STATEWIDE PRECAST INLETS & MANHOLES

An Overview
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TxDOT Standard Inlet & Manhole Program (SIMP)

· Purpose
  - Create Uniform Standards of Inlets and Manholes for all TxDOT Districts
  - Provide best practices for layout protocols, installation and inspection

· Summary: The purpose of the Standard Inlet & Manhole Program, a joint effort of the Texas Concrete Pipe Association and the Texas Department of Transportation was to simplify the layout protocol, selection, manufacture and installation of precast concrete inlets and manholes in the state of Texas and by so doing reduce costs, normalize expectations and improve installation. To those ends, the necessary styles were selected, standard geometries developed and minimum levels of reinforcement and concrete strength determined. The resulting standards can be found in this guide. This guide was prepared to assist in the use and maintenance of this program. This guide and program will be maintained by a joint task force comprised of personnel from TxDOT and the Texas Concrete Pipe Association.
**TxDOT Standard Inlet & Manhole Program (SIMP)**

- **Includes:**
  - Guide to the Standard Inlet and Manhole Program
  - Approved Cast Iron Product Sheets
  - Standard Details
  - All the above can be found at [http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/bridge-e-e.htm#CULVERTANDDRAINAGE](http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/bridge-e-e.htm#CULVERTANDDRAINAGE) under Precast Inlets & Manholes
Chapter 1 –
  - Purpose
  - Updates
Chapter 2 –
- Background & Objectives
- Development of Standards
- Standard Drawings
- Iron Standards
- Need for Non-Standard Designs
  - SIMP cannot cover every design. Unique designs are still needed.
  - Unique designs need to meet AASHTO LRFD design criteria.*
    - TxDOT Bridge Design Manual, Chapter 5, Section 5
  - Precast or cast-in-place

* District Standard Inlets are not covered in this program. However, they still need to meet AASHTO LRFD design criteria.
Chapter 3 –
  - Definitions
  - Abbreviations
Chapter 4 – Design
  - Overview
  - Bases
    • Precast base –
      - Attaches to inlets or lid.
    • Junction box
      - terminates below ground
      - below grade slab,
      - no access to the PJB from the surface, or it is connected to the POD inlet with an 18” vertical pipe
    • Size, depth, wall thicknesses
    • Risers
    • Joints
Chapter 4 – Design

- Inlets
  - Minimum cover

**Table 7: Minimum Cover for Inlet and Lid Assemblies**

<table>
<thead>
<tr>
<th>Inlet or Lid Assembly Type</th>
<th>Height of Assembly</th>
<th>Minimum Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curb inlet with the base outside of street (PCO)</td>
<td>21”</td>
<td>27”^1</td>
</tr>
<tr>
<td>Curb inlet with the base under of street (PCU)</td>
<td>27”</td>
<td>33”^1</td>
</tr>
<tr>
<td>Slab lid (PSL)</td>
<td>9”</td>
<td>15”</td>
</tr>
<tr>
<td></td>
<td>6” sloped</td>
<td>12”</td>
</tr>
<tr>
<td>Slab lid on a shallow box (POD)</td>
<td>27”</td>
<td>66” or 69”^2</td>
</tr>
<tr>
<td></td>
<td>24” sloped</td>
<td>63” or 66”^2</td>
</tr>
<tr>
<td>Median barrier drain (PMBD)</td>
<td>21”</td>
<td>27”</td>
</tr>
<tr>
<td>Area zone drain- slab lid on a raised box (PAZD)</td>
<td>6”^3</td>
<td>12”^3</td>
</tr>
<tr>
<td>Manhole flat slab</td>
<td>9”</td>
<td>15”</td>
</tr>
<tr>
<td>Manhole cone</td>
<td>varies by Manufacturer</td>
<td>height + 6”</td>
</tr>
</tbody>
</table>

