

July 24, 2007

TO: Members of the MAG Specifications and Details Committee

FROM: Robert Herz, Maricopa County DOT, Chairman

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF AGENDA

Wednesday, August 1, 2007 at 1:30 p.m.
MAG Office, Second Floor, Cholla Room
302 North First Avenue, Phoenix

The meeting of the MAG Specifications and Details Committee will be held at the place and time indicated above. The agenda for the meeting is provided below. **Please park in the garage under the building. Bring your ticket to the meeting, parking will be validated. For those using transit, the Regional Public Transportation Authority will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.** Please call me at (602) 506-4760 if you have questions about the upcoming meeting.

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AGENDA

<u>ITEM</u>	<u>COMMITTEE ACTION REQUESTED</u>
1. <u>Call to Order</u>	1. No action required.
2. <u>Approval of July 11, 2007 Meeting Minutes</u>	2. Corrections and approval of July 11, 2007 minutes.
3. <u>2006 & 2007 Cases</u>	3. Review of pending cases and voting on designated cases.
4. <u>Inventory Subcommittee Report</u>	4. For information and discussion.
5. <u>General Discussion</u>	5. For information and discussion.
6. <u>Adjournment</u>	6. No action required.

MEETING MINUTES FROM THE
MARICOPA ASSOCIATION OF GOVERNMENTS
STANDARD SPECIFICATIONS AND DETAILS COMMITTEE

July 11, 2007

Maricopa Association of Governments Office, Cholla Room
302 North First Avenue
Phoenix, Arizona

AGENCY MEMBERS

Jim Badowich, Avondale	* Jesse Gonzalez, Peoria
Steven Borst, Buckeye	Jeff Van Skike, Phoenix (St. Trans.)
David Fern, Chandler	Jami Erickson, Phoenix (Water)
* Mark Weiner, Gilbert	* Gerald Wright, Queen Creek
* Tom Kaczmarowski, Glendale	* Rodney Ramos, Scottsdale
Troy Tobiasson, Goodyear	* Don Moseley, Surprise
Bob Herz, MCDOT	James Bond, Tempe
Kelly Jensen, Mesa	

ADVISORY MEMBERS

John Ashley, ACA	Don Green, ARPA
Jeff Benedict, AGC	Paul R. Nebeker, Independent
Brian Gallimore, AGC	William Ast, NUCA
Peter Kandarlis, SRP, Vice Chairman	Dale Phelan, NUCA
Tom Kennedy for Don Cornelison, ARPA	

MAG ADMINISTRATIVE STAFF

Gordon Tyus

* Members not attending or represented by proxy.

GUESTS/VISITORS

John Shi & Yugantha Perera, MCDOT
Derek Von Cannon, ADS-Nyloplast
Mike Hook & Tiffany Ward, Hansen Pipe and Precast
Gordon Haws, City of Mesa
Mark Glock, City of Phoenix (Materials Lab)
Brian Parks, City of Phoenix (Fire Department)
Jim Sterne & Greg Ramon, City of Phoenix (Water Services)

1. Call to Order

Chairman, Bob Herz, called the meeting to order at 1:34 p.m.

2. Approval of Minutes

The members reviewed the June 6, 2007 meeting minutes. Jeff Van Skike introduced a motion to accept the minutes as written. Steven Borst seconded the motion. A voice vote of all ayes and no nays was recorded.

3. 2006 Cases (old cases)

a. **Case 06-04 – Reduced cement content for Reinforced Concrete Pipe (RCP) mixes, Section 735.** Revisions to Section 735 to eliminate the minimum fly ash and cement requirement. A review of the case was provided by David Fern. Since there are members that still appears to be concerned over the proposed modifications, David will invite an expert from the concrete and cement industry to the next meeting to discuss the topic and answer questions. A representative from the City of Phoenix Materials Lab will also attend to provide their perspective on the proposed changes.

4. 2007 Cases (new cases)

a. **Case 07-01A – Miscellaneous Corrections:** Dimension correction to Detail 535 catch basin type “F”. Paul Nebeker requested the detail include an invert depth dimension. James Bond agreed and will have the change included with the revised detail for the next meeting. Members were requested to be prepared to vote on this case at the next meeting.

b. **Case 07-01B – Miscellaneous Corrections:** Drafting correction to Detail 222 single curb. Brian Gallimore requested the detail include a note that formed depth not exceed the overall depth of the curb when base course extends deeper than the bottom of the curb. Bob Herz agreed and will have the change included with the revised detail for the next meeting. Members were requested to be prepared to vote on this case at the next meeting.

c. **Case 07-01C – Miscellaneous Corrections:** Typographic correction to Section 105.5 titled “Cooperation of Contractor”. The committee had no discussion on this item. Members were requested to be prepared to vote on this case at the next meeting.

d. **Case 07-01D – Miscellaneous Corrections:** Bob Herz presented a correction to Detail 510 titled “Corrugated Metal Pipe and Installation”. He found that a metric dimension of 0.6m was noted on the CMP connection detail. This is an English detail and should be note as 24 inches. Members were requested to be prepared to vote on this case at the next meeting.

e. **Case 07-02 – Revisions to Asphalt Concrete, Sections 321 and 710:** Major re-writes of Asphalt Concrete placement and materials Sections 321 and 710 as proposed by the Asphalt Paving Technical Committee (APTC). Written comments on modifications were provided by MCDOT and SRP to Sections 321 and 710, respectively. Don Green stated that these comments would be reviewed and responses prepared for the next meeting. Committee members were requested to continue reviewing the modifications and provide written comments as soon as possible.

f. **Case 07-03 – PVC Catch Basins, Proposed New Details 535-2, 535-3, 537-2, 539-2, 542-1 through 4, and 543-1 through 5:** Dale Phelan provided changes to proposed Details 537-2, 542-1 and 543-1 to make them more generic and improve constructability. The committee suggested additional changes to these details, including definitions on abbreviations that are not referenced in Section 101, changing reference descriptions of other MAG details, inclusion of CLSM backfills, providing minimum bedding depths below sumps, changing compacted lift thicknesses to be more compatible with other MAG specifications, and showing stub out locations so that pipes would not be placed under and parallel with gutters. There was also a discussion on the fabrication of basin sumps. Dale noted that the changes would be made and revisions prepared by the next meeting.

g. **Case 07-04 – Revision to Water Service Taps, Section 631.3.5:** Removing requirements for insulation of copper service pipe at corporation stops with dielectric insulators. Jami Erickson said that this practice was still being required for the light rail work, but that light rail will have its own detail showing the insulation requirements. Kelly Jensen stated that he would contact Jesse Gonzalez to discuss a new detail showing the insulation installation for water service taps, but suggested that the members be prepared to vote on the basic case at the next meeting. The new detail could be moved to next year's agenda as a new case. Members were requested to be prepared to vote on this case at the next meeting.

h. **Case 07-05 – Revision to Fire Hydrant Installation, Detail 360:** Add a new note to allow the use of joint restraint systems along with thrust blocks. The committee discussed the work up to this time, noting that either MAG Detail 360 be modified to incorporate the joint restrain modifications shown in City of Peoria Detail PE-360-1 or the Peoria detail be altered to replace the MAG detail by including multiple fire hydrant types used by all agencies. Kelly Jensen stated that he would contact Jesse Gonzalez to discuss the preferred approach and would provide the committee with a final recommendation at the next meeting.

i. **Case 07-06 – Revision to Section 104, Scope of Work:** Add order of precedence for contract documents and eliminate gender-specific wording. Bob Herz stated that he would review comments received to date and provide an update at the next meeting.

j. **Case 07-07 – Revision to Section 109, Measurements and Payments:** Clarification of language when duplicate Weighmaster's Certificates are to be provide to the Engineer, clarification on equipment payment rate calculations, and references state statutes that

govern retention. Bob Herz noted that all comments had been addressed. Members were requested to be prepared to vote on this case at the next meeting.

k. **Case 07-08 – Revision to Section 615.2, Sewer Line Construction:** Gerald Wright requests clarification of language for pipe and grade tolerances. The committee had no discussion on this item.

l. **Case 07-09 – Revision to Detail 145, Safety Rail:** Adding a new note requiring calculations be performed for use of rail anchor types 1, 2 and 3. Bob Herz stated that he would review comments received to date and provide an update at the next meeting.

m. **Case 07-10 – Deletion of Obsolete Details:** Deletion of Type C redwood pavement terminations in Detail 201 and deletion of curb warning beacons in Detail 221. The committee had no discussion on this item. Members were requested to be prepared to vote on this case at the next meeting.

n. **Case 07-11 – Revision to Detail 370, Vertical Realignment of Water Mains:** Include an option for realignment of ductile iron mechanical joint. Paul Nebeker prepared review comments and will send them to Jesse Gonzalez so that they can be included in the proposed changes.

o. **Case 07-12 – Revision to Detail 404-2, Water & Sanitary Sewer Separation/Protection:** Adding language to clarify the location of pipe and joint restraints to insure that fittings/couplings do not fail and create cross-contamination. Paul Nebeker prepared review comments and will send them to Jesse Gonzalez so that they can be included in the proposed changes.

p. **Case 07-13 – Revisions to Section 756, Fire Hydrants:** Jami Erickson proposes to modify Section 756 by providing performance criteria that will reduce maintenance and operation issues with fire hydrants. The result of these revisions will also be to reduce the number of fire hydrant brands that would be allowed. Brian Parks gave a presentation to the committee on the City of Phoenix fire hydrant maintenance program. The committee discussed these changes and suggested that using performance-based criteria in the specification would be preferred to including a limited list of hydrant vendors. Agencies would still be able to have their own limited list of vendors that would meet the specifications. Gordon Tyus was requested to provide a color copy of the proposed changes on the MAG website for review. Members were requested to review and return with comments for the next meeting.

q. **Case 07-14 – Revisions to Section 505, Concrete Structures:** Bob Herz proposes to modify Section 505 as requested by the supplements subcommittee to reduce the number of agency supplements to this section. Changes to Sections 101.2, 105.2 and 206 will result from the proposed revisions to Section 505. In general, the revisions include defining minor structures, defining construction tolerances, referencing more current national standards, defining dowel anchorage/placement requirements, requiring falsework certification, addressing bridge deck joint assemblies, and adding a section on

measurement with an expanded payment section. Gordon Tyus was requested to provide a color copy of the proposed changes on the MAG website for review. Members were requested to review and return with comments for the next meeting.

5. General Discussion:

a. John Ashley reviewed the latest progress of the supplements subcommittee. He provided a list of 52 supplements that involve only one agency and recommended that each agency using these supplements determine if they could be incorporated into the current MAG sections and details. John also recommended that agencies review the most current MAG sections and details to determine if some of their supplements could be eliminated due to changes to the MAG documents over the past few years. The subcommittee will meet again on July 26th at 1:30 pm.

b. The committee thanked the City of Chandler for recently hosting a seminar on ADA design issues. This seminar provided members with federal agencies contacts who can give current information on ADA requirements. The information obtained from the seminar will allow members to submit cases next year for updating sidewalk and driveway details.

6. Adjournment:

The meeting was adjourned at 3:17 p.m.

2007 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE	
06-04	Reduce cement content requirement for RCP section 735.4 (C)	Chandler	David Fern	5/03/2006 8/04/2006			Yes No Abstain
07-01	Miscellaneous Bloopers Case A – Correct Catch Basin wall thickness in detail 535.	Mesa	Kelly Jensen	1/03/2007 4/11/2007		0 0 0	Yes No Abstain
07-01	Miscellaneous Bloopers Case B – Detail 222, Correct Type A formed height.	MCDOT	Bob Herz	2/07/2007 2/07/2007		0 0 0	Yes No Abstain
07-01	Miscellaneous Bloopers Case C – Section 105.5, Correct wording in first sentence.	Mesa	Kelly Jensen	2/07/2007 2/07/2007		0 0 0	Yes No Abstain
07-02	Revision/ Re-Write Section 710 & Section 321	ARPA	Don Green	2/07/2007 4/13/2007		0 0 0	Yes No Abstain
07-03	PVC Catch Basins - New Details 535-2, 535-3, 537-2, 539-2, 542-1 through 4, and 543-1 through 5.	NUCA	Dale Phelan	2/07/2007 5/02/2007		0 0 0	Yes No Abstain
07-04	Section 631.3.5 Service Taps – Revise dielectric insulator requirements.	Mesa	Kelly Jensen	2/07/2007 2/07/2007		0 0 0	Yes No Abstain
07-05	Detail 360 – Revise to allow restrained joints.	Mesa	Kelly Jensen	2/07/2007 2/07/2007		0 0 0	Yes No Abstain
07-06	Revision to Section 104 Scope of Work	MCDOT	Bob Herz	3/07/2007 3/07/2007		0 0 0	Yes No Abstain
07-07	Revision to Section 109 Measurements and Payments	MCDOT	Bob Herz	3/07/2007 3/07/2007		0 0 0	Yes No Abstain
07-08	Revision to Section 615 Sewer Line Construction – Clarify tolerances for pipe versus trench bottom.	Queen Creek	Gerald Wright	5/02/2007		0 0 0	Yes No Abstain

2007 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE	
07-09	Detail 145, Safety Rail – Adding reinforcement requirement for anchor types 1, 2 and 3.	MCDOT	Bob Herz	5/02/2007 5/02/2007		0 0 0	Yes No Abstain
07-10	Deletion of Obsolete or Unused Details 1. Delete Type ‘C’ from Detail 201 Pavement Section at Termination. 2. Delete the Curb Warning Beacon from Detail 221 Curb and Gutter	MCDOT	Bob Herz	5/02/2007 5/02/2007		0 0 0	Yes No Abstain
07-11	Revision to Detail 370, Vertical Realignment of Water Mains	Peoria	Jesse Gonzalez	6/06/2007		0 0 0	Yes No Abstain
07-12	Revision to Detail 404-2, Water & Sanitary Sewer Separation/Protection	Peoria	Jesse Gonzalez	6/06/2007		0 0 0	Yes No Abstain
07-13	Revisions to Section 756, Fire Hydrants	Phoenix	Jami Ericson	7/11/2007		0 0 0	Yes No Abstain
07-14	Revisions to Section 505, Concrete Structures	Peoria	Bob Herz	7/11/2007		0 0 0	Yes No Abstain

* Case was approved with verbal modifications at time of voting.



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Where Values Make The Difference

MEMORANDUM Public Works Transportation

DATE: July 11, 2007

TO: MAG Specifications and Details Committee

FROM: David E. Fern, Transportation Operations Manager

SUBJECT: Proposed Revision to MAG Specification Section 735.4 (C)

PURPOSE: 1. Modify MAG Specifications Section 735.4 (C) ~~from a minimum Portland cement/Pozzolanic material mixture of 564 lbs. per cubic yard to minimum Portland cement/Pozzolanic material mixture of 470 lbs. per cubic yard of concrete.~~ **to eliminate Pozzolanic materials and mixture exceptions to ASTM C-76 [MAG Specifications Sections (B) and (C)] and reference compliance with the ASTM pozzolanic materials sections, ASTM sections, "ASTM C-311 and ASTM C-618".**

DISCUSSION: MAG Specification Section 735.2 requires Reinforced Concrete Pipe (RCP) quality as manufactured and tested in conformance with the requirements of ASTM C-76 "except as modified herein".

MAG Specification Section 735.7 establishes the tests and basis for acceptance, including reference to ASTM C-76.

The current mixture requirement under MAG Specification Section 735 (C) requires that all Reinforced Concrete Pipe be proportioned with portland cement or a combination of portland cement and Pozzolanic material in a mixture not less than 564 lbs. per cubic yard of concrete. ASTM C-76 requires only 470 lbs. per cubic yard unless mix designs with a lower cementitious materials content demonstrate that the quality of performance of the pipe meet the requirements of C76-03.

The MAG 735 exception to ASTM C-76 reduces the maximum pozzolonic material mixture content percentage by weight of cement from 25% in ASTM-C76 to 17.5 percent in MAG 735. MAG Materials Section 725.2 "Pozzolanic Materials" also lists the 17.5% maximum limit of pozzolanic material and portland cement content through reference under the MAG 500 structural sections and the current RGRCP sections.

c: File

SECTION 735

REINFORCED CONCRETE PIPE

735.1 GENERAL:

These specifications cover reinforced concrete pipe and related structures intended to be used for conveyance of sewage, industrial waste, storm and irrigation water.

The size, type, and D-load of the concrete pipe to be finished shall be as shown on the plans, or as specified under the item of work for the project of which the pipe is a part and shall be for pipe installed by the open-cut method of construction.

When specified in the special provisions, four sets of pipe line layout drawings shall be furnished to the Engineer prior to the manufacture of the concrete pipe. Catch basin connector pipe need not be included in the pipe line layout; however, pipe stubs shall be included. In lieu of including catch basin connector pipe in the pipe layout, a list of catch basin connector pipes shall accompany the layout. The connector pipe list shall contain the following information.

(A) Size and D-load of pipe.

(B) Station at which pipe joins main line.

(C) Number of section of pipe, length of section, type of sections (straight, horizontal bevel, vertical bevel, etc.).

The pipe layouts will be used by the Contracting Agency for reference only, but their use shall in no way relieve the Contractor of the responsibility for the correctness of the layout.

(D) All pipe installed in tunnels shall be ASTM C-76, Class III. Pipe stronger than that specified may be furnished at the Contractor's option, and at no additional cost to the Contracting Agency, provided such pipe conforms in all other respects to the applicable provisions of these specifications.

Whatever struts or other protective methods proved necessary to furnish and install the pipe to meet the limitation of cracks as specified herein, shall be provided and maintained throughout pipe handling and transportation.

735.2 QUALITY:

Reinforced concrete pipe shall be manufactured and tested in conformance with the requirements of ASTM C-76, except as modified herein.

All reinforced concrete pipe less than 36-inch inside diameter shall include an area of reinforcing steel in the bell not less than the area required for the circumferential reinforcement in the wall of the pipe.

735.3 CURVES, BENDS AND CLOSURES:

Horizontal and vertical long-radius curves shall be formed by bevel adapters or by beveling the straight pipe joint. The bevel of the pipe shall not exceed 5 degrees and the total angular deflection, for beveled pipe, shall not exceed 10 degrees. Small angular changes may be made with straight pipe provided that the joint opening does not exceed $\frac{3}{4}$ inch. Short radius curves and closures shall be formed with fabricated specials; however, the angular deflection of any segment of the fabricated section shall not exceed 10 degrees.

735.4 MATERIALS:

Except when otherwise permitted by the Engineer, no materials other than water, portland cement, Pozzolanic materials, mineral aggregates and steel shall be used in the manufacturing of the pipe, conforming to ASTM C-76, with the following exceptions:

, ASTM C-311 and to ASTM C-618

SECTION 735

(A) Portland Cement: Portland cement shall comply with ASTM C-150, Type II, low alkali. The pipe manufacturer shall supply a cement mill certificate in triplicate for each load of cement delivered, showing the specification, type, chemical analysis, and quantity. In lieu of the above, on stockpiled pipe the manufacturer shall certify that the type of cement used meets this specification. The pipe manufacturer shall also certify in writing that the cement content of the concrete complies with the specifications as to yield per cubic yard of concrete poured.

~~(B) Pozzolanic Materials: Pozzolanic materials shall conform to Subsection 725.2.1 and ASTM C-618. If an approved Pozzolanic material is used, 17.5 percent of the combined weight of Pozzolanic materials and portland cement shall be Pozzolanic material.~~

~~(C) Mixture: The proportion of portland cement or combination of portland cement and Pozzolanic material in the mixture shall not be less and 564 lbs. per cubic yard of concrete.~~

(B) (X) Concrete Admixtures: The pipe manufacturer shall certify in writing that no calcium chloride or admixture containing calcium chloride has been used in the manufacture of the pipe. Other admixtures may be used if approved by the Engineer. The pipe manufacturer shall certify to the brand and chemical content of such admixtures used.

(C) (X) Steel Reinforcement: The pipe manufacturer shall supply 3 copies of mill certificates showing heat numbers, chemical analysis, and physical tests on reinforcing steel. In lieu of the above, on stockpiled pipe the manufacturer shall certify that the type of steel used meets this specification. The number of steel wraps shall not be less than 5 percent below that shown on the shop drawing for any one pipe.

(D) (X) Rubber Gaskets shall comply with Section 765.

735.5 MANUFACTURER'S QUALIFICATIONS AND EQUIPMENT REQUIREMENTS:

The manufacturer shall be competent to manufacture the type, size and quality of pipe; in addition, he shall have satisfactory curing and storage facilities, and satisfactory financial resources.

Calibration of Cement and Aggregate Scales: The pipe manufacturer shall make whatever alterations are necessary to his equipment to enable the Contracting Agency's Sealer or State Inspector of Weights and Measures to check, calibrate, and seal the aggregate and cement scales used in the pipe production.

735.6 CURING OF PIPE:

(A) Steam Curing: The manufacturer shall provide adequate steam plant, piping, enclosures, and other facilities for curing the pipe. The enclosures shall be such that the temperature is maintained continuously between 110 and 150°F.

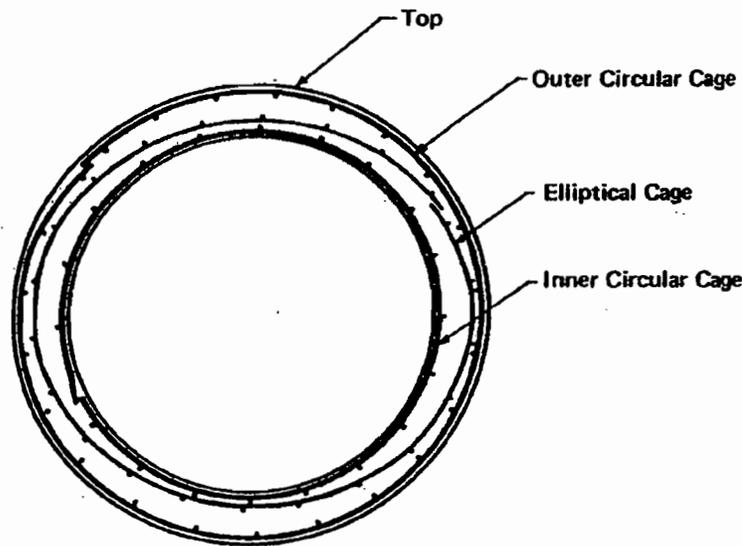
(B) Curing of the pipe shall not commence until the concrete has attained its initial set, but in any event not sooner than 1 hour nor later than 8 hours after placing of the concrete. Rate of rise of temperature shall not exceed 30° per hour.

(C) Water Curing: The pipe shall be kept moist during daylight hours. The pipe, including the ends, shall be covered with burlap for the first 3 days, except that, if the pipe is kept constantly and completely wet with fog sprays during the daylight hours, the burlap covering may be omitted. If the manufacturer fails to proceed immediately with the required water curing he shall seal the surfaces of the concrete, except joint surfaces that are to be grouted, with an approved, white pigmented sealing compound in accordance with Section 726.

735.7 TESTS AND ACCEPTANCE:

(A) Basis of Acceptance: The basis of acceptance for the reinforced concrete pipe shall be in accordance with ASTM C-76 by the method stated in the special provision and as amended herein. However, the purchaser may, at his option, make concrete cylinder tests for the purpose of determining release dates for shipment of the pipe and for his information in regard to general quality of the concrete.

(B) Segregation of Material: The slump of the concrete mix shall not exceed 4 inches so as to preclude excessive segregation of the materials used and shall be proportioned so that the result shall be a homogeneous concrete mixture of such quality that the pipe will conform to the tests and design requirements of these specifications.



NOTE 1—The total reinforcement area of the inner circular cage and the elliptical cage shall not be less than that specified for the inner cage in Tables 1-5.

NOTE 2—The total reinforcement area of the outer circular cage and the elliptical cage shall not be less than that specified for the outer cage in Tables 1-5.

FIG. 1 Triple Cage Reinforcement

option of the owner, the load to produce a 0.3-mm crack and the ultimate strength of the pipe; by such material tests as are required in 6.1, 6.2, and 6.4; by absorption tests on selected samples of concrete from the wall of the pipe; and by visual inspection of the finished pipe to determine its conformance with the accepted design and its freedom from defects.

5.1.2 *Acceptance on the Basis of Material Tests and Inspection of Manufactured Pipe for Defects and Imperfections*—Acceptability of the pipe in all diameters and classes produced in accordance with 7.1 or 7.2 shall be determined by the results of such material tests as are required in 6.1, 6.2, and 6.4; by crushing tests on concrete cores or cured concrete cylinders; by absorption tests on selected samples from the wall of the pipe; and by inspection of the finished pipe including amount and placement of reinforcement to determine its conformance with the accepted design and its freedom from defects.

