



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 07-01-14

SECTION 742

PRECAST MANHOLE

742.1 GENERAL:

This specification covers the requirements of precast manholes for gravity sanitary sewer and storm drain manhole. When noted on the plans or in the special provisions precast manhole shall be constructed according to this specification. 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: Joints and connections shall conform to ASTM C425, C990 and C923.

742.3 MANHOLE PENETRATIONS:

Cut out of the precast base shall be done using a mechanical hole saw. The location of the hole shall be determined by the plans and specifications. After the core is removed from the casting the manufacturer shall coat all reinforcing with a corrosion inhibiting epoxy suitable for end use application. The thickness of the epoxy shall be per the manufacturer recommendation suitable for the end use application. Knock outs shall be formed in the location noted on the plans or specifications.

742.4 REINFORCING

Reinforcing for the base shall meet the following specifications:

- Wire ASTM A615 or A706
- 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 manor 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 of from materials that conform to the physical and chemical requirements outlined in the ASTM C923, and C425.

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 a 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 4. There shall be a minimum of 2 lifting points on every precast manhole base. After base installation, the lifting holes shall be thoroughly 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

742.7.1 Imperfections: Any imperfections which in the opinion of the engineer may adversely affect the performance of the precast base 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

2" MIN. - 8" MAX. REINFORCED CONC. ADJUSTING RINGS. OVERALL ADJUSTMENT RING HEIGHT SHALL BE MIN 12" TO MAX 18" (24" OVERALL FROM FINISH GRADE)

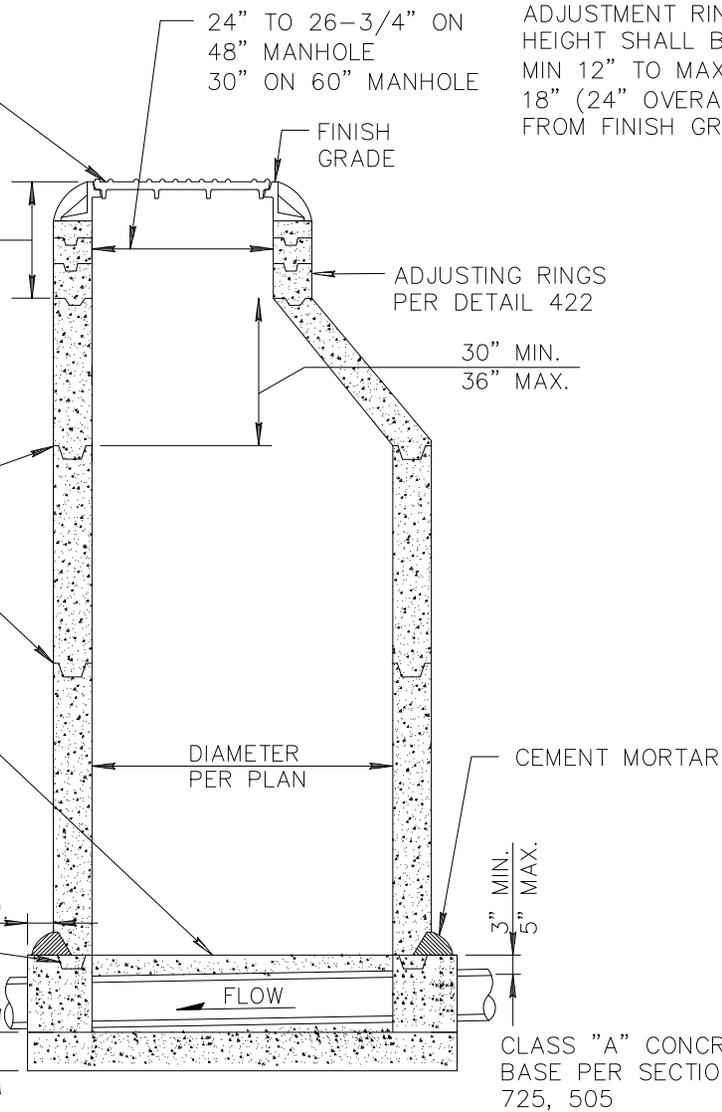
USE BUTYL RUBBER MASTIC JOINT SEALANT ON ALL JOINTS; EXCEPT TOP ADJUSTMENT RINGS

