Avondale

Supplement to MAG Uniform Standard Specifications and Details for Public Works Construction

2018

Avondale

The City of Avondale (the “City”) Supplement to the Maricopa Associates of Governments (MAG) Uniform Standard Specifications and Details for Public Works Construction (the “City of Avondale MAG Supplement” or “MAG Supplement”) replaces the existing City of Avondale MAG Supplement dated April 1, 2008.

The MAG Supplement shall be considered a Supplement to the Uniform Standard Specifications and Details for Public Works Construction (the “MAG Specifications”) as published by the Maricopa Association of Governments.

The City of Avondale MAG Supplement shall be used in conjunction with all construction improvement plans within the City jurisdiction.

2018 Supplement to MAG Specifications and Details

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PART 100 GENERAL CONDITIONS

SECTION 102 BIDDING REQUIREMENTS AND CONDITIONS

Subsection 102.4, EXAMINATION OF PLANS, SPECIAL PROVISIONS AND SITE OF WORK is modified to add the following:

102.4.1 Soil and Subsurface Conditions:

The Contractor shall make its own determinations as to the soil materials and subsurface conditions it may encounter, including the possible existence of rock, caliche, sand, gravel and ground water. The Contract shall take the necessary precautions and make the necessary preparations and adjustments to complete the required work in a timely manner.

SECTION 104 SCOPE OF WORK

Subsection 104.1.3, Water Supply is modified to add the following:

104.1.3.1 City Water Use

A. When City water is requested for use during construction, access and supply must be provided through an approved and available fire hydrant. This includes hydrants located in public right-of-way and hydrants located on private property and supplied by City water sources. All water use shall be metered through a City supplied hydrant meter. The Contractor shall be required to apply for and pay all fees plus security deposits to obtain use of a hydrant meter. Requests for meters must be submitted, by application, to the City's Public Works Water Resources Department. Once approved the Contractor must contact the City Hall Cashier/Utility Billing Counter for payment and to set up a delivery and install schedule. The City reserves the right to refuse issuance of a hydrant meter for any reason, including seasonal or regional demands.

B. As a requirement to receiving and using a City hydrant meter on a fire hydrant, the Contractor is responsible to supply the required fittings and valves including a City approved reduced pressure backflow prevention device to properly configure and operate the temporary construction water assembly per the City of Avondale Standard Detail A1390. The RP backflow device must be tested and certified after installation. The Contractor shall also secure the City supplied hydrant meter to prevent

theft and damage.

C. If a Contractor is allowed to build temporary on-site holding ponds for available agriculture irrigation water or other water supplies, the ponds shall be enclosed and secured with a minimum six (6) foot high chain link fence.

Subsection 104.1.4, Clean-Up and Dust Control is modified to add the following:

104.1.4.1 Air Pollution Requirements

A. The Contractor shall be responsible for dust control related to the project construction and shall take whatever means necessary to control any abnormal conditions.

B. The Contractor shall provide adequate means for cleaning trucks and/or other equipment of mud prior to entering public streets, and take whatever measures are necessary to insure that all roads are maintained in a clean, mud and dust free condition at all times.

C. Temporary drainage control measures may be required during and after construction until final lot build-out in accordance with the approved plans and in accordance with any established or required Best Management Practices (BMP) as part of the National Pollution Discharge Elimination System (NPDES) permit requirements. It is the Contractor's responsibility to meet all requirements.

D. The Contractor shall obtain all applicable state, county and local air quality permits.

E. The Contractor shall submit to the City a copy of their approved county dust control plan, erosion control plan, and permit prior to the start of work.

F. The Contractor is responsible for maintaining dust control at all times during the work, including off hours and weekends. The worksite must be kept debris free. Tracking dirt onto streets is not allowed and if it occurs must be cleaned immediately. Gravel track-out pads or other approved Best Management Practice (BMP) shall be used where applicable.

104.1.4.2 Project Clean-Up

The Contractor shall be responsible for daily and final clean-up operations of adjacent, existing paved streets used by construction traffic. This work includes daily street sweeping, power broom and water as needed or directed by the City.

SECTION
105
CONTROL OF WORK

Subsection 105.2, PLANS AND SHOP DRAWINGS is modified to add the following:

105.2.1 Submittals

A. General

All submittals shall conform to the requirements of MAG Specifications Section 105.2, Plans and Shop Drawings, except as modified herein.

B. Format, Distribution and Review

(1) Shop drawing submittals shall be no larger than 24” x 36” inch and no smaller than 11” x 17” inch as needed. All drawings shall indicate the name of the job, the City's job number, date, names of the Contractor and subcontractor, and the date of approval by the Contractor. Digital file format submittals may also be acceptable as directed by the City.

(2) Materials and equipment technical data info, catalog cut sheets, material and fabrication certificates and materials mix design reports shall be presented in three hole binders or bound; 8½”x11” format. Digital file format submittals are also acceptable as directed by the City. Faxed documents are not acceptable. Each submittal package must have a separate transmittal document, cover sheet and index. The Contractor must also create and update a standardized, itemized submittal tracking log spreadsheet and attach with each submittal or re-submittal.

(3) The Contractor shall first review all submitted data for compliance with the specifications and job requirements prior to any submittal. Clearly indicate what specific item, type, model, class, color, size, etc. is to be used and note any Contractor comments or recommendations on the submitted data. Four identical Contractor approved copies along with a letter of transmittal and the shop drawing index tracking sheet shall be delivered to the City or its authorized representative.

(4) The Contractor shall anticipate and schedule for a review period of 10 business days by the City and/or its designee and 20 business days for Fire Department related reviews, during which time the submittal(s) will either be approved, approved with comments,

disapproved, asked to be revised, or additional information may be requested. Two copies, stamped as approved or otherwise, will be returned to the Contractor by the City or its authorized representative. Any required re-submittals shall have an additional ten day review period. Re-submittals shall be made within seven business days. The process will be repeated until all required, submitted materials have been approved. Approved shop drawings and other material submittals shall become a portion of the contract file with the City as they are returned to the Contractor. The above requirements do not apply to the City's plan review process outlined in the 2018 City of Avondale General Engineering Requirements Manual.

C. Materials/Product Data

The following materials/product data shall be submitted for review and approval:

(1) Pipe, fittings, gaskets, joint restraint systems, polyethylene encasement material and other hardware appurtenances
(2) Valves, valve boxes, debris caps, valve key extensions, fire hydrants, tapping sleeves, air/vacuum valve assemblies, corporation/curb stops, service saddles and all other appurtenances
(3) Valve vaults, manholes and other precast structures
(4) Underground storm water detention systems (private and on-site)
(5) Pre-fabricated storm water catch basins (private and on-site)
(6) Drywell systems (private and on-site)
(7) Street lights (all components)
(8) Traffic signal (all components)
(9) Street striping and signage
(10) Samples, if required

D. Shop Drawing Submittals

The following shop drawings or documents shall be submitted for review and approval:

(1) Domestic or fire line water supply feeds into sites, including header configurations
(2) Domestic water and fire line water flushing plans
(3) Pipe laying schedules plans/diagrams for major trunk water, sanitary sewer and storm sewer systems
(4) Stormwater Pollution Prevention Plan (SWPPP)
(5) Traffic control plans
(6) Dirt export/import haul routes

(7) Utility protection plans
(8) Construction schedules
(9) 24 hour emergency contacts (names and phone numbers)
(10 Special fabrications/hardware
(11) Cathodic current testing stations and joint bonding details
(12) Shoring/trench box protection details (sealed by an Arizona registered professional structural engineer)

Product data shall include information such as the manufacturer's printed recommendations, compliance with recognized trade association standards, application of testing agency labels and seals, product dimensioning, and notation of coordination requirements.

E. Certificates

The following certificates shall be submitted for review and approval:

(1) Piping materials
(2) Reinforcing Steel

Certificates shall be prepared by the manufacturer or testing agency thereof and should include technical specifications and compliance with industry trade association and testing agency standards.

F. Mix Designs

The following mix designs shall be submitted for review and approval:

(1) Asphalt Concrete (AC) pavement
(2) Portland Cement Concrete
(3) Aggregate Base Course (ABC) material for utilities
(4) Aggregate Base Course (ABC) material for street base
(5) Controlled Low Strength Material (CLSM)
(6) Bedding Sand

The mix designs shall directly compare the proposed mix components and properties with those of the referenced standard mix or as modified within the designated specifications.

All dimensions and identification of products and materials included, along with notation of any coordination requirements and established field dimensions/measurements shall be clearly shown or noted.

G. Warranties

Furnish written warranties and reports on the findings of all tests that are

specifically required by the Specifications. Delivery of such warranties and test results shall not relieve the Contractor from any obligation assumed under any other provisions of the Contract.

Subsection 105.3, CONFORMITY WITH PLANS AND SPECIFICATIONS is modified to add to following:

105.3.1 Specifications

All work and materials shall conform to the current Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction (the “MAG Specifications”).

The Maricopa County Department of Transportation (MCDOT) and Arizona Department of Transportation (ADOT) specifications shall be used where specifically called out on the plans.

The City of Avondale Supplement to the Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction (the “MAG Supplement”) shall be considered part of the construction plans and they shall take precedence over individual plan notes.

105.3.2 Construction Methods

The City shall not be responsible for construction means, methods, techniques, sequences or procedures or for safety precautions or programs utilized in connection with the work. It is the responsibility of the Contractor to carry out the work in accordance with the contract documents.

Subsection 105.4, COORDINATION OF PLANS AND SPECIFICATIONS is modified to add the following:

105.4.1 Approved Plans

A City approved set of plans and a City Engineering Right-of-Way Construction Permit shall be maintained on the jobsite at all times work is in progress. Deviation from the plans shall not be allowed without a City approved plan revision or other specific written direction from the City.

Subsection 105.5, COOPERATION OF CONTRACTOR is modified to add the following:

105.5.1 Pre-Construction Meeting

A pre-construction meeting cannot be scheduled until the required City of Avondale permits are obtained. Separate pre-construction meetings may be required for each major phase of work as determined by the City.

105.5.2 Contractor's Representative

The Contractor or his authorized representative shall be present at the work site at all times during working hours. Instructions and information given by the City or its authorized representative to the Contractor's designated representative shall be considered as having been given to the Contractor.

105.5.3 Project Videotape

The Contractor, in the presence of the City Inspector, shall make a video *(DVD format, indexed)* of the project area located in or immediately adjacent to City right-of-way prior to commencing any construction activities. The Contractor and City Inspector will review the video for completeness, immediately after recording and any areas that are not clearly covered and defined, shall be re-recorded. The Contractor shall submit one copy of the video to the City Inspector.

105.5.4 Sequence of Construction

The Contractor shall remain sensitive to any ongoing development being constructed in the immediate vicinity of the project area. Good coordination with nearby contractors will be crucial in avoiding construction conflicts and maintaining an efficient working environment. Night and weekend work is typically not allowed. Non-emergency and normal construction work during nights or weekends requires prior written approval from the City.

Subsection 105.6, COOPERATION WITH UTILITIES is modified to add the following:

105.6.3 Utilities

A. It is the Contractor's sole responsibility to verify the presence and location of any and all existing overhead and/or underground utilities that may interfere with construction. It is the Contractor's sole responsibility to adequately protect and maintain any such utilities, at no additional cost to the City, whether or not said utilities are shown on construction plans. This may include, but is not limited, to coordinating, potholing and monitoring as directed by the individual utility companies.

B. The Contractor shall be responsible for any and all damage that may be incurred by the utility companies. The Contractor will be liable for any repair costs, including incidental costs.

C. The Contractor is responsible for any delays due to damages to utilities in conjunction with this construction. The Contractor will be liable for the cost of any utility relocation construction. The City will not participate in the cost of utility relocation construction caused by the Contractor.

D. Contractor shall comply with the Arizona Revised Statutes regarding "Blue Stake" locally known as "Arizona 811" and pothole activities as applicable. The Contractor shall be responsible for contacting the utility company in conflict and for making all necessary arrangements for relocating, repairing or abandoning the utility or facility as required by the utility company.

The Contractor shall be the City's Blue Stake field locator, and perform all requirements as prescribed in Ariz. Rev. Stat. § 40-360.21 – 31, for all underground facilities that have been installed by the Contractor on the current project, until the project is accepted by the City.

At least two full working days prior to commencing excavation, the Contractor shall contact the Arizona 811 "BLUE STAKE" CENTER for information relative to the location of buried utilities.

Subsection 105.7, COOPERATION BETWEEN CONTRACTORS is modified to add the following:

105.7.1 Construction by Others

The Contractor shall be responsible for arranging and coordinating construction of all applicable work specified to be done "by others" on the construction plans.

Subsection 105.8, CONSTRUCTION STAKES, LINES AND GRADES is modified to add the following:

105.8.1 Staking

All construction staking shall be at the Contractor's expense.

105.8.2 Staking Requirements for Public Facilities

Unless provided for by the developer/owner, the Contractor shall be required to employ and retain at the work site, a surveyor with the experience and capability of performing all survey, control and layout tasks required of the Contractor to

properly construct the work. The surveyor must be an independent land surveyor registered in the State of Arizona.

A. General

(1) From established primary control points, Contractor shall furnish all required lines, measurements, grades and elevations for construction of all facilities, structures, pipelines, street construction and all other site improvements.
(2) Contractor shall establish a base line for the project based upon the control information provided in the Contract Documents and establish a minimum of three bench marks suitable to the work.
(3) Contractor shall develop and make all detailed surveys, measurements and staking needed for construction including all temporary bench marks, control points, work lines, stationing, grade/slope elevations, pipe/structure inverts, batter boards, off-sets, and cut sheets.
(4) Contractor shall keep current, accurate, organized and legible as-built notes and measurements of the constructed work. Surveyor shall maintain a complete and accurate log of all control and survey work as it progresses. All survey data, field notes and computations shall be recorded and kept in industry standard hard bound field books, all in accordance with recognized established professional surveying standards.
(5) Contractor shall be held responsible for the preservation of all bench marks, points, marks, and stakes made or established for the work. Contractor shall re-establish and replace the same, at no additional cost to the City, any construction surveying/staking that has been accidentally, carelessly or willfully destroyed by any party.

B. Survey Staking Guidelines and Tolerances

(1) Alignment Staking – Every 50 feet on tangent and every 25 feet on curves.
(2) Slope Staking – Every 50 feet on tangent and every 25 feet on curves; re-stake every 10 feet in elevation.
(3) Easement Staking – Every 50 feet on tangent and every 25 feet on curves; wooden lath with flagging at 100 feet maximum spacing.
(4) Structures – Line stationing and at least two corners for location with two sets of off-sets plus centerline of inlets/outlets; elevations of bottom or floor and inlet/outlet inverts as necessary.
(5) Pipelines – Line stationing at appropriate offset dimensions with invert elevations every (see matrix):

PIPELINE STATIONING

WATER	SEWER	STORM DRAIN
25 Feet	25 Feet	50 Feet

Additional pipe line stationing required for all pipe fittings, horizontal/vertical bends, manholes, valves, fire hydrants and all appurtenances.

(6) Flat Concrete – Cut or fill elevations to top of curb or sidewalk at two feet offsets; every 50 feet on tangent and every 25 feet on curves.
(7) Roadway – Blue tops every 50 feet on tangent and every 25 feet on curves for subgrade, subbase and edge of pavement.
(8) Record Staking – Provide permanent stake at stub-outs, services and end-of-lines.
(9) Horizontal accuracy of easement staking shall be plus or minus 0.1 feet. Accuracy of all other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.02 feet vertically.
(10) Survey calculations shall include an error analysis sufficient to demonstrate the required accuracy.

