



**CITY OF BUCKEYE**  
Engineering Department

Case Number: 13-21

**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)

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

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

24" MAX ADJUSTING  
RINGS PER DETAIL  
422 (TYP)

30" MIN.  
36" MAX.

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

DIAMETER  
PER PLAN

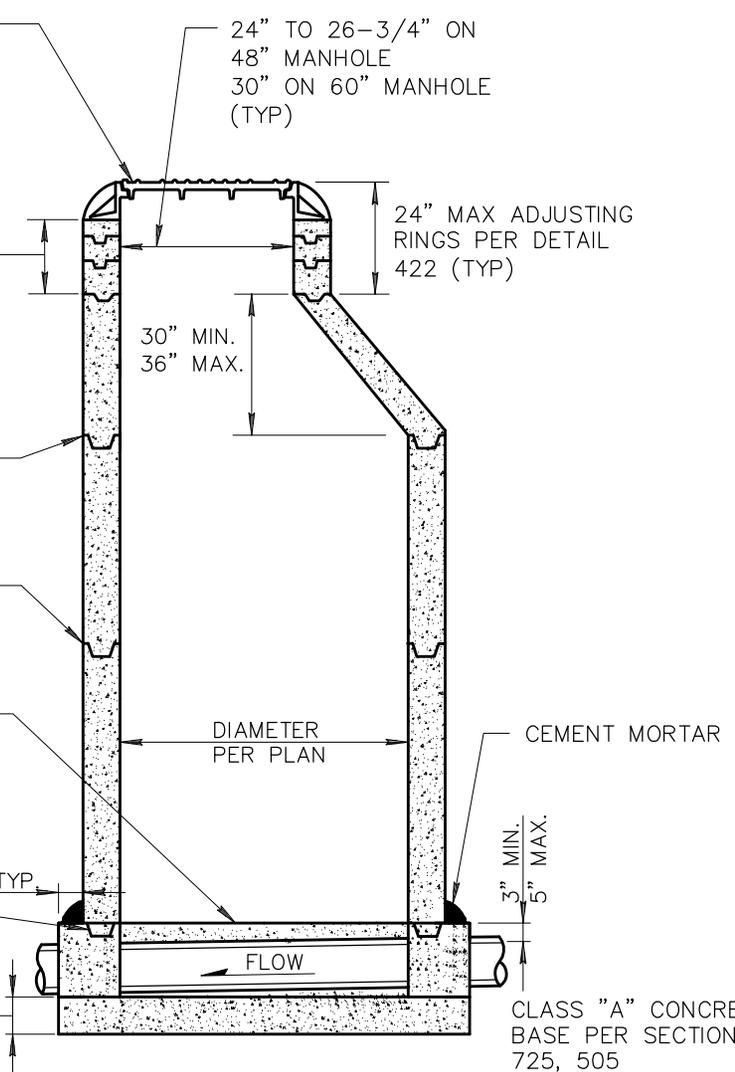
CEMENT MORTAR

4" TYP  
KEYWAY PRESSED INTO BASE  
TO MATCH PRECAST RISER

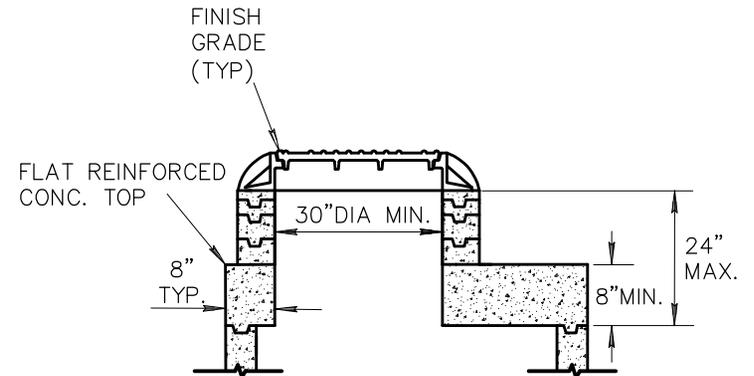
3" MIN.  
5" MAX.

