



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: Revised January 4, 2017
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Miscellaneous Corrections

Case 17-01 A

PURPOSE: Adjust Table footnote notation

REVISION:

Mark-up:

TABLE 725-1		
CONCRETE CLASSES - MINIMUM REQUIREMENTS		
Class of Concrete	Minimum Cementitious Materials Content (lbs. per cubic yard)	Minimum Compressive Strength* (1) at 28 Days (psi)
AA	600	4000
A	520	3000
B	470	2500
C	420	2000
* (1) In accordance with section 725.8.		

~~(1) In accordance with section 725.8.~~

Final Adjusted Table:

TABLE 725-1		
CONCRETE CLASSES - MINIMUM REQUIREMENTS		
Class of Concrete	Minimum Cementitious Materials Content (lbs. per cubic yard)	Minimum Compressive Strength* at 28 Days (psi)
AA	600	4000
A	520	3000
B	470	2500
C	420	2000
* In accordance with section 725.8.		



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: December 21, 2016
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Miscellaneous Corrections

Case 17-01C

PURPOSE: Correct spelling error in Section 337.3

REVISION:

337.3 EQUIPMENT:

The melter applicator unit shall be a self-contained double boiler device with the transmittal of heat through heat transfer oil. It must be equipped with an on board automatic heat controlling device to permit the attainment of a predetermined temperature, and then maintain that temperature as long as required. The unit shall also have a means to vigorously and continuously agitate the sealant to meet the requirements of Appendix X1.1 of ~~ATSM~~ASTM D6690. The sealant shall be applied to the pavement under pressure supplied by a gear pump with a hose and wand and direct connecting applicator tip. The pump shall have sufficient pressure to apply designated sealant at a rate of at least three (3) gallons (11.4 L) per minute. Melter applicators shall be approved for use by the sealant manufacturer.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: January 4, 2017

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Miscellaneous Corrections

Case 17-01 D

PURPOSE: Adjust Section 105.6 for Blue Stake name change to Arizona 811

REVISION:

105.6 COOPERATION WITH UTILITIES:

The Contracting Agency will notify all utility companies, all pipe line owners, or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.

The Contractor shall comply with the requirements of Arizona Revised Statutes-40-360.21 through 40-360.29 (~~one-call-system, Blue-Stake~~one-call notification center, Arizona 811) in notification to the interested utility owners prior to start of construction. The Contractor shall resolve all problems with the utility owners concerned.

SECTION 630

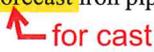
(B) 3 inches through 12 inches:

This specification generally describes valves and operator assemblies designed for underground service, as manufactured by Dresser Industries, B-I-F Industries Incorporated, Henry Pratt Company, Allis Chalmers Manufacturing Company, or approved equal.

Where material or equipment is designated on the plans or in this specification by a trade or manufacturer's name, it is so designated primarily to establish standards of quality, finish, appearance and performance.

All specific requirements of this specification must be adhered to, and all necessary modifications shall be made in the article specified by the trade name, type or model or manufacturer's equipment to make it conform to all specific requirements of this specification.

The valves shall be in accordance with AWWA C-504, Class 150-B, except as modified herein:

- (1) Valve ends may be the thin type or wafer type to be installed between flanges drilled in conformance with ASA B 16.1-125 or may be flanged both ends or the valves may have bell ends with rubber gaskets, forecast iron pipe or asbestos cement pipe conforming to the kind of pipe being used. 
- (2) Valves shall be designed for buried service with the valve shaft in a horizontal position and the operating shaft vertical.
- (3) Valves shall be left-hand opening, counter-clockwise unless shown otherwise on the plans.
- (4) Discs shall be Ni-Resist, ASTM [A436](#), Type 1, or cast iron, ASTM [A48](#), Class 40, in accordance with the following variations:
 - (a) Cast iron disc may be used providing the rubber seat ring is contained on the disc with the rubber ring closing against a Type 304 stainless steel ring or a bronze ring contained in the body of the valve.
 - (b) Ni-Resist disc may be used where rubber seat is contained in the valve body.
 - (c) Valves with rubber seats in the valve body may have cast iron discs with a Type 304 stainless steel or bronze edge seating surface retained on the edge of the disc.

Shafts and disc shaft fasteners shall be constructed of Type 304, stainless steel, unless the shaft is completely sealed from the line fluid. Valve shafts completely sealed from the line fluid may be of high strength steel with all other metal parts in contact with the line fluid to be Type 304 stainless steel.

