

# Mesa Standard Specifications

Amendments to MAG Uniform Standard  
Specifications for  
Public Works Construction



MESA STANDARD DETAILS  
AVAILABLE ON-LINE  
[WWW.MESAAZ.GOV/ENGINEERING](http://WWW.MESAAZ.GOV/ENGINEERING)

EFFECTIVE DATE March 17, 2016

CITY OF MESA  
MESA, ARIZONA

STANDARD SPECIFICATIONS  
FOR PUBLIC WORKS CONSTRUCTION

The City of Mesa Standard Specifications for Public Works Construction shall be in accordance with the 2015 edition of the Uniform Standard Specifications for Public Works Construction as sponsored by the Maricopa Association of Governments ([www.mag.maricopa.gov](http://www.mag.maricopa.gov)), as amended as follows:

A. Subsection 102.12 – Add a new paragraph (C), to read as follows:

(C) Submission of any unit prices in the bid proposal which are unbalanced, either above or below the amount of a reasonable bid price as determined by the City Engineer, to the potential detriment of the contracting agency.

B. Subsection 105.4 – Add the following to this section:

For any apparent error or omission in the plans and specifications, such corrections by the Engineer may include adjustments in units, quantities and unit prices.

C. Subsection 106.2 - Replace the text of Subsection 106.2 with the following text:

106.2.1 General:

The City of Mesa requires that all construction materials to be supplied, constructed or installed in, on or across any City of Mesa easement, right-of-way or City-owned property be subject to inspection, quality control (QC) & quality assurance (QA) testing, and approval or rejection by the City. This requirement also applies to any materials or infrastructure that, once in-place, will be owned, operated or maintained by the City of Mesa, regardless of where they are installed. Any material rejected by the City of Mesa shall be removed immediately and replaced in an acceptable manner to the City at no additional cost to the City.

“Quality Control (QC) Testing” is testing performed to assure the materials installed comply with the requirements set forth in City standards and the Contract Documents.

“Quality Assurance (QA) Testing” is testing performed to verify the accuracy and applicability of the QC testing results and to ascertain that the materials installed meet the specified levels of quality in accordance with City standards and the Contract Documents.

For City of Mesa projects (where the City of Mesa is the Contracting Agency), the General Contractor employed by the City shall be responsible for performing the QC testing as part of the Contract Work. For projects where the City of Mesa is not the Contracting Agency (“non-City projects”), the person or entity holding the City of Mesa permit for the work (“Permittee”) is responsible for completing the requirements set forth herein, as a condition of the permit. For “non-City projects”, the verbiage of this section presumes that the Permittee either is the General Contractor performing the permit work or that the Permittee will contractually pass the QC testing responsibility on to the Permittee’s General Contractor. Hence, the word “Contractor” is used throughout this section when speaking of the entity responsible for QC testing requirements. It shall be understood, however, that for “non-City projects” these responsibilities are ultimately incumbent on the permit holder.

Requirements related to minimum QC testing, including required minimum testing frequencies, are set forth herein. The City may also elect to perform independent QA testing for any project or permit. The City will typically perform QA testing at a frequency of approximately one QA sample for every four QC samples. However, the City may deviate from this frequency (either to increase or decrease it) at the City’s own discretion.

The Contractor (whether the City’s Contractor or the Permittee’s Contractor) shall provide all support necessary to perform QC and QA testing and sampling (i.e. shoring for testing, trench, backfill, backhoes, motor graders, loaders, etc. to facilitate testing and sampling) at no additional cost to the City.

#### 106.2.2 Quality Control Testing Program Requirements:

The Contractor shall establish, provide, and maintain an effective Quality Control Testing Program (QCTP). The Contractor shall develop his own program or procure the services of a consultant. In either case, the party performing the tests shall be currently certified by the National Bureau of Standards in the National Voluntary Laboratory Accreditation Program (NVLAP) for construction services or the AASHTO Accreditation Plan (AAP) for Soils, Asphalt and Concrete.

All testing shall be under the direction of a Professional Engineer registered in the State of Arizona, knowledgeable in Materials Testing. All test reports and forms shall be stamped by the Engineer.

All personnel performing materials sampling, collection and/or testing shall be proficient in their assigned duties and possess certification(s) commensurate with their position and responsibilities. The minimum certification(s) for each technician shall be NICET Level II, Arizona Technical Testing Institute, American Concrete Institute, or other nationally recognized program applicable to the project and approved by the City of Mesa. All personnel performing field testing or sampling shall carry copies of their certifications with them in the field and shall produce them upon request from the City Inspector. Failure to produce acceptable documentation of proper certification by either field personnel or the laboratory may be grounds for the City to reject testing or sampling done by that entity.

Prior to the start of any construction, the Contractor shall give the City Inspector a schedule of the proposed testing and the name of the laboratory that will perform the work, along with evidence of the required certifications required herein. If the proposed schedule, laboratory or personnel are deficient, the City will notify the Contractor and work may not proceed until the deficiency is corrected.

At any point during the project, if the City determines that the QC activities do not comply with the requirements set forth herein, the City may:

- (1) Order the Contractor to replace ineffective or unqualified quality control personnel.
- (2) Order the Contractor to stop operations until appropriate corrective action is taken.

#### 106.2.3 Additional Written QCTP Document Required for City of Mesa Projects:

The additional requirements of this subsection (106.2.3) apply only to projects where the City of Mesa is the Contracting Agency. For such projects, the Contractor shall prepare a written QCTP and shall submit it to the City as a required submittal. The Contractor shall not begin work until the QCTP has been reviewed and accepted by the City. Resumes of all personnel that will be associated directly or indirectly with the QCTP shall be included in the QCTP. The written QCTP shall include, but not be limited to, on-site/field and laboratory testing of all material delivered to the site and any existing materials or conditions pertinent to the project. The written QCTP shall include a description of the required field and construction materials laboratory tests, including required frequencies that meet the minimums established herein. The responsibilities of the engineer, project manager, supervisory personnel and each technician assigned to this project shall be included in the written QCTP. Substitutions or replacement of personnel shall require prior written approval by the City.

#### 106.2.4 Reporting Requirements:

The Contractor shall establish a system acceptable to the City to record and report all material test results. The daily test reports shall include but not be limited to:

1. Test designation
2. Date of test
3. Name of tester
4. Location of test/sample (station and offset)
5. Product suppliers and project codes (as applicable)
5. Depth/elevation of test/sample
6. Test result
7. Control requirement(s)

8. Cause of rejection (if applicable)
9. Results of retests (if applicable)
10. Remedial action (if applicable)

The Contractor shall submit test results to the City as soon as they are available (daily) by emailing them to the City Inspector at his/her official City email address and also emailing them to [mat.lab@mesaaz.gov](mailto:mat.lab@mesaaz.gov).

The Contractor shall also submit a weekly report to the City summarizing the testing and construction activities completed by emailing the report to the email addresses noted above. All weekly reports shall be submitted simultaneously to the Contractor, Permittee (if applicable) and City. The report shall include individual summary sheets for each utility line, structure and portion of the pavement section. Cores shall be numbered sequentially throughout the Project. Re-cores shall reference the original core by number and will contain the averaged values for thickness and density. Total pavement thickness shall be reported. Vertical location of tests for underground utilities shall indicate the depth of the excavation at the location of the test (i.e., cut to flow line [if applicable], depth to bottom or top of pipe, etc.) Density tests shall be numbered sequentially. If the minimum number of tests has not been performed per the QCTP, this shall be stated in the weekly summary report with an explanation of the circumstances. The City will maintain a copy of the test results and weekly reports in the City's electronic files.

In addition to providing electronic copies of materials testing at intervals as cited above, the Contractor or Permittee shall provide the City with two bound, hard copies of the test results showing the results of all of the testing completed for the permit or project. This shall be provided to the City prior to the request for Final Inspection. The Final Inspection will not be scheduled until such bound report has been received and verified by the City Inspector. The following information shall be included in the bound packets:

1. A cover letter shall be included that states that it is the registrant's opinion that the material testing has been performed in accordance with the City's latest minimum schedule of testing, that the materials were found to be in conformance with the applicable specifications, and that the tests were performed in accordance with the applicable ASTM and AASHTO procedures. The letter or the report as a whole shall bear the registrant's seal.
2. All pages shall be sequentially numbered and a table of contents shall be provided.
3. Hard copies of all of the test results completed to-date for the project shall be included in the report, reporting at least the minimum amount of information for each test as set forth in this section.