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

CLASS "A" CONCRETE  
BASE PER SECTION  
725, 505



**(PRECAST FLAT TOP M.H.)**



**NOTES:**

1. PRECAST STEEL REINFORCED MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 EXCEPT AS MODIFIED HEREIN.
2. CAST-IN-PLACE MANHOLE BASE TO BE CONSTRUCTED IN ONE PLACEMENT.
3. CAST-IN-PLACE MANHOLE BASE SHELF 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) CALCS.
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.

DETAIL NO.  
**420-1**

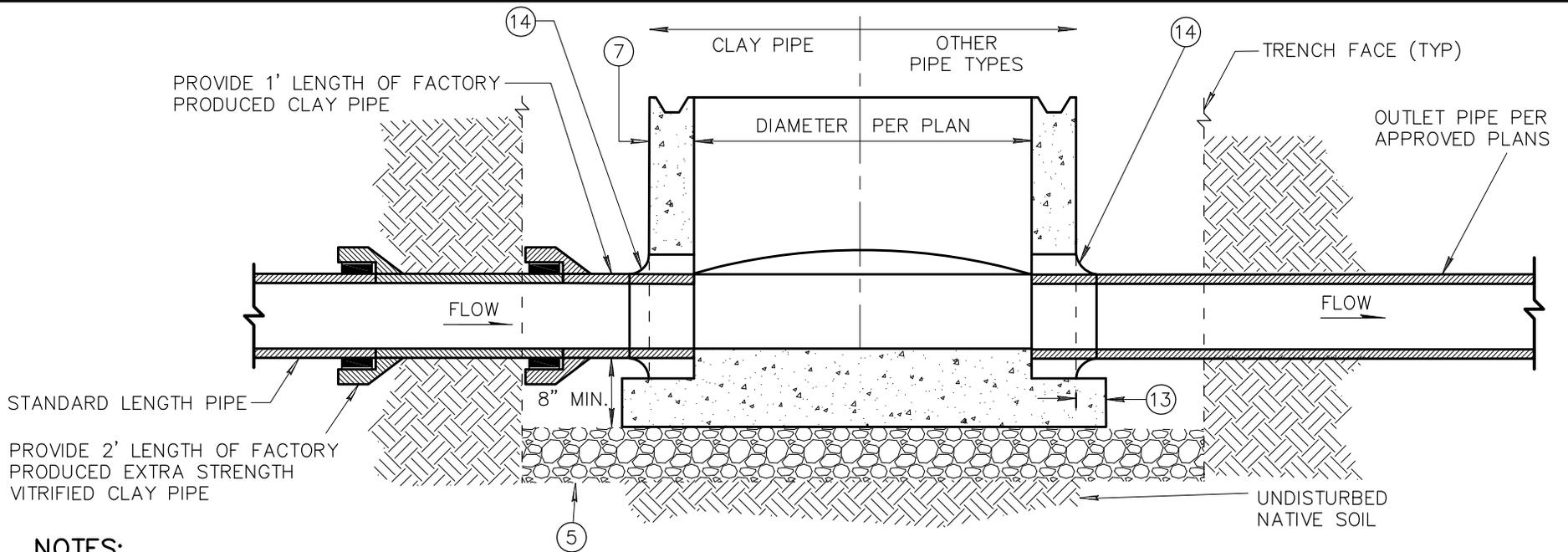


STANDARD DETAIL  
ENGLISH

**CONCRETE SANITARY SEWER MANHOLE**

REVISED  
01-01-2015

DETAIL NO.  
**420-1**



**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 SMOOTH 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.

DETAIL NO.

