

May 29, 2013

TO: Members of the MAG Standard Specifications and Details Committee

FROM: Tom Wilhite, City of Tempe, Chair

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF TENTATIVE AGENDA

Wednesday, June 5, 2013 at 1:30 p.m.
MAG Office, Suite 200 (Second Floor), Ironwood Room
302 North 1st Avenue, Phoenix

A meeting of the MAG Specifications and Details Committee has been scheduled for the time and place noted above. Members of the MAG Specifications and Details Committee may attend the meeting either in person, by videoconference or by telephone conference call. If you have any questions regarding the meeting, please contact Committee Chair Tom Wilhite at 480-350-2921 or Gordon Tyus, MAG staff at 602-254-6300.

In 1996, the Regional Council approved a simple majority quorum for all MAG advisory committees. If the MAG Specifications and Details Committee does not meet the quorum requirement, no action can be taken. Attendance at the meeting is strongly encouraged.

Pursuant to Title II of the Americans with Disabilities Act (ADA), MAG does not discriminate on the basis of disability in admissions to or participation in its public meetings. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Gordon Tyus at the MAG office. Requests should be made as early as possible to allow time to arrange the accommodation.

It is requested (not required) that written comments on active cases be prepared in advance for distribution at the meeting.

MAG Standard Specifications and Details Committee
TENTATIVE AGENDA
June 5, 2013

COMMITTEE ACTION REQUESTED

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| 1. <u>Call to Order and Introductions</u> | |
| 2. <u>Call to the Audience</u>
An opportunity is provided to the public to address the MAG Specifications and Details Committee on items that are not on the agenda that are within the jurisdiction of MAG, or non-action agenda items that are on the agenda for discussion or information only. Citizens will be requested not to exceed a three minute time period for their comments. A total of 15 minutes will be provided for the Call to the Audience agenda item, unless the committee requests an exception to this limit. Please note that those wishing to comment on agenda items posted for action will be provided the opportunity at the time the item is heard. | 2. Information. |
| 3. <u>Approval of May 1, 2013, Meeting Minutes</u> | 3. Review and approve minutes of the May 1, 2013 meeting. |

Cases Carried Forward from 2012

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| 4. <u>Case 12-12:</u>
New Section 739: Steel Reinforced Polyethylene Pipe (SRPE) | 4. Information, discussion and possible action.
Sponsor: Rod Ramos, Scottsdale
<i>(Updated)</i> |
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New Cases for 2013

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| 5. <u>Case 13-01 Miscellaneous Corrections:</u>
A. Revise title of Section 324
B. Section 505.6.3.3 (4) Typing error correction
C. Section 735.4 (D) Delete reference to AASHTO M-315
D. Correction to Detail 501-5
E. Correct typo in Section 311 Title
F. Remove reference to Section 702.4 in Subsection 795.8.4 Decomposed Granite
G. Revise Section 107.4 to change the Arizona Revised Statue reference 41-846 to 41-865.
H. Remove the word "AND" in the title of Section 725 so it reads "Portland Cement Concrete"
I. Section 108.8 Correction: Change "or" to "and" in first line.
J. Add missing superscript on 301.3 and correct typo in 321.14.3
K. Remove out-of-date ASTM references in Section 729. | 5. Information and discussion.
Sponsors: Bob Herz, Maricopa County
Peter Kandaris, DGA,
Jeff Hearne, Concrete WG
<i>(Updated)</i> |
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6. Case 13-05:
New Section 740 Polypropylene Pipe and Fittings for Gravity Storm Drain and Sanitary Sewer.
 7. Case 13-07:
Revisions to Detail 201 ASPHALT PAVEMENT EDGE DETAILS. Correct miscellaneous errors and change the Type B thickened edge depth dimension from "8 inch minimum" to "8 inches".
 8. Case 13-08:
Revision to Section 321.8.8 Thickened Edge. Eliminate references to 'base course' to clarify the surface being referenced.
 9. Case 13-09:
Revision to Section 321 Asphalt Penalty Tables based on City of Mesa Supplements.
 10. Case 13-10:
Revision to Section 301.7 (Subgrade Preparation) MEASUREMENT.
 11. Case 13-11:
Delete Section 737 ASBESTOS-CEMENT PIPE AND FITTINGS FOR STORM DRAIN AND SANITARY SEWER.
 12. Case 13-12:
Revisions to Section 340: Concrete Curb, Gutter, Sidewalk, Sidewalk Ramps, Driveway and Alley Entrance.
 13. Case 13-13:
Case 13-13: Revisions to Section 415 Flexible Metal Guardrail.
 14. Case 13-14:
Revisions to Section 711 Paving Asphalt to update tests and add new polymer modified section.
 15. Case 13-15:
Revisions to MAG Sections 603, 615 and 618 for flexible pipe.
6. **Information, discussion and possible action.**
Sponsor: Warren White, Chandler
(Updated)
 7. **Information, discussion and possible action.**
Sponsor: Bob Herz, Maricopa County
 8. Information and discussion.
Sponsor: Bob Herz, Maricopa County
(Updated)
 9. Information and discussion.
Sponsor: Bob Draper, City of Mesa
(Updated)
 10. Information and discussion.
Sponsor: Bob Herz, Maricopa County
(Updated)
 11. **Information, discussion and possible action.**
Sponsor: Bob Herz, Maricopa County
 12. Information and discussion.
Sponsor: Peter Kandarlis, Concrete Working Group
 13. Information and discussion.
Sponsor: Bob Herz, Maricopa County
 14. Information and discussion.
Sponsor: Jeff Benedict, Asphalt Working Group
(Updated)
 15. Information and discussion.
Sponsor: Warren White, Chandler

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| 16. <u>Case 13-16:</u>
Revision to Section 602; Encasement of Water or Sewer Pipe by Jacking or Tunneling Operation. | 16. Information and discussion.
Sponsor: Jim Badowich, Avondale
<i>(Updated)</i> |
| 17. <u>Case 13-17:</u>
Revision to Section 430.4 DECOMPOSED GRANITE AREA. Eliminate placement of polyethylene below decomposed granite. | 17. Information and discussion.
Sponsor: Bob Herz, Maricopa County |
| 18. <u>Case 13-18:</u>
Revisions for Detail 250-1 Driveway Entrances with Detached Sidewalk. | 18. Information and discussion.
Sponsor: Bob Herz, Maricopa County
<i>(New Case)</i> |
| 19. <u>New and Potential Cases for 2013:</u> | 19. Information and discussion. |

General Discussion

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| 20. <u>Working Group Reports</u> | 20. Information and discussion.

Water/Sewer Chair: Jim Badowich, Avondale
Asphalt Chair: Jeff Benedict
Materials Chair: Brian Gallimore
Concrete Chair: Jeff Hearne
Outside ROW: Peter Kandaris |
| 21. <u>General Discussion</u>
Reminder of change of date of July meeting to July 10, 2013. | 21. Information and discussion. |
| 22. <u>Request for Future Agenda Items</u> | 22. Information and discussion. |

Adjournment

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

May 1, 2013

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

AGENCY MEMBERS

Jim Badowich, Avondale
Craig Sharp, Buckeye (proxy)
Warren White, Chandler
Antonio Hernandez, El Mirage
Tom Condit, Gilbert
Mark Ivanich, Glendale
Troy Tobiasson, Goodyear
Bob Herz, MCDOT
Bob Draper, Mesa

Dan Nissen, Peoria (proxy)
Syd Anderson, Phoenix (St. Trans.)
* Jami Erickson, Phoenix (Water)
Rodney Ramos, Scottsdale
* Jason Mahkovtz, Surprise
Tom Wilhite, Tempe, Chair
Harvey Estrada, Valley Metro
* Gregory Arrington, Youngtown

ADVISORY MEMBERS

Jeff Benedict, ARPA
Tony Braun, NUCA
Bill Davis, NUCA (proxy)
Brian Gallimore, AGC
* Adrian Green, AGC

Jeff Hearne, ARPA
Peter Kandarlis, Independent (Audio)
Paul R. Nebeker, Independent
* Jacob Rodriguez, SRP

MAG ADMINISTRATIVE STAFF

Gordon Tyus

* Members not attending or represented by proxy.

GUESTS/VISITORS

Dan Currence, ADS
John Kanzlemer, Contech
Mike Hook (ACPA)
Arvid Veidmark (Specialized Services Co.)

1. Call to Order

Chairman Thomas Wilhite called the meeting to order at 1:30 p.m. The chair then introduced a future new member from Peoria, Mr. Dan Nissan. Mr. Nissan introduced himself and said he would be replacing Mr. Setovich as Peoria's representative.

2. Call to the Audience

Chairman Wilhite opened the call to the audience. No members of the audience requested to speak.

3. Approval of Minutes

The members reviewed the April 3, 2013 meeting minutes. While they were being reviewed Mr. Wilhite passed around a copy of the Southern California Greenbook. Bob Herz introduced a motion to accept the minutes as written. Rod Ramos seconded the motion. A voice vote of all ayes and no nays was recorded.

Review of 2012 Carry Forward Cases

4. Case 12-12: Steel Reinforced Polyethylene Pipe

Add new Section 739 for Steel Reinforced Polyethylene (SRPE) Pipe. Sponsor Rod Ramos reviewed the revised version of Section 739 based on last month's comments. The case had a memo prepared by Mr. Kanzlemer that outlined the changes. Most of the suggestions were incorporated in the revised draft. The case maintained wording that exceeds ASTM minimum requirements in four areas: Galvanized pipe, 80,000 psi vs. 20,305 psi for steel tensile strength, 335464C for cell classification and steel reinforced bell and spigot joints. Mr. Ramos said he discussed these items with the manufacturer and would like to see them retained in the spec so that agencies are not delivered substandard materials which they have not tested in the field.

Rod Ramos then went through the document highlighting other changes including:

- Adding ASTM F2562 reference in Table 1.
- Gaskets and water stops were updated to reference ASTM.
- The lower ASTM required pressure of 10.8 psi was retained.
- Terminology for electrofusion was changed to thermal weld.
- Added certification standards to match the other comments addressed.

Bob Herz asked why galvanizing was required when it was secondary protection, since if the plastic was cut through it would likely scratch the galvanized area as well. Mr. Ramos said it was incidental protection. Mr. Herz thought that if it was specified, the amount or thickness of galvanization should be included. Mr. Kanzlemer said he could get that information.

Paul Nebeker noticed that in Section 739.7 the reference to rubber gaskets should be changed to "elastomeric" to be consistent. Mr. Herz said language should be added to insure the

material is protected during installation, by adding “installed” to the listing in the first sentence of Section 739.7. Bob Draper had a question about the reference to 1.5 times the pressure rating for the pipe. He thought this could confuse people into using it for other than low pressure rated applications. Mr. Ramos agreed that the line could be deleted, which would then require the design engineer to determine if the pipe can be used for other applications.

Peter Kandarlis asked if the non-shrink grout specified in 739.3.3 needed a grout strength specification. Paul Nebeker said that most grout sold now does have a rating on the packaging. He also noted that concrete to plastic collars usually were not a problem. Mr. Ramos said he would modify the case based on comments and proposed to vote on it next month.

New 2012 Cases

5. Case 13-01 A-G: Miscellaneous Corrections

No new corrections were added and there was no further discussion on this case.

6. Case 13-02: Revision to Section 337 CRACK SEALING

Obtain compatibility with Maricopa County requirements. Bob Herz asked for any additional comments. Seeing none, he moved to accept the case as presented. Troy Tobiasson seconded the motion. A roll call vote was taken. The motion passed with 14 yes, 0 no, 0 abstain and 2 not present. Case 13-02 was approved.

7. Case 13-03: Revision to Section 321.8.6 ASPHALT CONCRETE OVERLAY

Obtain compatibility with Maricopa County requirements. Bob Herz asked for any additional comments. Seeing none, he moved to accept the case as presented. Rod Ramos seconded the motion. A roll call vote was taken. The motion passed with 14 yes, 0 no, 0 abstain and 2 not present. Case 13-03 was approved.

8. Case 13-04: Revision to Detail 120 SURVEY MARKER

Revise detail to prevent installation of survey markers that do not comply with requirements of state law. Bob Herz said the Type ‘B’ detail was updated to show both asphalt and ground installation methods in the section view. Seeing no further comments, Mr. Herz moved to accept the case as presented. Bob Draper seconded the motion. A roll call vote was taken. The motion passed with 14 yes, 0 no, 0 abstain and 2 not present. Case 13-04 was approved.

9. Case 13-05: New Section 740 Polypropylene Pipe and Fittings for Gravity Storm Drain and Sanitary Sewer

Propose new material section for Polypropylene Pipe material. Sponsor Warren White described the updated version of the case that was provided in the meeting addendum. He reminded the committee that the section was based on the existing Section 738 HDPE pipe and the updated Section 740 incorporated many of the same changes as described for Section 739

in Case 12-12. He thanked representatives from ADS and the water/sewer working group for assistance. Mr. White described the updated areas summarized in the bulleted list on the cover sheet for the case. These included:

- Incorporated references to installation specs in 603, 615, and 618.
- Updated specs for gaskets and water stops to reflect ASTM standards.
- Updated certification subsection to reflect ASTM requirements.
- Removed section on Dimensions and Tolerances.
- Corrected errors in the Markings subsection.
- Made other deletions and corrections as per comments.

Mr. White noted that (PP) is the industry standard abbreviation for Polypropylene Pipe. Bob Herz said the second paragraph in the general section could be deleted because it is a given. Tom Wilhite suggested using commas in the first paragraph to reduce the confusing number of parenthesis. Bob Draper noted that the reference to rubber gasket in 740.7 should be changed to elastomeric to be consistent. Bob Draper suggested adding “installed” to the listing in the first sentence of Section 740.7.

Jim Badowich had a comment on a job in Avondale where they are using solid wall HDPE with mechanical adapters and fusion welding. He suggested there may be a need for an additional specification for this method since none currently exists in MAG.

Bill Davis said that reference to thermal welding was removed from 740 since it is not part of the pipe material. Jim Badowich noticed that a reference to thermal welding was still shown on the top of page 2.

Mr. White said he would make the additional revisions and would like to vote on the case at the next meeting.

10. Case 13-06: Change Title of Part 600 to Include Storm Drain and Irrigation

Update Title of Part 600. Case sponsor Jami Erickson was not in attendance, however, Syd Anderson of Phoenix delivered the message that she would still like to vote on the case this month. The final title would read: WATER, SEWER, STORM DRAIN AND IRRIGATION. With no additional comment, Syd Anderson moved to accept the case as presented. Bob Herz seconded the motion. A roll call vote was taken. The motion passed with 13 yes, 0 no, 0 abstain and 3 not present. Case 13-06 was approved.

11. Case 13-07: Revisions to Detail 201 ASPHALT PAVEMENT EDGE DETAILS

Correct miscellaneous errors and change the Type B thickened edge depth dimension from “8 inch minimum” to “8 inches”. Bob Herz said this detail was updated to make the thickened edge 8” exactly, instead of 8” minimum to avoid additional payment for asphalt that is not necessary. Brian Galimore said that an 8” thickness would require two lifts, and it would make it difficult to construct and compact a small 4” thick trench. He said he would like to talk to contractors to see about the best method of constructing the edge without using a thicker dimension of asphalt. Mark Ivanich asked how you could test it anyway. Mr. Herz said they do

not test anything within 12” of the edge, but he does want the contractor to make a compactive effort on the edge. He asked members to send him their comments because he would like to vote on the case at the next meeting.

12. Case 13-08: Revision to Section 321.8.8 Thickened Edge

Eliminate references to ‘base course’ to clarify the surface being referenced. Mr. Herz explained that this case covered the written specifications on the thickened edge revisions of the detail in Case 13-07. There are a couple deletions he would like to make and asked members to review the case and get back to him if they have any issues.

13. Case 13-09: Revision to Section 321 Asphalt Penalty Tables

Raise penalties in tables based on City of Mesa supplement. Bob Draper said he was unable to attend the last asphalt working group meeting where the case was discussed; however, he did announce that they planned a few supplemental meetings on the issue before the next working group meeting. The case would continue to be addressed at the working group level and the results of the discussions will be presented at a future meeting.

14. Case 13-10: Revision to Section 301.7 (Subgrade Preparation) MEASUREMENT

Add subgrade preparation measurement for graded non-surfaced driveways. Bob Herz asked for comments. Brian Gallimore asked about subgrade prep tests. Tom Wilhite questioned what was meant by traveled area, and there was suggestions to call it unsurfaced driveway areas or unpaved roads. Mr. Wilhite suggested the area for subgrade preparation can be identified on the plans.

15. Case 13-11: Delete Section 737 ASBESTOS-CEMENT PIPE AND FITTINGS FOR STORM DRAIN AND SANITARY SEWER

Delete Section 737 and references to it. Bob Herz introduced a new case that was included in the agenda packet to prevent the use of asbestos-cement pipe and fittings for storm drain and sanitary sewer installations. In addition to deleting Section 737, the reference to it in Section 604 would also need to be removed.

Peter Kandarlis said this was reviewed previously and was not deleted because of the need to repair existing water lines. Mr. Herz noted that this case focused on just storm drain and sewer, and that removing its use in water lines would be a separate case. He suggested MAG may want to develop a spec for ACP removal. Jim Badowich said the water/sewer working group did discuss deleting it entirely except for repairs. Harvey Estrada volunteered to work on a specification for removal of asbestos-concrete pipe since Valley Metro has had experience removing this material. Antonio Hernandez said they often just abandon it in place. Bob Herz said if it is abandoned you may have problems if you dig through it. Mr. Hernandez said they do keep a record on the as-builts to locate the abandoned pipe.

Since the case is a pretty straight-forward deletion of a material no longer used, Mr. Herz proposed to vote on the case at the next meeting.

16. Case 13-12: Revisions to Section 340: Concrete Curb, Gutter, Sidewalk, Sidewalk Ramps, Driveway and Alley Entrance

Incorporate agency supplements and update Section 340 to current practice. Peter Kandarlis introduced a new case from the concrete working group. Major changes include: a new subgrade preparation subsection, addition of curing requirements, a new deficiencies subsection, and expansion of measurement and payment sections to provide more clarity and payment options for removal/replacement. The section was also reorganized to flow in a manner that more closely follows the construction process. Mr. Kandarlis explained the document mark-up to identify new, changed and deleted sections, and said a color version was available online. He hoped that these proposed changes would also help reduce agency supplements.

Tom Wilhite asked about using the specs in development projects and issues such as ADA cross slope requirements tying in to existing sidewalks. Mr. Kandarlis said ADA requirements can be updated and repair of ramps is also an issue. Harvey Estrada said Valley Metro had requests to make driveways accessible when doing light rail projects. Rod Ramos considered this more of a design issue, and falls back on the agency/owner to meet ADA standards.

Jim Badowich asked if the radius of joints was included. Members believed this information is provided on the sidewalk details.

17. Case 13-13: Revisions to Section 415 Flexible Metal Guardrail

The purpose was to allow use of either 8"x8" or 6"x8" wood posts for continuous guardrails, and delete reference to manufacturer's recommendations. Bob Herz introduced a new case to make minor revisions the guardrail post specifications in Section 415 and make them consistent along the length of the guardrail. Rod Ramos asked about the post orientation and Mr. Herz said it is shown on the detail drawings.

18. Case 13-14: Revisions to Section 711 Paving Asphalt

Revise Section 711 to update AASHTO references and add a new polymer modified section. Jeff Benedict introduced a new case coming out of the asphalt working group. He said the AASHTO test references in Table 711-1 were updated since the current references are to provisional AASHTO specs that no longer exist. He said these tests were reviewed by manufacturers. Mr. Benedict also explained a new table 711-2 that provided specifications for two polymer modified materials.

Bob Draper asked why AASHTO was used rather than ASTM. Bob Herz commented that since this is a type of highway material it makes sense to use the highway specifications.

Mr. Benedict asked members to review the case and provide him feedback.

19. Case 13-15: Revisions to MAG Sections 603, 615 and 618 for Flexible Pipe.

Update pipe installation requirements to allow for flexible pipe types. Warren White introduced a new case out of the water/sewer working group that made revisions to Sections 603, 615 and 618 to allow the proper installation of new flexible pipe materials such as those discussed in cases 12-12 and 13-05. Section 603 originally focused on HDPE pipe. This was revised to allow for a series of different types of flexible pipe. The trench width tables were updated to meet ASTM requirements. Mr. White summarized the changes included in the cover letter and the table showing the interrelated changes needed throughout the water/sewer specifications. He thanked representatives from ADS and Contech for their assistance and presented the case to allow agencies to review the proposal and provide feedback.

Mr. White said a separate but related issue of updating Detail 200 also needed to be addressed to make the terminology consistent with the revisions and industry standards.

Jim Badowich quickly summarized the process the water/sewer working group used to develop the case, and also introduced the issue of testing – including the use of laser testing. He asked members for feedback on testing issues and said the case would be continued to be discussed in the working group meetings. Mr. Wilhite thanked Mr. White and all those who helped develop the case.

20. Case 13-16: Revision to Section 602; Trenchless Installation of Steel Casing

Retitle and revise Section 602 to match current industry standards. Jim Badowich introduced a new case to thoroughly revise Section 602 based on feedback during the water/sewer working group meetings. Arvid Veidmark, a contractor specializing in this area, provided assistance revising the specification to meet industry practice. It removed obsolete processes, including the required use of grout. Instead, the casing could use spacers and could be filled with pea gravel and sealed with bulkheads. This would allow the pipe to be removed in the future if required.

Bob Draper asked about other trenchless methods. Mr. Veidmark said the spec focused on dry, rather than wet boring methods. Peter Kandaris said this section did not focus on directional boring either, although that is a specification that may need to be added to MAG in the future.

There was discussion of allowing different types of pipe/utilities rather than just water and sewer. There was a consensus to change the title to Trenchless Installation of Steel Casing, since the utilities going in the cases do not affect the casing installation. There was some discussion about using different materials for casing, although they tend to be exceptions in today's practice.

21. Case 13-17: Revision to Section 430.4 DECOMPOSED GRANITE AREA

Eliminate placement of polyethylene below decomposed granite. Bob Herz introduced a new case to delete reference to requiring polyethylene plastic in Section 430.4. He asked members to review it this month and send him comments.

22. Potential Cases for 2013

Other than the cases submitted during the meeting, no additional potential cases were discussed.

23. Working Group Reports

Chairman Wilhite asked for reports from the working groups.

a. **Water/Sewer Issues Working Group**

Jim Badowich said the group met April 23rd at 1:30 p.m. in the MAG office. He summarized the issues shown in the meeting notes. The group will continue to review active cases, as well as work on manhole details and water flushing and testing. The next meeting is scheduled for May 21st at 1:30 p.m. in the MAG office.

b. **Asphalt Working Group**

Jeff Benedict said the group met April 25th at noon at the ARPA offices. (Notes included in addendum.) Mr. Benedict said in addition to reviewing active cases they are planning to introduce a new case on utilities adjustment. The next meeting is scheduled for May 23rd at 12:00 p.m. at the ARPA office.

c. **Materials Working Group**

Brian Gallimore said the group extensively discussed Section 309 for Lime Stabilization, with a case expected in the future. He said he is also working on updating Section 345 dealing with adjustments, as well as revising the adjustments detail. He asked Jim Badowich about the brick manhole on the current detail. Mr. Badowich confirmed that the entire detail could be deleted, and that bricks would only be used for adjustments. The next meeting would follow the asphalt group as usual.

d. **Concrete Working Groups**

Jeff Hearne said the meeting notes were included in the addendum. He said the group is planning to continue work revising the Portland Cement Concrete Paving (PCCP) section including determining the correct compressive strength requirements. He said he reviewed several studies comparing the compressive and flexible strengths, and wanted to simplify the process to allow compressive strength as the default. He said they also want to review Section 729 on Joint Materials and since the current spec references ASTM requirements that no longer exist. The next meeting of the working group is scheduled for May 21st at ARPA following the materials working group at 1:30 p.m.

e. **Outside Right-of-Way Working Group**

Peter Kandarlis said the group met just before the committee meeting, so notes would be forthcoming. He summarized the process of reviewing the specifications and said he had a few volunteers lined up to help. Mr. Kandarlis said he would be reviewing the 200s section, while Jacob Rodriguez and Jeff Benedict would assist with the 300s section. Brian Gallimore said he would help find experts to review the landscaping sections, and that Jeff Hearne knew people who could review masonry standards. Mr. Kandarlis said he still needs assistance from someone in the water/sewer area. The next meeting will be on June 5th at 12:30 p.m. prior to the regular committee meeting.

24. General Discussion

Chairman Wilhite asked for general discussion items. Jim Badowich said there were a few copies of various details relating to the new case on trenchless installation for those interested.

Gordon Tyus asked members about their experience updating their agency's ASTM access.

25. Future Agenda Items

Chairman Wilhite asked for general discussion items. None were voiced by the committee.

26. Adjournment:

The chair adjourned the meeting at 3:44 p.m.