106.2.5 Required Minimum QC Testing Frequencies:

Although minimum testing frequencies are specified herein, the Contractor and Permittee (if applicable) shall bear full responsibility for the quality of the materials and installation and may elect to perform additional testing beyond the requirements set forth herein to ensure compliance.

The following table shall be used to determine the minimum frequency and types of tests that are required under the Contractor's QCTP:

Test	Method	Frequency
(AASHTO unless otherwise noted) Current Version in Use		

STREET SUBGRADE		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 250 linear feet per traffic lane or portion thereof (notes 1 & 4)
CURB & GUTTER SUBGRADE OR SIDEWALK SUBGRADE		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 250 linear feet or portion thereof (notes 1 & 4)
STRUCTURE FOUNDATION – SUBGRADE (if required)		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 250 square feet (if required) (notes 1 & 4)
STRUCTURAL BACKFILL		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 1,000 cubic feet or per 2-feet of lift thickness, whichever is greater (notes 1 & 4)
EMBANKMENT		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 250 linear feet per traffic lane per 12 inches of depth or portion thereof (notes 1 & 4)
TRENCH BACKFILL		
Sieve Analysis	T311	1 per soil type
Moisture Density Relationship	T99 & T224	1 per soil type
In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 250 linear feet per 2 feet of depth or portion thereof (notes 1, 3, & 4)
AGGREGATE BASE COURSE		
Sieve Analysis	T27	1 per source per each day's delivery
Plasticity Index	T146, T89 & T90	1 per source per each day's delivery
Moisture Density Relationship	T 99 & T224	1 per source

In-Place Density	T191(sandcone) or T310 (nuke) (note 8)	1 per 500 linear feet per traffic lane (notes 1 & 4)
<b>RESIDENTIAL, ARTERIAL, &amp; RUBBERIZED ASPHALTIC CONCRETE</b>		
Ignition Furnace Binder Calibration	T308	1 per mix design per project (note 6)
<b>ARTERIAL ASPHALTIC CONCRETE</b>		
Asphalt Binder Content	T308	1 per each day's paving or 500 tons whichever is greater
Percent <i>In-Lab</i> Air Voids @ Ndes	T269	1 per each day's paving or 500 tons whichever is greater
Theoretical Max Specific Gravity (Rice)	T209	1 per each day's paving or 500 tons whichever is greater
Gyratory Density	T312	1 per each day's paving or 500 tons whichever is greater
Sieve Analysis	T30	1 per each day's paving or 500 tons whichever is greater
Percent <i>In-Place</i> Air Voids	T269	1 per 1,000 linear feet per traffic lane or 1 per each day's paving, whichever is greater (notes 5 & 7)
<b>RESIDENTIAL &amp; RUBBERIZED ASPHALTIC CONCRETE</b>		
Asphalt Binder Content	T308	1 per each day's paving or 500 tons whichever is greater
Percent <i>In-Lab</i> Air Voids	T269	1 per each day's paving or 500 tons whichever is greater
Theoretical Max Specific Gravity (Rice)	T209	1 per each day's paving or 500 tons whichever is greater
Compaction of Marshall Specimens	T245	1 per each day's paving or 500 tons whichever is greater
Sieve Analysis	T30	1 per each day's paving or 500 tons whichever is greater
Bulk Specific Gravity of Marshall Specimens	T166	1 per each day's paving or 500 tons whichever is greater
Percent <i>In-Place</i> Air Voids	T269	1 per 1,000 linear feet per traffic lane or 1 per each day's paving, whichever is greater (notes 5 & 7)
<b>PORTLAND CEMENT CONCRETE</b>		
Sampling of Concrete	T141	1 per 50 cubic yards or per placement, whichever is greater
Temperature of Concrete	T309	1 per 50 cubic yards or per placement, whichever is greater
Slump	T119	1 per 50 cubic yards or per placement, whichever is greater
Making & Curing Concrete Specimens	T23	1 set of 4 cylinders per 50 cubic yards or per placement, whichever is greater

Compressive Strength of Concrete Specimens	T22	1 set of 4 cylinders per 50 cubic yards or per placement, whichever is greater
Percent Entrained Air Content	T152, T196, or T199	Where applicable, 1 per 50 cubic yards or per placement, whichever is greater
<b>GROUT</b>		
Sampling & Testing Grout	ASTM C1019	1 per day's construction or 5,000 square feet, whichever is greater
<b>MORTAR</b>		
Strength of Molded Masonry Cylinders & Cubes	ASTM C780 ANNEX A6	1 per day's construction or 5,000 square feet, whichever is greater
<b>DECOMPOSED GRANITE</b>		
Sieve Analysis	T27	1 per soil type or source (note 2)
<b>PLAYGROUND SAND</b>		
Sieve Analysis	T27	1 per soil type or source (note 2)

Note 1: Minimum testing frequency is based on passing tests only. Initial tests and retests that indicate noncompliance shall not be counted. The technician(s) performing the tests shall be present during the placement, moisturizing and compaction of the material. The technician(s) shall provide a written description of the contractor's activities in the compaction of the material (e.g., depth of lift, number of passes of the compactor, type of equipment used, how the material is reacting to compaction (pumping), level or sloped surface, how the fill material is tying in with previous material, etc.). The description will be included in the daily report.

Note 2: The certifications for the laboratory and technicians as discussed above will be changed as follows: The testing laboratory for landscape soil must be certified by the Western States Proficiency Testing Program. The person responsible for the testing and providing recommendations must be certified as a Professional Soil Scientist by The American Society of Agronomy.

Note 3: In-Place Density testing shall start at spring line for pipes 48 inches in diameter or less. Pipe with a diameter greater than 48 inches shall be tested in 2-foot increments from bottom of pipe. Laterals will be tested independently of the main line.

Note 4: The testing frequency stated will be the minimum required when continuous observation is performed by the Contractor's Quality Control Personnel. When Quality Control Personnel do not directly observe the construction process, the engineer has the option to stop work and/or adjust the testing frequency. Any adjustments, which result in an increase in the testing frequency and/or lost time, shall be at no additional cost to the City.

Note 5: The contractor will provide companion cored specimens at a ratio of 1:4 (one for the City to four for the contractor), subject to a minimum of one companion core for every day of paving. The City will witness the coring and reserves the option to obtain additional specimens as it deems necessary. Re-coring for deficient thickness or compaction will be performed no later than two working days after the original specimens are obtained. All cores are to be consecutively numbered without any duplication.

Note 6: Correction factors shall be established in strict accordance with AASHTO T308, Section 6.

Note 7: Cores shall be obtained according to MAG 321.14 and patched according to MAG 321.14 & MAG 708.

Note 8: For in-place density tests, the ratio of nuclear density tests to sand cone tests shall not exceed 10:1, unless otherwise approved by the City.

#### 106.2.6 Failing Test Results and Referee Lab:

The lab performing QC or QA testing shall notify the City Inspector, the Contractor and the Permittee (if applicable) immediately if the lab determines that the material being tested is not in conformance with the required specifications. The Contractor or Permittee shall take corrective action and the materials shall be retested by the same testing laboratory that performed the tests that indicated noncompliance.

If the QA test results are not in agreement with the QC test results, the Contractor shall have the option to retain a third party consultant for referee tests. The third party consultant shall meet the same requirements as the consultant performing the QC testing. The results of the third party shall be binding. All cost incurred by the referee testing shall be the Contractor's expense. If the Contractor elects not to retain a third party for referee testing, the City of Mesa test results will prevail.

D. Subsection 107.11 – Modify the subsection to add the following:

Underground Damage Prevention: For all projects that include underground excavation or other work that could impact City utilities, Contractor/Permittee is required to complete a 90-minute Underground Damage Prevention & Safety training presentation by City's Energy Resources Department, prior to commencing work and will take place at their offices or another suitable location. Contractor/Permittee personnel are responsible for their own transportation to and from the training site. Contractor/Permittee can contact the Damage Prevention Office at 480-644-5827 for assistance and to make reservations to attend a session. Information on City's Damage Prevention & Safety training is also available at [www.mesaaz.gov/energy/](http://www.mesaaz.gov/energy/), under "Energy Safety/Damage Prevention and Safety Training." This presentation includes background training on the various City utility systems, current City programs for locating and protecting existing utilities, a review of hazardous conditions specific to buried utility lines such as natural gas, electric, water, sewer, telecommunications, etc., and provides a forum for establishing lines of communication between appropriate City and Contractor staff prior to beginning work on the project.