PRECAST RISER SECTIONS AS REQUIRED

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

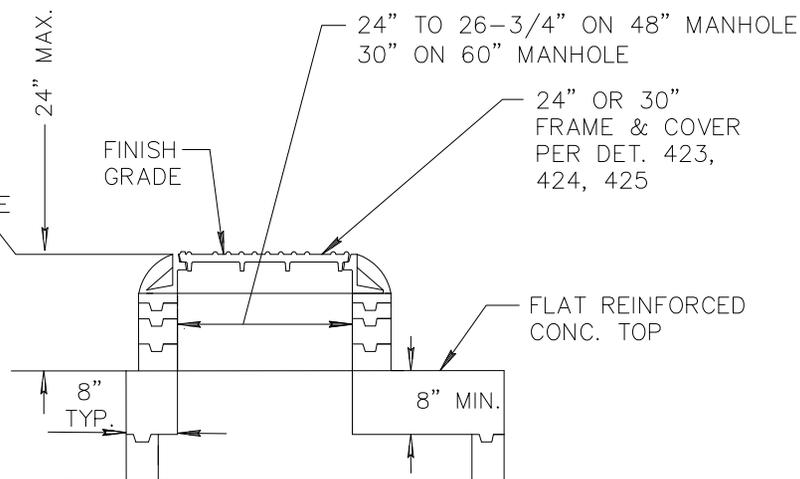
KEYWAY PRESSED INTO BASE TO MATCH PRECAST RISER

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



2" MIN. - 8" MAX. REINFORCED CONC. ADJUSTING RINGS. OVERALL ADJUSTMENT RING HEIGHT SHALL BE MIN 12" TO MAX 18" (24" OVERALL FROM FINISH GRADE)

(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.
8. FOR PRECAST BASE SEE DETAIL 420-2.
9. FLAT TOPS SHALL ONLY BE USED WITH APPROVAL FROM THE ENGINEER.