2013 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

(Updated information can be found on the website: <http://www.azmag.gov/Committees/Committee.asp?CMSID=1055>)

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE	
	CARRY FORWARD CASES FROM 2012						
12-12	Case 12-12: New Section 739 – Steel Reinforced Polyethylene Pipe (SRPE).	Scottsdale	Rod Ramos	07/11/2012 05/28/2013	Scheduled for: 06/05/2013	0 0 0	Yes No Abstain
	NEW CASES FOR 2013						
13-01	<p>Case 13-01: Miscellaneous Corrections:</p> <p>A. Revise title of Section 324</p> <p>B. Section 505.6.3.3 (4) Typing error correction</p> <p>C. Section 735.4 (D) Delete obsolete reference to AASHTO M-315</p> <p>D. Correction to Detail 501-5</p> <p>E. Correct typo in Section 311 Title</p> <p>F. Remove reference to Section 702.4 in Subsection 795.8.4 Decomposed Granite</p> <p>G. Revise Section 107.4 to change the Arizona Revised Statue reference 41-846 to 41-865.</p> <p>H. Remove the word “AND” in the title of Section 725 so it reads “PORTLAND CEMENT CONCRETE”</p> <p>I. Section 108.8 Correction: Change “or” to “and” in first line.</p> <p>J. Add missing superscript in 301.3 and correct typo in 321.14.3.</p> <p>K. Remove out-of-date ASTM references in Section 729.</p>	MCDOT	Bob Herz Peter Kandaris Jeff Hearne	01/02/2012 06/05/2013		0 0 0	Yes No Abstain
13-02	Case 13-02: Revision to Section 337 CRACK SEALING to obtain compatibility with Maricopa County requirements.	MCDOT	Bob Herz	01/02/2012 04/04/2013	Approved 05/01/2013	14 0 0	Yes No Abstain
13-03	Case 13-03: Revision to Section 321.8.6 Asphalt Concrete Overlay to obtain uniformity with Maricopa County requirements.	MCDOT	Bob Herz	02/06/2013 04/04/2013	Approved 05/01/2013	14 0 0	Yes No Abstain
13-04	Case 13-04: Revision to Detail 120 SURVEY MARKER.	MCDOT	Bob Herz	02/06/2013 04/08/2013	Approved 05/01/2013	14 0 0	Yes No Abstain

2013 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

(Updated information can be found on the website: <http://www.azmag.gov/Committees/Committee.asp?CMSID=1055>)

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE	
13-05	Case 13-05: New Section 740 Polypropylene Pipe and Fittings for Gravity Storm Drain and Sanitary Sewer.	Chandler	Warren White	02/06/2013 05/22/2013	Scheduled for: 06/05/2013	0 0 0	Yes No Abstain
13-06	Case 13-06: Modify Part 600 title to include Storm Drain and Irrigation.	Phoenix	Jami Erickson	03/06/2013 04/04/2013	Approved 05/01/2013	13 0 0	Yes No Abstain
13-07	Case 13-07: Revisions to Detail 201 ASPHALT PAVEMENT EDGE DETAILS. Correct miscellaneous errors and change the Type B thickened edge depth dimension from "8 inch minimum" to "8 inches."	MCDOT	Bob Herz	04/03/2013	Scheduled for: 06/05/2013	0 0 0	Yes No Abstain
13-08	Case 13-08: Revision to Section 321.8.8 Thickened Edge. Eliminate references to 'base course' to clarify the surface being referenced.	MCDOT	Bob Herz	04/03/2013 05/06/2013		0 0 0	Yes No Abstain
13-09	Case 13-09: Revision to Section 321 Asphalt Penalty Tables based on City of Mesa Supplements.	Mesa/ Asphalt WG	Bob Draper	04/03/2013 05/28/2013		0 0 0	Yes No Abstain
13-10	Case 13-10: Revision to Section 301.7 (Subgrade Preparation) MEASUREMENT.	MCDOT	Bob Herz	04/03/2013 05/06/2013		0 0 0	Yes No Abstain
13-11	Case 13-11: Delete Section 737 ASBESTOS-CEMENT PIPE AND FITTINGS FOR STORM DRAIN AND SANITARY SEWER.	MCDOT	Bob Herz	05/01/2013	Scheduled for: 06/05/2013	0 0 0	Yes No Abstain
13-12	Case 13-12: Revisions to Section 340: Concrete Curb, Gutter, Sidewalk, Sidewalk Ramps, Driveway and Alley Entrance.	Concrete WG	Peter Kandaris	05/01/2013		0 0 0	Yes No Abstain
13-13	Case 13-13: Revisions to Section 415 Flexible Metal Guardrail.	MCDOT	Bob Herz	05/01/2013		0 0 0	Yes No Abstain
13-14	Case 13-14: Revisions to Section 711 Paving Asphalt to update tests and add new polymer modified section.	Asphalt WG	Jeff Benedict	05/01/2013 05/23/2013		0 0 0	Yes No Abstain

2013 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

(Updated information can be found on the website: <http://www.azmag.gov/Committees/Committee.asp?CMSID=1055>)

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE
13-15	Case 13-15: Revisions to MAG Sections 603, 615 and 618 for flexible pipe.	Chandler/ Water-Sewer WG	Warren White	05/01/2013		0 0 0 Yes No Abstain
13-16	Case 13-16: Revision to Section 602; Encasement of Water or Sewer Pipe by Jacking or Tunneling Operation.	Avondale/ Water-Sewer WG	Jim Badowich	05/01/2013 05/22/2013		0 0 0 Yes No Abstain
13-17	Case 13-17: Revision to Section 430.4 DECOMPOSED GRANITE AREA. Eliminate placement of polyethylene below decomposed granite.	MCDOT	Bob Herz	05/01/2013		0 0 0 Yes No Abstain
13-18	Case 13-18: Revisions to Detail 250-1 Driveway Entrances with Detached Sidewalk.	MCDOT	Bob Herz	06/05/2013		0 0 0 Yes No Abstain
13-19						0 0 0 Yes No Abstain
13-20						0 0 0 Yes No Abstain
13-21						0 0 0 Yes No Abstain

STEEL REINFORCED POLYETHYLENE PIPE & FITTINGS FOR STORM DRAIN, IRRIGATION & SANITARY SEWER & IRRIGATION

739.1 GENERAL:

This specification covers the requirements of Steel Reinforced Polyethylene Pipe (SRPE) pipe manufactured per ASTM F2562 for storm drains, irrigation and sanitary sewer systems. When noted on the plans or in the special provisions, storm drains, irrigation and sanitary sewers may be constructed using SRPE pipe. ~~The SRPE pipe approved will be of the sizes are~~ 24 inch diameter through 120 inch diameter. Trench excavation, backfilling and compaction for ~~this~~ flexible pipe shall be in accordance with Section 603. Construction and installation shall be in accordance with Section 618 for storm drain and irrigation water ~~or and~~ Section 615 for sanitary sewers.

~~The size of the SRPE pipe to be furnished shall be specified by the Engineer and shown on the plans or in the project specifications.~~ The pipe stiffness class shall be Class 1, per Table 1 of ASTM F2562, unless otherwise specified.

739.2 MATERIALS:

739.2.1 Base Steel Materials: Continuous high strength galvanized ribs shall be cold rolled steel meeting the requirements of either ASTM A1008 or ASTM A1011 with minimum yield strength of 80,000 psi. ~~The steel shall have a galvanized coating meeting the requirements of ASTM A653 with a G60 minimum coating weight.~~ Steel ribs shall be completely encased within the HDPE profile.

739.2.2 HDPE Material Composition: SRPE pipe HDPE material and fittings shall, in accordance with ASTM F2562, be made from HDPE plastic compound meeting the minimum requirements of cell classification 335464C or higher cell classification, in accordance with ASTM D3350.

739.2.3 Gaskets: Elastomeric gaskets shall comply with the requirements in ASTM F477 and be as recommended by the pipe manufacturer.

739.2.4 Water Stops: Elastomeric Water stop gaskets shall conform to the requirements of ASTM C923.

739.2.5 Thermal Welding Material: The material used for thermally welding of the pipe ~~material~~ shall be compatible with the ~~pipe's~~ base material.

739.2.6 Lubricant: The lubricant used for assembly shall comply with manufacturer's recommendations and have no detrimental effect on the gasket or pipe.

739.3 JOINING SYSTEMS:

739.3.1 Gasket Type: Steel reinforced bell and spigot joints for the piping system and fittings shall consist of an integrally formed bell and spigot gasketed joint. The joint shall be designed so that when assembled, the elastomeric gasket located on the spigot is compressed radially on the pipe or fitting bell to form a water tight seal. The joint shall be designed so to prevent displacement of the gasket from the joint during assembly and when in service. The elastomeric gasket shall meet the provision of ASTM F477. Gasketed watertight pipe joints shall meet a minimum laboratory test pressure of 10.8 psi when tested in accordance with ASTM D3212.

All pipes shall have a home mark on the spigot end to indicate proper penetration when the joint is made.

The bell and spigot configurations for ~~the~~ fittings shall be compatible to those used for the pipe.

Joints shall provide a seal against exfiltration and infiltration. All surfaces of the joint upon which the gasket may bear, shall be smooth and free of any imperfections, which would adversely affect ~~the seal ability~~. The assembly of the gasketed joints shall be in accordance with the pipe manufacturer's recommendations.

739.3.2 Thermal Weld Type: Thermal weld joints, when specified, shall utilize plain ended pipe welded together by internal pressure testable couplers. The internal couplers shall have a minimum wall thickness equal to or greater

than the pipe wall thickness as defined in ~~pipe specification~~, ASTM F2562. The assembly of the welded joints shall be in accordance with the manufacturer's recommendations. Thermal welded pipe joints shall meet a minimum laboratory test pressure of 10.8 psi ~~or 1.5 times the allowable pressure rating for the pipe, whichever is greater~~, when tested in accordance with ASTM D3212.

739.3.3 Pipe To Concrete Structure Connections: An approved flexible connector, mechanical seal or water stop shall be provided at manhole entry or concrete structure connection to reduce infiltration and exfiltration. When grouting is necessary at a water stop connection, non-shrink grout shall be used.

739.4 FITTINGS:

Fittings for SRPE pipe may include tees, elbows, manhole adapter rings, plugs, caps, adapters and increasers. Fittings shall be joined by gasket type or thermal weld type joints in accordance with Subsection [739.3](#).

739.5 CERTIFICATION:

The manufacturer shall furnish a certification that all ~~delivered~~ materials ~~delivered shall~~ comply with the ~~minimum~~ requirements of ASTM F2562. The certification shall also identify the steel as galvanized ~~with a G60 minimum coating weight~~, ~~with~~ 80,000 psi yield strength and the cell classification of the HDPE material as 335464C minimum.

739.6 MARKINGS:

Markings on pipe and fittings shall be per ASTM F2562. The markings shall be clearly shown on the pipe, at least, at the end of each length of pipe and spaced at intervals of not more than 10 feet. Markings shall include the following information: ASTM F2562, the nominal pipe size in inches, the pipe stiffness class, the manufacturer's name, trade name or trademark, the manufacturer's production code: identifying plant location, machine, and date of manufacture.

739.7 CARE OF PIPE AND MATERIALS:

All pipe, ~~fittings, gaskets and water stop~~ materials shall be manufactured, handled, loaded, shipped, ~~and~~ unloaded, ~~and installed~~ in such a manner as to be undamaged and in sound condition, in the completed work. Particular effort shall be exercised to protect the ends of the pipe. Repairs on damaged pipe shall be made to the satisfaction of the Engineer ~~otherwise they shall not be used in the work and shall be replaced with an equal pipe or special in an acceptance condition~~ or removed from the project site. ~~At all times, rubber~~ Elastomeric gaskets shall be covered in a factory applied protective wrap ~~or stored in a cool, dark place until ready for use~~.

- End of Section -

SECTION 301

SUBGRADE PREPARATION

301.1 DESCRIPTION:

This Section shall govern the preparation of natural or excavated areas prior to the placement of sub-base material, pavement, curbs and gutters, driveways, sidewalks or other structures. It shall include stripping and disposal of all unsuitable material including existing pavement and obstructions such as stumps, roots, rocks, etc., from the area to be paved.

301.2 PREPARATION OF SUBGRADE:

With the exception of areas where compacted fills have been constructed as specified in Section 211, in the areas where new construction is required, the moisture content shall be brought to that required for compaction by the addition of water, by the addition and blending of dry, suitable material or by the drying of existing material. The material shall then be compacted to the specified relative density. If pumping subgrade should become evident at any time prior to paving, the Engineer may require proof rolling with a pneumatic-tire roller or other approved equipment in order to identify the limits of the unacceptable area. The proof rolling will be performed at no additional cost to the Contracting Agency.

Subgrade preparation shall also include preparing the subgrade to the required line and grade for paved or unpaved shoulders, tapers, turnouts, and driveways, and at all other project locations where aggregate base and/or select material courses are used in accordance with the Project Plans.

301.2.1 The Contractor may use removed existing asphalt concrete and other existing bituminous roadway surfacing materials originating on the project site, as embankment fill. All materials used shall be thoroughly crushed to sizes not exceeding four inches, or as approved by the Engineer. These asphalt/bituminous materials shall be placed not less than two feet below finished subgrade elevation.

Project earthwork quantities when included as separate contract pay items will include removed asphalt/bituminous material volumes, unless otherwise specified in the Special Provisions.

All unsuitable material and all excess material shall be disposed of in accordance with the requirements of Sections 205.2 and 205.6, respectively. When additional material is required for fill, it shall conform to Section 210.

301.3 RELATIVE COMPACTION:

The subgrade shall be scarified and loosened to a depth of 6 inches. Rock 6-inches or greater in size that becomes exposed due to scarification shall be removed from the scarified subgrade. When fill material is required, a layer of approximately 3 inches may be spread and compacted with the subgrade material to provide a better bond. The subgrade cut and fill areas shall be constructed to achieve a uniform soil structure having the following minimum compaction, measured as a percentage of maximum dry density when tested in accordance with AASHTO T-99, Method A, and T191 or ASTM D6938 with the percent of density adjusted in accordance with the rock correction procedures for maximum density determination, ARIZ-227c to compensate for the rock content larger than that which will pass a No. 4 sieve. Unless otherwise noted in the project plans or project specifications, compaction shall be performed within 2 percentage points of the optimum moisture content.

- (A) Below pavement, curb & gutter, attached sidewalk, roadway shoulders, and other areas within right-of-way subject to vehicular traffic 95 percent
- (B) Below detached sidewalk not subject to vehicular traffic 85 percent

301.4 SUBGRADE TOLERANCES:

Subgrade upon which pavement, sidewalk, curb and gutter, driveways, or other structures are to be directly placed shall not vary more than 1/4 inch from the specified grade and cross-section. Subgrade upon which sub-base or base material is to be placed shall not vary more than 3/4 inch from the specified grade and cross-section. Variations within the above specified tolerances shall be compensating so that the average grade and cross-section specified are met.

ADD MISSING REFERENCE TO ARIZ-227c

(1) Arizona Department of Transportation test method.

SECTION 321

321.14.2 Core Drilling Device: The core drilling device will be powered by an electrical motor, or by an acceptable gasoline engine. Either device used shall be capable of applying enough effective rotational velocity to secure a drilled specimen. The specimen shall be cored perpendicularly to the surface of pavement, and that the sides of the core are cut in a manner to minimize sample distortion or damage. The machinery utilized for the procedure shall be on a mounted base, have a geared column and carriage that will permit the application of variable pressure to the core head and carriage throughout the entire drilling operation. The carriage and column apparatus shall be securely attached to the base of the apparatus; and the base will be secured with a mechanical fastener or held in place by the body weight of the operator. The core drilling apparatus shall be equipped with a water spindle to allow water to be introduced inside of the drill stem while operating. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with embedded diamond chips in the cutting surface. The core barrel shall be of sufficient diameter to secure a specimen that is a minimum of four or six inches or whichever is prescribed for necessary testing. The core barrel shall not be missing more than one of the teeth used for cutting; if so it shall be discarded and another barrel shall be used. The core barrel shall also be a minimum of two inches longer than the anticipated depth of pavement in accordance with project paving plans.

321.14.3 Accessory Equipment: A sufficient supply of ice and dry ice shall be provided to sufficiently cool the pavement prior to securing the samples from the designated areas in the pavement. The ice should also be used to adjust the temperature of the water used to cool the core bit. A water supply (usually a plastic 35 – 55 gal drum) with sufficient hose to introduce the water into and through the spindle of the coring device by gravity feed. The drum should be white or light in color to minimize excessive thermal heating of the water (*for coring of asphalt rubber cores see Note 1*). At no time shall the water utilized in the coring operation exceed 65° F during the coring operation. Ice shall be utilized to ensure the temperature control of the water being introduced during the cutting operation. An ice chest or other suitably insulated container that can maintain a temperature of less than 70° F shall be used to secure the specimens during transport. The container will be equipped with flat shelving that will support the drilled cores throughout the entire specimen dimension during transport back to the testing facility.

Miscellaneous hand tools to remove the drilled specimen from the drill hole or the core barrel taking great care in not disturbing the specimen more than necessary (refer to fig. 1 in ASTM D5361-05).

321.14.4 Process: The pavement surface at the time of coring shall not exceed a temperature of 90° F; the pavement shall be conditioned with ice or dry ice to ensure that this requirement is met. Immediately after it has been ensured that the pavement has dropped to the required temperature, core drilling shall begin. The operator will then apply an even and continuous pressure (Note 2) to penetrate through the full depth of the pavement. The operator will concurrently ensure that enough water is moving over the core surface as to adequately remove any and all cuttings that could damage the drilled core. After the pavement thickness has been penetrated the core shall be carefully removed from either the drill hole or the core barrel and be immediately transferred to an ice chest or other suitable container. Each individual core shall be placed on a shelf in the cooler with the exposed side of the specimen facing down, or the “top side” down. If the specimen is a two lift core, the only acceptable means of separating lifts is with a power or other acceptable wet saw type of equipment (conforming to ASTM D5361-05); however, at no time shall cores be split using a mallet and screwdriver or metal straight edge when being tested for bulk density. Perpendicularity of the specimen shall be checked in the field after the specimen has been extracted from the surface. The core operator shall hold the core up to eye level and place the core top side down in a “speed square” or small carpenters square. The specimen placed in the square shall not depart from perpendicular to the axis more than 0.5° (approximately equivalent to 1/16 of an inch in 6 inches). If the specimen is outside of this distance from square it shall be discarded in the field and another sample cored that falls within tolerance. The cores upon arriving at the laboratory for testing shall be carefully cleaned and measured for thickness in accordance with ASTM D3549. A speed square shall be utilized to measure perpendicularity as compared to a 90° degree angle and shall not depart from perpendicular to the axis more than 0.5° (approximately equivalent to 1/16 of an inch in 6 inches). All remaining testing shall be done within the parameters of the current project and / or agency required specification.

- End of Section -

*Note 1 – It should be noted that when the material to be cored is a rubberized asphalt mixture a wetting agent such as liquid dish soap shall be added to the water barrel to hinder the material from sticking or allowing the binder to spread during coring.

*Note 2 – This refers to pressure exerted on the core barrel and machine during the coring process. Too much pressure can cause damage to the core barrel and the motor; and too little pressure can cause a glazing of the diamonds, reducing cutting efficiency and premature wear of the barrel.

EXPANSION JOINT FILLER**729.1 PREMOLDED JOINT FILLER:**

Expansion joint filler materials shall consist of premolded strips of a durable resilient compound and comply with ASTM D1751, D1752, or D2628, as specified by the Contracting Agency.

729.2 POUR TYPE JOINT FILLERS:

Pour type joint fillers shall comply with ASTM D1850, [D1190](#), [D1854](#), or with the following formulation, as specified by the Contracting Agency.

Asphalt latex joint filler shall consist of asphalt latex emulsion and sodium fluosilicate furnished in separate containers and mixed on the site. The emulsion shall consist by volume of 60 parts AR-1000 asphalt conforming to the requirements of Section 711, 40 parts of synthetic latex, GRS-Type 4, and 5 to 10 parts of sodium fluosilicate, half strength. The emulsion and sodium fluosilicate shall not be mixed until the joint is ready to be filled. The amount of sodium fluosilicate to be mixed with the emulsion shall be approximately 3 to 5 percent by weight of the emulsion. The joint to be filled shall be thoroughly cleaned and surface dry.

The sealing compound shall consist of paving asphalt, Grade AR-1000 conforming to the provisions of Section 711, emulsified with rubber latex in the presence of a suitable emulsifying agent. Rubber latex designated as GRS-Type 4, or any other approved type, containing approximately 40 percent solids.

The resulting emulsion shall consist of a minimum of 55 percent of paving asphalt and a minimum of 36 percent of rubber latex and shall conform to the requirements set forth in Table 729-1.

TABLE 729-1			
ASPHALT-LATEX EMULSION JOINT SEALING COMPOUND			
SPECIFICATION DESIGNATION	TEST METHOD	LIMITS	REMARKS
Furol Viscosity at 77°F.	AASHTO T-72	50-250 seconds	Before adding gelling agent.
Sieve Test	AASHTO T-59	1% Max.	Before adding gelling agent.
Penetration at 77°F.	ASTM D217	50-250	The penetration test is made on a specimen prepared by stirring 5% of sodium fluosilicate into the asphalt latex emulsion in a 6 ounce deep ointment can. The specimen is then allowed to stand in the air at a temperature of 77°F. $\pm 2^{\circ}$ for a period of 30 minutes and is then penetrated with a grease cone under a total load of 150 grams.
Elasticity		70% Min.	After addition of 5% of sodium fluosilicate and curing for 24 hours at 100°F. $\pm 2^{\circ}$, the specimen shall have an elastic recover of not less than 70%.
Dehydration		Loss 30% maximum	Twenty-five grams of emulsion, prior to adding the gelling agent, is placed in an 8 ounce flat ointment can and dehydrated in a suitable oven maintained at a temperature of 200°F. $\pm 2^{\circ}$ for a period of 24 hours.
Time of Set		15-60 minutes	After mixing the emulsion with 1% to 4% by weight of powdered sodium fluosilicate the emulsion shall harden or develop a set in from 16 to 60 minutes, under field conditions.

729.3 TEST REPORT AND SHIPMENT CERTIFICATE:

Each shipment shall be accompanied by a certificate in triplicate from the supplier that the material will comply with the above specifications and such certificate shall be delivered to the Engineer. The certificate shall show the shipment number for the entire lot of material contained in the shipment and shall also show a list which will enable the Engineer to identify each individual container by the supplier's batch number, with which each container shall be plainly marked.

729.4 APPLICATION:

At no time shall emulsion types be subjected to a temperature below 40°F. Prior to application, the material may be warmed, if necessary, to permit proper pouring of the joints. The method of heating shall be carefully controlled to avoid overheating of any part of the container or mixture and under no circumstances shall emulsions be heated to a temperature greater than 130°F.

Joints and cracks shall be thoroughly cleaned by hand or mechanical means immediately in advance of pouring the filler material. When new pavement has been cured by the Pigmented Sealing Compound Method, the joints and cracks shall be thoroughly scrubbed by means of a wire brush or a cloth mop saturated with gasoline or by other approved means.

All joints and cracks shall be surface dry before application of the joint sealer. No sealer shall be placed during unsuitable weather or when the atmospheric temperature is below 50°F., or when weather conditions indicate that the temperature may fall to 32°F within 24 hours.

The joints and cracks shall be filled in a neat and workmanlike manner by means of a cornucopia pot or other approved method.

DRAFT

SECTION 740

POLYPROPYLENE PIPE & FITTINGS FOR STORM DRAIN, IRRIGATION & SANITARY SEWER

740.1 GENERAL:

This specification covers the requirements of profile wall (both dual wall - Type S and triple wall - Type D) polypropylene (PP) pipe manufactured per ASTM F2736, ASTM F2764, AASHTO M330 for storm drain and sanitary sewer systems. When noted on the plans or in the special provisions, storm drains, irrigation and sanitary sewers may be constructed using PP pipe. PP pipe approved sizes are 12 inch diameter through 60 inch diameter. Trench excavation, backfilling and compaction for flexible pipe shall be in accordance with Section 603. Construction and installation shall be in accordance with Section 618 for storm drain and irrigation water or Section 615 for sanitary sewers.

740.2 MATERIALS:

740.2.1 Base Material Composition: Profile pipe base material and fittings shall meet polypropylene materials requirements as stated in Section 4, Table 1 of ASTM F2736, Section 5, Table 1 of ASTM F2764 or Section 6, Table 1 AASHTO M330.

740.2.2 Gaskets: Elastomeric gaskets shall comply with the requirements in ASTM F477 and be as recommended by the pipe manufacturer.

740.2.3 Water Stops: Elastomeric Water stop gaskets shall conform to the requirements of ASTM C923.

740.2.4 Lubricant: The lubricant used for assembly shall comply with manufacturer's recommendations and have no detrimental effect on the gasket or pipe.

740.3 JOINING SYSTEMS:

740.3.1 Gasket Type: Joints for the piping system and fittings shall consist of an integrally formed bell and spigot gasketed joint. The joint shall be designed so that when assembled, the elastomeric gasket located on the spigot is compressed radially on the pipe or fitting bell to form a water tight seal. The joint shall be designed so to prevent displacement of the gasket from the joint during assembly and when in service. The elastomeric gasket shall meet the provision of ASTM F477. Gasketed watertight joints shall meet laboratory test pressure of 10.8 psi when tested in accordance with ASTM D3212.

All pipes shall have a home mark on the spigot end to indicate proper penetration when the joint is made.

The bell and spigot configurations for fittings shall be compatible to those used for the pipe.

Joints shall provide a seal against exfiltration and infiltration. All surfaces of the joint upon which the gasket may bear, shall be smooth and free of any imperfections, which would adversely affect the seal. The assembly of the gasketed joints shall be in accordance with the pipe manufacturer's recommendations.

740.3.2 Pipe to Concrete Structure Connections: An approved flexible connection, mechanical seal, or water stop shall be provided at manhole entry or concrete structure connections to reduce infiltration and exfiltration. When grouting is necessary at a water stop connection, non-shrink grout shall be used.

740.4 FITTINGS:

Fittings for PP pipe may include tees, elbows, manhole adapter rings, plugs, caps, adapters and increasers. Fittings shall be joined by gasket type joints in accordance with Subsection 740.3.

The material used for thermally welding the fitting shall be compatible with the base pipe material.

740.5 CERTIFICATION:

The manufacturer shall furnish a certification that all delivered materials comply with the requirements of ASTM F2736, ASTM F2764, or AASHTO M330.

740.6 MARKINGS:

Markings on pipe and fittings shall be per ASTM F2736, ASTM F2764 or AASHTO M330. The markings shall be clearly shown on the pipe, at least, at each end of each length of pipe and spaced at intervals of not more than 10 feet. Markings shall include the following information: the manufacturer's name or trademark, nominal size, the specification designation, plant designation code, date of manufacture or an appropriate code. All fittings shall be marked with the designation number of the specification and with the manufacturer's identification symbol.

740.7 CARE OF PIPE AND MATERIALS:

All pipe, fittings, gaskets, and water stop materials shall be manufactured, handled, loaded, shipped, unloaded, and installed in such manner as to be undamaged and in sound condition, in the completed work. Particular effort shall be exercised to protect the ends of pipe. Repairs on damaged pipe shall be made to the satisfaction of the Engineer or removed from the project site. At all times elastomeric gaskets shall be covered in a factory applied protective wrap until ready for use.