At a minimum, the following Contractor/Permittee personnel shall attend this presentation and complete any required follow-up activities: Job Superintendent, Foreman, and Operator(s) from Contractor/Permittee, the same staff from the Natural Gas Subcontractor(s), and any other major Subcontractor as determined by City. This presentation is to be free of charge with no pre-set attendance limit. Contractor/Permittee is encouraged to have additional field personnel attend if possible.

Following completion of the presentation, Contractor/Permittee shall provide a letter certifying compliance with this Section to City's Engineering Inspector. To be accepted by City, Contractor Certification Letter must include the date(s) and time(s) of presentation, and the names of field personnel who attended and must specifically reference the Project Name and City Project Number or Permit Number, as applicable.

Nothing in this Section or City's Underground Damage Prevention & Safety training presentation shall be construed as replacing or superseding OSHA Regulations, Arizona State Law, and City's established policy for Contract Construction Safety, or other applicable regulations. Contractor/Permittee shall maintain and have sole responsibility for safety on the job site.

E. Subsection 108.1 – Add the following subsection:

(C) Start of Work

Work shall not start until the contract has been executed by both the contractor and the City.

F. Subsection 109.7 (A) – Replace the text of the first paragraph of the existing subsection with the following:

Contractors are advised that the City will make monthly progress payments during the course of the contract based on the Contractor's Application and Certificate of Payment together with a detailed estimate of work completed, which shall be in the form of the American Institute of Architect's (AIA's) forms G702 and G703 or City of Mesa Application for Payment form. The detailed estimate of work completed shall include all items from the bid schedule and/or schedule of values as applicable, and shall include values for work completed previous to application, current work completed, previously stored materials, new stored materials, value of work completed, retention, value of work completed less retention, and amount due this request. The monthly payment cycle will start with the date of the Notice to Proceed. The City may process payments more frequently if requested by the Contractor and agreed to by the City.

The payment process functions as follows: prior to the monthly payment cycle date, the Contractor and the City's Construction Inspector shall together prepare a list of agreed upon quantities for each item of work completed and accepted during the progress payment period. The Contractor shall then submit the Application and Certificate of Payment and an invoice with the detailed estimate of work completed based on the list of agreed upon quantities to the City's Inspector for signature. The invoice shall reflect the Contractor's company name, billing information, City of Mesa project number, Project Manager information and the total amount due at time of billing. Upon receipt of these documents, the Inspector will obtain the necessary approvals and forward the Application to the appropriate City staff for payment processing. The progress payment will be processed for payment within fourteen (14) days (except final payments) after the Application for Payment has been certified and approved by the Engineer in accordance with A.R.S. §34-221.

For the purpose of definition, the City's Construction Inspectors are the "owner's designated recipients" of all pay requests. If the Contractor has any questions about the payment process, please call the City's Engineering Contract Administration. Contact information will be provided at the pre-construction meeting. All other questions shall be directed to the City Inspector assigned to the contract.

When the contract nears completion and the contract proceeds approach the limit of funds approved, the City of Mesa shall pay up to the aggregate amount approved by initial award and as revised by executed change orders, less appropriate retention, if applicable. When the final adjusting/balancing change order is written and approved, the balance of contract proceeds, if any, will be released to the Contractor. This procedure is in no way intended to delay or reduce the Contractor's right to final payment, as set forth in A.R.S. §34-221.

Note: The remaining paragraphs of the existing subsection shall remain as written.

G. Subsection 109.8 – Add a new subsection 109.8.4, to read as follows:

109.8.4 Delays and Damages Policy:

The Contractor is advised that the City of Mesa has established a written Policy Statement for Calculating Delays and Damages. The latest revision of this Policy, dated May 19, 2006, is herewith incorporated by reference and made a part hereof. Copies of the Policy Statement may be obtained on the following City of Mesa web link: <http://mesaaz.gov/home/showdocument?id=13974> (Appendix 2)

If progress in the work covered by the contract is delayed, the provisions of the Policy Statement shall come into effect.

Neither this section nor the Policy Statement shall be construed to void any provisions of this contract which require notice of delays; provides for arbitration or other procedures for settlement, or provides for liquidated damages.

H. Subsection 301.3 – Revise Subparagraph (B) compaction requirements to read as follows and add general note to all compaction requirements:

(B) Detached sidewalks not subject to vehicular traffic ..... 90 Percent  
All compaction above shall be performed within 2 percent of the optimum moisture content.

I. Subsection 306.1 – Add the following text to the end of this subsection:

Unless otherwise approved in writing in advance by the City Engineer, geogrid reinforcement of the subgrade shall not be used to reduce (or justify a reduction in) the pavement or aggregate base course thickness or cross-section.

J. Subsection 310.3 – Revise subparagraph (C) to reflect 90%

K. Subsection 310.4 – Revise the Corrective Measures in Table 310-1, Type IV and Type V to add the following:

NOTE: All lime treated ABC shall have plasticity index of Non-Plastic (NP) per City of Mesa Policy for Testing of Lime-Modified Aggregate Base to Determine Plasticity Index, latest version (available at <http://mesaaz.gov/business/engineering/policies-forms>.)

L. Section 321 – Remove any references to Warm Mix Asphalt (WMA) Technologies.

M. Subsection 321.1 – Add the following to the subsection:

All work shall be in accordance with the project specifications, as shown on the approved plans or as directed in writing by the Engineer.

N. Subsection 321.4 – Remove any reference to CSS-1h.

O. Subsection 321.5 – Delete the 1<sup>st</sup> paragraph and substitute the following:

The mix design shall be in accordance with the current East Valley Asphalt Committee criteria and be included on the current approved asphalt mixes list.

P. Subsection 321.5 – Delete the 3<sup>rd</sup> paragraph and substitute the following:

If the contractor elects to change its source of material, the contractor shall furnish the Engineer with a new mix design that is in accordance the East Valley Asphalt Committee criteria and is included on the current approved asphalt mixes list.

Q. Subsection 321.8.4 – Modify the subsection to add the following:

Cold rolling of asphalt pavement (defined as compacting the pavement when its temperature has dropped below 185 degrees Fahrenheit) is prohibited.

R. Subsection 321.8.6 – Delete the 2<sup>nd</sup> paragraph and substitute the following:

Asphalt concrete mix aggregate gradation and percentage of asphalt binder shall be in accordance with Section 710 and the East Valley Asphalt Committee criteria.

S. Subsection 321.10.2 – Delete reference to “fan drying per AASHTO T209 Section 15”.

T. Subsection 321.10.2 – Add the following to paragraph 5 after TABLE 321-4:

The minimum limits of corrective action shall include the affected area but no less than one city block or 660 feet. The Contractor shall remove any areas of bleeding, but in no case less than the specified roller width, as directed by the Engineer, and replace the affected material with new material meeting the specification requirements for the mix type involved. This shall be done, any time within the one (1) year warranty until the bleeding has been corrected, at no additional cost to the City. Should the stability of the mix be affected by the excess asphalt cement to such an extent that the pavement is displaced under normal traffic load, within the one (1) year warranty; the areas affected shall be removed and replaced with new material, at no additional cost to the City. The criteria for determining stability of the mix shall be 3/8-inch movement or more of the asphalt (rutting or shoving) measured with a 10-foot straight edge in any direction.

U. Subsection 321.10.4 – Add the following after TABLE 321-6:

Asphalt pavement thickness deficiency greater than 0.50 inches shall require an 8-foot edge mill and the placement of a minimum of 1.5-inch of additional asphalt overlay at no cost to the Owner.

V. Subsection 321.10.6 – Delete this section in its entirety.

W. Subsection 321.10.11 – Delete this section in its entirety.

X. Subsection 340.3.9 – Modify the subsection to add the following:

Vertical displacement across joints shall not exceed 1/8 inch.