Valves with rubber seat mounted in the body shall have the rubber either bonded or mechanically retained in its final position. Rubber seats which are on the disc edge shall be retained by a clamping ring and screws. Clamping ring and screws shall be made of 18-8 stainless steel, Type 304, or bronze conforming to ASTM [B61](#) or ASTM [B584](#).

Manual operators shall have AWWA 2 inch square operating nuts and shall require at least 2 turns per inch diameter to rotate the disc 90 degrees. Operators must accept a minimum of 300 ft. lbs. input torque on stops at ends of travel without damage to valve or operator. The operator torque rating shall equal, or exceed, the valves shown in Table I of AWWA C-504 for valve class specified above.

All interior ferrous surfaces exposed to fluid flow shall be epoxy coated to a minimum dry film thickness of 6 mils.

Epoxy coatings shall be factory applied by an electrostatic or thermosetting process in accordance with the manufacturer's printed instructions.

The epoxy materials used shall be 100% powder epoxy or liquid epoxy that conforms to the requirements AWWA C550-81, and to the prevailing requirements of the Food and Drug Administration and of the Environmental Protection Agency.

All exterior ferrous surfaces, except finished or bearing surfaces, shall be factory coated with 2 coats of asphaltic varnish conforming to Federal Specification TT-V-51c, or shall be epoxy coated as required above for interior surfaces.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

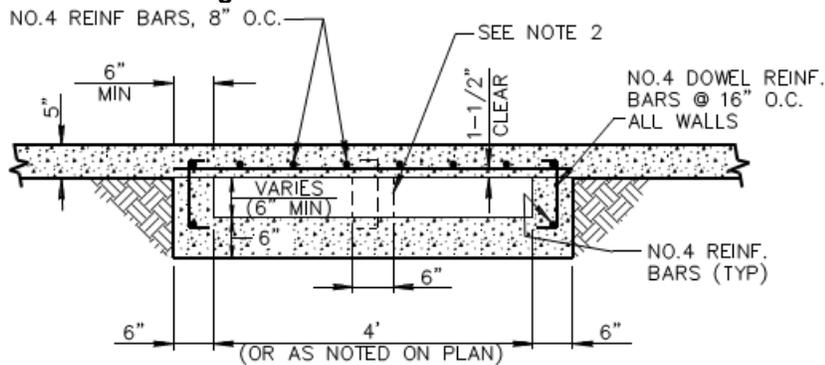
Date: March 1, 2017
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Miscellaneous Corrections

Case 17-01 F

PURPOSE: Correct rebar depicted in Section B-B of Detail 206-1

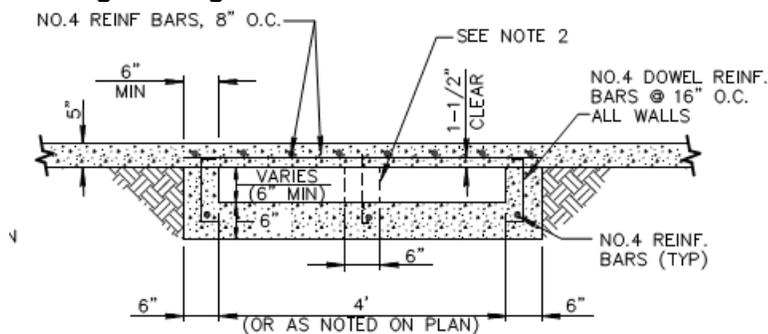
REVISION:

Corrected Drawing:



SECTION B-B

Existing Drawing:



SECTION B-B

SECTION 331

Polymer Content/Type	4% min. (see Section 714.4)
Additive	As required for mix properties
Water	As required for mix properties
Aggregate Grading	Meets Section 331.4.2.4
Consistency (ISSA T-106)	2.5 to 3.0 cm
Traffic Time	See Section 331.4.2.2
Abrasion Loss (ISSA TB-100)	75 g/ft ² maximum
Adhesion (ISSA TB-114)	90% minimum
Loaded Wheel Sand Adhesion	See Section 331.4.2.3

331.4.2.2 Modified Cohesion Test (ISSA TB-139): Furnish laboratory test data showing the mix design to be trafficable thirty (30) minutes after application at 77 F conforming to the following criteria in accordance with test methods described in the applicable specifications.

