Date: 07-25-13

To: MAG Specifications and Details Committee

From: Craig Sharp

RE: Section 742 Precast Manhole Bases

Purpose: Creating a new section and details for precast manhole bases and modifying the existing cast in place manhole detail No. 420-1, 420-2, 421 and 422.

Revisions:

Creating a new section and details for precast manhole bases and modifying existing details.

Updated 08-25-14
SECTION 742

PRECAST MANHOLE

742.1 GENERAL:
This specification covers requirements for precast manhole sections. All precast manhole manufacturers shall be NPCA (National Precast Association) certified and shall provide all NPCA certifications upon request. Loading criteria for the precast manholes shall meet or exceed the AASHTO H20 loading requirements. All precast manhole risers shall be monolithically cast to ensure water tightness and have a certified structural design and the manhole shall be cast in a fashion to achieve water tightness. This shall include a monolithic cast manhole or a multi section cast manhole which also shall have a certified structural design.

742.2 MATERIALS:

742.2.1 Concrete Materials: Concrete materials shall conform to the requirements of Section 725 and Table 725-1 for Class AA.

742.2.2 Precast Sections: Precast sections shall conform to ASTM C478, AASHTO M199. The design shall be in accordance with ACI 318 and ASTM C890 using traffic load A-16 (HS20-44).

742.2.3 Joints and Connections: Details of proposed joints and connections shall be submitted to the engineer for approval and shall conform to ASTM C990, C993, or C425 as applicable.

742.3 MANHOLE PENETRATIONS:
The location of penetrations shall be determined by the plans and specifications. Manhole penetrations may be formed or cut out. Cut outs of the precast base shall be done using a mechanical hole saw. After the core is removed from the casting, the precaster shall coat all exposed reinforcing with a corrosion inhibiting epoxy suitable for end use application. The thickness of the epoxy shall be per the epoxy manufacturer’s recommendation. Knock outs shall be formed in the location noted on the plans or specifications.

742.4 REINFORCING:
Reinforcing steel shall meet the following specifications:
• Bars ASTM A615 or A706
• Wire and wire fabric A1064
Design of the reinforcing shall be in accordance with ACI 318 and ASTM C890

742.5 GASKETS:
A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure. The design of the connector shall provide a flexible, watertight seal between the pipe and the concrete. The connector shall assure that a seal is made between the structure wall and the pipe by:
• Casting the connector integrally with the structure wall during the manufacturing process in a manner that will not pull out during pipe coupling.
• compressing the connector against the inside circumference of the structure by means of wedge or toggle style connection, expansion ring or other means approved by the engineer.

The connector shall be made from materials that conform to the physical and chemical requirements in ASTM C923 or C425 as applicable. The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

The connection hardware shall be constructed of type 316 stainless steel meeting ASTM A480. The hardware shall ensure a water tight connection between the concrete and the pipe material and shall provide an adequate seal enough to withstand the negative air pressure test per ASTM C-1244.

742.6 LIFTING POINTS:
Lifting points shall be designed and evaluated by a registered professional engineer and have a minimum safety factor of four. There shall be a minimum of two lifting points on every precast manhole base. After base installation, the lifting holes shall be thoroughly
SECTION 742

packed with a pre-packaged non-shrink grout. Bent reinforcing steel bars shall not be used as lifting devices. Through lifting holes will not be allowed.

742.7 IMPERFECTIONS:

Any imperfections which in the opinion of the engineer may adversely affect the performance of the precast section shall be cause for rejection.