Y. Subsection 340.3.10 – Add the following immediately after the first paragraph:

Concrete work is considered deficient if any of the following conditions exist:

- A. Misalignment, heaving or settlement that results in a discontinuity in excess of 1/8-inch over 5 feet.
- B. Visible cracks, not contained within control joints that have opened to 1/32-inch or more.
- C. Cracking, spalling or scaling of the concrete surface.
- D. Gouges that expose aggregate.
- E. Graffiti
- F. Imprints and/or depressions causing ponding or an inconsistency in the specified finish of the concrete.
- G. Broken or chipped edges.
- H. Structural cracking, durability cracking, or alkali-silica reaction (ASR) cracking
- I. Visible cracking in concrete used for architectural finishes and that negatively impacts the aesthetics, as determined by the Engineer.

Z. Subsection 340.3.10 – Replace the second paragraph with the following:

Concrete work that does not comply with tolerance requirements of this section and Section 340.3.9 shall be removed and replaced to the nearest joint. Remove and replace gutters that exceed the ponding tolerance. Concrete work that exhibits these deficiencies (except graffiti) within the one (1) year warranty period shall also be subject to removal and replacement, to the nearest joint, at no cost to the owner. Grinding is not allowed in lieu of replacement. Any use of grinding to correct minor deficiencies shall be submitted and approved by the Engineer prior to use.

AA. Subsection 401.3 – Add a new sentence to read as follows:

Contractor shall use off-duty City of Mesa police officers as required by the City of Mesa Traffic Barricade Manual for work within the City limits.

BB. Section 405.4 – Add the following: Chains will be required between the frame and cover on all survey monuments as shown in M.A.G. Detail 120-1.

CC. Subsection 601.4.3 – Delete penultimate paragraph and replace with the following:

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 2-feet.

DD. Subsection 601.4.5 – Revise the first sentence of the third paragraph of this subsection to read as follows:

Flooding is not acceptable as a water consolidation method unless it is clearly specified in the Plans or Special Provisions. Water settling is not allowable within County rights-of-way.

Delete the last paragraph of this Subsection and add the following:

Drop hammer equipment similar to that used for breaking pavement or driving piles shall not be used for compacting backfill at any stage of the backfill operations.

EE. Subsection 601.6.5 – Add the following new paragraph:

CLSM: Where Controlled Low Strength Material (CLSM) backfill is specified on the drawings, no additional compensation shall be given. CLSM backfill shall be included in the unit price per linear foot. No slurry shall come into contact with any metal surface, services, air releases, etc. The metal shall be insulated with a layer of native material provided that native material is acceptable.

FF. Section 610 – Delete all references to PVC water pipe.

GG. Subsection 610.4.2 – Replace the first sentence with:

Pipe joint deflection shall be limited to three (3) degrees or 67 percent of the manufacturer's recommended maximum allowable deflection, whichever is less.

HH. Subsection 610.4.2 – Add the following paragraphs after the first sentence of this section:

The pipe shall be laid accurately to the alignments and grades shown on the plans or established by the Engineer. All adjustment to lines and grade shall be made by scraping away or filling in under the barrel of the pipe. Hammering on the pipe, dropping the pipe, or shimming under the pipe with rocks, blocks, or foreign material to bring the pipe to grade will not be permitted.

The pipe shall be handled and lowered into the trench by means of belt slings. The number and size of slings shall be adequate to prevent damage to the pipe.

The pipe shall be assembled and joined in accordance with the manufacturer's instructions for the type of joint used. All portions of the joints shall be thoroughly cleaned before the sections of pipe are put together. The position of the rubber gasket shall be checked with a feeler gage at each joint prior to laying the next section.

II. Section 610.4.4 – Add the following paragraph after the first paragraph:

Prior to placing each pipe section, the interior shall be cleaned of all foreign matter. Cleaning shall be accomplished by brushing, blowing with compressed air, washing with water, or by any combination of these methods necessary to remove all foreign matter. The pipe shall be laid with a uniform bearing under the full length of the barrel. Normally, the pipe shall be laid with the bell end pointed in the direction of installation. On grades exceeding 10 percent, the pipe shall be laid uphill.

JJ. Subsection 610.6.1 – Add the following sentence:

All ductile iron pipe shall be polyethylene wrapped unless approved otherwise by the City.

KK. Subsection 610.6.2 – Delete all references to naturally pigmented material.

LL. Subsection 610.7 – Add the following paragraph to the end of this section:

Waterline air release and vacuum valves shall not be constructed in driveways, sidewalks, pathways, washes or retention/detention areas unless approved in writing by the City.

MM. Subsection 610.9 – Add the following paragraphs to the end of this section:

Fire hydrants shall not be constructed in driveways, sidewalks, pathways, washes or retention/detention areas unless approved in writing by the City.

Minimum distance allowable between the centerline of the lowest nozzle and ground line is 18 inches.

The approved list of fire hydrants that are allowed by the City of Mesa is available on-line at <http://www.mesaaz.gov/home/showdocument?id=3258> . No exceptions are allowed.

NN. Subsection 610.10 – Add the following paragraph to the end of this section:

Fittings cut into ACP within six feet of another fitting or joint will require the short section of pipe to be removed and replaced with ductile iron pipe.

OO. Subsection 610.13 – Add the following paragraph:

Water meters shall not be constructed in driveways sidewalks, washes or retention/detention areas unless approved by the City.

PP. Subsection 610.10 – Revise subparagraph (A) as follows:

Include ductile iron per ASTM A536 as an acceptable sleeve material.

QQ. Subsection 610.10 – Revise subparagraph (B)(1) as follows:

Remove cadmium plating per ASTM B766 as a coating option.

RR. Subsection 610.10 – Revise subparagraph (B)(1) to add:

Bolts and nuts for water transmission, water production, and water supply facilities shall be per Water Resources Approved Products List.

SS. Subsection 610.10 – Add the following subsection:

(F) Electrical isolation in the form of either flexible or rigid insulating fittings, as specified herein, shall be provided as required to obtain electrical isolation at flanges of main line valves, flanges at tie-ins, and flanges for air release/air vacuum valve connections.

Rigid insulating fittings shall be flanges with dielectric insulating flange kits containing full face insulating gaskets, full length insulating bolt sleeves and double set insulating washers. All insulating materials shall be of a type designated by the manufacturer as suitable for service at the operating temperatures and pressure specified and be compliant with the Water Resources Approved Products List. Dielectric flange insulating kits shall be installed during the installation of the flange in which the kits are to be located.

Rigid insulating fittings between threaded steel outlets and corporation stops shall be dielectric insulating unions. Dielectric insulating unions shall be 250-pound test and shall be ground joint, precision machined and threaded to accurate dimensions. They shall be composed of malleable iron castings with molded nylon insulation. The nylon insulation shall be of a non-brittle type capable of sever shock loads and impact without fracturing. It shall be chemically unaffected by specified projects at temperatures to 120 degrees F. The nylon insulator shall have excellent dielectric properties.

TT. Add the following new subsection:

610.17 Corrosion Monitoring Test Stations:

The Contractor shall furnish all materials and perform all work for installing a corrosion monitoring system for all buried Concrete Cylinder Pipelines.

(A) Materials and Construction Methods:

Two wire test stations shall be installed along the pipeline at intervals not to exceed 1,000 feet, or as indicated by project specific plans and specifications. Four wire insulating test station shall be installed at all insulating fittings where shown on the plans, with two wires installed on each side of the insulating fittings.

Wires for corrosion monitoring points shall be minimum AWG No. 8 insulated with HMW/PE insulation. Wires shall be sized such that they may be used on any and all of the field tests specified.

Thermite weld connections, as shown, specified or directed by the Engineer, shall be made with thermite weld kits specifically designed by the manufacturer for such applications. Thermite welds shall be a maximum 25-gram charge or per project specifications.

When connecting test lead conductors by the use of thermite weld equipment to concrete cylinder pipe or steel pipe, the pipe surface shall be cleaned by scraping, filing, or wire brushing to produce a clean, bright surface. The thermite weld shall be installed in accordance with the manufacturer's instructions and as indicated. Upon completion of the thermite weld, but before the application of the cement-mortar coating, the Contractor shall strike the weld with two sharp blows from a brass hammer. Resistance between leads shall be measured and shall not exceed 150% of calculated theoretical resistance. All defective welds shall be replaced by the Contractor.

(B) Field Tests:

(1) Field tests shall be performed by a qualified testing firm under the supervision of a NACE-certified cathodic protection specialist to determine the following:

- Pipeline electrical conductivity.
- Effectiveness of insulating joints.
- Metering point integrity.
- Presence of stray D/C current on the pipeline.
- Initial pipe to soil potential.
- Casing Isolation.

