SECTION A - A
TYPICAL MANHOLE

PLAN VIEW

SECTION A - A
BOTTOM SECTION FOR DROP MANHOLE

TYPICAL PRECAST REINFORCED DRAINAGE STRUCTURES

STEEL REINFORCEMENT SHALL BE AS SPECIFIED IN CURRENT ASTM C-478 (TYP.)

DETAIL FOR
1'-4" & 2'-0" TOP SECTIONS
SHAPE MAY VARY FROM DETAIL SHOWN BUT MUST COMPLY WITH ASTM C-478 AND JOINTS SHALL BE COMPATIBLE WITH THE RISER

CONCRETE FOOTING SHALL BE 8" THICK FOR DEPTHS TO 25'-0" AND 1'-0" THICK FOR DEPTHS OVER 25'-0"

SEPARATE BASE OPTION

STEEL REINFORCEMENT (SEE NOTES)

INTEGRAL BASE OPTION

STEEL REINFORCEMENT (SEE NOTES)

CONCRETE FOOTING SHALL BE 6" THICK FOR DEPTHS TO 25'-0" AND 1'-0" THICK FOR DEPTHS OVER 25'-0"

SECTION A - A
TYPICAL MANHOLE

PRECAST REINFORCED CONCRETE SHOWN
OTHER OPTIONS INCLUDE CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE WALL SECTIONS
SEE TYPICAL WALL SECTIONS FOR WALL THICKNESS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
DRAINAGE STRUCTURES

DEPARTMENT DIRECTOR
Kirk T. Sloude

APPROVED BY:
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:
DIRECTOR, BUREAU OF DEVELOPMENT

Michigan Department of Transportation
PREPARED BY: DESIGN DIVISION
DRAWN BY: B.L.T.
CHECKED BY: J.R.P.
HALF SECTION A - A

TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING

PLACE CASTING ON INLET AS SPECIFIED ON PLANS

FOR PLACEMENT OF STEPS SEE MANHOLE DETAILS

SECTION B - B

INLET

SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

PRECAST SUMP FOR PRECAST RISERS

SECTION A - A

SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

PRECAST SUMP FOR BRICK OR BLOCK CONSTRUCTION

SECTION A - A

SEE TYPICAL BRICK AND BLOCK SECTION FOR SIZE AND BASE OPTIONS

PRECAST SUMP FOR 2'-0" DIA. STRUCTURES

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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**PRECAST REINFORCED CONCRETE FLAT SLAB TOP FOR PRECAST CONCRETE STRUCTURE, 2' x 4' CASTING**

**SECTION A - A**

- D bars may be bent at a smaller radius rather than paralleling the radius in the drain opening.
- D bars at 0.20 in² at 90° (typ.)

**SECTION B - B**

- D bars at 0.20 in² at 90°

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**TABLE OF DIMENSIONS**

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<tr>
<th>Structure Diameter</th>
<th>Cover Diameter</th>
<th>T</th>
<th>K</th>
<th>L</th>
<th>Bar Maximum Spacing (Bottom Each Way)</th>
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<tr>
<td>4'-0&quot;</td>
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<td>8'-0&quot;</td>
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<td>#5 at 6&quot;</td>
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</table>

*Only bottom layers of steel necessary.

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**MICHIGAN DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DEVELOPMENT STANDARD PLAN FOR**

**DRAINAGE STRUCTURES**
PRECAST REDUCER CAP

PRECAST FLAT SLAB TOP

SEPARATE BASE OPTION

REDUCER CAP DIMENSIONS

<table>
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<tr>
<th>STRUCTURE DIA.</th>
<th>CAP DIAMETER</th>
<th>B</th>
<th>CAP DEPTH &quot;D1&quot;</th>
<th>CAP DEPTH &quot;D2&quot;</th>
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</thead>
<tbody>
<tr>
<td>7'-0&quot;</td>
<td>101½&quot;</td>
<td>8½&quot;</td>
<td>1'-5&quot;</td>
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<td>8'-0&quot;</td>
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FLAT SLAB TOP DIMENSIONS

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<th>B</th>
<th>COVER DEPTH &quot;D1&quot;</th>
<th>COVER DEPTH &quot;D2&quot;</th>
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BASE AND RISER DIMENSIONS

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<tr>
<th>STRUCTURE DIA.</th>
<th>BASE DIAMETER &quot;A1&quot;</th>
<th>BASE DIAMETER &quot;A2&quot;</th>
<th>MIN. WALL THICKNESS</th>
<th>BASE DEPTH &quot;D1&quot;</th>
<th>BASE DEPTH &quot;D2&quot;</th>
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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT
STANDARD PLAN FOR
DRAINAGE STRUCTURES
DRAINAGE STRUCTURES

DEPTHS AS SPECIFIED ON PLANS

STRUCTURE DIAMETER

HALF SECTION A - A

TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING

SECTION B - B
SHOWING REDUCER CAP

SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST MANHOLE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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DRAINAGE STRUCTURES

DEPTHS AS SPECIFIED ON PLANS

STRUCTURE DIAMETER

DEPTHS AS SPECIFIED ON PLANS

4'-0" DIA.