^1 measured from top of assembly to bottom of assembly; top of assembly is 9” above infall
^2 includes additional height of min. backfill and PJB below grade slab; below grade slab varies by PJB size
^3 measured from infall to bottom of assembly; does not include portion of assembly above finished grade
Chapter 4 – Design

- Inlets
  - Structure Placement
    “To allow adequate working space for the proper placement and compaction of backfill, locate structures with minimum 2 ft. separation. Separation must be measured at the largest portion of the structures—typically the base units— or at extensions.” (page 23)
  - Location
    “Curb inlets work best—they will accept the greatest amount of infall—when installed level. The slope of the road should be leveled at the point of curb inlet installation rather than attempting to match the curb inlet to the slope of the road. If eliminating roadway slope at the inlet location is not possible, a grate inlet may be a better choice than a curb inlet for that particular location. “ (page 22)
  - Orientation
    - Foundation and bedding
    - Miscellaneous Details
Chapter 5 – Installation

- “A firm and uniform foundation is essential to provide a uniform bearing surface and to prevent adverse settlement. The foundation must be compacted to the same minimum density as the foundation below penetrating pipes. When the foundation material is either unsuitable or unstable, the foundation should either be stabilized or removed and replaced with a suitable foundation material. The base of the excavation should be free of any large stones or other similar objects.”

- “Thoroughly compact the bedding and backfill under incoming pipes and utilities to prevent differential settlement or shearing at the connection, which could induce unintended and uncalculated stresses in both the pipe and the precast structure.”

Chapter 6 - Inspection
Approved Cast Iron Product Sheets

- Provides details of the cast iron frames, rings, covers, and grates for use with the Precast Inlet and Manhole Standards.

- Products by:
  - US Foundry
  - EJ Group Inc.
  - Neenah Foundry
  - DL Foundry (newest, does not have all products, yet)
Standard Details

- PB – Precast Base
- PBGC - Pipe and Box Grouted Connections - NEW
- PJB – Precast Junction Box
- PDD – Design Data for Precast Base and Junction Box
- PRM – Precast Round Manhole
- PCO – Precast Curb Inlet Outside Roadway
- PCU – Precast Curb Inlet Under Roadway
- PSL – Precast Slab Lid
- POD – Precast Overpass Drain
- PMBD – Precast Median Barrier Drain
- PAZD - Precast Area Zone Drain

Other standard and reference drawings that accompany the drainage structures include:
- Example of PB Reducing Slab and Reduced Riser Sizes
- Example of PSL Styles and Sizes
- CGT-PCO – Curb and Gutter Transition Details for PCO Inlet
- CGT-PCU – Curb and Gutter Transition Details for PCU Inlet
FABRICATION NOTES:
1. Precast Class B concrete in accordance with
   ACI 408 and having a Minimum compressive
   strength of 4000 psi.
2. Steel reinforcing steel or equivalent area of
   W13. Precast (preferential reinforcing
   bars in vertical walls of tank, riser and cone
   in accordance with ACI 408.6.1
3. Spans with a thickness of 32" or greater require
   1/4" galvanized reinforcing steel.
   Provide steel area = 0.01% (f) each way.
4. Manufacturing base and risers to nearest.
5. Provide gusset and groove joints for full closure
   of manhole. Minimum gusset depth 24".
6. Provide lifting devices in compliance with
   manufacturer’s recommendations.
7. Provide cast iron safety cover, unless noted
   otherwise elsewhere in this plan.

INSTALLATION NOTES:
1. Cases may be horizontal or vertically. Redundant
   cases are acceptable. Use manufacturer for size
   determination.
2. Installation work to be provided by Contractor.
3. Shall provide reinforcing steel in accordance with
   ACI 408.6.1
4. Steel reinforcing bars shall pass unobstructed
   through riser and gusset sections. All
   gusset and groove joints shall be
grooved in accordance with 8" between
each section, or 5' the joint depth whichever is
greater.
5. Use flat rubber gasket joints without
   lubrication.
6. Grade adjustments not to exceed 1/8" in
   alignment or 1" in elevation.