Set Time Test: 30 minutes 12 kg-cm minimum.

Early Rolling Traffic Time: 60 minutes 20 kg-cm minimum.

331.4.2.3 Loaded Wheel Sand Adhesion Test (ISSA TB-109): Furnish laboratory test data showing the mix design conforming to the following criteria in accordance with test methods described in the appropriate specifications.

<u>Vehicles/day</u>	Maximum	Minimum Sand Adhesion
0-30		70 g/ft ²
250-1500		60 g/ft ²
1500-3000		55 g/ft ²
greater than 3000		50 g/ft ²

331.4.2.4 The laboratory shall further report the quantitative effects of moisture content in the unit weight of the aggregate (bulking effect). The report must clearly show the theoretical recommended proportion of aggregate, mineral filler (Min. & Max.), water (Min. & Max.), additive(s), and asphalt, and how the proportions are based (dry aggregate weight, total mix, etc.).

331.5 TESTING: Samples for quality assurance will be taken throughout the project per ISSA TB101 for testing by an approved laboratory as required by the Engineer. Materials with test results not meeting these specifications shall be corrected immediately. Testing shall be at the expense of the Agency for the following:

- (A) Asphalt content
- (B) Aggregate gradation
- (C) Percent polymer content and type—certified by supplier

331.6 EQUIPMENT:

331.6.1 General: All equipment, tools and machines used in the performance of this work shall be maintained in satisfactory working condition at all times to ensure a high quality product.

CAST IRON WATER METER BOX COVER PER DETAIL 311
310 OR 315

GROUND LEVEL

CAST IRON WATER METER BOX COVER PER DETAIL 311
310 OR 315

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

2" ADAPTER BRASS OR COPPER

2" P.E. OR COPPER PIPE

2" CORP STOP

2" COPPER PIPE

6" GRAVEL BED

2" BRASS COUPLING

CAST IRON VALVE BOX (LOCKING) PER DETAIL 391-1 BASE TO REST ON THRUST BLOCK

2" BRONZE CURB STOP

TAPPED PLUG OR CAP

WATER MAIN

2" BRASS ELL

BRONZE OR BRASS FITTING

WATER LINE

2" TAPPED CAP (CAST IRON)

VALVE BOX LOCATION MAY VARY IF APPROVED BY THE CITY ENGINEER.

CONCRETE THRUST BLOCK PER DETAIL 380

TYPE 'A'

TYPE 'B'

DETAIL NO.
390



STANDARD DETAIL
ENGLISH

CURB STOP WITH FLUSHING PIPE

REVISED
01-01-1998
2017

DETAIL NO.
390

SECTION 728 – REVISED 6-29-17 - CASE 17-01 J

CONTROLLED LOW STRENGTH MATERIAL

728.1 GENERAL:

Controlled Low Strength Material (CLSM) is a mixture of cementitious materials, aggregates, admixtures\additives, and water that, as the cementitious materials hydrate, forms a soil replacement. CLSM is a self-compacting, flowable, cementitious material primarily used as a backfill, structural fill, or a replacement for compacted fill or unsuitable native material. Placement and usage of each type of CLSM is described in Section 604.

728.2 MATERIALS:

Cementitious materials shall conform to Section 725.2.

Coarse aggregate shall conform to ASTM C33 grading size No. 57. The size and gradation of fine aggregates (sand) shall conform to ASTM C33. Alternate materials meeting the applicable requirements of Section 701 or 702 such as combinations of other aggregates, Aggregate Base Course (ABC) or Reclaimed Concrete Material (RCM) may be used to replace the required coarse and fine aggregate as long as the approved mix design meets the requirements of Table 728-1 and is approved by the Engineer.

Water shall conform to Section 725.4.

728.3 PROPORTIONING OF MIXTURES AND PRODUCTION TOLERANCES:

Proportioning of the mixture shall comply with Section 725.6 and Table 728-1. The CLSM shall have consistency, workability, plasticity, and flow characteristics such that the material when placed is self-compacting. A minimum of 40% coarse aggregate shall be used. A mix design shall be submitted for the Engineer's approval prior to the excavation for which the material is intended for use. Sampling shall be in accordance with ASTM D5971. The flow consistency shall be tested in accordance with ASTM D6103-04. Unit weight (when applicable) shall be obtained by ASTM D6023. Compressive strength shall be tested in accordance with ASTM D4832.