- End of Section -



MARICOPA COUNTY
Department of Transportation

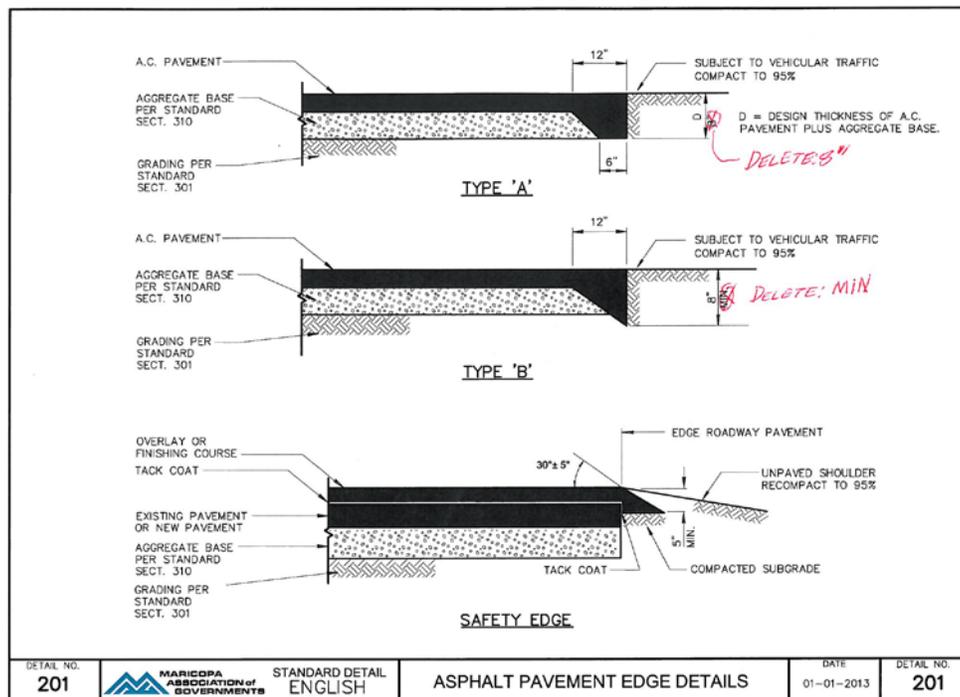
MEMORANDUM

Date: March 18, 2013
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Revisions for Detail 201 ASPHALT PAVEMENT Case 13-07
 EDGE DETAILS

PURPOSE: Correct miscellaneous errors and change the Type B thickened edge depth dimension from "8 inch minimum" to "8 inches".

REVISIONS:

1. Correct title shown in the index to match the detail title. This is a miscellaneous correction.
2. Type A – Delete an erroneous miscellaneous 8" dimension. This is a miscellaneous correction.
3. Type B – Delete 'MIN.' from the 8" depth shown. This is a change from the existing detail.



100 SERIES: GENERAL INFORMATION			200 SERIES: STREET INFORMATION			200 SERIES: STREET INFORMATION (CONTINUED)		
Detail	Revised	Title	Detail	Revised	Title	Detail	Revised	Title
101	2011	GENERAL INFORMATION	240	2010	VALLEY GUTTER	240	2010	VALLEY GUTTER
110-1	2011	PLAN SYMBOLS (SYMBOLS)	250-1	2009	DRIVEWAY ENTRANCES WITH DETACHED SIDEWALK	250-1	2009	DRIVEWAY ENTRANCES WITH DETACHED SIDEWALK
110-2	2011	PLAN SYMBOLS (LINE TYPES)	250-2	2013 *	DRIVEWAY ENTRANCES WITH SIDEWALK ATTACHED TO CURB	250-2	2013 *	DRIVEWAY ENTRANCES WITH SIDEWALK ATTACHED TO CURB
112	1998	DIMENSIONING FOR ROAD IMPROVEMENT PLANS	251	2003	RETURN TYPE DRIVEWAYS	251	2003	RETURN TYPE DRIVEWAYS
120-1	2001	SURVEY MARKER	252	2005	BUS BAYS	252	2005	BUS BAYS
120-2	2007	SURVEY MARKER - FOR UNINCORPORATED AREAS OF THE COUNTY	260	2013 *	ALLEY ENTRANCE (WITH VERTICAL CURB AND GUTTER)	260	2013 *	ALLEY ENTRANCE (WITH VERTICAL CURB AND GUTTER)
122	2011	PAVEMENT MARKER FOR FIRE HYDRANTS	262	2012	WING TYPE ALLEY ENTRANCE (WITH COMBINED CURB AND GUTTER)	262	2012	WING TYPE ALLEY ENTRANCE (WITH COMBINED CURB AND GUTTER)
130	2003	BARRICADES	263	2002	WING TYPE ALLEY ENTRANCE (WITH ROLL TYPE CURB AND GUTTER)	263	2002	WING TYPE ALLEY ENTRANCE (WITH ROLL TYPE CURB AND GUTTER)
131	1998	STREET SIGN BASE	270	2001	FRAME AND COVER (AND GRADE ADJUSTMENTS)	270	2001	FRAME AND COVER (AND GRADE ADJUSTMENTS)
140	2009	BOLLARD	300 SERIES: WATER INFORMATION					
141	2009	HAZARD MARKER	301	1998	BLOCKING FOR WATER GATE AND BUTTERFLY VALVES	301	1998	BLOCKING FOR WATER GATE AND BUTTERFLY VALVES
145	2011	SAFETY RAIL	302-1	1998	JOINT RESTRAINT WITH TIE RODS (DRAWING)	302-1	1998	JOINT RESTRAINT WITH TIE RODS (DRAWING)
150	1998	PRECAST SAFETY CURB	302-2	1998	JOINT RESTRAINT WITH TIE RODS (NOTES)	302-2	1998	JOINT RESTRAINT WITH TIE RODS (NOTES)
160	2013 *	6' CHAIN LINK FENCE AND GATE	303-1	1998	JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES (DRAWING)	303-1	1998	JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES (DRAWING)
200 SERIES: STREET INFORMATION			303-2	1998	JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES (TABLES)	303-2	1998	JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES (TABLES)
Detail	Revised	Title	310	1998	CAST IRON WATER METER BOX COVER NO. 1	310	1998	CAST IRON WATER METER BOX COVER NO. 1
200-1	2010	BACKFILL, PAVEMENT AND SURFACE REPLACEMENT	311	1998	CAST IRON WATER METER BOX COVER NO. 2	311	1998	CAST IRON WATER METER BOX COVER NO. 2
200-2	2010	BACKFILL, PAVEMENT AND SURFACE REPLACEMENT	312	1998	CAST IRON WATER METER BOX COVER NO. 3	312	1998	CAST IRON WATER METER BOX COVER NO. 3
201	2013 *	PAVEMENT SECTION AT TERMINATION	313	1998	CAST IRON WATER METER BOX COVER NO. 4	313	1998	CAST IRON WATER METER BOX COVER NO. 4
202	1998	ALLEY DETAILS (PAVED AND UNPAVED)	314	1998	CAST IRON WATER METER BOX COVER NO. 5	314	1998	CAST IRON WATER METER BOX COVER NO. 5
203	1998	SCUPPERS	320	1998	CONCRETE WATER METER BOXES	320	1998	CONCRETE WATER METER BOXES
204	1998	EQUIPMENT CROSSING	321	1998	STANDARD WATER METER VAULT	321	1998	STANDARD WATER METER VAULT
205	2006	PAVED TURNOUTS	340	2002	INSTALLING TAPPING SLEEVES AND VALVES	340	2002	INSTALLING TAPPING SLEEVES AND VALVES
206-1	2007	CONCRETE SCUPPER	342	1998	CONCRETE PRESSURE PIPE TAPPING SLEEVE	342	1998	CONCRETE PRESSURE PIPE TAPPING SLEEVE
206-2	2007	CONCRETE SCUPPER	345-1	1998	3", 4", 6" WATER METER	345-1	1998	3", 4", 6" WATER METER
206-3	2007	CONCRETE SCUPPER (ISOMETRIC VIEW)	345-2	1998	4", 6" WATER METER WITH ON-SITE HYDRANTS	345-2	1998	4", 6" WATER METER WITH ON-SITE HYDRANTS
210	2012	RESIDENTIAL SPEED HUMP	346	1998	FIRE LINE DETECTOR CHECK VAULT	346	1998	FIRE LINE DETECTOR CHECK VAULT
211	1998	STANDARD TRENCH PLATING DETAIL	360-1	2013 *	DRY BARREL FIRE HYDRANT INSTALLATION	360-1	2013 *	DRY BARREL FIRE HYDRANT INSTALLATION
212	2012	UTILITY POTHOLE REPAIR	360-2	2013 *	WET BARREL FIRE HYDRANT INSTALLATION	360-2	2013 *	WET BARREL FIRE HYDRANT INSTALLATION
220-1	2007	CURB AND GUTTER TYPES A, B, C AND D	360-3	2013 *	FIRE HYDRANT INSTALLATION DETAILS	360-3	2013 *	FIRE HYDRANT INSTALLATION DETAILS
220-2	2007	CURB AND GUTTER TYPES E AND E	362	1999	LOCATIONS FOR NEW FIRE HYDRANTS	362	1999	LOCATIONS FOR NEW FIRE HYDRANTS
221	2011	CURB AND GUTTER TRANSITION TYPE A TO TYPE C, INTEGRAL ROLL CURB, GUTTER AND SIDEWALK	370	1998	VERTICAL REALIGNMENT OF WATER MAINS	370	1998	VERTICAL REALIGNMENT OF WATER MAINS
222	2008	SINGLE CURB - TYPES A, B AND TERMINATION	380	1998	THRUST BLOCKS FOR WATER LINES	380	1998	THRUST BLOCKS FOR WATER LINES
223	1998	MEDIAN NOSE TRANSITION	381	1998	ANCHOR BLOCKS FOR VERTICAL BENDS	381	1998	ANCHOR BLOCKS FOR VERTICAL BENDS
224	1998	JOINT FOR DRAINAGE INLETS AND MANHOLE COVERS	389	2001	CURB STOP WITH VALVE BOX AND COVER	389	2001	CURB STOP WITH VALVE BOX AND COVER
225	2005	CONCRETE PAVERS	390	1998	CURB STOP WITH FLUSHING PIPE	390	1998	CURB STOP WITH FLUSHING PIPE
230	2011	SIDEWALKS	391-1	2001	VALVE BOX INSTALLATION AND GRADE ADJUSTMENT	391-1	2001	VALVE BOX INSTALLATION AND GRADE ADJUSTMENT
234	2012	CURB MODIFICATION AT DETECTABLE WARNING	391-2	2001	VALVE BOX INSTALLATION AND GRADE ADJUSTMENT	391-2	2001	VALVE BOX INSTALLATION AND GRADE ADJUSTMENT
235-1	2012	CURB RAMPS (TYPE A)	392	2001	DEBRIS CAP INSTALLATION	392	2001	DEBRIS CAP INSTALLATION
235-2	2012	CURB RAMPS (TYPE B)	* NEWLY REVISED.					
235-3	2012	CURB RAMPS (TYPE C)						
235-4	2011	CURB RAMPS (TYPE D)						
235-5	2011	CURB RAMPS (TYPE E)						

REVISE TITLE TO MATCH DETAIL

DETAIL NO. 100-1		STANDARD DETAIL ENGLISH	INDEX (PAGE 1 OF 2)	REVISED 01-01-2013	DETAIL NO. 100-1
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MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: March 18, 2013

Revised 5/6/2013

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Revision to Section 321.8.8 Thickened Edge

Case 13-08

PURPOSE: Eliminate references to 'base course' to clarify the surface being referenced and to delete an unnecessary Contractor submittal.

REVISIONS:

Proposed changes:

321.8.8 Thickened Edge: ~~Prior to commencing paving operations that require construction of a thickened edge, the Contractor shall submit for the Engineer's approval construction procedures to be used for placement and compaction of the thickened edge.~~

When the depth of the thickened edge extends ~~two-four~~ inches or more below the bottom of the asphalt pavement ~~base course~~, the portion below the asphalt pavement base course shall be placed and compacted as a separate construction operation. Construction of the asphalt pavement base course may immediately follow compaction of the lower portion of the thickened edge.

When the depth of the thickened edge extends less than ~~two-four~~ inches below the bottom of the asphalt pavement ~~base course~~, the portion below the asphalt pavement base course may be placed and compacted with the asphalt pavement base course in a single operation.

Proposed Modified Specification in final form:

321.8.8 Thickened Edge: When the depth of the thickened edge extends four inches or more below the bottom of the asphalt pavement, the portion below the asphalt pavement shall be placed and compacted as a separate construction operation. Construction of the asphalt pavement may immediately follow compaction of the lower portion of the thickened edge.

When the depth of the thickened edge extends less than four inches below the bottom of the asphalt pavement, the portion below the asphalt pavement may be placed and compacted with the asphalt pavement in a single operation.

SECTION 321

deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient sample. The asphalt content of the original deficient sample will be averaged with the asphalt binder content of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the asphalt binder content deviates by more than ±

0.40% from the mix design target value, then Table 321-4 shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

TABLE 321-4 ASPHALT BINDER CONTENT ACCEPTANCE AND PENALTIES		
	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the <u>initial</u> owner (i.e. permits): Corrective Action
Deviation from that permitted		
Over 0.0 to 0.1% points <u>above that permitted</u>	\$2.00	<u>LC & MC: Slurry Seal EA (see 321.10.6)</u>
Over 0.1 to 0.2% points <u>above that permitted</u>	\$6.00	<u>LC: Slurry Seal EA (see 321.10.6) MC: Mill Removal and Replacement or EA per 321.10.6</u>
Over 0.2% points <u>above that permitted</u>	<u>Mill Removal and Replacement* or EA per 321.10.6</u>	<u>LC & MC: Mill Removal and Replacement* or EA per 321.10.6</u>
<u>Within Permitted Range</u>	<u>Full Payment</u>	<u>No corrective action</u>
<u>Over 0.0 to 0.1% points below that permitted</u>	\$2.00	<u>LC & MC: Slurry Seal</u>
<u>Over 0.1 to 0.2% points below that permitted</u>	\$6.00	<u>LC: Slurry Seal MC: Mill Removal and Replacement or EA per 321.10.6</u>
<u>Over 0.2% points below that permitted</u>	<u>Mill Removal and Replacement</u>	<u>LC & MC: Mill Removal and Replacement</u>

- NOTES: LC = Local, Collector or Industrial Streets
MC = Arterial or Major Collector Streets
Slurry Seal = Per Agency Requirements
Overlay = 1.25-inch per Agency Requirements
For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

If the laboratory air voids fall within a range of 2.8% to 6.2%, the asphalt concrete will be paid for at the contract unit price. If the laboratory air voids are outside of this range, the deficient area will be evaluated within the subplot by coring at maximum

intervals of 100 feet from the deficient sample. The laboratory air voids of the original deficient sample will be averaged with the laboratory air voids obtained from each of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the laboratory air voids is outside the indicated range, then Table 321-5 shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

SECTION 321

TABLE 321-5		
LABORATORY VOIDS ACCEPTANCE AND PENALTIES		
Laboratory Air Voids (Measured at N _{des} or 75 blows as applicable)	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the <u>initial</u> owner (i.e. permits): Corrective Action
Less than 1.5%	<u>Mill Removal and Replacement</u> * or EA per 321.10.6	<u>Mill Removal and Replacement</u> * or EA per 321.10.6
1.5-2.0%	\$2.50 \$10.00 or <u>Mill Removal and Replacement</u>	<u>LC: Mill Removal and Replacement or Overlay</u> EA (see 321.10.6) <u>MC: Mill Removal and Replacement</u>
2.1-2.7%	\$1.00 \$5.00	<u>LC: Slurry Seal or EA</u> (see 321.10.6) <u>MC: Slurry Seal or EA</u> (see 321.10.6)
2.8-6.2%	Full Payment	No corrective action
6.3-6.9%	\$1.00 \$5.00	<u>LC: Slurry Seal or EA</u> (see 321.10.6) <u>MC: Slurry Seal or EA</u> (see 321.10.6)
7.0-8.0%	\$2.50 \$10.00 or <u>Mill Removal and Replacement</u>	<u>LC: Mill Removal and Replacement or Overlay</u> EA (see 321.10.6) <u>MC: Mill Removal and Replacement</u>
Greater than 8.0%	<u>Mill Removal and Replacement</u> * or EA per 321.10.6	<u>Mill Removal and Replacement</u> * or EA per 321.10.6

NOTES: LC = Local, Collector or Industrial Streets

MC = Arterial or Major Collector Streets

Slurry Seal = Per Agency Requirements

Overlay = 1.25-inch per Agency Requirements

For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

If an agency or Engineer is purchasing asphalt concrete directly from a commercial material supplier, the agency or Engineer will use Section [321.10](#), and specifically Tables [321-3A](#) or [321-3B](#) as applicable, [321-4](#) and [321-5](#) from Section [321.10](#), when determining the acceptance of the asphalt concrete with the material supplier.

321.10.3 Surface Testing: If directed by the Engineer surface drainage test shall be performed. The completed surfacing shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/4 inch from the lower edge of a 12-foot straightedge when the straightedge is placed parallel to the centerline of the roadway. The straightedge shall be furnished by the contractor and shall be acceptable to the Engineer.

SECTION 321

All streets shall be water tested for drainage in the presence of the Engineer or designated representative before final acceptance. Any areas not draining properly shall be corrected to the Engineer's satisfaction at the Contractor's expense. Water for this testing shall be provided and paid for by the Contractor.

When deviations in excess of the above tolerance are found, humps or depressions shall be corrected to meet the specified tolerance, or shall be cut out along neat straight lines and replaced with fresh hot mixture and thoroughly compacted to conform with and bond to the surrounding area. Materials and work necessary to correct such deviations shall be at no additional cost to the Contracting Agency.

321.10.4 Asphalt Pavement Thickness: Asphalt Pavement thickness will be determined from cores secured from each subplot for this purpose. Such cores will be taken and measured by the Asphalt Concrete Coring Method. This method can be found at in Section [321.14](#). Each core location will be patched by the party responsible for the testing.

If the pavement thickness is deficient from the target thickness by 0.25 inches or less, it will be paid for at the contract unit price. If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is not the owner (i.e. permits) the following steps will apply:

- (1) If the thickness deficiency of the pavement exceeds 0.25 inch, the limits of the deficient area will be evaluated by coring at maximum intervals of 100 feet from the deficient core. The thicknesses of the original deficient core will be averaged with the thicknesses of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the resulting average thickness deficiency is greater than 0.25 inch, additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.
- (2) If the pavement thickness from step one above deviates from the target thickness by more than 0.25 inch but not more than 0.50 inch, corrective action will be required. This corrective action will consist of application of a Type II slurry seal coat in accordance to Section [715](#). The Contractor may present an engineering analysis outlining other proposed remedial measures for the consideration of the Engineer. The Engineer will review the engineering analysis and decide within 30 working days whether to accept the proposed remedial measures.
- (3) If the pavement thickness from step one above deviates from the target thickness by more than 0.50 inch, corrective action will be required. The deficient area will be overlaid with no less than 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with the appropriate end and edge milling, with a mixture approved by the Engineer. The Contractor may present an engineering analysis outlining other proposed remedial measures for the Engineer's consideration. The Engineer will review the engineering analysis and decide within 10 working days whether to accept the proposed remedial measures. If the Engineer chooses to reject the engineering analysis, the indicated overlay will be constructed by the Contractor at no additional cost to the Owner.

If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is the owner, Table [321-6](#) will apply.

Specified Pavement Thickness	Reduction in Payment or Corrective Action
Less than 1.5 inches	50%
1.50 inches to 1.99 inches	33%
2.00 inches to 2.49 inches	25%
2.50 inches to 2.99 inches	20%
3.00 inches and over	17%

SECTION 321

321.10.5 Density:

321.10.5.1 Pavement 1-1/2 Inches or Less in Nominal Thickness:

Compaction shall consist of a "Rolling Method Procedure" using an established sequence of coverage with specified types of compactors. A pass shall be defined as one movement of a compactor in either direction. Coverage shall be the number of passes as are necessary to cover the entire width being paved.

The rolling sequence, the type of compactor to be used, and the number of coverages required shall be as shown in Table [321-7](#).

TABLE 321-7				
ROLLING SEQUENCE FOR LIFT THICKNESS 1½" OR LESS				
Rolling Sequence	Type of Compactor		No. of Coverages	
	Option No. 1	Option No. 2	Option No.1	Option No. 2
Initial	Static Steel	Vibrating Steel	1	1
Intermediate	Pneumatic Tired	Vibrating Steel	4	2- 4*
Finish	Static Steel	Static Steel	1-3	1-3

* Based on the roller pattern which exhibits the best performance.

The Contractor shall select the option for compaction and, when pneumatic-tired compactors are used will designate the tire pressure. Steel wheel compactors shall not be used in the vibratory mode for courses of one inch or less in thickness nor when the temperature of the asphaltic concrete falls below 180 degrees F. Initial and intermediate compaction shall be accomplished before the temperature of the asphaltic concrete falls below 200 degrees F.

Compaction will be deemed to be acceptable on the condition that the asphaltic concrete is compacted using the type of compactors specified, ballasted and operated as specified, and with the number of coverages of the compactors as specified.

321.10.5.2 Pavement Greater than 1-1/2 Inches in Nominal Thickness:

Achieving the required compaction is the responsibility of the contractor. The number and types of rollers is the contractor's responsibility and shall be sufficient to meet these requirements.

In-place air voids shall be determined in accordance with AASHTO T-269 utilizing cores taken from the finished pavement. The maximum theoretical density used in the determination of in-place air voids will be the average value from the acceptance samples determined for the Lot as outlined in [321.10.1](#).

The Engineer will designate one random test location for each subplot and the acceptance laboratory will obtain one core from that location. Regardless of subplot quantities or boundaries, a minimum of one core will be obtained per residential street and a minimum of one core per travel lane for collector and arterial streets. The outside one foot of each pass of the pavement course or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor will provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in Section [321.14](#). Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

If the pavement density has in-place voids of 8.0% or less, the asphalt concrete will be paid for at the contract unit price. If the pavement density has in-place voids greater than 8.0%, the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient core(s). If both cores in a subplot are deficient, 3 to 4 additional cores may be necessary to re-evaluate acceptance. The in-place voids of all the original core(s), whether deficient or acceptable, will be averaged with the in-place voids of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the average of the in-place voids is greater than 8.0% then Table [321-8](#) shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

SECTION 321

TABLE 321-8		
PAVEMENT DENSITY PENALTIES		
Limits of In-place Air Voids for lift thicknesses greater than 1.5 inches <u>and greater</u>	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the <u>initial</u> owner (i.e. permits): Corrective Action
8.1% to 9.0%	\$4.00 <u>\$5.00</u>	<u>LC: Slurry Seal or EA (see 321.10.6)</u> <u>MC: Slurry Seal or EA (see 321.10.6)</u> <u>EA</u>
9.1% to 10.0%	\$6.00 <u>\$10.00 or Mill Removal and Replacement</u>	<u>LC: Mill Removal and Replacement or Overlay or EA per 321.10.6</u> <u>MC: Mill Removal and Replacement or EA per 321.10.6 and Type II Slurry Seal</u>
10.1% to 11.0%	<u>Removal* or EA per 321.10.6</u>	<u>Removal* or EA per 321.10.6</u>
Greater than 11.0%	<u>Mill Removal and Replacement</u>	<u>Mill Removal and Replacement</u>

*Notes: The Contractor shall remove and replace the entire subplot that is deficient. Removal for In-place Air Voids greater than ~~10.1~~10.0% is not eligible for Section 321.10.6.

LC = Local, Collector or Industrial Streets

MC = Arterial or Major Collector Streets

Slurry Seal = Per Agency Requirements

Overlay = 1.25-inch per Agency Requirements

For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

321.10.6 Engineering Analysis (EA): Within 10 working days after receiving notice that a lot or subplot of asphalt concrete is deficient and is found to fall within the “Removal or EA” band per Table(s) 321-4, 321-5, and/or 321-8 the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties along with possible remediation(s) listed in the “Removal or EA” category. Engineering Analysis can also be proposed for non-removal categories of “Corrective actions” when the contracting agency is not the owner (i.e. permits).

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action to the material(s) in place as it relates to the in-place material’s performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs. If the lot or subplot is submitted for referee testing by the contractor, the ten working days allowed to prepare an engineering will begin upon notification of referee test results.

~~When an Engineering Analysis recommends that a specific lot or subplot should not be removed, the Engineering Analysis will recommend that the following penalties (Table 321-9) be paid when the contracting agency is the owner, for the specific criteria being reviewed by the EA.~~

TABLE 321-9

SECTION 321

ENGINEERING ANALYSIS PENALTIES for REMOVAL* LOTS/SUBLOTS LEFT IN PLACE		
Acceptance Criteria	Acceptance Limits	Penalty When Contracting Agency is the Owner (\$/Ton)
Asphalt Binder Content	Over 0.2% points from that Permitted	\$9.00
Laboratory Air Voids (Measured at N_{des} or 75 blows as applicable)	Less than 1.5% or Greater Than 8.0%	\$3.75
Limits of In place Air Voids	10.1% to 11.0%	\$9.00

Within 15 working days, the Engineer will determine whether or not to accept the contractor's proposed Engineering Analysis.



SECTION 321

deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient sample. The asphalt content of the original deficient sample will be averaged with the asphalt binder content of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the asphalt binder content deviates by more than ±

0.40% from the mix design target value, then Table 321-4 shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

TABLE 321-4		
ASPHALT BINDER CONTENT ACCEPTANCE AND PENALTIES		
Deviation from that permitted	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the initial owner (i.e. permits): Corrective Action
Over 0.0 to 0.1% points above that permitted	\$2.00	LC & MC: Slurry Seal
Over 0.1 to 0.2% points above that permitted	\$6.00	LC: Slurry Seal MC: Mill Removal and Replacement or EA per 321.10.6
Over 0.2% points above that permitted	Mill Removal and Replacement	LC & MC: Mill Removal and Replacement
Within Permitted Range	Full Payment	No corrective action
Over 0.0 to 0.1% points below that permitted	\$2.00	LC & MC: Slurry Seal
Over 0.1 to 0.2% points below that permitted	\$6.00	LC: Slurry Seal MC: Mill Removal and Replacement or EA per 321.10.6
Over 0.2% points below that permitted	Mill Removal and Replacement	LC & MC: Mill Removal and Replacement

NOTES: LC = Local, Collector or Industrial Streets
 MC = Arterial or Major Collector Streets
 Slurry Seal = Per Agency Requirements
 Overlay = 1.25-inch per Agency Requirements
 For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

If the laboratory air voids fall within a range of 2.8% to 6.2%, the asphalt concrete will be paid for at the contract unit price. If the laboratory air voids are outside of this range, the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient sample. The laboratory air voids of the original deficient sample will be averaged with the laboratory air voids obtained from each of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the laboratory air voids is outside the indicated range, then Table 321-5 shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

SECTION 321

TABLE 321-5

LABORATORY VOIDS ACCEPTANCE AND PENALTIES		
Laboratory Air Voids (Measured at N _{des} or 75 blows as applicable)	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the initial owner (i.e. permits): Corrective Action
Less than 1.5%	Mill Removal and Replacement	Mill Removal and Replacement
1.5-2.0%	\$10.00 or Mill Removal and Replacement	LC: Mill Removal and Replacement or Overlay MC: Mill Removal and Replacement
2.1-2.7%	\$5.00	LC: Slurry Seal or EA (see 321.10.6) MC: Slurry Seal or EA (see 321.10.6)
2.8-6.2%	Full Payment	No corrective action
6.3-6.9%	\$5.00	LC: Slurry Seal or EA (see 321.10.6) MC: Slurry Seal or EA (see 321.10.6)
7.0-8.0%	\$10.00 or Mill Removal and Replacement	LC: Mill Removal and Replacement or Overlay MC: Mill Removal and Replacement
Greater than 8.0%	Mill Removal and Replacement	Mill Removal and Replacement

NOTES: LC = Local, Collector or Industrial Streets

MC = Arterial or Major Collector Streets

Slurry Seal = Per Agency Requirements

Overlay = 1.25-inch per Agency Requirements

For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

If an agency or Engineer is purchasing asphalt concrete directly from a commercial material supplier, the agency or Engineer will use Section [321.10](#), and specifically Tables [321-3A](#) or [321-3B](#) as applicable, [321-4](#) and [321-5](#) from Section [321.10](#), when determining the acceptance of the asphalt concrete with the material supplier.