Testing firm qualifications and all test data shall be submitted for approval by the City. All test results shall be submitted to the City.

(2) The testing procedure shall be as follows:

(a) The test shall be conducted by measuring response of the pipe to the application of cathodic protection test current with an auxiliary ground at a minimum of 10 feet from the pipeline. The positive terminal of the portable test rectifier unit shall be connected to the auxiliary ground. The negative terminal shall be connected to the pipeline at a test station. The test rectifier shall be energized with A/C power and shall be adjusted to provide sufficient D/C current to obtain adequate pipe-to-soil potential shifts along the pipeline for performing the tests. A current interrupter shall be inserted in the test rectifier circuit so that the rectifier is turned "OFF" and "ON" automatically. A set of "NATIVE" potentials shall be obtained prior to the application of the test current.

(b) Measurements of the pipe-to-soil potential shall be made with the test current turned both OFF and ON. The pipe-to-soil potential shall be measured at representative locations along the full lengths of the pipeline to be tested. In addition, potential measurements shall be taken across the dielectric insulating fittings. The pipe-to-soil potentials shall be measured with a potentiometer/voltmeter circuit of a multi-combination meter and with respect to portable copper sulfate reference electrode placed at grade. Contact to the pipe for obtaining potential measurements shall be made at test stations previously installed during construction for that purpose.

(c) If the pipe-to-soil potential is made more positive by application of the test current, electrical discontinuity of the pipeline is indicated between that point and the point at which the test rectifier negative connection was made.

(d) If the pipe-to-soil potential is made more negative by application of the test current, electrical continuity of the pipeline is indicated between that point and the point at which the test rectifier negative connection was made. The magnitude of negative shifts will be analyzed to determine if the degree of electrical continuity is consistent with the specified requirements for joint bonding.

(e) Dielectric isolation across insulating fittings shall be indicated by the pipe-to-soil being more positive or insignificant differences in the pipe-to-soil potentials across the fittings with the application of the test current.

(f) Multiple test set-ups will be necessary so that the full length of the pipeline is demonstrated to be electrically continuous and dielectrically isolated from other structures.

UU. Subsection 610.14 – Add the following paragraph:

All pipelines shall be left clean. Before filling any section of pipeline with water, it shall be cleaned of all dirt and debris. The Engineer shall inspect the interior of the pipeline during installation. The Contractor shall furnish the necessary lights and equipment for making the inspection.

VV. Subsection 610.16 – Add the following paragraph:

(l) Corrosion Monitoring Test Stations: Measurement and payment for corrosion monitoring test stations shall be per each test station as furnished and installed per the plans, including all excavation, backfill, wiring, field testing, valve box and cover, and all appurtenant work.

WW. Subsection 611.2 – Disinfecting Water Mains – Modify the subsection to add:

Water mains shall be disinfected per AWWA C-651, latest edition. In cases of overlap or conflict between MAG Section 611 and AWWA C-651, AWWA C-651 shall take precedence. In addition, add the following text to the end of MAG Section 611.2.12:

The Contractor shall also note that the City Mesa of Water Resources Department conducts water main sampling for bacteria tests from 8:00 a.m. to 3:00 p.m., Monday through Thursday, except holidays, and requires a minimum of two business days' notice prior to said sampling. The Contractor shall schedule the required bacteria testing within this time frame. There shall be no additional payment or allotment of time to Contractor for failure to coordinate the sampling in accordance with the City's availability (as noted herein) to perform the sampling. Prior to pressure testing the system, bacteria tests should be passed if connected to the system.

If the Contractor schedules work such that sampling for bacteria tests is to be conducted on Friday, Saturday or Sunday, the Contractor may employ the services of a private laboratory to collect the samples and perform the required analytical tests. However, prior to using a private laboratory, the Contractor shall submit the laboratory's information, credentials and proposed test methods to the City for prior approval. The laboratory shall be certified by the Arizona Department of Health Services (ADHS) to perform coliform bacteria and Heterotrophic Plate Count (HPC) tests in accordance with American Water Works Association (AWWA), Standard C651-14, *Disinfecting Water Mains* (State certified). (Refer to ADHS's webpage for the list of approved contractors <https://app.azdhs.gov/bfs/labs/elbis/drinkingwatertestinglabs/drinkingwatersearchcontent/page.aspx>). When available, test results from the private laboratory shall be sent via email to the City Inspector and shall also be emailed to [WaterQualityVM@MesaAz.gov](mailto:WaterQualityVM@MesaAz.gov). Sampling and testing performed by the City is done at no cost to the Contractor; whereas,

the Contractor shall pay all costs (without any pass through to the City) for sampling and testing by the private laboratory.

All flushing of the system should meet a minimum flushing velocity of 3 feet per second in the pipe to be disinfected. The following table should be used to determine appropriate taps for anticipated flow rates for flushing:

**Table 611.2 - Minimum Flushing Rate**

Pipe Diameter (inches)	Flow Rate for Flushing (gpm)	Number of Taps <sup>2</sup>			Number of 2 1/2" Fire Hydrant Outlets <sup>1</sup>
		1"	1 1/2"	2"	
4	120	1	-	-	1
6	260	-	1	-	1
8	470	-	2	-	1
10	730	-	3	2	1
12	1,060	-	-	3	2
16	1,880	-	-	5	2

<sup>1</sup>With a 40 psi pressure in the main with the fire hydrant flowing to atmosphere, a 2 1/2 inch fire hydrant outlet will discharge approximately 1,000 gpm; and a 4 1/2 inch fire hydrant outlet will discharge approximately 2,500 gpm.

<sup>2</sup>Number of taps on pipe based on discharge through 5 feet of galvanized iron pipe with one 90° elbow.

\*Reference to AWWA C651, Table 3 – Testing and Disinfection from AWWA.

XX. Subsection 611.4 (B) – Remove and replace the second paragraph with the following:

After acceptance but prior to the termination of the warranty period, the Contractor shall test the long term deflection of the storm drain. If it is determined that the deflection exceeds 7 ½% of the average inside diameter, that portion of the installation shall be corrected by the Contractor at no cost to the Contracting Agency.

YY. Subsection 611.3 (D) – Modify the subsection to add:

The Contractor shall provide the Engineer sewer and video inspections from an approved pipeline company. The annotated video inspection records shall be provided in DVD format for new sewer pipeline and existing sewer pipeline connections at the discretion of the Engineer. The video shall clearly show all ponded water depths, joints, seals, connections, connecting pipes, junction structures and manholes. In the case of new sewer pipeline, the video shall show the entire length of the new sewer pipeline installation. In the case of existing sewer pipeline to which new sewer connections are made, the video shall clearly show each connection and shall show a distance along the existing sewer pipe of not less than ten (10) feet on either side of the connection. The video annotation shall include a bookmark and identifying note for each manhole, junction structure, and connection. This video shall be provided to the Engineer. The Contractor will not be allowed to place the final pavement over the sewer line until the Engineer has reviewed and approved the video. No separate payment will be made for this inspection; as the cost of the video inspection shall be included in the cost of the pipe by the Contractor.

ZZ. Subsection 611.4 – Modify the subsection to add:

**(C) VIDEO INSPECTION OF STORM DRAIN MAINLINES:**

The Contractor shall provide the Engineer with an annotated video inspection record (in DVD format) of the new mainline storm drain pipeline and of any existing storm drain pipelines to which new storm drain connections (e.g., catch basin lateral pipes) are made. The video shall clearly show all joints, seals, connections, connecting pipes, junction structures and manholes. In the case of new mainline storm drain pipeline, the video shall show the entire length of the new mainline storm drain pipeline installation. In the case of existing storm drain pipeline to which new storm drain connections are made, the video shall clearly show each connection and shall show a distance along the existing storm drain pipe of not less than ten (10) feet on either side of the connection. The video annotation shall include a bookmark and identifying note for each manhole, junction structure, and connection. This video shall be provided to the Engineer. The Contractor will not be allowed to place the final pavement over the storm drain line until the Engineer

has reviewed and approved the video. No separate payment will be made for this inspection; the cost of the video inspection shall be included in the cost of the pipe.