**420-2**



STANDARD DETAIL  
ENGLISH

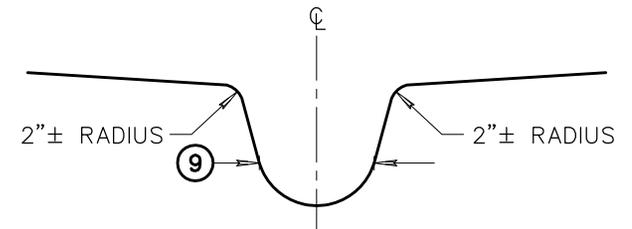
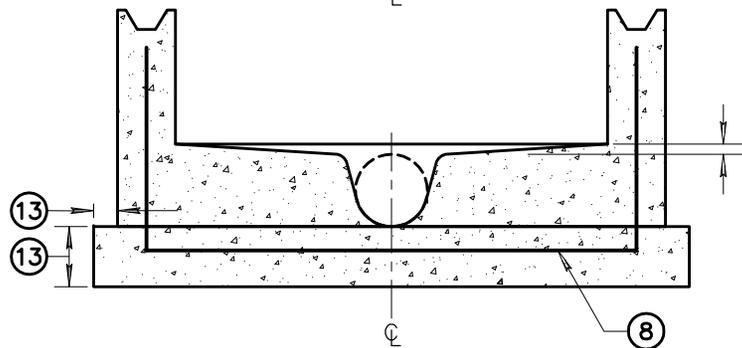
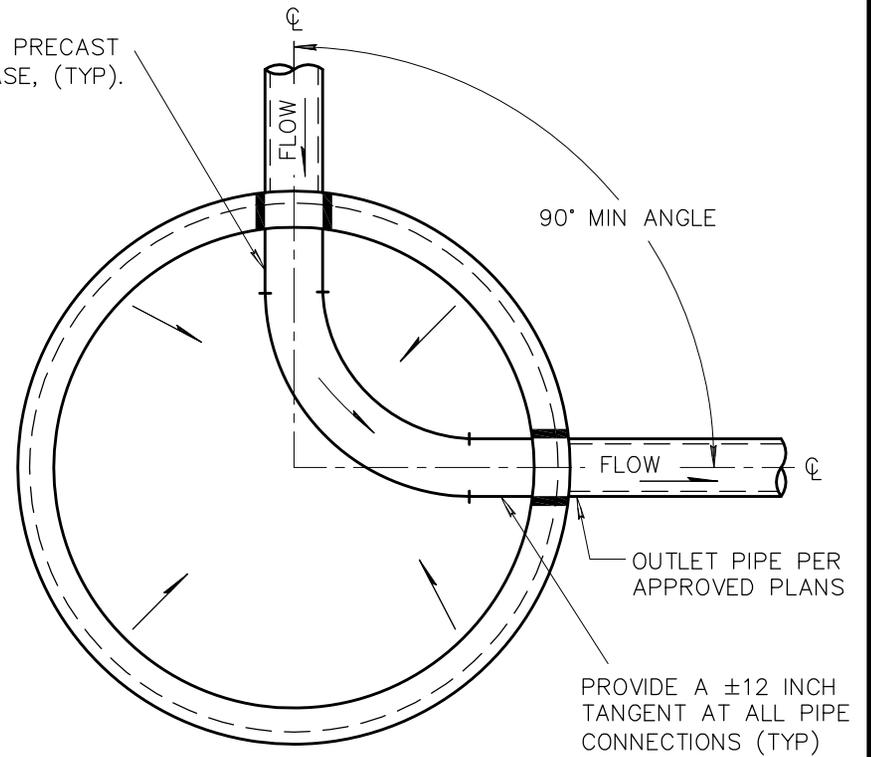
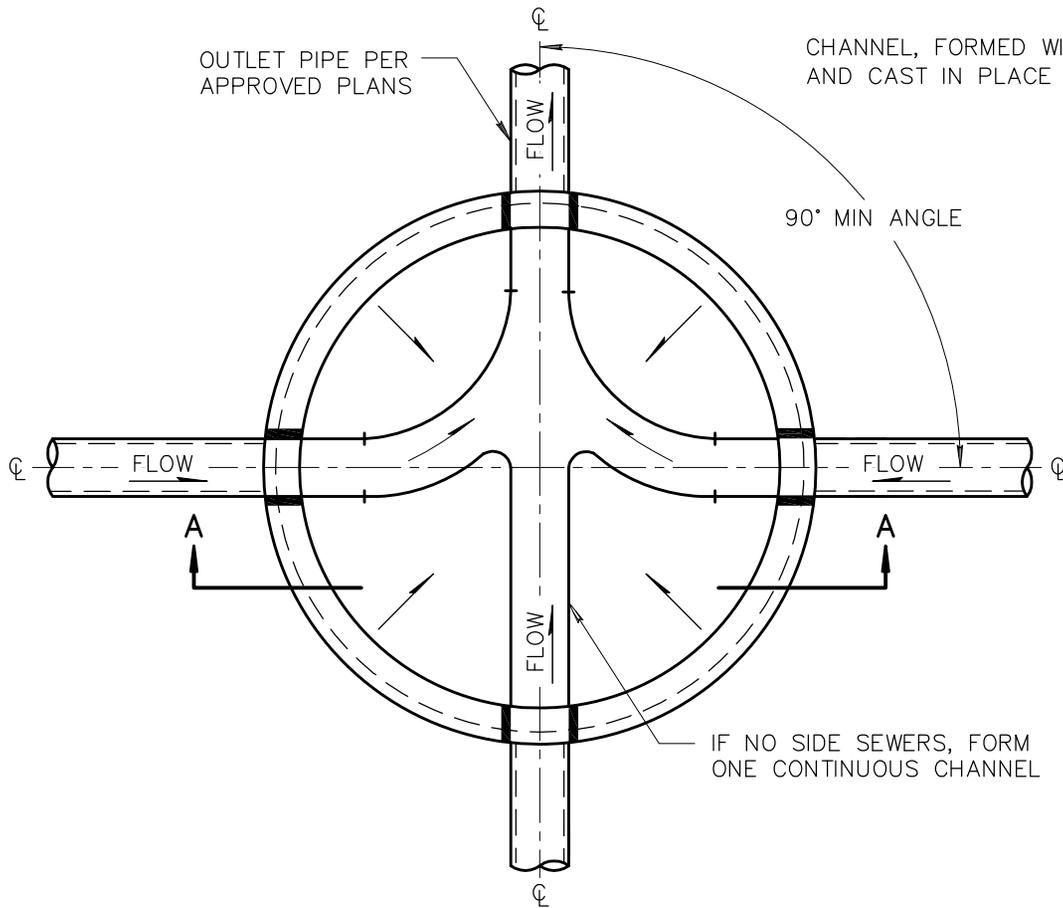
**PRECAST CONCRETE MANHOLE BASE**