C. Re-establishment of Survey Monuments

(1) All section corners, quarter corners, and center of sections shall be a brass cap in hand hole per MAG Standard Detail 120-1 Type A. All existing monumentation shall be preserved both horizontally and vertically.
(2) An Arizona Registered Land Surveyor at the Contractor's or developer's expense must reset any survey monuments disturbed by construction. Disturbed monuments shall be reset to first order accuracy for horizontal location. Any disturbed monuments in the City's Vertical Survey Datum shall be reset to third order accuracy and a new vertical datum established and certified by an Arizona Registered Land Surveyor. At least two other section corner quarter corner monuments on the City's survey list shall be referenced as a check. The survey notes showing these referenced monuments and elevations certifications shall be submitted for approval to the City Engineer before the project will be accepted as completed or bonds released.
(3) All monumentation information, as referenced above, shall be submitted within 60 days of City acceptance or the certificate of occupancy will be withheld.
(4) Monument locations shall be marked with "straddlers" (four nails with metal "shiners") that are driven into the pavement, placed in pairs approximately six feet apart and opposite to each other.

Lines connecting opposing pairs shall form a 90 degree cross with three foot legs. The center of the cross shall signify the exact location of the center of the monument to be set. Monuments shall be drilled or punched after they have been installed.

Subsection 105.10, INSPECTIONS OF WORK is modified to add the following:

105.10.1 City of Avondale Notification and Inspections

The Contractor must notify the City's Development and Engineering Services Department at least two business days before initial start of work. See permit for contact information. A pre-construction meeting with the City shall occur prior to the start of construction. Typical City inspections require a one business day minimum notification. No weekend, holiday or night-time work is allowed unless prior written approval is obtained from the City.

Subsection 105.11, REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK is modified to add the following:

105.11.1 Approvals/Acceptance

Any work performed without the approval of the City and/or all work and material not in conformance with the specifications is subject to removal and replacement at the Contractor's expense.

Subsection 105.15, ACCEPTANCE is modified to add the following:

105.15.1 Acceptance of Improvements

The following general list of requirements shall be completed, approved and accepted by the City prior to the issuance of a Letter of Acceptance. For the Issuance of a Certificate of Occupancy, all requirements for each permitted improvement as listed below shall be completed, approved, and accepted by the City. The date designated on the Letter of Acceptance shall be when the one year warranty period starts. See each separate improvement Construction Specification section for further details.

A. Grading and Drainage acceptance requires complete RLS certified as-built record drawings, building pad elevation certifications, drywell drilling logs/percolation tests for all installed drywells, verification of ADWR drywell registration and drainage basin capacity certifications.

B. Sanitary Sewer acceptance requires complete RLS certified as-built record drawings, trench compaction tests, passing and acceptance of 100 percent air and deflection tests (mandrel), manhole testing/inspection, including vacuum leak test, spark and pull tests for linings, line cleaning

documentation, removal of temporary plugs, 100 percent TV video (CCTV) inspection and documentation for integrity, slope and deflection compliance, plus documentation, pavement placement (if required), sewer manhole invert worksheets and lateral line stub or service line termination identification per specification.

C. Water acceptance requires complete RLS certified as-built record drawings, trench compaction tests, passing and acceptance of hydrostatic pressure test, flushing tests, passing and acceptance of disinfection tests, backflow test certification, minimum flow/pressure tests and pavement replacement (if required).

D. Storm Sewer acceptance requires complete RLS certified as-built record drawings, trench compaction tests, line cleaning, and visual manhole/structure inspections. All pipe sizes 24 inches and greater require 100 percent video inspection and documentation.

E. Concrete and Paving acceptance requires complete RLS certified as-built record drawings, all compaction testing, concrete testing reports, asphalt testing reports, and passing water drainage test.

F. Street Light acceptance requires complete RLS certified as-built record drawings, energization of lights, street light pole numbers assigned, installed and documented.

G. Traffic Signal acceptance requires complete RLS certified as-built record drawings, Letter of Acceptance from the City Traffic Division, and three (3) sets of Operation and Maintenance manuals.

H. Landscaping acceptance requires backflow devices certification, as-built record drawings of main lines, Letter of Acceptance from City of Avondale Development and Engineering Services Department, three sets of Operation and Maintenance manuals, and a certification of two herbicide applications.

I. Pavement Markings and Signage requires as-builts a visual inspection for conformance with the approved improvement plans and Letter of Approval from City Traffic Division.

J. Dry Utilities require trench compaction test results, a Letter of Acceptance from each utility company, and pavement replacement (if required).

K. Utility testing and disinfection documentation.

L. Geotechnical/material testing results; interim and final compilation reports.

M. As-built plan drawings and digital file documents.

N. Maricopa County DEQ issued Approval of Construction (A.O.C.) certificates.

O. Stormwater Pollution Prevention Plan (SWPPP) Notice of Termination (NOT).

105.15.2 As-built Record Drawings

A. All excavation is to remain open and no backfill shall take place until all underground fittings including but not limited to tees, valves, horizontal bends, vertical bends, stub-outs, and any other required facilities have been as-built. Contractor must make items accessible in which the Contractor's Surveyor can as-built survey and properly document the elevation and location of all items listed above. Any item which is backfilled without being as-built shall be re-excavated at the Contractor's expense to allow the Surveyor to as-built.

B. The Contractor shall maintain a full size set of blue/black line drawings onsite and continuously update these drawings to reflect any and all field adjustments, changes, additions, deletions etc. as they occur during the course of construction. Changes to the original plan drawings shall be made by striking through the original information with a single line. The as-built changes shall be noted with the letters 'AB' after the correction. The as-built changes shall be shown in both plan and profile as appropriate. Changes in horizontal alignment shall be noted on the plan and tied down by stationing and offsets from the monument line. Any portions of the Work not constructed shall be clearly labeled "deleted" or "not built".

C. At project completion, the Contractor shall submit a final, clean, full size set of blue/blackline record plan drawings showing the entire project with the as-built information as described above. This final set shall be prepared, reviewed and sealed by the Contractor's surveyor. The City shall review the final paper set for completeness and acceptability. If rejected, the Contractor shall correct or complete the as-built drawings and resubmit for an additional review.

D. The Contractor shall submit a RLS certified as-built spread sheet or as-built plan set listing manhole numbers, corresponding MH invert elevations, pipe slopes, lateral, stub and service invert elevations, top of cone shaft/flat top elevation and rim elevations. All elevations shall be taken prior to backfill. The as-built spreadsheet or as-built plan set shall be received reviewed and approved by the City prior to the issuance of a concrete or paving permit. No Certificate of Occupancy shall be given without City approved Sanitary Sewer as-built drawings.

E. Once the bond set of redlines as-built plans are approved and accepted the as-built plans shall be submitted in duplicate digital files, both "TIF"

and “PDF” formats.

105.15.3 Final Acceptance

When all work comprised in the plans, specifications and/or Contract has been satisfactorily completed in accordance with the Contract Documents, including clean-up and restoration, the Contractor shall so notify the City or its authorized representative in writing. The City or its authorized representative will then schedule and conduct a final field inspection of the project’s work and then prepare a written punch list to itemize and document deficiencies and omissions found related to the work. This will include project administrative close-out tasks including submitting and obtaining approval of final as-built record plan drawings. When all deficiencies and omissions disclosed by the final inspection/punch list have been corrected or completed, acceptance of this project will be given by the City by a written Letter of Acceptance. The Contractor shall be responsible for the work covered under the Contract until such acceptance is given.

SECTION 106 CONTROL OF MATERIALS

Subsection 106.2, SAMPLES AND TESTS OF MATERIALS is deleted in its entirety and replaced with the following:

106.2. Sampling and Testing

For quality control purposes, the Contractor shall provide and pay for all geotechnical services including material sampling and testing. Samples shall be taken under the direction of the City or its authorized representative. Testing shall be performed by an independent testing laboratory, pre-approved by the City or its authorized representative, under the supervision of a professional civil or geotechnical engineer registered in the State of Arizona. Each report shall indicate the location at which the test was made, the date of the test, type and source of material tested, test designation being used and the name of the person who performed the test. The Contractor shall pay for any re-testing as a result of a failed test.

A. Geotechnical Tests

A minimum 24 hour notice required to schedule inspections and tests. All tests shall be conducted by a certified geotechnical testing lab, provided for by the Contractor or developer/owner, at their cost. The City does not provide a geotechnical testing service. Sufficient testing shall be done to adequately verity the required densities and tolerances. The location and frequency of tests shall be per MAG and as further directed by the City. All reports and test results shall be submitted to the City for review and

approval. Approval of and/or meeting the required minimum test standards are mandatory in continuing on to the next phase of work.

All initial geotechnical field test results shall be emailed or hand delivered to the City within two business days. Typed and bound final reports with digital back-ups shall be delivered to the City within two weeks of the tests being taken or at the job completion, as directed by the City.

B. Aggregate Materials for Pipe Bedding/Backfill and Pavement Replacement

The laboratory shall collect the sample from the proposed material source and submit test results for approval. The laboratory report shall identify the source and include gradation of the material, plasticity index, liquid limit and percentage of water. If more than one material source is proposed for approval, the Contractor shall pay for the necessary test to confirm the suitability of the additional sources.

C. Trench Compaction Tests

The Contractor shall excavate the compacted backfill where directed by the City or its authorized representative for the purpose of conducting the following density tests as outlined below. The cost of all excavation, including backfill and re-compaction, shall be the Contractor's responsibility. The materials being compacted shall have the densities outlined in the respective sections of the Specifications. The City or its authorized representative will choose the location and depth for the in-place density tests. If any test made should fail to pass, the area must be reworked and one additional test must be taken at the Contractor's expense. It shall be the responsibility of the Contractor to accomplish the required backfill compaction and to control his operations by providing additional testing as necessary to verify and confirm that the Contractor is complying with the requirements of the compaction specifications. The Contractor shall determine the required optimum moisture content and control this moisture accordingly.

The minimum number of in-place density tests and/or sets required will be as follows:

Trenches crossing existing or proposed streets; one test per crossing.

(1) Trenches beneath existing or proposed pavement, curb, gutter or sidewalk or when any part of the trench is within five feet of any of the above; one test for the bedding, one test for the backfill and a minimum of at least one test for the base material every 500 feet.
(2) At all other locations – one test every 500 feet and at each street crossing.

D. Poured In Place Concrete

The consistency of the concrete shall be determined and regulated on the basis of the slump test as described by ASTM C-143. Slump tests shall be provided by the Contractor throughout the progress of the project. Concrete shall be of the class and strength indicated on the Contract Plan Drawings or as otherwise directed by the MAG Specifications.

Not less than four cylinder specimens shall be made by the Contractor for each 50 cubic yards of each class of concrete with a minimum of four specimens for each class placed or not less than four specimens for each half-day of placement. Specimens shall be tested in accordance with ASTM C-42. Two cylinders shall be tested at 14 days. If the tested strength meets or exceeds the minimum 14 day requirements, the City may accept the concrete. The City or its authorized representative may have the other two cylinders tested at 28 days, or discard at 60 days. Retesting as a result of failure shall be done at the Contractor's expense.

E. Aggregate Base Materials Compaction Tests

One compaction test will be required on the compacted base material every 500 feet of pavement or fraction thereof. Areas of less than 500 feet in length will require a minimum of two tests. The City or its authorized representative will choose the location and depth of in-place density tests. If any test made should fail, the area must be reworked and two additional tests shall be taken at the Contractor's expense.

The compacted base material shall be compacted to 100 percent of maximum density for the full depth when tested in accordance with MAG Specification Section 301.3 and 310.2. Aggregate base material shall not be placed on subgrade until final compaction tests of the subgrade have confirmed that the subgrade meets the compaction requirements of these Specifications.

F. Asphalt Concrete Pavement Testing

(1) Hot sample tests and acceptance of the material shall follow MAG Specification Section 321.
(2) One nuclear density gauge test every 300 lineal feet per lane per mix shall be used for on-site contractor control Q.C. during installation, but shall not be used for final acceptance.
(3) Final acceptance asphalt pavement cores are required and shall be taken in accordance with MAG Specification Section 321.14. If the test cores indicate deficiencies, additional cores shall be required per MAG. Any associated additional testing costs shall be the

Contractor's responsibility.

G. Controlled Low Strength Material (CLSM) Testing

The consistency of the CLSM shall comply with the requirements of MAG Specifications Section 728 and be determined and regulated on the basis of the slump test, as described by ASTM C-143. Slump tests shall be provided by the Contractor throughout the progress of the project. If the ½ sack or one sack CLSM cement content, slump or compressive strength exceeds the MAG Specifications per Table 728-1, the City Inspector will not approve the installation of the CLSM material. New test data shall be resubmitted for City approval.

The City Inspector may require the following cylinder tests: four cylinder specimens shall be made by the Contractor for each 50 cubic yards of each class of CLSM with a minimum of four specimens for each class of CLSM placed or not less than four specimens for each half-day of placement. Retesting as a result of failure shall be done at the Contractor's expense.

Subsection 106.5, STORAGE OF MATERIALS is modified to add the following:

106.5.1 Excess Material

Disposal of and/or stockpiling of excess material within the City limits or municipal planning area will be done in accordance with City regulations. The placing of material on private property requires written authorization from the property Owner. Haul plans and permits are required for offsite import/export.

Subsection 106.6, HANDLING MATERIALS is modified to add the following:

106.6.1 Haul Plan

A haul plan for offsite material import or export shall be required for City review and approval prior to the start of hauling. A City right-of-way construction permit shall also be required.

SECTION 107 LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

Subsection 107.2, PERMITS is modified to add the following:

107.2.1 City of Avondale Permits

A. The Contractor shall be responsible to obtain and pay for any and all necessary permits prior to construction, unless provided for otherwise.

B. City of Avondale Engineering permits shall be required for the following work items:

(1) All work within the City right-of-way, including but not limited to: grading, sanitary sewer, water, storm sewer, non-potable water, concrete, paving, gas, electric, telecommunications, cable TV, fuel lines, irrigation, landscaping, street lights, and traffic signals.
(2) All onsite grading and drainage improvements including offsite hauling.
(3) All onsite utilities listed above that will be located in City right-of-way, City easements, or public utility easements. All onsite utility main lines that connect to City utility main lines.

The Contractor shall also provide the City with a copy of the Arizona Department of Environmental Quality (ADEQ) Notice of Intent (NOI) for all required site grading work.

Contractor must keep a copy of the approved construction plans, traffic control

plan(s), Storm Water Management Plan (SWMP), or Stormwater Pollution Prevention Plan (SWPPP) and the City of Avondale engineering permit on the jobsite when working.

All other required permits will be the Contractor's responsibility to obtain including but not limited to; Maricopa County Department of Transportation (MCDOT) right-of-way permit, Maricopa County Environmental dust control permit, Flood Control District of Maricopa County flood plain use permit, and City fire hydrant meter. All Contractors must have a current insurance certificate on file with the City.

Subsection 107.5, SAFETY, HEALTH AND SANITATION PROVISIONS is modified to add the following:

107.5.3 Safety

The Contractor agrees to assume sole and complete responsibility for jobsite conditions during the course of construction of this project including safety of all persons and property. This requirement shall apply continuously and not be limited to normal working hours. The Contractor shall defend, indemnify and hold the City harmless from any and all liability, real or alleged, in connection with the performance of work on this project, excepting for liability arising from the sole negligence of the City.

Subsection 107.6, PUBLIC CONVENIENCE AND SAFETY is modified to add the following:

107.6.2.1 Construction Noise Limitations

Per Avondale City Code Chapter 4, Buildings and Building Regulations Article XII Construction Noise Limitations are as follows:

A. From May 1st through October 31st, Monday through Friday, construction work shall not begin prior to 5:00 AM and shall stop by 7:00 PM.

B. From November 1st through April 30th, Monday through Friday, construction work shall not begin prior to 6:00 AM and shall stop by 7:00 PM.

C. Weekends and Holidays: Construction work shall not begin prior to 7:00 AM and shall stop by 7:00 PM on Saturdays and Sundays and on all City, State and Federal holidays.