321.10.3 Surface Testing: If directed by the Engineer surface drainage test shall be performed. The completed surfacing shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/4 inch from the lower edge of a 12-foot straightedge when the straightedge is placed parallel to the centerline of the roadway. The straightedge shall be furnished by the contractor and shall be acceptable to the Engineer.

SECTION 321

All streets shall be water tested for drainage in the presence of the Engineer or designated representative before final acceptance. Any areas not draining properly shall be corrected to the Engineer's satisfaction at the Contractor's expense. Water for this testing shall be provided and paid for by the Contractor.

When deviations in excess of the above tolerance are found, humps or depressions shall be corrected to meet the specified tolerance, or shall be cut out along neat straight lines and replaced with fresh hot mixture and thoroughly compacted to conform with and bond to the surrounding area. Materials and work necessary to correct such deviations shall be at no additional cost to the Contracting Agency.

321.10.4 Asphalt Pavement Thickness: Asphalt Pavement thickness will be determined from cores secured from each subplot for this purpose. Such cores will be taken and measured by the Asphalt Concrete Coring Method. This method can be found at in Section [321.14](#). Each core location will be patched by the party responsible for the testing.

If the pavement thickness is deficient from the target thickness by 0.25 inches or less, it will be paid for at the contract unit price. If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is not the owner (i.e. permits) the following steps will apply:

- (1) If the thickness deficiency of the pavement exceeds 0.25 inch, the limits of the deficient area will be evaluated by coring at maximum intervals of 100 feet from the deficient core. The thicknesses of the original deficient core will be averaged with the thicknesses of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the resulting average thickness deficiency is greater than 0.25 inch, additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.
- (2) If the pavement thickness from step one above deviates from the target thickness by more than 0.25 inch but not more than 0.50 inch, corrective action will be required. This corrective action will consist of application of a Type II slurry seal coat in accordance to Section [715](#). The Contractor may present an engineering analysis outlining other proposed remedial measures for the consideration of the Engineer. The Engineer will review the engineering analysis and decide within 30 working days whether to accept the proposed remedial measures.
- (3) If the pavement thickness from step one above deviates from the target thickness by more than 0.50 inch, corrective action will be required. The deficient area will be overlaid with no less than 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with the appropriate end and edge milling, with a mixture approved by the Engineer. The Contractor may present an engineering analysis outlining other proposed remedial measures for the Engineer's consideration. The Engineer will review the engineering analysis and decide within 10 working days whether to accept the proposed remedial measures. If the Engineer chooses to reject the engineering analysis, the indicated overlay will be constructed by the Contractor at no additional cost to the Owner.

If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is the owner, Table [321-6](#) will apply.

Specified Pavement Thickness	Reduction in Payment or Corrective Action
Less than 1.5 inches	50%
1.50 inches to 1.99 inches	33%
2.00 inches to 2.49 inches	25%
2.50 inches to 2.99 inches	20%
3.00 inches and over	17%

SECTION 321

321.10.5 Density:

321.10.5.1 Pavement 1-1/2 Inches or Less in Nominal Thickness:

Compaction shall consist of a “Rolling Method Procedure” using an established sequence of coverage with specified types of compactors. A pass shall be defined as one movement of a compactor in either direction. Coverage shall be the number of passes as are necessary to cover the entire width being paved.

The rolling sequence, the type of compactor to be used, and the number of coverages required shall be as shown in Table [321-7](#).

TABLE 321-7				
ROLLING SEQUENCE FOR LIFT THICKNESS 1½” OR LESS				
Rolling Sequence	Type of Compactor		No. of Coverages	
	Option No. 1	Option No. 2	Option No.1	Option No. 2
Initial	Static Steel	Vibrating Steel	1	1
Intermediate	Pneumatic Tired	Vibrating Steel	4	2- 4*
Finish	Static Steel	Static Steel	1-3	1-3

* Based on the roller pattern which exhibits the best performance.

The Contractor shall select the option for compaction and, when pneumatic-tired compactors are used will designate the tire pressure. Steel wheel compactors shall not be used in the vibratory mode for courses of one inch or less in thickness nor when the temperature of the asphaltic concrete falls below 180 degrees F. Initial and intermediate compaction shall be accomplished before the temperature of the asphaltic concrete falls below 200 degrees F.

Compaction will be deemed to be acceptable on the condition that the asphaltic concrete is compacted using the type of compactors specified, ballasted and operated as specified, and with the number of coverages of the compactors as specified.

321.10.5.2 Pavement Greater than 1-1/2 Inches in Nominal Thickness:

Achieving the required compaction is the responsibility of the contractor. The number and types of rollers is the contractor’s responsibility and shall be sufficient to meet these requirements.

In-place air voids shall be determined in accordance with AASHTO T-269 utilizing cores taken from the finished pavement. The maximum theoretical density used in the determination of in-place air voids will be the average value from the acceptance samples determined for the Lot as outlined in [321.10.1](#).

The Engineer will designate one random test location for each subplot and the acceptance laboratory will obtain one core from that location. Regardless of subplot quantities or boundaries, a minimum of one core will be obtained per residential street and a minimum of one core per travel lane for collector and arterial streets. The outside one foot of each pass of the pavement course or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor will provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in Section [321.14](#). Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

If the pavement density has in-place voids of 8.0% or less, the asphalt concrete will be paid for at the contract unit price. If the pavement density has in-place voids greater than 8.0%, the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient core(s). If both cores in a subplot are deficient, 3 to 4 additional cores may be necessary to re-evaluate acceptance. The in-place voids of all the original core(s), whether deficient or acceptable, will be averaged with the in-place voids of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the average of the in-place voids is greater than 8.0% then Table [321-8](#) shall apply to the subplot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

SECTION 321

TABLE 321-8		
PAVEMENT DENSITY PENALTIES		
Limits of In-place Air Voids for lift thicknesses 1.5 inches and greater	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the initial owner (i.e. permits): Corrective Action
8.1% to 9.0%	\$5.00	LC: Slurry Seal or EA (see 321.10.6) MC: Slurry Seal or EA (see 321.10.6)
9.1% to 10.0%	\$10.00 or Mill Removal and Replacement	LC: Mill Removal and Replacement or Overlay or EA per 321.10.6 MC: Mill Removal and Replacement or EA per 321.10.6
Greater than 11.0%	Mill Removal and Replacement	Mill Removal and Replacement

*Notes: The Contractor shall remove and replace the entire subplot that is deficient. Removal for In-place Air Voids greater than 10.0% is not eligible for Section [321.10.6](#).

LC = Local, Collector or Industrial Streets

MC = Arterial or Major Collector Streets

Slurry Seal = Per Agency Requirements

Overlay = 1.25-inch per Agency Requirements

For Mill Removal and Replacement, Milling requirement may be eliminated if the lift is placed on subgrade or ABC

321.10.6 Engineering Analysis (EA): Within 10 working days after receiving notice that a lot or subplot of asphalt concrete is deficient and is found to fall within the “Removal or EA” band per Table(s) [321-4](#), [321-5](#), and/or [321-8](#) the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties along with possible remediation(s) listed in the “Removal or EA” category. Engineering Analysis can also be proposed for non-removal categories of “Corrective actions” when the contracting agency is not the owner (i.e. permits).

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action to the material(s) in place as it relates to the in-place material’s performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs. If the lot or subplot is submitted for referee testing by the contractor, the ten working days allowed to prepare an engineering will begin upon notification of referee test results.

Within 15 working days, the Engineer will determine whether or not to accept the contractor’s proposed Engineering Analysis.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: March 27, 2013

Revised 5/6/2013

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Revised Section 301.7 (Subgrade Preparation) MEASUREMENT

Case 13-10

PURPOSE: Add subgrade preparation measurement for non-surfaced areas designated for vehicle traffic.

REVISIONS:

Proposed Changes:

301.7 MEASUREMENT:

Measurement for Subgrade Preparation will be by the square yard. The area to be measured will be the total accepted area of new asphalt ~~concrete pavement and new portland or Portland~~ concrete pavement (PCCP), including paved shoulders, tapers, ~~and~~ turnouts, and unpaved roadway shoulders. ~~Subgrade Preparation area measured Measurement~~ will also include the accepted surface area of driveways that ~~are paved or~~ are surfaced with aggregate base, or select materials and non-surfaced areas designated for vehicle traffic.

Except for PCCP, the area under portland cement concrete surfaces such as concrete curb and gutter, sidewalk, concrete driveways and driveway entrances, and concrete alley entrances will not be included in the Subgrade Preparation measurement ~~this pay item~~.

Project earthwork quantities for Roadway Excavation, Borrow Excavation, and Fill Construction shall not be separately measured when they are not listed as separate line items on the fee proposal form. In such case, unless otherwise specified, payment for said earthwork items shall be included in the unit price for Subgrade Preparation.

Proposed Modified Specification in final form:

301.7 MEASUREMENT:

Measurement for Subgrade Preparation will be by the square yard. The area to be measured will be the total accepted area of new asphalt concrete pavement and new portland cement concrete pavement (PCCP), including paved shoulders, tapers, turnouts, and unpaved roadway shoulders. Subgrade Preparation area measured will also include the accepted surface area of driveways that are surfaced with aggregate base, or select materials and non-surfaced areas designated for vehicle traffic.

Except for PCCP, the area under portland cement concrete surfaces such as concrete curb and gutter, sidewalk, concrete driveways and driveway entrances, and concrete alley entrances will not be included in the Subgrade Preparation measurement.

Project earthwork quantities for Roadway Excavation, Borrow Excavation, and Fill Construction shall not be separately measured when they are not listed as separate line items on the fee proposal form. In such case, unless otherwise specified, payment for said earthwork items shall be included in the unit price for Subgrade Preparation.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: April 16, 2013

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Delete Section 737 ASBESTOS-CEMENT PIPE AND FITTINGS FOR **Case 13-11**
STORM DRAIN AND SANITARY SEWER

PURPOSE: Prevent the use of asbestos-cement pipe for storm drain and sanitary sewer installations.

REVISIONS: Delete Section 737 in its entirety and revise all references to section 737. Section 737 is only referenced in section 605.3.

Proposed Section 605 Changes:

SECTION 605
SUBDRAINAGE

605.1 DESCRIPTION:

The subdrainage system shall be constructed in accordance with the notes and details shown on the plans and the applicable provisions of these specifications except as modified in the special provisions.

605.2 CONCRETE:

All concrete placed in drainage structures, subdrain outlets, pipe collars, and similar features of the subdrainage system shall conform to the applicable provisions of Section 725.

605.3 SUBDRAINAGE PIPE:

Subdrainage pipe, both perforated and non-perforated, shall be either bell and spigot concrete, bell and spigot vitrified clay, or corrugated metal pipe, ~~or asbestos cement pipe~~ as shown on the plans or specified in the special provisions. However, if the particular kind of pipe is not shown on the plans nor specified in the special provisions, subdrainage pipe shall be concrete pipe of at least standard strength quality and shall conform to the requirements of Section 736. Vitrified clay pipe shall conform to the requirements of Section 743. ~~Asbestos cement pipe shall conform to the requirements of Section 737.~~ Corrugated metal pipe shall conform to the requirements of Section 760.

605.3.1 Pipe Joints: Unless the pipe joints are of a self-aligning type, have the bottom half of the bell joint filled with mortar to securely hold the pipe in alignment and to bring the inner surface of abutting pipes flush and even. Where a tight joint for non-perforated pipe is required, the bell joint shall be completely filled with mortar.

~~Asbestos cement pipe joints shall be made with couplings in accordance with the recommendations of the pipe manufacturer.~~

605.4 SUBDRAINAGE MANHOLES:

Subdrainage manholes, including inlets, outlets, flap gates, gate boxes, and drop steps, shall comply with the requirements of the plans and the special provisions.

DATE: April 27, 2013

TO: MAG Specifications and Details Committee Members

FROM: Peter Kandaris, Advisory Member

RE: Revisions to Section 340 – Concrete Curb, Gutter, Sidewalk, Sidewalk Ramps, Driveway and Alley Entrance

Purpose: Update standard identified by Concrete Working Group. This standard has not been significantly changed since 1999. Numerous agencies have created supplements to this standard and some agencies have complete replacement sections.

Revisions: The changes include incorporation of supplement sections from many MAG agency members and subsectioning the Construction Methods portion of the standard into a logical work process. The Concrete Working Group has also made updates as needed and wording improvements for clarity. Major changes are summarized below:

- a. A new subgrade preparation subsection has been created which includes methods for handling expansive subgrade (including a new table).
- b. Curing requirements have been added.
- c. A deficiencies subsection has been added.
- d. Measurement and payment sections have been expanded to provide specific clarity for curb ramps, curb terminations/transitions, and payment for unsuitable material removal/replacement.

Agencies are requested to review the proposed changes (specifically in comparison to agency supplements) and provide feedback to the Concrete Working Group for any needed modifications.

SECTION 340

CONCRETE CURB, GUTTER, SIDEWALK, SIDEWALK RAMPS, DRIVEWAY AND ALLEY ENTRANCE

340.1 DESCRIPTION:

The various types of concrete curb, gutter, sidewalk, sidewalk ramps, driveways, and alley entrances shall be constructed to the dimensions indicated on the plans and standard detail drawings.

340.2 MATERIALS:

Concrete shall be ~~class B unless otherwise~~ noted on the standard details. Concrete shall conform to the requirements of Section 725.

Expansion joint filler shall be 1/2-inch thick preformed bituminous material in compliance ~~comply~~ with Section 729, unless otherwise noted.

340.2.1 Detectable Warnings: Truncated dome dimensions and spacing for detectable warnings are defined by the Americans with Disabilities Act Accessibilities Guidelines (ADAAG) for optimal detectability and public safety. Detectable warnings shall consist of raised truncated domes aligned in a square grid pattern in conformity to the ADAAG. Truncated domes shall have the following nominal dimensions: base diameter of 1.0 inches (0.9 inches minimum) top diameter of 50 percent of the base diameter minimum to 65 percent of the base diameter maximum, and height of 0.2 inches. Dome center-to-center spacing of 2.35 inches, measured between the most adjacent domes on the square grid. Dome center-to-center spacing for radial installations shall be 1.6 inches minimum and 2.4 inches maximum with a base-to-base spacing of 0.65 inches minimum. Detectable warning edges shall be sized and installed so that dome spacing is maintained across adjoining edges. Each dome shall have a minimum static friction of coefficient of 0.8 as tested per ASTM C1028.

340.2.1.1 Color and Contrast: Detectable warnings shall contrast visually with adjoining surfaces, either light-on-dark or dark-on-light. Specific colors to be used shall be approved by the local jurisdictional agency prior to installation. Detectable warnings shall have integral color throughout.

340.2.1.2 Materials: Detectable warning materials shall be durable with a non-slip surface not subject to spalling, chipping, delamination, or separation. All detectable warnings shall be approved by the local jurisdictional agency prior to installation.

340.2.1.3 Attachment System: Detectable warnings shall be either placed in freshly poured concrete (wet-set) or recessed into pre-formed concrete. Detectable warnings using wet-set placement shall have an anchoring method that assures constant contact of the detectable warning bottom surface with the concrete as it cures, thus rendering the ramp a single monolithic structure. The thicker and heavier detectable warnings lowered into pre-formed recesses in the concrete substrate must demonstrate a firm fitting into metal reinforced frames without gaps along the edges that can channel water, sand, or debris. They must also be able to resist movement (i.e. sliding, rocking, or lifting) once in service. All attachment systems shall be approved by the local jurisdictional agency.

340.3 CONSTRUCTION METHODS:

~~Existing pavements and concrete that are joined by new construction shall be cut in accordance with Section 601.~~

340.3.1 Subgrade Preparation: The subgrade shall be constructed and compacted true to grades and lines shown on the plans and as specified in Section 301. All soft, expansive or unsuitable material shall be removed to a depth of not less than 6 inches below subgrade elevation and replaced with material satisfactory to the Engineer. Removal and replacement of soft, expansive or unsuitable material will be paid for as extra work.

~~When the Engineer determines that the existing subgrade consists of soils with have questionable swelling characteristics, the soils shall be tested to determine if they are non-expansive, marginally expansive, or expansive. Testing shall be in accordance with ASTM D4546 (one-dimensional swell test) remolded to 95% of maximum density at optimum moisture. Maximum density and optimum moisture shall be determined in accordance with ASTM D698(A). Based on the test results, the subgrade removal and compaction requirements of Section 301.3 shall be modified as noted in Table 340-1, the moisture content shall be brought as close as possible to the optimum required for compaction. This shall be done by the addition of water, by the addition and blending of dry suitable material or by the drying of existing material. The subgrade shall then be compacted to a relative density of 75% minimum to 85% maximum with 80% as ideal.~~

<u>Table 340-1</u>			
<u>% Swell</u>	<u>Description</u>	<u>Required Corrective Action ⁽¹⁾</u> <u>Section 301.1 Type "A" Subgrade</u>	<u>Required Corrective Action ⁽¹⁾</u> <u>Section 301.1 Type "B" Subgrade</u>
<u><1</u>	<u>Non-expansive</u>	<u>No Change</u>	<u>No Change</u>
<u>1 to 3</u>	<u>Marginally expansive</u>	<u>Compact to between 90% and 95% of maximum density at a moisture content between 0% to 3% above optimum moisture per ASTM D698</u>	<u>Compact to between 85% and 90% of maximum density at a moisture content between 0% to 3% above optimum moisture per ASTM D698</u>
<u>>3</u>	<u>Expansive</u>	<u>Remove the upper 24 inches of subgrade and replace with non-expansive material per this table and Section 301.3.</u>	

(1) Note: Alternate corrective measures may be submitted to the Agency by the Contractor for review. The submittal must include recommendation affixed with the professional seal of an Arizona registered engineer

~~Material removed due to expansive potential or otherwise found to be unsuitable displaced in the construction shall not be placed on the base and/or surfacing material already in place on the roadway nor shall the excavated material be placed in such a manner as to interfere with access to property or traffic flow in the street.~~

~~Existing concrete sidewalks and driveways which abut the new sidewalks and driveway entrances shall be removed to a distance required to maintain a slope as indicated by standard details or not to exceed 1 inch per foot where sidewalks are concerned. Sawcutting is required at the match lines and payment will be made under the respective pay items as provided in the proposal.~~

340.3.2 Formwork: Concrete curbs, gutters and sidewalks shall be constructed by the conventional use of forms, or may be constructed by means of an appropriate machine when approved by the Engineer.

If machines designed specifically for such work and approved by the Engineer are used, the results must be equal to or better than that produced by the use of forms. If the results are not satisfactory to the Engineer, the use of the machine shall be discontinued and the Contractor shall make necessary repairs at

his own expense. All applicable requirements of construction by use of forms shall apply to the use of machines.

Forms conforming to the dimensions of the curb, gutter, sidewalk, sidewalk ramps, driveway, and alley entrance shall be carefully set to line and grade, and securely staked in position. The forms and subgrade shall be watered immediately in advance of placing concrete.

Forms shall be thoroughly cleaned each time they are used, and shall be coated with a light oil, or other releasing agent of a type which will not discolor the concrete.

340.3.3 Concrete Placement: The concrete shall be thoroughly spaded away from the forms so that there will be no rock pockets next to the forms. The concrete may be compacted by mechanical vibrators approved by the Engineer. Tamping or vibrating shall continue until the mortar flushes to the surface, and the coarse aggregate is below the concrete surface. The surface shall then be struck off and worked to grade and cross section with a wood float.

If machine placement is used, the machine shall place, consolidate and finish the concrete in one complete pass, requiring a minimum of hand finishing producing a dense and homogeneous section. A form shall trail behind the machine for such a distance that no appreciable concrete slumping will occur. Final finishing shall be as specified hereinafter.

340.3.4 Joints: Shall be constructed in a straight line, vertical plane and perpendicular to the longitudinal line of the sidewalk, curb and gutter, single curb, etc., except in cases of curved alignment, where they shall be constructed along the radial lines of the curve.

340.3.4.1 Expansion Joints: ~~Unless otherwise specified, expansion joints shall be installed at all radius points, at both sides of each driveway, at both sides of each alley entrance, at adjoining structures and at every change of depth in the concrete and shall provide for complete separation of adjoining structures. The maximum distance between expansion joints shall be 50 feet, except in radii such as doglegs and cul-de-sacs where the maximum distance between expansion joints shall be 25 feet. Expansion joints shall be constructed in a straight line, vertical plane and perpendicular to the longitudinal line of the sidewalk, curb and gutter, single curb, etc., except in cases of curved alignment, where they will be constructed along the radial lines of the curve. Expansion joints shall be placed to match the joints of the adjacent concrete such as sidewalk to the curb and gutter or single curb, etc.~~

Expansion joints shall be constructed to the full depth and width of the concrete and shall match joints in adjacent pavement, sidewalk, curb or gutter. The expansion joint material shall extend fully through the concrete and one inch into the subgrade with the top of the expansion joint material one-quarter inch below the top surface ~~as depicted in Detail 230~~. Expansion joint material shall be secured in place prior to placement of concrete. ~~Unless otherwise specified, all expansion joints installed against newly placed concrete, sawcut or other smooth surfaces shall comply with Section 729.1—Premolded Joint Filler per ASTM D1751, ½ inch, Bituminous Type. Expansion joints installed against existing uneven surfaces shall be per Section 729.2—Pour Type Joint Filler.~~

340.3.4.2 Contraction Joints: ~~Contraction joints, unless otherwise specified, the large aggregate in contraction joints shall be separated to either side of the joint for a minimum depth equal to 25% of the concrete thickness; the finished depth shall be a minimum of ¾ inch, shall be constructed in accordance with the standard details, and in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk, sidewalk ramp or curb and gutter, except in cases of curved alignment when they will be constructed along the radial lines of the curb.~~

~~Sidewalk or sidewalk ramp score marks, unless otherwise specified, shall be constructed in accordance with the standard detail.~~

340.3.5 Edges: All exposed edges shall be shaped with a suitable tool so formed ~~as to round the~~ edges ~~to a radius~~ having the shape as indicated on the ~~standard~~ referenced details.

~~**340.3.1 Detectable Warnings:** The detectable warning surface shall be located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum back from the face of curb. Detectable warning surfaces for railroads shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.~~

340.3.6 Detectable Warnings: Detectable warnings shall be installed perpendicular to the direction of pedestrian/wheelchair travel and have a minimum width of 24 inches measured perpendicular to the edge of the roadway or rail crossing. The base surface of detectable warnings shall be installed flush with the adjacent walkway surface; the truncated domes shall extend above the walkway surface. The boundary between detectable warnings and the adjacent walkway shall provide a flush uniform surface that will not cause ponding of water nor present a tripping hazard. Partial domes at the edge of the detectable warning shall be made flush to match the base surface of the detectable warning. Detectable warnings installed on curb ramps shall extend the full width of the ramp depression.

Detectable warnings installed on sidewalk ramps shall modify the sidewalk concrete thickness at the detectable warning to provide a minimum concrete thickness of four-inches (4"). When detectable warnings are modules inset into the sidewalk ramp, the bottom surface of the sidewalk shall be lowered a distance equal to or greater than the module thickness to maintain the minimum sidewalk thickness. The sidewalk bottom surface shall have a minimum transition taper length of 12" between the thickened and normal depth sections of sidewalk. ~~The detectable warning surface shall be located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum back from the face of curb.~~

Detectable warning surfaces for pedestrian at-grade rail crossings not located within a street or highway shall be installed on each side of the rail crossing, located as shown on plans. Detectable warnings shall extend the full width of the pedestrian walkway.

Repair of ADA ramps shall be done in such a way as to maintain a single monolithic structure, such as installation of #4 dowel rods spaced at 8 inches on center or other methods as determined by the Engineer.

340.3.7 Form Removal and Finishing: The front face form shall not be removed before the concrete has taken the initial set and has sufficient strength to carry its own weight. Gutter forms and rear forms shall not be removed until concrete has hardened sufficiently to prevent damage to the edges. ~~Special care shall be taken to prevent any damage.~~ Any portion of concrete damaged while stripping forms shall be repaired or ~~if the damage is severe,~~ replaced at no additional cost to the Contracting Agency.

After the forms are removed, the joints shall be tooled and the surface finished with a float to remove all imperfections. In all cases, the resulting surface shall be smooth and of uniform color with all rough spots, projections, and form stakes removed. No plastering of the concrete will be allowed. The concrete work shall have a true surface; shall be free from sags, twists, or warps; have a uniform appearance; and be true to the lines, grades, and configurations indicated on the drawings.

Surfaces shall be sweat finished by means of a steel trowel or light brooming.

The Contractor shall stamp ~~his~~the company name and year ~~on all work done by him~~, on each end of the curb, gutter, sidewalk or sidewalk ramp constructed. The letters shall not be less than 3/4 inch in height.

340.3.8 Curing: As soon after the completion of the finishing operations as the condition of the concrete will permit, all exposed surface shall either be sprayed with a pigmented curing compound or sealed with a material conforming to Section 726. Curing compound shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely seal all exposed concrete surfaces with a uniform film. The membrane shall be applied in two applications for a total coverage of 150 square feet per gallon. Concrete surfaces shall be kept damp until the curing compound is applied. Should the curing compound 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 curing compound over the damaged area.

If due to weather conditions, materials used, or for any other reason, there is any likelihood of the fresh concrete checking or cracking before the curing operations, it shall be kept damp (not wet) by indirect fine spray of water until such danger is past, or until curing operations are started in the particular area affected. The need for adequate continuous curing is greatest during the first few hours after placement of concrete.

340.4.9 Tolerances: The face, top, back, and flow line of the curb and gutter shall not deviate in excess of 1/4-inch over 10 feet, as ~~be~~ tested with a 10-foot straightedge or curve template, longitudinally along the surface. ~~Any deviation in excess of 1/4 inch shall be corrected at no additional cost to the Contracting Agency.~~

The surface of concrete sidewalk or sidewalk ramp shall not deviate in excess of 1/8-inch over 5 feet as ~~be~~ tested with a 5-foot straightedge except for the 1/4-inch recess of the preformed material in expansion joints. ~~Any deviation in excess of 1/8 inch shall be corrected at no additional cost to the Contracting Agency.~~

All finished concrete elevations shall not deviate from the elevations shown on the plans, or indicated by typical sections or standard details referenced within the construction documents, by more than 1/4 inch.