TABLE 728-1	
CONTROLLED LOW STRENGTH MATERIAL REQUIREMENTS	
Portland Cement Content, Sack/cu yd	Flow, inches
1/2 Sack	9±2
1 Sack	9±2
1 1/2 Sack	9±2

Notes for Table 728-1:

- (1) CLSM mixes meeting the table requirements will not generally be placeable by means of a concrete pump or may not provide the needed workability for certain conditions. When pumpable mixes or increased workability are required, the addition of fly ash or a natural pozzolan in excess of the required Portland Cement Content may be used.
- (2) Ready-mixed structural concrete or grout shall not be used in lieu of CLSM without prior approval from the Engineer and shall be subject to rejection.

728.4 MIXING:

CLSM mixing shall comply with Section 725.7 Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Mixes shall be homogenous, readily placeable and uniformly workable.

SECTION 729 (Case 17-01K)

EXPANSION JOINT FILLER

729.1 PREMOLDED JOINT FILLER:

Expansion joint filler materials shall consist of preformed strips of a durable resilient compound and comply with ASTM [D1751](#) ~~[D5974](#)~~, [D1752](#), or [D2628](#), as specified by the Contracting Agency or as approved by the Engineer.

729.2 POUR TYPE JOINT FILLERS FOR PORTLAND CEMENT CONCRETE PAVING (PCCP):

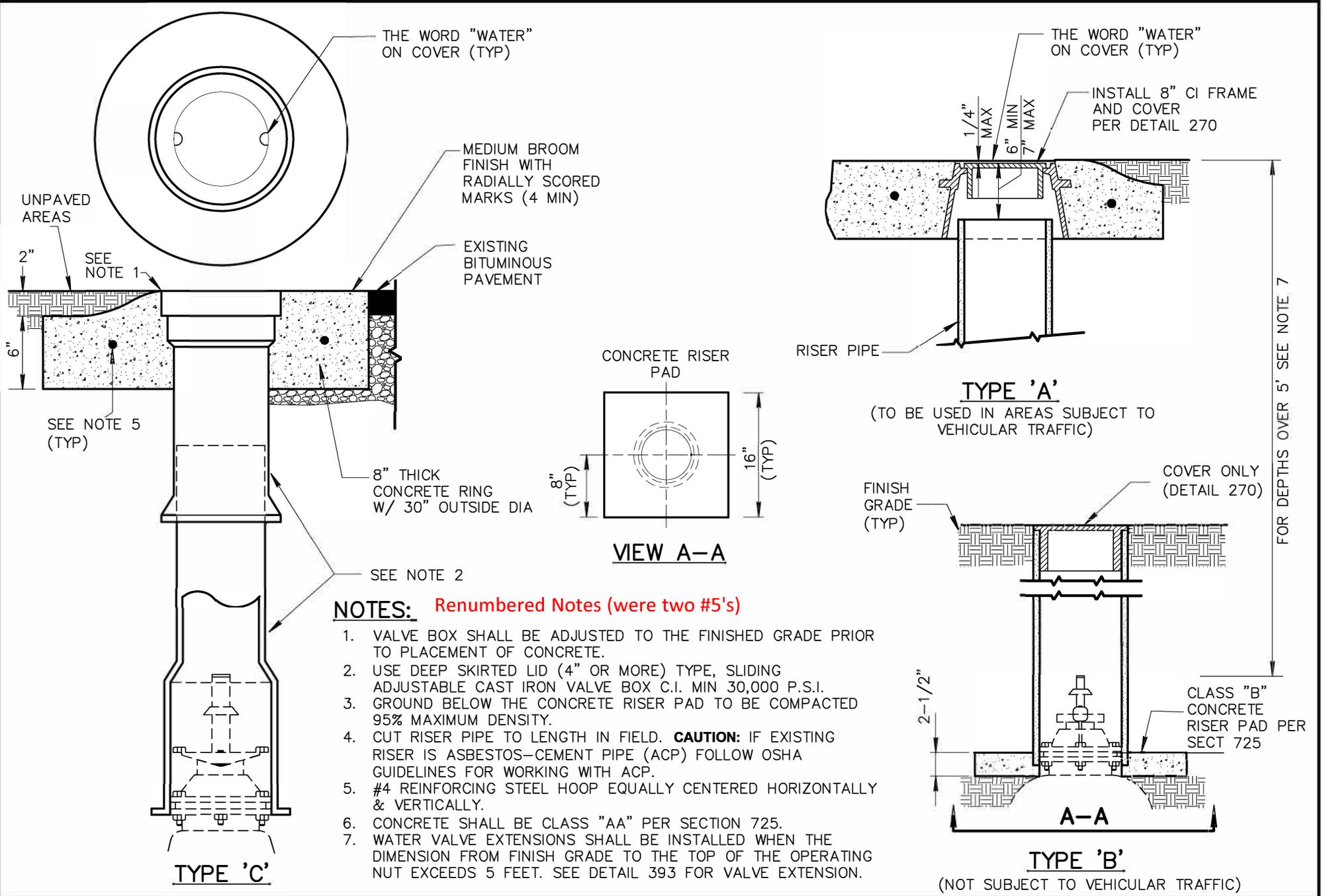
Pour type joint fillers shall comply with ASTM [D3406](#) or as approved by the Engineer. Joint sealant shall not contain any coal tar materials. The following requirement shall be added to paragraphs 7.1 of ASTM [D3406](#):