Subsection 107.7, BARRICADES AND WARNING SIGNS is modified to add the following:

107.7.1 Access

The Contractor shall maintain access to all businesses, schools and residences along the project boundaries at all times. Where there is more than one point of access to a property, the Contractor shall not restrict more than one access at a time. Access to at least one driveway shall be maintained during non-working hours. The Contractor shall also provide for safe and adequate public pedestrian movement through and around the Project as needed. Directional business name signs shall also be required where access is impacted or limited.

107.7.2 Traffic Control

The Contractor shall be responsible for providing proper barricading and traffic control including access into and throughout the work site. This is to include any upfront potholing activities. A certified traffic control plan must be submitted to the City for review and approval at least three City of Avondale business days before work can take place. The Contractor shall install approved barricading and traffic control, as approved by the City. Traffic control plan must include the project/job name and the assigned City permit number. Plan must comply with the applicable Manual on Uniform Traffic Control Devices (MUTCD) and City of Phoenix Traffic Barricade Manual. Barricade setup and related work may not start until the traffic control plan is approved by the City. Permittee shall maintain all traffic control devices on a 24 hour, seven day basis. The permit shall contain the name and 24/7 contact telephone number. In the interest of public safety, the City may require adjustments/additional devices from what was originally permitted. All additional devices installed shall be at no additional expense to the City.

107.7.3 Construction Access

All construction access locations are subject to City Engineer's approval. The Contractor shall be responsible for maintaining proper and adequate access roads inside and throughout the parcel allowing for inspection accessibility. This includes grading, gravel fill, and trench plates as required.

107.7.4 Trench and Street Barricading

Trench barricading must be safely secured and barricaded at all times. Overnight trenching involving street cuts shall be steel plated in accordance with MAG Standard Detail No. 211 and City of Avondale Standard Detail A1103. Steel plate installation shall be type A (milled in) for arterial and collector streets. Type B (ramped) shall be allowed on local streets only. Plates are only allowed for a maximum period of five business days after which the street must be permanently patched. Temporary asphalt patching, if allowed by the City Inspector, is only allowed for a maximum period of five business days after which the street must be permanently patched.

Street barricading and traffic channelization (signs, barricades, fencing and

channelizing devices) shall comply with the City of Phoenix Traffic Barricade Manual (TBM). The TBM represents the typical methods required for the uniform application and placement of standard barricade devices. Special circumstances not specifically addressed in the TMB require a separate submittal of a traffic control plan for approval by the City.

SECTION
108
COMMENCEMENT, PROSECUTION AND PROGRESS

Subsection 108.8 GUARANTEE AND WARRANTY PROVISIONS: Is modified to add:

108.8.1 Warranty

All right-of-way related improvements including water, sewer, drainage, streets, and landscaping related items shall be under warranty for a period of one year from City acceptance date. The Contractor shall be responsible for performing any required repair work and all associated costs of repairs within the warranty time frame. All warranty repair work shall be inspected and approved by the City. 30 calendar days prior to the end of the one year warranty period, a walk through inspection shall take place between the City and the Contractor. All improvements including drainage structures/facilities, curb and gutter, sidewalk, all pavement and street related work, waterlines and facilities, sewer related facilities, street lights, traffic signals, right-of-way landscaping, signage and pavement markings shall be re-inspected for damage or failure. Repairs shall be performed as outlined above. For subdivisions, a second television-inspection shall be required for all sewer lines. Storm sewers shall be required to be cleaned by hydro-vac or other approved method.

End of Section

PART 200 EARTHWORK

No City of Avondale Changes

PART 300 STREETS AND RELATED WORK

SECTION
321
ASPHALT CONCRETE PAVEMENT

Subsection 321.1, DESCRIPTION is modified to add the following:

321.1.1 General Requirements

Construction of paving related improvements shall not begin until the following conditions are met:

A. All underground utility construction including dry utilities shall be complete, including backfill and compaction.

B. All water and sewer services, laterals and stub-outs shall be complete, including backfill and compaction.

C. All storm and sanitary sewer invert as-built information shall have been received and approved by the City. See City Sewer Invert Elevation Worksheets and related City specification requirements.

D. All related water and sewer utility testing required by the City shall be complete, approved and accepted. All testing results shall pass City requirements.

E. All geotechnical compaction density testing results relating to the curb/gutter, road subgrade, and sub-base (ABC) work within City right-of-way areas shall have been received and approved by the City. All testing results shall pass City requirements.

F. All required concrete testing shall have been completed and approved with test reports received and accepted by the City. All testing results shall pass City requirements.

G. Any required material technical data submittals (Asphalt Mix Designs) shall have been received and approved by the City.

H. Any required conduit sleeving for utilities, landscaping, etc. shall have been installed. All sleeving conduits under the street improvements shall be schedule 80 PVC

I. The required concrete work only as-builts shall have been submitted, reviewed and approved by the City per the specifications.

J. All utility access covers/lids (valve box, manhole frame/cover) are adjusted.

K. Letters from all the utility companies shall be provided to the City, stating that all underground installations related to the street right-of-way and easements for the project are complete, and that no additional cross street boring will be required.

L. All required geotechnical testing shall be done in accordance with MAG Specifications and as amended by the MAG Supplement.

M. City approved technical information submittals are required for all materials used on the project. All materials must match approved submittals exactly or they will be rejected, any rejected materials shall be removed from the site immediately.

N. All water valve boxes, sewer manhole frame and covers, sewer clean-outs, and other utility access street penetrations shall have all been accounted for, referenced, and adequately lowered below grade to allow for paving operations. Utility items shall be accurately measured and marked to an off-set point (tied-off) on the adjacent concrete curb or other temporary benchmark as needed. Accurate dimensions shall be indicated. All data shall also be accurately documented on a set of construction plans. Accurate route surveying is also allowed in accordance with industry standards, however current GPS methods are not preferred and can only be used as a backup reference.

O. Final inspection of all concrete and paving improvements is required after the paving phase is 100 percent completed and shall be performed by the City Engineer. All utility adjustments, striping and signage shall also be 100 percent complete. Inspections shall include onsite visual inspection, plan checks, and a water flow test; all monitored by the City Engineer. Water flow tests shall encompass the entire street with adequate water to completely fill all gutters and establish flow. Area shall be wet down 30 minutes prior to the scheduled inspection by water truck. Pre-wet may need to be adjusted depending on season, plus additional water may need to be applied as needed and as directed by the City. All streets including the gutters and sidewalks shall be clean, dirt and debris free. This includes construction debris and stockpiled construction materials.

Subsection 321.2, MATERIALS AND MANUFACTURER is modified to add the following:

321.2.1 Asphalt Concrete

Asphalt Concrete design mix material submittals are required and shall be submitted to the City's Development and Engineering Services Department for review and approval a minimum of five business days prior to the scheduled

paving date. It is strongly recommended that a second “back-up” mix design be submitted for review and approval from a different plant location or different material supplier in case the primary supplier is not able to provide delivery. Mix designs and certification documents shall be dated no older than one year. Material commodity codes printed on the delivery tickets shall match the City approved mix design submittals exactly. Failure to provide the correct mix matching the approved commodity code will result in the paving operation being shut down until the correct material is delivered. Design mixes are required regardless of what material is specified on the City approved construction plans.

Throughout a paving operation that exceeds 400 square yards, the Contractor shall provide a representative from an independent geotechnical testing firm who shall be on site to confirm a rolling pattern, monitor temperatures and check that the required compaction densities are being obtained, for quality control purposes. The lab representative shall also perform the required material sampling and testing per MAG Specification and as modified by the MAG Supplement. The City Engineer shall be notified at once if any problems are encountered.

Subsection 321.4, APPLICATION OF TACK COAT is modified to add the following:

321.4.1 Tack Coat

A tack coat of City approved emulsified asphalt shall be applied per the MAG Specifications specified coverage rate between the base course and the surface course paving layers if applicable. If both courses are not completed the same day or if dust or another substance could cause a bond breaking effect, a tack coat shall be applied. City approval is required to pave both base and surface courses in the same day. All base course paving shall be thoroughly cleaned by whatever means necessary to ensure it is free of dirt, mud or other foreign substances before tack application and or surface course paving takes place.

Subsection 321.8.1, PLACING, is modified to add the following two paragraphs to read as follows:

Unless otherwise authorized by the City, installation of the base and surface courses shall not occur on the same day. Small jobs may be eligible and encouraged to pave both courses in one day but this is to be determined by the City in advance. The base course shall be tested in accordance with MAG Specification and as modified by City specification to verify specification and installation compliance. After the test results have been reviewed and approved by the City, authorization shall be issued and given to the Contractor to schedule installation of the surface course. The surface course shall then be tested to verify specification and installation compliance. Mineral aggregate gradation, asphalt cement content (oil), course thickness and compaction density test reports shall be submitted to the City for review and approval on both base and surface courses.

The asphalt edge at lip of gutter shall be min. ¼ inch to max ⅜ inch above lip of gutter with no stray asphalt mix squeezed over onto the gutter, if this occurs all excess asphalt shall be removed using a method that will not damage the gutter.

SECTION 333 FOG SEAL COATS

Subsection 333.1, DESCRIPTION is modified to add the following language:

Unless otherwise directed, application of a fog seal coat in accordance with MAG Specifications shall not be required on new paving.

SECTION 336 PAVEMENT MATCHING AND SURFACING REPLACEMENT

Subsection 336.1, DESCRIPTION is modified to delete the second paragraph entirely and replace it with the following:

Asphalt concrete pavement replacement shall be constructed in accordance with City of Avondale Standards. City of Avondale standard is to replace pavement, whether parallel or transverse to the direction of traffic flow, with a "T-top" type pavement section. Backfill requirements can be found in the most recent edition of MAG Specifications and the MAG Supplement, Section 601.4.

Subsection 336.2, MATERIALS AND CONSTRUCTION METHODS is modified to add the following:

Section 336.2.4.3 Street Cuts/Patches

The pavement replacement section for all longitudinal and transverse trenches located in an existing asphalt concrete paved street four inches thick or greater shall be constructed in accordance with MAG Uniform Standard Detail No. 200. Trench backfill and surface replacement, shall be a Type "A" repair with the off-set joint modification. If poor soil material conditions or "under-mining" occurs, a "T"-Top trench repair and replacement is required, as directed by the City.

A. The minimum trench pavement replacement width shall be four feet. Where the existing adjacent matching pavement is in poor condition and distress, such as alligator cracking or raveling, additional asphalt pavement replacement to match and create a proper joint may be required as directed by the City.

B. The depth of the permanent surface replacement shall be one inch thicker than the removed existing pavement section.

C. Sawcut or construction joints shall be adequately tack oiled.

D. Asphalt material shall be a City approved 19 mm or 12.5 mm mix design, MAG Marshall or Gyratory mix design depending on street classification as directed by the City. No COP mixes allowed.

E. Vibratory steel drum roller or vibratory steel drum roller in conjunction with a pneumatic tire roller is the only compaction method allowed.

F. Slurry backfills or open trenches in existing roadways must be properly steel plated and barricaded overnight. Temporary asphalt patches or completed and backfilled trench work that remains plated must be replaced as soon as possible and cannot remain for more than five days, or as required by the City.

G. Wherever possible, controlled directional boring shall be used when installing underground utilities including service connections, in or across an existing paved street. Open cut trenching in or across an existing paved street are not allowed unless the City has given prior written approval. Approved construction plans must specifically designate a street cut. Large diameter bores require specific plans. Unless otherwise approved, minimum pipe/conduit coverage depth shall be 36 inches from the top of street pavement. Any sleeving for conduit or cable installed under new or existing streets shall be Schedule 80 PVC pipe.

H. Major trench cuts, widenings or other pavement replacements that exceed 300 feet in length shall require pavement re-surfacing in accordance with MAG Specification Section 336, as modified herein. Surface treatment shall be as required by the City using a MAG slurry seal, per MAG Specification Section 332, or an approved micro-seal per MAG Specification Section 331.

I. Unless otherwise directed by the City, all joints shall be hot crack sealed per MAG Specification Section 337; including pothole and bore pit pavement replacements. Joint seal type to be as directed by the City Engineering depending on condition of joint and field circumstances. This shall be completed before any re-striping takes place.

336.2.4.4 Potholes

All utility potholing in existing paved streets shall be done using the vacuum excavation type method. Dimensions for the potholing pavement cuts shall be limited to 12”x12” square holes. All potholes shall be backfilled and patched in accordance with MAG Standard Detail 212. Backfill material shall be one sack CLSM per MAG Specification Section 728. Asphalt concrete pavement replacement shall use a City approved 12.5 mm hot mix design. Asphalt thickness shall be five inch minimum or match existing, whichever is greater.

Asphalt shall be placed and compacted in two lifts. The asphalt patch shall be crack sealed afterward.

336.2.4.5 Pavement Replacement

Pavement replacement for open cut trenching, transverse and longitudinal, in any existing paved street, shall be in accordance with MAG Standard Detail 200, Type "A", with an offset joint for the surface course construction. Asphalt materials and placements shall be in accordance with applicable MAG Specifications and MAG Supplement. Pavement replacement for arterial and collector type streets shall be one inch thicker than the existing thickness or five inches minimum, whichever is greater. Pavement replacement for residential streets shall be one inch thicker than the existing thickness or three inches minimum, whichever is greater. Asphalt concrete pavement replacement shall use a City approved 19.0 mm or 12.5 mm hot mix design. Design mixes shall be submitted for City review and approval. Arterial and collector streets shall be paved using a minimum of two separate lifts; a three inch minimum base course, followed by a two inch minimum surface course. Pavement replacement for residential local streets that is a minimum of three inches thick can be paved in one lift. All vertical surfaces (saw/curb edges) shall be tacked. Overnight or bad weather conditions that exist between paving lifts shall also require application of a tack coat. After the final lift of asphalt is in place, all new seams/edges shall be crack sealed with an approved flexible sealant. Testing shall be performed by an independent certified geotechnical testing lab in accordance with these specifications provided for by the utility Owner, Contractor or Developer, at their cost. The location and frequency of tests shall be as directed by the City.

When the pavement replacement trench edge is within three feet of the lip of gutter or curb, the full width of asphalt within the area shall be removed and replaced with one inch thicker than the existing pavement.

336.2.4.6 Damage to Property

Damage to any adjacent street facility or structure caused by construction or construction related work shall be replaced or repaired at the Contractors cost as directed by the City before the City's final acceptance of the work.

Any adjacent pavement, concrete or landscaping must be satisfactorily restored/repaired to pre-job conditions to the approval of adjacent property owner or City of Avondale. This includes traffic loop detectors which must be completely reinstalled if cut. Longitudinal trenching parallel to the road that leaves a 48 inch or less remnant pavement section to lip of gutter or pavement edge, will be required to be replaced as part of the trenching pavement replacement. Sidewalk must be replaced to the nearest joint.

SECTION
340
CONCRETE CURB, GUTTER, SIDEWALK, SIDEWALK RAMPS, DRIVEWAY AND ALLEY ENTRANCE

Subsection 340.1, DESCRIPTION is modified to add the following:

340.1.1 General Requirements

Construction of concrete related improvements shall not begin until the following conditions are met:

A. All underground utility construction including dry utilities shall be complete, including backfill and compaction.

B. All water and sewer services, laterals and stub-outs shall be complete, including backfill and compaction.

C. All storm and sanitary sewer invert as-built information shall have been received and approved by the City. See City Sewer Invert Worksheets and related City specification requirements on the City of Avondale website.

D. All related water and sewer utility testing required by the City shall be complete, approved and accepted. All testing results shall pass City requirements.

E. All geotechnical compaction density testing results relating to all underground utility work within City right-of-way and easement areas shall have been received and approved by the City. All testing results shall pass City requirements.

F. Any required material technical data submittals (Concrete Designs) shall have been received and approved by the City.

G. Any required conduit sleeving for utilities, landscaping, etc. shall have been installed. All sleeving conduits under the street improvements shall be Schedule 80 PVC.