When required by the Engineer, gutters ~~having a slope of 0.8 foot per hundred feet or less, or where unusual or special conditions cast doubt on the capability of the gutters to drain, they~~ shall be water tested. ~~Water testing shall consist of~~The Contractor shall establishing flow in the length of gutter to be tested by supplying and distributing water from a hydrant, tank truck or other source. ~~One hour a~~After the supply of water is shut off; and water has stopped flowing, the gutter shall be inspected for evidence of ponding or improper shape. The work shall be deemed deficient if ~~In the event~~ water is found ponded in the gutter to a depth greater than 1/2 inch; or ponding extends onto the adjacent asphalt pavement; ~~the defect or defects shall be corrected in a manner acceptable to the Engineer without additional cost to the Contracting Agency.~~

Areas between elevations shown on the plans shall be straight graded or smoothly transitioned through a vertical curve in a manner approved by the Engineer or as otherwise indicated on the construction documents.

340.3.10 Deficiencies: Any section of the work deficient in depth or not conforming to the plans or specifications shall be removed and replaced by the Contractor at no additional cost to the Contracting Agency. Replacement or reconstruction shall be from joint to joint.

Concrete work that deviates in straightness as specified in Section 340.3.9 shall be removed and replaced.

Remove and replace gutters that exceed the ponding tolerance in Section 340.3. (no grinding allowed).

Remove and replace all work that exceeds the elevation tolerance in Section 340.3.

Finishing and Curing of the concrete shall be done in the manner specified in Section 505.

~~340.3.1 Detectable Warnings: The detectable warning surface shall be located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum back from the face of curb. Detectable warning surfaces for railroads shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.~~

~~Detectable warnings shall be installed perpendicular to the direction of pedestrian/wheelchair travel and have a minimum width of 24 inches measured perpendicular to the edge of the roadway or rail crossing. The base surface of detectable warnings shall be installed flush with the adjacent walkway surface; the truncated domes shall extend above the walkway surface. The boundary between detectable warnings and the adjacent walkway shall provide a flush uniform surface that will not cause ponding of water nor present a tripping hazard. Partial domes at the edge of the detectable warning shall be made flush to match the base surface of the detectable warning. Detectable warnings installed on curb ramps shall extend the full width of the ramp depression.~~

~~Detectable warnings installed on sidewalk ramps shall modify the sidewalk concrete thickness at the detectable warning to provide a minimum thickness of four inches (4"). When detectable warnings are modules inset into the sidewalk ramp, the bottom surface of the sidewalk shall be lowered a distance equal to or greater than the module thickness to maintain the minimum sidewalk thickness. The sidewalk bottom surface shall have a minimum transition taper length of 12" between the thickened and normal depth sections of sidewalk.~~

340.4 BACKFILLING:

Unless otherwise specified the Contractor shall backfill behind the curbs, sidewalk or sidewalk ramps with soil native to the area to the lines and grades shown on the plans.

340.5 MEASUREMENT:

Concrete curbs and gutters of the various types shown on the plans and in the proposal, will be measured along gutter flow line through inlets, catch basins, driveways, sidewalk ramps, etc., by the lineal foot to the nearest foot for each type, complete in place. Measurement for curb terminations and transitions shall be included with the linear measurement of the various types of curb or curb and gutter as shown on the plans and in the proposal.

Curb and gutter type shall be based on the configuration of the final exposed surfaces. The increased curb and gutter depth required at valley gutter aprons or driveways shall not be measured as a separate pay item; any additional Contractor cost shall be included in the unit cost associated with the valley gutter, driveway or other associated item

Concrete sidewalks, ~~sidewalk ramps~~, driveways, alley intersections, valley gutters and aprons will be measured to the nearest square foot complete in place. ~~When concrete sidewalk, sidewalk ramps, driveways, alley intersections, valley gutters, and/or aprons are cut during trenching operations, the square foot measurement for payment will be in accordance with Section 336.~~

Detectable warnings shall not be measured for payment. Detectable warnings are considered integral to the walking surface that they form a part of and the cost is included in the related pay item.

Curb ramp installations shall be measured as complete installed units and shall include the ramp curb and the walking surfaces between the ramp curb and back of curb and gutter or single curb. Single curb or curb and gutter located at the edge of roadway shall be paid for separately. The surface area of curb ramps shall not be included in the measured quantity for sidewalks.

340.6 PAYMENT:

Payment ~~for the above named items~~ will be made in accordance with the unit prices or lump sums as set forth in the proposal. Such payment shall include full compensation for furnishing all labor, material, tools and equipment and accomplishing all work in conformance with the contract documents.

Payment for curb ramps shall include the ramp curb and the walking surfaces between the ramp curb and back of curb and gutter or single curb.

Over-excavation of soft, expansive or unsuitable materials and installation granular materials will be paid as a separate pay item, not included with the above measured pay items.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: April 29, 2013

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Revision to Section 415 Flexible Metal Guardrail

Case 13-13

PURPOSE: 1. Allow use of either 8" by 8" wood posts or 6" by 8" wood posts for any continuous length of guardrail when a specific wood post size is not identified by plans, standard details, or special provisions.
2. Delete reference to manufacturer's recommendations regarding installation of guardrail delineation. All requirements are contained in the specifications and standard details.

REVISIONS: See attached file with changes noted in red-lined strike-out format.

SECTION 415
FLEXIBLE METAL GUARDRAIL

415.1 DESCRIPTION:

The work under this section shall consist of furnishing all materials, constructing new guardrail, and delineating guardrail sections at the locations shown on the plans.

Guard rail end treatments shall be as specified on the plans or special provisions.

415.2 MATERIALS:

The rail elements, bolts, nuts and other fittings shall conform to the specifications of AASHTO M 180, except as modified in this section. The rail metal shall conform to AASHTO M 180, Type I, Class A and in addition to the requirements of AASHTO M 180, shall withstand a cold bend, without cracking of 180 degrees around a mandrel of a diameter equal to 2 1/2 times the thickness of the plate.

Three certified copies of mill test reports of each heat from which the rail element is formed shall be furnished to the Engineer.

All materials shall be new, except as otherwise noted on the plans or special provisions.

Railing Parts furnished under these specifications shall be interchangeable with similar parts regardless of source. All surfaces of guardrail elements that are exposed to traffic shall present a uniform, pleasing appearance and shall be free of scars, stains or corrosion.

Nails shall be 16 penny common galvanized.

Bolts shall have shoulders shaped to prevent the bolts from turning.

Unless otherwise specified the rail elements, terminal sections, bolts, nuts, and other fittings shall be galvanized in accordance with Section 771. Where galvanizing has been damaged, the coating shall be repaired in accordance with Section 771.

Guardrail reflector tabs shall be either 3003-H14 Aluminum strip 0.063 ± 0.004 inches thick, or steel strip 0.078 ± 0.008 inches thick galvanized in accordance with ASTM A-653 coating designation G 90. The reflector material shall be high-reflectivity sheeting, either silver-white or yellow and shall conform to the requirements of Arizona State Department of Transportation Standard Specifications for Road and Bridge Construction. Adhesive for sheeting attachment to the metal tab shall be of the type and quality recommended by the sheeting manufacturer. Reflector tabs shall conform to the Reflector Tab Detail of Maricopa County Department of Transportation Standard Detail 3002.

Timber for posts and blocks shall be rough sawn (unplanned) or S4S with the nominal dimensions indicated. Any species or group of woods graded in accordance with the requirements for Timber and Posts of the Western Wood Products Association may be used. Timber shall be No. 1 or better, and the stress grade shall be as follows:

6" by 8" Post and Block	1200 psi
8" by 8" Post and Block	900 psi
10" by 10" Post and Block	900 psi

When the plans show guardrail systems using 8" by 8" timber posts and blocks, the Contractor may use 8 1/4" nominal size posts and blocks with a stress grade of 825 pounds per square inch. ~~Substitution of 8" by 8" posts for 6" by 8" post may be approved on a per project basis by the Engineer.~~

At the time of installation, the dimensions of timber posts and blocks shall vary no more than plus or minus 1/2" from the nominal dimensions as specified on the project plans. The size tolerance of rough sawn block in the direction of the bolt holes shall vary no more than plus or minus 3/8".

All timber shall have a preservative treatment as per the requirements of AASHTO M 133.

Structural steel shapes shall conform to the requirements of ASTM A36 and be galvanized in conformance with the appropriate requirements of AASHTO M 111. Dimensions shall meet the dimensional requirements of the American Institute of Steel Construction.

Steel tubes shall conform to the material requirements of ASTM A500 or A501 and be galvanized in conformance with the requirements of AASHTO M 180, Type 1.

415.3 CONSTRUCTION REQUIREMENTS:

415.3.1 General: The construction of the various types of guardrail shall include the assembly and erection of all component parts complete at the locations shown on the project plans or as directed by the Engineer.

Posts shall be as indicated by plans, standard details, or special provisions. Only one type and size of post and block shall be used for any one continuous length of guardrail.

Terminal sections shall be installed in accordance with the manufacturer's recommendations.

Workmanship shall be equivalent to good commercial practice and all edges, bolt holes and surfaces shall be free of torn metal, burrs, sharp edges and protrusions.

The various types of guardrail shall be constructed with wood posts and wood blocks, except as otherwise noted on the plans.

The bolted connection of the rail element to the post shall withstand a 5,000 pound pull at right angles to the line of the railing. All metal work shall be fabricated in the shop. No punching, cutting or welding shall be done in the field, except as provided for by the project plans. All metal cut in the field shall be cleaned and the galvanizing repaired in accordance with Section 771.

Where field cutting or boring of wood posts and blocks is permitted, the affected areas shall be thoroughly swabbed with at least two passes of the same type of wood preservative as initially used.

Where wood posts with rectangular sections are used, the posts shall be set so that the longest dimension is perpendicular to the rail.

All bolts shall extend beyond the nuts a minimum of two threads, except that all bolts adjacent to pedestrian traffic shall be cut off flush to the nut.

Bolts extending more than 2" beyond the nut shall be cut off to less than 1/2" beyond the nut.

Unless otherwise shown on the plans, bolts shall be torqued as follows:

Diameter of Bolt	Torque, Foot/Pounds
5/8"	45-50
3/4"	70-75
7/8" and larger	120-125

All bolts, other than those specified to be torqued, shall be securely tightened.

When guardrail is being constructed under traffic, the work shall be conducted so as to constitute the least hazard to the public. Guardrail work shall be performed in the direction of traffic flow when feasible.

Any section of guardrail that is removed for modification shall be replaced within five calendar days of the date the guardrail is removed, unless otherwise directed by the Engineer. At the end of each day, incomplete guardrail sections having an exposed end toward oncoming traffic shall have an appropriate temporary protective end treatment acceptable to the Engineer set securely in place together with approved overnight traffic control devices set in place.

415.3.2 Delineation: The maximum spacing between reflector tabs shall not exceed six posts. The slotted part of the tab shall be installed under the mounting bolt head so that the Reflectorized surface of the tab faces oncoming traffic. The exposed ends of the slotted part of the tab shall be bent up against and then over the top of the bolt head. The color of the reflective portion of the barrier markers shall conform to the color of the adjacent edge line. Silver-faced reflector tabs shall be installed on the right hand side of all roadways, and yellow-faced tabs shall be installed on the left-hand side of one-way, or median divided roadways.

All guardrail delineation shall be installed in accordance with the manufacturer's recommendations and as specified herein.

415.3.3 Roadway Guardrail: Wood posts shall be used for new guard rail installations unless otherwise indicated by plans or special provisions. Wood posts shall either be driven or placed in manually or mechanically dug holes; however, driven posts will not be permitted at locations where damage to the curb, gutter, sidewalk, buried items, shoulders or pavement might occur. The Engineer will be the sole judge as to whether driving of posts will be allowed. Driving of posts shall be accomplished in a manner that will prevent battering, burring, or distortion of the post. Any post which is damaged to the extent it is unfit for use in the finished work, as determined by the Engineer, shall be removed and replaced at no additional cost to the Agency.

The posts shall be firmly placed in the ground. The space around posts shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted to the density of the surrounding material.

Where pavement is disturbed in the construction of guardrail, the damaged surfacing shall be repaired as approved by the Engineer.

Where a culvert or other obstacle is at an elevation which would interfere with full depth post placement, guardrail installation shall comply with requirements of Section 415.3.4 Bolted Guardrail Anchors or Section 415.3.5 Nested Guardrail.

Wood blocks shall be toe nailed to the wood post with one 16 penny galvanized nail on each side of the top of the block. Wood blocks shall be set so that the top of the block is no more than ½" above or below the top of the post, unless otherwise shown on the project plans.

Rail elements shall be spliced at 25 foot intervals or less. Rail elements shall be spliced at posts unless otherwise shown on the project plans and shall be spliced by lapping in the direction of traffic in the nearest adjacent lane. Rail elements at joints shall have full bearing. When the radius of curvature is 150 feet or less, the rail elements shall be shop curved.

The Contractor shall dispose of surplus excavated material remaining after the guard railing has been constructed.

415.3.4 Bolted Guardrail Anchors: Where the elevation of the top surface of a concrete box culvert or other similar installation prevents the placement of a post of the specified length, the posts shall be shortened and anchored in accordance with Maricopa County Department of Transportation Standard Detail 3010.

415.3.5 Nested Guardrail: This work shall consist of furnishing and constructing nested guardrail, Type 1, 2, or 3, as shown in Maricopa County Department of Transportation Standard Details 3008-1 through 3008-3.

415.3.6 Guardrail to Structure Transitions: Guardrail transitions shall be constructed in accordance with requirements shown on the plans and special provisions.

415.4 MEASUREMENT:

The limits of measurement for roadway guardrail shall be as detailed in Maricopa County Department of Transportation Standard Detail 3016, except as otherwise noted on the plans or special provisions. Guardrail, of the type shown on the project plans, will be measured by the linear foot along the face of the rail element from center to center of posts, exclusive of guardrail terminals, guardrail end terminal assemblies, nested guardrail (Types 1, 2 and 3) and guardrail transitions.

Delineation is considered a part of installation of guardrail and hence will not be measured as a separate item.

The accepted quantities of guardrail posts secured with bolted guardrail anchors will be measured by the unit each.

Nested guardrail, Types 1, 2, or 3, and guardrail transitions will be measured by the unit each, complete in place and accepted as shown on the plans.

415.5 PAYMENT:

Payment for accepted quantities of each type of guardrail will be made at the contract unit price. Payment shall be full compensation for furnishing materials and installing guardrails, complete in place including excavation, backfill, and disposal of surplus material.

Payment for Bolted Guardrail Anchors will be at the contract unit price, and shall be full compensation for the work, complete in place, including steel brackets, hardware, excavation, backfill, removing and replacing surfacing, cutting and fitting steel beam posts or timber posts, drilling anchor bolt holes in steel posts, timber posts, and box culverts, and disposal of surplus materials.

Payment for guardrail transitions will be at the contract unit price. Payment shall be full compensation for furnishing materials and installing guardrail transitions, complete in place including excavation, backfill, and disposal of surplus material.

- End of Section -

Case 13-14:

Section 711 Paving Asphalt

Changes to this section are as follows:

In the table 711-1 (existing table) the temporary AASHTO tests are replaced with the current final test procedure numbers. They are crossed out.

AASHTO tests are used here to assure that the latest specifications are used.

The new polymer modified section is added at the end of the current section. It is printed in table 711-2. The same format that is used in 711-1 is used with three modified asphalt materials. Two polymer modified materials and a current TR product.

The section was reviewed by two labs that do most of the liquid testing in the valley. Their comments are incorporated in this edition.

PAVING ASPHALT

711.1 GENERAL:

The asphalt shall be produced from crude asphalt petroleum or a mixture of refined liquid asphalt and refined solid asphalt. It shall be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffin oil and shall be homogeneous and free from water.

Polymer modified asphalt cement shall be produced from crude asphalt petroleum and a polymer or blend of polymers mixed to produce a homogeneous material free from water.

Asphalt shall not be heated during the process of its manufacture, storage, or during construction so as to cause injury as evidenced by the formation of carbonized particles.

711.2 TESTING REQUIREMENTS:

Paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table and [ASTM D6376-AASHTO M-320](#) with the PAV temperature changes noted herein in this table.

TABLE 711-1				
PERFORMANCE GRADING SYSTEM				
	PG 58-22	PG 64-16	PG-70-10	PG 76-16
Original Asphalt				
Viscosity, ASTM D4402-AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135	135
Dynamic Shear ASTM D7175-AASHTO T315 (Note 2) G*/Sin δ, Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
Rolling Thin Film Oven Residue (ASTM D2872-AASHTO T240)				
Mass Loss, Maximum %	1.0	1.0	1.0	1.0
Dynamic Shear ASTM D7175-AASHTO T315 G*/Sin δ, Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
Pressure Aging Vessel Residue (ASTM D6521-AASHTO R28)				
PAV Aging Temperature, °C	100	100	110	110
Dynamic Shear ASTM D7175-AASHTO T315 G*·Sin δ, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	28	34	34
Creep Stiffness, ASTM D6648-AASHTO T313 (Note 3) S, Maximum, 300.0 Mpa m-value, Minimum, 0.300 Test Temp. @60s, °C	-12	-6	0	-6

Direct Tension, ASTM D6723 AASHTO T314 (Note 3) Failure Strain, Minimum 1.0% Test Temp. @ 1.0 mm/min. °C	-12	-6	0	-6
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On all Grades Flash Point Temperature [ASTM D92](#)[AASHTO T48](#): Minimum 230 °C and Mass Loss, Maximum 1.00 percent.

NOTES:

(1) This requirement may be waved at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

(2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of $G^*/\sin(\delta)$ at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer ([ASTM D4402](#)-[AASHTO T210](#) or [AASHTO T202](#)).

(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The m-value requirement must be satisfied in all cases.

Polymer modified paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table 711-2 and AASHTO M320 with the PAV temperature changes noted herein this table.

TABLE 711-2			
PERFORMANCE GRADING SYSTEM			
	PG 64-28P	PG-76-22P	PG76-22TR
Viscosity AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135
Dynamic Shear AASHTO T315 (Note 2) G*/Sin δ, Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	64	76	76
Elastic recovery D-6084 procedure "B" @ 25°C "B" @ 10°C	65	65	55
Phase Angle, Max	75	75	75
Separation test, Texas 540 % Max	4	4	4
Dynamic Shear AASHTO T315 G*/sin δ, Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	64	76	76
PAV Aging Temperature, °C	100	110	110
Dynamic Shear AASHTO T315 G* sin δ, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	31	31
Mass Loss, AASHTO T240 Weight % Max	1.0	1.0	1.0
M-value AASHTO T313 0300 Min	-18	-12	-12

<u>Creep Stiffness, AASHTO T313</u> <u>S, Maximum, 300.0 Mpa</u> <u>m-value, Minimum, 0.300</u> <u>Test Temp. @60s, °C</u>	<u>-18</u>	<u>-12</u>	<u>-12</u>
<u>Direct Tension, AASHTO T314 (Note 3)</u> <u>Failure Strain, Minimum 1.0%</u> <u>Test Temp. @ 1.0 mm/min. °C</u>	<u>-18</u>	<u>-12</u>	<u>-12</u>

On all Grades Flash Point Temperature AASHTO T48: Minimum 230 °C and Mass Loss, Maximum 1.00 percent.

NOTES:

(1) This requirement may be waved at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

(2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of $G^*/\sin(d)$ at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer (AASHTO T210 or AASHTO T202).

(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The m-value requirement must be satisfied in all cases.

~~Design Note: Performance Grade Asphalts are selected for certain reliabilities with respect to high and low pavement temperatures. The specified characteristics are based upon a loading frequency that approximates vehicle speeds of approximately 90 km/hr. Since all binders are frequency dependent, the designer may consider increasing the high temperature requirement for slow transient and standing loads, such as intersection loading. The high temperature requirement may also be increased for excessive numbers of equivalent single axle loads.~~

711.3 TEST REPORT AND CERTIFICATION:

At the time of delivery of each shipment of asphalt, the supplier supplying the material shall deliver to the purchaser 3 certified copies of the test report which shall indicate the name of the refinery and supplier, type and grade of asphalt delivered, date and point of delivery, quantity delivered, delivery ticket number, purchase order number, and results of the above specified tests. The test report shall be signed by an authorized representative of the supplier certifying that the product delivered conforms to the specifications for the type and grade indicated.

Until the certified test reports and samples of the material have been checked by the Engineer, that material will be only tentatively accepted by the Contracting Agency. Final acceptance will be dependent upon the determination of the Engineer that the material involved fulfills the requirements prescribed. The certified test reports and the testing required in connection with the reports shall be at no additional cost to the Contracting Agency.

711.4 TEMPERATURES:

Paving asphalt shall be heated in such a manner that steam or hot oils will not be introduced directly into the paving asphalt during heating.

711.5 CONVERSION OF QUANTITIES:

When pay quantities of paving asphalt are determined from volumetric measurements, the volumetric measurement at any temperature shall be reduced to the volume the material would occupy at 60 degrees F. in accordance with ASTM D-1250. In converting volume to weight, the computations shall be based on Table 711-3.

TABLE 711-3		
ASPHALT CEMENT QUANTITY CONVERSION		
Grade of Material	Gals. Per Ton of 60 °F.	Lbs. Per Gal at 60 °F.
PG 58-22	236	8.47
PG 64-16	235	8.5
PG 70-10	235	8.5
PG 64-28P	236	8.47
PG 76-22P,TR	236	8.47
PG 76-16	233	8.6

- End of Section -

PAVING ASPHALT

711.1 GENERAL:

The asphalt shall be produced from crude asphalt petroleum or a mixture of refined liquid asphalt and refined solid asphalt. It shall be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffin oil and shall be homogeneous and free from water.

Polymer modified asphalt cement shall be produced from crude asphalt petroleum and a polymer or blend of polymers mixed to produce a homogeneous material free from water.

Asphalt shall not be heated during the process of its manufacture, storage, or during construction so as to cause injury as evidenced by the formation of carbonized particles.

711.2 TESTING REQUIREMENTS:

Paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table and AASHTO M-320 with the PAV temperature changes noted herein in this table.

TABLE 711-1				
PERFORMANCE GRADING SYSTEM				
	PG 58-22	PG 64-16	PG-70-10	PG 76-16
Original Asphalt				
Viscosity, AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135	135
Dynamic Shear AASHTO T315 (Note 2) G*/Sin δ, Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
Rolling Thin Film Oven Residue (AASHTO T240)				
Mass Loss, Maximum %	1.0	1.0	1.0	1.0
Dynamic Shear AASHTO T315 G*/Sin δ, Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
Pressure Aging Vessel Residue (AASHTO R28)				
PAV Aging Temperature, °C	100	100	110	110
Dynamic Shear AASHTO T315 G*·Sin δ, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	28	34	34
Creep Stiffness, AASHTO T313 (Note 3) S, Maximum, 300.0 Mpa m-value, Minimum, 0.300 Test Temp. @60s, °C	-12	-6	0	-6
Direct Tension, AASHTO T314 (Note 3) Failure Strain, Minimum 1.0% Test Temp. @ 1.0 mm/min. °C	-12	-6	0	-6

On all Grades Flash Point Temperature AASHTO T48: Minimum 230 °C and Mass Loss, Maximum 1.00 percent.

NOTES:

(1) This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

(2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of $G^*/\sin(\delta)$ at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer (AASHTO T210 or AASHTO T202).

(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The m -value requirement must be satisfied in all cases.

Polymer modified paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table 711-2 and AASHTO M320 with the PAV temperature changes noted herein this table.

TABLE 711-2			
PERFORMANCE GRADING SYSTEM			
	PG 64-28P	PG-76-22P	PG76-22TR
Viscosity ,AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135
Dynamic Shear AASHTO T315 (Note 2) $G^*/\sin \delta$, Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	64	76	76
Elastic recovery D-6084 procedure "B" @ 25°C "B" @ 10°C	65	65	55
Phase Angle, Max	75	75	75
Separation test, Texas 540 % Max	4	4	4
Dynamic Shear AASHTO T315 $G^*/\sin \delta$, Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	64	76	76
PAV Aging Temperature, °C	100	110	110
Dynamic Shear AASHTO T315 $G^*\sin \delta$, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	31	31
Mass Loss, AASHTO T240 Weight % Max	1.0	1.0	1.0
M -value AASHTO T313 0300 Min	-18	-12	-12
Creep Stiffness, AASHTO T313 S , Maximum, 300.0 Mpa m -value, Minimum, 0.300 Test Temp. @60s, °C	-18	-12	-12
Direct Tension, AASHTO T314 (Note 3) Failure Strain, Minimum 1.0% Test Temp. @ 1.0 mm/min. °C	-18	-12	-12

On all Grades Flash Point Temperature AASHTO T48: Minimum 230 °C and Mass Loss, Maximum 1.00 percent.

NOTES:

(1) This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

(2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of $G^*/\sin(d)$ at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer (AASHTO T210 or AASHTO T202).

(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The m-value requirement must be satisfied in all cases.

711.3 TEST REPORT AND CERTIFICATION:

At the time of delivery of each shipment of asphalt, the supplier supplying the material shall deliver to the purchaser 3 certified copies of the test report which shall indicate the name of the refinery and supplier, type and grade of asphalt delivered, date and point of delivery, quantity delivered, delivery ticket number, purchase order number, and results of the above specified tests. The test report shall be signed by an authorized representative of the supplier certifying that the product delivered conforms to the specifications for the type and grade indicated.

Until the certified test reports and samples of the material have been checked by the Engineer, that material will be only tentatively accepted by the Contracting Agency. Final acceptance will be dependent upon the determination of the Engineer that the material involved fulfills the requirements prescribed. The certified test reports and the testing required in connection with the reports shall be at no additional cost to the Contracting Agency.

711.4 TEMPERATURES:

Paving asphalt shall be heated in such a manner that steam or hot oils will not be introduced directly into the paving asphalt during heating.

711.5 CONVERSION OF QUANTITIES:

When pay quantities of paving asphalt are determined from volumetric measurements, the volumetric measurement at any temperature shall be reduced to the volume the material would occupy at 60 degrees F. in accordance with ASTM D-1250. In converting volume to weight, the computations shall be based on Table 711-3.