5.1.3 When agreed upon between the owner and manufacturer, any portion or any combination of the tests itemized in 5.1.1 or 5.1.2 may form the basis of acceptance.

5.2 *Age for Acceptance*—Pipe shall be considered ready for acceptance when it conforms to the requirements as indicated by the specified tests.

6. Materials

6.1 *Reinforced Concrete*—The reinforced concrete shall consist of cementitious materials, mineral aggregates, and water, in which steel has been embedded in such a manner that the steel and concrete act together.

6.2 *Cementitious Materials:*

6.2.1 *Cement*—Cement shall conform to the requirements of portland cement of Specification C 150 or shall be portland blast-furnace slag cement or portland-pozzolan cement conforming to the requirements of Specification C 595, except that

the pozzolan constituent in the Type IP portland-pozzolan cement shall be fly ash and shall not exceed 25 % by weight.

6.2.2 *Fly Ash*—Fly ash shall conform to the requirements of Class F or Class C of Specification C 618.

6.2.3 *Allowable Combinations of Cementitious Materials*—The combination of cementitious materials used in the concrete shall be one of the following:

6.2.3.1 Portland cement only,

6.2.3.2 Portland blast furnace slag cement only,

6.2.3.3 Portland pozzolan cement only, or

6.2.3.4 A combination of portland cement and fly ash.

6.3 *Aggregates*—Aggregates shall conform to Specification C 33 except that the requirement for gradation shall not apply.

6.4 *Admixtures and Blends*—Admixtures and blends may be used with the approval of the owner.

6.5 *Steel Reinforcement*—Reinforcement shall consist of wire conforming to Specification A 82 or Specification A 496 or of wire fabric conforming to Specification A 185 or Specification A 497 or of bars of Grade 300 steel conforming to Specification A 615/A 615M.

6.6 *Synthetic Fibers*—Collated fibrillated virgin polypropylene fibers may be used, at the manufacturer's option, in concrete pipe as a nonstructural manufacturing material. Only Type III synthetic fibers designed and manufactured specifically for use in concrete and conforming to the requirements of Specification C 1116 shall be accepted.

7. Design

7.1 *Design Tables*—The diameter, wall thickness, compressive strength of the concrete, and the area of the circumferential reinforcement shall be as prescribed for Classes I to V in Tables 1-5, except as provided in 7.2.

SECTION 725

PORTLAND CEMENT CONCRETE

725.1 GENERAL:

Portland cement concrete shall be composed of portland cement or portland Pozzolan cement, Pozzolonic Materials, fine and coarse aggregates, water, and, if provided for or allowed, certain admixtures.

All of the materials used for concrete shall be in accordance with these specifications and requirements for the particular material as provided herein.

Weighing and metering devices used for the purpose of proportioning materials shall fulfill requirements as to accuracy and tolerance prescribed by the Weights and Measures Division of the State of Arizona and shall be sealed and certified in accordance with the procedures established by this agency. This certification shall not be over 12 months old and shall be renewed whenever required by the Engineer. When portable plants are set up at a new or temporary location, the scales and scale assembly shall be inspected and certificate issued regardless of the date when the scales were last tested. The Engineer may require the Contractor to run a quick scale check at any time with certified weights furnished by the Contractor and order the scale recertified if necessary.

TABLE 725-1			
CONCRETE CLASSES MINIMUM REQUIREMENTS			
Class of Concrete	Min. Cement Content Lbs. Per Cu Yard	Minimum Compressive Strength (1)	
		at 14 Days psi	At 28 Days psi
AA	600	3200	4000
A	520	2400	3000
B	470	2000	2500
C	420	1600	2000

(1) As tested in accordance with ASTM C-39. Maximum slump 5 inches when tested in accordance with ASTM C-143.

Class AA concrete shall be used as specified.

Class A concrete shall be used for concrete structures, either reinforced or non-reinforced, and for concrete pavements.

Class B concrete may be used for curbs, gutters and sidewalks.

Class C concrete may be used for thrust blocks, encasements, fill or over-excavation, etc.

725.2 PORTLAND CEMENT:

Cement to be used or furnished under this specification shall be Portland cement, conforming with the requirements of ASTM C-150, Type II, low alkali, or Portland Pozzolan Cement, conforming with the requirements of ASTM C-595, Type IP (MS), low alkali, except when another type including high early strength is specified in the special provisions or shown on the plans. Type V cement (ASTM C-150) shall be specified in the special provisions for use in concrete which will be exposed to contact with soils or waters containing water soluble sulfates (as SO_4) in concentration greater than 0.20% by weight of soil or 1500 PPM in solutions. Pozzolonic materials shall not be used as a directly added ingredient in concrete in combination with Portland Pozzolan Cement.

SECTION 725

Cement shall be sampled and tested as prescribed in applicable ASTM specifications. The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the cement manufacturer, identifying the cement and stating that the cement delivered to the batching site complies with those specifications. When requested by the Engineer, the Contractor shall furnish him with 3 copies of said certification. The cost of furnishing tested cement shall be considered as included in the contract bid price and no additional allowance will be made therefore.

When suitable facilities, as recommended by the Concrete Plant Manufacturer's Bureau, and approved by the Engineer, are available for handling and weighing bulk cement, such facilities shall be used. Otherwise the cement shall be delivered in original unopened sacks that have been filled at the mill and bear the name or brand of the manufacturer. The type of cement, and the weight of cement contained in each sack shall be plainly marked thereon.

Cement shall be stored in such manner as to permit ready access for the purpose of inspection and identification, and so as to be suitably protected against damage by contamination or moisture. Should any lot of bulk cement be delivered to the site show evidence of contamination, the Engineer may require that such lot be removed from the site.

A cement shall not be mixed with any other brand or type unless written permission has first been obtained from the Engineer. All cement used in the manufacture of concrete for any individual structure shall be of the same brand unless otherwise approved by the Engineer.

725.2.1 Pozzolonic Materials: Pozzolonic materials to be used in concrete or furnished under this specification shall conform to the requirements of ASTM C-618.

If an approved pozzolonic material is used, 15 percent by weight of the Table 725-1 minimum portland cement requirements shall be replaced. The replacement ratio shall be 1.2 pounds of pozzolan per pound of replaced portland cement. If the class of concrete is not from Table 725-1, the amount of pozzolonic material used will be 17.5 percent of the combined weight of pozzolonic material and portland cement.

Pozzolans shall be sampled and tested as prescribed in ASTM C-618 and ASTM C-311. The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the Pozzolan supplier identifying the Pozzolan and stating the Pozzolan delivered to the batching site complies with applicable specifications. The cost of furnishing tested Pozzolan shall be considered as included in the contract bid price and no additional allowance will be made therefore.

Pozzolan material shall be handled and stored in the same manner as portland cement. When facilities for handling bulk Pozzolan are not available, the Pozzolan shall be delivered in original unopened sacks bearing the name and brand of the supplier, the type and source of the Pozzolan, and the weight contained in each sack plainly marked thereon.

A Pozzolan shall not be mixed with any other brand or type unless written permission has first been obtained from the Engineer. All Pozzolan used in the manufacture of concrete for any individual structure shall be of the same type, and from the same source unless otherwise approved by the Engineer.

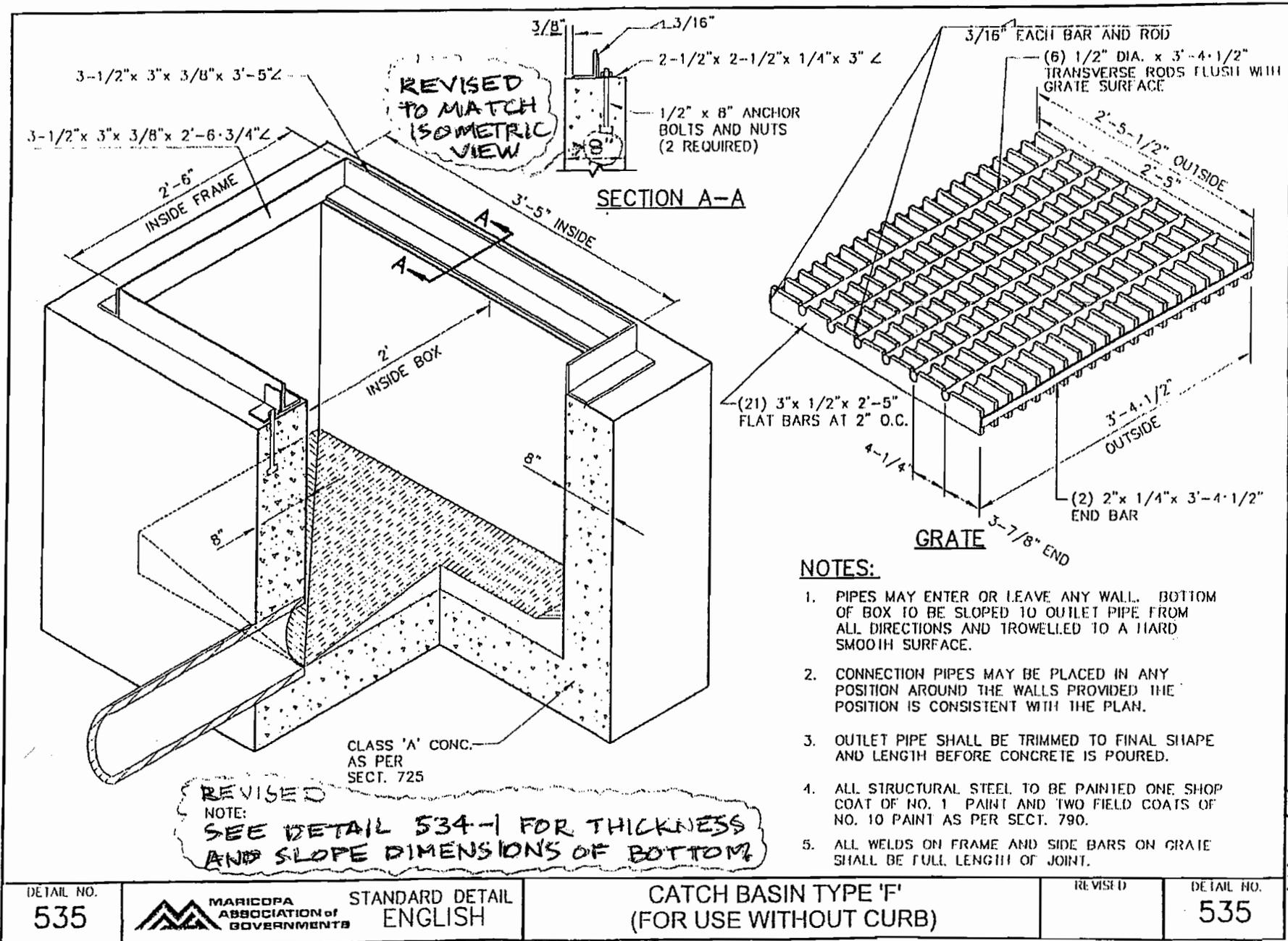
725.3 AGGREGATES:

Aggregates shall be crushed rock or gravel or a combination thereof and sand conforming to the requirements prescribed in Section 701. Prior to the delivery of the aggregates, the Contractor will be required to furnish samples for testing, and shall notify the Engineer as to when and where they will be available. Thereafter, additional required samples shall be furnished at the expense of the Contractor, but the cost of testing and making the grading analysis will be borne by the Contracting Agency. Samples shall be taken by the Engineer or in the presence of the Engineer.

No method which may cause the segregation, degradation or the combining of materials of different grading shall be used.

725.4 AGGREGATE GRADING:

Aggregates for each batch of concrete to be prepared shall be combined from materials separately stored in the various sizes and gradations as prescribed in Section 701. The relative proportions of each aggregate used will be as required to meet the provisions of this specification and will be the responsibility of the Contractor.



CASE 07-01A

DETAIL NO. 535



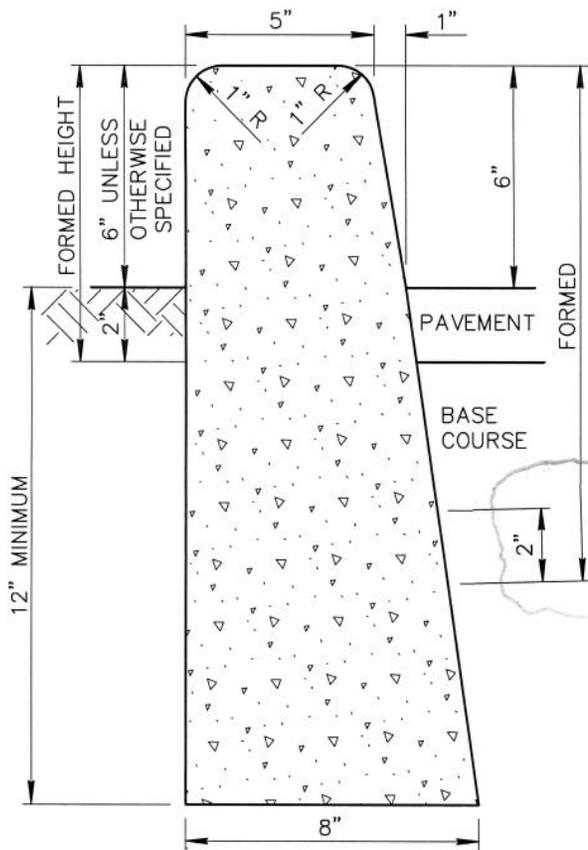
STANDARD DETAIL ENGLISH

CATCH BASIN TYPE 'F' (FOR USE WITHOUT CURB)

REVISED

DETAIL NO. 535

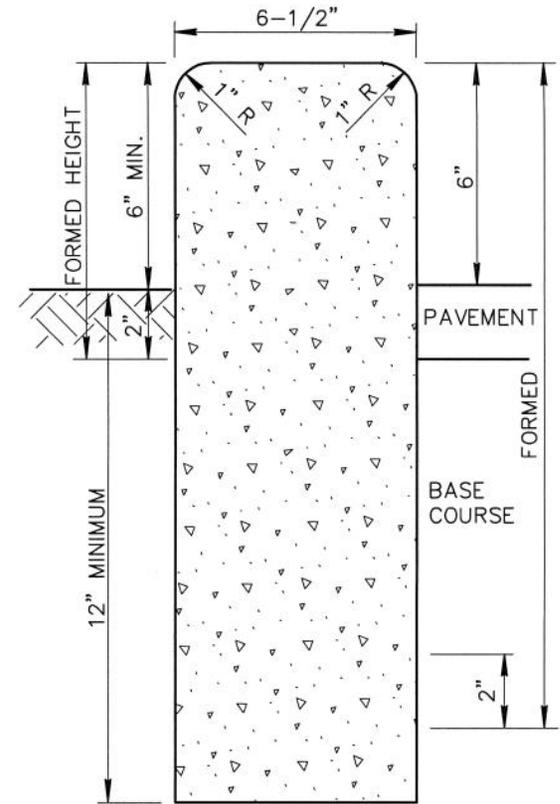
TOTAL COMBINED → MAX. CLEARANCE BETWEEN FRAME & GRATE IS 1/2"



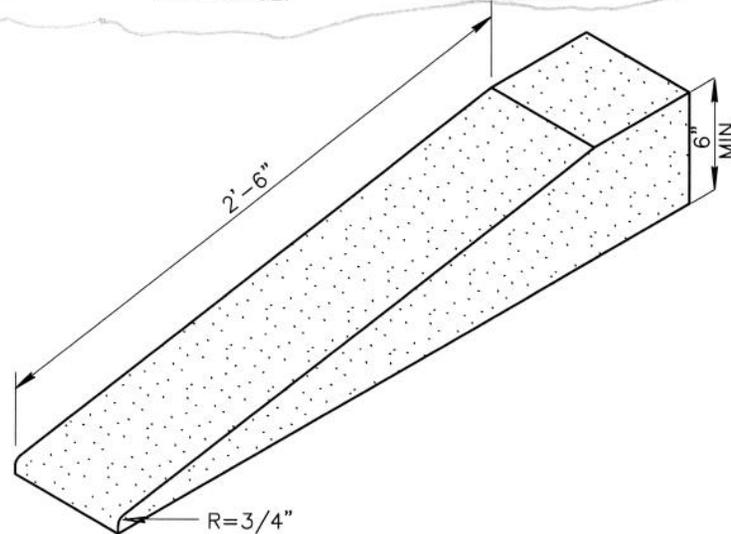
TYPE 'A'

NOTES:

1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE.
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.
4. CONCRETE CURBS CONFORM TO SECT. 340.
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10'
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.
7. WHEN PAVEMENT AND BASE COURSE EQUALS OR EXCEEDS 10" IN DEPTH, THE ENTIRE ROADWAY SIDE OF THE CURB SHALL BE FORMED. THE TOTAL CURB HEIGHT REMAINS 18" UNLESS NOTED OTHERWISE.



TYPE 'B'



TYPICAL CURB TERMINATION

DETAIL NO.

222



STANDARD DETAIL
ENGLISH

SINGLE CURB -
TYPES A, B AND TERMINATION

REVISED

01-03-2002

DETAIL NO.

222

CASE 07- 01 B
7/24/2007

Mesa proposes to make this change

Case # 07-01C

SECTION 105

In the event the Engineer finds the materials or the finished product in which the materials are used not in conformity with the plans and specifications, but that reasonably acceptable work has been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as he deems necessary to conform to his determination based on engineering judgement.

In the event the Engineer finds the materials or the finished product in which the materials are used or the work performed are not in conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by the Contractor at no additional cost to the Contracting Agency.

In all instances wherein the items and/or specifications require installation or construction in accordance with either manufacturers' or suppliers' recommendations and/or instructions, said recommendations and/or instructions shall be submitted with the applicable portion clearly marked for approval prior to the commencement of work on that item or portions of the contract.

105.4 COORDINATION OF PLANS AND SPECIFICATIONS:

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

105.5 COOPERATION OF CONTRACTOR: "work site" The word "site" is missing

The Contractor will be supplied with a ~~minimum~~ of seven sets of approved plans and special provisions, one set of which the Contractor shall keep available on the ~~site~~ at all times.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, his inspectors, and other Contractors in every way possible.

The Contractor shall at all times be present at the work in person or represented by a competent superintendent. The superintendent shall be authorized to receive and fulfill instructions from the Engineer and who shall supervise and direct the work. No less than fourteen days prior to the scheduled/planned Notice to Proceed, the Contractor shall submit to the Engineer for review and approval, the name and qualifications of the proposed superintendent. When the superintendent is approved, he shall not be changed by the Contractor without written approval of the Engineer. Instructions and information given by the Engineer to the Contractor's superintendent shall be considered as having been given to the Contractor.

(A) All phases of the project such as concrete work, pipe work, etc., shall be under the direct supervision of a foreman or his designated representative on the site who shall have authority to accept instructions, with respect to that particular phase of the project, and take action required to properly carry out the work.

(B) In the event of noncompliance with the above, the Engineer may require the Contractor to stop work on that part of the project until the required supervision is present.

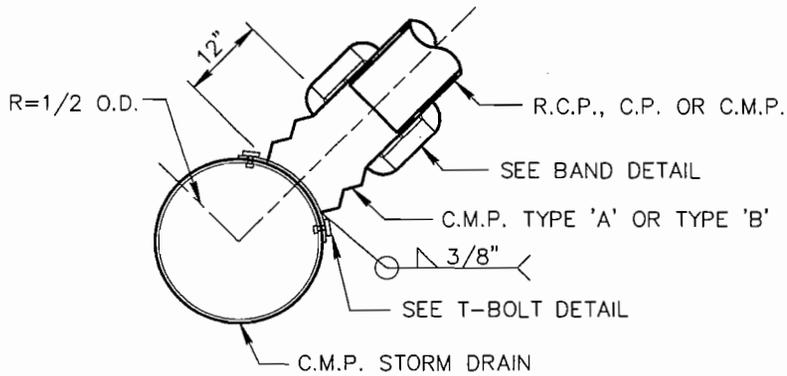
The Contractor shall file with the Engineer, the names, addresses, and telephone numbers of representatives who can be contacted, at any time, in case of emergency. These representatives must be fully authorized and equipped to correct unsafe or excessively inconvenient conditions on short notice.

Emergencies may arise during the progress of the work which may require special effort or require extra shifts of men to continue the work beyond normal working hours. The Contractor shall be prepared in case of such emergencies from whatever cause, to do all necessary work promptly.

105.6 COOPERATION WITH UTILITIES:

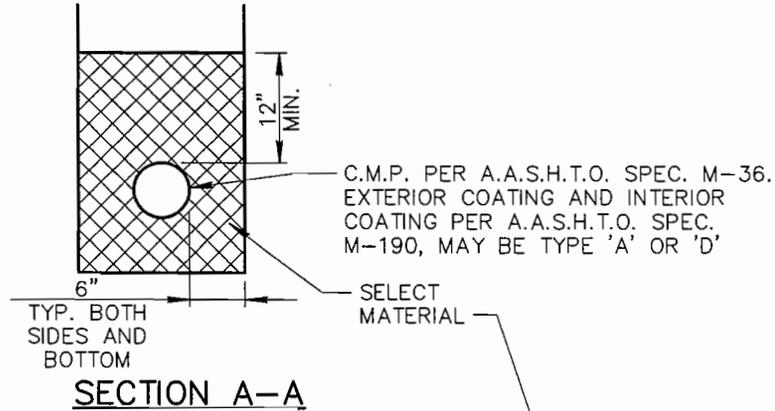
The Contracting Agency will notify all utility companies, all pipe line owners, or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.

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

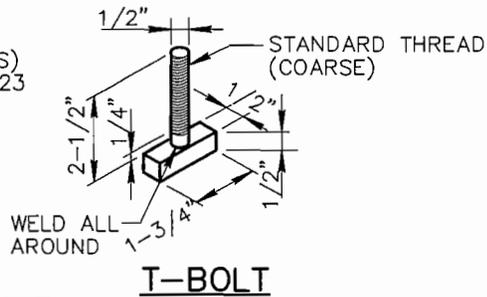


CONNECTOR CROSS SECTION

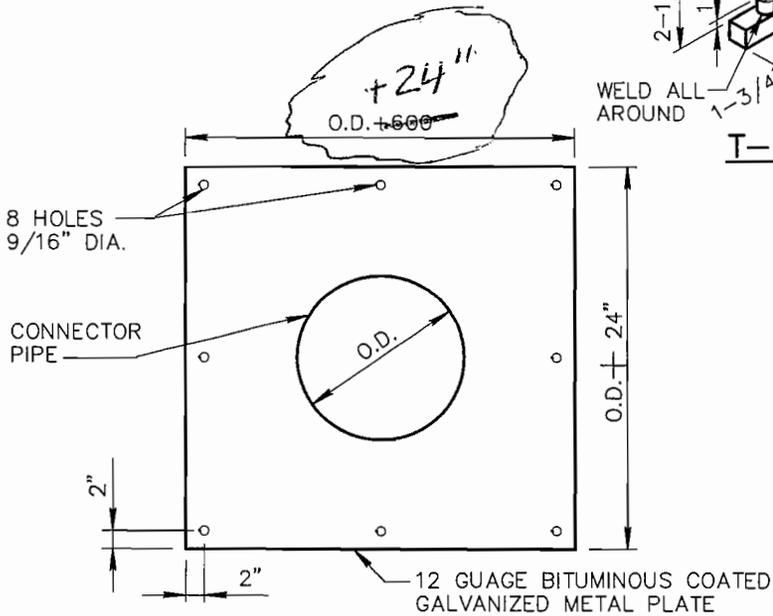
NOTE:
USE 5/8" WASHER AND NUT, ALL PIECES
(NUTS, WASHERS, AND FABRICATED BOLTS)
TO BE GALVANIZED AS PER A.S.T.M. A-123
LATEST REVISION.