AAA. Subsection 615.2 – Modify the subsection to add:

Ductile iron pipe shall be minimum pressure class 150 unless otherwise noted and shall be ceramic epoxy lined as approved by the City Engineer.

BBB. Section 620 – Remove Section 620 entirely and add the following section:

## SECTION 620

### CAST-IN-PLACE CONCRETE PIPE

#### 620.1 GENERAL:

This specification covers cast-in-place non-reinforced concrete pipe intended for use as storm sewers or irrigation lines. The abbreviated title is CIPP. CIPP is conduit made of Portland cement concrete cast monolithically in a properly prepared trench, using equipment specifically designed for this purpose. The type of equipment to be used by the Contractor must be approved by the Engineer and the Contractor may be required to furnish evidence of the successful use of this equipment on prior work. CIPP will be placed only:

(A) By experienced operators. The Engineer will be the sole judge as to experience level.

(B) In the presence of the Engineer or Representative.

(C) In ground capable of standing unsupported from the bottom of the trench to the top of the pipe without sloughing.

(D) In fill when it can be demonstrated to the satisfaction of the Engineer that the fill will adequately support the pipe.

(E) When allowed as an allowable storm sewer pipe material, this designation is no warranty, expressed or implied, that conditions will be suitable for the use of CIPP. Any costs incurred and/or time required to provide suitable conditions or to substitute an alternate pipe acceptable to the Engineer, in whole or part, shall be the responsibility of the Contractor. In addition, the Contractor at no additional cost to the City, shall provide the following: A Soils Report that confirms that soil conditions are adequate for CIPP installation; Engineering Analysis that indicates the hydraulic grade line for the design events is kept within the CIPP installation. The City Engineer must grant specific approval for the installation of CIPP.

#### 620.2 MATERIALS:

620.2.1 Cement shall be ASTM C-150, Type II, low alkali as per Section 725.

620.2.2 Sand aggregate used for concrete and mortar shall conform to Section 701. Maximum size of the aggregate shall not be greater than 1/3 of the minimum wall thickness up to and including a wall thickness of 4-1/2 inches. The maximum aggregate size is 1-1/2 inches.

620.2.3 Water used for concrete and for curing the pipe shall be as per Section 725.

620.2.4 Concrete shall be Class A in accordance with Section 725. Slump shall be the minimum required for satisfactory placement of the concrete by the equipment used by the Contractor. The slump shall not exceed 3 inches.

620.2.5 Bonding mortar shall consist of two (2) or more parts of cement to three (3) parts of sand by volume.

#### 620.3 CONSTRUCTION METHODS:

620.3.1 Excavation: The trench shall be neatly excavated with vertical sides and semi-circular bottom. The trench shall be shaped to form the bottom outside of the pipe on the alignment and to the grades specified in the plans. Departure from and return to the established grade for the finished trench and the invert of the installed pipe shall not exceed 1 inch per 10 linear feet with a maximum allowable departure of 0.10 feet. Departure from and return to specified alignment for the trench and pipe shall not exceed the allowable tolerances specified for the grade. The bottom of the trench, hereinafter known as the trench form, shall be shaped to provide full, form, and uniform support by undisturbed earth or compacted fill for at least the bottom 210 degrees of the pipe. Density of the fill shall be at least five percent (5%) greater than the natural in-place soil, but in no case less than 90 percent (90%) when tested in accordance with AASHTO T-99, Method A and T-191 or ASTM D-2922 and D-3017.

In no case shall pipe be installed in rocky, fractured or fragmented strata or if the soil consists of large cobblestones or boulders. The Contractor may substitute rubber gasket reinforced concrete pipe for CIPP in these unsuitable areas. There will be no additional payment for this substitution. In no case will expansive soils be used for backfill.

Excavated trench shall be checked for compliance with requirements for grade and alignment prior to placement of concrete. The Contractor shall submit his proposed method of grade and alignment control and checking of same for conformance with specifications to the Engineer for his approval prior to start of work. The Contractor shall supply manpower, equipment and materials, as are required, to provide and confirm compliance with grade and alignment requirements. This is a non-pay item and all costs incurred shall be included in the bid item(s) for the pipe installation.

620.3.2 Placement: At the time of concrete placement, all soil in the trench shall be adequately moistened so that water is not drawn from the freshly placed concrete. However, the trench form shall be completely free of water, mud, and debris. All forming devices, including the slipforms and hopper of the placement device, shall be thoroughly moistened. Concrete shall not be placed when temperature of the concrete exceeds 90 degrees Fahrenheit or is less than 50 degrees Fahrenheit. The soil adjacent to the trench shall be at a temperature above freezing.

The pipe shall be constructed in one placement, the entire cross-section being placed monolithically. Inside forms shall be sufficiently rigid to withstand consolidation of the fresh concrete. Placement shall be such as to produce a thoroughly consolidated homogeneous concrete mixture conforming to the test requirements of this specification. Effective consolidation means shall be applied to the fresh concrete over the entire circumference and from within the pipe shell. Consolidation means shall be capable of effectively placing and consolidating fresh concrete at production speeds. Methods of consolidating shall be capable of building up sufficient pressure to effectively bond the concrete to the surrounding earth and to keep loose sand, mud, and water out of the pipe shell.

Under no circumstances will the Contractor be allowed to continue the pipe installation if the vibrators of the cast-in-place machine are inoperable. Portable vibrators or "stingers" shall only be used to supplement internal vibrators on the machine and not as a sole source to consolidate and distribute the concrete mix.

The Contractor shall make provisions for removing sloughed material, debris and any foreign objects from trench before and during placement of concrete such that buildup of material does not occur ahead of the machine. In addition, small transverse trenches shall be dug across trench bottom, at distances not to exceed 25 linear feet, to receive soil built up and pushed ahead of the slipform.

(A) Construction Joints:

When pipe placement stops in excess of sixty (60) minutes, a construction joint shall be formed. The ends of the pipe that are to be butt contact shall be left in rough condition with a slope between 20 and 45 degrees. Number 4 reinforcing bars shall be embedded 12 inches in the previous pour and 12 inches into the next pour and shall be placed 12 inches on center for pipe 42 inches in diameter or less and shall be placed 18 inches on center for pipe diameters in excess of 42 inches. Immediately before resuming concrete placement the surface to be bonded shall be cleaned of all laitance, coatings, foreign materials, and loose or defective concrete thoroughly wetted and coated with a layer of bonding mortar (Section 620.2.5) approximately 1/4 inch thick. In lieu of the bonding mortar, neat cement paste may be thoroughly scrubbed onto the wet surface of the previously placed concrete.

For a joint that may be used for connections to another pipe or structure, a joint shall be made by squaring off the end of the pipe. An excavation shall be made along the sides and bottom of the cast-in-place pipe, for any diameter, to permit casting of a concrete collar as described above.

(B) Pipe Dimensions and Tolerances:

The internal diameter of the pipe at any point shall not be less than 95% of the nominal diameter, and the average of any four (4) measurements of the internal diameter made at 45 degree intervals shall not be less than the nominal diameter.

Pipe less than 15-inches inside diameter shall not be allowed.

For pipe with an inside diameter of 15-inches to 24-inches the minimum wall thickness shall be 2-1/2 inches. For pipe exceeding 24-inches inside diameter the minimum wall thickness shall be 1/12 of the inside diameter, plus 1-inch.

Offsets at form laps and horizontal edges shall not exceed 1/2-inch for pipe having inside diameter not greater than 42-inches; 3/4-inch for pipe having inside diameter greater than 42-inches, but not greater than 72-inches; and 1-inch for pipe having inside diameter greater than 72-inches.

(C) Pipes Placement:

It is essential that concrete placement be done in a smooth and steady manner with as few starts and stops as is possible. The Contractor shall schedule materials and operate the pipe machine at speeds and in a manner that will achieve this.

The Contractor shall provide an anchoring system for pull of the machine in a manner which will provide the least probability of causing deviations in grade and/or alignment. Adjustments to or modifications in anchoring system when required in the opinion of the Engineer shall be made at no additional cost to the project.

620.3.3 Curing and Backfilling: The Contractor shall be responsible for proper curing of the concrete and backfilling the trench to an even grade. Final backfill and compaction shall not be started until concrete has developed a compressive strength of at least 3000 psi. The pipe shall be checked for grade, alignment and thickness prior to backfilling. Curing shall be performed in such a manner as to prevent the premature drying of the concrete. The Contractor shall use the method described below.