DETAIL NO.
420-1

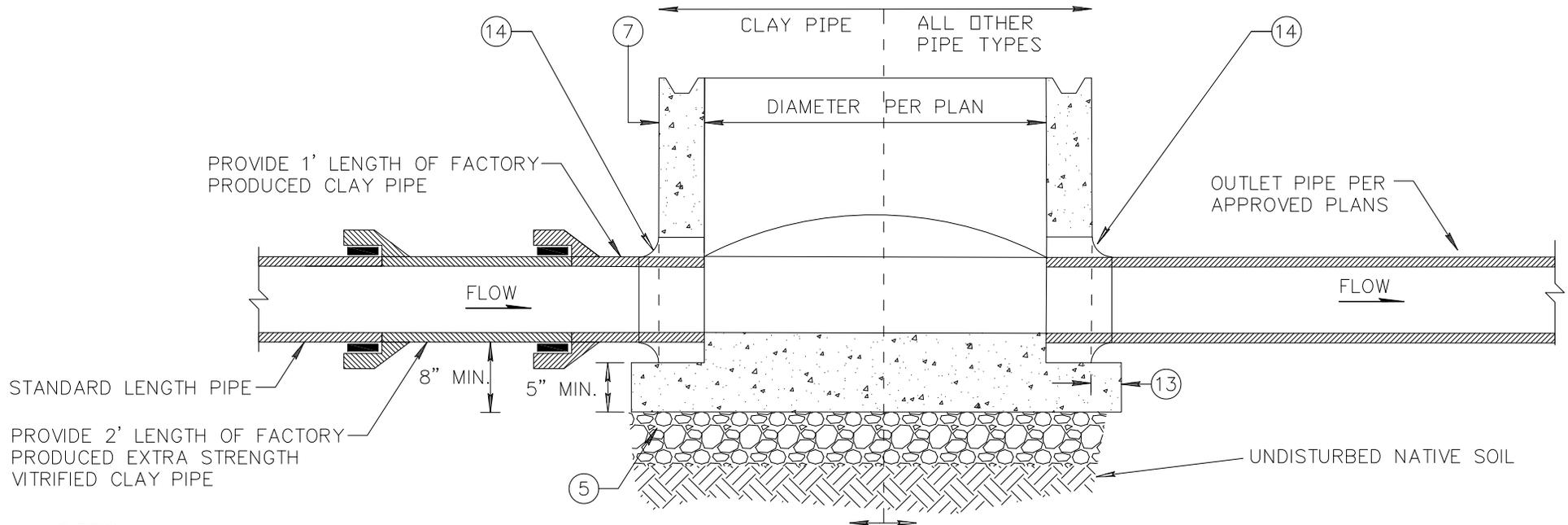


STANDARD DETAIL
ENGLISH

CONCRETE SANITARY SEWER MANHOLE

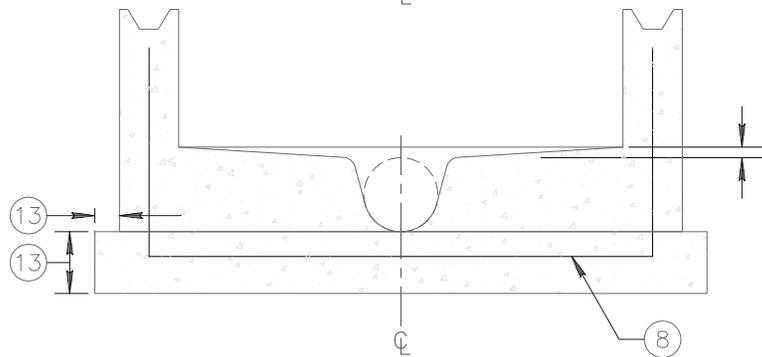
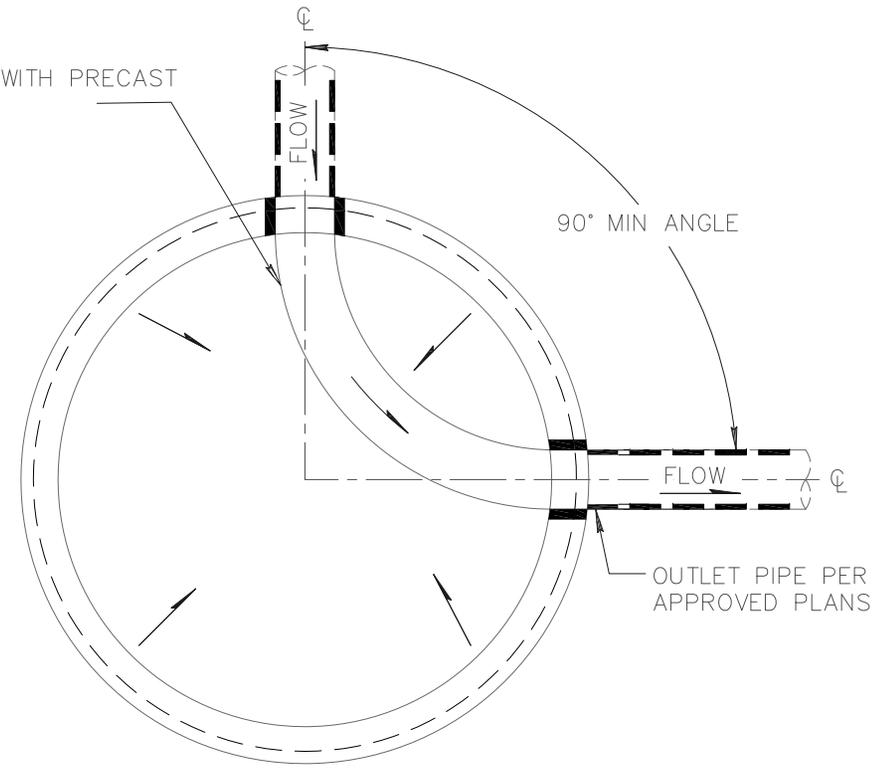
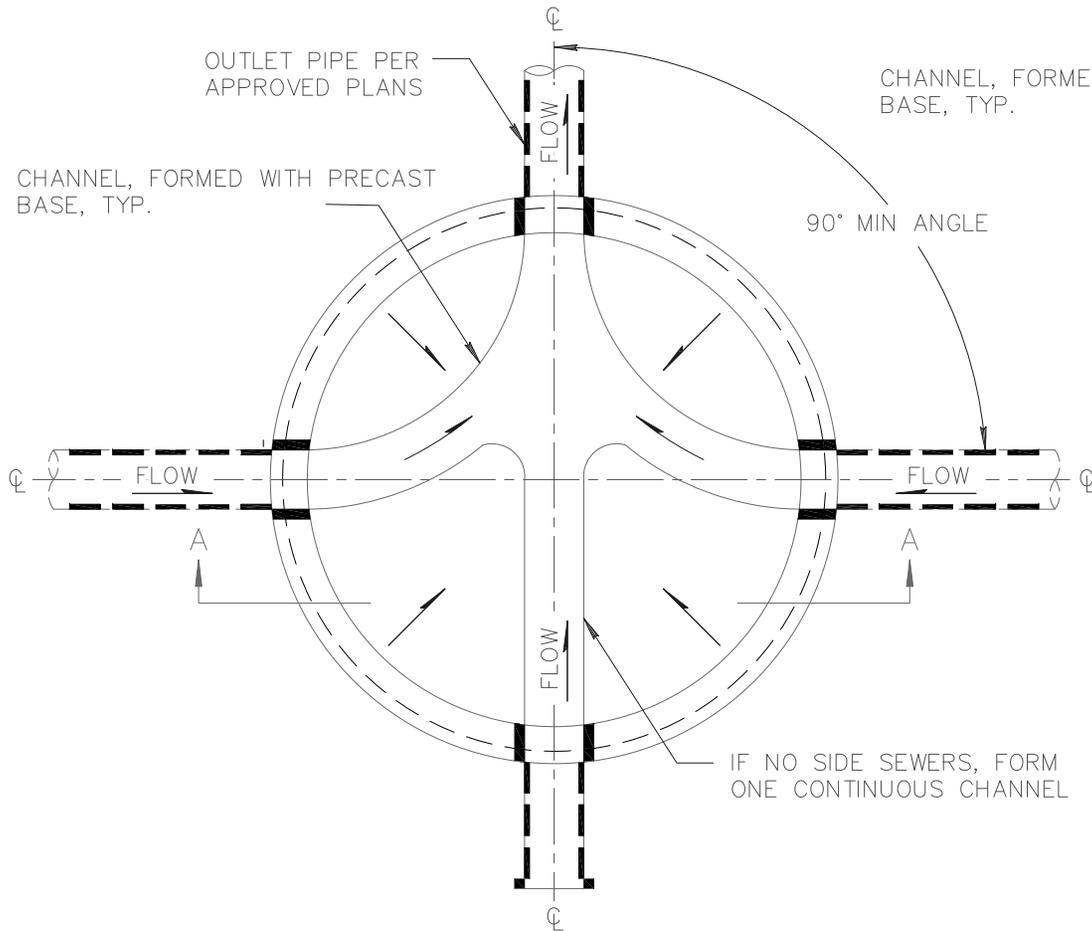
REVISED
01-01-2015