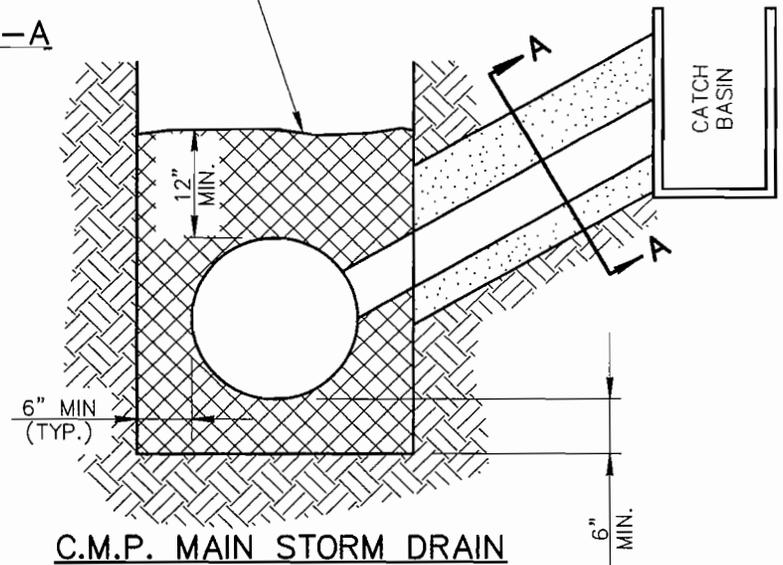
SECTION A-A



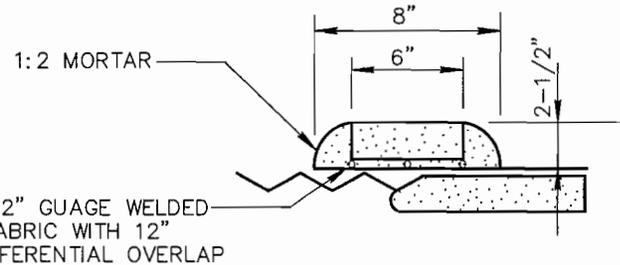
T-BOLT



**C.M.P. CONNECTION TO MAIN STORM DRAIN
24" PIPE AND SMALLER**



C.M.P. MAIN STORM DRAIN



BAND DETAIL

DETAIL NO.

510



STANDARD DETAIL
ENGLISH

**CORRUGATED METAL PIPE
AND INSTALLATION**

REVISED

DETAIL NO.

510

**MARICOPA COUNTY DEPT OF TRANSPORTATION
DESIGN REVIEW COMMENTS**

Project:	MAG 321 Revision	Submitted:	
Project No.:		Percent:	
Consultant:		Reviewed By:	John Shi, PhD, PE, 6/10/2007

ACTION CODES :	A =	C =
	B =	D =

ITEM #	SHEET #	COMMENT	DISPOSITION	
			INTL.	FINAL
1		321.1: The phrase "on a previously prepared base or subgrade" should stay.		
2		321.1: for the case of construction under a permit, the section the defines of the developer as Owner, and agency, the ultimate owner will not have control over quality. See Section 321.10.5.		
3		321.3: Re consider the definition of "excessive moisture". A lot of soils will pump at or above optimum moisture, or even slightly below the optimum moisture when being compacted.		
4		321.2: The last sentence should specified who will select the mix type.		
5		321.5: Table 321-1, the "%" should be "percent point". Historically, the word "Percent" has been used for the meaning of "percent point". I am not sure whether we need to correct the usage of the word this time.		
6		321.5: Repeated word "that" should be deleted.		
7		321.6: The requirements for measuring device calibration in the current Section 710.5.3 regarding proportioning are not stated in the proposed Section 321.		
8		321.7: Rearrange the first sentence. Or, delete the first three words, and capitalize the first letter of the word "petroleum".		
9		321.8.2: the requirements for smoothness at transverse joints have been reduced from 1/4" over 25 feet to 1/4" over 12 feet. 10 to 15 degree skew at saw-cut is no longer required. Are these better practice? Should we quit doing them?		
10		321.8.4: The requirement for the speed of roller is not specified. We have seen contractors using higher roller speed that cause micro cracking at surface similar to "heat checking".		
11		321.6: Storage limit changed from 12 hours to 24 hours. Is there any improvements in storage method and equipments?		
12		321.9: The status of Quality Control changed from required to "any desired". This "desired" QC status may not provide necessary information for making judgment as outlined in the last two sentences of this subsection.		
13		321.8.4: Should this 250 degree F be independent of the recommended minimum temperature for compaction from the mix design?		
14		321.8.4: for the case of construction under permit, the permitting agency should have certain involvement in review of quality assurance process and test results.		
15		321.10.2 Tables: for the items showing only EA (engineering Analysis), what will be the corrective action if the EA results showing the same range and the Owner's engineer does not agree with the contractor's proposal?		
16		321.10.4: in the sixth paragraph, second sentence, the word "density" should be deleted.		
17		321.10.2: the paragraph below Table 321-3, it seems that QA and QC functions are mixed. The next question is who is going to cease the production the contractor, the supplier, or the owner (agent)? Why QA results is used for quality control purpose?		

Project:	MAG 321 Revision		Submitted:	
Project No.:			Percent:	
Consultant:			Reviewed By:	John Shi, PhD, PE, 6/10/2007
ACTION CODES :		A =	C =	
		B =	D =	
ITEM #	SHEET #	COMMENT	DISPOSITION	
			INTL.	FINAL
18		321.10.3: in second paragraph, the clause "the contracting agency is not the owner" is in contradiction with the terms in subsection 321., second situation. The current specification treat the ultimate owner as the owner; whereas the proposed specification treat the developer as the owner for the type of project under permit.		

Preliminary comments on revised Section 710 by SRP

710.1: The second line provides for mineral admixture when required by the mix design or Engineer, but 710.2.3 paragraph 2 requires minimum cement or hydrated lime contents. This could be misinterpreted. Suggest that the second line in 710.1 be deleted.

710.1: Change the word “produced” to “placed”.

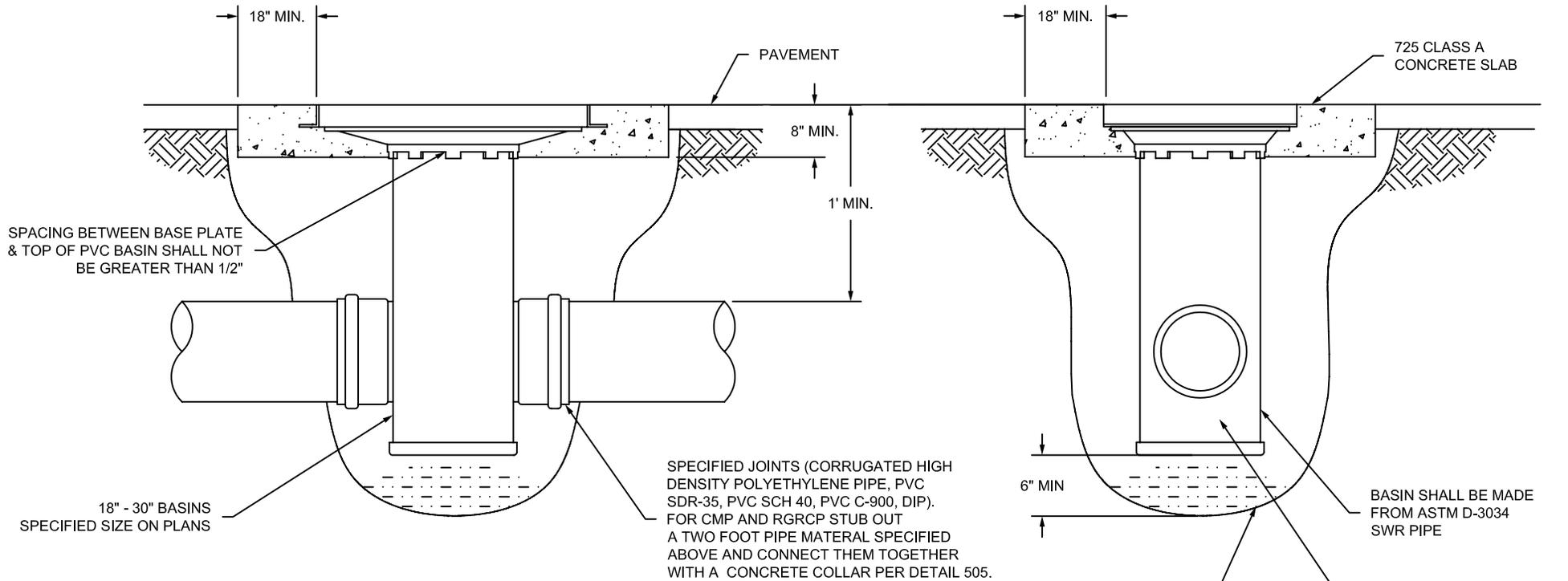
710.1: Asterisk comment below Table 710-1 references the restricted zone, yet all other restricted zone requirements have been deleted from this section. Suggest rewording to eliminate restricted zone references.

710.2.2: Any term not defined in Section 101 that is noted in Table 710-2 needs to be include in Section 101, such as “AI”. There should be some discussion on what “Arizona 212” is.

710.3.1: Second paragraph references a “mix design report”, but Section 321 just references a “mix design”. Need to have parallel wording. Suggest including the word “report” in Section 321 where submittal for the mix design are requested.

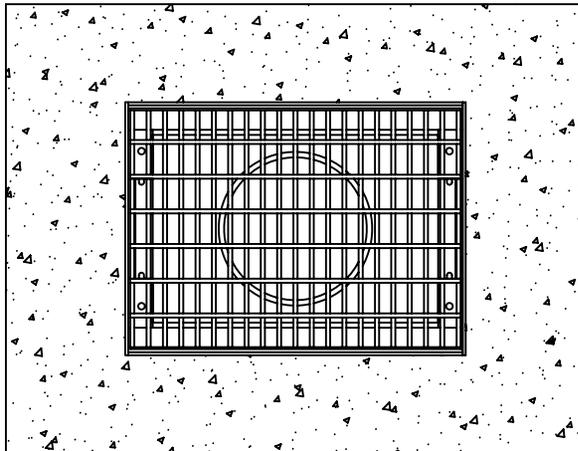
710.3.2.1 & 710.3.2.2: Typically, the most current version of a standard is referenced in specifications as “latest”. Suggest changing wording of “current” to “latest”.

Table 710-3: It would be very beneficial to see a comparative graph of the existing Marshall mix gradations versus the proposed new gradation. It seems that the new gradations are much more liberal in their ranges. Why was this done?



BACKFILL MATERIAL SHALL BE 701.2.1. BACKFILL MATERIAL SHALL BE PLACED UNIFORMLY IN 8" LIFTS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY, OR 1/2 SACK CLSM PER 728.

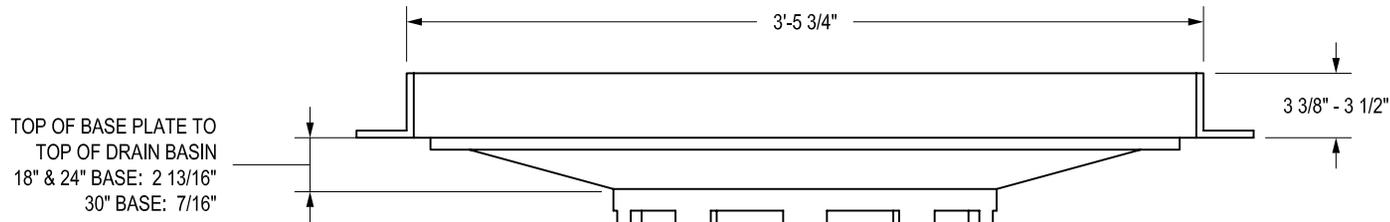
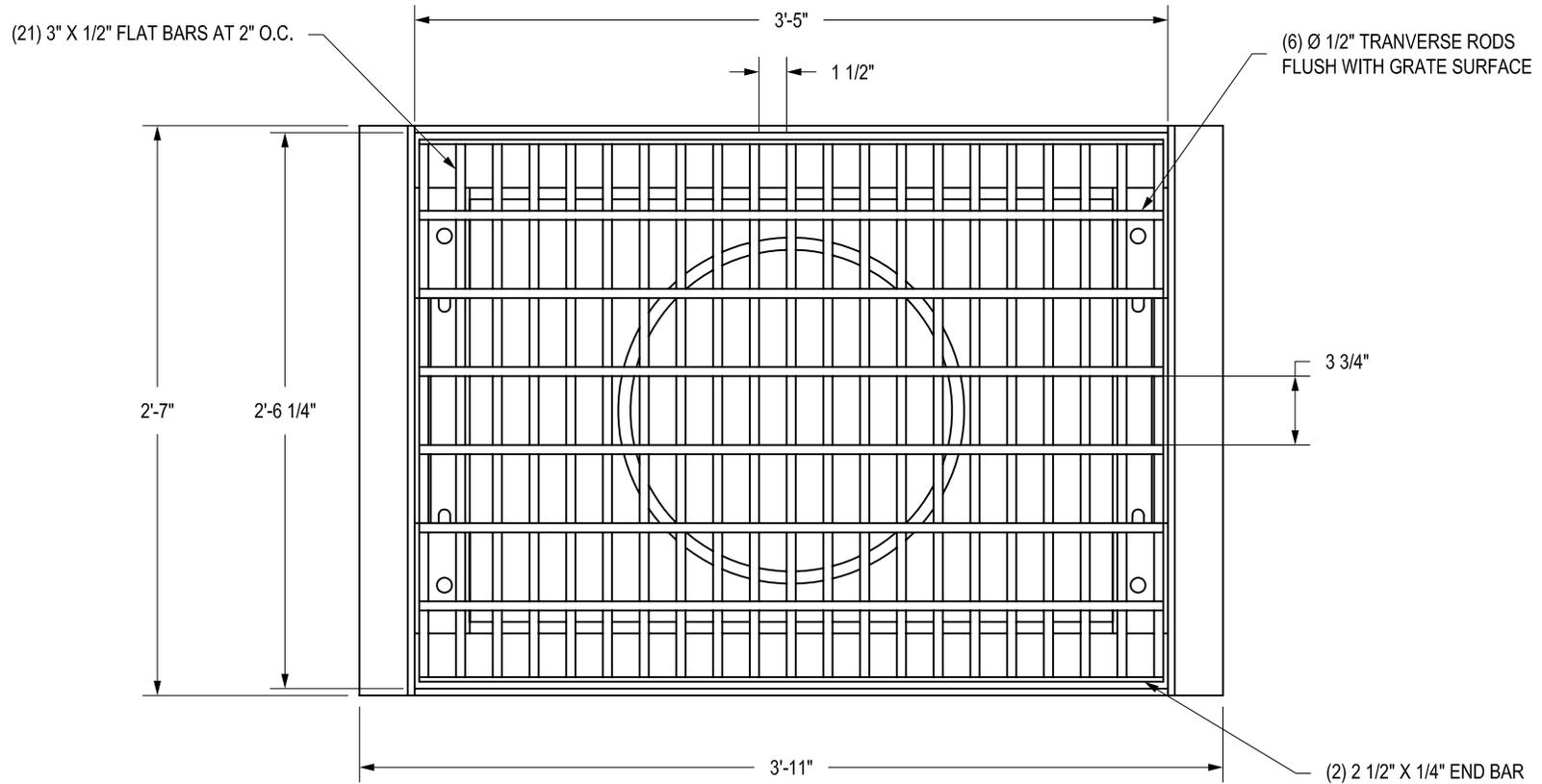
TOP VIEW



DETAIL NO.
535-2

CATCH BASIN 'J'

REVISED
DETAIL NO.
535-2



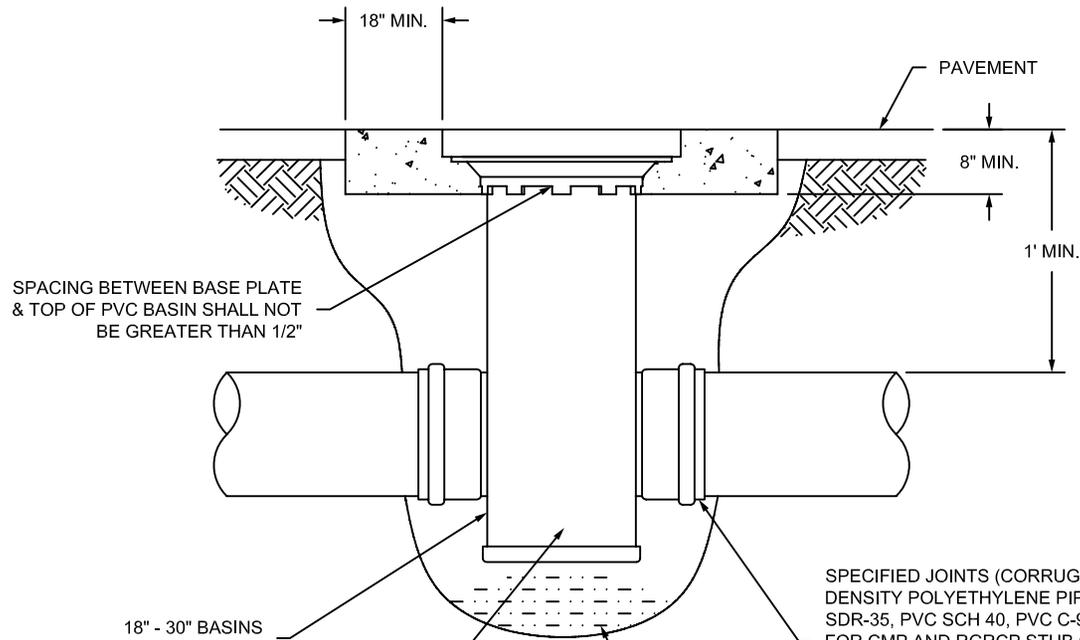
GRATE MEETS H-20 LOAD RATING.
 QUALITY: FRAME & GRATE MATERIALS SHALL CONFORM TO ASTM
 A-36 STEEL, BASE PLATE MATERIALS SHALL CONFORM TO ASTM A53
 GRADE 70-50-05 DUCTILE IRON
 ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO.
 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790
 OR GALVANIZED. BASE PLATE ARE FURNISHED WITH BLACK ENAMEL
 PAINT AND ZINC PLATED FASTENERS.
 ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL
 LENGTH OF JOINT.
 APPROX. DRAIN AREA = 761.18 SQ IN.

DETAIL NO.
535-3

GRATE FOR CATCH BASIN 'J'

REVISED

DETAIL NO.
535-3



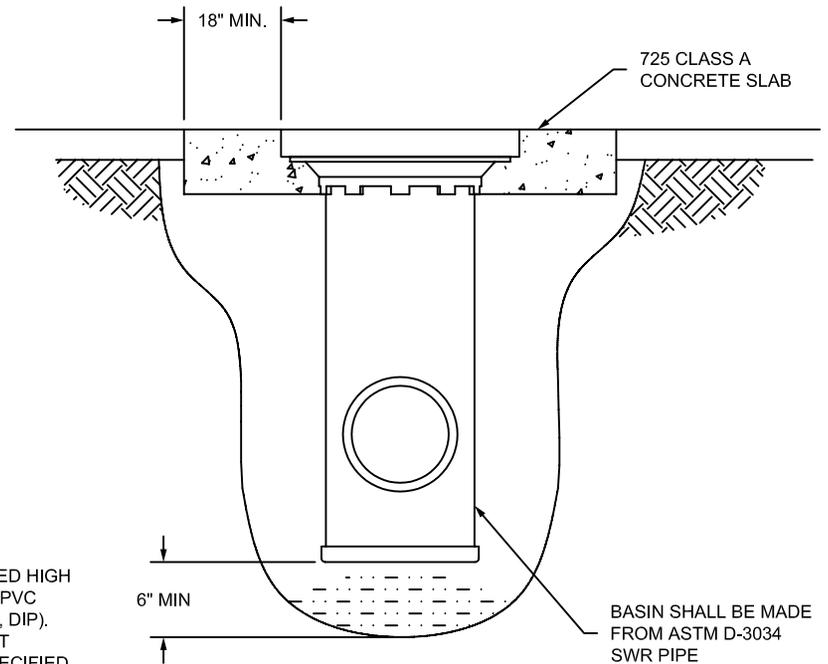
SPACING BETWEEN BASE PLATE & TOP OF PVC BASIN SHALL NOT BE GREATER THAN 1/2"

18" - 30" BASINS SPECIFIED SIZE ON PLANS

FILL SUMP WITH CONCRETE TO INVERT

SPECIFIED JOINTS (CORRUGATED HIGH DENSITY POLYETHYLENE PIPE, PVC SDR-35, PVC SCH 40, PVC C-900, DIP). FOR CMP AND RGRCP STUB OUT A TWO FOOT PIPE MATERIAL SPECIFIED ABOVE AND CONNECT THEM TOGETHER WITH A CONCRETE COLLAR PER DETAIL 505.

BACKFILL MATERIAL SHALL BE 701.2.1. BACKFILL MATERIAL SHALL BE PLACED UNIFORMLY IN 8" LIFTS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY, OR 1/2 SACK CLSM PER 728.

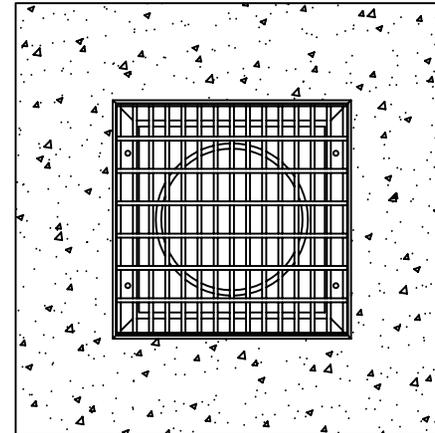


725 CLASS A CONCRETE SLAB

6" MIN

BASIN SHALL BE MADE FROM ASTM D-3034 SWR PIPE

TOP VIEW

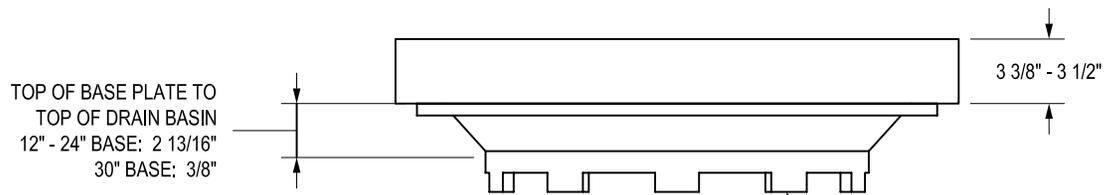
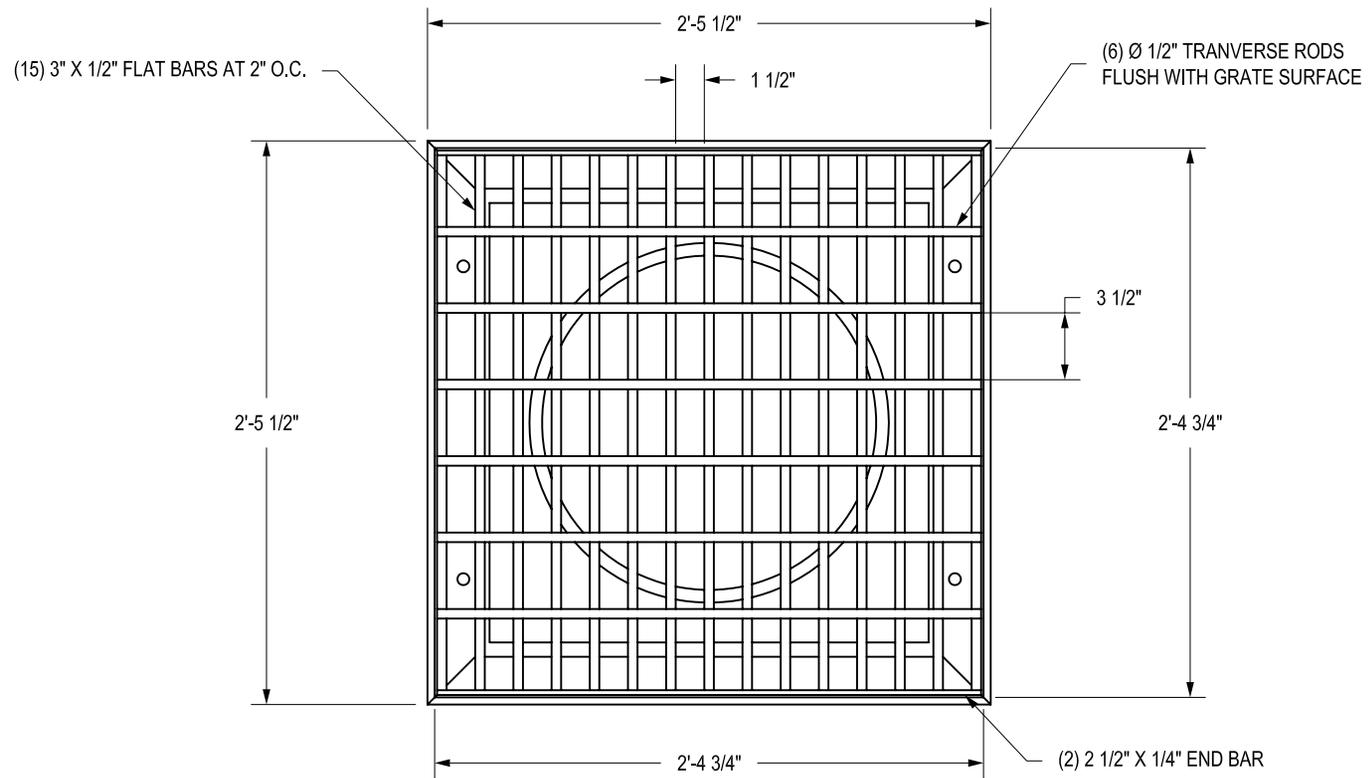