(A) Polyethylene film complying with ASTM C-171, nominal thickness 0.0015 inches, shall be placed on the exposed top surface of the pipe immediately after the pipe is cast. The film shall be anchored in place with loose soil to assure continuous, adequate curing.

A humid atmosphere within the pipe, as evidenced by condensation on the interior surface, shall be maintained for at least seven (7) days following placement, except for a maximum period of 24 hours allowed for removing forms and making repairs. To prevent air drafts which may dry the pipe and to maintain a humid atmosphere inside the pipe, all openings, ends, manholes, and connector pipes shall be kept closed or securely covered, except when actual work is in progress on the inside of the pipe. The pipeline shall be partially filled with water during the curing period when work is not being performed on the inside of the pipe.

620.3.4 Repair: Immediately after removal of the forms, the inside of pipeline will be inspected for required repairs and conformance with all dimensional requirements including alignment and grade. The Engineer shall be the sole judge as to the repairability of deficiencies. The Engineer shall require removal and replacement of those sections of pipeline which the Engineer judges to be non-repairable or which is not within required dimensional tolerances including alignment and grade.

When concrete placement is done by a method requiring the use of metal inner forms, the Contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of forms within 4 to 6 hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

When concrete placement is done by methods using pneumatically inflated inner liner, the Contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of the pneumatic inner liner within 12 hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

All rock pockets, non-longitudinal cracks or indentations shall be cleaned out, moistened and filled with 1:2 cement grout or approved epoxy material. Except where, in the opinion of the Engineer, the width and/or length of the crack may indicate a structural deficiency, repairs shall be made as required for longitudinal cracks.

At the discretion of the Engineer, longitudinal cracks exceeding 0.01 inches in width and 12 inches in length may be cause for rejection and removal and replacement of that portion of the pipe. Subject to the approval of the Engineer, cracks may be repaired using a pressure applied epoxy compound capable of providing structural correction to the area in addition to sealing the void. A longitudinal crack shall be defined as one which has the general direction of a 30 degree angle or less with the alignment of the pipe.

Irrespective of concrete placement method, all repairs, patches and finishing shall be completed within 24 hours of concrete placement. The Contractor, prior to start of concrete placement on project shall submit a written schedule of his proposed work activities and work time schedules for the Engineer's review and approval. No time schedule requiring overtime by the Engineer's staff is authorized without specific written approval of the Engineer.

Compliance with this section is a non-pay item and any costs incurred shall be included in the bid proposal item(s) for the pipe.

620.3.5 Finishing: Except for the form offsets, the interior surface of the pipe shall be equivalent to or better than a wood float finish. Form offsets shall be trimmed so as to provide a reasonably tapered slope from surface to surface. The bottom of the pipe below the metal forms shall be finished in a workmanlike manner and shall conform to the general circular circumference of the pipe without sags, dips and/or humps. All extraneous concrete shall be removed from the interior surface.

#### 620.4 TESTS:

Random tests shall be made of the wall thickness at the top, bottom and sides, approximately every 100 feet, on a daily basis by probes through fresh concrete or small holes drilled through the concrete. Holes shall be properly and permanently closed and sealed, flush with the inside surface of the pipe, after measurements are made, in accordance with the requirements of the fifth paragraph of the Mesa Supplement to MAG Specifications Subsection 620.3.4, contained herein.

Test cylinders shall be prepared and tested as per Section 725. If the cylinder tests indicate that the concrete does not meet the specified strength requirements, cores shall be taken from the same section of concrete represented by the faulty test cylinder under the supervision of the Engineer.

The concrete should be at least 14 days old before the core specimens are taken. The diameter of the core specimens for the determination of compressive strength should be at least three (3) times the maximum nominal size of the coarse aggregate used and must be at least twice the maximum nominal size of coarse aggregate.

The length of the specimen, when capped, should be twice the core diameter. A core having a maximum height of less than 95 percent of its diameter before capping or a height less than its diameter after capping shall not be tested.

If cores are taken, the Contractor shall patch all core holes in such a manner that the patch will be permanent, will not leak, and will have a smooth interior finish flush with the interior surface of the pipe.

Procedures and payment for coring shall be in accordance with applicable portions of Section 725.

The Engineer will evaluate the test results and his decision as to the required corrective action shall be final.

620.5 MEASUREMENT:

Measurement of cast-in-place concrete pipe will be the number of linear feet of pipe measured horizontally along the pipe axis from end to end of pipe. At change in diameter, the measurement shall be to center of manhole or transition.

620.6 PAYMENT:

Payment will be made at the contract 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 the cast-in-place concrete pipe as specified including removal of obstructions, excavation, backfilling, compacting, testing, and all incidental costs not specifically covered in other items in the proposal.

CCC. Subsection 625.3.1 – Add the following text to the end of this Section:

All manholes shall have a minimum of 6-inches and maximum of 16-inches of reinforced concrete adjusting rings.

All joints between shaft sections, cones and adjustment rings shall be sealed with “RAM NEK” plastic gasket, mortar, or approved equal.

When a manhole is called out in the plans or in the specification to be lined with a PVC T-lock lining, all exposed concrete surfaces, including the shelf and opening, shall be lined.

When manholes are placed within asphalt paved areas, the rings and covers shall be installed per MAG Standard Detail 422.

DDD. Subsection 630.2 – Add the following text to the end of this section:

The approved list of gate valves that are allowed by the City of Mesa is available on-line at <http://www.mesaaz.gov/home/showdocument?id=3258> . No exceptions are allowed.

EEE. Subsection 630.3.1 – Revise the sentence that refers to valves larger than 20-inches having flanged ends, as follows:

Direct-buried valves larger than 20-inches shall be installed with mechanical joint ends unless otherwise indicated by project specific plans and specifications. Valves with flanged ends may be installed with adjacent flexible couplings or other approved provisions to minimize joint rigidity. Valves and joints shall be restrained as required.

FFF. Subsection 630.3.1(C) – Delete the entire subsection and replace it with the following text:

(C) Valve 14-inches through 20-inches:

Valves shall be iron body resilient-seated gate valves in accordance with the latest revision of AWWA C-509 or AWWA C-515.

Valves designed in accordance with AWWA C-509 or AWWA C-515 shall be designed to work equally well with pressure on either side of the gate.

Valves shall not be installed in the horizontal position without prior written approval by Water Resources Department. With prior approval, valves installed in the horizontal position shall be equipped with bronze rollers, scrapers, and tracks, and shall be designed for service in the horizontal position.

Bypass valves are required on transmission main valves 20-inches in diameter and larger in accordance with the City of Mesa Engineering and Design Standards Manual. Bypass size shall be in accordance with Table 630-1 or as indicated on the design drawings.

Valves shall not be placed in vaults unless otherwise approved in writing by the Water Resources Department.

GGG. Subsection 630.3.1(D) – Delete the entire subsection and replace it with the following text:

(D) Valves 24-inches and Larger:

Valves shall be resilient-seated gate valves in accordance with the latest revision of AWWA C-509 or C-515, unless otherwise approved by the City.

Valves shall not be installed in the horizontal position without prior written approval by Water Resources. With prior approval, valves installed in the horizontal position shall be equipped with bronze rollers, scrapers, and tracks, and shall be designed for service in the horizontal position.

Bypass valves are required on transmission main valves 20-inches in diameter and larger in accordance with the City of Mesa Engineering and Design Standards Manual. Bypass size shall be in accordance with Table 630-1 or as indicated on the design drawings.

Valves shall not be placed in vaults unless otherwise approved by the City.

HHH. Subsection 630.4.2(B) – Revise the subsection to remove the reference to JCM #415 Type 2 ESS or approved equal and add the following:

Tapping sleeves shall be per the Water Resources Approved Products List.

III. Subsection 630.4.2(A)(2)(a) – Delete the subsection in its entirety.

JJJ. Subsection 630.5 Butterfly valves: Delete paragraph (B) 3 INCHES THROUGH 12 INCHES: the section in its entirety.

KKK. Section 631 – Delete all references to “polyethylene pipe” from this section.

LLL. Subsection 631.3.5 – Revise the subsection to delete all references to tapped couplings and direct taps and add the following:

Services shall be installed per City of Mesa Design Standards and Water Resources Approved Products List.