SECTION B - B
SHOWING REDUCER CAP

SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST INLET

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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HALF SECTION A - A

TOP OF MASONRY STRUCTURE OR BOTTOM OF CASTING

SECTION B - B
SHOWING REDUCER CAP

SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT
STANDARD PLAN FOR

DRAINAGE STRUCTURES

6-15-2016
SECTION A - A

PRECAST RISER RING

M I N.

(FOR 2'-0" DIAMETER STRUCTURE)

* 6" COVER

1'-3" MIN. LAP

#4 BAR (TYP.)

NOTES:

* WHEN RISER TONGUE LENGTH IS GREATER THAN 3" USE 2 TIMES THE TONGUE LENGTH.

NOTE: PRECAST RISER SHALL FULLY ENGAGE THE TONGUE OF THE RISER PIPE.

PRECAST RISER RING

(For 2'-0" Diameter Structure)

NOTES:

THE DRAINAGE STRUCTURE COVERS ALLOWED FOR USE ON THESE DRAINAGE STRUCTURES ARE SPECIFIED IN SUBSEQUENT STANDARD PLANS AND ARE INTERCHANGEABLE ON ANY STRUCTURE.

THE TOPS OF MASONRY STRUCTURES SHALL BE SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE USING MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

PREMIUM JOINTS ARE REQUIRED ON ALL SANITARY MANHOLES. SEE ASTM DESIGNATION C-923.

GRANULAR MATERIAL CLASS III SHALL BE USED IN BACKFILLING AROUND ALL STRUCTURES THAT FALL WITHIN THE 1:1 INFLUENCE LINES FROM THE EDGE OF PAVEMENT OR BACK OF CURB.

STEPS FOR DRAINAGE STRUCTURES SHALL BE OF AN APPROVED DESIGN AND MADE FROM CAST IRON, ALUMINUM, OR PLASTIC COATED STEEL. RINGS SHALL BE A MINIMUM OF 10" IN CLEAR LENGTH, DESIGNED TO PREVENT THE FOOT FROM SLIPPING OFF THE END. THE MINIMUM HORIZONTAL PULL OUT LOAD SHALL BE 400 LBS. THE MINIMUM VERTICAL LOAD SHALL BE 800 LBS.

THE BELL SHALL BE REMOVED FOR THE FIRST LENGTH OF OUTLET PIPE PROJECTING THROUGH THE WALL OF THE MANHOLE.

PRECAST CONCRETE SECTIONS, SUMPS, AND FLAT TOP SLABS SHALL BE BUILT ACCORDING TO CURRENT ASTM C-476 AND ACCORDING TO DETAILS SPECIFIED ON THIS PLAN. PRECAST REINFORCED CONCRETE FLAT TOP SLAB SHALL BE MARKED TO SHOW LOCATION OF REINFORCEMENT. THE WALLS OF THE PRECAST UNITS MAY HAVE A SLIGHT TAPER TO ALLOW FOR FORM REMOVAL. PRECAST CONCRETE 2'-0" DIAMETER DRAINAGE STRUCTURES SHALL HAVE A MINIMUM 3" WALL THICKNESS WITH A 6" MINIMUM BEARING SURFACE ON TOP. SEE PRECAST RISER RING FOR 2'-0" DIAMETER STRUCTURE.

THE MAXIMUM INSIDE DIAMETER OF PIPES ENTERING OR LEAVING PRECAST DRAINAGE STRUCTURES SHALL BE 2'-0" LESS THAN THE INSIDE DIAMETER OF THE DRAINAGE STRUCTURE. A PIPE LEAVING A 2'-0" DIAMETER DRAINAGE STRUCTURE IS ALLOWED TO HAVE 1'-0" INSIDE DIAMETER OR LESS.

THE NUMBER OF PIPE OPENINGS IN A RISER SHALL BE DETERMINED BY THE DESIGNER. SPACING BETWEEN OPENINGS SHALL BE 1'-0" MINIMUM. OPENINGS MAY BE CONSTRUCTED BY CASTING OR SCRIBING IN PRECAST STRUCTURES DURING FABRICATION OR BY CORING THE CURED CONCRETE.

PRECAST CONCRETE FOOTINGS OR BASES SHALL BE REINFORCED WITH #4 BARS SPACED AT 1'-0" BOTH WAYS OR WITH TWO LAYERS OF WELDED WIRE FABRIC OF EQUIVALENT CROSS SECTIONAL AREA LAID AT RIGHT ANGLES AND WIDED TOGETHER. REINFORCEMENT SHALL BE PLACED IN TOP OF FOOTING AND SHALL BE MARKED.

PRECAST CONCRETE FOOTINGS SHALL BE SUPPORTED BY A COMPACTED 6" GRANULAR SUBBASE.

THE MINIMUM WALL THICKNESS FOR ALL 2'-0", 4'-0", 5'-0", AND 6'-0" DRAINAGE STRUCTURES USING CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE CONCRETE SHALL BE AS SPECIFIED IN TYPICAL WALL SECTIONS.

THE CONICAL SECTION OF MANHOLES OR CATCH BASINS CONSTRUCTED OF BLOCK OR BRICK SHALL BE SHROUDED WITH GEOTEXTILE FABRIC TO A MINIMUM DEPTH OF 6'-0" OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL SHALL BE LEFT ON THE TOP (8" OR MORE) TO ROLL OVER THE TOP OF THE CONE.

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST BE APPROVED BY THE ENGINEER.