Grade of Material	Gals. Per Ton of 60 °F.	Lbs. Per Gal at 60 °F.
PG 58-22	236	8.47
PG 64-16	235	8.5
PG 70-10	235	8.5
PG 64-28P	236	8.47
PG 76-22P,TR	236	8.47
PG 76-16	233	8.6



Chandler • Arizona
Where Values Make The Difference

MEMORANDUM

Case # 13-15

DATE: May 1st, 2013
TO: MAG Specifications and Details Committee Members
FROM: Warren White, City of Chandler Representative
SUBJECT: Proposed Revisions to MAG Sections 603, 615 and 618

Based upon MAG Working Group discussion, and proposed flexible pipe material specifications, revisions to the following MAG Sections are proposed. The intent is to create a new flexible pipe installation specification (Section 603), leaving Section 601 as the ridged pipe installation spec. Section 615 & 618 would then be updated to reflect the two base specifications for rigid and flexible pipes.

SECTION 603 TRENCH EXCAVATION, BACKFILLING, AND COMPACTION FOR FLEXIBLE PIPE

- All “HDPE” revised to “flexible”
 - Defining profile HDPE as “Profile HDPE (meeting ASTM F894)”
 - Reference Section 601 for Rigid Pipe Trench, Excavation, Backfilling and Compaction
- 603.2
- Add 603.2.1 language (from Section 601.2.1)
 - Updated trench widths
 - Added 603.2.3 Trench Grade from 601
 - Added 603.2.4 Fine Grading from 601
 - Added 603.2.5 Overexcavation from 601
 - Added 603.2.6 Excavation from Manholes, Valves, Inlets, Catch Basins and Other Accessories from 601
 - Added 603.2.7 Pavement and Concrete Cutting & Removal from 601
 - Added 603.2.8 Grading and Stockpiling from 601
- 603.3
- Added 603.3 Protection of Existing Utilities from 601
- 603.4
- Added 603.4.1 Foundation from 601
 - Added 603.4.3 Backfilling from 601
 - Added 603.4.4 Compaction Densities from 601; Add Table 603-2 from 601
 - Added 603.4.7 Rights-of-Way Belonging to Others from 601
 - Added 603.4.8 Test Holes from 601
 - Added 603.4.9 Foundation and Bedding for Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines from 601

603.5

- Added General language to 603.5 from 601

603.6

- Added 603.6 from 601

SECTION 615 SEWER LINE CONSTRUCTION

- Defining profile HDPE as “Profile HDPE (meeting ASTM F894)”
- Revising PVC or HDPE to flexible pipe

615.2

- Remove paragraph for PVC pipe and refer to Section 603

615.4

- Update “HDPE and PVC” to thermoplastic

SECTION 618 STORM DRAIN CONSTRUCTION

- All “HDPE” revised to “flexible”
- Define installation reference Section 601 for rigid pipe and Section 603 for flexible pipe

618.2

- Add Section 739 and 740 to pipe sections
- Call out gaskets to meet ASTM F477

618.3

- Instead of Class V pipe only for railroads – changed to pipe included in AREMA specifications

Here is an overview of related Sections:

	TRENCH EXCAVATION, BACKFILLING AND COMPACTION	INSTALLATION	MATERIAL
Flexible Pipe	Section 603 (Revised title, was Installation of HDPE)	Section 615 - Sewer	Section 738 - HDPE
		Section 618 - Storm	Section 739 - SRPE
		Section 610 - Water	Section 740 - Polypropylene
			Section 745 - PVC
Rigid Pipe	Section 601	Section 615 - Sewer	Section 735 - RCP
	(Current Title)	Section 618 - Storm	Section 736 - Non-RCP
		Section 610 - Water	Section 743 - VCP
			Section 750 - DIP
			Section 752 - ACP
			Section 785 - Concrete

SECTION 603

TRENCH EXCAVATION, BACKFILLING AND COMPACTION FOR FLEXIBLE PIPE

603.1 DESCRIPTION:

The work covered by this specification consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with flexible pipe installation in accordance with the plans, specifications and special provisions. Pipe materials that are considered to be flexible include thermoplastic pipes and corrugated metal pipe and arches. See Section [601](#) for rigid pipe trench excavation, backfilling and compaction.

For installation procedures of flexible pipe for sewer line construction, see Section [615](#).

For installation procedures of flexible pipe for storm drain construction, see Section [618](#).

HDPE pipe and fittings shall conform to Section [738](#). SRPE pipe and fittings shall conform to Section [739](#). Polypropylene pipe and fittings shall conform to Section [740](#). PVC pipe and fittings shall conform to Section [745](#). Corrugated metal pipe and arches shall conform to Section [760](#).

This section covers flexible pipeline installations of gravity and low-pressure storm drain and sanitary sewer construction.

For the purpose of this specification, low-pressure is defined as the test pressures of 3.5 psi of air or 4 feet of water as specified in Section [615.11](#).

For the purpose of this specification, flexible pipe shall include 8 inches through 120 inches nominal diameter.

603.2 EXCAVATION:

601.2.1 General: The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the plans, and including excavation ordered by the Engineer of compacted backfill for the purpose of making density tests on any portion of the backfill.

603.2.2 Trench Widths: Trenches for flexible pipe other than profile HDPE pipe, meeting ASTM F894, shall conform to the dimensions in Table [603-1](#), unless otherwise specified in the special provisions, indicated on the plans, and/or approved by the Engineer. Trench widths for profile HDPE pipe, meeting ASTM F894, will be designed by the Engineer and included on the plans or in the special provisions.

FLEXIBLE PIPE – TRENCH WIDTHS		
Size of Pipe (Nom. Dia.)	Maximum Width At Top Of Pipe Greater Than O.D. Of Barrel	Minimum Width At Springline Each Side of Pipe (1)
Less than 18 inches	20 inches	8 inches
18 inches to 24 inches inclusive	23 inches	9.5 inches
27 inches to 36 inches inclusive	28 inches	12 inches
42 inches to 60 inches inclusive	34 inches	14 inches
66 inches to 78 inches inclusive	44 inches	16 inches
84 inches to 96 inches inclusive	48 inches	18 inches
102 inches to 120 inches inclusive	54 inches	21 inches

(1) When the specified compaction cannot be obtained in the haunch area and/or bedding zone, the Contractor shall make necessary changes in his methods and/or equipment to obtain the desired results. In some instances, the Minimum Width at springline shall be adjusted wider to assist the Contractor in obtaining the compaction. The Engineer must be satisfied with the Contractor's compaction effort, concur with the change and approve the revised distance. There shall be no additional cost to the Agency for the extra trench width.

SECTION 603

For multiple pipe installations in a single trench, the Engineer shall provide details on the plans or in the Special/Technical Provisions as to the layout, pipe configuration, distances between pipes and trench walls, the type of backfill, bedding and foundation materials, etc.

The width of the trench shall not be greater than the maximum indicated in Table 603-1, at and below the level of the top of the pipe. The width of the trench above that level may be made as wide as necessary for sheeting and bracing, and for proper installation of the work.

603.2.3 Trench Grade: Alignment and elevation stakes shall be furnished by the Contractor at set intervals and agreed upon offsets. On water main projects, elevation stakes will be furnished only when deemed necessary by the Engineer. In all cases where elevation stakes are furnished, the Engineer will also furnish the Contractor with cut sheets.

For all pipe 12 inches or greater in diameter, the Contractor shall excavate for and provide an initial granular bedding at least 4 inches thick or 1/12 the O.D. of the pipe whichever is greater. This bedding material shall be placed at a uniform density with minimum compaction and fine graded as specified below.

Bell or coupling holes shall be dug after the trench bottom has been graded. Such holes shall be of sufficient width to provide ample room for caulking, banding, or bolting. Holes shall be excavated only as necessary to permit accurate work in the making of the joints and to insure that the pipe will rest upon the prepared bottom of the trench, and not be supported by any portion of the joint.

Depressions for joints, other than bell-and-spigot, shall be made in accordance with the recommendations of the joint manufacturer for the particular joint used.

603.2.4 Fine Grading: Unless otherwise specified in the plans and/or special provisions, the bottom of the trench shall be accurately graded to provide uniform bearing and support for each section of the pipe at every point along its entire length, except for portions of the pipe where it is necessary to excavate for bells and for proper sealing of the pipe joints.

603.2.5 Overexcavation: Except at locations where excavation of rock from the bottom of the trench is required, care shall be taken not to excavate below the depth indicated.

Unauthorized excavation below the specified grade line shall be refilled at the Contractor's expense with ABC material compacted to a uniform density of not less than 95 percent of the maximum density as determined by AASHTO T-99 and T-191 or ASTM D6938. When AASHTO T-99, method A or B, and T-191 are used for density determination, ARIZ 227c will be used for rock correction.

Whenever rock is encountered in the trench bottom, it shall be overexcavated to a minimum depth of six inches below the O.D. of the pipe. This overexcavation shall be filled with granular material placed with the minimum possible compaction.

Whenever unsuitable soil incapable of supporting the pipe is encountered, the Contractor will notify the Engineer and a field determination will be made as to the depth of overexcavation and the granular fill required.

603.2.6 Excavation for Manholes, Valves, Inlets, Catch Basins and Other Accessories: The Contractor may excavate to place the concrete structure directly against the excavated surface, provided that the faces of the excavation are firm and unyielding and are at all points outside the structure lines shown on the plans. If the native material is such that it will not stand without sloughing or if precast structures are used, the Contractor shall overexcavate to place the structure and this overexcavation shall be backfilled with the same material required for the adjoining pipe line trench and compacted per Table 603-2.

Any unnecessary excavation below the elevation indicated for the foundation of any structure shall be replaced with the same class of concrete specified for the structure or with 1 ½ 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. However, when using 1 ½ sack controlled low strength material, placement of the material shall be

SECTION 603

per Section 604 which will require a time lag between the material and the structural concrete. The placement of the additional material shall be at no cost to the Agency.

603.2.7 Pavement and Concrete Cutting and Removal: Where trenches lie within the Portland cement concrete section of streets, alleys, driveways, or sidewalks, etc., such concrete shall be sawcut to neat, vertical, true lines in such a manner that the adjoining surface will not be damaged. The minimum depth of cut shall be 1 ½ inches or 1/4 of the thickness, whichever is greater.

Asphalt pavement shall be clean-cut, with approved equipment and by approved methods in accordance with the requirements of Section 336.

No ripping or rooting will be permitted outside limits of cuts. Surfacing materials removed shall be hauled from the job site immediately, and will not be permitted in the backfill.

603.2.8 Grading and Stockpiling: All grading in the vicinity of trench excavation shall be controlled to prevent surface water from flowing into the trenches. Any water accumulated in the trenches shall be removed by pumping or by other approved methods.

During excavation, material suitable for backfilling shall be piled in an orderly manner, a sufficient distance back from the edges of trenches, to avoid overloading and to prevent slides or cave-ins. Material unsuitable for backfilling, or excess material, shall be hauled from the job site and disposed of by the Contractor.

The Contractor shall, prior to final acceptance of the work, submit a letter to the Contracting Agency stating the location of each disposal site for all excess or unsuitable material and certify that he has obtained the property owner's permission for the disposal of all such materials.

Where the plans and/or special provisions provide for segregation of topsoil from underlying material for purposes of backfill, the material shall not be mixed.

603.2.9 Shoring and Sheeting: The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. The bracing, sheathing, or shoring shall not be removed in one operation but shall be done in successive stages as determined by the Engineer to prevent overloading of the pipe during backfilling operations. The cost of the bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price for the pipe.

All shoring and sheeting deemed necessary to protect the excavation and to safeguard employees, shall be installed. See Section 107.

603.3 PROTECTION OF EXISTING UTILITIES:

601.3.1 Utilities: Unless otherwise shown on the plans or stated in the specifications, all utilities, either underground or overhead, shall be maintained in continuous service throughout the entire contract period. The Contractor shall be responsible and liable for any damages to or interruption of service caused by the construction.

If the Contractor desires to simplify his operation by temporarily or permanently relocating or shutting down any utility or appurtenance, he shall make the necessary arrangements and agreements with the owner and shall be completely responsible for all costs concerned with the relocation or shutdown and reconstruction. All property shall be reconstructed in its original or new location as soon as possible and to a condition at least as good as its previous condition. This cycle of relocation or shutdown and reconstruction shall be subject to inspection and approval by both the Engineer and the owner of the utility.

The Contractor shall be entirely responsible for safeguarding and maintaining all conflicting utilities that are shown on the plans (Sections 107 and 105 apply). This includes overhead wires and cables and their supporting poles whether they are inside or outside of the open trench. If, in the course of work, a conflicting utility line that was not shown on the plans is discovered, the Contracting Agency will either negotiate with the owner for relocation, relocate the utility, change the alignment and grade of the trench or as a last resort, declare the conflict as extra work to be accomplished by the Contractor in accordance with Section 104.

SECTION 603

601.3.2 Irrigation Ditches, Pipes and Structures: The Contractor shall contact the owners of all irrigation facilities, and make arrangements for necessary construction clearances and/or dry-up periods.

All irrigation ditches, dikes, headgates, pipe, valves, checks, etc., damaged or removed by the Contractor, shall be restored to their original condition or better, by the Contractor at no additional cost to the Contracting Agency.

601.3.3 Building, Foundations and Structures: Where trenches are located adjacent to building, foundations, and structures, the Contractor shall take all necessary precaution against damage to them. The Contractor shall be liable for any damage caused by the construction.

Except where authorized in the special provisions or in writing by the Engineer, water settling of backfill material in trenches adjacent to structures will not be permitted.

601.3.4 Permanent Pipe Supports: Permanent pipe supports for the various types and sizes of sewer, water and utility lines shall conform to the Standard Details or the details shown on the plans. Such pipe supports shall be erected at the locations shown on the plans and/or at any other locations as necessary as determined by the Engineer.

601.3.5 Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: These underground facilities shall be adequately supported by the Contractor. Support for plastic pipes shall be continuous along the bottom of the pipe. Support for metal pipe and electrical conduit may be continuous or nylon webbing may be used for suspension at no greater than ten-foot intervals.

The Contractor shall avoid damaging the plastic pipe, pipeways or conduits during trench backfilling and during foundation and bedding placement.

There will be no measurement or payment for this work. The Contractor will include all associated costs in the unit price for the conduit installation.

603.4 FOUNDATION, BEDDING, BACKFILLING AND COMPACTION:

601.4.1 Foundation: The material upon which the conduit or structure is to be placed shall be accurately finished to the grade or dimensions shown on the plans or as directed by the Engineer. The bottom portion of the trench shall be brought to grade so that the conduit or structure will be continuously in contact with the material on which it is being placed. If rocky or unsuitable soil is encountered, Subsection [603.2.5](#) applies.

603.4.2 Bedding: Coarse aggregate shall be used for bedding of Profile HDPE pipe (meeting ASTM F894). Coarse aggregate shall be in accordance with Subsection [603.4.6](#), for size, type, and gradation. For corrugated HDPE pipe as defined under Section [738](#), SRPE pipe as defined under Section [739](#), PP pipe as defined under Section [740](#), PVC pipe as defined under Section [745](#), and corrugated metal pipe and arches as defined under Section [621](#), bedding shall meet the requirements of subsection [601.4.2](#) and Table [601-2](#) with the compaction requirements stipulated below.

Bedding material shall be carefully deposited in 8 inches or less loose lifts, thoroughly and carefully compacted around the pipe, equally around both sides of the pipe, with approved vibratory compactors or other tools or equipment when applicable, or by shovel slicing as approved by the Engineer. This shall be repeated until enough material is placed and compacted to provide a minimum of one (1) foot cover over the top of Profile HDPE pipe (meeting ASTM F894), or to the top of other flexible pipe. Compaction densities, as well as further compaction requirements shall be as stipulated in Table [603-2](#), unless shown otherwise on the plans.

603.4.3 Backfill: Backfill shall be sound earthen material free from broken concrete, broken pavement, wood or other deleterious material. Unless otherwise specified, this may be native material with no piece larger than 4 inches, select material or aggregate base course. Backfill under street pavement shall be constructed per Detail 200-1 with the type of replacement noted on the plans or in the special provisions. Unless otherwise noted, backfill under single curb, curb and gutter, sidewalk, driveways, valley gutters, etc. shall be the same as the adjacent street pavement.

Where water consolidation is used, backfill will be placed in lifts as required in the following table prior to settlement.

SECTION 603

Trench Width	Backfill Lifts
18 to 24	Not to exceed 4
25 to 36	Not to exceed 6
Over 36	Not to exceed 8

The above backfill lift limitations are not applicable when water saturation is done by the jetting method. Where mechanical compaction is used, backfill shall be placed in lifts the height of which shall not exceed that which can be effectively compacted depending on the type of material, type of equipment and methods used, and under no circumstances shall exceed 4 feet.

Backfill, around utilities that are exposed during trench excavation, shall be placed in accordance with the bedding methods.

603.4.4 Compaction Densities: Unless otherwise provided in the plans and/or special provisions, the trench backfill shall be thoroughly compacted to not less than the densities in Table 603-2 when tested and determined by AASHTO T-99 and T-191 or ASTM D6938. When AASHTO T-99, method A or B, and T-191 are used for density determination, ARIZ-227c will be used for rock correction. All compaction discussed within this section shall be performed within 2 percentage points of optimum moisture content unless otherwise noted in the project plans or project specifications.

The density required will depend on the Type shown on the plans and/or called for in the special provisions. Density required for each type shall comply with Table 603-2.

TABLE 603-2				
MINIMUM TRENCH COMPACTION DENSITIES				
Backfill Type	Location	From Surface to 2 feet Below Surface	From 2 feet Below Surface To 1 foot Above Top of Pipe	From 1 foot Above Top of Pipe to Bottom of Trench
I	Under any existing or proposed pavement, curb, gutter, sidewalk, or such construction included in the contract, or when any part of trench excavation is within 2-feet of the above.	100% for granular 95% for non-granular	90%	90%
II	On any utility easement street, road or alley right-of-way outside limits of (I).	85%	85%	90%
III	Around any structures or exposed utilities.	95% in all cases		

Note: The type required will generally be shown on the plans and the plans will govern. Where no type is shown on the plans, the type shall comply with Table 603-2.

A consideration in determining the backfill Types as shown on the plans, is based on the trench widths as shown in the Contract Documents. If these trench widths increase beyond those widths referred to above and fall within the 2-foot limit of paved surfaces and other improvements due to construction exigencies, the backfill designation for that portion within the 2-foot limit of such improvements shall be Type I even though Type II backfill is shown on the plans.

603.4.5 Compaction Methods: For flexible pipe installations where the backfill and bedding material is coarse aggregate, mechanical compaction shall be the only method for consolidating backfill and bedding. Water consolidation shall not be used as a method of compaction for coarse aggregate whether used as a foundation, bedding or backfill material.

For flexible pipe installations where the backfill material is other than coarse aggregate, consolidation shall be by mechanical means. Water consolidation may be used as a compaction method for the backfill material only when prior written approval to do so is provided by the Engineer.

SECTION 603

603.4.6 Specifications for Material: Coarse aggregate shall consist of crushed rock as defined in Section [701.2](#) with 100 percent of the specified size of aggregate having one fractured face tested in accordance with ARIZ-212, and having the gradation complying with ASTM D448, Table 1, Size Numbers 6, 67, 68, 7, 78, or 8 as recommended by the Engineer. The gradation size number to be furnished shall be shown on the plans or in the project specifications.

603.4.7 Rights-Of-Way Belonging to Others: Backfill and compaction for irrigation lines of the Salt River Valley Water Users' Association and Roosevelt Irrigation Districts and for trenches in State of Arizona and Maricopa County right-of-way outside the limits of the Contracting Agency shall be accomplished in accordance with their permit and/or specifications.

603.4.8 Test Holes: Boring logs shown on the plans do not constitute a part of the contract and are included for the Contractor's convenience only. It is not intended to imply that the character of the material is the same as that shown on the logs at any point other than that where the boring was made. The Contractor shall satisfy himself regarding the character and amount of rock, gravel, sand, silt, clay and water to be encountered in the work to be performed.

603.4.9 Foundation and Bedding for Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: Foundation and bedding for these underground facilities shall be native material or sand which conforms to the grading requirement of ASTM C33 for fine aggregate. When backfill material consists of aggregate base course, crushed stone, or other material containing stones, only sand will be used for foundation, and bedding. The foundation depth shall be six inches and bedding depth shall be one foot above the top of the facility. Compaction will be in accordance with Section [603](#).

603.5 PREPARING AND INSTALLING FLEXIBLE PIPE:

When requested in the Special Provisions or by the Engineer prior to installation, the Contractor shall furnish to the Contracting Agency an affidavit (certification) from the pipe manufacturer (or his designee) stating that the Contractor is familiar with the manufacturer's suggested installation methods and procedures and the installation complies with those procedures and is consistent with MAG requirements.

Also, when required in the Special/Technical Provisions or requested by the Engineer, the pipe manufacturer or his designee will review the Contractor's methods and procedures for pipe installation in the field. The Contractor will make any adjustments in the installation as recommended by the manufacturer or his representative. If necessary, the Contractor may be required to reinstall or provide corrections to pipe installed prior to the field review at no cost to the Agency. Once the manufacturer or his representative has reviewed the Contractor's installation methods and the Contractor has adjusted his installation methods as recommended by the same, the manufacturer or his representative shall furnish to the Contracting Agency an affidavit (certification) that the Contractor's installation methods and procedures, at the time of the review, complied with the manufacturer's installation practices. The affidavit must provide the name of the manufacturer's representative witnessing the pipe installation.

603.5.1 Storage and Handling: Pipe shall be stored and handled in such a way to minimize out-of-roundness. Pipe shall be stored in shaded areas to minimize adverse effects of thermal, and ultraviolet exposure.

Pipe that is out-of-round in excess of 3% of the nominal pipe diameter as specified in Section [738](#), shall not be installed and shall be removed if installed.

603.5.2 Strutting: Strutting of Profile HDPE pipe (meeting ASTM F894) per Section [738](#) will be required when the diameter is 42 inches or larger. For Profile HDPE pipe (meeting ASTM F894) with diameters smaller than 42 inches, strutting may be required at the discretion of the Engineer. Strutting of corrugated metal pipe per Section [721](#), corrugated HDPE pipe per Section [738](#), SRPE pipe per Section [739](#), PP pipe per Section [740](#) and PVC pipe per Section [745](#) is not required.

Strutting consists of placing wood struts, whose length is typically 3% longer than the nominal pipe diameter, inside the pipe. A minimum of three (3) sets of struts are placed in each pipe length, oriented vertically, spaced equally throughout the length of pipe and set so as not to interfere with the jointing of the pipe. The struts shall be kept in place until the bedding material is placed and compacted around the pipe. The struts must be removed before any

SECTION 603

backfill or bedding is placed above the pipe. The procedure of strutting the pipe shall not damage the pipe in any way. If the pipe is out of round, the struts will be placed in the long direction of the out-of-round. If the strut cannot be held in place by the pipe, the pipe will be removed from the job site per Subsection [738.9](#).

603.5.3 Orienting: If the pipe is out-of-round, the pipe should be oriented so that the long axis is placed vertically when installed in the trench. When struts are used, the struts shall be oriented vertically when pipe is installed in the trench.

603.5.4 Installing Pipe: Flexible pipe and fittings shall be installed in accordance with ASTM D2321 (AASHTO Section 26 for corrugated metal pipe) or manufacturer's recommendation. Flexible pipe shall be handled so as not to damage the pipe. Hoisting shall be accomplished with cloth belt slings or ropes. The pipe shall be protected by wood blocking when jointing is accomplished by pipe jacking, back hoe bucket, come-along, or cable pipe puller.

603.6 PAVEMENT REPLACEMENT AND SURFACE RESTORATION:

603.6.1 Grading: The Contractor shall do such grading in the area adjacent to backfilled trenches and structures as may be necessary to leave the area in a neat and satisfactory condition approved by the Engineer.

603.6.2 Restoring Surface: All streets, alleys, driveways, sidewalks, curbs, or other surfaces, in which the surface is broken into or damaged by the installation of the new work, shall be resurfaced in kind or as specified to the satisfaction of the Engineer in accordance with Section [336](#).

603.6.3 Cleanup: The job site shall be left in a neat and acceptable condition. Excess soil, concrete, etc., shall be removed from the premises.

603.6.4 Temporary Pavement: The Contractor shall install temporary asphalt pavement or the first course of permanent pavement replacement in accordance with Section [336](#) immediately following backfilling and compaction of trenches that have been cut through existing pavement. Except as otherwise provided in Section [336](#), this preliminary pavement shall be maintained in a safe and reasonably smooth condition until required backfill compaction is obtained and final pavement replacement is ordered by the Engineer. Temporary paving removed shall be hauled from the job site and disposed of by the Contractor at no additional cost to the Contracting Agency.

603.7 PAYMENT:

No pay item will be included in the proposal, nor direct payment made for trench excavation, backfilling, compaction, or placement of temporary pavement. The cost of these features of work shall be included in the unit price per bid per linear foot for furnishing and laying pipe.

- End of Section -

SECTION 615

SEWER LINE CONSTRUCTION

615.1 DESCRIPTION:

The construction or extension of sewer lines shall conform to the applicable standard specifications and details, except as otherwise required on the plans or as modified in the special provisions.

Concrete pipe shall conform to Section 735. High density polyethylene (HDPE) pipe shall conform to Section 738. Vitrified clay pipe shall conform to Section 743. Polyvinylchloride (PVC) pipe and fittings shall conform to Section 745. Polypropylene (PP) pipe and fittings shall conform to Section 740. Steel reinforced polyethylene (SRPE) pipe and fittings shall conform to Section 739.

615.2. TRENCHING:

Excavation of trenches shall be accomplished in accordance with Section 601 for rigid pipe and 603 for flexible pipe.

The Engineer shall furnish the Contractor alignment and elevation stakes at agreed-upon intervals and offset together with cut sheets showing the difference in elevation from the top of the stakes to the flow line of the pipe.

The trench shall be dry when the fine grading of the bottom of the trench is accomplished. Before placement of pipe the fine grade shall be carefully checked by use of a string line, laser beam, or other means so that when in final position the pipe will be true to line and grade ± 0.05 feet for 8 inches through 12 inches, ± 0.10 feet for 15 inches and larger.

For rigid pipe, the width of the trench shall be per Table 601-1. For flexible pipe, the width of the trench shall be per Table 603-1.

615.3 SEPARATION

To protect water lines from contamination by sewer lines, separation and extra protection shall be in accordance with Section 610.

Sewer lines that are constructed of ductile iron pipe for extra protection shall be internally lined for sewer service.

615.4 LAYING PIPE:

Pipe shall be of the type, class and size called for on the plans. All pipe shall be protected during handling against impact shocks and free falls. No damaged or defective pipe shall be installed in the work. Pipe shall be kept clean at all times, and as the work progresses, the interior of the pipe shall be cleared of all dirt and superfluous materials of every description.