GENERAL NOTES:
1. Dimensioned according to ASME A208.
2. Payment for materials 1% above ACI standards.
3. Payment for labor is contract price.
4. Foundation and backfill prior to installation.
5. Foundation and backfill and inspection
   materials to be furnished by Contractor.
6. Installing contractor’s own workmanship
   standards for placement tolerance.

COVER DIMENSIONS:

<table>
<thead>
<tr>
<th>SIZE (DIA)</th>
<th>48 in</th>
<th>60 in</th>
<th>72 in</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>5 in</td>
<td>6 in</td>
<td>7 in</td>
</tr>
<tr>
<td>MAX DEPTH</td>
<td>25 ft</td>
<td>25 ft</td>
<td>25 ft</td>
</tr>
<tr>
<td>A (EACH WAY)</td>
<td>0.22 in²/ft</td>
<td>0.30 in²/ft</td>
<td>0.45 in²/ft</td>
</tr>
<tr>
<td>B (EACH WAY)</td>
<td>N/A</td>
<td>0.37 in²/ft</td>
<td>0.62 in²/ft</td>
</tr>
<tr>
<td>C (EACH WAY)</td>
<td>0.24 in²/ft</td>
<td>0.46 in²/ft</td>
<td>0.46 in²/ft</td>
</tr>
<tr>
<td>BH MIN</td>
<td>12 in</td>
<td>36 in</td>
<td>36 in</td>
</tr>
<tr>
<td>TS</td>
<td>9 in</td>
<td>9 in</td>
<td>9 in</td>
</tr>
<tr>
<td>RS</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>REDUCED RISER DIA</td>
<td>N/A</td>
<td>48 in</td>
<td>48 in</td>
</tr>
<tr>
<td>MAX HOLE DIA</td>
<td>32 in</td>
<td>40 in</td>
<td>54 in</td>
</tr>
</tbody>
</table>

Precast Round Manhole
Precast Inlets and Manholes

### Standards - PCO

**Front View (Showing Left and Right Extensions)**

**Plan View (Showing Left and Right Extensions)**

<table>
<thead>
<tr>
<th>SIZE (Y)</th>
<th>N</th>
<th>MH DIA</th>
<th>Ra</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>9&quot;</td>
<td>18&quot;</td>
<td>(4) #5 Additional</td>
</tr>
<tr>
<td>4&quot;</td>
<td>16&quot;</td>
<td>32&quot;</td>
<td>(4) #5 Additional</td>
</tr>
<tr>
<td>5&quot;</td>
<td>16&quot;</td>
<td>32&quot;</td>
<td>(4) #5 Additional</td>
</tr>
<tr>
<td>6&quot;</td>
<td>16&quot;</td>
<td>32&quot;</td>
<td>(4) #5 Additional</td>
</tr>
</tbody>
</table>

+ Nominal ring and cover size.
- **Generic Form**
  - INLET(COMPL)(TYPE)(style of top)(size of lid – size of frame)
  - Not all fields are used for all types
Bid Codes

INLET(COMPL)(TYPE)(style of top)(size of lid – size of frame)

- TYPE - PSL (slab lid), PAZD (area zone drain), and POD (overpass drain)
  - Style of top – FG, SFG, SL, RH, RC, RG, SH, S1 (not all allowed on all types)
Bid Codes

INLET(COMPL)(TYPE)(style of top)(size of lid – size of frame)

- **TYPE** - PSL (slab lid), PAZD (area zone drain), and POD (overpass drain)
  
  - For styles, SL, RH, RC, and RG, only “size of lid” is used - (X x Y)
  
  - For FG, SFG, SH, and S1, use “size of lid – size of frame”
    
    - (X x Y – A x B)
    
    - Exception - POD use “size of lid”, only - (X x Y)