The minimum ambient temperature during application and ambient temperatures under various storage conditions shall be clearly marked on the container.

729.3 TEST REPORT AND SHIPMENT CERTIFICATE:

When requested by the Engineer, each shipment shall be accompanied by a Certificate of Compliance that the material complies with the above specifications.

- End of Section -



DETAIL NO.
391-1



STANDARD DETAIL
ENGLISH

VALVE BOX INSTALLATION
AND GRADE ADJUSTMENT

REVISED
01-01-2018

DETAIL NO.
391-1

NOTE:
PAINT COVER BOTH SIDES
ONE PRIME COAT, TWO
FINISH COATS, SECT.
790, PAINT NO. 9

10 GAUGE SHEET
STEEL COVER

(2) 5/16"
HOLES
4" O.C.

2-1/2"

1/4" ROD
HANDLE

HANDLE EXTENDS
6" BELOW
TOP WHEN GATE
IS OPEN

2-1/2"

STANDARD
CONCRETE
PIPE

CONCRETE AS
REQUIRED TO
SECURE GATE

FINISH
GRADE

VARIABLE

GROUT JOINTS
WATER
TIGHT

30"
UNLESS OTHERWISE
SPECIFIED

GATE TYPE,
SIZE AND NO.
REQUIRED AS
GIVEN ON PLANS

SIZE OF PIPE
AS SHOWN
ON PLANS

6"

4"

TYPE 'A'

NOTES:

1. BRACE TO BE INSTALLED EVERY 2' FROM TOP OF HEADGATE FRAME. BOTTOM BRACE TO BE HIGH ENOUGH TO ENABLE FULL OPENING OF HEADGATE.
2. INSTALL 1/2" BOLTS INTO LEAD PLUG DRILLED TO WITHIN 1" OF OUT SIDE OF STANDPIPE. SPACERS TO BE INSTALLED AT EACH BOLT BETWEEN HEADGATE FRAME AND INSIDE OF STAND PIPE.
3. LOCATION OF 2" HOLE FOR GATE STEM TO BE DETERMINED AFTER INSTALLATION OF GATE.
4. CONCRETE SHALL BE CLASS A PER SECT. 725.

PAINT ARROW ON OUTSIDE OF STANDPIPE INDICATING DIRECTION "TO OPEN" HEADGATE.

SEE NOTE 2

SEE NOTE 1

GROUT JOINTS
WATER TIGHT

18"
MIN.

SIZE OF
PIPE AS
SHOWN
ON PLANS

FORM CONC. AROUND
END OF PIPE BEHIND
HEADGATE FRAME

SEE NOTE 3

(4) 3/8" BOLTS TO BE
GROUTED INTO STANDPIPE
EQUI-DISTANT WITH
1-1/2"x3" RECTANGULAR
WASHERS AND NUTS

GALVANIZED EXPANDED
METAL LID (9 GAUGE)

REINF. CONC.
PIPE

VARIES
48" MIN.
52" MAX.

FINISH
GRADE

1" C.R.S.
LIFT ROD

HEADGATE TO BE APPROVED
BY AGENCY.

Removed
Reference to
SWANSON
800 SERIES.

4"

4"

TYPE 'B'

DETAIL NO.