DETAIL NO.
537-2

CATCH BASIN - TYPE 'I'

REVISED

DETAIL NO.
537-2



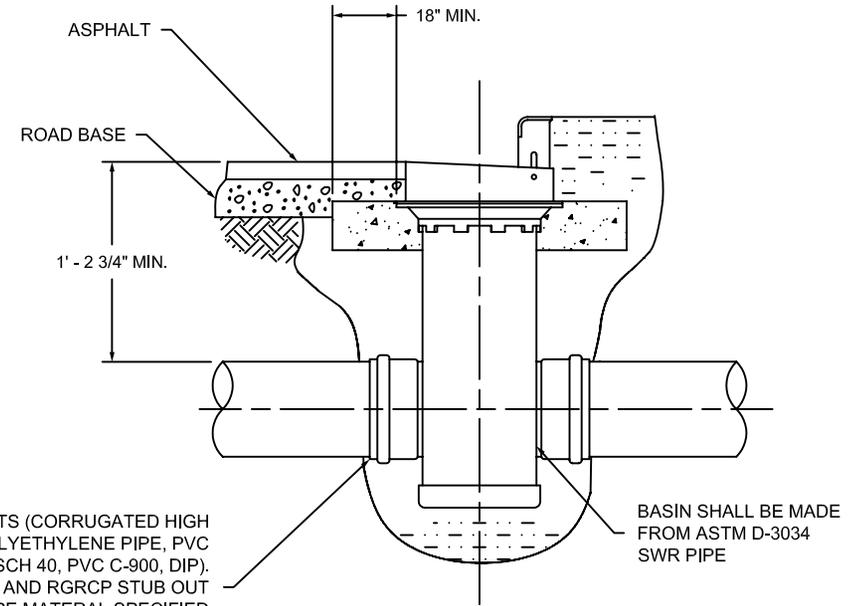
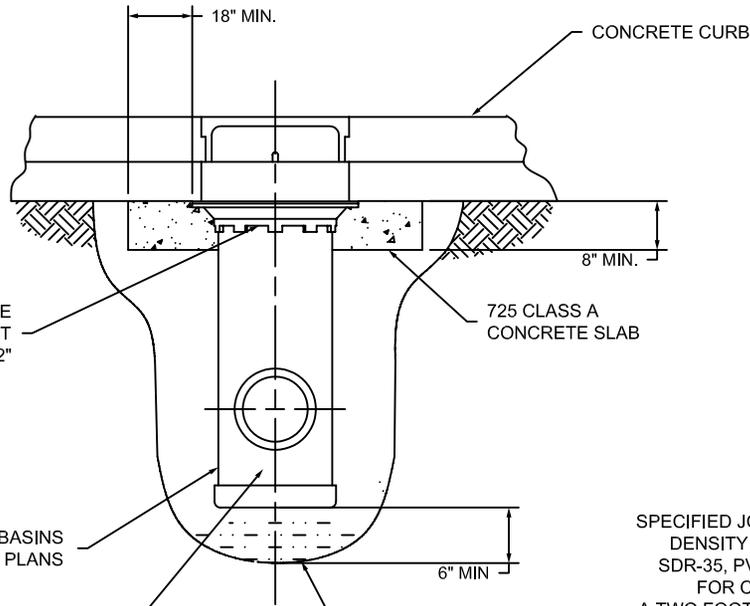
GRATE MEETS H-20 LOAD RATING
 QUALITY: FRAME & GRATE MATERIALS SHALL CONFORM TO ASTM
 A-36 STEEL, BASE PLATE DUCTILE IRON MATERIALS SHALL CONFORM
 TO ASTM A536 GRADE 70-50-05
 APPROX. DRAIN AREA = 551.25 SQ IN
 ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO.1
 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790 OR
 GALVANIZED. BASE PLATE ARE FURNISHED WITH BLACK ENAMEL
 PAINT AND ZINC PLATED FASTENERS.
 ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL
 LENGTH OF JOINT.

DETAIL NO.
 539-2

GRATE FOR CATCH BASIN 'I'

REVISED

DETAIL NO.
 539-2



SPACING BETWEEN BASE PLATE & TOP OF PVC BASIN SHALL NOT BE GREATER THAN 1/2"

18" - 30" BASINS SPECIFIED SIZE ON PLANS

FILL SUMP WITH CONCRETE TO INVERT

725 CLASS A CONCRETE SLAB

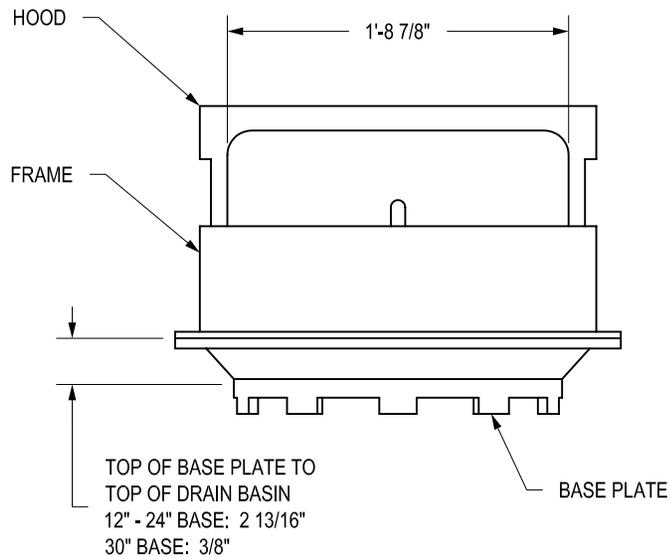
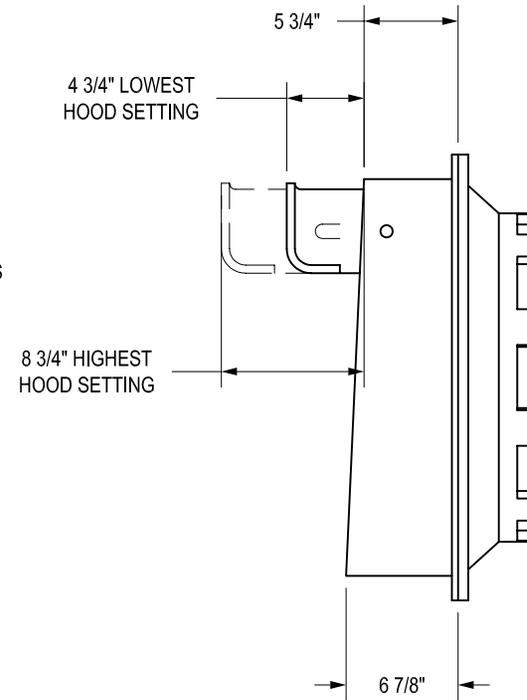
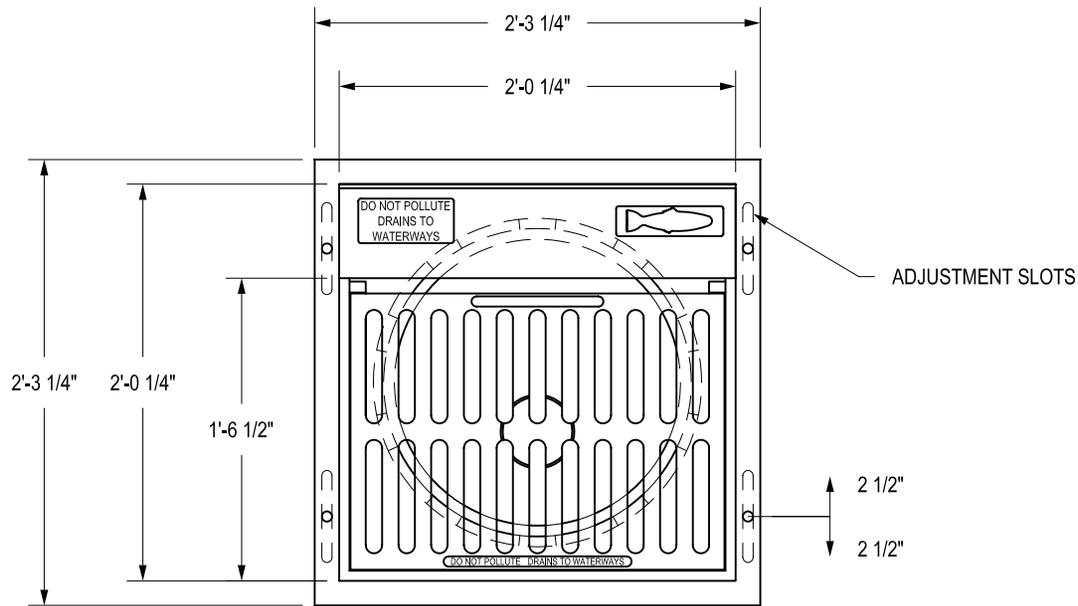
SPECIFIED JOINTS (CORRUGATED HIGH DENSITY POLYETHYLENE PIPE, PVC SDR-35, PVC SCH 40, PVC C-900, DIP). FOR CMP AND RGRCP STUB OUT A TWO FOOT PIPE MATERIAL SPECIFIED ABOVE AND CONNECT THEM TOGETHER WITH A CONCRETE COLLAR PER DETAIL 505.

BASIN SHALL BE MADE FROM ASTM D-3034 SWR PIPE

BACKFILL MATERIAL SHALL BE 701.2.1. BACKFILL MATERIAL SHALL BE PLACED UNIFORMLY IN 8" LIFTS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY, OR 1/2 SACK CLSM PER 728.

TOP VIEW

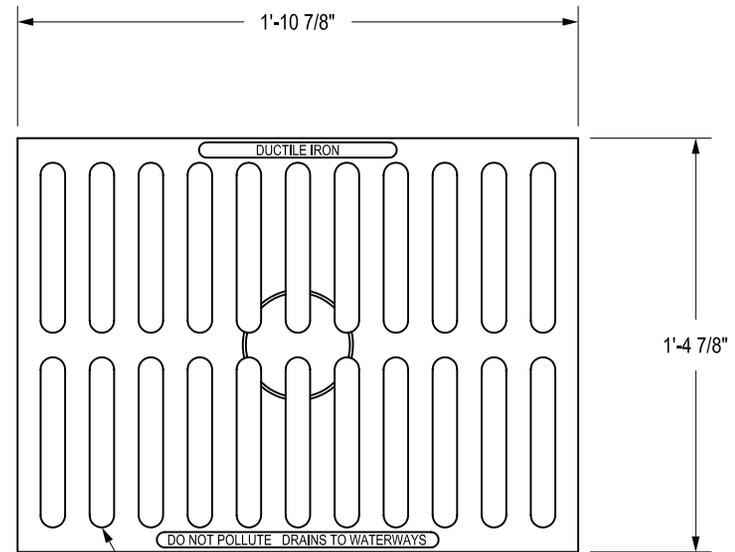




MATERIAL: DUCTILE IRON GRATE MEETING H-20 LOAD RATING & CONFORMING TO ASTM A536 GRADE 70-50-05
 ALL CASTINGS ARE FURNISHED WITH BLACK ENAMEL PAINT AND ZINC PLATED FASTENERS
 SLOPE OF GRATE SURFACE IS 5.2%
 CURB INLET FRAME INSIDE VOLUME IS APPROX 1.76 CU FT

GRATE MEETS H-20 LOAD RATED
MATERIAL: DUCTILE IRON SHALL CONFORM TO ASTM A536 GRADE 70-50-05.
PAINT: CASTINGS ARE FURNISHED WITH A BLACK ENAMEL PAINT.

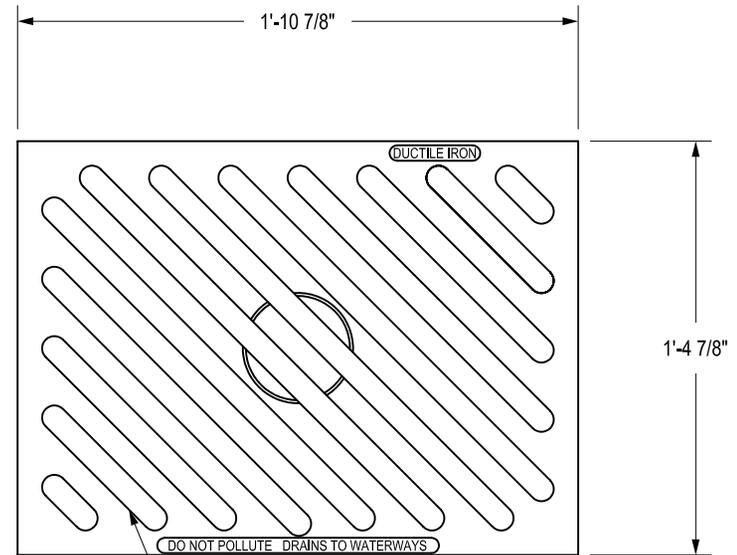
APPROX. DRAIN AREA OF GRATE = 146.18 SQ IN.
APPROX. DRAIN AREA OF GRATE & HOOD
LOWEST SETTING = 227.37 SQ IN
LOWEST + 1" SETTING = 248.25 SQ IN
LOWEST + 2" SETTING = 269.12 SQ IN
LOWEST + 3" SETTING = 290.00 SQ IN
HIGHEST SETTING = 310.87 SQ IN



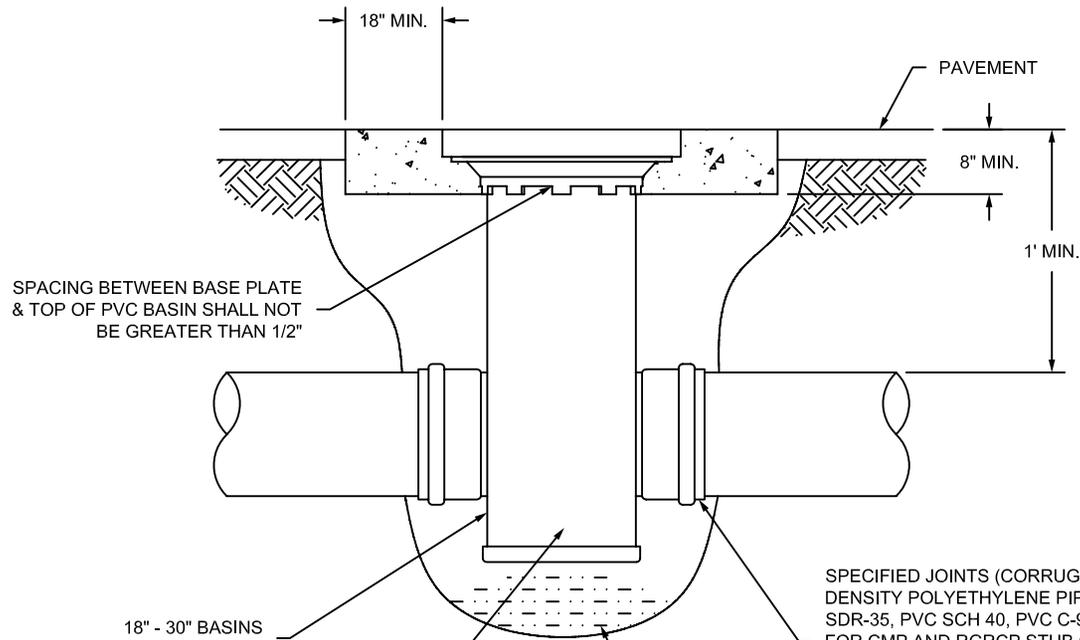
(22) X 1" GRATE SLOTS

GRATE MEETS H-20 LOAD RATING.
MATERIAL: DUCTILE IRON SHALL CONFORM TO ASTM A536 GRADE 70-50-05.
PAINT: CASTINGS ARE FURNISHED WITH A BLACK ENAMEL PAINT.

APPROX. DRAIN AREA OF GRATE = 146.70 SQ IN.
APPROX. DRAIN AREA OF GRATE & HOOD
LOWEST SETTING = 227.89 SQ IN
LOWEST + 1" SETTING = 248.77 SQ IN
LOWEST + 2" SETTING = 269.64 SQ IN
LOWEST + 3" SETTING = 290.52 SQ IN
HIGHEST SETTING = 311.39 SQ IN



(12) X 1" GRATE SLOTS



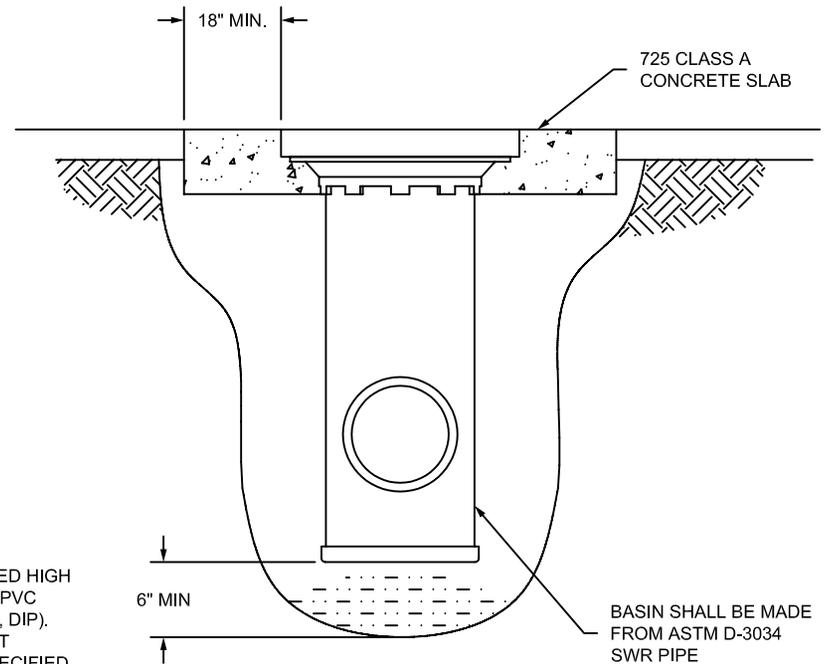
SPACING BETWEEN BASE PLATE & TOP OF PVC BASIN SHALL NOT BE GREATER THAN 1/2"

18" - 30" BASINS SPECIFIED SIZE ON PLANS

FILL SUMP WITH CONCRETE TO INVERT

SPECIFIED JOINTS (CORRUGATED HIGH DENSITY POLYETHYLENE PIPE, PVC SDR-35, PVC SCH 40, PVC C-900, DIP). FOR CMP AND RGRCP STUB OUT A TWO FOOT PIPE MATERIAL SPECIFIED ABOVE AND CONNECT THEM TOGETHER WITH A CONCRETE COLLAR PER DETAIL 505.

BACKFILL MATERIAL SHALL BE 701.2.1. BACKFILL MATERIAL SHALL BE PLACED UNIFORMLY IN 8" LIFTS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY, OR 1/2 SACK CLSM PER 728.

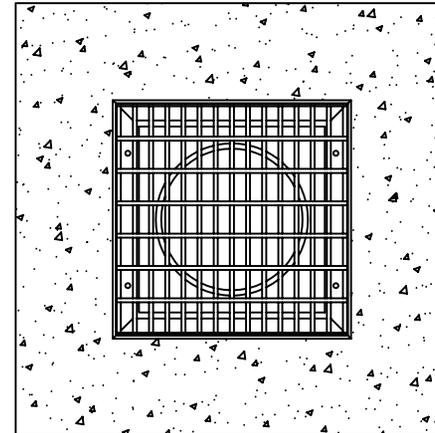


725 CLASS A CONCRETE SLAB

6" MIN

BASIN SHALL BE MADE FROM ASTM D-3034 SWR PIPE

TOP VIEW

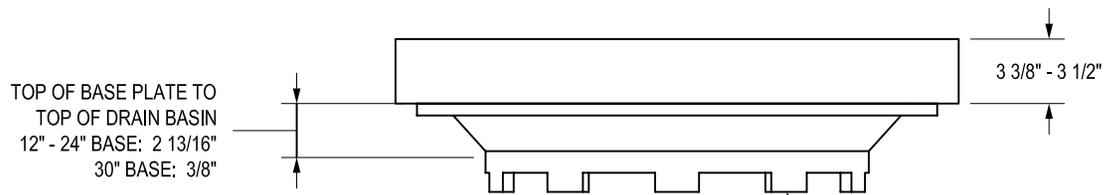
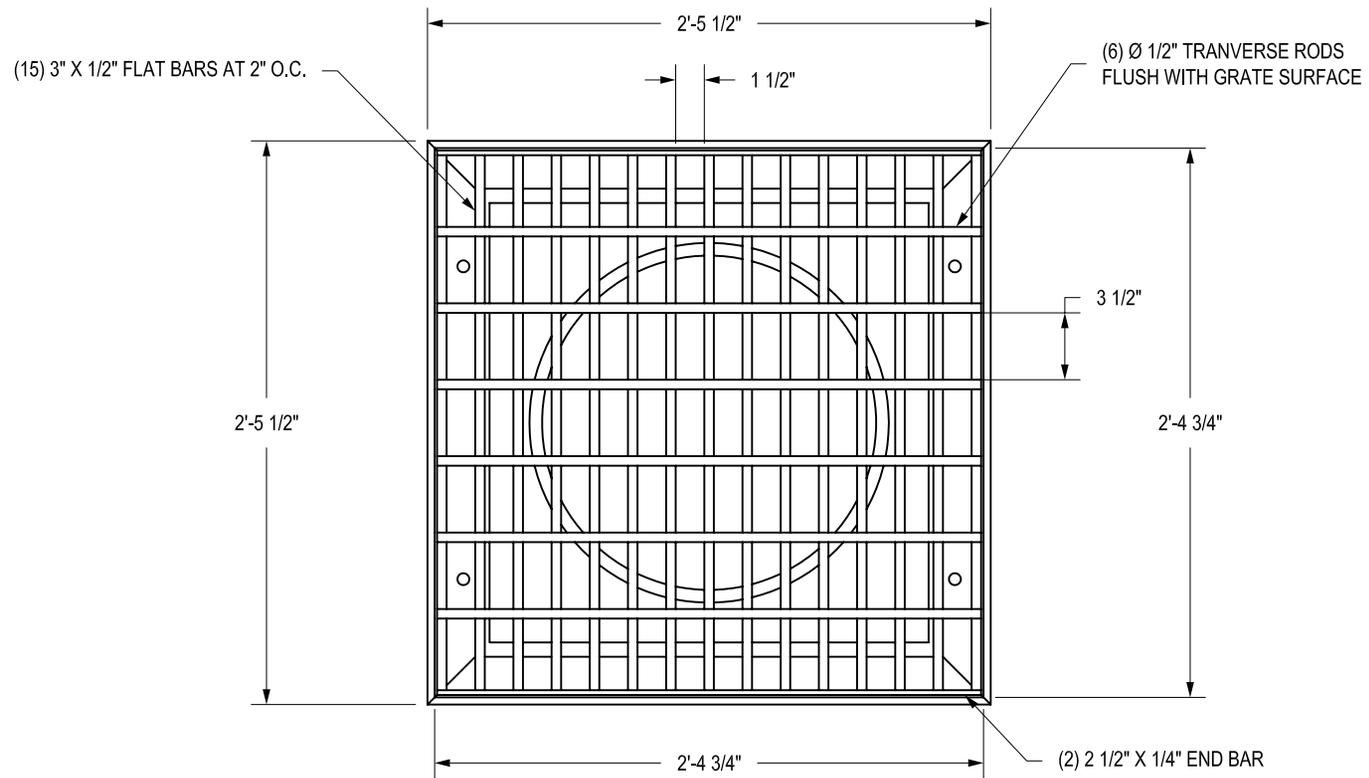


DETAIL NO.
537-2

CATCH BASIN - TYPE 'I'

REVISED

DETAIL NO.
537-2



TOP OF BASE PLATE TO
TOP OF DRAIN BASIN
12" - 24" BASE: 2 13/16"
30" BASE: 3/8"

BASE PLATE

GRATE MEETS H-20 LOAD RATING
 QUALITY: FRAME & GRATE MATERIALS SHALL CONFORM TO ASTM
 A-36 STEEL, BASE PLATE DUCTILE IRON MATERIALS SHALL CONFORM
 TO ASTM A536 GRADE 70-50-05
 APPROX. DRAIN AREA = 551.25 SQ IN
 ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO.1
 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790 OR
 GALVANIZED. BASE PLATE ARE FURNISHED WITH BLACK ENAMEL
 PAINT AND ZINC PLATED FASTENERS.
 ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL
 LENGTH OF JOINT.