H. Letters from all the utility companies shall be provided to the City, stating that all underground installations related to the street right-of-way and easements for the project are complete, and that no additional cross street boring will be required.

I. All required geotechnical testing shall be done in accordance with MAG Specifications and as amended by the MAG Supplement. Subgrade shall be tested to verify if the existing soils are expansive in nature per MAG

Specification Section 340.3.1. If the existing soils are determined to be expansive, corrective action shall be taken to remove and replace or mitigate the unsuitable material as outlined in the MAG Specifications.

J. City approved technical info submittals are required for all materials used on the project. All materials must match approved submittals exactly or they will be rejected. Any rejected materials shall be removed from the site immediately.

340.1.2 Deficiencies

For various common deficiencies encountered, the required corrective actions are listed as follows:

A. Inverse flows in concrete curb, gutter and valley gutter shall be replaced, no grinding allowed.

B. Incorrect elevations with correct flow direction; grinding may be allowed at the discretion of the City Engineer as long as it does not exceed ¾ inches in depth and is visually acceptable.

C. Curb, gutter, valley gutter and sidewalk with cracks larger than 1/16 of an inch, regardless of location, shall be replaced from joint to joint.

D. Any deviation in straightness along the top or sides of curb shall not be in excess of ¼ inch when checked with a 10 foot straightedge, any curb that does not conform shall be replaced if directed to do so by the City Engineer.

E. Any deviation or protrusion in the surface of sidewalk (or any other surface designated for use by pedestrians) that may cause a tripping hazard shall be corrected to the City Engineer's satisfaction.

F. Foreign substances and marks on the concrete surfaces shall be removed completely.

G. Chips, scrapes, gouges and other similar deficiencies may be patched with a City approved epoxy based patching compound, or may require replacement, at the City Engineer's discretion.

H. Poor or sloppy workmanship may require replacement at the City Engineer's discretion.

I. As-built elevation differences that exceed ±0.15 feet or longitudinal slope differences of 10 percent that adversely affect the grade shall be reconstructed. No as-built longitudinal slope less than 20 percent shall be accepted unless special design criteria was allowed and approved by the City as part of the City approved improvement plans. As-built elevations

or slopes that adversely affect the grade, shape, safety or ride-ability of the road, cause water ponding in excess of ½ an inch in depth or cause concern that the gutters/street will not drain properly, shall not be acceptable.

Subsection 340.2, MATERIALS is modified to add the following:

340.2.2 Class A Concrete

Concrete to be used for construction of aprons, valley gutters, right turn/deceleration lanes, paving, sidewalk ramps, commercial driveways and other concrete facilities designed to support vehicle traffic shall be at a minimum MAG Class A mix with a fiber mesh additive or a MAG Class AA mix, unless otherwise directed by the City.

Subsection 340.3 CONSTRUCTION METHODS is modified to add the following:

340.3.11Construction Methods (City of Avondale)

A. Open form inspections are required before placing concrete. It is the Contractor's responsibility to schedule these inspections with the City Engineer a minimum of one business day in advance.

B In the case where sidewalk is being installed adjacent to street lights, no sidewalk construction shall begin until either the street lights and the associated electric junction boxes have previously been installed or all street light pole locations and the associated electric junction boxes have been staked by a surveyor. The purpose is to avoid alignment conflicts. The street light locations shall take precedence over sidewalk location and shall not be relocated to avoid a conflict unless written authorization is provided by the City. The sidewalk shall shift or meander around the poles as directed by the City. The same process is required for other possible obstructions such as utility cabinet boxes or pedestals.

C. Sewer service, lateral or stub locations shall be identified with a stamped "S" into the concrete curb per MAG Standard Detail 440-4. Water laterals, stubs, and services shall also be identified with a stamped "W" into the concrete curb. Locations to be verified and staked by a surveyor prior to curb construction.

D. Contraction joints spacing for various types of concrete work shall be as follows:

(1) Vertical single curb, ribbon curb, vertical curb and gutter – five feet
(2) Roll curb - five feet (match joints in sidewalk)
(3) Sidewalk – five feet

E. Sidewalk ramps located at intersections where traffic signals are located, or will be located, may require field fit modifications to allow for proper ADA wheelchair access to the pedestrian push buttons located on the signal poles. Consult with the City Engineer before constructing these ramps for specific direction on layout and construction. Form inspections and approvals shall be required before placing any concrete.

F. A City approved curing agent shall be applied as soon as possible after finishing, especially in hot, dry weather to help prevent cracking.

G. Related handrail construction shall conform exactly to MAG Standard Detail 145, Type 1 or 4, depending on post locations relative to the structure. Type 2 or 3 shall not be allowed. No variations will be allowed without prior written approval from the City.

H. For construction inspection purposes, concrete work only as-builts shall be prepared, checked, certified, and submitted by a RLS for City review and approval prior to the start of any actual paving work. Submittal shall consist of two full size black line paper plan sets stamped and sealed by a RLS. Submittal must be complete with all gutter and top of curb as-built elevations provided. Submittals shall include all curb and gutter elevations, valley gutters, aprons, driveway entrances, corner/intersection radii, ECR's and BCR's, concrete bus bays, and concrete right-turn/deceleration lanes. All longitudinal gutter slopes shall be re-calculated including the valley gutters. Cross-street valley gutters shall also be included. Items out of tolerance and any other discovered deficiencies shall be corrected including reconstruction as required prior to starting any adjacent paving construction. Items/areas corrected or reconstructed shall be as-built as outlined above for review and approval by the City for a second time. This inspection submittal process does not replace the required as-built record drawings submittal for the final street improvements. No paving construction shall begin until all related deficiencies are corrected and the City gives written approval for the as-builts.

SECTION 345 ADJUSTING FRAMES, COVERS, VALVE BOXES AND WATER METER BOXES

Subsection 345.1, DESCRIPTION is modified to add the following:

345.1.1 Utility Adjustments:

Any pavement repair resulting from inaccurate location for a valve or manhole adjustment shall be backfilled using one sack CLSM per MAG Specification Section 728 and MAG Supplement Section 106.2.3. The area shall be milled out

to a minimum 6 X 6 foot square by two inches deep and repaved using the same A.C. mix used to originally construct the pavement. All joints to be crack sealed.

The following Section 399 shall be added to Part 300 – Streets and Related Work of the MAG Specifications to read as follows:

SECTION
399
DRY UTILITIES

399.1 General Specifications

See Part 100, General Conditions for additional requirements.

399.2 Trenching

All staking, trenching, conduit, and installations shall be in accordance with the local utility provider.

399.3. Installation in Right-of-Way

Installation of dry utilities within existing streets, proposed streets, or within five feet shall be in accordance with Part 100, General Conditions, including potholing, street cuts, backfill, and compaction and pavement replacements.

399.4 Compaction

Geotechnical testing for compaction densities is required for all longitudinal and transverse trench crossings within new subdivision developments. Testing and reporting requirements shall be in accordance with Part 100, General Conditions.

399.5 PVC Sleeves

All transverse street crossings in existing and in new streets within City right-of-way shall be sleeved with Schedule 80 PVC pipe unless directed otherwise.

399.6 Air Testing

Low-pressure air testing of all sanitary sewer in accordance with MAG Specifications and this MAG Supplement shall not begin until installation and backfill of all dry utilities is complete. See Part 600, Water and Sewer.

399.7 Water Settling

Water settling methods for compaction and backfill shall only be allowed for new subdivisions and as directed by the City in accordance with Part 100, General Conditions. All trench areas shall be restored to original condition.

399.8 Street Lights

See Part 800, Street Lights, for specific construction specifications on installation of street light poles and appurtenances.

End of Section

PART 400 RIGHT-OF-WAY AND TRAFFIC CONTROL

SECTION 430 LANDSCAPING AND PLANTING

Subsection 430.4, DECOMPOSED GRANITE AREA is delete in its entirety and replace with the following:

430.4.1 Scope of Work

Work includes the furnishing of all labor, material, equipment and services necessary to complete the work for this Section as indicated on the drawings and as specified and necessary to complete the construction of decomposed granite groundcover.

430.4.2 Materials

A. Decomposed granite shall be native, local, desert of size ¾ inch diameter screened in all arterial and collector street right-of-way landscaping areas. For properties with the Old Town Avondale Business District the color of the decomposed granite shall be “jesse red” or equivalent. Granite shall be free of organic matter and other debris. The granite colors shall be "brick red," "autumn red" or “madison gold”. Actual granite color and size shall be specifically identified on the plans or special conditions. If the size is not clearly specified, the Contractor shall obtain clarification from the City. The Contractor shall submit a five gallon bucket sample of the actual granite to be used on the project. The City must approve the sample before the Contractor spreads the granite on the project area. Any requested deviation from the specified size and/or color must be approved by the City.

B. Chemical herbicide shall be industrial grade "Surflan" pre-emergent or other City approved equal.

430.4.3 Surface Preparation

A. The existing grade shall be fine graded and raked free of organic matter and other debris one inch diameter and larger. A level board not less than eight feet in length shall be used to inspect subgrade for accuracy and trueness. All weeds and grass shall be completely removed. All trench and plant excavation must be completed prior to fine grading. All excavations must be properly and thoroughly compacted as to prevent any future settlement. All grades adjacent to curbs, sidewalks or headers

shall be at two and one-half inches below the top of concrete unless directed otherwise. Turndown excavations are not acceptable.

B. Subgrades shall be inspected and approved by the City or designated representative prior to the Contractor spreading any granite material.

430.4.4 Decomposed Granite Installation

Installation procedures for decomposed granite may vary by the scale of the project and the size of specific areas to receive decomposed granite groundcover. Installed granite shall be dragged or raked to remove any irregularities. Installation shall provide a compacted depth of two inches decomposed granite as specified on the drawings. Methods of compacting such as rolling or water settling shall be approved by the City or designated representative. A level board not less than eight feet in length shall be used to inspect grade for accuracy and trueness. Granite finish grade shall be a one-half inch below the top of curb, sidewalk or header surfaces, unless otherwise specified on the drawings.

430.4.5 Weed and Grass Control

A. Application of commercial grade chemical herbicide pre-emergents shall be at the rate and method recommended by the manufacturer and in accordance with local accepted standards. Material shall be applied in solution with water in the proper proportions as recommended by the manufacturer. The Contractor, subcontractor or individual performing the actual spraying operation, chemical application and transportation of these chemicals shall be properly and currently licensed or permitted as required by any applicable federal, state or local regulations and statutes.

B. Two separate applications shall be done, one being after completion of fine grading before the granite, and the second application being done after the granite is placed.

C. The Contractor shall be responsible for the proper removal of any existing weeds or grass. At the beginning of the contract work, or no less than 10 days before fine grading is started, the Contractor shall correctly apply a commercial chemical herbicide as recommended by the manufacturer to any unwanted weeds and grass as so directed by the City. Grading only is not acceptable for weed and grass elimination. Spray application of the herbicide shall be done sufficiently prior, ten days minimum, before any manual removal of the grass and weeds is to take place. The Contractor shall not begin finish grade work until all weeds and grass is removed or the existing growth shows visible evidence of being treated with an herbicide.

430.4.6 Cleanup

The Contractor shall remove and properly dispose of any and all debris and waste materials developed as a result of the work in this Section. All paved surfaces shall be clean of dirt or granite upon completion of this scope of work.

430.4.7 Maintenance and Guarantee

Areas of granite shall be maintained free of weeds and grass, free of other debris and true to grade until final acceptance and until completion of the maintenance period.

Subsection 430.5 TREES, SHRUB, AND GROUND COVER PLANTING is deleted in its entirety and replace with the following:

430.5.1 Proof of Material Purchased

All shipments or orders of plant material shall be inspected at the nursery or at the growing site by the authorized federal and state authorities. All necessary inspection certificates as may be required by law for the necessary transportation shall accompany the invoice for each shipment or order of stock and shall be filed with the Contractor prior to acceptance of the materials.

430.5.2 Materials

A. Humus shall be approved forest humus or other approved organic material free from sticks, stones, roots, or other foreign matter.

B. Stakes shall be two inch by two inch by eight foot redwood or two inch diameter by eight foot lodge pole pine free of any knots or defects. The tree planting standard detail drawing may vary the staking material requirements. The standard details for staking prevail.

   (1) Wire for fastening trees to stakes shall be No. 12 gauge, annealed galvanized steel, not iron.
   (2) Hose to encase wires used for fastening trees to stakes shall be two ply reinforced rubber or plastic garden hose in lengths of six inches.
   (3) Staples shall be a No. 14 gauge, one inch long, blued or zinc coated.

C. Prepared Backfill shall be composed of three parts of native soils to one part of humus by volume, thoroughly mixed to insure uniformity. Native soil shall be natural, fertile, friable soil, which possesses the characteristics of representative productive soils in the vicinity. The soil used shall not be excessively acid or alkaline, nor toxic substances

harmful to plant growth. The soil used shall be without admixture of subsoil, and be reasonably free of noxious weeds, clay lumps, clods, stones, roots, stumps, and foreign debris of any kind.

D. Water used in planting shall be kept free from oil, acids, alkali, salt and other substances harmful to plant growth.

430.5.3 Plant Materials

A. All plant materials furnished shall be nursery-grown, well branched, and well-proportioned unless otherwise indicated. All plants are subject to inspection and approval by the City before planting. All plants found unsuitable in growth or condition, or which are not true to name, or meet the City materials. Call per requirement shall be removed at the expense of the Contractor and replaced with acceptable plants.

B. Nomenclature in durable, legible labels in weather resistant ink shall be provided for ease of inspection and identification. The label detailing the correct plant name and size shall be securely attached to all plants, bundles, and containers of plant material delivered to the site.

C. Quality and size of plants shall be in accordance with the latest industry accepted nursery grading standards. All plants shall have a normal habit or growth and shall be sound, healthy, vigorous, and free from disease and insect infestations. Trees shall have a straight trunk throughout their height. Any tree with a weak, thin trunk not capable of supporting itself when planted in the open shall not be accepted. The minimum acceptable size of all plants measured before pruning with branches in normal position, shall conform to the measurements specified within the plant list. Plants larger in size than specified may be used, but the use of larger plants will not affect the contract price. If larger plants are used, the ball of earth or spread of roots shall be increased proportionately.

D. Container-grown plants must be grown in pots, cans, tubs, or boxes for a minimum of three months and a maximum of one year. They must have sufficient roots to hold earth intact after removal from containers, but must not be rootbound. Plants must be carefully removed from containers so as to prevent breaking or cracking of earth during the planting process.

430.5.4 Plants Required

A. The species (scientific and common names), sizes, manner in which to be furnished, and the approximate number required, are to match the plant list on the plans and specifications. The Contractor shall furnish and install all plant material necessary to complete the planting as shown on the landscape plans or as directed by the City.

B. Plant kinds other than those indicated on the plant list will be considered by the City only upon submission of proof that the plant is not reasonably procurable in the local region and upon prior authorization of essential characteristics as the kind of plant specified in regards to appearance, ultimate height, shape, habit of growth, general soil, and other requirements. The average cost and value of the substituted plants shall not be less than the cost and value of plants indicated. All substitutions of plants must be submitted in writing at least five days prior to the bid opening date. Approval of the substitution must be acknowledged by the Owner in writing before approval is granted.

C. All nursery stock shall be planted as soon as possible after delivery to the site. Plants shall not be exposed to excessive sun or drying winds until planting. Stock, which is not satisfactory in the opinion of the Owner, shall be immediately removed from the site at the Contractor's expense and replaced with acceptable stock.