DETAIL NO.
420-1



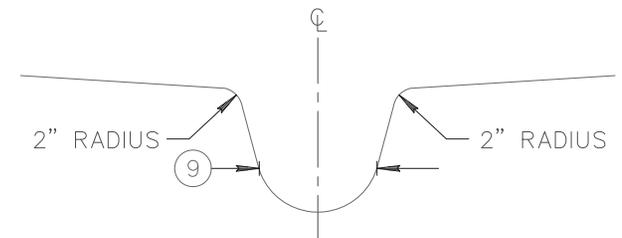
NOTES:

- 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 10" MINIMUM #57 ROCK PER ASTM D448 WITH AT LEAST 50% ONE FRACTURED FACE WHEN TESTED IN ACCORDANCE WITH ARIZ 212 OR 8" ABC PER SECTION 702 COMPACTED TO 100% RELATIVE 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.
- 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 ELASTOMERIC GASKET/BOOT PER ASTM C425 AND ASTM F477. ADDITIONALLY, A POLYURETHANE JOINT MAY BE USED ON EXTRA STRENGTH VITRIFIED CLAY PIPE.



SECTION A-A

TOP OF SHELF TO
TOP OF PIPE
(MIN. 2%)
NOT
TO EXCEED 3"



CHANNEL TRANSITION SHALL
BE CONSISTENT FROM INLET
TO OUTLET OF MANHOLE.