<table>
<thead>
<tr>
<th>Style</th>
<th>Size (X x Y)</th>
<th>W</th>
<th>A x B (nominal)</th>
<th>Short Span Reinf Steel Area</th>
<th>Long Span Reinf Steel Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL</td>
<td>3' x 3'</td>
<td>6&quot;</td>
<td>n/a</td>
<td>0.37 in²/ft</td>
<td>0.37 in²/ft</td>
</tr>
<tr>
<td>RH,RC,RG,SH,S1,FG</td>
<td>3' x 3'</td>
<td>6&quot;</td>
<td>3' x 3' or 32&quot; Dia</td>
<td>0.37 in²/ft</td>
<td>0.37 in²/ft</td>
</tr>
<tr>
<td>SFG</td>
<td>3' x 3'</td>
<td>6&quot;</td>
<td>3' x 3'</td>
<td>0.32 in²/ft</td>
<td>0.32 in²/ft</td>
</tr>
<tr>
<td>SL</td>
<td>4' x 4'</td>
<td>6&quot;</td>
<td>n/a</td>
<td>0.34 in²/ft</td>
<td>0.34 in²/ft</td>
</tr>
<tr>
<td>RH,RC,RG,SH,S1,FG</td>
<td>4' x 4'</td>
<td>6&quot;</td>
<td>3' x 3' or 32&quot; Dia</td>
<td>0.41 in²/ft</td>
<td>0.41 in²/ft</td>
</tr>
<tr>
<td>SH,S1,FG</td>
<td>4' x 4'</td>
<td>6&quot;</td>
<td>4' x 4'</td>
<td>0.41 in²/ft</td>
<td>0.41 in²/ft</td>
</tr>
<tr>
<td>SFG</td>
<td>4' x 4'</td>
<td>6&quot;</td>
<td>4' x 4'</td>
<td>0.32 in²/ft</td>
<td>0.32 in²/ft</td>
</tr>
<tr>
<td>SL</td>
<td>3' x 5'</td>
<td>6&quot;</td>
<td>n/a</td>
<td>0.39 in²/ft</td>
<td>0.39 in²/ft</td>
</tr>
<tr>
<td>RH,RC,RG,SH,S1,FG</td>
<td>3' x 5'</td>
<td>6&quot;</td>
<td>3' x 3' or 32&quot; Dia</td>
<td>0.48 in²/ft</td>
<td>0.48 in²/ft</td>
</tr>
<tr>
<td>SH,S1,FG</td>
<td>3' x 5'</td>
<td>6&quot;</td>
<td>3' x 5'</td>
<td>0.48 in²/ft</td>
<td>0.48 in²/ft</td>
</tr>
<tr>
<td>SFG</td>
<td>3' x 5'</td>
<td>6&quot;</td>
<td>3' x 5'</td>
<td>0.32 in²/ft</td>
<td>0.32 in²/ft</td>
</tr>
</tbody>
</table>
Bid Codes

INLET(COMPL)(TYPE)(style of top)(depth = Y)

- **TYPE - PCO and PCU (curb inlets)**
  - INLET(COMPL)(PCO or PCU)(Y)(extension)
  - e.g. INLET (COMPL)(PCO)(3FT)(LEFT)

- **TYPE – PMBD (median drain)**
  - INLET(COMPL)(PMPD)(Y)
  - e.g. INLET (COMPL)(PMBD)(4FT)

- **TYPE – PRM (manhole)**
  - MANH(COMPL)(PRM)(diameter)
  - e.g. MANH (COMPL)(PRM)(60IN)

- **TYPE – PJB (junction box)**
  - JCTBOX(COMPL)(PJB)(size)
  - e.g. JCTBOX(COMPL)(PJB)(5FTX5FT)
Questions tend to be District and project specific, none to be addressed now.

- Please email

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  Taya.Retterer@txdot.gov

  Bridge Standards Engineer
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