D. All plants shall be in accordance with the City of Avondale approved plant list in the Avondale City Code Section 12, Appendix A, Low Water Using Plant List. The following tree varieties shall be prohibited:

(1) Mulberry trees
(2) Olive trees with the exception of the Swan Hill or Wilson Olive varieties

E. All trees required by this part shall have a minimum trunk height of six feet, with a minimum one and a one-half inch caliper measured four feet above the ground. Multi-trunk trees may have smaller average caliper measurements. Palms shall have a minimum trunk height of five feet. This size of tree is generally referred to as “15 gallon” in the landscaping industry.

F. Twenty-four inch box trees shall have a minimum trunk height of eight feet with a minimum two inch caliper measured four feet above the ground. Multi-trunk trees may have smaller average caliper measurements. Palms shall have a minimum trunk height of eight feet.

430.5.5 Planting Season

The planting of trees and shrubs shall be performed during favorable weather conditions, during the season or seasons, which are normal for such work, or as determined by acceptable local practice.

430.5.6 Streetscape standards – The following landscaping shall be required along all streets:

A. Trees with a minimum size as specified herein shall be planted at the rate of one tree per 20 feet of linear street frontage. A minimum of 25 percent of the required trees shall be 24 inch box trees.

B. Shrubbery with a minimum size of five gallons shall be planted in appropriate numbers to complement the placement of trees, but in no case shall be less than two shrubs per 20 feet of linear street frontage.

C. Clustering of trees and shrubbery shall be encouraged to accent focal points or landmarks and to provide variety to the streetscape. Contouring of the ground and placement of mounds and earth berms along streets shall be required.

430.5.7 Obstructions Below Ground

Any rock or other underground obstructions shall be removed by the landscape Contractor to the depth necessary to permit proper planting according to plans and specifications. Other locations for the planting may be selected by the Contractor upon approval of the City if underground construction, obstructions, or rock are encountered in the excavation of planting areas. The Contractor must be knowledgeable of locations of all existing underground utilities prior to any work. Their protection is the responsibility of the Contractor. All damage shall be corrected at the expense of the Contractor to the satisfaction of the City or respective utility company.

430.5.8 Planting Operations

A. The Contractor shall be responsible for finish grading the landscaped areas. This may require removing or adding material to achieve an acceptable grade.

B. Plant Locations: Trees and shrubs in containers will be placed in accordance with the planting plans for location approval by the City prior to planting.

(1) Planting shall not be placed so as to block visibility of traffic signs or street signs, including as the plants and trees are projected to grow to full growth.

(2) Planting within sight visibility triangles shall be restricted to shrubs no taller than two feet at full growth and trees with branches hanging no lower than seven feet.

(3) The planting Contractor shall stake the plant locations as required to coordinate the planting work with the irrigation work. Trees will

be planted a minimum of five feet from adjacent curbing or sidewalks unless directed otherwise. Shrubs will be planted a minimum of two and a half feet from adjacent curbing or sidewalks unless directed otherwise. These perimeter spacing requirements shall take precedence over the planting plans. Shrub clusters shown on the planting plans are for general quantity, location and layout style purposes only. Actual shrub spacing shall be at a minimum of four feet from any plant in any direction unless directed otherwise. Location of plants on the planting plan shall take precedence over plant locations on the irrigation plan. If prior to or during the planting operation, the Contract encounters any obstructions, space restrictions, or other circumstances which may require shifting or relocation of plant locations, or addition/subtraction of individual plants, the Contractor shall notify the City of the specific problem for direction and approval. Failure to comply with these spacing requirements may result in removal, replacement, and replanting of the plants at the Contractor's expense.

C. Excavation for Planting: This shall include the excavation and stockpiling of native soil. Planting pits shall be excavated to a volume twice the size of the rootball of the plant to be planted.

D. Base Backfill: If required, base backfill of the pit bottom shall be backfilled with prepared backfill material and be water settled to eliminate any future settlement of the plant.

E. Setting Plants: Plants shall be carefully removed from containers and set in a manner as to assure that the rootball remains intact as a part of this operation. Plants shall be set plumb and faced to give the best appearance in relation to adjacent plants or structures. Trees shall be braced in position until backfilling operations are complete.

F. Final Backfill and Fine Grading: Backfilling operations of planting pits shall be completed with prepared backfill material. The soil shall be thoroughly tamped and water settled to eliminate all voids in the backfill while maintaining the plumb position of the plant. The wells shall be graded and the planting area shall be fine graded.

G. Staking of Trees: Staking shall be as described on the standard detail drawings. The Contractor may provide additional staking upon approval of the City for trees not meeting the specification of being self-supporting. Unless directed otherwise, all 15 gallon trees shall be staked.

H. Pruning: Plants shall be pruned of superfluous growth after planting as directed by the City.

I. Fertilization: All plant material shall receive proper application of an approved root stimulator and/or plant food additive as recommended by the manufacturer. Applications shall be made during and after planting, throughout the construction period before acceptance, and during any prescribed maintenance period after acceptance. Approvals by the Owner or Landscape Architect do not relieve the Contractor from any liability for plant responsibility.

J. The Landscape Contractor shall be responsible for protecting new plants from rabbits and any other animals during construction and through the specified maintenance period.

K. Planting wells: All tree and shrub plants shall be installed in a graded irrigation well. Wells for shrubs shall be two inches deep and 24 inches in diameter, around the shrub. Wells for trees shall be two inches deep and 36 inches in diameter around the tree. The top of the irrigation bubbler shall be installed to a maximum height of two inches above the bottom of the well's finish grade. The one bubbler for each shrub shall be spaced approximately four to six inches from the plant. The two bubblers for each tree shall be spaced approximately 10 inches to 12 inches from the plant, one on each side, in line with the plant center.

430.5.9 Cleanup

Any soil, manure, or other material dropped onto paved areas by hauling operations or otherwise, shall be removed promptly, keeping these areas clean at all times. All excess soil, stone, and debris created under this scope of work shall be removed from the site or disposed of, as directed by the Owner.

430.5.10 Inspections

The City or its designated representative shall perform the required jobsite, yard, and plant nursery inspections as outlined in the Project Plans/Specifications. A minimum two City business days notice is required. The Contractor shall be required to have an authorized person present at both the substantial and final completion inspections. The City and/or its designated representative reserve the right to make any unscheduled or unannounced inspections or jobsite visits.

430.5.11 Maintenance Period

A. The maintenance period shall begin after the substantial completion inspection and punch list items are completed. Substantial completion is defined as all grading, irrigation and planting work being completed including any structures, electrical appurtenances, irrigation controllers, security cages and granite groundcover. The start date for the

maintenance period shall be approved by the City and put in writing. An additional inspection may be required to verify completion of punch list items.

B. During the maintenance period, the Contractor shall maintain all trees, shrubs, and ground cover. The maintenance shall include all labor, equipment, and materials required for the irrigation, weeding, grading, staking, and general care to ensure the healthy growth of all plants. The Contractor shall make timing and flow adjustments to the irrigation system as required to properly establish and maintain the plant material through the construction and maintenance periods. The Contractor shall be responsible for all irrigation repairs when such repairs are required for the maintenance operations. When the maintenance period is completed, a final completion inspection shall take place. The job will not be accepted until the final completion inspection is done and all resulting final punch list items are corrected. The City shall approve the final acceptance and issue a written document stating final acceptance of the job and the date of acceptance.

C. The Contractor's maintenance period shall be for one calendar year from the Owner approved date of substantial completion.

430.5.12 Plant Guarantee and Replacement

A. Guarantee: The Contractor shall guarantee all shrub material to be in vigorous, healthy condition for a period of one year from the Owner approved date of substantial completion. All trees shall be guaranteed to be in vigorous, healthy condition for a period of one year from the Owner approved date of substantial completion.

B. Replacement: Any plant under this specification which is dead, missing, unhealthy, or otherwise not acceptable and not in a satisfactory growing condition during the construction, maintenance period, or at the end of the guarantee period, shall be removed from the site and replaced with a suitable, acceptable plant as specified within five days.

C. Plant protection for protection services: Permit from Department of Agriculture for protected species affected, removed or salvaged by construction.

SECTION 440 SPRINKLER IRRIGATION SYSTEM INSTALLATION

Section 440, Sprinkler Irrigation System Installation is deleted in its entirety and replaced with the following:

440.1 Examination and Verification of Drawings and Site

It shall be the Contractor's responsibility to report to the City any deviations between mechanical drawings, specifications and the site. Failure to do so prior to the bid date and prior to installation of equipment, resulting in replacing and/or relocating equipment, shall be done at the Contractor's expense.

440.2 Materials

The specifications shall be deemed to be used for the purpose of facilitating a description of the materials and establishing quality whenever any material is specified by name and/or number, and shall be deemed and construed to be followed by the words "or approved equal". Substitutions will not be permitted which have not been submitted for prior approval by the Owner. All materials shall be new and the best of their class and kind. Sufficient descriptive literature and samples must be furnished for any materials submitted as "equal" substitutes.

440.3 Permits and Inspections

A. Any permits required for the installation or construction of any irrigation work included under this Contract shall be obtained and paid for by the Contractor. The Contractor shall also arrange for and pay all costs in connection with any inspections and examinations required by the permitting authorities.

B. The Contractor shall notify the Owner at least two City business days in advance of the time when inspection of the irrigation system work is required.

440.4 Polyvinyl Chloride (PVC) Pipe

A. Plastic pipe shall be as described and specified on the drawings. It shall be of unplasticized PVC compounds extruded from virgin parent materials. PVC pipe shall be newly purchased with no visible evidence of extended direct sun light exposure. Pipe shall be free from dents, cracks, holes, or other abrasions. All pipes shall be manufactured by an approved manufacturer.

B. All pipes shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, size, schedule or class, PVC physical property value, testing standards designation, and maximum working pressure psi at 73.4 degrees Fahrenheit.

C. Mainline pipe is defined as all pipe installed from the source, such as a meter, curb stop or backflow prevention assembly, to a mainline valve or lateral valve as defined on the plan drawings. Mainline pipe upstream from the backflow preventer and between the water meter and the backflow device shall be Type K copper tubing. High pressure mainlines three inches and larger shall be C-900, Class 200, rubber gasket, bell and spigot pipe with push-on or mechanical joint D.I.P. fittings as specified. Standard mainline pipe downstream from the backflow preventer sizes ¾ inch to two and one-half inch diameter shall be Schedule 40 solvent weld.

D. Lateral pipe is defined as all non-pressurized pipe installed downstream from the control valves and that which distributes water to the bubblers, emitters and sprinklers. Lateral pipeline sized ¾ inch to two and one-half inch diameter shall be Class 200, solvent weld. One-half inch diameter lateral pipe shall be Class 315, solvent weld. Lateral line pipe sizes three inches in diameter and larger shall be Class 160, rubber gasket, bell and spigot.

440.5 Plastic Pipe Fittings and Connections

A. All plastic pipe fittings to be installed shall be molded fittings manufactured of the same material as the pipe and shall be suitable for either solvent weld or threaded connections. No fittings made of other materials shall be used. Fittings shall be marked with manufacturer's name, size, and schedule information.

B. Slip fittings socket taper shall be so sized that a dry unsoftened pipe end conforming to these special provisions can be inserted no more than half way into the socket. Unless otherwise specified, all plastic fittings shall be of Schedule 40 or Schedule 80 PVC material.

C. All plastic to metal joints shall be made with PVC Schedule 80 male adapters or PVC Schedule 80 nipples. Threaded joints for such connections shall be made up with teflon ribbon tape.

D. Primer and solvent cement for socket connections of PVC material shall be compatible with material to be welded as recommended by the plastic material manufacturer.

E. All plastic to plastic threaded connections shall be made up with teflon based joint compound such as Permacel, Rectorseal 5 or approved equal.

F. Fittings for PVC bell and spigot pipe with gasket shall be mechanical joint or push-on ductile iron pipe as specified and conforming to the applicable AWWA standards.

440.6 Copper Pipe and Fittings

A. Copper tubing shall be seamless, Type K, hard drawn temper.

B. Fittings shall be wrought copper or brass solder joint unless specified otherwise. Solder joints shall be made using alloy grade Sb5, 95-5 tinantimony with a rosin type flux. Joints between dissimilar metal shall be made using threaded, insulating fittings. Threaded joints shall be made up with teflon ribbon tape or teflon based joint compound.

440.7 Bubblers and Risers

All bubblers and riser assemblies shall be of the types and sizes specified on the plans. Bubbler emitters for trees and shrubs shall be Rainbird or other City approved equal. All bubbler risers shall be made up of ½ inch Flex PVC tubing with ½ inch male adapters.

440.8 Equipment

A. The irrigation controller shall be of the size specified on the plans. The irrigation controller shall be the light-energized Solatrol LEIT irrigation control computer or other City approved equal.

B. The lateral line valves shall be; diaphragm-operated, electrically actuated, to be used in conjunction with the Solatrol LEIT or other City approved equal controller. Valve sizes shall be as indicated on the plans.

C. The backflow prevention device/assembly shall be of the type and size specified on the plans. Brass bodied, threaded ball shut-off valves are required before and after the actual backflow device. A threaded union shall be installed on the downstream side of the backflow device in-line with the pipe, perpendicular to the ground. The entire backflow prevention assembly shall be installed per the latest applicable City codes.

D. All mainline shut-off valves shall be threaded brass bodied gate valves. Gate valves shall be a domestic brand, Nibco, Grinnell, Waterous, or approved equal. Location and size shall be as indicated on the plans.

E. Any main line taps shall be performed by the Contractor. The meter shall be furnished and installed by the City.

440.9 Irrigation Control Cable

A. All wiring to be used for connecting the automatic controller to the electric solenoid actuated control valve shall be Type UF-600V, 7 strand or solid copper, PVC insulation, single conductor, UL approved underground

feeder cable. All "hot" wires are to be one color and all "common" wires are to be of another color. All wiring to the solenoid valves shall be installed in the irrigation mainline trench, along side the pipe.

B. Connectors shall be a waterproof type such as manufactured by Pentite, or other City approved equal.

C. Solatrol special low-voltage cable shall be used in conjunction with the Solatrol light energized LEIT irrigation controller system.

D. Any wiring to be installed under concrete or asphalt shall be sleeved separately using Schedule 80 PVC pipe. This is for locations under existing conditions or future conditions as specified on the plans. Sleeve sizes and lengths shall be noted on the plans. Any wire splicing, other than at the controller or solenoid valves, shall be done in a grey, rectangular plastic junction box, visible and flush with the final grade. The lid of the junction box shall be marked "IRR. ELECTRIC". The base of the junction box shall be set in pea gravel. Lid shall be a bolt down model, Carson or approved equal.

E. Irrigation controller wire is to be installed along side mainline piping, joint trench.

440.10 Trenching

A. All main lines shall have a minimum cover of 15 inches, and all lateral lines shall have a minimum cover of eight inches based on finish grades unless otherwise indicated on the plans. Sprinkler lines connecting rotor pop-up sprinklers shall be installed with a minimum cover of 15 inches based on finish grades.

B. Alignment of pipe shall be for a simple layout with pipe running parallel or perpendicular to features such as curbs, sidewalks, and buildings as may be possible with onsite conditions.

C. The intent of the irrigation pipe drawings is to show the general layout schematic of the water distribution. The tree and shrub layout shall govern the actual pipe and sprinkler locations.

440.11 Installation of Plastic Pipe and Fittings

A. Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacture.

B. Plastic pipe shall be cut with the proper saw or tubing cutters in a manner so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that smooth unobstructed flow can be obtained.

C. Solvent welded connections shall be made using primer and solvent cement compatible with pipe. Pipe sizes up to and including Two and one-half inch diameter shall be primed prior to the application of the solvent. Pipe shall be fully inserted in all sockets.

D. Permission to cut or break sidewalks, concrete, or asphalt shall be obtained from the Owner. Where piping on the drawings is shown under paved areas, but running parallel and adjacent to planted areas, the intent of the drawings is to install the piping in the planted area.