503



STANDARD DETAIL
ENGLISH

IRRIGATION STANDPIPE

REVISED

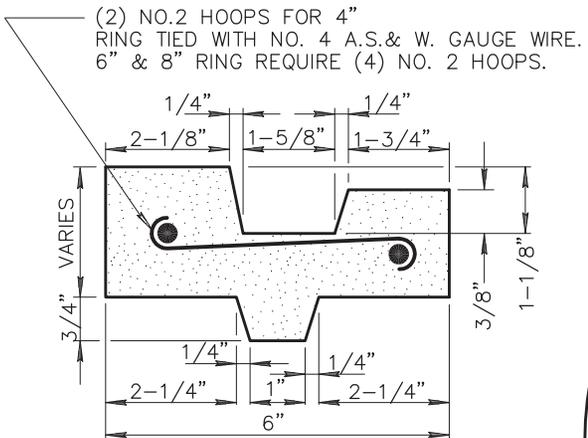
01-01-2018

DETAIL NO.

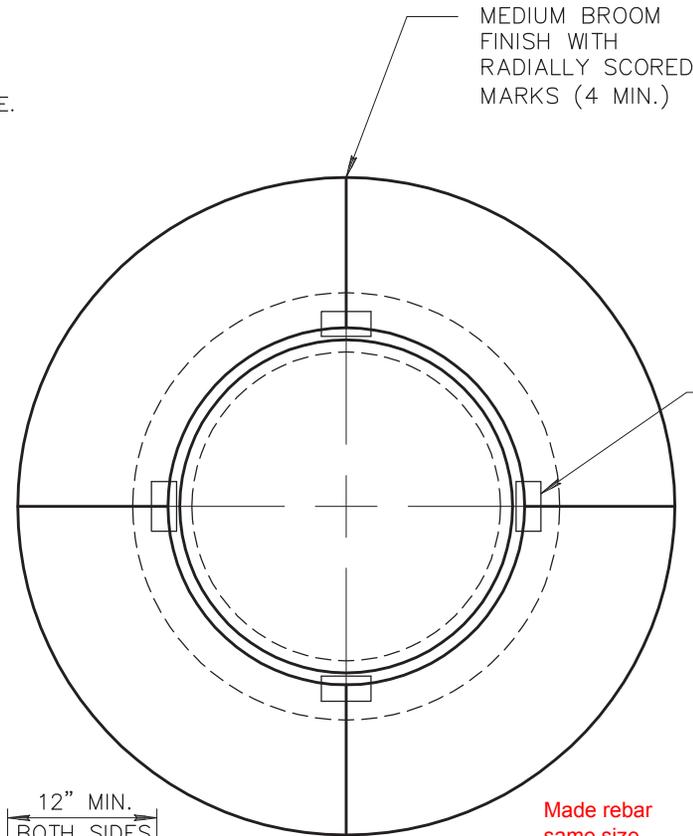
503

NOTES:

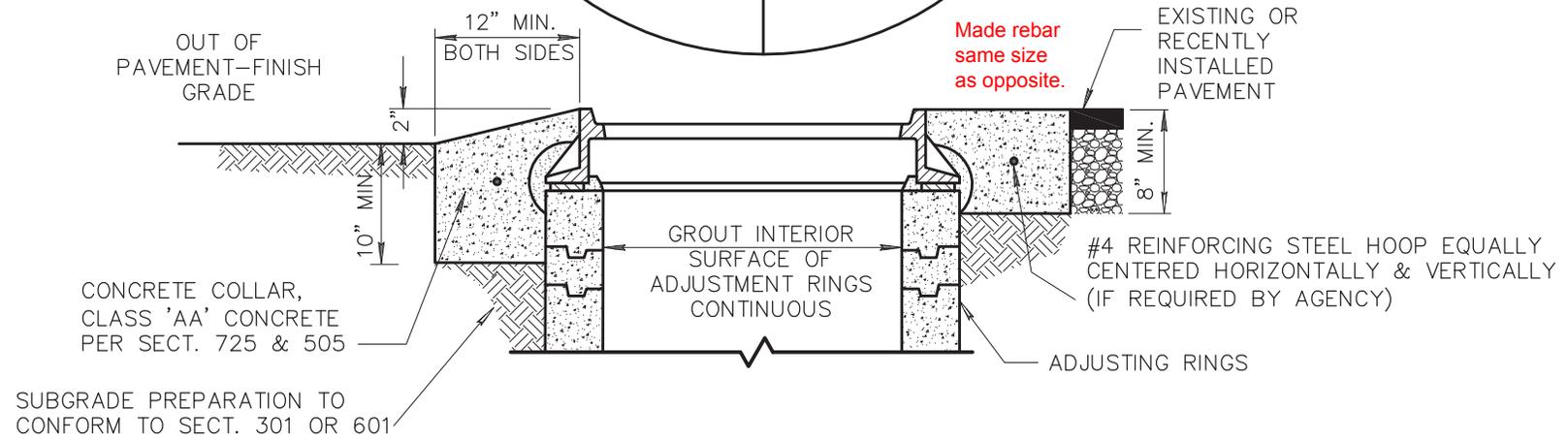
1. CONTRACTORS SHALL ADJUST ALL MANHOLE RINGS AND COVERS, INCLUDING MANHOLES OUTSIDE OF THE PAVEMENT.
2. ADJUSTMENT SHALL BE CONSTRUCTED PER MAG SECTION 345.
3. MANHOLE COATINGS PER AGENCY
4. GROUT SHALL BE USED BETWEEN FRAME AND ADJUSTING RING TO ACHIEVE WATER TIGHTNESS.