The laying of the pipe shall be in finished trenches free from water or debris, and shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow. Each pipe shall be laid firmly and true to line and grade, in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flowline. Any adjustment to line and grade shall be made by scraping away or filling in under the body of the pipe, never by wedging or blocking under the pipe ends.

The alignment and grade of each length of pipe shall be checked after setting by measurement from the string line, laser beam target or other means approved by the Engineer.

At all times when work is not in progress, open ends of the pipe and fittings shall be securely closed to the satisfaction of the Engineer, so that no water, earth or other substance will enter the pipe or fittings.

Thermoplastic pipe and fittings shall be installed in accordance with ASTM D2321. HDPE Profile pipe (meeting ASTM F894) bedding shall comply with Subsection 603.4. Flexible pipe bedding shall be placed in two lifts. The first lift will be from the bottom of the trench to the spring line of the pipe. The second lift will be from the spring line to one foot above the top of the pipe. Separate inspections will be required on each lift. The Contractor shall place the first lift in a manner that will insure uniform support under the haunches and proper alignment of the pipe.

615.5. FITTINGS:

All fittings shall conform to the requirements of the pipe specifications and shall be located as shown on the plans, or as directed by the Engineer, in accordance with the standard details.

615.6 JOINTING:

615.1 Rubber Gasket Joints: Prior to making pipe joints, all surfaces of the portions of the pipes to be joined shall be cleaned, dried, and prepared in accordance with the manufacturer's recommendations. The joints shall then be carefully centered and completed.

Trenches shall be kept water-free during the installation of joints and couplings.

The joint and coupling materials will be as specified in the appropriate pipe sections and shall be installed in accordance with the manufacturer's recommendations. Cement mortar joints will NOT be permitted in sanitary sewer construction.

615.6.2 Water Stops: Water stops will be required when connecting flexible pipe to concrete structures, manholes, etc. The water stop shall comply with Section 738 and will be installed per manufacturer recommendations.

615.7 SANITARY SEWER SERVICE TAPS:

When the construction of sanitary sewer service taps are called for in the special provisions, they shall be constructed in accordance with standard details for sewer taps except for HDPE pipe.

To maintain structural integrity of the pipe, service taps for HDPE pipe shall be constructed in accordance with the manufacturer's recommendations.

When any damage occurs to the pipe ribs or wall, outside the tap area, the Contractor shall perform repairs, as recommended by the manufacturer at no cost to the Contracting Agency. Damage to the pipe will include but not be limited to gouging, marring, and scratching forming a clear depression in the pipe.

The locations of the service tap for each property shall be in the downstream 1/3 of the lot, or as requested by the property owner. Sewer service taps shall not be covered until they have been plugged and marked in accordance with standard details and their location has been recorded by the Engineer. Electronic markers shall be placed at no greater depth than electronic locating devices can locate them (typically 2'-4').

615.8 SANITARY SEWER CLEANOUTS:

The cleanouts shall be constructed at locations shown on the plans, in accordance with the standard details for cleanouts.

615.9 MANHOLES:

Manholes shall be constructed to conform with the requirements of Sections 625, Section 505 and standard details.

615.10 BACKFILLING:

Backfilling and compaction shall be done in accordance with Sections 601 for rigid pipe and 603 for flexible pipe.

615.11 TESTING:

Pressure testing of force mains shall be done in accordance with Section 610.15.

Sewers and pipe lines shall be subject to acceptance testing after backfilling has been completed but prior to the placement of the finished surface material.

The Contracting Agency reserves the right to require testing of the entire installation. Cost of repairs or corrections necessary to conform to the following testing requirements will be borne by the Contractor at no additional cost to the Contracting Agency.

(A) Low Pressure Air Test:

Testing will be accomplished by the means of "Low Pressure Air Testing." Tests may be conducted by the Contractor or an independent testing firm. However, acceptance tests shall be made only in the presence of the Engineer.

Test Procedure:

- (1) Before testing, the pipe shall be thoroughly cleaned.
- (2) The Contractor shall seal off the section of pipe to be tested at each manhole connection. Test plugs must be securely braced within the manholes.
- (3) A minimum of two connecting hoses to link the air inlet test plug with an above ground test monitoring panel must be provided.
 - (a) One hose is to induce air through the test plug and into the test chamber.
 - (b) The second hose is for the purpose of monitoring the test pressure from within the enclosed pipe.
- (4) **UNDER NO CIRCUMSTANCES ARE WORKERS TO BE ALLOWED IN THE CONNECTING MANHOLES WHILE A PRESSURE TEST IS BEING CONDUCTED.**
- (5) Add air slowly into the test section. After an internal pressure of 4.0 psi is obtained, allow internal air temperature to stabilize.
- (6) After stabilization period, adjust the internal air pressure to 3.5 psi, disconnect the air supply and begin timing the test.
- (7) Refer to Table 615-1 to determine the length of time (minutes) the section under test must sustain while not losing in excess of 1 psi as monitored by the test gauge. If the section of line to be tested includes more than one pipe size, calculate the test time for each size and add the test times to arrive at the total test time for the section.
- (8) Sections so determined to have lost 1 psi or less during the test period will have passed the leakage test. Those sections losing in excess of 1 psi during the test period will have failed the leakage test.
- (9) Appropriate repairs must then be completed and the line retested for acceptance.

TABLE 615-1			
SANITARY SEWER AIR TEST			
Minimum Test Time for Various Pipe Sizes*			
Nominal Pipe Size, in	T (time), min/100 ft	Nominal Pipe Sizes, in.	T (time), min/100 ft.
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

*The time has been established using the formulas contained in ASTM C828, Appendix.

(B) Hydrostatic Test

Exfiltration Testing (water):

Sanitary sewer testing by means of exfiltration should only be considered when low pressure air testing cannot be used and only with approval of the Engineer.

Testing Procedure:

- (1) The Contractor shall furnish all equipment for testing.
- (2) Seal off the downstream end of the line and fill with water to a minimum head of 4 feet in a stand at the high end.
- (3) A period of at least one hour will be allowed for absorption time before making the test.
- (4) A suitable meter or method of measuring the quantity of water used in necessary.
- (5) The allowable water loss for sanitary sewers shall not exceed 0.158 gallons per hour per 100 feet of pipe per inch of diameter of pipe under a minimum test head of 4 feet above the top of the pipe at the upper end.

(C) Deflection Test for flexible Pipe:

In addition to the tests prescribed above, the Contractor shall perform a deflection test on the system as directed by the Engineer. Any part of the installation which shows deflection in excess of 5% of the published inside diameter shall be corrected.

After acceptance but prior to the termination of the warranty period, the Contracting Agency may test the long term deflection of the sewer. If the Contracting Agency determines that the deflection has exceeded 7.5% of the average inside diameter, that portion of the installation shall be corrected by the Contractor at no cost to the Contracting Agency.

(D) Closed Circuit T.V. Inspection:

The Contracting Agency reserves the right to visually inspect the interior of the sewer line using a television camera. Any defects in the pipe or construction methods revealed shall be corrected by the Contractor at no additional cost to the Contracting Agency.

The Contracting Agency will pay for the initial T.V. inspection. Any additional inspection(s) required, due to failure of the initial inspection, shall be paid for by the Contractor.

615.12 PAVEMENT AND SURFACING REPLACEMENT:

Pavement and surfacing replacement shall be done in accordance with Section 336.

615.13 CLEAN UP:

The Engineer has the right to close down forward trenching and pipe laying where testing, backfill, compaction and cleanup does not follow in an orderly manner.

615.14 MEASUREMENT AND PAYMENT:

(A) Sewer Pipe and Fittings: (Vitrified clay, cast iron and other approved types of pipe.)

Measurement will be made horizontally through manholes and fittings and from centerline to centerline of structures, for the various types and sizes of pipe called for on the plans and in the proposal.

Payment for the various sizes and types of pipe will be made at the unit price bid per linear foot, and shall be compensation in full for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, removal of obstructions, backfilling, water settling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.

(B) Sanitary Sewer Service Taps:

Measurement will be the number of taps installed.

Payment will be made at the unit price bid and shall be compensation in full for furnishing and installing pipe and fittings complete in place, as specified and called for on the plans and standard details, including all cost of excavation, removal of obstructions, shoring and bracing, backfilling, compaction, pavement replacement, maintenance of traffic, and all work incidental thereto.

(C) Sanitary Sewer Cleanouts:

Measurement will be the number of cleanouts installed.

Payment will be made at the unit price bid and shall be compensation in full for furnishing and installing pipe, fittings, and frame and cover as called for on the plans and in accordance with the standard details.

-End of Section-

SECTION 618

STORM DRAIN CONSTRUCTION

618.1 DESCRIPTION:

This section covers concrete pipe line and flexible pipe line construction used for the conveyance of irrigation water and storm drainage in streets, easements, and alley right of ways, under low hydrostatic heads.

Installation of pipe in laterals of Salt River Valley Water Users' Association or other irrigation districts shall conform to the specifications and permit of the respective irrigation district.

Installation of pipe in State Highways shall conform to the specifications and permit of the Arizona Department of Transportation.

618.2 MATERIALS:

The concrete pipe and flexible pipe, specials, joints, gaskets, and testing shall be according to Sections 620 or 735, 736, 738, 739, and 740 except as specified below or as modified by special provisions.

(A) Specials: Pipe specials such as closure pieces, wyes, tees, bends, and manhole shafts shall be provided as indicated on the plans, and such specials shall be made equal in strength, diameter, and other physical characteristics to the standard straight pipe lengths by the use of extra concrete, extra reinforcing, or steel items. Drawings of specials shall be submitted to the Engineer for approval before their fabrication.

(B) Rubber Gasket Joints: When rubber gasket pipe is used, the joint shall be sealed with a continuous ring gasket made of a special composition rubber of such size and cross-section as to fill the annular space provided for it. The gasket shall be the sole element depended upon to make the joint watertight, and shall have smooth surfaces, free from pits, blisters, porosity, and other imperfections.

- (1) Rubber Gaskets for RCP shall be in accordance with ASTM C443 or AASHTO M315.
- (2) Rubber Gaskets for flexible pipe shall be in accordance with ASTM F477.

(C) Water Stops: Water stops will be required when connecting HDPE pipe to concrete structures, manholes, etc. The water stop shall comply with Section 738 and will be installed per manufacturer recommendations.

(D) Cement Mortar Joints for RCP will be in accordance with Subsection 736.3.

618.3 CONSTRUCTION METHODS:

Excavation, bedding, backfilling, and compaction or consolidation of backfill and bedding of trenches shall be accomplished in accordance with Sections 601 for rigid pipe and 603 for flexible pipe, except as specified below, or as modified by special provisions.

The Contractor shall over-excavate the trench and fill with select materials in accordance with standard details.

Where the cover over the top of the pipe is less than 10 feet, the maximum trench width is unrestricted. The pay width, however, for pavement replacement shall remain in accordance with Section 336. For pipe, with 10 feet or more cover, the maximum trench width shall be as required by Sections 601 for rigid pipe and 603 for flexible pipe.

The laying of the pipe shall be in finished trenches free from water or debris, and shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow. Each pipe shall be laid firmly and true to line and grade, in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden off-sets of the flow line. Any adjustment to the line and grade shall be made by scraping away or filling in under the body of the pipe, never by wedging or blocking under the pipe ends.

Variation from prescribed alignment and grade shall not exceed 0.10 foot and the rate of departure from or return to established grade or alignment shall be no more than 1 inch in 10 feet of pipe line unless otherwise approved by the Engineer. For closures and deflection angles greater than 10 degrees, joint shall be made by use of a bend, specifically manufactured fitting, or by a concrete collar, per standard details. Pipe shall be the type, class and size shown on the plans or in the special provisions.

All pipe, for permit construction, shall be reinforced concrete pipe, ASTM C76 Class III or HDPE pipe in accordance with ASTM F894, AASHTO M252 or AASHTO M294, PP pipe in accordance with AASHTO M330, ASTM F2736, or ASTM F2764, SRPE in accordance with ASTM F2562. For reinforced concrete pipe, the minimum cover from the top of the pipe to the finished grade shall be 2 feet and the maximum cover shall be 12 feet. The minimum and maximum cover for flexible pipe shall be as specified in the special provisions or the manufacturer's recommendations.

All pipes installed under railroad tracks shall be included in AREMA specifications and the minimum cover over all pipe shall be as specified in the railroad permit and/or special provisions. Bedding shall be in accordance with standard details.

The allowable water loss for irrigation lines shall not exceed 2 gallons per hour per 100 feet of pipe per inch of diameter of pipe, under a minimum test head of 1 foot above the top of the pipe at the upper end when tested in accordance with the procedures of Section 615.

618.4 JACKING PIPE:

At locations where jacking is required, the storm drain line shall be installed by jacking to the lengths indicated on the plans, in accordance with the following. The methods and equipment used in jacking reinforced concrete pipe conduit shall be optional with the Contractor, provided that the proposed method is first approved in writing by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for damages of any nature which might occur as a result of the methods used.

Only workmen experienced in the operation of jacking concrete conduit shall be used.

The driving ends of the conduit shall be properly protected and the conduit shall be driven true to alignment and grade. The deviation from true line and grade at any single point within the jacked portion shall be limited to 0.5 feet horizontal deviation from line and +/- feet vertical deviation from grade.

Any section of conduit which may show signs of failure shall be removed and replaced with a new section of precast conduit or with a cast-in-place section, which in the opinion of the Engineer is adequate to carry the loads imposed upon it. In this respect it shall be understood that where pipe is specified on the drawings to be jacked into place the jacked pipe shall be reinforced concrete of the strength specified in these specifications and the design of such pipe is based upon superimposed loads and not upon loads which may be placed upon the pipe as a result of jacking operation. Any increase in pipe strength required in order to withstand jacking loads shall be the responsibility of the Contractor. The reinforcing shall be circular and of either single or double cage design.

Spacer blocks shall be placed in the inside circular space which will allow sufficient width for point mortaring when jacking is completed and to equalize pressure during jacking. Three grout holes per 8-foot section of pipe shall be made during manufacturing.

Double rubber gaskets and band type joints shall be provided for 36 inches diameter and larger pipe.

One hole shall be made on the top midway between the ends. Two additional holes, each approximately 1.5 feet from each end and approximately midway between the springline and top on opposite sides shall be made.

Where the nature of the soil, or the structure under which the conduit is being jacked is such that, there is increased danger of a cave-in or damage to said structure, the method of jacking the conduit shall be as specified below.

The leading section of conduit shall be equipped with a jacking head securely anchored thereto prevent any wobble or alignment variation during jacking operations. The length and details of the jacking head shall be subject to the written approval of the Engineer. Excavation shall be carried out entirely within the jacking head and no excavation in advance thereof will be permitted. Every effort shall be made to avoid any loss of earth outside of the jacking head. Excavated material shall be removed from the conduit as excavation progresses, and no accumulation of such material within the conduit will be permitted.

Upon completion of the jacking operations, all voids around the outside face of the conduit shall be filled by grouting through each of the previously constructed grout holes to the satisfaction of the Engineer. The grout shall be a mixture of one part cement to three parts sand and a mixture by volume.

Grouting equipment and material shall be on the job before jacking operations are started in order that grouting around the jacked conduit may be started immediately after the jacking operation. After grouting, the holes in the conduit shall be repaired to the satisfaction of the Engineer.

618.5 VIDEO INSPECTION OF NEW MAINLINE STORM DRAINS:

The Contractor shall provide the Engineer with an annotated video inspection record (either VHS or DVD format) of the new mainline storm drain pipeline. The video shall clearly show all joints, seals, connecting pipes, and manholes. This video shall be provided to the Engineer, and reviewed and approved by the Engineer prior to the Contractor being allowed to place the final pavement over the storm drain line. No separate payment will be made for this inspection; the cost of the video inspection shall be included in the cost of the pipe.

618.6 MEASUREMENT:

(A) Main Line Pipe: Shall be the number of linear feet pipe laid as measured along the pipe axis.

(B) Connecting Pipe: Shall be the number of linear feet of pipe installed, as measured along the pipe axis from a main line pipe, or a manhole, or a catch basin to a catch basin, or a plugged end, and shall include the portions of the connecting pipe embedded in the above structures.

(C) Jacked Pipe: Shall be made at the ground surface and shall be the number of linear feet of ground surface undisturbed by the cut and cover construction on either side of the jacked section.

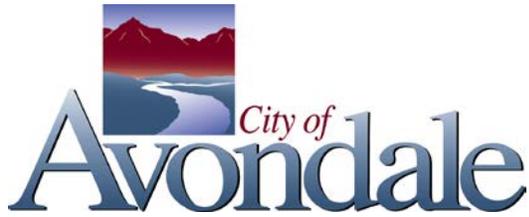
618.7 PAYMENT:

(A) Main Line Pipe: Will be paid at the unit price bid per linear foot, to the nearest foot, for each size and type of pipe and shall be compensation in full for furnishing and installing the type of pipe as specified and as shown on the plans including removals of obstructions, excavation, bedding, backfilling, compacting, testing, joint materials, joining, collars, and field closures.

(B) Connecting Pipe: Will be paid at the unit price bid per linear foot, to the nearest foot for each size of pipe and shall be compensation in full for furnishing and installing complete in place as shown on the plans and as specified, the connecting pipe and specials including spur connections, removal of obstructions, excavations, bedding, backfilling, compacting, joint materials, joining, collars, field closures, and testing.

(C) Jacked Pipe: Will be paid the same as for main line pipe.

-End of Section-



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DATE: May 1, 2013

TO: MAG Specifications and Details Committee

FROM: Jim Badowich, Avondale Representative, Vice Chair

SUBJECT: New Case 13-16:
Revision to Section 602; *Encasement of Water or Sewer Pipe by Jacking or Tunneling Operation*

PURPOSE: Update and revise specification to current industry methods and technology including revision to the specification title.

SECTION 602

Below is the original MAG 602-1967???**ENCASEMENT OF WATER OR SEWER PIPE BY JACKING OR TUNNELING OPERATION****602.1 DESCRIPTION:**

The Contractor shall furnish all labor, material and equipment as required to perform the jacking or tunneling operation in accordance with the plans and specifications.

In the performance of the work, the Contractor shall comply with the lawful requirements of the affected Contracting Agencies, owners of public utilities and any other facilities which might be endangered by jacking or tunneling operations.

602.2 GENERAL:

Unless otherwise provided for by the Contracting or Permitting Agency the Contractor shall be responsible for determining the required thickness of the steel liner plate or steel casing in accordance with the manufacturer's recommendations.

The inside diameter of the steel liner plate or steel casing shall be a minimum of 12 inches larger than the largest outside diameter of the carrier pipe or the size indicated on the plans, whichever is greater. No part of the plates or flanges shall be allowed to extend inside this net diameter. It shall be the responsibility of the Contractor to increase such dimension where necessary to provide placement room for pipe bells or to provide adequate space for grout placement.

The tolerances allowed for the alignment and grade of carrier pipe shall be the same as if it was being installed in a trench (Sections [610](#), [615](#) and [618](#)).

The approach trench for jacking or tunneling operation shall be shored to safeguard existing sub-structure and surface improvements and to protect against ground movement in the vicinity of the jack supports or tunnel portal.

602.3 JACKING OPERATION:

Before starting operations, the Contractor shall submit in accordance with Subsection [105.2](#), detailed shop drawing of the jacking pit bracing, the casing, the jacking head, the carrier pipe installation method and the bracing to prevent carrier pipe flotation and shifting.

The casing shall consist of welded steel pipe (ASTM A283 Grade C). Shop and field joints shall be butt weld. Fabrication and welding shall be in accordance with AWWA C-200. Weld or hydrostatic testing is not required.

The leading edge of the casing shall be equipped with a steel jacking head, securely anchored to prevent any wobble or alignment variation during the jacking operation. Excavation shall not be made in advance of the jacking head and every effort shall be made to avoid any loss of earth outside of the jacking head. Excavated material shall be removed from the casing as excavation progresses and accumulation of material within the casing shall not be permitted.

Once the jacking operation has started, it shall be continued around the clock until the specified limits have been reached.

On steel casing 36 inches or larger (I.D.), grout connections shall be provided at a maximum spacing of 10 feet. Upon completion of the jacking operation, all voids around the outside face of the steel casing shall be filled by grouting. Grouting equipment and material shall be on the job site before the jacking operations are completed so that grouting may be started immediately. Grout shall be placed by means of pumps capable of pressures up to 100 psi unless otherwise approved by the Engineer. Grouting pressure shall be controlled to approximately 10 psi so as to avoid movement of the ground around the steel casing. After grouting has been completed, the grouting connections will be closed with threaded steel plugs.

Steel casing smaller than 36 inches (I.D.) will not require outside grouting unless caving or earth movement occurs.

SECTION 602

602.4 TUNNELING OPERATIONS:

Before starting operations, the Contractor shall submit, in accordance with Subsection [105.2](#), detailed shop drawing of the steel liner plate, method of installing the steel liner plates, tunnel dimensions, method of backpacking any cave-ins or overexcavation, carrier pipe installation method, and the bracing to prevent carrier pipe shifting and flotation.

Only steel liner plates will be used for tunnel support. All plates shall be punched for bolting on both longitudinal and circumferential seams or joints and shall be fabricated for erection inside the tunnel. Grout connections will be provided on the liner plates at a maximum distance of 10 feet. The entire periphery of the tunnel will be lined allowing no gaps between the liner plates. Excavation of the tunnel section shall be restricted to the least clearance required to permit erection of the liner plate. Every effort will be made to prevent any loss of ground and the Contractor shall perform the grouting operation at intervals not to exceed three rings of the liner plate. Grout shall be placed by means of pumps capable of pressures up to 100 psi. The placement pressure shall not, normally, exceed 10 psi to avoid deformation of the liner plate or the ground. After grouting has been completed, the grout connection will be closed with threaded steel plugs.

602.5 DEWATERING:

All water encountered during the jacking or tunneling operation shall be disposed of by the Contractor in such a manner as will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes and equipment for dewatering will be considered incidental to the work and no additional payment will be made.

602.6 CARRIER PIPE PLACEMENT:

Carrier pipe, larger than 24 inches (I.D.), shall be placed using pipes or rails for alignment and grade. Carrier pipe, 24 inches I.D. or less, may be placed using pipes, rails or wooden skids, at the Contractor's option. In either case, it shall be the Contractor's responsibility to obtain the required alignment and grade for the carrier pipe and to ensure that the carrier pipe does not draw or rest on the casing or liner plate.

After the carrier pipe has been placed and securely blocked to prevent shifting or flotation, the entire annular space shall be completely filled with grout.

If the Contractor is not ready to place the carrier pipe immediately following completion of the jacking or tunneling operation, the ends shall be protected with temporary bulkheads. The approach trench shall be backfilled in accordance with Sections [601](#) and [336](#).

After completion of the grouting operation, the Contractor shall remove all loose and disturbed material in the approach trench and backfill the trench in accordance with Sections [601](#) and [336](#).

602.7 MEASUREMENT AND PAYMENT:

Measurement for this work shall be at the ground surface and shall be the number of horizontal linear feet of ground surface undisturbed by the cut and cover construction on the ends of the steel casing or tunnel liner operation. Payment compensation for furnishing all labor, material, tools, and equipment required for the successful completion of the jacking or tunneling operation, including carrier pipe placement, in accordance with this Section.

- *End of Section* -

SECTION 602

This is the first revision submitted to the subcommittee March 3, 2013

TRENCHLESS INSTALLATION OF WATER OR SEWER PIPE ENCASEMENT OF WATER OR SEWER PIPE BY OR TUNNELING OPERATION

602.1 DESCRIPTION:

The Contractor shall furnish all labor, material and equipment as required to perform the ~~jacking or tunneling~~ trenchless operation in accordance with the plans and specifications ~~using horizontal earth auger boring, hand tunneling, pipe ramming or other trenchless method.~~

In the performance of the work, the Contractor shall comply with the lawful requirements of the affected Contracting Agencies, owners of public utilities and any other facilities which might be endangered by ~~jacking or tunneling~~ trenchless operations.

602.2 GENERAL:

Unless otherwise provided for by the Contracting or Permitting Agency the ~~minimum wall thickness for steel casing shall be 3/8", or greater as determined by casing size, soil conditions and installation method.~~ Contractor shall be responsible for determining the required thickness of the steel liner plate or steel casing in accordance with the manufacturer's recommendations.

~~The inside diameter of the steel liner plate or steel casing shall be a minimum of 12 inches larger than the largest outside diameter of the carrier pipe or the size indicated on the plans, whichever is greater. No part of the plates or flanges shall be allowed to extend inside this net diameter. It shall be the responsibility of the Contractor to increase such dimension where necessary to provide placement room for pipe bells or to provide adequate space for grout placement.~~

The tolerances allowed for the alignment and grade of carrier pipe shall be the same as if it was being installed in a trench (Sections [610](#), [615](#) and [618](#)).

~~The approach trench bore & reception pits for jacking or tunneling the trenchless operation shall be shored to safeguard existing sub-structure and surface improvements and to protect against ground movement. in the vicinity of the jack supports or tunnel portal.~~

602.3 TRENCHLESS JACKING OPERATION:

Before starting operations, the Contractor shall submit in accordance with Subsection [105.2](#), detailed shop drawing of the ~~jacking bore pit shoring, the casing, the jacking head, and the carrier pipe installation method. and the bracing to prevent carrier pipe flotation and shifting.~~

The casing shall consist of welded steel ~~pipe~~ **plate rolled into a can** confirming to (ASTM A283 Grade C or ASTM A252). Shop and field joints shall be butt weld. Fabrication and welding shall be in accordance with AWWA C-200. Weld or hydrostatic testing is not required.

~~The leading edge of the casing shall be equipped with a steel jacking head, securely anchored to prevent any wobble or alignment variation during the jacking operation. Excavation shall not be made in advance of the jacking head and every effort shall be made to avoid any loss of earth outside of the jacking head. Excavated material shall be removed from the casing as excavation progresses and accumulation of material within the casing shall not be permitted.~~

~~Once the jacking operation has started, it shall be continued around the clock until the specified limits have been reached.~~

It shall be the responsibility of the contractor, considering geotechnical conditions and project specific conditions, to determine if the project shall run continuously around the clock until the specified limits have been reached.

SECTION 602

~~On steel casing 36 inches or larger (I.D.), grout connections shall be provided at a maximum spacing of 10 feet. Upon completion of the jacking operation, all voids around the outside face of the steel casing shall be filled by grouting. Grouting equipment and material shall be on the job site before the jacking operations are completed so that grouting may be started immediately. Grout shall be placed by means of pumps capable of pressures up to 100 psi unless otherwise approved by the Engineer. Grouting pressure shall be controlled to approximately 10 psi so as to avoid movement of the ground around the steel casing. After grouting has been completed, the grouting connections will be closed with threaded steel plugs.~~

On steel casing 36 inches or larger grout connections shall be provided at a maximum spacing of every 20 feet located at 12 o'clock in the steel casing. Upon completion of the boring operation, the contractor shall inspect each grout hole to determine if grouting is required. Any void greater than 2" will require the boring contractor to attempt grouting. After grouting the grout holes will be closed with a threaded steel plug.