DETAIL NO.
539-2

GRATE FOR CATCH BASIN 'I'

REVISED

DETAIL NO.
539-2



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: March 7, 2007
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Revisions to Section 109 MEASUREMENTS AND PAYMENTS **Case 07- 07**

PURPOSE: Section 109.2 SCOPE OF PAYMENT – Add clarification of when duplicate Weighmaster's Certificates are to be provided to the Engineer.

Section 109.5.1 Equipment – Information added to clarify how to calculate payment rates.

Section 109.7 PAYMENT FOR BOND ISSUE AND BUDGET PROJECTS – Added references to the Arizona Revised Statues that govern retention for Construction Manager at Risk and Design Build projects.

SECTION 109

MEASUREMENTS AND PAYMENTS

109.1 MEASUREMENT OF QUANTITIES:

All work completed under the contract will be measured by the Engineer according to United States standard measures. The methods of measurement and computation to be used in determination of quantities of materials furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

A station, when used as a definition or term of measurement, will be 100 linear feet.

Unless otherwise specified, longitudinal measurements will be made along the grade line.

Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

The term ton will mean the short ton consisting of 2,000 pounds avoirdupois.

Unless otherwise specified, structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

In computing volumes of excavations or fill, the average end area method or other acceptable methods as determined by the Engineer will be used.

Volumes will be computed at 60°F, using ASTM D-1250 for Asphalt or ASTM D-633 for Tars.

Lumber will be measured by the thousand board foot measure actually used in the work. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term lump sum, when used as a pay item, will mean complete payment for the work described.

Sundry items which have a basis for measurement and payment herein and which are incidental to or required in the construction of the work but are not included as items in the bid schedule shall be considered an integral part of the contract, and all labor, materials, etc. required for such items shall be furnished by the Contractor and the cost of same included in the unit price bid.

109.2 SCOPE OF PAYMENT:

Measurement and payment for pay items in the proposal will be as indicated in the applicable standard specification or in the special provisions.

When payment is specified to be made on the basis of weight, the weighing shall be done on certified platform scales sealed by the State Inspector or the City Sealer of Weights and Measures as defined by Arizona Revised Statutes Sections 44-2112 and 44-2116. The Contractor shall furnish the Engineer with duplicate Weighmaster's Certificates showing the actual net weights together with the information required by Arizona Revised Statutes Section 44-2142. The Contractor shall furnish the Engineer with duplicate Weighmaster's Certificates at the time of delivery unless the Engineer designates a different submittal time. The Contracting Agency will accept the certificates as evidence of the weight delivered.

Payment for the various items in the proposal will be made at the unit price bid in the proposal, and shall be compensation in full for furnishing all labor, materials, equipment and appurtenances necessary to complete the work in a satisfactory manner as shown on the plans and as required in the specifications, with all connections, testing, and related work completed. Each item, fixture, piece of equipment, etc., shall be complete with all necessary connections and appurtenances, for the satisfactory use and operation of said item. No additional payment will be made for work related to any item unless specifically called for in the proposal. This compensation shall also cover all risk, loss, damage or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of Section 107.

SECTION 109

The Contracting Agency will deduct the cost of accomplishing the work from monies due or to become due to the Contractor. Computation of the cost will be in accordance with Subsection 109.5.4.2.

109.4.6 Allowable Mark-Ups:

Only the allowable mark-ups as defined in Subsection 109.5 shall be allowed. Additional compensation for other items shall not be considered or allowed.

*109.5 ACTUAL COST WORK:

The compensation for actual cost work performed by the Contractor (Subcontractor) shall be determined by the Engineer in the following manner.

109.5.1 Equipment: For all equipment, the use of which has been authorized by the Engineer, except for small tools and manual equipment, the Contractor will be paid in accordance with the latest Schedule of Equipment Rates used by the Arizona Department of Transportation. Payment for equipment will be made following the calculations in Section 109 of the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction. The value of 0.933 shall be used for the adjustment factor F used in the rental rate formulas ($F = 0.933$).

109.5.2 Material: For all material, accepted by the Engineer and used in the work, the Contractor will be paid the actual cost of such material including transportation cost, to which total cost will be added a sum equal to 15 percent thereof.

109.5.3 Labor: For all labor and for the foreman, when he is in direct charge of the operation, the Contractor will be paid:

(A) The actual wages paid plus the current percentage thereof as determined by the Arizona Department of Transportation which is deemed to cover the Contractor's cost incurred as a result of payment imposed by State or Federal Law and payments that are made to, or on behalf of, the workman other than the actual wage. Actual wage is defined as the required current hourly rate paid to the labor classification concerned and does not include any fringe benefits or dislocation allowances. If the Contractor is not required to pay fringe benefits equivalent to the Current rates published in the Federal Register, an equitable deduction will be made from the current percentage established by the Arizona Department of Transportation.

(B) For the first \$50,000 of labor cost computed under paragraph (A) above, the Contractor will be paid an amount equal to (15) fifteen percent for overhead and profit.

(C) For all labor cost computed under paragraph (A) above, in excess of \$50,000 but not exceeding \$100,000, the Contractor will be paid an amount equal to (12) twelve percent for overhead and profit.

(D) For any labor cost computed under paragraph (A) above in excess of \$100,000 the Contractor will be paid an amount equal to (10) ten percent for overhead and profit.

109.5.4 Work Performed by Subcontractors or Other Sources:

109.5.4.1 Work Performed by Subcontractors: If it is determined by the Engineer that portions of the Actual Cost Work to be performed requires specialized labor or equipment not normally used by the Contractor and such work is then authorized to be performed by a subcontractor(s), the subcontractor(s) will be paid by the Contractor in accordance with the actual cost work procedures outlined herein. The Contractor will be paid by the Contracting Agency the full amount of the subcontract plus the following percentages for administration and supervision.

(A) For the first \$10,000 accumulated total of all change order work performed by subcontractors (less mark-up for overhead and profit), the Contractor will be paid an amount equal to 10 percent of the accumulated total for administration and supervision. If the accumulated total is \$3,000 or less, the Contractor will be paid \$300 for administration and supervision.

(B) For all change order work in excess of \$10,000 accumulated total performed by subcontractors (less mark-up for overhead and profit), the Contractor will be paid an amount equal to five percent of the accumulated total for administration and supervision.

*Not applicable to Improvement District Projects.

SECTION 109

***109.7 PAYMENT FOR BOND ISSUE AND BUDGET PROJECTS:**

(A) Partial Payments: The Contracting Agency will make a partial payment to the Contractor on the basis of an estimate prepared by the Contractor or Engineer for work completed through the last day of the preceding calendar month. Payment will be within 14 calendar days after the estimate has been certified and approved by the Engineer and received by the owner.

The Contracting Agency will retain 10 percent of all estimates as a guarantee for complete performance of the contract in accordance with Arizona Revised Statutes Section 34-221 or 34-607, unless the Contractor elects to deposit securities in accordance with Arizona Revised Statutes Section 34-221, Paragraph C.5. or 34-607, Paragraph B.5.

When the Contractor is fifty percent completed, one-half of the amount retained shall be paid to the Contractor provided he is making satisfactory progress on the contract and there is no specific cause or claim requiring a greater amount to be retained. After the contract is fifty percent completed, no more than five percent of the amount of any subsequent progress payments made under the contract will be retained providing the Contractor is making satisfactory progress on the project. Except that, if at any time the owner determines satisfactory progress is not being made, ten percent retention shall be reinstated for all progress payments made under the contract subsequent to the determination.

Any material or equipment which will become an integral part of the completed project will be considered for partial payment in the Contractor's monthly progress payments. The intent of making partial payments is to provide the Contractor payment for direct material or equipment purchased. The purpose is to minimize the effect of escalating costs by procuring key materials. It is not the intent to pay for all materials but only those meeting the following conditions.

(1) A total value of all items requested for payment must be greater than \$20,000. No payment will be processed until the material or equipment has been observed, reviewed or verified by the Contracting Agent representative. Only the material or equipment meeting the requirements of the plans and specifications will be paid. Payment for material or equipment does not constitute final acceptance.

(2) Materials or equipment must be stored or stockpiled either on site, in a warehouse, or secured storage area. The Contractor assumes all responsibility for protection of these materials or equipment and shall insure them to cover loss or damage to same without additional liability or added costs to the Agency for providing this security, insurance, and storage.

(3) The Contractor will provide access to the storage area or warehouse upon request of the Contracting Agent's representative for the purpose of verifying the inventory of items paid for under this section. None of the materials or equipment paid for under this section will be removed from the storage site until incorporated into the work of the project. The storage site shall be within the general geographical area of the project.

(4) The Contractor shall provide a paid invoice and/or lien waiver for items paid for under this section. The Agency will not pay more than the invoice price for the item or items, less retention.

(5) The Engineer may exclude individual payment requests which in the Engineer's judgement do not warrant storage and prepayment under the intent of this section.

(B) Final Payment: When the project has been accepted as provided in Section 105, and within 30 calendar days after final inspection of the work completed under the contract, the Engineer will render to the Contracting Agency and the Contractor, a final estimate which will show the amount of work performed and accepted under the contract. All prior estimates and partial payments will be subject to correction in the final estimate for payment.

Within sixty (60) calendar days after final acceptance, the Contracting Agency will pay the Contractor all amounts due him under the contract, except that before final payment will be made, the Contractor shall satisfy the Contracting Agency by affidavit that all bills for labor and materials incorporated in the work have been paid. The Contractor's Affidavit may be obtained from the Engineering Office of the Contracting Agency.

*Not applicable to Improvement District Projects.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

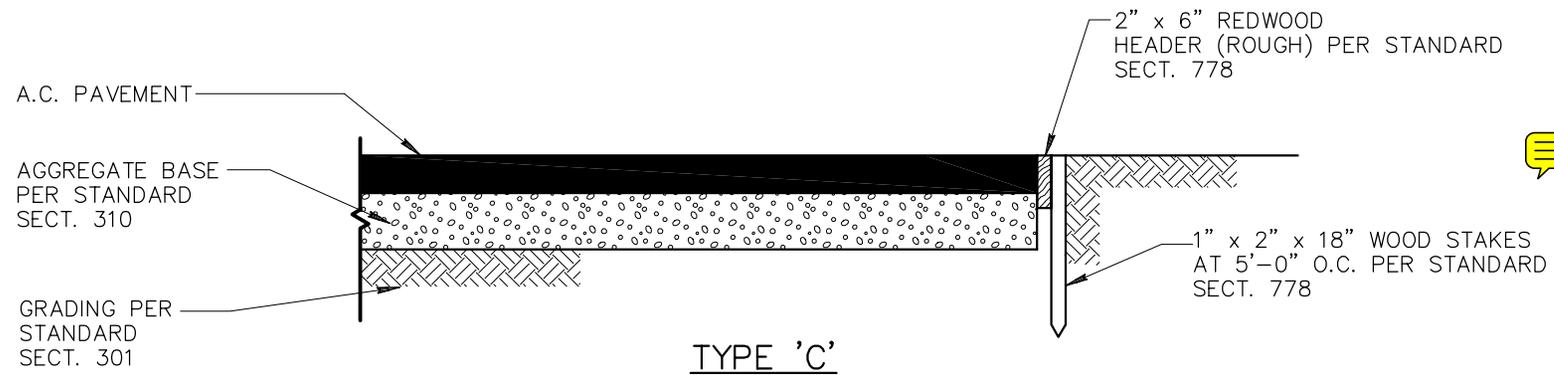
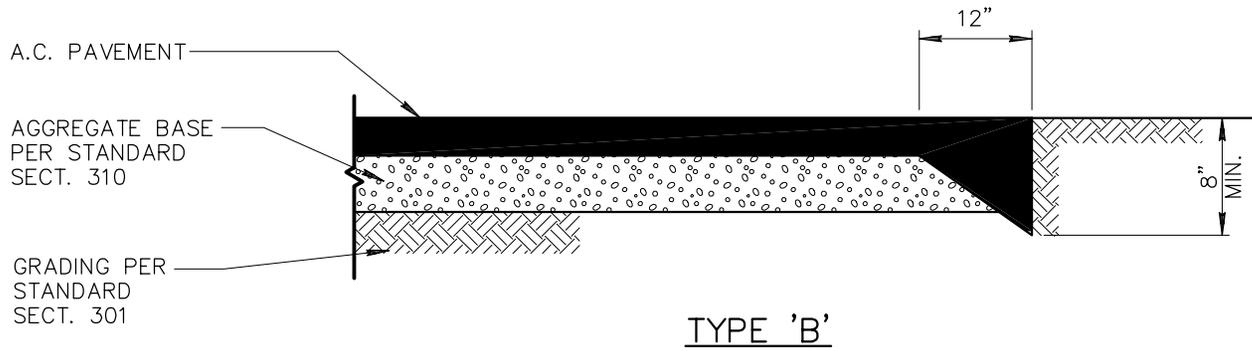
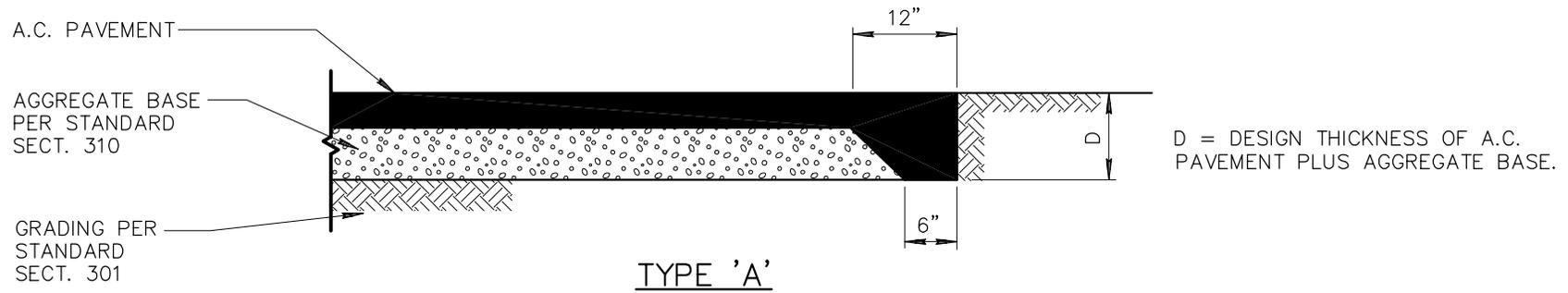
Date: May 2, 2007
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Deletion of Obsolete Details

Case 07- 10

PURPOSE: Delete unused or obsolete details.

REVISION:

1. Delete the Type C redwood header pavement termination from Detail 201 Pavement Section at Termination.
2. Delete the Curb Warning Beacon detail from Detail 221 Curb and Gutter.



DETAIL NO.

201



STANDARD DETAIL
ENGLISH

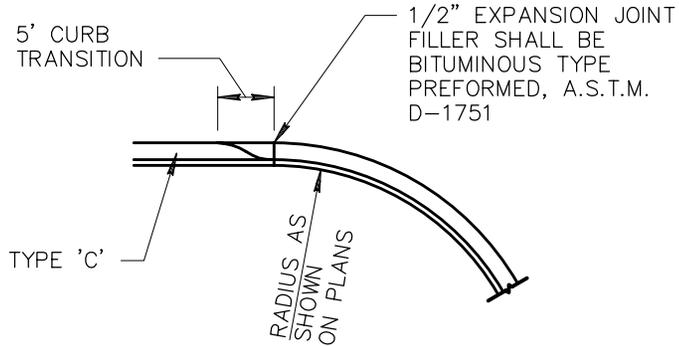
PAVEMENT SECTION AT TERMINATION

REVISED

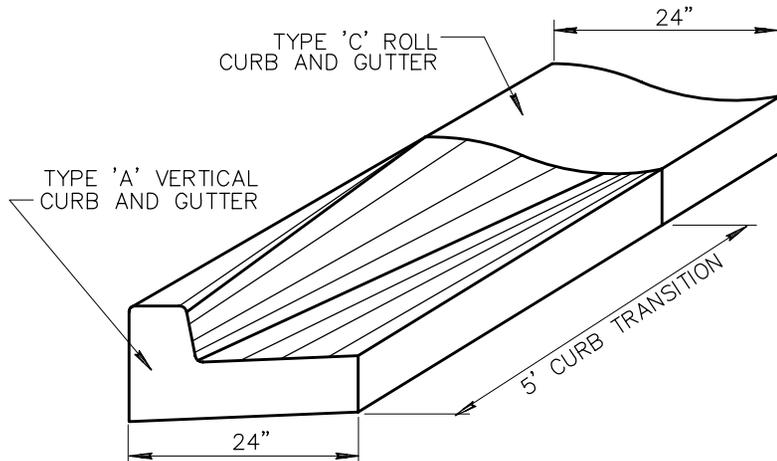
DETAIL NO.

201

CURB AND GUTTER TRANSITION



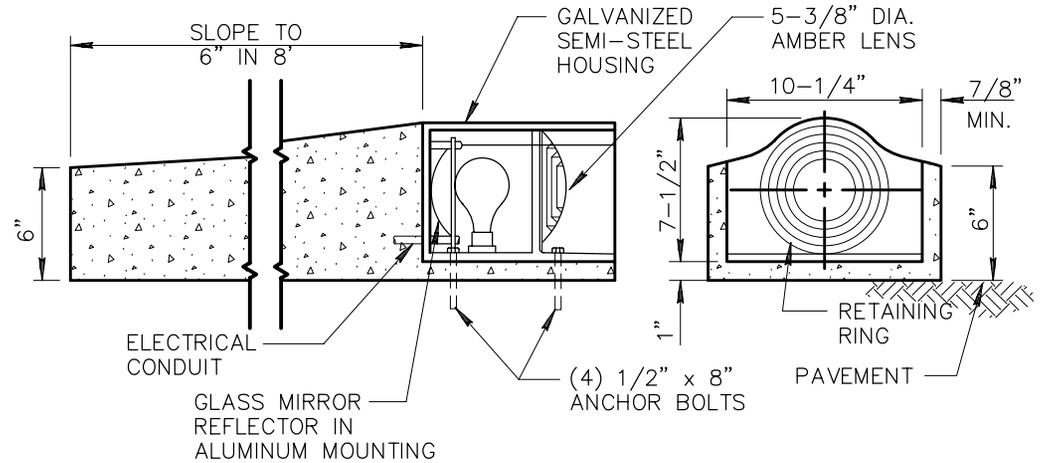
CURB TRANSITION TYPE 'A' TO TYPE 'C'



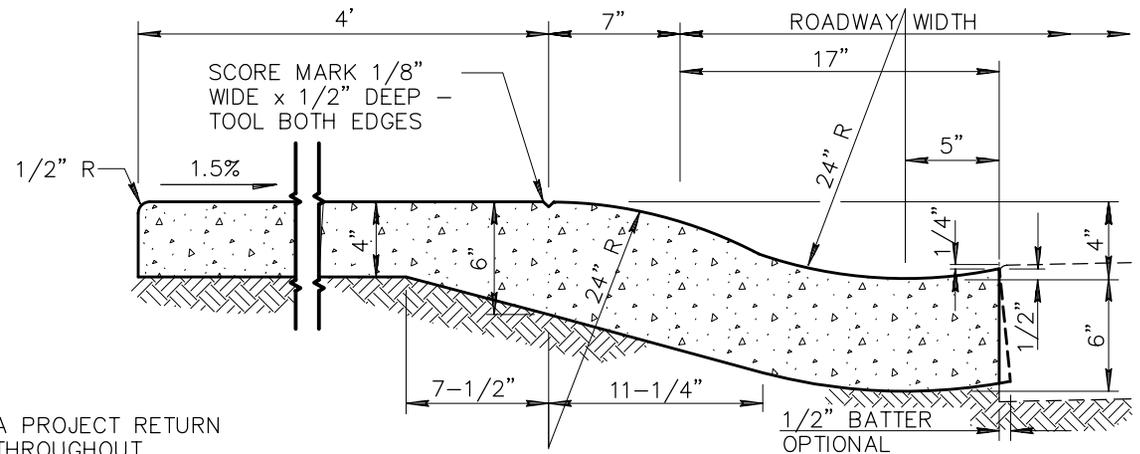
NOTES: (CURB AND GUTTER TRANSITIONS)

1. THE CURB TRANSITION WILL BE PAID FOR AS TYPE 'C'. WHEN A PROJECT RETURN AND GUTTER THROUGHOUT, THE ENTIRE RETURN AND GUTTER THROUGHOUT, THE ENTIRE RETURN SHALL BE MEASURED AND PAID FOR AS TYPE 'A'.
2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING CURB AND GUTTER, THE TRANSITION SHALL BE INDICATED ON PLANS.
3. CLASS 'B' CONCRETE PER SECT. 725.
4. TRANSITION BETWEEN TYPICAL SECTIONS SHALL BE ACCOMPLISHED BY THE USE OF DIRECT STRAIGHT LINE TRANSITIONS OF THE FLOW LINE AND OTHER SURFACE FEATURES.

CURB WARNING BEACON



INTEGRAL ROLL CURB, GUTTER AND SIDEWALK



NOTES: (INTEGRAL ROLL CURB, GUTTER AND SIDEWALK)

1. CONCRETE TO BE MONOLITHIC POUR. EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.
2. CONTRACTION JOINT SPACING 5' MAXIMUM.
3. EXPANSION JOINTS PER SECT. 340.
4. CLASS 'B' CONCRETE PER SECT. 725.

DETAIL NO.

221



STANDARD DETAIL
ENGLISH

CURB AND GUTTER
(TRANSITION, INTEGRAL & WARNING BEACON)

REVISED

01-01-2007

DETAIL NO.

221

FIRE HYDRANTS

756.1 GENERAL:

Fire Hydrants furnished by the Contractor shall be designed, manufactured, and tested in compliance with the latest edition of the American Water Works Association (AWWA) - C. 502 Standard for Dry-Barrel Fire Hydrants, supplemented as follows:

756.2 DRAWINGS:

Detail drawings or blue prints showing all components, principal dimensions, construction details and materials used shall be submitted to the Contracting Agency for approval. The Contracting Agency reserves the right to consider the quality, appearance and past performance of fire hydrants when reviewing drawings for approval.

756.3 HYDRANTS:

Fire hydrants shall be Mueller Super Centurion 250, Clow Medallion, Kennedy K-81. Alternate hydrants by request only to Owner. The diameter of the main valve seat opening shall be not less than 5 inches in diameter. The entire valve assembly shall be effectively sealed against moisture.

Deleted: shall comply with AWWA C-502, supplemented as follows:¶

All interior ferrous surfaces of the shoe exposed to fluid flow shall be epoxy coated to a minimum dry 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 of AWWA C-550, and to the prevailing requirements of the Food and Drug Administration and of the Environmental Protection Agency.

Deleted: dry barrel similar or equal to the Corey or Mueller Improved Type.

Deleted: The inside diameter of the barrel shall be a minimum of 7 inches and t

Style of inlet shoe connections shall be bell or mechanical joint with accessories, gland, bolts, gaskets and having a 6 inch diameter inlet connection. Facing of the main valve against seats shall be synthetic rubber or balata. The top of the stem or bonnet shall be equipped with the O-ring seal. Hydrants shall be constructed so that extension sections in multiples of 6 inches, with rod and coupling, can be added to increase barrel length. The hose and streamer nozzle connections shall match the standard size and threads per inch of the Contracting Agency. Operating and outlet nozzle cap nuts shall be of solid pentagonal shape. The pentagon shall measure fifteen-sixteenths to thirty-one thirty-seconds inch on side, 1 1/2 inch from point to flat. All barrels above ground shall have a prime coat and painted with two coats of fire hydrant yellow paint. Hydrants shall be constructed so that the standpipe can be rotated to at least 8 different positions.

Hydrants shall be designed for a 250 psi working pressure and tested to a 500 psi hydrostatic pressure.