REVISED

01-01-2015

DETAIL NO.

**420-2**



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

**TYPICAL CHANNEL**

SEE DETAIL 420-2 FOR NOTES

DETAIL NO.

420-3



STANDARD DETAIL  
ENGLISH

CONCRETE MANHOLE BASE

REVISED

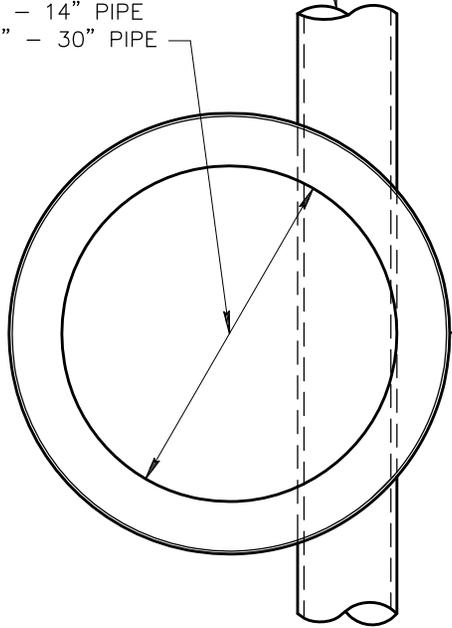
01-01-2015

DETAIL NO.

420-3

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

4"  
TYP

2% MIN NOT TO  
EXCEED 3"

CEMENT  
MORTAR  
(TYP)

30" MIN.  
36" MAX.