E. All pipes in rocky soils shall be thoroughly bedded in sand or approved backfill material.

F. Any irrigation pipe to be installed under concrete or asphalt shall be sleeved using schedule 80 PVC pipe. This is for locations under existing conditions or future conditions as specified on the plans. Sleeve sizes and lengths shall be as noted on the plans. Sleeves for irrigation pipe shall not be used simultaneously for controller electric wires. Sleeves for the controller electrical wires shall be done separately.

440.12 Installation of Copper Pipe

A. All copper tubing shall be cut squarely and accurately to measurements established by the Contractor and shall be worked into place without forcing. Proper provision shall be made for expansion and contraction of all tube lines. Proper fittings shall be used at all changes of direction.

B. All copper tubing shall be cut with square ends with all burrs removed. Tubing shall be handled and protected carefully. All tubing cut, dented, or otherwise damaged shall be replaced with new tubing at the Contractor's expense. All pipe to fitting connections shall be properly prepped with a wire brush or abrasive cloth tape. Flux shall be applied to both surfaces to be joined. Tubing shall be inserted to the full depth of the fitting, and then soldered.

C. Where copper pipe is to be installed in or through concrete, the pipe shall be wrapped with protective tape or coated with a protective coating. Where copper pipe is installed through concrete walls, slabs, or structures, the copper pipe shall be sleeved. The area between the sleeve and pipe shall be caulked.

440.13 Thrust Blocks

Concrete thrust blocks shall be provided on all pressure pipelines three inches and larger with non-restrained joints. The thrust blocks shall be located at all fittings including valves, tees, stub-outs and bends greater than 22.5 degrees. The concrete shall be 3,000 psi and shall be placed against properly dampened, undisturbed soil, centered on the thrust resultant line.

440.14 Installation of Equipment

A. Irrigation Controllers shall be installed as shown on the plans and per manufacturer specifications. All electrical connections and distribution shall be per local applicable codes. The electric service supply to the controller shall be installed in conduit. Control valve solenoid wires, located above ground, shall also be installed in conduit.

B. Backflow prevention assemblies shall be installed in a protective rectangular box steel cabinet. The cabinet shall be built of light gauge steel materials with welded construction. Spanded steel shall be used for the top and sides of the box. Angle steel shall be used for the top perimeter and side corners. See standard detail drawing. Cabinet dimensions shall accommodate the size of the backflow prevention assembly. Dimensions shall be as noted on the plans, details or field determined. The cabinet shall be mounted on a four inch thick concrete pad. The steel protective cabinet shall be attached to the base utilizing a detachable mechanism with lock down provisions. See standard detail drawing. The Owner shall provide the required locks. The waterlines to and from the backflow prevention device shall come up through the concrete pad through PVC sleeves.

C. All exposed metal including welds shall be coated with a red oxide type primer. All bare metal surfaces shall be free of rust, oil, dirt, foreign substances and moisture prior to application of the primer coat. All primed metal shall be allowed to dry completely. All primed surfaces shall be painted with medium dry industrial enamel. Primed surfaces shall be properly prepared according to the paint manufacturer's instructions. The Contractor shall follow the manufacturer's directions concerning external conditions, temperature, application methods and thinning procedures. The paint shall be of a flat finish, exterior type and desert beige in color unless directed otherwise. The Contractor shall submit a paint chip sample to the Owner for approval before any paint is to be applied. The Contractor shall allow any painted surface/item to dry completely before handling.

D. Irrigation controllers that require a metered 120 volt electric service shall have a separate wall or pedestal mount meter cabinet. The meter cabinet shall be installed next to the irrigation controller. The Contractor shall

provide a stamped metal address identification tag, riveted to the meter cabinet. The meter cabinet shall be painted to match the irrigation controller and backflow prevention cabinets. Pedestal meter cabinets shall be in a concrete pad with a copper ground rod. The Owner shall provide the Contractor with the meter service address.

E. Irrigation controllers requiring 110 volt service shall be installed inside a protective metal cabinet mounted on a concrete pad.

F. The Contractor shall provide a circuit breaker panel for each irrigation controller, to be located alongside the controller, installed in the same protective cabinet.

G. The Contractor shall construct and install all irrigation controllers and all associated electrical equipment per local applicable codes including the local electric power utility providing service. The Contractor shall be responsible for scheduling and arranging all necessary inspections for electric power related items with the local power utility company and the City of Avondale Building Inspection Division. All permits and inspections shall be paid by the Contractor and included in the cost of the irrigation.

H. Light-energized irrigation controller shall be installed in a protective metal cabinet constructed of the same materials. The post type controller, such as the Solatrol LEIT, shall have its PVC mounting pole placed inside a steel pipe with steel plates at both ends. One plate is to be mounted to a concrete pad and the other will have an expanded steel, detachable cage, to protect the actual controller on top. See standard detail drawing.

I. Solenoid valves for lateral lines shall be installed as per manufacturer's directions. All Solenoid valves shall be installed in an 11 inch x 17 inch x 12 inch deep, green, PVC rectangular valve box with a non-hinged, bolt down cover. Carson Model Series 1419B. All valve boxes shall be installed flush with the finished grade granite surface and installed in a pea gravel base. Valve box lids shall be marked "Irrigation Control Valve".

J. All manual operated, main line irrigation gate valves shall be installed in a round 10 inch diameter by 10 inch deep, green, PVC valve box with a non-hinged, bolt down cover. Carson Model Series 910. All valve boxes shall be installed in a pea gravel base and be flush with the finish grade.

K. Other equipment such as pressure regulators, filters, and fertilizer applicators shall be installed in rectangular PVC valve boxes. If more than one piece of equipment is to be installed in one valve box, a larger box may be required. The plans will show if equipment is to be combined in one valve box. If not directed, the Contractor shall assume to use one separate valve box for each piece of equipment.

440.15 Flushing and Testing of Plastic Pipe

A. Irrigation main lines shall be tested in place before backfilling for a period of not less than one hour, and shall not show any loss of water through fittings. Pressure shall be static line pressure. The Contractor shall notify the City in two City business days prior to testing for a visual inspection of the explored mainline. Pipe may be center loaded but all joints must be uncovered for testing and inspection. Lateral lines shall be visually inspected only prior to system flushing.

B. Control valves shall be opened and a full head of water used to flush out the system after all new sprinkler piping and risers are in place and connected, and all necessary division work has been completed and prior to the installation of sprinkler heads. Heads shall be installed after the system is thoroughly flushed.

440.16 Backfilling

A. The main shall be pressure tested prior to backfilling. Backfilling of trench before testing shall be completed at the Contractor's risk. The City reserves the right to have any or all pipe excavated as is required to determine the size, quality, and/or water-tight integrity at the expense of the Contractor.

B. Contractor shall water settle trenches and provide rough grade to match the grade conditions prior to the work as a part of this Section.

440.17 Installation of Irrigation Heads and Risers

A. All irrigation heads shall be set perpendicular to finished grades unless otherwise designated on the plans.

B. All irrigation heads adjacent to existing walks, curbs, or other paved areas, shall be set to grade. Rotor pop-up sprinkler heads, which are to be installed in lawn areas where the turf has not yet been established, shall be set four inches above the proposed finished grade. Heads installed in this manner will be lowered to grade by the Contractor when the turf is sufficiently established to allow walking on it without appreciable destruction.

C. All irrigation heads containing adjustable pin nozzles shall have the pins adjusted for adequate and proper distribution.

D. All nozzles on stationary pop-up sprinklers shall be tightened after installation. All sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius, diameter and/or gallonage.

E. Sprinkler heads and risers shall conform to details and descriptions on the drawings.

440.18 Installation of Bubblers and Risers

A. Bubbler and riser assemblies shall be installed as shown on the plans. Coordination of bubbler installation with planting is a requirement.

B. Bubblers shall not be assembled to the riser until flushing is completed. Care shall be taken prior to bubbler installation and pipe kept free of foreign matter after flushing and prior to emitter installation.

C. All bubblers are to be located in the planting wells. Each shrub shall have one each 0.25 GPM installed four to six inches from the plant. Each tree shall have two each 0.5 GPM installed 10 inches to 12 inches from the plant, one on each side, in line with the center of the plant. The top of the irrigation bubbler shall be installed to a height of two inches above the bottom of the tree well finish grade.

D. Risers for bubblers shall be a one-half inch PVC Flex pipe and male adapters. One-half inch solvent weld 90 elbows or tees shall be used to transition from the lateral PVC pipe to the one-half inch PVC Flex pipe.

440.19 Warranty - Guarantee

Warranty shall be for a period of one year from acceptance by the Owner.

440.20 Maintenance

A. The Contractor shall maintain the system in proper working order for a period of one year from the City approved date of substantial completion.

B. Maintenance shall include the setting of irrigation heads to proper finish grades after turf has been established.

C. Maintenance shall include any bubbler/riser adjustments required to allow the irrigation system to operate properly.

D. Maintenance shall include any necessary irrigation controller adjustments to the watering timetable during the one year period.

E. Maintenance shall include any and all repairs due to an irrigation pipeline break. This is to include erosion damage, plant replacement, granite replacement, grading, irrigation repairs and any damage to adjacent concrete, AC pavement, fences, etc., as a result of the flooding and/or erosion caused by the irrigation break. Erosion repair due to over watering shall be the Contractor's responsibility. All maintenance repairs are to be paid at the Contractor's expense.

F. At the end of the maintenance period a final completion, onsite walk-through inspection shall take place between the City, Landscape Architect, and Contractor. Any missing and/or damaged bubblers and/or risers shall be replaced at the Contractor's expense.

440.21 Operation and Maintenance Instruction

The Contractor shall instruct or provide for instruction of all operation and maintenance procedures for all equipment including but not limited to; irrigation controller, backflow preventer, manual valves, solenoid valves, electric service disconnects, circuit breakers, pressure regulators, fertilizer applicators, bubblers and sprinklers.

440.22 Operation and Maintenance Manuals (O&M)

The Contractor shall provide three sets of Operation and Maintenance (O&M) Manuals for applicable equipment to the City if the landscaping is in the median or homeowners association for all other locations. The O&M manuals shall include general information and specifications for all equipment including valves and valve boxes. Actual model numbers, dimensions and sizes shall be noted if applicable.

End of Section

PART 500 STRUCTURES

No City of Avondale Changes

PART 600 WATER AND SEWER

SECTION 601 TRENCH EXCAVATION, BACKFILLING AND COMPACTION

Subsection 601.4.4, Initial Backfill is modified to add the following paragraphs to the end of the section:

For all waterline and fire line work, material for the entire pipe embedment zone, including the bedding, haunching, and initial backfill, shall consist of a City approved MAG ABC granular material per MAG Specification Section 702. This requirement also applies to private on-site fire lines.

For all sanitary sewer line work, material for the entire pipe embedment zone, including the bedding, haunching, and initial backfill, shall consist of a City approved granular sand material in accordance with ASTM D-2321 or as acceptable to the City. This requirement also applies to private on-site sewers. Water settling is allowed for compaction of the pipe embedment zone for sanitary sewer lines only.

For City of Avondale fiber optic and telecommunications conduit the pipe embedment zone shall be one sack CLSM per MAG Specification Section 728 and shall extend a minimum of six inches above the top of pipe.

Subsection 601.4.5, Final Backfill is modified to add the following paragraphs to the end of the section:

For sanitary sewer lines and waterlines constructed parallel to and within an existing or proposed right-of-way street section, the final backfill material up through the top of subgrade shall be ABC per MAG Specification Section 702. Final Backfill within five feet of all manholes located in existing or proposed right-of-way street sections shall be a one sack CLSM.

For sanitary sewer lines and waterlines constructed within and perpendicular across an existing or proposed right-of-way street section including intersections, the Final Backfill up through the top of subgrade shall be a one sack CLSM per MAG Specification Section 728.

For sanitary sewer lines and waterlines that are to be constructed five feet beyond an existing or proposed asphalt concrete pavement section and for on-site sanitary sewer, domestic water and fire lines (i.e. new commercial development), the Final Backfill up through the top of subgrade may be native material per MAG Specification Section 601.

For sanitary sewer lines and waterlines that are to be constructed within five feet of a proposed local and minor collector street (i.e. new subdivision development) the Final Backfill up through the top of subgrade may be native material per MAG Specification Section 601. Final Backfill within five feet of all manholes located in existing or proposed ROW street sections shall be a one sack CLSM.

SECTION 610 WATERLINE CONSTRUCTION

Subsection 610.2 GENERAL: Is modified to add:

610.2.1 City of Avondale General Requirements

A. All construction water from City fire hydrants/lines/systems shall be metered, including waste, testing water, flushing water and water used for compaction, (contact City Engineer for more information). Systems shall be protected with proper, City approved backflow prevention systems per City of Avondale Standard Detail A1325 through A1327.

B. Mega-Lug type restraints are not acceptable for joint restraint when used on PVC pipe; thrust blocks sized per MAG Specification Section 610.14 are required.

C. Contractor shall provide adequate construction staking for all waterline installations including finish grade cut/fill dimensions, to allow for proper depth of installation and inspection. Minimum staking locations shall include all fittings, valves, fire hydrants, blow-offs, tie-ins, services, laterals, stubs, and change of horizontal/vertical direction. Refer to MAG Supplement Section 105.8.2 for staking requirements.

D. Blue metal studs six feet in length shall be used to mark the ends of laterals, stubs or services. The metal studs shall be buried to a depth of three feet and shall extend three feet above finish grade. In addition to the metal studs, a 3M electronic marker ball shall be buried over the pipe end at a depth of three feet to four feet at the end of each service. Where applicable, concrete curb shall also be marked; with a stamped “W” in wet concrete or chisel etched in the existing concrete curb in accordance with MAG Standard Detail 440-4 modified to “W” in lieu of an “S”. Services shall be terminated in a meter box.

Subsection 610.3 MATERIALS: Is modified to add:

610.3.1 City of Avondale Material Requirements

A. Water main material shall be according to the following schedule:

(1) Eight inch - 12 inch (including subdivisions and fire lines):

Ductile Iron Pipe (DIP) Pressure Class 350, Cement Mortar Lined and Seal Coated
ANSI/AWWA C151-A21.51

(2) 16 inch - 36 inch:

Ductile Iron Pipe (DIP) Pressure Class 250, Cement Mortar Lined and Seal Coated ANSI/AWWA C151-A21.51

(3) Six inch fire hydrant laterals:

Ductile Iron Pipe (DIP) Pressure Class 350, Cement Mortar Lined and Seal Coated ANSI/AWWA C151-A21.51

B. City approved technical material/manufacturer data is required to be submitted for all pipe materials and appurtenances used on the project before work commences. All materials must match the technical submittal data exactly or it will be rejected.

C. All materials shall be new and undamaged. Any PVC pipe material showing evidence of visible sun over exposure (ultraviolet damage indicated by discoloration) shall not be accepted. Any rejected materials shall be removed from the site immediately, or a cease work order will be issued.

D. All flange bolt hardware shall be stainless steel for both underground and vault installations.

Subsection 610.4, CONSTRUCTION METHODS, is modified as follows:

Subsection 610.4.1, Trenching/Cover, is modified to delete the first paragraph and portions (A) and (B) of the paragraph and replace with the following:

All water mains shall be installed to a minimum depth of cover measured from the top of pipe to finished grade as listed below:

A. For waterline 16 inches in diameter and smaller, provide a minimum cover of 48 inches over the top of pipe.

B. For waterlines larger than 16 inches in diameter, provide a minimum cover of 60 inches over the top of pipe.

C. Public water mains that are installed through undeveloped property where the final finished grade elevation is not known, (i.e., future street alignments), a minimum cover of 60 inches over the top of the pipe shall be required.

D. New waterlines, fire lines, and water service lines shall not be installed in retention basins. Only landscape irrigation lines downstream of proposed backflow prevention devices may reside in the retention basins.