Steel casing smaller than 36 inches (O.D.) will not require outside grouting unless caving or earth movement occurs

602.4 TUNNELING OPERATIONS:

~~Before starting operations, the Contractor shall submit, in accordance with Subsection [105.2](#), detailed shop drawing of the steel liner plate ~~or steel casing~~, method of installing the steel liner plates ~~or steel casings~~, tunnel dimensions, method of backpacing any cave ins or over excavation, carrier pipe installation method, and the bracing to prevent carrier pipe shifting and flotation.~~

~~Only steel liner plates, ~~steel casings or rib & lagging~~ will be used for tunnel support. All plates shall be punched for bolting on both longitudinal and circumferential seams or joints and shall be fabricated for erection inside the tunnel. Grout connections will be provided on the liner plates at a maximum distance of 10 feet. The entire periphery of the tunnel will be lined allowing no gaps between the liner plates. Excavation of the tunnel section shall be restricted to the least clearance required, to permit erection of the liner plate. Every effort will be made to prevent any loss of ground and the Contractor shall perform the grouting operation at intervals not to exceed three rings of the liner plate ~~or rib & lagging~~. ~~For steel casing grouting will commence after the casing has been completely installed.~~ Grout shall be placed by means of pumps capable of pressures up to 100 psi. The placement pressure shall not, normally, exceed 10 psi to avoid deformation of the liner plate or the ground. After grouting has been completed, the grout connection will be closed with threaded steel plugs.~~

602.5 DEWATERING:

All water encountered during the ~~jacking or tunneling~~ trenchless operation shall be disposed of by the Contractor in such a manner as will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes and equipment for dewatering will be considered incidental to the work and no additional payment will be made.

602.6 CARRIER PIPE PLACEMENT:

~~Carrier pipe, larger than 24 inches (I.D.), shall be placed using pipes or rails for alignment and grade. Carrier pipe, 24 inches I.D. or less, may be placed using pipes, rails or wooden skids, at the Contractor's option. In either case, it shall be the Contractor's responsibility to obtain the required alignment and grade for the carrier pipe and to ensure that the carrier pipe does not draw or rest on the casing or liner plate.~~

Pressurized carrier pipes, ie water, gas, shall be placed using casing spacers, wood skids or 1" -2" pipes for rails.

Gravity carrier pipes, ie sewer, storm drain, shall be placed using wood skids or 1"-2" pipes for rails.

In either case it shall be the Contractor's responsibility to obtain the required line and grade for the carrier pipe and to ensure that the carrier pipe does not draw or rest on the casing.

SECTION 602

The annular space between the casing and carrier line shall be left empty, should the annular space need to be filled 5/16" to 3/8" pea gravel shall be used to fill the annular space.

Bulkheads consisting of brick and mortar or concrete, shall be constructed on either end of the casing, bulkheads shall be a minimum of 8" thick.

~~After the carrier pipe has been placed and securely blocked to prevent shifting or flotation, the entire annular space shall be completely filled with grout.~~

If the Contractor is not ready to place the carrier pipe immediately following completion of the jacking or tunneling operation, the ends shall be protected with temporary bulkheads. The ~~approach trench~~ bore pits shall be backfilled in accordance with Sections [601](#) and [336](#).

~~After completion of~~ completing the grouting operation, the Contractor shall remove all loose and disturbed material in the ~~approach trench~~ bore pits and backfill the ~~trench~~ pits in accordance with Sections [601](#) and [336](#).

602.7 MEASUREMENT AND PAYMENT:

Measurement for this work shall be at the ground surface and shall be the number of horizontal linear feet **from the end of the casing in the bore pit to the end of the casing in the reception pit** ~~of ground surface undisturbed by the cut and cover construction on the ends of the steel casing or tunnel liner operation.~~ Payment compensation for furnishing all labor, material, tools, and equipment required for the successful completion of the ~~jacking or tunneling~~ trenchless operation, including carrier pipe placement, in accordance with this Section.

- End of Section -

SECTION 602

2nd revision of MAG 602- preliminary final draft March 3, 2013

TRENCHLESS INSTALLATION OF WATER OR SEWER PIPE

602.1 DESCRIPTION:

The Contractor shall furnish all labor, material and equipment as required to perform the **trenchless** operation in accordance with the plans and specifications **using horizontal earth auger boring, hand tunneling, pipe ramming or other trenchless method.**

In the performance of the work, the Contractor shall comply with the lawful requirements of the affected Contracting Agencies, owners of public utilities and any other facilities which might be endangered by **trenchless** operations.

602.2 GENERAL:

Unless otherwise provided for by the Contracting or Permitting Agency the **minimum wall thickness for steel casing shall be 3/8-inch, or greater as determined by casing size, soil conditions and installation method.**

The tolerances allowed for the alignment and grade of carrier pipe shall be the same as if it was being installed in a trench (Sections [610](#), [615](#) and [618](#)).

The **bore & reception pits** for the **trenchless** operation shall be shored to safeguard existing sub-structure and surface improvements and to protect against ground movement.

602.3 TRENCHLESS OPERATION:

Before starting operations, the Contractor shall submit in accordance with Subsection [105.2](#), detailed shop drawing of the **bore pit shoring**, the casing, **and** the carrier pipe installation method.

The casing shall consist of welded steel **plate rolled into a can conforming to** (ASTM A283 Grade C or ASTM A252). Shop and field joints shall be butt weld. Fabrication and welding shall be in accordance with AWWA C-200. Weld or hydrostatic testing is not required.

It shall be the responsibility of the contractor, considering geotechnical conditions and project specific conditions, to determine if the project shall run continuously around the clock until the specified limits have been reached.

On steel casing 36 inches or larger grout connections shall be provided at a maximum spacing of every 20 feet located at 12 o'clock in the steel casing. Upon completion of the boring operation, the contractor shall inspect each grout hole to determine if grouting is required. Any void greater than 2 inches will require the boring contractor to attempt grouting. After grouting the grout holes will be closed with a threaded plug.

Steel casing smaller than 36 inches (O.D.) will not require outside grouting unless caving or earth movement occurs

602.4 DEWATERING:

All water encountered during the **trenchless** operation shall be disposed of by the Contractor in such a manner as will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes and equipment for dewatering will be considered incidental to the work and no additional payment will be made.

602.5 CARRIER PIPE PLACEMENT:

Pressurized carrier pipes, (i.e. water, gas) shall be placed using casing spacers, wood skids or 1-inch to 2-inch steel pipes for rails.

SECTION 602

Gravity carrier pipes, (i.e. sewer, storm drain) shall be placed using wood skids or 1-inch to 2-inch steel pipes for rails.

In either case it shall be the Contractor's responsibility to obtain the required line and grade for the carrier pipe and to ensure that the carrier pipe does not draw or rest on the casing.

The annular space between the casing and carrier line shall be left empty, should the annular space need to be filled 5/16-inch to 3/8-inch pea gravel shall be used to fill the annular space.

Bulkheads consisting of brick and mortar or concrete, shall be constructed on either end of the casing, bulkheads shall be a minimum of 8 inches thick.

If the Contractor is not ready to place the carrier pipe immediately following completion of the jacking or tunneling operation, the ends shall be protected with temporary bulkheads. The bore pits shall be backfilled in accordance with Sections [601](#) and [336](#).

After completing the operation, the Contractor shall remove all loose and disturbed material in the bore pits and backfill the pits in accordance with Sections [601](#) and [336](#).

602.6 MEASUREMENT AND PAYMENT:

Measurement for this work shall be at the ground surface and shall be the number of horizontal linear feet from the end of casing in the bore pit to the end of casing in the reception pit. Payment compensation for furnishing all labor, material, tools, and equipment required for the successful completion of the trenchless operation, including carrier pipe placement, in accordance with this Section.

- End of Section -

SECTION 602

3rd revision of MAG 602-Preliminary Final Draft-May 22, 2013 TRENCHLESS INSTALLATION OF ~~WATER OR SEWER PIPE~~ STEEL CASING

602.1 DESCRIPTION:

The Contractor shall furnish all labor, material and equipment as required performing the trenchless operation for installing steel casing for water or sewer lines and dry utilities in accordance with the plans and specifications using horizontal earth auger boring, hand tunneling or pipe ramming. ~~or other trenchless method.~~

In the performance of the work, the Contractor shall comply with the lawful requirements of the affected Contracting Agencies, owners of public utilities and any other facilities which might be endangered by trenchless operations.

602.2 GENERAL:

Unless otherwise provided for by the Contracting or Permitting Agency the minimum wall thickness for steel casing shall be 3/8-inch, or greater as determined by casing size, soil conditions and installation method.

The tolerances allowed for the alignment and grade of carrier pipe shall be the same as if it was being installed in a trench (Sections [610](#), [615](#) and [618](#)).

The bore & reception pits for the trenchless operation shall be shored to safeguard existing sub-structure and surface improvements and to protect against ground movement.

602.3 TRENCHLESS OPERATION:

Before starting operations, the Contractor shall submit in accordance with Subsection [105.2](#), detailed shop drawing of the bore pit shoring, the casing, and the carrier pipe installation method.

The casing shall consist of welded steel plate rolled into a can conforming to (ASTM A283 Grade C or ASTM A252). Shop and field joints shall be butt weld. Fabrication and welding shall be in accordance with AWWA C-200. Weld or hydrostatic testing is not required.

It shall be the responsibility of the contractor, considering geotechnical conditions and project specific conditions, to determine if the project shall run continuously around the clock until the specified limits have been reached.

On steel casing 36 inches or larger grout connections shall be provided at a maximum spacing of every 20 feet located at 12 o'clock in the steel casing. Upon completion of the boring operation, the contractor shall inspect each grout hole to determine if grouting is required. Any void greater than 2 inches will require the boring contractor to attempt grouting. After grouting the grout holes will be closed with a threaded plug.

Steel casing smaller than 36 inches (O.D.) will not require outside grouting unless caving or earth movement occurs

602.4 DEWATERING:

All water encountered during the trenchless operation shall be disposed of by the Contractor in such a manner as will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes and equipment for dewatering will be considered incidental to the work and no additional payment will be made.

SECTION 602

602.5 CARRIER PIPE PLACEMENT:

Pressurized carrier pipes, (i.e. water, gas) shall be placed using casing spacers, wood skids or 1-inch to 2-inch steel pipes for rails.

Gravity carrier pipes, (i.e. sewer, storm drain) shall be placed using wood skids or 1-inch to 2-inch steel pipes for rails.

In either case it shall be the Contractor's responsibility to obtain the required line and grade for the carrier pipe and to ensure that the carrier pipe does not draw or rest on the casing.

The annular space between the casing and carrier line shall be left empty, should the annular space need to be filled 5/16-inch to 3/8-inch pea gravel shall be used to fill the annular space.

Bulkheads consisting of brick and mortar or concrete, shall be constructed on either end of the casing, bulkheads shall be a minimum of 8 inches thick.

PVC conduits for dry utilities, (i.e. communications, fiber, electric) shall be placed using non-metallic PVC casing spacers.

Grout may be used to fill the annular space when PVC electrical conduits are the carrier line.

~~If the Contractor is not ready to place the carrier pipe immediately following completion of the jacking or tunneling operation, the ends shall be protected with temporary bulkheads. The bore pits shall be backfilled in accordance with Sections 601 and 336.~~

After completing the operation, the Contractor shall remove all loose and disturbed material in the bore pits and backfill the pits in accordance with Sections 601 and 336.

602.6 MEASUREMENT AND PAYMENT:

Measurement for this work shall be at the ground surface and shall be the number of horizontal linear feet from the end of casing in the bore pit to the end of casing in the reception pit. Payment compensation for furnishing all labor, material, tools, and equipment required for the successful completion of the trenchless operation, including carrier pipe placement, in accordance with this Section.

- *End of Section* -



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: May 1, 2013

To: MAG Specifications and Details Committee

From: Robert Herz, MCDOT Representative

Subject: Revision to Section 430.4 DECOMPOSED GRANITE AREA

Case 13-17

PURPOSE: Eliminate placement of polyethylene below decomposed granite.

PROPOSED SECTION 430.4 CHANGES:

430.4 DECOMPOSED GRANITE AREA:

Decomposed granite shall be in accordance with Section 795. The Contractor shall confirm that a sufficient quantity is available so that the entire area will be of the same composition and appearance, and shall furnish a sample to the Engineer for approval as to color.

After preliminary grading is completed and the area has been cleared and grubbed, a pre-emergence control, such as Surfban, or equal, shall be applied over the entire area, in accordance with the manufacturer's recommendations. ~~In flat areas, a 10 mm black polyethylene film shall be placed prior to spreading the granite.~~ The decomposed granite shall be evenly distributed over the area with a minimum depth of 2 inches. Finish grading will be accomplished and the granite will be lightly watered and then compacted to an extent satisfactory to the Engineer. After compaction, a second treatment with the pre-emergence control will be accomplished.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: May 15, 2013
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Revisions for Detail 250-1 DRIVEWAY ENTRANCES **Case 13-18**
WITH DETACHED SIDEWALK

PURPOSE: Coordinate Detail 250-1 with Detail 250-2 by incorporating the applicable 2012 revisions made to Detail 250-2 into Detail 250-1.

REVISIONS:

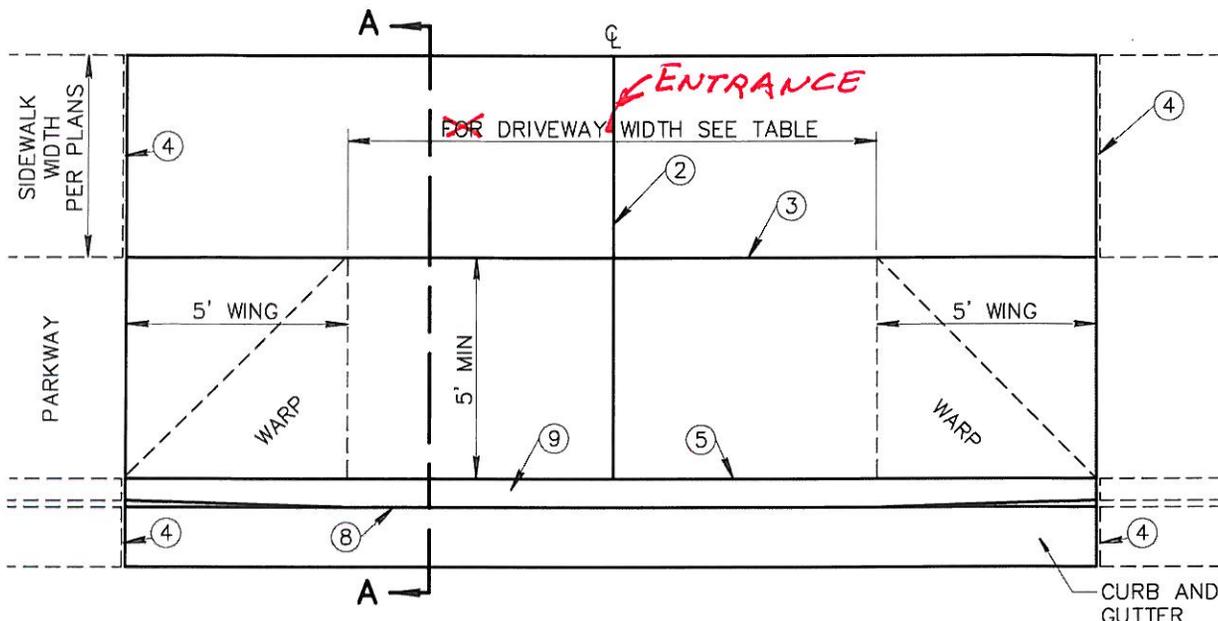
- Replace "Driveway Width" with "Driveway Entrance Width".
- Add Detail 250-2 note #13 and #14 into Detail 250-1.

Note Revisions for Detail 250-1:

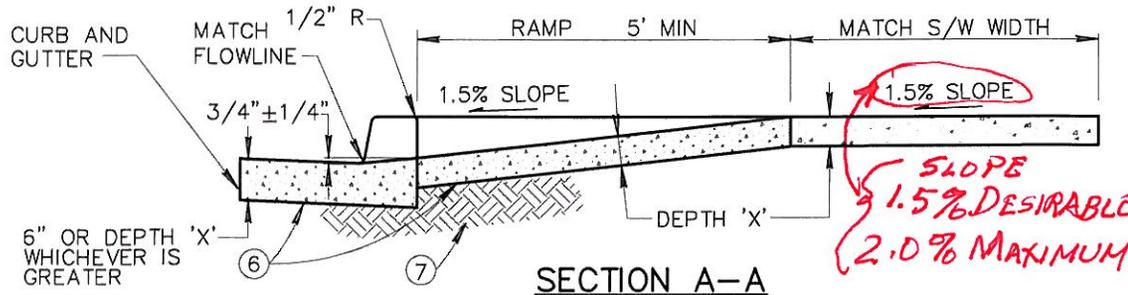
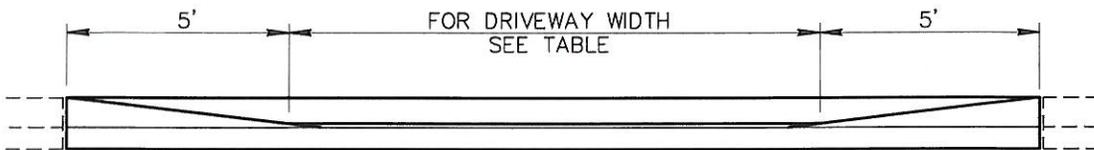
1. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS.
12. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.

New added notes:

13. 'DRIVEWAY ENTRANCE WIDTH' IS THE DRIVEWAY WIDTH PLUS ADDITIONAL WIDENING REQUIRED BY THE LOCAL JURISDICTION.
14. ELEVATION AT TOP OF DRIVEWAY RAMP SHALL BE EQUAL TO OR HIGHER THAN NORMAL TOP OF CURB ELEVATION.



DRIVEWAY WITH DETACHED SIDEWALK



SECTION A-A

NOTES: *CONTRACT*

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE ~~DB~~ FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. CONTRACTION JOINT ON D/W CENTERLINE.
3. CONTRACTION JOINT.
4. 1/2-INCH EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB - CONSTRUCTION JOINT.
6. CONCRETE CLASS AS NOTED IN TABLE. CONCRETE PER SECTION 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A-A AND ELEVATION: D/W SHOWN WITH VERTICAL CURB AND GUTTER, ROLL TYPE CURB AND GUTTER TREATED SIMILARLY.
11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS. STROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.

12. ADD NEW NOTES FROM DETAIL 250-2
13. ENTRANCE
14.

COMMERCIAL AND INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH 'X'
COMMERCIAL	* 16'	40'	A	9"
INDUSTRIAL	* 16'	40'	A	9"
* 24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH 'X'
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
* 16' DESIRABLE				

DETAIL NO.
250-1



STANDARD DETAIL
ENGLISH

**DRIVEWAY ENTRANCES WITH
DETACHED SIDEWALK**

REVISED
01-01-2009

DETAIL NO.
250-1

Water/Sewer Working Group Meeting

Meeting Notes

May 21, 2013

Opening:

A meeting of the Specifications and Details Water/Sewer Working Group was called to order by chair Jim Badowich on May 21, 2013, at 1:30 p.m. in the MAG Chaparral Room.

1. Introductions/Attendance

Tony Ayala (Avondale), Jim Badowich (Avondale), Arturo Chavarria (Hanson), Dan Currence (ADS), Jared Dusha (Contech), Rob Godwin (Goodyear), Mike Hook (ACPA), Mark Kastl (Wolseley), John Kanzlemar (Contech), Paul Nebeker (Pipe Right Now), Gordon Tyus (MAG), Warren White (Chandler).

2. Precast Manhole Specifications

Craig Sharp was not present to give any updates on this item.

3. Manhole Revisions/Update

Jim Badowich said he had a redlined copy of Detail 420 that he planned to give to Craig Sharp to make drafting changes. He added that 420-2 would be the cast-in-place option and 420-3 would be the precast base detail. Mr. Tyus said he sent Detail 422 to Brian Gallimore to work on revising the adjustment details. Mr. Badowich said the sealer reference should be made more generic.

4. Case 12-12 SRPE Pipe (Proposed Section 739)

John Kanzlemar handed out an updated version of Section 739 (Steel Reinforced Polyethylene Pipe) that addressed the committee's concerns and those of Bob Herz. He explained the changes that were shown in red, and discussed the few items that he left unchanged. Mike Hook objected to the approval of up to 120" diameter pipe since he felt it had not been thoroughly tested in the region. Jim Badowich said he believed it was a design issue, and should be determined by the engineer. The wording of the last sentence was discussed and it was decided to eliminate "or stored in a cool, dark place until ready for use." Mr. Kanzlemar said he would make this change and provide an update for the committee agenda with plans for a vote at the June meeting.

5. Case 13-05 Polyethylene Pipe (Proposed Section 740)

Dan Currence said he needed to make the same updates to 740 that were discussed for 739 to make the two cases consistent. He also agreed to remove a reference to Section 742 since it is not yet approved. He said he would make the updates and send the revised case to Mr. Tyus for the next committee agenda mail out.

6. Case 13-15 Revisions to 603, 615 and 618 for flexible pipe

Warren White discussed the updates to the pipe installation revisions. In addition, Arturo Chavarria handed out the latest revisions to 601 for rigid pipe. Mr. White also provided a table listing all the references to other sections and details that needed to be updated. One issue was the backfill detail in 200-1. The terminology needed to be updated to match ASTM standards, and use the same terminology throughout the revised sections. Jim Badowich mentioned that

Jami Erickson was looking into this. Subsection 336.2.3 references 601 for temporary pavement replacement. Members agreed to move this subsection of 601 into 336. It was suggested that the change to Section 340 could be incorporated in the case already sponsored by Peter Kandaris. Mr. Tyus noted that there is a sentence in the revised 601 that directs flexible pipe installation to use Section 603, which may help redirect many of the 601 references. There was also discussion about whether to include 601 and revisions to detail 200-1 in this case. Mr. White said he would continue to review it and work with other members.

7. Water Testing/Flushing

Rob Godwin of Goodyear handed out revised draft of proposed changes to Section 610 to make the testing section be more consistent with current practice and AWWA standards. He used track changes in the document to help clarify what was moved, deleted, changed and added. He noted AWWA standards are more conservative than those in MAG now. Mr. Godwin said some pipe types such as AC could be removed. Mr. Badowich commented that Avondale only allows PVC pipe with a DR14 rating (pressure class 200).

8. Case 13-16: Encasement of Water or Sewer Pipe by Jacking or Tunneling Operation

Mr. Badowich sponsored a case to update Section 602 at the last committee meeting. He said they planned on changing the name of the section to “Trenchless Installation of Steel Casing,” to more accurately describe the process within. It was not to include directional boring. Arvid Veidmark was not present, but was helpful in developing the case. Mr. Badowich said he would provide updates for the next committee agenda.

8. Next Meeting Date

The next meeting of the Water/Sewer working group is tentatively scheduled for Tuesday, June 19th at 1:30 p.m. at the MAG office.

The meeting was adjourned at 3:10 p.m.

Report to MAG Technical committee
Meeting on May 23rd 2013 Asphalt Working Group meeting
By chairman, Jeff Benedict

The meeting was called to order at noon on May 23rd.

In attendance: Scott Thompson (ATC), Mike Whitman (WTI), Don Cornelison (Speedie), Greg Groneberg (Southwest Asphalt), Brian Galimore (WSP), Patrick Shields (Palo Verde Const.), Chris Brien (PV Constructors), Rob Godwin (Goodyear), Brad Parker (Mesa Materials), Josh Wagner (Chandler), Bob Draper (Mesa), John Allen (Scottsdale), Peter Kandaris (DGA Consulting), Jeff Hearne (SRMG) and Gordon Tyus (MAG)

Introductions were made and goals were reviewed.

Case 13-09 A discussion on 321's penalty tables took place. Bob Draper (Mesa) was interested in coming up with some factual backing for the penalties listed in the proposal. He suggested that he would put a Table type spreadsheet showing the agency costs on a premature pavement repair. The committee was in favor of this information. The industry further suggested a review with actual projects (data) to show what the real penalty to the contractor would total. The industry promised to meet and have a presentable justification for the next meeting. The other agency members (Scottsdale, Goodyear, and Chandler) would take a copy back to their agencies for review.

Section 711 Case 13-14 Polymer modified Asphalt specifications was reviewed. No changes were recommended, though a typo was discovered. This will be corrected and sent to Gordon for distribution.

Section 325 City of Phoenix "rubber overlay" will be discussed before the next working group meeting in June. Syd Anderson, Phil Feliz and Jeff Benedict will meet with the City personnel to discuss and review the section and bring any recommended changes to the working group. The meeting is set up for May 28.

Section 345 Adjustments to utility frames and covers: Brian Galimore has provided some recommended changes for this section. The proposed case was reviewed and discussed. It was in agreement to take this to the main committee for further discussion.

A discussion on the thickened edge case for MCDOT was held and no objections were voiced.

The meeting was adjourned at 1:20 pm.

The next asphalt working group meeting will be June 13th 2013 at 12:00 at the ARPA meeting room. This is to accommodate the ARPA convention the week of June 17th.

MAG Concrete Working Group

Thursday, May 23, 2013, 1:30 pm at the ARPA Offices

Meeting Notes

Present:

See attached attendance sheet.

Discussion:

- 1) MAG Section 340 Draft Revision – Peter Kandaris. Brian Gallimore had provided comments from several Contractors on various sections that were reviewed/discussed by the group. Peter will work on another revision to bring to the Standards Committee.
- 2) Revision of Section 324 on Portland Cement Concrete Paving – Jeff Hearne. A new draft version dated 5-20-13 was provided to the group along with several handouts to document the relationship between compressive and flexural strengths (ACPA, NRMCA, PCA). Additional discussion regarding joint materials and a proposed draft of Section 729 was discussed to potentially be submitted to the Standards Committee to eliminate withdrawn ASTM Standards. Work will continue on both Sections probably into next year.

Date for Next Meeting:

Due to the ARPA Convention being held out of the Phoenix area during the third week of June, the **next meeting** is scheduled a week early on **June 13, 2013 @ 1:30 pm** in the ARPA offices (following the Asphalt and Materials Working Group meetings).

Any and all participants are welcome and encouraged to be involved.

Attendance
Initials

MAG Concrete Working Group

Thursday, May 23, 2013

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June 2013

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