ADJUSTING RING DETAIL



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



SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

MARICOPA COUNTY
Department of Transportation



MEMORANDUM

Date: July 24, 2017
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Miscellaneous Corrections Case 17-01 O

PURPOSE: Change occurrences of "waterproof paper" to "curing paper" to match terminology used in referenced ASTM C171.

REVISION:

SECTION 726

CONCRETE CURING MATERIALS

726.1 GENERAL:

Curing materials shall consist of ~~waterproof~~ ^{Curing} paper, polyethylene film or liquid membrane-forming compounds which, when applied to fresh concrete, will inhibit moisture loss and reduce temperature rise during the curing period. All curing materials and methods shall be approved by the Engineer prior to use. Wet coverings such as burlap, cotton mats, or other moisture-retaining fabrics also may be used, or may be required by special provisions.

726.2 MATERIALS:

- ~~Waterproof~~ ^{Curing} paper, or polyethylene film, shall conform ASTM [C171](#).
- (B) Liquid membrane-forming compounds shall conform ASTM [C309](#). Type 1 compound with either a Class A or Class B vehicle shall be used for concrete structures, except bridge decks, approach slabs, and portland cement concrete pavement. Type 2 white pigmented compound, with either a Class A or Class B vehicle shall be used for portland cement concrete pavement, bridge decks and approach slabs.
- (C) Burlap cloth made from jute or kenaf shall conform to AASHTO M-182.

- End of Section -



Designation: C171 – 16

Standard Specification for Sheet Materials for Curing Concrete¹

This standard is issued under the fixed designation C171; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers materials in sheet form used for covering the surfaces of hydraulic cement concrete to inhibit moisture loss during the curing period and, in the case of the white reflective type materials, to also reduce temperature rise in concrete exposed to radiation from the sun. The following types are included:

1.1.1 Curing Paper:

1.1.1.1 Regular.

1.1.1.2 White.

1.1.2 Polyethylene Film:

1.1.2.1 Clear.

1.1.2.2 White Opaque.

1.1.3 White-Burlap-Polyethylene Sheet.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

NOTE 1—This specification does not cover materials such as burlap, cotton mats, or rugs used with additional applications of water to maintain a water-saturated environment on such surfaces. Sheet materials having additional characteristics such as insulating properties and the ability to carry additional water to the curing region are commercially available but are not currently addressed in this specification.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes shall not be considered as requirements of the standard.

2. Referenced Documents

2.1 ASTM Standards:²

C156 Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete

¹ This specification is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.22 on Materials Applied to New Concrete Surfaces.

Current edition approved Feb. 1, 2016. Published March 2016. Originally approved in 1942. Last previous edition approved in 2007 as C171–07. DOI: 10.1520/C0171-16.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D829 Test Methods for Wet Tensile Breaking Strength of Paper and Paper Products (Withdrawn 2009)³

D4397 Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

E96/E96M Test Methods for Water Vapor Transmission of Materials

E1347 Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

3. Terminology

3.1 Definitions:

3.1.1 **curing paper, n**—a composite consisting of two layers of kraft paper bonded together with a bituminous material and reinforced with fiber, used for covering the surface of fresh concrete to inhibit moisture loss during the curing period.