Hydrants shall be of the break flange traffic model type with a replaceable breakable unit immediately above the ground line to minimize repairs necessary due to traffic damage. The breakable stem coupling will be made of a corrosion resistant material such as stainless steel or bronze, or have a permanently applied non corrosive finish such as nickel plating or fusion bonded epoxy coating.

Hydrants shall be of the compression type; constructed such that the main valve closes with the water pressure to assure no loss of water in the event of damage to the upper portion of the fire hydrant.

Main valve opening shall have a minimum diameter of 5-inches to assure optimum flow. Facing of the main valve against the seats shall be of rubber or synthetic rubber minimum of 1 inch in thickness. Plastic or Neoprene type main valves will not be allowed.

Hydrants shall be of the dry top design with o-ring seals to ensure that the operating threads will be protected from water entry. Dry top design to include factory- lubricated operating mechanism which allows supplemental lubricant to be added in the field without removal of the upper barrel. Standard lubricant shall be a NSF 61 approved oil or grease suitable for a temperature range of 40 degrees to 150 degrees F.

Hydrants shall have a cast iron weather shield at the operating nut to protect the clearance area between the top casting and the operating nut.

The operating nut shall be a one-piece bronze casting. Both the operating nut and the nozzle cap nuts shall be National Standard Pentagon in shape and measure 1-1/2 inches from point to flat at the base of the nut.

Hydrants shall have two hose nozzles, 2-1/2 inch diameter, and one pumper nozzle approved by the Owner. Rubber gasket nozzle caps shall be provided. Screw Threads shall be per owner requirements.

Hydrant nozzle section shall be capable of rotation through 360 degrees with respect to the standpipe to allow the positioning of the hose or pumper nozzles

Minimum distance allowable between the centerline of the lowest nozzle and ground / bury line is 18-inches. Bury line shall be visibly marked on lower barrel of hydrant.

Hydrants shall have markings indicating direction of opening right to left (counter-clockwise).

Hydrants shall have permanent markings identifying the manufacturer name, model identification, size of the main valve opening and the year of manufacture

Hydrants shall have an automatic drain that is operated by the main valve rod. The drain valve is to open as the main valve is closed and close as the main valve is opened. The port and seat of the drain valve shall be bronze. Drain facings shall not be leather.

The outside of the hydrant top section shall be painted a minimum of one coat of non-lead base premium primer and two (2) finished coats of non-lead base premium durable paint. The surface will be properly prepared, smooth, clean, and dry before primer is applied. The primer coat will be applied to a DFT (Dry Film Thickness) of 3-4 mils. The final 2 coats will be applied to achieve a DFT of 6-8 mils on top of the primer coat. Paint will be a semi-gloss, bright chrome safety yellow in color. Paint will have high color retention. Paint will be fade and UV resistant, rust resistant, resistant to abrasions and chipping and have flexibility qualities.

The shoe of the hydrant shall be provided with a mechanical joint connection, 6-inch in size. All interior ferrous surfaces of the shoe, exposed to continuous fluid flow (including the valve plate and cap nut), shall be epoxy coated to a minimum dry 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 material used shall be 100-percent powder epoxy or liquid epoxy that conforms to the requirements of AWWA C-550-81, NSF 61 approved, and to the prevailing requirements of the Food and Drug Administration and to the Environmental Protection Agency.

Hydrants shall have a bronze valve seat and shall be threaded into a bronze drain ring or shoe bushing to prevent electrolysis between these components

Hydrants shall be designed to permit the use of extension sections.

Hydrants shall be designed to allow all working parts to be removable through the top dome or bonnet section of the hydrant, which will be separate from the nozzle section of the upper barrel.

Hydrants shall be suitable for installation in 42-inch depth of trench.

All nuts and bolts to be buried below ground will be of 304 stainless steel.

The friction loss must be guaranteed by the manufacturer to match statistics in Table 756-1

756.4 MANUFACTURER:

The manufacturer shall guarantee that the hydrant is so constructed that the valve stem will not be bent when hydrant is damaged or broken at or near the grade level. A safety breaking flange or thimble, shall be provided. The friction loss must be guaranteed, by the manufacturer, to satisfy Table 756-1.

TABLE 756-1			
MAXIMUM PERMISSIBLE LOSS OF HEAD FOR HYDRANTS			
Number of Outlet Nozzles	Nominal Diameter of Outlet	Total Flow From Outlet Nozzles GPM	Maximum Permissible Head Loss PSI
2	2 1/2 inches	500	2.0
1	4 inches	600	2.5

756.5 WARRANTY:

All items shall be warranted for a minimum period of five (5) years from date of acceptance by the Owner, against defects in material and workmanship. At any time during that period, if a defect should occur in any item, it shall be repaired or replaced by the Seller at no obligation to the Owner, except where it would be shown that the defect was caused by misuse and not by fault of manufacturer. The bidder expressly warrants all items to be new, free from defect in design, materials, and workmanship and to be fit and sufficient for their intended purpose. All warranties shall survive acceptance and payment by the city.

756.6: INSPECTION

All items shall be inspected before acceptance by an authorized representative of the Owner for workmanship, acceptance and proper functioning of components, and conformance to all requirements of this specification.

Should deficiencies be found, it shall be the responsibility of the supplier to pack the item(s) in question, make necessary corrections, and then return to the Owner for re-inspection and acceptance at no additional expense or obligation to the Owner.

Supplements:

Municipality	Supplements
SC:	<p style="text-align: center;">SECTION 756 FIRE HYDRANTS</p> <p>756.3 HYDRANTS: <i>Delete the text in this subsection in its entirety and replace it with the following:</i></p> <p>All fire hydrants furnished to, or installed in, the City shall conform to the following specifications:</p> <ol style="list-style-type: none"> (1) Hydrants shall be designed, manufactured, installed and tested in compliance with the latest edition of AWWA. C-502 Standard for Dry-Barrel Fire Hydrants, as published by the American Water Works Association. (2) Hydrants shall be designed to operate at the maximum pressure of the line, and tested at the same p.s.i. as the main line. (3) Hydrants shall be of the break flange traffic model type with a replaceable breakable unit immediately above the ground line for minimizing repairs due to traffic damage. (4) Hydrants shall be of the compression type. Construction such that the main valve closes with the water pressure to assure no loss of water in the event of damage to the upper portion of the fire hydrant. (5) Main valve opening shall have a minimum of diameter of 5 1/4 inch to assure optimum flow. The inside diameter of the barrel shall be a minimum of 7 inches. Facing of the main valve against the seats shall be synthetic rubber or balata. (6) Hydrants shall be of the drop top design with O-ring seals to insure that the operating threads will be protected from water entry. Dry top design to include factory lubricated operating mechanism which allows supplemental lubricant to be added in the field without removal of the top section. Standard lubricant shall be either oil or grease, suitable for a temperature range of 40 degrees to 150 degrees F. (7) All hydrants shall have a weather shield at the operating nut to protect the clearance area between the top casting and the operating nut. (8) The operating nut shall be one-piece bronze casting, both the operating nut and the nozzle cap nuts to be National Standard Pentagon in shape and measure 1 1/2 inch from point of flat at the base of the nut. Nozzle caps to be provided with rubber gaskets. (9) Hydrants shall have two 2 1/2 inch diameter hose nozzles with National Standard Fire Hose Coupling Screw Threads, and one 4 1/2 inch diameter pumper nozzle with National Standard Threads. Both the Pumper and Hose Nozzle shall be threaded and locked into place with "O" rings used as pressure seals. The use of caulked type nozzles is prohibited. (10) Hydrant nozzle section shall be capable of rotation through 360 degrees with respect to the standpipe to allow the positioning of the hose or pumper nozzles. (11) Hydrant shall have identification mark indicating direction of opening right to left (counter clockwise). (12) Hydrants shall have permanent markings identifying the manufacturer name, size of main valve opening, and year of manufacture. (13) Hydrants shall have an automatic drain that is operated by the main valve rod. Drain valve is to open as the main valve is closed and close as the main valve is opened. Drain valve systems shall be fully automatic.

	<p>Port and seats of drain valve to be bronze.</p> <p>(14) The outside of the hydrant top section shall be painted a minimum of one coat of primer and two finished coats of chrome yellow enamel.</p> <p>(15) The shoe of the hydrant shall be provided with a mechanical joint connection, 6 inch in size. All interior ferrous surfaces of the shoe exposed to continuous fluid flow (including the valve plate and cup nut) shall be epoxy coated to a minimum dry thickness of 6 mils. Epoxy coating shall be factory applied by an electrostatic or thermosetting process in accordance with the manufacturers printed instructions. The epoxy material used shall be 100 percent powder epoxy or liquid epoxy that conforms to the requirements of AWWA C550 and to the prevailing requirements of the Food and Drug Administration and of the Environmental Protection Agency.</p> <p>(16) The hydrant shall have bronze valve seat and shall be threaded into bronze drain ring or shoe bushing to prevent electrolysis between these components.</p> <p>(17) Hydrants shall be designed to permit the use of extension sections and allow all parts to be removable from ground level without requiring excavation of the hydrant.</p> <p>(18) The friction loss must be guaranteed by the manufacturer to satisfy the following table:</p> <p>(19) <i>Pour a PCC Collar around the fire hydrant barrel in accordance with AWWA Standard M 17 as shown in COS Standard 2366.</i></p>
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Municipality	Supplements												
SC:	<p>756.4 MANUFACTURER: <i>Modify table 756-1 as follows:</i></p> <p style="text-align: center;">TABLE 756-1 MAXIMUM PERMISSIBLE LOSS OF HEAD FOR HYDRANTS</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>No. of Outlet Nozzles</th> <th>Nom. Diam. of Outlet</th> <th>Total Flow From Outlet Nozzles GPM</th> <th>Maximum Permissible Head Loss PSI</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">2 1/2"</td> <td style="text-align: center;">500</td> <td style="text-align: center;">2.0</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">4 1/2"</td> <td style="text-align: center;">600</td> <td style="text-align: center;">2.5</td> </tr> </tbody> </table>	No. of Outlet Nozzles	Nom. Diam. of Outlet	Total Flow From Outlet Nozzles GPM	Maximum Permissible Head Loss PSI	2	2 1/2"	500	2.0	1	4 1/2"	600	2.5
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2	2 1/2"	500	2.0										
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Municipality	Supplements
SC:	<p>756.5 CERTIFICATION <i>The Contractor shall provide, to the City, manufacturer certifications attesting the fire hydrants as shown on the submitted product data sheets meet the requirements of this specification.</i></p>

Municipality	Supplements												
SC:	<p data-bbox="285 281 808 302">756.4 MANUFACTURER: <i>Modify table 756-1 as follows:</i></p> <p data-bbox="440 331 1040 380" style="text-align: center;">TABLE 756-1 MAXIMUM PERMISSIBLE LOSS OF HEAD FOR HYDRANTS</p> <table border="1" data-bbox="297 407 1193 579"> <thead> <tr> <th data-bbox="297 407 521 495">No. of Outlet Nozzles</th> <th data-bbox="529 407 743 495">Nom. Diam. of Outlet</th> <th data-bbox="751 407 966 495">Total Flow From Outlet Nozzles GPM</th> <th data-bbox="974 407 1193 495">Maximum Permissible Head Loss PSI</th> </tr> </thead> <tbody> <tr> <td data-bbox="297 501 521 537">2</td> <td data-bbox="529 501 743 537">2 1/2"</td> <td data-bbox="751 501 966 537">500</td> <td data-bbox="974 501 1193 537">2.0</td> </tr> <tr> <td data-bbox="297 543 521 579">1</td> <td data-bbox="529 543 743 579">4 1/2"</td> <td data-bbox="751 543 966 579">600</td> <td data-bbox="974 543 1193 579">2.5</td> </tr> </tbody> </table>	No. of Outlet Nozzles	Nom. Diam. of Outlet	Total Flow From Outlet Nozzles GPM	Maximum Permissible Head Loss PSI	2	2 1/2"	500	2.0	1	4 1/2"	600	2.5
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Municipality	Supplements
SC:	<p data-bbox="285 669 521 690">756.5 CERTIFICATION</p> <p data-bbox="285 695 1193 743"><i>The Contractor shall provide, to the City, manufacturer certifications attesting the fire hydrants as shown on the submitted product data sheets meet the requirements of this specification.</i></p>



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: July 11, 2007

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Revisions to Section 505 CONCRETE STRUCTURES

Case 07- 14

PURPOSE: Incorporate specification modifications from MCDOT's Supplement into the MAG specifications as requested by the MAG Standards & Details Consolidation Subcommittee.

REVISIONS:

Section 505

1. Define MINOR STRUCTURES as structures that may be cast-in-place or furnished as precast units.
2. Defines construction tolerances.
3. Bending of reinforcing steel is revised to reference the AASHTO LRFD Bridge Construction Specifications.
4. Adds new section to define placement and anchorage requirements for Dowels.
5. Requires certification of falsework by the Contractor's Professional Engineer.
6. Addresses Bridge Deck Joint Assemblies.
7. Adds a MEASUREMENT section and expands the payment section.

Revisions to the following sections are included in this case due to references from proposed revisions of section 505:

101.2 DEFINITIONS AND TERMS

- Added definition for Professional Engineer

105.2 PLANS AND SHOP DRAWINGS

- Adds the requirement that shop drawings for temporary support structures be sealed by a professional engineer.

206 STRUCTURE EXCAVATION AND BACKFILL

- Defines structural backfill requirements based on conditions of use.
- Allows structural excavation and structural backfill to be pay items and defines criteria for measurement and payment.

101.2 DEFINITIONS AND TERMS:

[Add the following:]

Professional Engineer: A person who has a current engineering registration granted by the Arizona State Board of Technical Registration in one or more branches of engineering recognized by the board.

105.2 PLANS AND SHOP DRAWINGS:

The Contractor shall submit, for review, a proposed schedule of shop drawings and product data submittals. This schedule will include concrete and asphalt concrete mix designs unless they are previously approved supplier's mix design. The schedule will show the needed response date for each submittal and will indicate the relationship of the submittal to the project construction schedule.

Shop drawings for major temporary support structures such as falsework, shoring, soldier piles, and other major temporary structures that facilitate construction shall be prepared by and bear the seal and signature of a Professional Engineer. Temporary support structures for Minor Structures as defined in Section 505.1.1 are exempt from this requirement.

The Contractor shall submit five (5) copies of each shop drawing, product data or mix design to the Engineer for review. Each submittal shall be numbered sequentially and shall be submitted in accordance with the schedule established in conjunction with the Contracting Agency so as to cause no delay in the work schedule. The Contractor shall certify, by stamp or letter, that he has reviewed and approved the submittal and that it conforms to the requirements of the contract documents. If this certification is not included, the submittal will be returned without action.

At the time of each submittal, the Contractor shall define and delineate in writing, separate from the certification, any deviations from the contract documents. If the Engineer accepts this deviation, he will authorize the deviation by issuing a change order or if the deviation is minor by endorsement to the letter.

The Engineer will review and return the submittals in accordance with the previously established response date. The review will be only for conformance with the design concept of the work and for compliance with the information contained in the contract documents. The review of a specified item, as such, will not indicate review of the assembly in which the item functions. Review by the Engineer will not relieve the Contractor from responsibility for any errors or omissions in the submittals nor from his responsibility for complying with the contract documents. The only exception is deviations accepted in accordance with the preceding paragraph.

If the submittal is acceptable, one (1) copy with each page stamped "Furnish as Submitted" will be returned to the Contractor. The Contractor shall submit additional copies (as required) to the Engineer.

If the Engineer determines that the submittal requires corrections or is to be rejected, one (1) copy stamped "Furnish as Noted" or "Revise and Resubmit" will be returned to the Contractor. The Contractor will submit five (5) corrected or new copies.

The copy stamped "Furnish as Submitted," returned to the Contractor, will become a part of the contract documents and will be kept at the job site. Any work done prior to the receipt of this review will be at the Contractor's risk and expense.

SECTION 206

STRUCTURE EXCAVATION AND BACKFILL

206.1 DESCRIPTION:

Structure excavation shall consist of the removal of material for the construction of foundations for bridges, manholes, retaining walls, box culverts, head walls for culverts, and other structures, and other excavation designated on the plans or in these specifications or in the special provisions as structure excavation.

Structure backfill shall consist of furnishing material, if necessary, and placing and compacting backfill material around structures to the lines designated on the plans or specified or directed by the Engineer.

Structure excavation and structure backfill shall include the furnishing of all materials and equipment and the providing of other facilities which may be necessary to perform the excavations and place and compact the backfill, and the subsequent removal of these facilities, except where they are required or permitted by the plans, special provisions or Engineer to remain in place.

206.2 FOUNDATION MATERIAL TREATMENT:

When footing concrete or masonry is to rest upon rock, the rock shall be fully uncovered and the surface thereof shall be removed to a depth sufficient to expose sound rock. The rock shall be roughly leveled off or cut to approximate horizontal and vertical steps, and shall be roughened. Seams in the rock shall be grouted under pressure or treated as the Engineer may direct and the cost thereof will be paid for as extra work.

When no piles are used and footing concrete or masonry is to rest on an excavated surface other than rock, care shall be taken not to disturb the bottom of the excavation and final removal of the foundation material to grade shall not be made until just before the concrete or masonry is placed. Except when over-excavation is directed by the Engineer, excavation below grade shall be replaced with the same class of concrete specified for the structure or with 1 1/2 sack controlled low strength material as specified in Section 728. When the replacement material is structural concrete, the material shall be placed at the same time as the structure material. Placement of controlled low strength material shall be per Section 604 which will require a time lag between placement of the material and the structural concrete. The placement of the additional material shall be at no cost to the Agency.

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The excavation for structures shall be completed to the bottom of the footings before any piles are driven therein, and excess material remaining in the excavation after pile driving shall be removed to the elevation of the bottom of the footings.

When piles are used and ground displacement results from pile driving operations, the Contractor shall at his expense excavate or backfill the footing area to the grade of the bottom of the footing as shown on the plans with structure backfill material.

206.3 INSPECTION:

When any structure excavation is completed, the Contractor shall notify the Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer.

206.4 STRUCTURE BACKFILL:

206.4.1 Preparation for Structural Backfill: Prior to the placement of structure backfill, the Contractor shall remove all loose, unstable materials from the sides of the structure excavation. The Contractor shall then compact the bottom of the remaining open structure excavation to a uniform density of not less than 95 percent maximum dry density. With the approval of the compaction of the bottom of the open structure excavation by the Engineer, the Contractor may start the placement of the Structure Backfill.

206.4.2 Structure Backfill for Earth Retaining Structures: Structure Backfill to be placed against concrete structures designed to retain earth loads, such as bridge abutment backwalls and wingwalls, box culvert outside walls and wingwalls, and retaining walls:

(A) Shall conform to the material requirements of Section 701.2.1 Crushed Rock, and the gradation requirements for Select Material, Type A or B in Table 702-1.

(B) Shall not be placed until the concrete has reached its full design strength.

(C) Shall be placed in layers not more than 8 inches in depth before compaction, when compacted by pneumatic or mechanical tamping devices.

(D) Shall be uniformly compacted to at least 95 percent of maximum density.

206.4.3 Structure Backfill for Structures Other than Earth Retaining: Structure Backfill placed against concrete structures not designed to retain earth loads:

(A) Shall not be placed until the concrete has attained a minimum compressive strength of 2500 psi in compression as specified in Section 725 and in no case less than 72 hours after casting.

(B) Shall be uniformly compacted to at least 90 percent of maximum density.

206.4.4 Structure Backfill for Structures within Paved Areas: Where a structure is located within an existing street, proposed street, or paved area:

(A) Backfill within 2 feet of the surface shall be compacted to the minimum density specified in Table 601-2, for Type I or shall be filled with 1/2 sack or 1 sack controlled low strength material as specified in Sections 604 and 728.

(B) All other structural backfill shall be compacted to the minimum density specified in Table 601-2, for Type III or shall be filled with 1/2 sack or 1 sack controlled low strength material as specified in Sections 604 and 728.

206.4.5 Structure Backfill for Precast Minor Structures: Minor structures, as defined in Section 505.1.1, when furnished as precast structures, shall be placed on a layer of Structure Backfill at least 6 inches in depth that conforms to the material requirements of Section 206.4.2. The layer shall have been shaped to fit the bottom surface of the precast unit and compacted to not less than 100 percent maximum density. The Structure Backfill shall be at or near optimum moisture content, as approved by the Engineer. After the unit has been initially set in place and checked for line and grade, it shall be removed, and any defects in its bearing area shall be corrected by trimming and by placing and compacting similarly moistened Structure Backfill. The process of removal, correction and replacement shall continue until the imprint of the unit on the bearing area indicates essentially uniform contact, and the unit is in reasonable conformity with the lines and grades shown on the project plans.

206.5 PAYMENT:

Unless otherwise provided in the special provisions or proposal, no payment will be made for structure excavation and backfill as such; the cost thereof shall be included in the price bid for the construction or installation of the items to which such excavation and backfill are incidental or appurtenant.

When the Special Provisions identify Structure Excavation and/or Structure Backfill as pay items, the following methods of measurement and payment shall be used:

206.5.1 Measurement

(A) Structure Excavation: Structure Excavation will be measured by the cubic yard, based on the volumes calculated from the measurement/pay limits shown on the Project Plans. If no limits are shown, the measurement for Structure Excavation shall be in accordance with the applicable details shown on the current Arizona Department of Transportation (ADOT) Standard Drawings B-19.30 and/or B-19.50.

No reduction in measurement for payment will be made when the Contractor elects to not excavate all material between the limits of the actual structure, and the pay limits shown on the Project Plans and/or the above referenced ADOT Standard Drawings.

No additional measurement for payment will be made for excavation resulting from lack of side support for structure excavations, nor due to carelessness of the Contractor.

Deleted: Backfilling operations shall conform to the following requirements: Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling. No backfill material shall be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of cast-in-place concrete box culverts until the concrete has developed a strength of not less than 2500 psi in compression as specified in Section 725. ¶

¶ All structural backfill in any

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(B) **Structure Backfill:** Structure Backfill will be measured by the cubic yard, based on the volumes calculated from the measurement/pay limits shown on the Project Plans. If no limits are shown, the measurement for Structure Backfill shall be in accordance with the applicable details shown on the current ADOT Standard Drawings B-19.40 and/or B-19.50.

206.5.2 Payment

Structure Excavation and Structure Backfill: The accepted quantities of Structure Excavation and the accepted quantities of Structure Backfill will be paid for at their respective contract unit prices.

Hauling, placing, and compacting surplus Structure Excavation in embankments, or otherwise disposing of the material, shall be included in the contract price paid for Structure Excavation.

Payment for additional Structure Excavation, where it is found necessary to excavate to a depth greater than three feet below the elevation shown on the Project Plans to remove unsuitable material in accordance with the requirements of Section 206.2, payment will be made in accordance with the provisions of Section 104.2.

SECTION 505

CONCRETE STRUCTURES

505.1 DESCRIPTION:

Concrete bridges, culverts, catch basins, manholes, retaining walls, abutments, piers, footings, foundations and similar structures shall be constructed in conformity with the plans and specifications. Concrete for use in work constructed under this specification and testing thereof shall conform to the requirements of Section 725. Reinforcing shall conform to the requirements of Section 727.

Safe and suitable ladders shall be provided to permit access to all portions of the work.

505.1.1 MINOR STRUCTURES:

Concrete structures such as cattle guards, catch basins, median barriers, headwalls, and other small miscellaneous structures of sizes that can readily be precast as units, and furnished and installed in place, are hereby defined as Minor Structures. Such Minor Structures, at the option of the Contractor, may be either constructed of cast-in-place concrete, or furnished as precast units. Precast units shall be fabricated in accordance with shop drawings submitted by the Contractor and approved by the Engineer, in accordance with the requirements of Section 105.2

505.2 SUBGRADE FOR CONCRETE STRUCTURES:

Each subgrade upon which concrete is placed shall be firm and free from water. Ground water shall be kept several inches below subgrade until the concrete has set. When the subgrade is in dry earth, it shall be moistened with water from a spray nozzle immediately before concrete is placed.

When the design details for the project provide for the construction of filter or drain material consisting of gravel or combination of gravel and sand, which material becomes subgrade for concrete, the placing of steel reinforcement and pouring of concrete shall follow the placing of the filter or drain material as closely as practical. The filter or drain material shall be kept dewatered to the extent necessary to prevent any portion of concrete materials being carried away before the concrete has attained its final set. No payment will be made for the work required to keep such materials dewatered, other than such costs as may be included in the prices bid for various items of work or amount bid for dewatering when the schedule provides an item for same.