CLASS A CONCRETE  
PER SECT. 725, 505

TROWEL  
FINISH  
SMOOTH

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

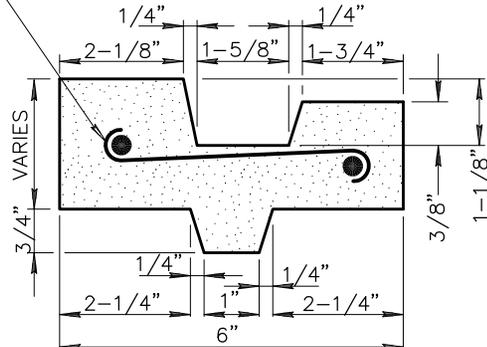
REVISED

01-01-2015

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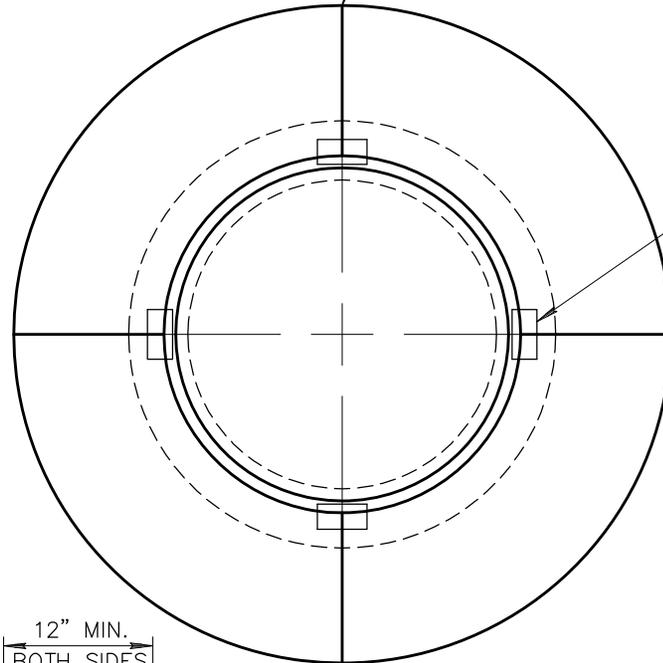
421

(2) NO.2 HOOPS FOR 4" RING TIED WITH NO. 4 A.S.& W. GAUGE WIRE. 6" & 8" RING REQUIRE (4) NO. 2 HOOPS.



**ADJUSTING RING DETAIL**

MEDIUM BROOM FINISH WITH RADIALLY SCORED MARKS (4 MIN.)

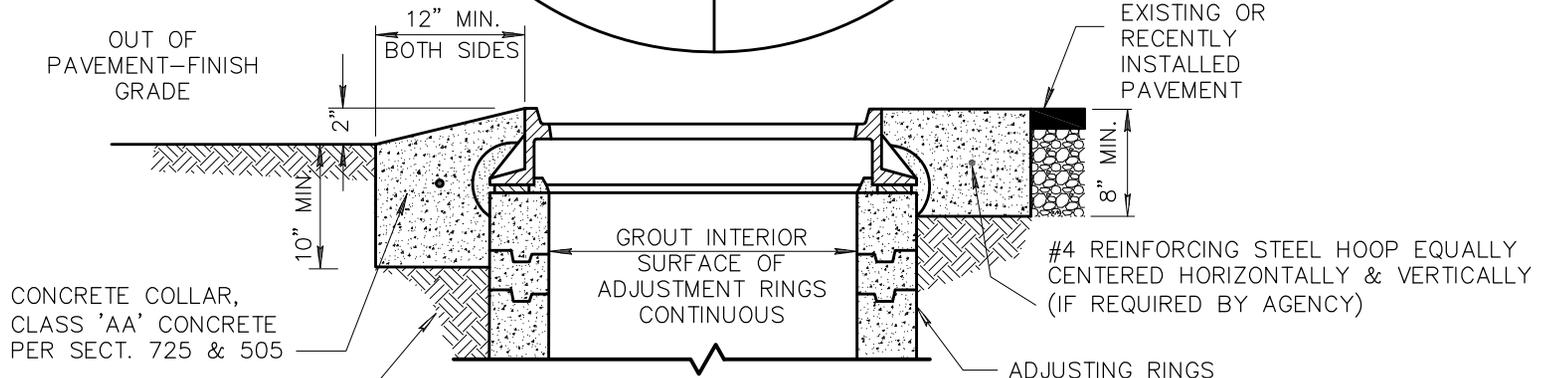


**NOTES:**

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.

SPACER TYPE	REQUIRED THICKNESS
BRICK	GREATER THAN 2"
4"X2" STEEL SPACER	1/2" TO 2"
GROUT	LESS THAN 1/2"

OUT OF PAVEMENT—FINISH GRADE



SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

DETAIL NO.

422



STANDARD DETAIL  
ENGLISH

**MANHOLE FRAME  
AND COVER ADJUSTMENT**

REVISED

01-01-2015

DETAIL NO.

422