4. Ordering Information

4.1 The purchaser shall specify the type of curing material to be furnished under this specification.

4.2 Lengths and widths of the rolls or mats of the sheet materials furnished shall be as agreed upon between the purchaser and seller.

5. Performance Requirements

5.1 The sheet materials furnished under this specification shall be tough, strong, resilient, and capable of withstanding normal job use without puncturing or tearing.

5.2 The sheet material shall exhibit a water vapor transmission rate (WVTR) of no more than 10 g/m² in 24 h when tested according to Test Methods E96/E96M using the Water Method in the environment (test cabinet) specified in Test Method C156.

5.3 The daylight reflectance of the white side of white curing paper shall be at least 50 % when measured by Test Method E1347. The daylight reflectance of white polyethylene film and the polyethylene side of white burlap-polyethylene sheet shall be at least 70 % when measured according to Test Method E1347.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

SECTION 725

725.9 ACCEPTANCE:

(A) Plastic Concrete Properties

(1) The slump of the concrete shall meet the requirements of ASTM [C94](#) Tolerances in Slump section. When the approved mix design or project specification requirements for slump are a “maximum” or “not to exceed”, the following tolerances apply:

Specified slump:	If 3” or less	If more than 3”
Plus tolerance	0 inch	0 inch
Minus tolerance	1 1/2 inch	2 1/2 inch

INDENT → When the approved mix design or project specification requirements for slump are not written as a “maximum” or “not to exceed”, the following tolerances apply:

PART OF (1)

For design slump of:	Tolerance
2 inch and less	+/- 1/2 inch
More than 2 through 4 inch	+/- 1 inch
More than 4 inch	+/- 1 1/2 inch

(2) Limit the maximum allowable temperature of the concrete mixture immediately before placement to 90 degrees F unless otherwise specified or unless a higher allowable temperature is pre-approved by the Engineer. At the discretion of the Engineer, recommended practices in ACI 305, Specification for Hot Weather Concreting, can provide good reference information and may be used to modify maximum allowable concrete temperature and acceptance.

INDENT → Per ACI 306, Specification for Cold Weather Concreting, when the atmospheric temperature at the time of placing concrete is above 30°F the temperature of the concrete, as placed, shall not be less than 60°F. When the atmospheric temperature at the time of placing concrete is between 0°F and 30°F the temperature of the concrete, as placed, shall not be less than 65°F.

PART OF (2) (3) Air entrained concrete shall meet the requirements of ASTM [C94](#) Air-Entrained Concrete section. The air content of air-entrained concrete when sampled from the transportation unit at the point of discharge shall be within the approved mix design tolerance or +/- 1.5 % of the specified value. When a representative sample taken prior to discharge shows an air content below the specified level by more than the allowable tolerance, additional air entraining admixture shall be added to the concrete mix to achieve the desired air content level, followed by a minimum of 30 revolutions at mixing speed.

(4) Per ASTM [C94](#) Mixing and Delivery section, discharge of the concrete shall be completed within 1 1/2 hour after the introduction of the mixing water to the cementitious materials or the introduction of the cementitious materials to the aggregates. The Engineer may allow the continuation of concrete placement after the 1 1/2 hour time limit has been reached if the concrete is of such slump or workability that it can be placed without the addition of water to the batch.

Any concrete failing to meet the tolerances for plastic concrete properties in 725.9 (A) (1) through (4) shall be reviewed by the Engineer and is subject to rejection.

(B) Hardened Concrete Properties – Compressive Strength

Compressive strength of concrete shall be determined on the basis of cylinder strength tests obtained in accordance with section [725.8.2](#) and shall be acceptable if the tests meet or exceed the minimum specified strength. When the validity of cylinder strength tests are suspect, the strength of concrete in question shall be determined in accordance with Section [725.8.3](#).

When compressive strength test results are less than the specified minimum, an Engineering Analysis to determine the impact of the strength reduction may be required by the Engineer prior to the decision to accept or reject the concrete. The Engineering Analysis will be at the Contractor’s expense. Any concrete that is rejected by the Engineer shall be removed and replaced by the Contractor at the Contractor’s expense.

When concrete is accepted by the Engineer on the basis of test results of less than 100% of the required minimum compressive strength, an adjustment in the concrete unit price may be made for the quantity of concrete represented by such strength tests in accordance with Table [725-2](#).