When concrete is to rest on rock, the rock shall be fully uncovered. The surface of the rock shall be removed to a depth sufficient to expose sound rock. Bedrock shall be roughly leveled off or cut to approximately horizontal and vertical steps. Seams in the rock shall be grouted as directed by the Engineer and the base for structures shall be slush grouted or otherwise treated as the Engineer may direct.

Precast Concrete Minor Structures shall be founded in accordance with the requirements of Section 206.4.5.

505.3 FORMS:

Forming plans for cast-in-place bridge decks and cast-in-place bridge superstructures shall be prepared in accordance with the requirements of Section 105.2.

Forms shall be of suitable material and of type, size, shape, quality, and strength to enable construction as designed. The forms shall be true to line and grade, mortar tight, and sufficiently rigid to resist any appreciable amount of springing out of shape during placing of the concrete. The responsibility for their adequacy shall rest with the Contractor. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited. The surfaces of forms shall be smooth and free from irregularities, dents, sags and holes that would appreciably deface the finished surface. Forms previously used shall be thoroughly cleaned of all dirt, mortar and foreign matter before being reused, and the reuse of forms shall be subject to the approval of the Engineer. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly treated with an approved releasing agent that will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete.

Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber, or material which will provide a surface at least equally satisfactory. Any lumber or material which becomes badly checked or warped prior to placing concrete may be rejected.

Forms for all exposed surfaces of bridges, viaducts, overcrossings and similar structures shall be constructed of plywood or an approved equal. Plywood for forms shall be exterior type, of the grade Concrete-Form Exterior, conforming to the specifications of the NBS, Commercial Standards latest edition. Plywood shall be furnished and placed in 48 inches widths and in uniform lengths of not less than 96 inches, except where the dimension of the member formed is less than the specified panel dimension. Plywood shall be placed with the grain of the outer plies in the direction of the span. Where plywood is attached directly to the studding or joints, the panels shall be not less than 5/8 inch thick, and the studdings or joints shall be spaced not more than 12 inches, center to center. Plywood less than 5/8 inch thick, otherwise conforming to the requirements specified, may be used with a continuous backing of 5/8 inch sheathing. All form panels shall be placed in a neat, symmetrical pattern with the horizontal joints level and continuous.

Wood forms for copings and curbs shall have a thickness of not less than 15/8 inches and a width of not less than the full depth of coping or curb.

Unless otherwise shown on the plans, all sharp edges shall be chamfered with 3/4 inch triangular fillets. Forms for curved surfaces shall be so constructed and placed that the finished surface will not deviate appreciably from the arc of the curve.

Forms shall be so constructed that portions, where finishing is required, may be removed without disturbing portion of forms to remain.

Forms for girders and slabs shall be cambered as may be required by the Engineer.

Forms shall, as far as practicable, be so constructed that the form marks will conform to the general lines of the structure.

Form clamps or bolts, approved by the Engineer, shall be used to fasten forms. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used unless authorized by the Engineer. Clamps or bolts shall be of sufficient strength and number to prevent spreading of the forms. They shall be of such type that they can be entirely removed or cut back 1 inch below the finished surface of the concrete. Forms for outside surfaces shall be constructed with stiff wales at right angles to the studs and all form clamps shall extend through and fasten such wales, all based on the rate of concrete pour.

The Contractor may at his own option, pour such portions of the concrete for the structure directly against the side of the excavation or sheathing without the use of outside forms, provided that the following conditions are met.

(A) If concrete is poured directly against the sides of the excavation, the faces of the excavation must be firm and compact, and be able to stand without sloughing off and be at all points outside the concrete lines shown on the plans.

(B) If concrete is poured against sheathing, such sheathing shall be closely fitted and shall be outside of the concrete lines shown on the plans. Those surfaces against which the concrete is to be poured shall be faced with building paper. Except as otherwise specified all sheathing shall be removed, but not until either at least 7 days after placing concrete or until the concrete has attained a strength in compression of not less than 2,000 psi. Care should be used in pulling sheathing so as to avoid damaging the concrete. Voids left by the removal of sheathing, piles and/or similar sheathing supports shall be backfilled with material having a sand equivalent of not less than 30 and consolidated by jetting as directed by the Engineer. When, in the opinion of the Engineer, field conditions or the type of sheathing or methods of construction used by the Contractor are such as to make the removal of sheathing impracticable, that portion of the sheathing against which concrete has been poured may be left in place.

Regardless of the method used in pouring concrete without outside forms the following stipulations shall hold:

(A) The reinforcing steel shall be accurately set and held firmly in place, to the satisfaction of the Engineer.

(B) No direct payment will be made for building paper, sheeting, gunite or concrete placed outside of concrete lines shown on the plans. The cost thereof shall be absorbed in the prices bid for the various items of work.

(C) The Contractor shall assume all risks of damage to the work or to existing improvements due to any reason whatsoever that may be attributable to the method of construction outlined above.

505.3.1 Removal of Forms: The falsework supporting any span of a continuous or rigid frame structure subject to bending stress shall not be released until after the last concrete placed in the span and in the adjoining spans, excluding concrete above the deck slab, has attained a compressive strength of not less than twice the design unit stress, or 21 days after the concrete is placed, whichever occurs first.

Stairway riser forms shall be removed and the finish of the steps completed on the day the concrete is placed. Metal stairway treads, if required by the plans, shall be installed immediately after the steps have been placed.

Side forms for beams, girders, columns, railings, or other members wherein the forms do not resist dead load bending shall be removed not more than 24 hours after placing concrete, where finishing is required, unless otherwise directed by the Engineer, provided that satisfactory arrangements are made to cure and protect the concrete thus exposed.

Side forms for arch rings, columns, and piers shall be removed before the members of the structure which they support are poured or placed so that the quality of the concrete may be inspected. Such forms shall be so constructed that they may be removed without disturbing other forms which resist direct load or bending stress.

Forms and shoring for box and arch sections of sewers and storm drains may be removed as follows:

- (A) Forms for open channel walls — 16 hours.
- (B) Outside forms of box sections and inside wall forms of box sections which do not support the slab forms — 16 hours.
- (C) Arch sections in open cut — 12 hours.
- (D) Slab forms for box sections:
 - (1) Type II Cement — 48 hours or 6 hours per foot of span between supports, whichever is greater.
 - (2) Type III Cement — 24 hours or 3 hours per foot of span between supports, whichever is greater.
 - (3) Type V Cement — 56 hours or 7 hours per foot of span between supports, whichever is greater.

The periods of time at which the Contractor may remove forms, as set forth above, are permissive only and subject to the Contractor's assuming all risks that may be involved in such removals. At his option, except for surfaces to be finished, the Contractor may leave the forms in place for such longer periods as are, in his opinion, required.

505.4 FALSEWORK:

Falsework construction and erection shall not commence until the Contractor has received written approval of the sealed final falsework shop drawings.

All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were poured at one time.

All falsework, staging, walkways, forms, ladders, cofferdams, and similar accessories shall equal or exceed the minimum applicable safety requirements of Section 107. Compliance with such requirements shall not relieve the Contractor from full responsibility for the adequacy and safety of said items.

Falsework shall be founded upon a solid footing safe against undermining and protected from softening. When the falsework is supported on timber piles, the piles shall be driven to a bearing value as determined by the formula specified in Section 501, equal to the total calculated pile loading. The maximum calculated pile loading shall not exceed 20 tons.

Falsework and forms shall be so constructed as to produce in the finished structure the lines and grades indicated on the plans. Suitable jacks or wedges shall be used in connection with the falsework to set the forms to grade or camber shown on the plans, or to take up any settlement in the form work either before or during the placement of concrete. Single wedges for this purpose will not be permitted; it being required that all such wedges be in pairs to insure uniform bearing. Dead load deflection in stringers and joints will be compensated for by varying depths of the joists or by using varying depth nailing strips.

Arch centering shall be removed uniformly and gradually, beginning at the crown and working toward the springing, to permit the arch to take its load slowly and evenly. Centering for adjacent arch spans shall be struck simultaneously.

Falsework under any continuous unit or rigid frame shall be struck simultaneously; the supporting supports being released gradually and uniformly, starting at the center and working both ways towards the supports.

505.4.1 Falsework Design: Falsework design shall be in accordance with the requirements of Section 105.2.

Falsework shall be designed by the Contractor to carry all loads and pressures which may be applied to it. The construction loads to be applied are as follows:

Tunnel centering – 100 percent of the concrete load where concrete is placed by pumping. Forms shall be so constructed to provide adequate relief for excessive pump pressure.

All other structures – a live load of 30 pounds per square foot of horizontal area.

Transverse and longitudinal bracing – a horizontal force equal to 2 percent of the vertical load.

The unit stresses for wood falsework shall be those recommended in the West Coast Lumbermen's Association's standard grading and dressing rules increased 25 percent for short time loading.

Falsework may be bolted or spiked at the option of the Contractor, but the use of bolts and spikes shall not be combined in the same connection. The allowable spacings and connection values of bolts and spikes shall be in accordance with the national design specifications for stress-grade lumber and its fastenings as recommended by National Lumber Manufacturers Association except that an additional allowance of 25 percent for temporary use shall be added to the connection values for bolts and spikes.

Ends of columns bearing on wedges shall be tied in both direction by girts.

Unit stresses for steel falsework shall be in accordance with the requirements of the specifications for design, fabrication and erection of structural steel for buildings of the AISC.

505.5 PLACING REINFORCEMENT:

Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in position by wiring at intersections with wire not smaller than No. 16 gage and by using concrete or metal chairs, spacers, metal hangers, supporting wires and other approved devices of sufficient strength to resist crushing under full load. Wooden supports shall not be used.

Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted. Before placing in the forms, all reinforcing steel shall be thoroughly cleaned of mortar, oil, dirt, loose mill scale, loose or thick rust and coatings of any character that would destroy or reduce the bond. No concrete shall be deposited until the placing of the reinforcing steel has been inspected and approved.

Bundle bars shall be tied together at not more than 6 foot centers.

The Contractor will be allowed the following tolerances when placing, tying and supporting reinforcing steel:

- (1) In slabs and beams, horizontal bars shall be within ¼ inch measured vertically, of the position indicated on the plans.
- (2) In vertical walls, columns, wings, and similar members, clearance from the forms shall be within ¼ inch of the clearance shown on the plans.
- (3) In slabs or walls, long runs of bars may vary up to 2 inches in spacing; however, the specified number of bars shall be placed.

505.5.1 Splicing: Splices of bars shall be made only where shown on the plans or as approved by the Engineer. Where bars are spliced they shall be lapped at least 30 diameters, unless otherwise shown on the plans.

Welding of reinforcing steel will not be permitted unless specifically authorized by the Engineer.

505.5.2 Bending Reinforcement: Bending of reinforcing steel shall conform to the requirements of the AASHTO LRFD Bridge Construction Specifications Section 9.4.

Deleted: Bends and hooks in bars shall be made in the manner prescribed in the ACI, Manual of Standard Practice

Bars shall not be bent nor straightened in a manner that will injure the material. Bars with kinks or unspecified bends shall not be used.

505.5.3 Welded Wire Fabric: Welded wire fabric shall be held firmly in place and spliced not less than 2 meshes.

505.5.4 Dowels

505.5.4.1 Dowel Placement: Dowel placement shall consist of drilling or coring dowel holes in concrete, furnishing and placing anchoring materials, and placing reinforcing steel dowels in accordance with the details shown on the Project Plans, and the requirements of the project Special provisions and these Specifications.

Dowel holes shall be cored where dowels are to be placed:

- (A) in bridge decks and other thin concrete sections, and the depth of the dowel hole shown on the project plans projects to 3 inches or less from the opposite face of the concrete section, or
- (B) within 4 inches from an existing concrete edge.

Cored holes shall be intentionally roughened after coring.

All holes shall be blown clean with compressed air, prior to applying the anchoring material.

The diameter of the holes for the dowels shall be 1/8" larger than the diameter of the dowels to be placed. The depth of the holes for the dowels shall be as shown on the Project Plans.

The anchoring materials for the dowels shall be an epoxy adhesive conforming to the requirements of Section 505.5.4.2, unless otherwise specified on the Project Plans and/or the project Special Provisions, or as approved by the Engineer.

505.5.4.2 Anchoring Materials: Epoxy materials shall be used for anchoring dowels. The Contractor shall submit Certificates of Compliance or Analysis, complete with supporting documentation, to the Engineer for all epoxy materials to be used for anchoring dowels on a specific project, in accordance with the requirements of Section 106.2. The epoxy materials shall be provided by the Contractor in general conformance with the requirements of Section 1015.1 – General Requirements of Section 1015 – EPOXY MATERIALS of the current Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction, amended to date.

Epoxy resin base anchoring adhesive shall be used for anchoring dowels in concrete. High viscosity, or non-sag epoxies in the form of a gel, shall be used for horizontal or near-horizontal applications, where flow out of the anchoring hole is a problem. Low and medium viscosity epoxies may be used in vertical anchoring holes that open upward. The anchoring product shall specifically be designed for the designated application, according to the manufacturer's product literature.

Epoxy resin base anchoring adhesive shall provide the specified minimum tensile pullout resistance, when tested in accordance with Arizona Test Method 725, as modified in accordance with Section 505.5.4.3 of these specifications. The pot life of the anchoring material shall be determined in accordance with AASHTO T 237, Part I. The determined pot life shall be within 25 percent or 10 minutes of the pot life specified by the manufacturer, whichever is greater.

505.5.4.3 Dowel Strength Requirements: The epoxy resin base anchoring adhesive shall provide the following minimum pullout resistances:

<u>#4 dowels:</u>	<u>12.0 Kips</u>
<u>#5 dowels:</u>	<u>18.6 Kips</u>
<u>#6 dowels:</u>	<u>26.4 Kips</u>
<u>#7 dowels:</u>	<u>36.0 Kips</u>

Arizona Test Method (ATM) 725 is a Tensile Proof Dowel Test, developed by ADOT to specifically test #6 reinforcing steel dowels anchored in Portland cement concrete with an epoxy adhesive. When testing reinforcing steel dowel sizes, the anchoring hole (ATM 725: PREPARATION – 4.(a)) shall be modified as follows; the rotary hammer drill bit size (ATM 725: APPARATUS – 2.(a)) shall be modified accordingly:

#4 dowels:	5/8" diameter x 8" long
#5 dowels:	3/4" diameter x 10" long
#6 dowels:	7/8" diameter x 12" long
#7 dowels:	1" diameter x 14" long

The Contractor may opt to conduct pullout tests with hole lengths other than those required above, based on the adhesive manufacturer's product literature and recommendations; however, test results shall demonstrate that the tested system provides the required pullout resistances.

505.6 PLACING CONCRETE:

No concrete shall be placed in any forms supported by falsework until the Contractor's Professional Engineer has inspected the completed falsework, and has issued a properly sealed and signed certificate that the falsework has been constructed according to the approved falsework drawings.

Where a schedule for placing concrete is shown on the plans, no deviation will be permitted therefrom unless approved in writing by the Engineer.

The placing of concrete for a given pour shall start at the low point and shall proceed upgrade, unless otherwise permitted by the Engineer.

With the exception of concrete placed in slope paving and aprons, and concrete placed under water, all concrete shall be compacted by means of high frequency internal vibrators of a type, size and number approved by the Engineer. The number of vibrators employed shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least 2 vibrators shall be available at the site of the structure in which more than 25 cubic yards of concrete is to be placed. The vibrators shall not be attached to or held against the forms or the reinforcing steel. The locations, manner and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without causing segregation of the mortar and coarse aggregate, and without causing water or cement paste to flush to the surface. Fresh concrete shall be spread in horizontal layers insofar as practicable and the thickness of the layers shall not be greater than can be satisfactorily consolidated with the vibrators. If additional concrete is to be placed, care shall be taken to remove all laitance and to roughen the surfaces of the concrete to insure that fresh concrete is deposited upon sound concrete surfaces. Layers of concrete shall not be tapered off in wedge-shaped slopes, but shall be built with square ends and level tops.

Mixed concrete, after being deposited, shall be consolidated until all voids are filled and free mortar appears on the surface. The concrete shall be placed as nearly as possible in its final position and the use of vibrators for extensive shifting of the mass of fresh concrete will not be permitted.

Fresh concrete shall not be permitted to fall from a height greater than 6 feet without the use of adjustable length pipes or elephant trunks.

The use of approved external vibrators for compacting concrete will be permitted when the concrete is inaccessible for adequate compaction provided the forms are constructed sufficiently rigid to resist displacement or damage from external vibration.

During the placing of concrete, care shall be taken that methods of compaction used will result in a surface of even texture free from voids, water or air pockets, and that the coarse aggregate is forced away from the forms in order to leave a mortar surface. Spades or broad-tined forks shall be provided and used to produce the desired results if required by the Engineer.

The use of chutes in conveying or depositing concrete will be allowed only at the discretion of the Engineer, and wherever they are used they shall be laid at such inclination as will permit the flow of concrete of such consistency as is required. The use of additional water in mixing the concrete to promote free flow in chutes of low inclination will not be allowed. Where necessary in order to prevent segregation, chutes shall be provided with baffle boards or a reversed section at the outlet.

Columns shall be poured preferably through pipes of adjustable length and not less than 6 inches in diameter.

Horizontal members or sections shall not be placed until the concrete in the supporting vertical members or sections has been consolidated and a minimum 2 hour period has elapsed to permit shrinkage to occur.

Walkways shall be provided along each side and for the full length of bridge structures outside the deck area. These walkways shall be of sufficient width, and so constructed as to provide for the support of the bridges from which the longitudinal floats specified are to be operated. Inspection walkways and access thereto shall be provided under the deck forms between each pair of girders and outside of each outside girder for the full length of the bridge structure. The walkways shall be not more than 8 feet below the concrete to be inspected.

505.6.1 Construction Joints in Major Structures: The work shall be so prosecuted that construction joints will occur at designated places shown on plans unless specifically permitted otherwise by the Engineer. The Contractor shall complete, by continuous depositing of concrete, section for the work comprised between such joints. The joints shall be kept moist until adjacent concrete is placed.

All construction joints at the bottom of walls or arches, at the top of walls, and all longitudinal construction joints having a keyed, stepped or roughened surface shall be cleaned by sandblasting prior to pouring the adjacent concrete. Any quality of sand may be used which will accomplish the desired results.

The sandblasting operations shall be continued until all unsatisfactory concrete, and all laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall be washed thoroughly to remove all loose material. The method used in disposing of waste water employed in washing the concrete surfaces shall be such that the waste water will not stain, discolor, or affect exposed surfaces of the structures. The method of disposal will be subject to the approval of the Engineer.

All horizontal construction joints or those on slight slopes, shall be covered with Class D mortar as specified in Section 776.

Expansion and contraction joints in the concrete structures shall be formed where shown on the plans and as directed. In general, such joints shall have smooth abutting surfaces, painted or separated and sealed as detailed on the plans. No reinforcement shall be extended through the joints, except where specifically noted or detailed on the plans. Concrete or mortar shall not be permitted to lap these joints in such a manner as to effect a tie or bond that would later promote spalling.

Asphalt paint or premolded asphalt filler used in joints shall be as specified in Section 729.

No direct payment will be made for furnishing and placing asphaltic paint, premolded asphaltic filler or other types of joint separators; their costs shall be included in the price bid for the item of work of which they are a part.

505.6.2 ADVERSE WEATHER CONCRETING:

(A) Hot Weather Concreting: Hot weather is defined as any combination of high ambient temperature, low relative humidity, and wind velocity which would tend to impair the quality of fresh concrete. These effects become more pronounced as wind velocity increases. Since last minute improvisations are rarely successful, preplanning and coordination of all phases of the work are required to minimize these adverse effects.

As an absolute minimum, the Contractor shall insure that the following measures are taken:

(1) An ample supply of water, hoses, and fog nozzles are available at the site. (2) Spare vibrators are on hand in the ratio of one spare vibrator for each three in use. (3) Preplanning has been accomplished to insure prompt placement, consolidation, finishing, and curing of the concrete. (4) Concrete temperature on arrival should be approximately 60°F. and in any event shall not exceed 90°F. The use of cold water and ice is recommended. (5) The subgrade is moist, but free of standing water. (6) Fog spray is utilized to cool the forms and steel. Under extreme conditions of high ambient temperature, exposure to the direct rays of the sun, low relative humidity, and wind, even strict adherence to these measures may not produce the quality desired and it may be necessary to restrict concrete placement to early morning only. If this decision is made, then particular attention must be directed to the curing process since the concrete will be exposed to severe thermal stresses due to temperature variation; heat of hydration plus midday sun radiation versus nighttime cooling.

(B) Cold Weather Concreting: Concrete shall not be placed on frozen ground, nor shall it be placed when the ambient temperature is below 40°F, unless adequate means are used to heat the aggregate and/or water and satisfactory means have been taken for protecting and heating the concrete during the curing period.

(C) Wet Weather Concreting: Placing of concrete shall be discontinued when the quantity of rainfall is such as to cause a flow or wash to the surface. Any concrete already placed and partially cured shall be covered to prevent dimpling. A construction joint will be installed prior to shut down.

(D) Replacement of Damaged or Defective Concrete: Upon written notice from the Engineer, all concrete which has been damaged or is defective, shall be replaced by the Contractor at no cost to the Contracting Agency.

(E) Recommended Reference:

1. ACI-305 Hot Weather Concreting
2. ACI-306 Cold Weather Concreting
3. ACI-308 Recommended Practices for Curing Concrete

505.6.3 Bridge Deck Joint Assemblies

505.6.3.1 Description: This work shall consist of furnishing and installing expansion devices including the seals, anchorage system, and hardware in accordance with the project plans and these specifications.

505.6.3.2 Materials: Elastomer Seals shall be of the Compression Seal or Strip Seal type, and shall conform to the requirements of the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction Section 1011-5.

Steel shapes and plates shall conform to the requirements of ASTM A36, or ASTM A588.

505.6.3.3 Construction Requirements:

(1) General: Deck joint assemblies shall consist of elastomer and steel assemblies which are anchored to the concrete at the deck joint. The seal armor shall be cast in the concrete. The completed assembly shall be properly installed in the planned position, shall satisfactorily resist the intrusion of foreign material and water, and shall provide bump-free passage of traffic. For each size of seal on a project, one piece of the seal material supplied shall be at least 18 inches longer than required by the project Plans. The additional length will be removed by the Engineer and used for materials testing. Certificates of Compliance conforming to the requirements of Section 106.2 shall also be submitted by the Contractor.

(2) Shop Drawings: Prior to fabrication, the Contractor shall submit shop drawings to the Engineer for approval, in accordance with the requirements of Section 105.2. The shop drawings shall show complete details of the method of installation to be followed, including a temperature correction chart for adjusting the dimensions of the joint according to the ambient temperature, and any additions or rearrangements of the reinforcing steel from that shown on the project plans.

Deck joint assemblies for pretensioned and post-tensioned prestressed concrete superstructures shall be installed at the narrowest joint opening possible to allow for long-term superstructure shortening.

(3) Elastomer Seals: Seals shall conform to the requirements specified.

(4) Welding: All welding and inspection of welding for structural steel, except for tubular structures, shall be performed in accordance with the requirements of the ANSI/AASHTO/AWS D1.5-88 Bridge Welding Code. All other references to the American Welding Society (AWS) Structural Welding Code AWS D1.1-80 and the AASHTO Standard Specifications for the Welding of Structural Steel Highway Bridges are deleted.

The use of electro-slag welding process on structural steel will not be permitted.

(5) Armor: All steel for cast-in-place deck joint assemblies shall conform to the requirements specified.

(6) Galvanizing: All steel parts of strip seal assemblies shall be galvanized after fabrication, in accordance with the requirements of ASTM A123 and A153, unless ASTM A588 steel is used. Bolts shall be high strength, conforming to the requirements of ASTM A325M, with a protective coating of cadmium or zinc, followed by a chromate and baked organic coating conforming to the requirements of ASTM F1135, Grade 3, 5, 6, 7, or 8 and Color Code A.

Steel parts of compression seal assemblies do not require galvanizing, plating, or painting.

(7) Joint Preparation and Installation: At all joint locations, the Contractor shall cast the bridge decks and abutment backwalls with a formed blockout, sized to accommodate the pre-assembled joint assembly. The joint assembly will be anchored in the concrete to be placed with the secondary pour in the blockout. Prior to the secondary pour, the surface of the existing concrete in the blockout shall be coated with an approved adhesive specifically formulated for bonding new concrete to old concrete.

Installed armor assemblies shall be covered or otherwise protected at all times prior to installing the elastomer portion of the joint assembly. The elastomer shall be installed at such time and in such manner that it will not be damaged by construction operations.