Section 610.4.5, TESTING is modified to add the following:

The following tests and inspections shall be required on all waterlines:

A. All pipe material including fittings, valves, hydrants and other related appurtenances.

B. Trenching and pipe bedding/haunching.

C. Pipe installation including all mains, services and connections.

D. Thrust blocks/joint restraint systems.

E. Tracer wire installation including the tracer wire connectivity/continuity.

F. Pipe embedment zone backfill incl initial backfill

G. Tapping sleeve/valve installation and associated pressure test.

H. Final Backfill, depths and backfill materials.

I. Compaction densities with geotechnical testing provided by an independent Arizona certified firm.

J. Pavement replacement, if required.

K. Valve box inspection after adjustment.

L. Verification of open corp and curb stop valves for all water services.

M. Physical verification that all valves are open.

N. Verification that fire hydrants are correctly installed and located per MAG Standard Detail 360-2.

O. Pressure testing of all new lines (per MAG Specifications and City of Avondale MAG Supplement as outlined here-in).

P. Proper disinfection flushing, and related testing per MAG Specifications and City of Avondale MAG Supplement as outlined here-in).

Q. Electrical current connectivity/continuity for cathodic protection systems on ductile iron pipe lines where cathodic protection is specified.

R. Special meter/valve manholes/vault structures.

S. Blow-offs and pressure relief valves.

T. Location markers for fittings, stubs, laterals and service location identification

Subsection 610.4.6, City of Avondale Construction Requirements is added to read as follows:

610.4.6 City of Avondale Construction Requirement

Ten gauge solid copper insulated tracer wire shall be installed on top of all water mains including fire lines and secured with industrial grade adhesive tape to prevent movement during backfill. Tracer wire shall be looped up into all valve boxes per City of Avondale Standard Detail A1391. Sufficient length of slack shall be provided to allow the tracer wire to reach 12 inches above finished grade. All connections shall be kept to a minimum and shall be made with waterproof wire nuts. The entire system shall be interconnected and shall be tested for continuity by a qualified third party. Tracer wire is not required on copper wire service lines.

Contractor shall install underground electronic detectable marker devices (3M Balls) over all fittings where vertical and horizontal change of direction occurs. Devices shall be indicated as installed on the as-built record drawings.

Subsection 610.7, VALVES is modified to add the following:

610.7.1 Valves

All valves up to and including size 24 inch shall be resilient seat/wedge gate valves, epoxy-coated inside and outside in accordance with AWWA Specifications. All valves shall be located within the street.

610.7.2 Valve Boxes

All valve boxes installed on City water valves shall be two-piece adjustable cast iron per City of Avondale Standard Detail A1391. All lids shall be labeled for

"WATER". Debris caps shall be required. Where indicated, bolt down type valve box lids shall be required.

Water valve location signage using blue flexible fiberglass flat post markers, shall be required for all locations outside of any paved areas including landscaped medians.

Subsection 610.9, FIRE HYDRANTS is modified to add the following:

610.9.1 Fire Hydrant Materials and Colors

All public and private fire hydrant materials and installations shall meet MAG Standard Detail 360-2. All public hydrants shall be yellow in color. All private fire hydrants shall be red in color and cannot be field painted. Hydrants must be "factory" painted from the manufacturer per industry paint spec requirements including UV protection. Material submittals required.

Subsection 610.11, CONNECTION TO EXISTING MAINS is modified to add the following:

610.11.1 Connection Requirements

Any and all valves on the existing City water system shall only be operated by the Public Works Department, Water Division. Contact the City Water Division a minimum of three business days in advance of the desired connection date to coordinate connection. Any damage to existing facilities caused by any Contractors on the project shall become the responsibility of the City permit holder to resolve.

Pressure tests, disinfection and related testing shall be completed before opening valves to the existing system or connection onto existing system, and shall not be done without the City Engineer's approval. All waterline tests shall be performed prior to the connection into the existing water system.

Night tie-ins to existing utilities may be required to minimize service interruption to customers, and shall be scheduled with the City Water Division a minimum of seven business days in advance.

Same size connections (size on size) using a tapping sleeve and valve shall not be permitted unless a heavy duty mechanical cast or ductile iron tapping sleeve is used per MAG Specifications 630.4. Depending on the circumstances, City approval may also be required. The City does not provide tapping services. Waterline taps are the Contractor's responsibility.

Subsection 610.12, FIRE LINE SERVICE CONNECTIONS is modified to add the following paragraph:

Installation of fire backflow prevention assemblies shall be per City of Avondale Standard Detail A1325. Pressure testing of the backflow prevention assembly and related piping up to five feet from the building shall be under the observation of the City Engineer.

Subsection 611.1, HYDROSTATIC TESTING is deleted in its entirety and replaced with the following:

611.1 DESCRIPTION

The testing of new water lines, fire lines and force mains shall conform to the applicable testing procedures and inspection requirements as outlined herein, except as otherwise required on the plans, as modified in the special provisions or as directed by the City.

Water mains shall be isolated, disinfected, sampled and tested to meet the Safe Drinking Water Act Requirements per 40 CFR Part 141.

The Contractor shall provide all vents, piping, plugs, bulkheads, valves, bracing, blocking, pumps, and measuring devices and all other equipment necessary for performing the tests including new or good condition pressure gages. If required, Contractor shall pay the City for water used in the performance of the required flushing and pressure testing. Water quantities used shall be calculated or meter measured as directed and approved by the City.

The start of a testing and disinfection cycle shall be scheduled no later than a Tuesday morning on a regularly scheduled City of Avondale work week to ensure completion of the sampling and testing processes by Thursday or Friday at the latest. All prior notifications to the City for test scheduling shall be no less than 48 hours.

611.1.2 FLUSHING AND HYDROSTATIC TESTING:

Waterlines, fire lines and force mains including all fittings and connections thereto shall be pressure tested for water-tightness by subjecting each section to hydrostatic testing in accordance with applicable provisions of AWWA C-651, except as modified below.

611.1.2.1 Flushing Completed Main Lines:

A. Flushing Plan: If required by the City or its authorized agent, the Contractor shall submit a written flushing plan for review and approval prior to starting any flushing activities. The plan may be a written detailed narrative or a shop drawing submittal depending on complexity of the system or City requirements. There may be different plans for preliminary

flushing (lighter solids debris) and a final flushing (high chlorine). The plan shall include and indicate the connection feed point, backflow protection device, measuring meter (if required), all valves and fire hydrants, all permanent or temporary air release points and/or testing ports, discharge outlets, proper de-chlorination procedure (for final flushing) and final disposal location/destination of the flushing water. The plan shall indicate the required sequential phasing to achieve a positive, one directional flushing action.

B. Valve Operation: Check with the City or its authorized agent for any policy regarding the operation of valves or other appurtenances.

C. Line Filling: The test section shall be slowly filled with potable water and all air shall be vented from the line. The rate of filling shall be as determined by the City or its authorized agent, with at least 48-hour notice required before tests are scheduled. Measurement and documentation of the volume flow of water into and out of all lines shall be made by means of (i) a pitot gage, (ii) a meter supplied by the City, (iii) a volume calculations based on design, system and conditions as monitored and approved by the City or (iv) some other pre-approved device/set-up.

D. Preliminary (Debris) Flushing: All mains 12 inches and smaller shall be flushed using clean potable water, prior to chlorination, as thoroughly as possible with the water pressure and outlets available. Preliminary flushing is intended to remove only light debris and should not be relied upon to remove heavy material. Contractors shall exercise care and proper workmanship in the pipe laying operation to not allow dirt and debris to get into the pipe. Excessive amounts of dirt, bedding materials, rocks or other foreign debris, especial large size items, left in installed pipe lines may cause damage to valves and fire hydrants during flushing operations. When excessive or large debris is witnessed exiting the outlets during the flushing operation, the valves and fire hydrants shall be thoroughly inspected to verify that the valves and fire hydrants are in good working order.

E. Required flow and openings (either taps or hydrants) to flush pipelines at 3.0 ft/sec (40 psi residual pressure in water main) * Reference AWWA C651-14.

Outlet Size Requirements For Flushing

Main Size	Minimum Outlet Size Required
Four - Six inches	Three inches
Eight inches	Four inches
10 -16 inches	Six inches
24 inches and greater	Eight inches

City has final determination of size, number of blow offs and location of flushing inlets and outlets.

611.1.2.2 Hydrostatic Testing

Pressure testing may be performed before or after final backfilling. If the pipe line is properly and safely center-loaded, a visual inspection for leaks may be made along the pipe line while the test section is under test pressure. Any visible leaks shall be repaired and a retest conducted. However, if mechanical compaction is to be used in the backfilling operations per AWWA C-600, the pressure tests shall not be performed until final backfilling is 100 percent completed including compaction. Backfill and compaction shall be 100 percent complete for any restrained pipe line sections for the entire designated restrained distance prior to pressure testing. All pipe sections, stub laterals, fire hydrant laterals, blow-offs, and valves encompassed in the test section shall be verified to be open, water filled and pressurized. Hydrostatic testing shall not begin until the pipe has been filled with water for at least 24 hours to allow for air venting and absorption.

A. Pressure Testing: Unless otherwise noted in the Contract Documents, the minimum prescribed test pressure shall be at least 200 psi for lines smaller than 16 inches and 150 psi for lines 16 inches or larger, not to exceed five psi over the minimum prescribed test pressure, as measured at the lowest end of the section under test. The duration of each pressure test shall be at least two hours, during which time the test section shall not drop below the minimum prescribed test pressure. If the pressure in the pipe test section has not stabilized by the end of the testing period, a hydrostatic retest will be required.

B. Each section of a new line between sectionalizing valves or between the last sectionalizing valve and the end of the project shall be tested separately as required in AWWA C-651, and/or as modified in these specifications, except that any such section less than 500 feet in length may be tested with the adjacent section, if both sections of line have the same pipe class rating. No section greater than 2,640 feet in total pipe length shall be tested without written permission of the Engineer.

C. Contractor shall bleed all air out of new lines being tested. After all air has been determined to have been removed and the pressure has stabilized and maintained constant, the line shall be determined to be ready for testing. No further **"**makeup water" for absorption will be allowed nor should be necessary. All final backfilling and compaction shall be completed to top of trench before testing can start. The Contractor shall furnish all necessary apparatus and assistance to conduct the testing.

Subsection 611.2, DISINFECTING WATER MAINS is deleted in its entirety and replaced with the following:

611.2 DISINFECTING WATER MAINS

611.2.1 Isolation

New water mains shall be physically isolated from active distribution systems until initial disinfection and satisfactory bacteriological results have been completed. The means for protecting active distribution systems from contamination due to reverse flow shall be according to level of protection required by Arizona Administrative Code (A.A.C) R18-4-215.

611.2.2 Disinfection

The method of chlorination used shall be approved by the City or its authorized agent and must conform to NSF/ANSI 60 & 61 Standards. The City or its authorized agent shall determine the number and locations for sample risers. The contractor is responsible for supplying equipment to properly dose the new main with a chlorine concentration no lower than 10 parts per million (ppm). The City or its authorized agent will verify the chlorine level is at 10 ppm at time of dosing and verify that after 24 hours of high chlorine solution sitting in the pipes that the chlorine concentration is at 10 ppm or above. All new valves, hydrants and othe r appurtenances shall be operated fully to ensure full disinfection from the chlorine solution.

After 24-hour verification is complete, the water main shall be completely flushed of the high chlorine concentration. A chlorine neutralizing agent may be required during flushing discharge. Check with the City Inspector to confirm.

A. Methods of Applying Chlorine: Any of the following methods of application of chlorine (arranged in order of preference) may be used, subject to the approval of the City or its authorized agent.
   (1) Liquid chlorine gas-water mixture.
   (2) Calcium or sodium hypochlorite and water mixture.

B. Point of Application: The preferred point of application of the chlorinating agent is at the beginning of the pipe line extension or any valved section of it and through a corporation stop inserted in the top of the newly laid pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap or other potable water source on the pressure side of the gate valve controlling the flow into the pipe line extension.

C. Rate of Application: Water from the existing distribution system or other approved potable water source of supply shall be controlled so the rate of flow shall not exceed 500 gpm, unless approved by the City or its approved agent, through a suitable measuring device into the newly laid pipe line during the application of chlorine. The rate of chlorine solution flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall produce at least 10 ppm of residual chlorine after 24 hours standing in the pipe. This may be expected with an application of 50 ppm, although some conditions may require more

On lines 12 inches in diameter or less, determination of the rate of flow of water into the line to be treated may be made by starting with the line full of water and measuring the rate of discharge at a hydrant located at the end of the pipe farthest away from the point of chlorine application.

For lines larger than 12 inches in diameter, the disinfection operation is generally started with the line empty.

D. Retention Period: The highly chlorinated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria. This period should be at least 24 hours and no more than 48 hours. If the circumstances are such that less than a 24-hour retention period must be used and upon approval by the City or its authorized agent, the chlorine concentration shall be increased to 100 ppm not to exceed 300 ppm and retained for at least 2 hours. Under these conditions, special care should be taken to avoid chemical attack on pipes, valves, hydrants and other appurtenances.

E. Short Pipe Sections / Laterals / Stubs: For relatively short sections of pipelines of up to eighty feet (80') or less in length and where the new line cannot be isolated for testing or installation of a temporary backflow and metering set-up is not possible or feasible, the following procedure may be allowed with City approval on a case-by-case basis. Various modifications may be necessary or required depending on specific circumstances. This does not apply to small diameter domestic copper water services of up to two inches.

(1) 100 percent of all new pipe materials/fittings used in the installation and tie-in from the City's existing main to the new backflow assembly on fire lines and up to the first meter connection or completed meter manifold on domestic water lines shall be disinfected. Any new tie-in valves at the main line shall remain completely closed.

(2) All new pipe materials/fittings used in the installation and tie-in are to be disinfected by swabbing with a chlorine solution of at least 200 parts per million using NSF/ANSI 60 & 61 approved equipment, materials and chemicals. The chlorine solution shall be tested by the City to ensure that it meets the strength requirements. The City Inspector shall witness the swabbing procedure and document results. A new swabbing device should be used for each new line.

(3) The new lines and fittings shall remain empty and closed to the atmosphere for 24 hours to allow the high chlorine treatment sufficient time to disinfect.

(4) After the 24-hour period, with City supervision, the new valves shall be operated and the ends of the lines shall be opened at the largest port available to allow initial flushing of the high chlorine solution. The City shall test this first flow of water to verify at least 10 parts per million of chlorine is still present. The line can then continue to be sufficiently flushed until the chlorine levels are below 2.0 (ppm) parts per million as verified by the City.

(5) The new lateral valves at the main tie-in shall then be closed and remain closed after flushing; the new lateral line shall remain charged with water and allowed to sit for an additional 24-hour period.

(6) After 24 hours, the City shall check the chlorine residual levels and collect microbiological samples for lab testing. The new lateral valves at the main tie-in shall remain closed until the City receives the laboratory results that show both a negative reading for Total Coliform and a negative reading for E. coli.

611.2.3 Final Flushing, Sampling and Testing

Following chlorination, all treated water in the newly laid pipeline shall be thoroughly flushed until the replacement water throughout the new pipeline can be proved, by laboratory testing, comparable in quality to the water served to the public from the existing water system. Prior to sampling for laboratory testing, the residual chlorine throughout the length of the pipeline shall be reduced to 2.0 ppm or less. Once the required residual chlorine level in the pipeline is achieved, bacteriological samples shall be taken as outlined below.

The City or its authorized representative will collect all samples for testing of the new water mains. To initiate the sampling and testing, the Contractor will present to the City or its authorized agent a written request for such work no later than 48 hours prior to the time when samples are to be taken. Samples shall be taken from a tap and riser located and installed in such a way as to prevent outside

contamination. Samples shall never be taken from an unsterilized hose or fire hydrants.