– End of Section –
TYPE 'A' TOP
(PRECAST ECCENTRIC CONICAL TOP MANHOLE)

24" OR 30" FRAME & COVER PER DET.
423, 424, 425 (TYP)

OVERALL ADJUSTMENT RING
HEIGHT SHALL BE 12" MIN TO 18" MAX (TYP)

USE BUTYL RUBBER MASTIC JOINT SEALANT ON ALL JOINTS; EXCEPT TOP ADJUSTMENT RINGS

PRECAST RISER SECTIONS AS REQUIRED

CONCRETE SHELF SHALL BE PER DETAIL 420-3 SECTION A-A

FLOW

CLASS "A" CONCRETE BASE PER SECTION 725, 505

24" MAX ADJUSTING RINGS PER DETAIL 422 (TYP)

24" TO 26−3/4" ON 48" MANHOLE
30" ON 60" MANHOLE (TYP)

Cement Mortar

DIAMETER PER PLAN

30" MIN.
36" MAX.

4" TYP

3" TYP

5" MAX

8" TYP

8" MIN.

30" DIA. MIN.

8" TYP

8" MIN.

24" MAX.

FLAT REINFORCED CONC. TOP

FINISH GRADE (TYP)

NOTES:

1. PRECAST STEEL REINFORCED MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 476 EXCEPT AS MODIFIED HEREIN.

2. CAST-IN-PLACE MANHOLE BASE TO BE CONSTRUCTED IN ONE PLACEMENT.

3. CAST-IN-PLACE MANHOLE BASE SHELFT AND CHANNEL TO RECEIVE SMOOTH TROWEL FINISH.

4. MANHOLE COATINGS PER AGENCY.

5. SEE MAg DETAIL 422 FOR FINAL ADJUSTMENT TO GRADE.

6. ANY MANHOLE OVER 20' SHALL REQUIRE ENGINEER (STRUCTURAL) CALC.

7. THE MANHOLE ACCESS POINT SHALL BE ORIENTED IN SUCH A WAY THAT THE OPENING IS DIRECTLY ABOVE THE LOWEST INVERT, OR AS OTHERWISE DIRECTED BY THE PLANS OR ENG.

8. FOR PRECAST BASE SEE DETAIL 420−2.

9. FLAT TOPS SHALL ONLY BE USED WITH APPROVAL FROM THE ENGINEER.
NOTES:

1. PRECAST, MANUFACTURER SHALL BE AN NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA) CERTIFIED PLANT. ENTIRE PRECAST BASE SHALL BE MANUFACTURED AT THE PLANT PER ASTM C478.
2. MAG "AA" 4000 PSI CONCRETE SHALL BE USED FOR PRECAST MANHOLE BASES.
3. SPRING LINE OF CAST-IN-PLACE BELL SHALL STOP AT INSIDE FACE OF MANHOLE.
4. JOINTS FOR BARREL SECTION SHALL BE TONGUE AND GROOVE TYPE. ALL LIFTING HOLES SHALL BE SEALED WITH GROUT.
5. ALL PRECAST MANHOLE BASES SHALL BE PLACED ON 8" MINIMUM OF ABC PER SECTION 702 COMPACTED TO 100% MAXIMUM DENSITY.
6. ALL MODIFICATIONS SHALL BE APPROVED BY THE ENGINEER.
7. MINIMUM WALL THICKNESS SHALL BE PER ASTM C478 (MIN 5").
8. REINFORCEMENT SHALL BE DESIGNED BY AN ARIZONA REGISTERED PROFESSIONAL ENGINEER.
9. CHANNEL TRANSITION SHALL BE CONSTANT FROM INLET TO OUTLET OF MANHOLE TO FACILITATE SMOOOTH TRANSITIONS AND ACCOMMODATE CORRESPONDING MANDREL.
10. THERE SHALL BE NO HARD CONNECTIONS (GROUTED) INTO THE MANHOLE BASE UNLESS APPROVED BY THE ENGINEER.
11. ALL SEWER SERVICE CONNECTIONS SHALL HAVE THE SAME CONNECTION TYPES IN THE PRECAST MANHOLE BASE.
12. ALL CORE HOLES INTO THIS STRUCTURAL PRECAST BASE SHALL BE COATED WITH AN APPROVED COATING MATERIAL.
13. THE MANHOLE BOTTOM SHALL EXTEND OUTSIDE THE MANHOLE WALL A MINIMUM 6" WIDE ON 48" BASES, 7" WIDE ON 60" BASES, AND 8" WIDE ON 72" BASES. EXTENDED BOTTOM SHALL BE A MINIMUM OF 5" THICK.
14. ALL PIPE CONNECTIONS SHALL BE IN COMPLIANCE WITH ASTM F477 OR ASTM C425. AN EXTRA STRENGTH VCP BELL WITH A POLYURETHANE JOINT THAT MEETS ASTM C425 MAY BE USED WITH VCP.
OUTLET PIPE PER APPROVED PLANS