TYPICAL CHANNEL

SEE DETAIL 420-2 FOR NOTES

DETAIL NO.
420-3

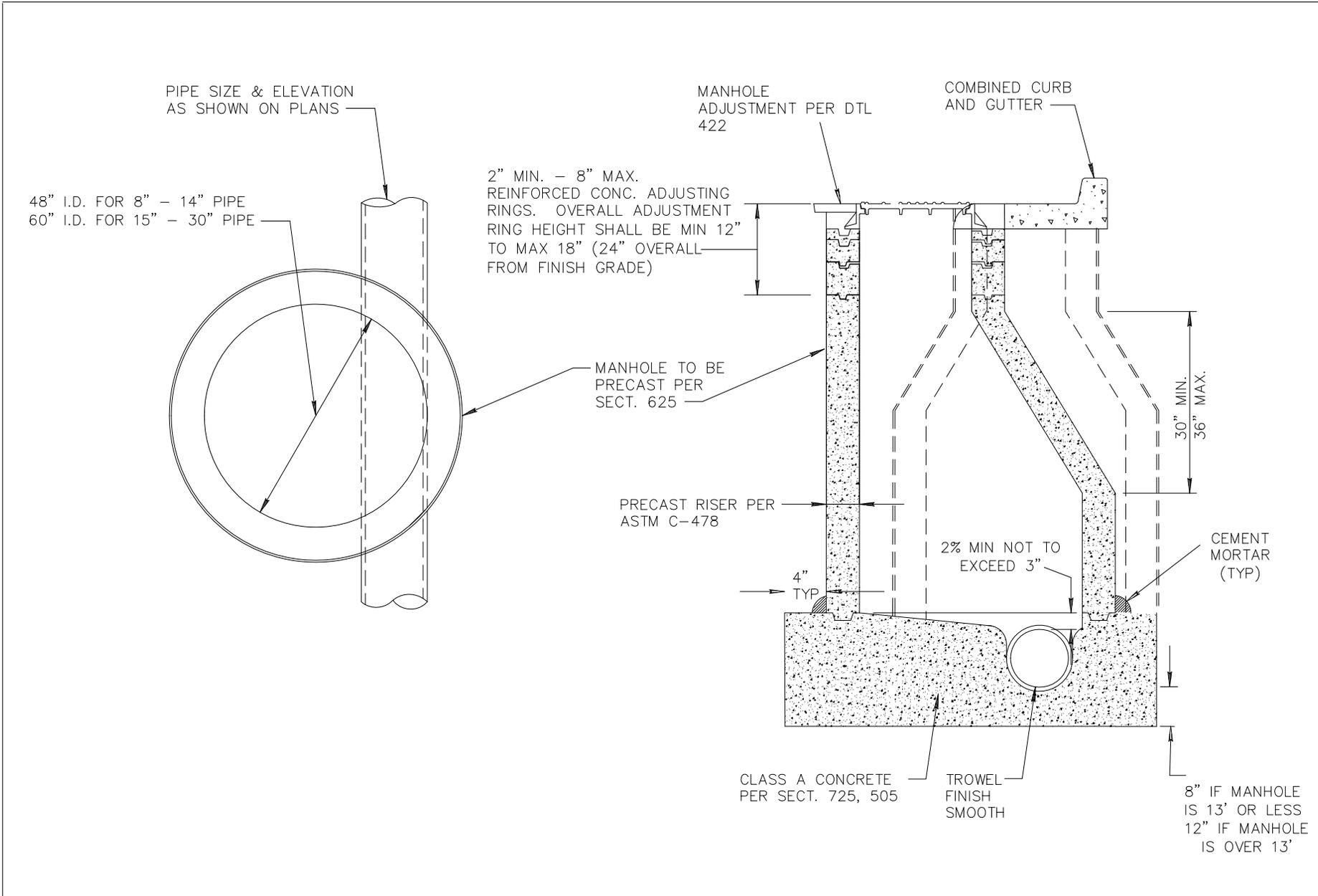


STANDARD DETAIL
ENGLISH

PRECAST CONCRETE MANHOLE BASE

REVISED
01-01-2015

DETAIL NO.
420-3



DETAIL NO.

