAR PIPE DIAMETERS 15" THROUGH 24"

TYPE 2 CONNECTOR

FOR USE ON CIRCULAR PIPE DIAMETERS 27" THROUGH 60"

AND FOR ALL ARCH AND ELLIPTICAL PIPE SIZES

SECTION A - A

FOR PLAN VIEW SEE SHEETS 1 AND 2

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT

STANDARD PLAN FOR

CULVERT

SLOPED END SECTIONS

(CONCRETE AND METAL)
NOTE:
IN LONGITUDINAL DRAINAGE SITUATIONS, CROSS TUBES ARE REQUIRED AT A 24" MAXIMUM SPACING. THE NUMBER OF CROSS TUBES REQUIRED WILL VARY DEPENDING ON THE LENGTH OF THE CULVERT SLOPED END SECTION.

OUTFALL LABEL STAMPED INTO STEEL
(LABEL PLACED ON THE INSIDE OF THE END SECTION AT THE SPRINGLINE OF THE PIPE)
(LETTERING: 1/2" HIGH x 1" WIDE x 1/4" DEEP)
SEE NOTES

NOTE:
IN TRANSVERSE DRAINAGE SITUATIONS, NO TUBES ARE REQUIRED WHEN THE "W" DIMENSION IS 30" OR LESS. CROSS TUBES ARE REQUIRED WHEN THE CLEAR SPAN DIMENSION IS LARGER THAN 30". THE NUMBER OF CROSS TUBES WILL VARY DEPENDING ON THE LENGTH OF THE LONGITUDINAL TUBE REQUIRED. WHEN THE "W" DIMENSION IS 36" TO 60", ONE LONGITUDINAL TUBE IS REQUIRED. WHEN THE "W" DIMENSION IS LARGER THAN 60", TWO LONGITUDINAL TUBES EQUALLY SPACED ARE REQUIRED. LONGITUDINAL TUBES SHALL BE WELDED TO CROSS TUBES TO ATTAIN A SINGLE PIECE STRUCTURE.

METAL CULVERT SLOPED END SECTION SHOWING CROSS TUBES USED FOR LONGITUDINAL DRAINAGE INSTALLATIONS

OUTFALL LABEL STAMPED INTO STEEL
(LABEL PLACED ON THE INSIDE OF THE END SECTION AT THE SPRINGLINE OF THE PIPE)
(LETTERING: 1/2" HIGH x 1" WIDE x 1/4" DEEP)
SEE NOTES

METAL CULVERT SLOPED END SECTION SHOWING CROSS TUBES USED FOR TRANSVERSE DRAINAGE INSTALLATIONS (CONNECTED TO CONCRETE PIPE SHOWN)
Concrete Culvert Sloped End for Circular Pipe

Concrete Culvert Sloped End Sections for Circular Pipes

<table>
<thead>
<tr>
<th>Pipe Dia. (Inches)</th>
<th>Slope</th>
<th>Dimensions (Inches)</th>
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<td>0  57  25  5  8</td>
</tr>
<tr>
<td></td>
<td>4:1</td>
<td>28  55  28  5  8</td>
</tr>
<tr>
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<td>4:1</td>
<td>47  127  51  5  8</td>
</tr>
<tr>
<td></td>
<td>6:1</td>
<td>47  183  51  5  8</td>
</tr>
</tbody>
</table>

Michigan Department of Transportation
Bureau of Development Standard Plan for
Culvert Sloped End Sections
(Concrete and Metal)
STEEL REINFORCEMENT FOR CONCRETE CULVERT SLOPED END

NOTES:

- ALL STEEL REINFORCEMENT SHALL BE #4 BARS

- HORIZONTAL STEEL SHALL MEET THE REQUIREMENTS IN THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

- GALVANIZED STEEL SHALL MEET THE REQUIREMENTS IN THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

- GALVANIZED TOE PLATE EXTENSIONS ARE REQUIRED ON METAL CULVERT SLOPED END SECTIONS WHEN INDICATED ON THE PLANS OR BY AUTHORIZATION WHEN EITHER HEIGHT OF FILL IS 10'-0" OR MORE OR WHEN THE CULVERT GRADE IS 10% OR MORE. THEY SHALL BE MATCHED-PUNCHED TO FIT HOLES IN TOE PLATE AND SUPPLIED LOOSE, COMPLETE WITH 3/8" DIAMETER GALVANIZED BOLTS. TOE PLATE EXTENSIONS SHALL BE THE SAME THICKNESS AS THE METAL CULVERT SLOPED END SECTION. LENGTH OF TOE PLATE EXTENSION IS "OVERALL WIDTH" LESS 6".

- CORRUGATED METAL PIPES, ARCHED PIPES, AND SMOOTH TAPERED SLEEVES THAT ARE SHOWN ON THIS PLAN HAVE 2¼" x ¼" CORRUGATIONS. EQUIVALENT PIPE AND SLEEVE SIZES WITH 3" x 1" OR 5" x 1" CORRUGATIONS WILL BE ALLOWED.

- FOR BOTH METAL AND CONCRETE CULVERT SLOPED END SECTIONS, CROSS AND LONGITUDINAL BARS/TUBES SHALL BE SCHEDULE 40 GALVANIZED PIPE. A.S.T.M. A53.

- WHEN PARALLEL BARS/TUBES ARE WELDED TO CROSS TUBES, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED ACCORDING TO SECTION 716 OF THE STANDARD SPECIFICATIONS.

- SLOTTED HOLES FOR PARALLEL TUBE ATTACHMENT SHALL BE PROVIDED FOR ALL METAL CULVERT SLOPED END SECTIONS.

- SMOOTH TAPERED SLEEVES (FOR METAL END SECTIONS) SHALL BE GALVANIZED AND HAVE A MINIMUM THICKNESS AS FOLLOWS:
  - 0.078" FOR NOMINAL PIPE DIAMETERS LESS THAN 27"
  - 0.109" FOR NOMINAL PIPE DIAMETERS 27" AND LARGER
  - 0.078" FOR ELLIPTICAL PIPES LESS THAN 24" x 38"
  - 0.109" FOR ELLIPTICAL PIPES 24" x 36" AND LARGER

- ANY SEAMS IN SMOOTH TAPERED SLEEVES SHALL BE BUTT WELDED.

- A TYPE 2 CONNECTOR (FOR METAL END SECTIONS) DESIGNATED FOR ROUND PIPES 27" AND LARGER MAY BE USED ON SMALLER PIPE SIZES.

- OUTFALL LABEL TO BE USED ONLY WHERE STORMWATER WILL DISCHARGE DIRECTLY TO THE WATERS OF THE STATE.