CHANNEL, FORMED WITH PRECAST AND CAST IN PLACE BASE, (TYP).

90° MIN ANGLE

IF NO SIDE SEWERS, FORM ONE CONTINUOUS CHANNEL

OUTLET PIPE PER APPROVED PLANS

PROVIDE A ±12 INCH TANGENT AT ALL PIPE CONNECTIONS (TYP)

SECTION A-A

TOP OF SHELF TO TOP OF PIPE (MIN 2% SLOPE) NOT TO EXCEED 3”

CHANNEL TRANSITION SHALL BE CONSISTENT FROM INLET TO OUTLET OF MANHOLE TO FACILITATE SMOOTH TRANSITIONS AND ACCOMMODATE CORRESPONDING TRANSITIONS AND MANDREL.

TYPICAL CHANNEL

SEE DETAIL 420-2 FOR NOTES
PIPE SIZE & ELEVATION
AS SHOWN ON PLANS

48" I.D. FOR 8" - 14" PIPE
60" I.D. FOR 15" - 30" PIPE

MANHOLE ADJUSTMENT
PER DETAIL 422

COMBINED CURB
AND GUTTER

SEE DETAIL
420-1 FOR
ADJUSTMENT
REQUIREMENTS

MANHOLE TO BE
PRECAST PER
SECT. 625

PRECAST RISER PER
ASTM C-478

2% MIN NOT TO
EXCEED 3"

4" TYP

CLASS A CONCRETE
PER SECT. 725, 505

TROWEL
FINISH
SMOOTH

CEMENT
MORTAR
(TYP)

8" IF MANHOLE
IS 13' OR LESS
12" IF MANHOLE
IS OVER 13'

DETAIL NO. 421
STANDARD DETAIL
ENGLISH
OFFSET MANHOLE 8" TO 30" PIPE
REVISED 01-01-2015
DETAIL NO. 421
NOTES:

1. CONTRACTORS SHALL ADJUST ALL MANHOLE RINGS AND COVERS, INCLUDING MANHOLES OUTSIDE OF THE PAVEMENT.
2. ADJUSTMENT SHALL BE CONSTRUCTED PER MAG SECTION 345.
3. MANHOLE COATINGS PER AGENCY.
4. GROUT SHALL BE USED BETWEEN FRAME AND ADJUSTING RING TO ACHIEVE WATER TIGHTNESS.

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<tr>
<th>SPACER TYPE</th>
<th>REQUIRED THICKNESS</th>
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<tr>
<td>BRICK</td>
<td>GREATER THAN 2&quot;</td>
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<tr>
<td>4&quot;X2&quot; STEEL SPACER</td>
<td>1/2&quot; TO 2&quot;</td>
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<tr>
<td>GROUT</td>
<td>LESS THAN 1/2&quot;</td>
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ADJUSTING RING DETAIL

OUT OF PAVEMENT—FINISH GRADE

CONCRETE COLLAR, CLASS 'AA' CONCRETE PER SECT. 725 & 505

SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

10" MIN. ADJUSTING RINGS

GROUT INTERIOR SURFACE OF ADJUSTMENT RINGS CONTINUOUS

#4 REINFORCING STEEL HOOP EQUALLY CENTERED HORIZONTALLY & VERTICALLY (IF REQUIRED BY AGENCY)