421



STANDARD DETAIL
ENGLISH

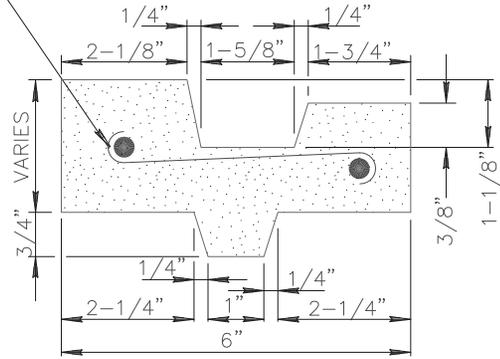
OFFSET MANHOLE 8" TO 30" PIPE

REVISED
01-01-2015

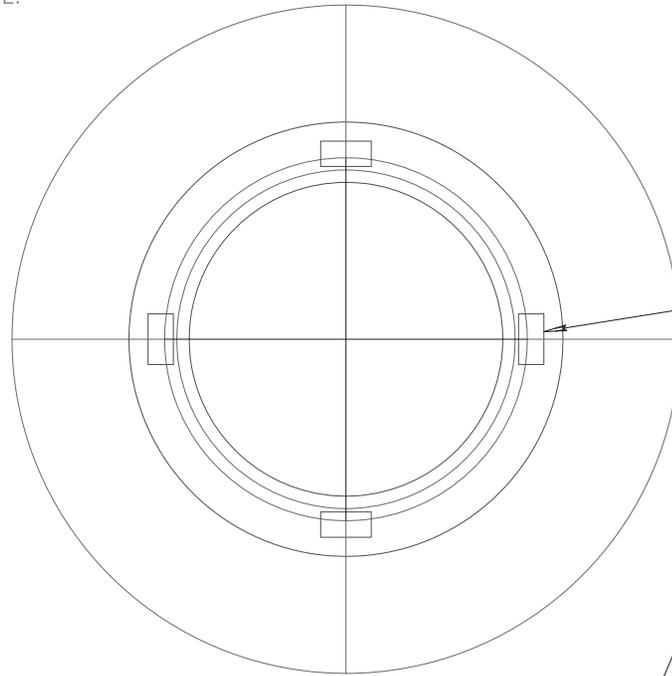
DETAIL NO.

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.



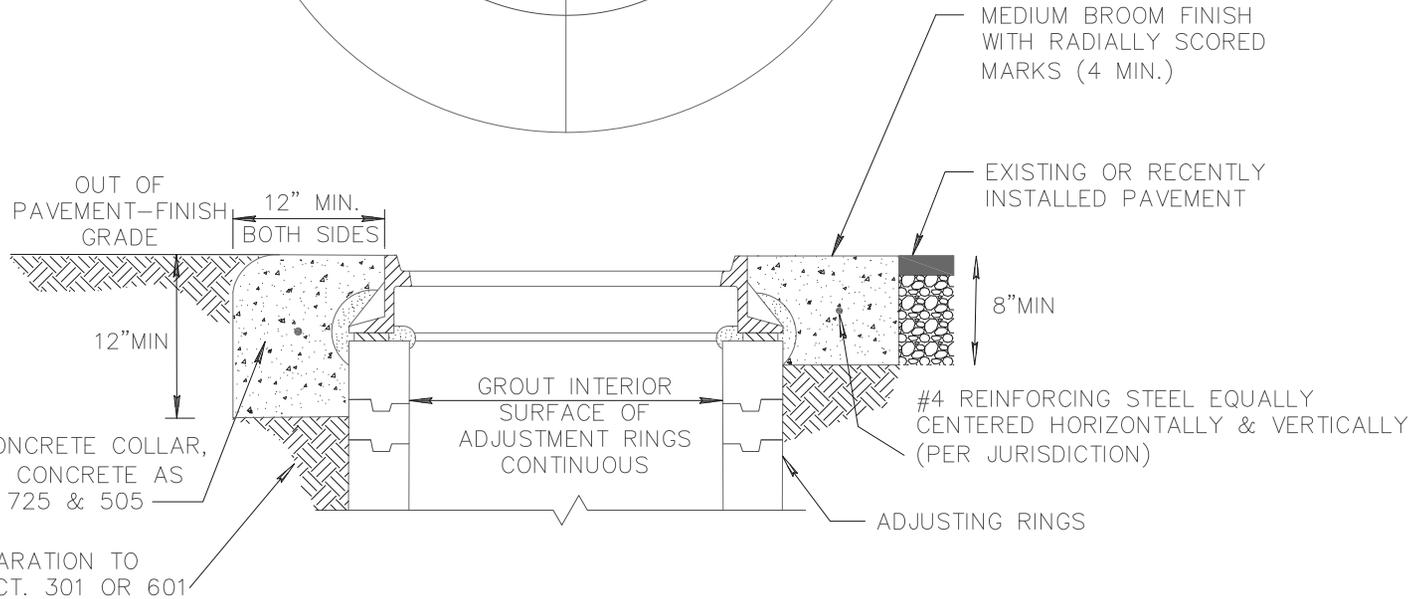
ADJUSTING RING DETAIL



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 RING TO ACHIEVE WATER TIGHTNESS.

ADJUSTMENT SUPPORTS
PER SECTION 345



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

EXISTING OR RECENTLY
INSTALLED PAVEMENT

8" MIN

#4 REINFORCING STEEL EQUALLY
CENTERED HORIZONTALLY & VERTICALLY
(PER JURISDICTION)

ADJUSTING RINGS

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

GROUT INTERIOR
SURFACE OF
ADJUSTMENT RINGS
CONTINUOUS

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