MMM. Subsection 710.1 – Delete 2<sup>nd</sup> sentence in 1st paragraph and replace with the following two (2) sentences:

Mineral admixture, mineral filler and anti-stripping agent shall be included in the mixture when required by the mix design or by the Engineer. All materials shall be proportioned by weight, volume or a combination in a central mix plant in the proportions required by the mix design to provide a homogeneous and workable mass.

NNN. Subsection 710.1 – Add the following after TABLE 710-1:

Unless otherwise noted, all hot asphalt pavement shall meet the “Hot Asphalt Mix Criteria” latest approved version at the time of asphalt placement, as established by the East Valley Asphalt Committee. Additionally, all hot asphalt mixes provided shall be approved in writing by the East Valley Asphalt Committee prior to placement. Copies of the “Hot Asphalt Mix Criteria” are available on the City of Mesa Engineering web link:

<http://mesaaz.gov/business/engineering/approve-products-equipment-natural-gas-line-contractors>

OOO. Subsection 710.2.2 – Delete last paragraph and substitute the following:

The natural sand shall not exceed 15 percent for Marshall mixes and Gyratory mixes by weight of the total aggregate for a mix.

PPP. Subsection 710.2.4 – Add the following to this section:

When liquid anti-stripping agents are used, the agent shall conform to the requirements of AASHTO designation R 15-89. The agent shall be added in accordance with the manufacturer's recommended dosage rate. Other mineral filler, mineral admixture, or anti-stripping agents, shall be approved by the Engineer prior to start of the mix design.

QQQ. Section 718 - Add the following paragraph:

Unless otherwise noted on the Plans or Specifications, all Preservative Seals for asphalt concrete pavement in the City of Mesa shall be Type D in compliance with the test methods and requirements within MAG Section 718.

RRR. Subsection 725.2.1 – (Pozzolonic): Only Class F Pozzolonic material will be permitted in Portland cement concrete.

SSS. Subsection 726.1 – Add the following to this subsection:

For concrete curbs, sidewalks and driveways, the contractor shall use a liquid membrane conforming to AASHTO M-148, Type 2 (White Pigmented).

TTT. Subsection 750.1 - Delete section in its entirety.

UUU. Subsection 750.3 - Add the following paragraph:

Ductile iron pipe shall be either push-on or mechanical joint. Lug type restraining systems which rely on penetrating into the pipe wall are acceptable. Alternatively, mechanical restraining systems shall be as approved in the City of Mesa Engineering and Design Standards Manual. The approved list of Mechanical Restraint and Joint Systems that are allowed in the City of Mesa is available on-line at: <http://www.mesaaz.gov/home/showdocument?id=3258> . No exceptions are allowed.

Where flanged fittings are called for on the plans, flanges shall be integrally cast with pipe and shall comply with ANSI B16.1, Class 125. If threaded flanges are used, a minimum Class 53 ductile iron pipe is required.

VVV. Subsection 750.4 – Delete references to gray iron and add the following:

See Water Resources Approved Products List for approved fitting materials, configurations, and manufacturers.

WWW. Section 752 – Delete this section in its entirety.

XXX. Section 756 – In addition to the standard requirements of this Section, the following requirements shall also pertain:

Internal bronze parts shall be low-zinc (not more than seven percent (7%) zinc). There shall be two (2) hose nozzles, 2 ½-inches in diameter with National Standard Threads; and one (1) steamer connection 4 ½-inches in diameter with National Standard Threads.

The approved list of fire hydrants that are allowed by the City of Mesa is available on-line at <http://www.mesaaz.gov/home/showdocument?id=3258> . No exceptions are allowed.

YYY. Section 758 - Modify the section as follows:

Delete all references to AWWA C301, prestressed concrete pressure pipe.

ZZZ. Subsection 772.2 – Modify the subsection as follows:

**ALL** posts, rails and braces shall be Type A, unless otherwise specified on the plans or in the Special Provisions.

AAAA. Section 792 – Delete all reference to Lignin-Based, Organic Resin and Petroleum Resin Dust Palliatives from this section within the City of Mesa.

BBBB. SPECIAL NOTICE REGARDING STREET EXCAVATION BACKFILLING AND PAVEMENT REPLACEMENT:

The Contractor shall be responsible for backfilling and replacing pavement in all street excavations per the latest edition of the City of Mesa’s Policy Statement for Street Trench Backfilling and Pavement Replacement. Copies of this policy statement are available on-line at:

<http://mesaaz.gov/business/engineering/policies-forms>

SPECIAL ATTENTION IS CALLED TO THE POLICY STATEMENT REQUIREMENTS FOR TRANSVERSE TRENCHES. BACKFILL IN ALL TRANSVERSE TRENCHES SHALL BE ONE-HALF (1/2) SACK CONTROLLED LOW STRENGTH MATERIAL PER MAG SECTION 728.

A cash bond, as stipulated in the policy statement, will not be required for City of Mesa contract projects, but will be required for permit construction.

CCCC. SPECIAL NOTICE REGARDING DRIVEWAY AND SIDEWALK RAMP CUTS IN EXISTING CURB AND GUTTER SECTION:

The City of Mesa does not allow vertical, longitudinal cuts through the gutter section in order to install driveways or sidewalk ramps. In order to accomplish this work, the Contractor shall employ one of the following methods:

1. Sawcut perpendicular to the flowline through the curb and gutter section at the limits of the section to be replaced, remove, and replace in entirety; or,
2. Saw through the curb section with the sawcut having a slope towards the gutter. At the face of the curb, the sawcut shall be flush with the gutter and at the back of the curb, one (1) inch above the gutter. Horizontal curb cut shall taper from sawcut to top of curb to establish wings in accordance with the City of Mesa’s details for driveways and sidewalk ramps.

DDDD. SPECIAL NOTICE REGARDING TECHNICAL SPECIFICATIONS FOR RUBBERIZED ASPHALTIC CONCRETE PAVEMENT:

For streets classified as “Arterial” within the City of Mesa (listed within the most current City of Mesa Transportation Plan), all new construction and overlays shall receive a surface asphalt course of rubberized asphalt in accordance with the current East Valley Asphalt Committee criteria. Street widening and trench patches shall match the existing arterial asphalt surface type.

Other street classifications designated to receive rubberized asphalt overlays will also use the current East Valley Asphalt Committee criteria.

The materials, mix design and installation of the rubberized asphalt shall comply with MAG Section 321 and 710 as amended by the City of Mesa.

AAAA. SPECIAL NOTICE REGARDING REQUIRED DETAILED SHOP DRAWINGS FOR SPECIALTY ITEMS:

This Special Notice applies to projects and permits that propose to use non-standard, specialty materials within City of Mesa rights-of-way or easements or for infrastructure that

will be owned, operated or maintained by the City of Mesa. "Specialty materials" are defined as items, such as specialty streetlight poles, specialty streetlight fixtures or specialty street name signs, that are requested for aesthetic reasons and which are not on the City of Mesa's Approved Products Lists or otherwise not fully in accordance with the City of Mesa's Standard Details and Specifications. For such items, detailed shop drawings, including product data sheets, must be included and shown in the permit drawings and must be approved by the City of Mesa (including approval by the City of Mesa departments that own, operate or maintain such items) during the plan review process. For the submittal of some items (such as specialty streetlight poles), the City may also require the applicant to submit detailed structural design calculations sealed by a registered professional structural engineer properly licensed to practice in the State of Arizona. City approval of shop drawings and any required supporting structural calculations must be obtained prior to permit issuance. The permittee shall ensure that the materials delivered and installed in the field are in full compliance with the shop drawings and structural calculations approved by the City. The shop drawings must be shown in and remain a part of the approved building permit plan set that is used for construction, and shall remain in the engineer's certified as-built/record drawings that the permittee is required to submit upon completion of the project.

By way of clarification: Specialty items should be discussed with the City during the planning and zoning phases of a project and should not, without prior discussion or notice, be proposed in plans submitted for review. The City typically requires execution of a development agreement with the developer during the project planning phase to set forth the requirements for the installation and maintenance of specialty items before such items may be proposed in a plan set or for a project. When specialty items are desired, the developer shall allot time for these activities in the planning phase. The City is not under any obligation to approve non-standard specialty items.

The requirements of this section do not apply to capital improvement projects contracted and administered by the City of Mesa (e.g., where the City is the contracting agency).