The seal element shall be installed subject to these specifications and approval of the Engineer. Immediately prior to the installation of the seal element, the steel contact surfaces of the joint armor shall be clean, dry, and free of oil, rust, paint, or foreign material. Any perforation or tearing of the seal element due to installation procedures or construction activities will be cause for rejection of the installed seal element.

During the installation of all proprietary deck joint assemblies, the manufacturer's representative shall be present. As a minimum, the representative shall be present during the placement of the joint assembly in the deck blockout, prior to the secondary concrete pour, and shall also be present during the installation of the seal element.

505.6.4 Water Stops

Water stops of rubber or plastic, shall be placed in accordance with the details shown on the project plans. Where movement at the joint is provided for, the water stops shall be of the type permitting such movement without damage. Water stops shall be mechanically spliced, vulcanized, or heat-sealed to form continuous watertight joints, in accordance with the manufacturer's recommendations, and as approved by the Engineer.

505.6.5 Longitudinal Joints between Precast Bridge Deck Units

After erection of the units and at the time requested by the Engineer, the longitudinal shear key joints between units shall be thoroughly packed with a pre-packaged non-shrink grout or a sand-cement grout with an expansion agent approved by the Engineer. The Contractor shall then transversely connect the deck units with the connection rods, stressing and anchoring them as shown on the project plans.

505.7 CONCRETE DEPOSITED UNDER WATER:

When conditions render it impossible or inadvisable in the opinion of the Engineer to dewater excavation before placing concrete, the Contractor shall deposit under water, by means of a tremie or underwater bottom dump bucket, a layer of concrete of sufficient thickness to thoroughly seal the cofferdam. To prevent segregation the concrete shall be carefully placed in a compact mass and shall not be disturbed after being deposited. Water shall be maintained in a still condition at the point of deposit.

A tremie shall consist of a water tight tube having a diameter of not less than 10 inches with a hopper at the top. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while charging the tube with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering, when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when concrete is being placed. The tremie tube shall be kept full of concrete. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it in the deposited concrete. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous.

The underwater bucket shall have an open top and the bottom doors shall open freely and outward when tripped. The bucket shall be completely filled and slowly lowered to avoid back wash and shall not be dumped until it rests on the surface upon which the concrete is to be deposited. After discharge, the bucket shall be raised slowly until well above the concrete.

Concrete deposited in water shall have 10 percent extra cement added.

505.8 CURING:

As soon after the completion of the specified finishing operations as the condition of the concrete will permit without danger of consequent damage thereto, all exposed surface shall either be sprinkled with water, covered with earth, sand or burlap; sprayed with a curing compound or sealed with a material conforming with Section 726. All concrete for bridge structures shall be water cured unless otherwise permitted by the Engineer. The Contractor shall use the wet burlap method for the water cure of all concrete in bridge decks and approach slabs, unless otherwise authorized by the Engineer.

Concrete that is water cured must be kept continuously wet for at least 10 days after being placed; preferably being covered, if possible, with at least 2 layers of not lighter than 7 ounce burlap, except that handrail, baserail, railing posts, tops of walls, and similar parts of the structure, if water cured, must be covered with burlap as above prescribed, immediately following the finishing treatment specified therefor, and such covering shall not be removed in less than 4 days. Roadway areas, floors, slabs, curbs, walks, and the like, that are water cured may be covered with sand to a depth of at least 2 inches, in lieu of the burlap as specified above, as soon as the condition of the concrete will properly permit, and such covering must remain wet and in place until the concrete so covered is at least 10 days old unless otherwise directed by the Engineer or provided by special provisions.

When a sprayed impervious membrane is used, it shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely cover and seal all exposed surfaces of the concrete with a uniform film. To insure complete coverage, membrane shall be applied in two applications for a total coverage of 150 square feet per gallon. The membrane, however, shall not be applied to any surface until all of the finishing operations have been completed; such surfaces being kept damp, until the membrane is applied. All surfaces on which a bond is required, such as construction joints, shear planes, reinforcing steel, and the like, shall be adequately covered and protected before starting the application of the sealing medium in order to prevent any of the membrane from being deposited thereon; and any such surface with which the seal may have come in contact shall immediately thereafter be cleaned. Care shall be exercised to avoid and prevent any damage to the membrane seal during the curing period. Should the seal be broken or damaged before the expiration of 10 days after the placing of the concrete, the break shall be immediately repaired by the application of additional impervious membrane over the damaged area.

Should any forms be removed sooner than 10 days after the placing of the concrete, the surface so exposed shall either be immediately sprayed with a coating of the membrane seal, or kept continuously wet by the use of burlap or other suitable means until such concrete has cured for at least 10 days.

When tops of walls are cured by the membrane sealing method the side forms, except metal forms, must be kept continuously wet for the 10 days following the placing of the concrete.

If due to weather conditions, materials used, or for any other reason, there is any likelihood of the fresh concrete checking or cracking prior to the commencement of the curing operations, it shall be kept damp, but not wet, by means of an indirect fine spray of water until all danger of such checking or cracking is past, or until the curing operations are started in the particular area affected.

Since hot weather leads to more rapid drying of concrete, protection and curing are far more critical than in cool weather. Water curing should be used wherever it is practical and should be continuous to avoid volume changes due to alternation of wetting and drying. The need for adequate continuous curing is greatest during the first few hours after placement of concrete in hot weather.

505.9 FINISHING CONCRETE:

Immediately after the removal of forms as provided above, all concrete surfaces shall be finished in accordance with the requirements specified below.

All surfaces scheduled to be covered with backfill shall be finished so as to be free of open and rough spaces.

All surfaces that will remain exposed in the completed work shall be finished so as to be free of open and rough spaces, depressions or projections. All angles and fillets shall be sharp and true and the finished surface shall present a pleasing appearance of uniform color.

All top surfaces of walls, abutments, piers, etc., shall be finished to a smooth surface and shall be cured by an approved method.

If rock pockets or honeycomb are of such an extent and character as to affect materially the strength of the structure and to endanger the steel reinforcement the Engineer may declare the concrete defective and require the removal and replacement of that portion of the structure affected by the Contractor at no additional cost to the Contracting Agency.

If finishing operations are not carried out as set forth below, all placing of concrete shall stop until satisfactory arrangements are made by the Contractor to promptly correct defective finishing work and to carry out finishing operations as specified.

One of the classes of finish as specified shall be applied to the various surfaces as set forth under applicability of finishes.

No finishing or patching shall be permitted until the surface has been inspected by the Engineer.

505.9.1 Finishing Fresh Concrete in Bridge Decks: Upon placing the deck to a uniform and true surface, screed supports shall promptly be removed from the surface and any necessary hand finishing shall be promptly accomplished in the areas where the screed supports have been removed.

After final floating of the plastic concrete, bridge decks subject to vehicular traffic shall be textured transversely. Apparatus producing textured grooved shall be mechanically operated from an independent self-propelled bridge. Grooves shall be 1/16 to 1/8 inch in width and 3/32 to 6/32 in depth. Center to center spacing of the grooves shall be as follows: 7/8 inch, 3/4 inch, 1 inch, 3/4 inch, 1-1/8 inch and then repeated, or other measurements as approved by the Engineer. Texturing shall be completed before surface of concrete is torn or unduly roughened by texturing operation. Grooves that close following texturing will not be permitted and will have to be retextured. Hand tine brooms shall be available on the job site, at all times during texturing operation, to repair faulty texturing grooves.

The finished surface will be tested with a 10 foot straightedge furnished by the Contractor. The testing will be accomplished by holding the straightedge in contact with the deck surface and parallel to the centerline. The surface shall not vary more than 1/8 inch from the lower edge of the straightedge. Areas showing high spots of more than 1/8 inch shall be corrected by cutting or planing. The cutting or planing machine shall be a rotary type, equipped with an adjustable cutter and having a minimum wheel base of 10 feet. Areas showing low spots of more than 1/8 inch shall be filled with an approved mixture of sand, cement and epoxy. The mixture shall firmly adhere to the surface and shall match the surrounding concrete. All areas corrected shall not show deviations in excess of 1/8 inch when tested with a 10 foot straightedge.

505.9.2 Finishing Fresh Concrete in Sidewalks and Bridge Sidewalks: After the concrete has been placed and spread between the forms, it shall be thoroughly worked until all the coarse aggregate is below the surface and the mortar comes to the top. Concrete may be consolidated by means of mechanical vibrators approved by the Engineer.

The surface shall then be struck off and worked to grade and cross section with a wood float.

A mechanical finishing machine that will consolidate the concrete and strike off and finish the surface may be used if permitted by the Engineer, provided that the machine produces a sidewalk equal to or better in all respects than that produced by the methods specified herein.

The surface shall be sweat finished by means of a steel trowel followed by a light broom finish.

The sidewalks shall be marked and edged with the proper tools to form the joints, marking and edges shown on the plans.

505.9.3 Finishing Green Concrete: Class I Finish — All bolts, wires and rods shall be clipped and recessed. All holes, honeycomb, rock pockets and other surface imperfections shall be cleaned out, thoroughly moistened and carefully patched with mortar. Mortar shall be composed of 1 part of cement and 2 parts of fine sand. A portion of the required cement for mortar shall be white as required to match the color of the surrounding concrete.

Class II Finish — The surface shall be patched and pointed as specified above for Class I Finish and then promptly covered with polyethylene film, wet burlap or wet cotton mats. If polyethylene film is used, the film shall be held securely to the surface by means of weights, adhesive or other suitable means. Only white polyethylene film for covering will be acceptable.

When the mortar used in patching and pointing has set sufficiently, the surface shall be uncovered and thoroughly rubbed with either a float or a carborundum stone until the surface is covered with a lather. Cork, wood or rubber floats shall be used only on surfaces sufficiently green to work up such lather, otherwise a carborundum stone shall be used. During the rubbing process, a thin grout composed of 1 part cement and 1 part of fine sand may be used to facilitate producing a satisfactory lather; however, this grout shall not be used in quantities sufficient to cause a plaster coating to be left on the finished surface. A portion of the required cement for grout shall be white as required to match the color of the surrounding concrete. Rubbing shall continue until irregularities are removed and there is no excess material. At the time a light dust appears, the surface shall be brushed or sacked. Brushing or sacking shall be carried in one direction so as to produce a uniform texture.

Class III Finish — The surface shall be treated as specified above under Class II Finish except that after brushing, the surface shall again be securely covered with polyethylene film, wet burlap or wet cotton mats. In not less than 1 day nor more than 4 days, the surface shall be uncovered and rubbed with a carborundum stone. This rubbing shall continue until the entire surface is of a smooth texture and uniform color. During the process, the use of a thin mixture of equal parts of sand and cement with water will be permitted. At the time a light dust appears, the surface shall be brushed or sacked, care being taken to carry this brushing in one direction so as to produce a uniform texture.

505.9.4 Finish Hardened Concrete: If for reasons either beyond the control of the Contractor or with the approval of the Engineer, more than 6 days have elapsed between the time of placing concrete and the time of the removal of forms, the concrete shall be considered as hardened. Prior to finishing hardened concrete, the surface shall be covered with burlap or cotton mats and kept thoroughly wet for a period of at least 1 hour. Finishing shall be identical to the respective requirements for Class I, Class II and Class III Finish for green concrete, except that the use of a mechanically operated carborundum stone will be required for Class II and Class III Finishes.

505.9.5 Applicability of Finishes: Surfaces requiring Class I Finish — All formed structures that are to be covered by backfill and those surfaces that are normally not in view of either vehicular or pedestrian traffic such as the surfaces on the inside of barrels of culverts, the under surfaces of decks, surfaces of concrete girders, piers and abutment walls.

Surfaces requiring Class II Finish — All exposed surfaces of headwalls, wingwalls, deck edges on culverts, end of piers on bridges and culverts, retaining walls and those vertical surfaces under highway grade separation structures that are exposed to view of the traveling public, including piers and pier caps, the outside face of outside girders, and other similar surfaces.

When surfaces of uniform texture and pleasing appearance are obtained through the use of first class metal forms, paper tubing or the use of special form coatings and the use of special care, such surfaces may, upon approval of the Engineer, be excluded from the surfaces requiring Class II Finish.

Surfaces requiring Class III Finish for bridge structures — All formed or finished surfaces above the surface of the deck on the roadway side of the handrail and the outside vertical surfaces from the top of handrail and dado to the lower edge of the chamfer at the bottom of the deck.

505.10 DIMENSIONAL TOLERANCES:

The maximum allowable tolerances or deviations from dimensions shown on the project plans or the approved shop drawings shall be as follows:

505.10.1 Cast-in-Place Concrete

(A) Variation from plumb in the lines and surfaces of columns, piers, abutment and girder walls:

In any 10 foot or less length: 0.4 inches

Maximum for the entire length: 1 inch

(B) Variation in cross-sectional dimensions of columns, piers, girders, and in the thickness of slabs and walls:

+ 1/4 inch
- 1/8 inch

(C) Girders alignment (deviation from straight line parallel to center line of girder measured between diaphragms):

1/8 inch per every 10 feet in length

(D) Variation in footing cross sectional dimensions in project plans:

+ 2 inches
- 1/2 inch

(E) Variation in footing thickness:

Greater than specified - No Limit

Less than specified - 5 percent of specified thickness up to a maximum of 1 inch

(F) Subgrade Tolerances:

Slab poured on subgrade excepting footing thickness:

+ 1/4 inch
- 3/4 inch

(G) Girder Bearing Seats:

Deviation from plane surface (flatness): ± 1/8 inch in 10 feet.

Deviation from required elevation:

+ 1/4 inch
- 1/8 inch

(H) Cast-in-Place concrete box girder superstructures:

Deviation in overall depth:

+ 1/4 inch
- 1/8 inch

Deviation in slab and wall thickness:

+ 1/4 inch
- 1/8 inch

Deviation of post-tensioning ducts:

± 1/4 inch

505.10.2 Minor Precast Concrete Structures:

Precast units that do not comply with the dimensional tolerances specified herein will be rejected. Precast units that show evidence of cracks, pop outs, voids or other evidence of structural inadequacy, or imperfections that will reduce the aesthetics of the unit after final placement, will be rejected. The maximum allowable tolerances or deviations from the dimensions shown on the drawings shall be as follows:

(A) Over-all dimensions of member: ± 1/4 inch per 10 feet, maximum of ± 3/4 inch.

(B) Cross-sectional dimensions: Sections 6 inches or less $\pm 1/8$ inch

Sections 18 inches or less and over 6 inches $\pm 1/4$ inch

Sections 39 inches or less and over 18 inches $\pm 1/4$ inch

(C) Deviations from straight line:

Not more than $1/4$ inch per 10 feet

All exposed, sharp corners of the concrete shall be filleted $3/4$ inches with a maximum allowable deviation of $\pm 1/8$ inch.

505.11 MEASUREMENT:

505.11.1 Reinforcing Steel:

When reinforcing steel is scheduled for payment as a specific item, it will be measured in pounds, based on the total computed weight for the size and length of bars, or for the area of welded wire fabric, as shown on the Project Plans or as approved by the Engineer.

Unit bar weights for deformed and plain billet-steel bars will be the nominal unit weights specified in AASHTO M 31 (ASTM A 615).

Area unit weights for steel welded wire fabric will be calculated based on specified wire spacings and unit weights for specified wire types and sizes. Unit weights for plain wire shall be based on the nominal areas specified for Wire Size Numbers in AASHTO M 32 (ASTM A 82). Unit weights for deformed wire shall be the nominal unit weights specified for Deformed Wire Size Numbers in AASHTO M 225 (ASTM A 496).

If the area unit weights for steel welded wire fabric are specified on the Project Plans or in the Special Provisions, both the Contractor and the Engineer shall independently calculate the area unit weight, using specified wire spacings, types and sizes, and the criteria in the preceding paragraph. Any apparent discrepancy between the specified and calculated area unit weights shall be resolved by the Engineer prior to the Contractor placing the order for the steel welded wire fabric.

Lap splices made for the convenience of the Contractor will not be included in the measurement for payment.

Reinforcing steel for Minor Structures, as defined in Section 505.1.1, will not be measured, but will be included in the items unit price or specified method of payment, unless otherwise called out on the Project Plans or in the Special Provisions.

Dowel Placement will be measured by the unit each.

505.11.2 Concrete:

When concrete is scheduled for payment on the basis of cubic yards, the calculation of the quantity of concrete for payment will be made only to the neat lines of the structures as shown on the plans. The quantity will be based on the concrete having the specified plan lengths, widths/depths, and thicknesses. However, all concrete shall be placed to line and grade within the tolerances specified in Section 505.10, or as approved by the Engineer as being reasonable and acceptable for the type of work involved. No volumetric deductions will be made for rounded or beveled edges, space occupied by reinforcing steel, metal inserts, or openings 0.5 square yard or less in area.

The quantity of concrete will be calculated considering any mortar used to cover construction joints as being concrete. The cost of cement used in any mortar for covering construction joints, patching, or other uses in the structure being constructed, in excess of that required for the design mix of the adjacent concrete, shall be absorbed in the cost of the item of work of which said mortar is a part.

505.11.3 Deck Joint Assemblies:

Deck joint assemblies will be measured to the nearest tenth of a foot. Measurement will be made along the centerline of the joint, at the surface of the roadway, from face-to-face of curb or barrier. No measurement will be made for that portion of the deck joint assembly required by plan details to extend through the barrier face or curb; that portion of the joint assembly will be considered incidental to the sealing of the joint.

505.11.4 Bridge Railing, Curbs, Barriers, and Approach Slabs

Bridge Pedestrian Fence and Curb, Bridge Pedestrian Fence and Parapet, and Bridge Fence and Parapet will be measured to the nearest tenth of a foot, from end post to end post.

Bridge Traffic and Pedestrian Rail will be measured to the nearest foot, determined from the outside dimensions of the rail.

Bridge Concrete Barrier will be measured to the nearest tenth of a foot.

Barrier Concrete Barrier Transition will be measured as a unit for each constructed.

Reinforced Concrete Approach Slab will be measured to the nearest square yard.

505.12 PAYMENT:

Deleted: 505.10

Payment for portland cement concrete structures will be made in conformity with the terms of the contract and will be based on unit prices and/or lump sums as set forth in the proposal. Such payment shall include full compensation for furnishing all labor, materials, tools and equipment, preparation of subgrade for placing of concrete and doing all work required to construct the structures in conformity with the plans and specifications.

505.12.1 Reinforcing Steel: The accepted quantities of reinforcing steel, of the type indicated on the Project Plans or specified in the Special Provisions, and measured in conformance with Section 505.11.1 will be paid for at the contract unit price per pound, complete in place.

The accepted quantity of dowels placed will be paid for at the contract unit price for Dowel Placement, which shall be full compensation for the work, complete in place. Steel reinforcement furnished for the dowels will be measured and paid for under the pay item Reinforcing Steel.

No measurement or direct payment will be made for dowels which are required to replace existing reinforcing steel that is damaged as a result of the Contractor's operations; the Contractor shall furnish and place such dowels at his own expense.

505.12.2 Concrete: Payment for Portland cement concrete structures will be made in conformity with the terms of the contract and will be based on unit prices and/or lump sums as set forth in the proposal. Such payment shall include full compensation for furnishing all labor, materials, tools and equipment, preparation of subgrade for placing of concrete, and doing all work required to construct the structures in conformity with the plans and specifications.

Where concrete is scheduled for payment on the basis of cubic yards, the calculation of the quantity of concrete for payment will be made only to the neat lines of the structures as shown on the plans and on the basis of the concrete having the specified lengths, breadths, and thicknesses. The quantity of such concrete will be calculated considering the mortar used to cover construction joints as being concrete and no deductions will be made for rounded or beveled edges, space occupied by reinforcing steel, metal inserts, or openings 5 square feet or less in area. The cost of cement used in mortar for covering construction joints, patching, or other uses in the structure being constructed, in excess of that required for the design mix of the adjacent concrete, shall be absorbed in the item of work of which said mortar is a part.

Deleted: However, all concrete shall be placed to line and grade within such tolerances as, in the opinion of the Engineer, are reasonable and acceptable for the type of work involved.

An adjustment in the contract unit price, to the nearest cent, will be made for the quantity of concrete represented by the results of cylinder strength tests that are less than the specified 28-day compressive strength. Strength tests will be conducted in accordance with Section 725.10 of the Uniform Standard Specifications. The adjustment in contract unit price, if the concrete is accepted, will be based on the schedule in Section 725.11.

The contract unit price for structural concrete shall include full compensation for all items incidental to providing a concrete structure complete in place, including waterstops, roadway drains, scuppers, metal inserts, and bearing pads.

505.12.3 Minor Concrete Structures and Accessories:

The accepted quantities of:

<u>Minor Structures</u>	<u>Each</u>
<u>Deck Joint Assemblies</u>	<u>0.1 Foot</u>
<u>Bridge Pedestrian Fence and Curb</u>	<u>0.1 Foot</u>
<u>Bridge Pedestrian Fence and Parapet</u>	<u>0.1 Foot</u>
<u>Bridge Fence and Parapet</u>	<u>0.1 Foot</u>
<u>Bridge Traffic and Pedestrian Rail</u>	<u>Foot</u>
<u>Bridge Concrete Barrier</u>	<u>0.1 Foot</u>
<u>Bridge Concrete Barrier Transition</u>	<u>Each</u>
<u>Reinforced Concrete Approach Slab</u>	<u>Square Yard</u>

will be paid for at the unit price and/or lump sums as set forth in the proposal. The contract unit price shall include full compensation for all labor, materials, tools and equipment necessary to provide the concrete structure or accessory complete in place, including all concrete, reinforcing steel, and items embedded in the concrete, such as anchor bolts, grates and frames, metal inserts, etc.

ONLY ONE AGENCY WITH SUPPLEMENT OF SPECIFICATION

AGENCY	SPEC. #	SPECIFICATION
Scottsdale	103	Awards and Execution of Contract
Scottsdale	343	Exposed Aggregate Paving
Scottsdale	345	Adjusting, frames, covers, valve boxes and water meters
Scottsdale	360	Telecommunication installation
Scottsdale	405	Monuments
Scottsdale	403 add	Traffic Signalization
Scottsdale	611	Disinfecting water mains
Scottsdale	620	Cast-in-place concrete pipe
Scottsdale	621	Corrugated metal pipe and arches
Scottsdale	619 add	Precast reinforced concrete box sections
Scottsdale	715	Slurry Seal materials
Scottsdale	737	Asbestos-cement pipe and fittings
Scottsdale	745	PVC sewer pipe and fittings
Total	13	
Maricopa	108	Commencement, Prosecution and progress
Maricopa	201	Clearing and grubbing
Maricopa	205	Roadway excavation
Maricopa	206	Structure excavation and Backfill
Maricopa	210	Borrow excavation
Maricopa	211	Fill construction
Maricopa	215	Earthwork for open channels
Maricopa	220	Rip Rap Construction
Maricopa	308 add	Line Slurry with fly ash stabilization
Maricopa	315	Bituminous prime coat
Maricopa	325 add	Asphalt-rubber concrete gap graded
Maricopa	333	Fog seal coats
Maricopa	416 add	Guardrail end treatment
Maricopa	502 add	Reinforced concrete shafts
Maricopa	507 add	Water-repellent penetration stain
Maricopa	727	Steel Reinforcement
Total	16	

AGENCY	SPEC. #	SPECIFICATION
Phoenix	312	Cement treated base
Phoenix	351 add	Traffic Signals
Phoenix	361 add	Microseal
Phoenix	425	Top Soil
Phoenix	520	Steel and Aluminum hand rails
Phoenix	604	Placement and control low strength material
Phoenix	622 add	High Density Polyethylene pipe
Phoenix	702	Base material
Phoenix	705	Portland Cement treated base
Phoenix	735	Reinforced concrete pipe
Phoenix	750	Iron water pipe and fittings
Phoenix	757	Sprinkler Irrigation system
Phoenix	758	Concrete pressure pipe-steel cylinder type
Phoenix	787	Gray iron casting
Phoenix	795	Landscape material
Total	15	
Mesa	322	Asphalt concrete overlay
Mesa	329	Tack coat
Mesa	709	Reclaimed Asphalt pavement
Mesa	717	Asphalt rubber
Mesa	718	Preservative Seal for Asphalt concrete
Mesa	772	Chain link fence
Total	6	
Tempe	334	Preservative seal for Asphalt concrete
Chandler	616	Cover Material
Grand Total	52	

LIST OF MEMBERS
For
MAG Standard Specifications and Details Committee

Page 1 of 4
July 24, 2007

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July 24, 2007

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LIST OF MEMBERS
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July 24, 2007

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July 24, 2007

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