The number of sampling locations are determined by the City or its authorized agent and at a minimum shall be as follows:

A. Waterlines up to but less than 150 feet in length require one sampling riser installed as near the end as possible.

B. Waterlines 150 feet to 300 feet in length, two sampling risers, one near each end of the line. Waterlines 300 feet to 3,000 feet in length, a minimum of three sampling risers. In addition, dead ends on main lines should be represented with a sampling riser.

The number of samples taken at each sampling location shall be determined by the City or its authorized agent based on the following method.

C. One Sample from each sampling location taken 24 hours after flushing high chlorine, which is examined in the laboratory. (Total Coliform (TC) method).

Upon completion of laboratory testing, results of all tests shall be sent by the laboratory to the City. Results of laboratory analysis will be interpreted by the City, and reported to the Contractor. Under no circumstance shall the Contractor contact the laboratory. If there is need for test results before written reports are submitted, such information shall be obtained only from the City or its authorized representative.

Laboratory and field analysis shall be done by methods approved by the Arizona Department of Health Services (ADHS).

611.2.4 Final Connections

Any temporary air release blow-offs and test sample risers shall be left exposed and protected during backfilling until all testing is complete. After all testing is complete and accepted; they shall be properly lowered and terminated as directed by the City.

Connections to the existing pipelines or existing valves shall not be made until after all or that specific section of new pipe main line has satisfactorily passed all required hydrostatic and disinfection tests.

611.2.5 Repetition of Chlorination Procedure

Should the initial treatment fail to result in the conditions specified above, the original chlorination procedure shall be repeated until satisfactory results are obtained.

SECTION
615
SANITARY SEWER LINE CONSTRUCTION

Subsection 615.2, DESCRIPTION is modified to add the following:

615.2.1 Materials

Sewer pipe (mains, laterals and services) shall be according to the following schedule:

Four inch - Twelve inch	PVC SDR 26 (SDR 26 for depths less than 6 feet and depths greater than 10 feet)
15 inch - 18 inch	PVC SDR 26, as required by the City,
21 inch - 24 inch	High strength VCP
30 inch and larger	Lined RGRCP or project specific design
Force Mains or Special Use Sewer Lines:	PVC or HDPE; project specific design

City approved technical material/manufacturer data is required for all pipe materials and appurtenances used on the project before work commences. All materials must match the technical submittal data exactly or it will be rejected.

All materials shall be new and undamaged. Any PVC pipe material showing evidence of visible sun over exposure (ultraviolet damage indicated by discoloration) shall not be accepted. Any rejected materials shall be removed from the site immediately, or a cease work order will be issued.

Contractor shall install underground electronic detectable marker devices (3M Balls) over all fittings where vertical and horizontal change of direction occurs. Devices shall be indicated as installed on the as-built record drawings.

Subsection 615.5, PIPE INSTALLATION is modified to add the following:

615.5.1 Tie-Ins

No upstream sewer construction shall start until the down stream sewer main is completed and approved by the City. Pipe laying shall commence at the proposed project outfall on the existing City sewer and proceed upstream. Any exceptions to this specification must be approved in writing by the City Engineer.

MAG Standard Detail 427 plug shall be installed in the furthest downstream manhole and remain in place until all sewer testing and cleaning is completed. Removal of the plug shall be done only under the supervision of the City Engineer. Under no circumstances shall the sewer plug be removed before City inspection. Should the sewer plug fail prior to City inspection, the Contractor shall, at his expense, hydro-vac the sewer to a location approved by the City Inspector to adequately remove all debris carried into the City mains. Video inspection after cleaning shall also be required, and shall be paid for by the Contractor. Any damage or cleaning expenses at affected lift stations and levied fines shall be paid for by the Contractor. The Contractor shall also be liable for any damage to private property and/or environmental damage/clean up.

Long term mechanical plugs (six to 24 months) shall be required for upstream lines that are part of the next phase or another section not approved for use/acceptance at that time. Plug locations to be as directed by the City.

All mechanical plugs shall be tagged and documented per City specifications for Contractor location tracking and identification. Tags and identification numbers shall be provided by the City. Proper installation shall be completed by the Contractor. The Contractor shall be held financially liable for any blockage/back-up incident, associated fines or related damage caused by lost or forgotten plugs discovered in the City's sewer system.

Final tie-ins to the City's existing sewer system shall only be authorized by the City Inspector or other assigned person after all related inspections, testing, lining and final adjustments to grade have been 100 percent completed to the satisfaction of the City.

615.5.2 Sewer Line Constructions Tolerances

The construction tolerance for the installation of sewer lines is such that under no circumstances shall the sewer flow velocity be less than two feet per second (fps) with the sewer pipe flowing at d/D = 0.5.

Pipe shall be installed true to line and grade with allowable deviations of plus or minus 0.05 feet for pipe sizes larger than eight inch yet including 12 inch, and plus or minus 0.10 feet for pipe sizes larger than 12 inches. This deviation is to be used for pipe inverts and dip deflections only.

Pipe eight inches and smaller require all slopes to be greater or equal to 0.003.5 feet per foot. Flatter slopes will not be accepted.

The as-built invert elevations shall certify that the minimum velocity of two fps has been maintained for each reach of the sewer line installation.

Subsection 615.8, SANITARY SEWER SERVICE TAPS is modified to add the following paragraphs:

Minimum depth of cover for sewer services within City right-of-way and public utility easements shall be five feet or as shown on the plans. Exceptions will require City approval. All sewer service pipe shall be bedded and shaded with a City approved sand bedding material.

Ten gauge solid copper insulated tracer wire shall be installed on top of all sewer laterals and sewer services and secured with industrial grade adhesive tape to prevent movement during backfill. Excess tracer wire (2' min.) shall be coiled up at the end of the service line (cap and marker stud / ball) located at the back of right-of-way or back of public utility easement, if provided.

Green metal studs six feet in length shall be used to mark the ends of laterals, stubs or services. Metal studs shall be buried to a depth of three feet and shall extend three feet above finish grade.

A sewer service shall be installed per MAG Standard Detail at all locations shown and noted on the plans. Residential service sizes shall be four inches unless otherwise noted on the plans. Commercial service sizes shall be six inches unless otherwise noted on the plans.

All sewer services must be installed past the right-of-way line to the easement line in public roadways; and in the case of private roadways where no easement exists, past the back of curbing and/or sidewalk.

City approved underground electronic detection device markers (3M Balls) or cleanouts with electronic marker caps (if specified) shall be required on all sewer services located in City right-of-way. All sewer services shall be marked using MAG Standard Detail 440-1 or 440-3 if specified, as directed by the City.

In addition to the marker balls/clean-out caps, the concrete curb shall also be marked; stamped "S" in wet concrete or chisel etched with an "S" in the existing concrete in accordance with MAG Standard Detail 440-4.

Subsection 615.13, INSPECTION AND TESTING is modified to add the following:

Section 615.13.1 Test and Inspection Required

The following tests and inspections shall be required on 100 percent of all mains and service lines:

A. All Pipe materials including fittings and appurtenances

B. Trenching and Pipe bedding and haunching; including initial backfill

C. Installation of all main lines, laterals, service lines (including tracer wire) and connections

D. Installation of cast-in-place (pre-cast if allowed or specified) manhole bases including subgrade compaction, water stops and reinforcing steel if necessary

E. Installation of precast manhole shaft sections and adjusting rings

F. Manhole frame and covers; including restraint systems for water tight MHs

G. Backfill of pipe embedment zone

H. Connections to existing lines including existing stub outs, taps into existing manholes and installation of “wye” fittings

I. Final Backfill, depths and backfill material

J. Compaction densities with Geotechnical Testing provided by an independent Arizona certified lab

K. Deflection measured by mandrel or laser profiling, including force mains and special use sewer lines

L. CCTV inspection to measure deflection, dips and to verify if line is true to line and grade, performed by Contractor’s third party provider.

M. Low pressure air test in accordance with MAG Specification Section 611.3(A)

N. Sewer Manholes; (1) vacuum, (2) lining systems, (3) spark test, (4) pull test

O. Pavement replacement, if required

P. Manhole frame and cover adjustments

Q. Manhole pesticide treatment; documentation as required

R. Final cleaning of all mainlines; documentation as required

S. Location markers; stubs, laterals and service location identification

T. Lift stations, if required

U. Force mains, if required

CCTV inspection video shall be in DVD format, indexed and professionally prepared and must include a written summary documentation. All main lines to be cleaned prior to video with water present. An industry standard depth measurement gauge shall be visible at all times and all video shall include stationing, manhole ID's and running length footages. Complete, detailed written reports with observations, problems, summaries and recommendations shall accompany all videos.

No testing shall take place until backfill and compaction activities for the sewer lines are 100 percent complete.

The low-pressure air testing component shall not take place until after installation is complete on all dry utilities, including backfill. The City must grant approval before testing.

All testing shall be witnessed by the City Inspector or other City designated person. Independent, third party observers shall only be permitted if approved in writing by the City.

For construction inspection purposes, City furnished sewer invert worksheets shall be submitted, reviewed and approved by the City prior to the start of any street/concrete work. All as-built elevations of the manhole pipe inverts, as-built pipe lengths and recalculated pipe slopes shall be completed, checked, certified and submitted by a Registered Land Surveyor (RLS). Items out of tolerance shall be required to be reconstructed prior to starting the next construction phase. Failure to submit the worksheets in a timely, periodic manner shall cause the City to halt further construction and cease to issue subsequent permits. This sewer pipe invert as-built worksheet process is an inspection requirement and is separate from the City required submission of final as-built record drawings.

SECTION 625 MANHOLE CONSTRUCTION AND DROP SEWER CONNECTIONS

Subsection 625.3, CONSTRUCTION METHODS is modified to add the following:

Subsection 625.3.3 Manhole Construction

All sanitary sewer manholes shall be constructed per MAG Standard Detail 420. Manholes shall be five foot diameter with 30 inch diameter frame and covers unless specified otherwise.

Building/assembly of all pre-cast manholes shall utilize a flexible, self-sealing butyl sealant (Ram-Nek, ConSeal or other City approved equal) between all barrel sections including between the first barrel (bottom) section and the cast-in-place base.

No steps shall be allowed in manholes.

Manhole covers shall read “AVONDALE SANITARY SEWER” and shall be non-rocking, Deeter, NEENAH R-1595 or City approved equal.

Where manholes are located outside the street or sidewalk, there shall be a Class B cast-in-place concrete adjustment collar six inches thick, and 12 inches wide placed around the manhole frame and flush with the top of the manhole frame. An identification sign green fiberglass flat rod shall be placed adjacent to the concrete ring.

All manholes to be treated with a roach pesticide paint type application. Pesticide shall be effective for a minimum of two years.

All sanitary sewer manhole interiors shall be lined with a corrosion protection coating system including the base and top adjustment rings. Material submittals required for pre-approval or see City approved materials list for coating systems.

Manhole adaptor gaskets or “water stops” shall be installed on all PVC (or other thermoplastic poly type smooth surfaced flexible material) pipe inlets and outlets before concrete placement for the manhole bases. Material submittals required for pre-approval or see City approved materials list.

All cast-in-place concrete manhole bases shall be allowed to cure for a minimum of a full 24 hours before any pre-cast barrel sections are set in place.

Manholes that exceed 20 feet in depth shall require an engineered (sealed), steel reinforced cast-in-place base. Approved plan or contractor submittal required.

Core drilling new or existing manholes through the cast-in-place base section shall not be allowed. Pipes shall be set directly into the cast-in-place manhole base. The upper pipe penetration on a drop inlet or any pipe penetration through a manhole/precast structure shall only be done by core drilling the proper size outside diameter (OD) dimension to tightly secure/install the pipe by using a proper sized, City approved stainless steel mechanical seal (Link-Seal or other City approved equal). Destructive methods such as chiseling or jack hammering shall not be allowed. After the mechanical seal is positioned and set per the manufacturer’s recommendations, the remaining void space on both sides of the seal shall be grouted flush with an approved non-shrink grout sealant material.

Final “wet” tie-ins on new manholes constructed on existing City sewer main lines

shall not take place until all upstream sewer lines, laterals and service lines are constructed including clean-outs and utility adjustments; and final acceptance of the new upstream sewer has been authorized by the City. Until the final tie-in is authorized, the existing sewer pipe shall not be cut into or penetrated in any manner.

SECTION 631 WATER TAPS AND METER SERVICE CONNECTION

Subsection 631.2, MATERIALS is modified to add the following paragraphs:

All water services shall be installed per City of Avondale standards at all locations shown and noted on the plans. Residential service sizes shall be one inch unless otherwise noted. All water services to be copper pipe type “K”. Service saddles shall be heavy duty, two piece brass/bronze material with four bolt or heavy duty two bolt connectors. Wide stainless steel bands are also acceptable. Only copper pipe and brass fittings to be used entirely unless otherwise directed. No joints are allowed underground between corps and curbstops. All corps and curbstops (meter/angle) to be “pac joint” type as approved by the City. Bedding and shading for copper service lines shall be City approved sand material per MAG Specification Section 701.3.

City does not provide tapping service. This is the responsibility of the Contractor.

End of Section

PART 700 MATERIALS

SECTION 710 ASPHALT CONCRETE

Subsection 710.1, GENERAL is modified to add the following:

710.1.1 Corrective Requirements for Deficiencies

Mineral aggregate gradation, asphalt cement content (oil), course thickness and compaction density test reports shall be submitted to the City for review and approval on both base and surface courses. Any paving that does not meet the MAG material and installation specifications, as amended by the City, shall be removed and replaced at the Contractor's expense. Fog seals, chip seals, slurry seals or other remedies shall not be accepted by the City. Extended warranties are also not accepted.

SECTION 750 IRON WATER PIPE AND FITTINGS

Subsection 750.3, Joint Requirements is modified to add the following paragraph to the end of the section.

Unless indicated on the plans or as otherwise directed, all ductile iron pipe lines shall be installed using a proper, City approved joint restraint system, Mega-Lug, Field Lock Gasket or City approved equal in lieu of concrete thrust blocks in accordance with MAG Standard Detail 303.

End of Section

THE FOLLOWING PART 800, STREET LIGHTS IS HEREBY ADDED TO THE MAG SPECIFICATIONS TO READ AS FOLLOWS:

PART 800 STREET LIGHTS

SECTION 801 STREET LIGHTS

801.1 General Specifications

See Section 100 General Conditions for additional requirements.

801.2 Backfill

See Section 601 Trench Excavation, Backfill and Compaction for additional backfill requirements.

801.3 Permits

It is the sole responsibility of the Contractor to obtain all permits. Separate permits are required for conduit trenching and for the street light installations.

801.4 Submittals

Technical data on the following items shall be submitted to the City for review and approval prior to construction including, but not limited, to the following: poles, mast arms, fuse holders, conduit, conductors, photocells, concrete footings, "J" boxes, luminaires, lamps, etc.

801.5 Service

The Contractor shall furnish and install trench, conduit, conductor and backfill from the underground junction box to the pole and to the point of delivery as determined by the serving utility company. The Contractor shall coordinate with the serving utility company for routing of conduit and construction requirements.

801.6 Conduit

Conduit shall be installed at the depth specified on the plans and in accordance with the specifications of the serving utility company. Conduit between the pole and adjacent J-box shall be one inch carflex liquid tight flexible nonmetallic conduit or approved equal. Conduit must be UL rated and suitable for underground use.

801.7 Light Pole Identification

The Contractor shall furnish and install a number on each light pole; street light pole identification and numbering will be provided by the City.

801.8 Restoration

It is the Contractors responsibility to restore all property, landscaping, sidewalk paving, and driveways that are disturbed during street light construction to their original condition.

801.9 Performance

Prior to acceptance, the Contractor/Owner/developer shall energize and operate the entire roadway lighting system, for two consecutive weeks without failure. If a lamp or ballast should fail, it shall be immediately replaced.

801.10 Pole Location

Unless otherwise specified, the preferred street light poles location shall be per City of Avondale Standard Details A1080 through A1083.

For local streets, street light pole may not be located closer than two feet from back of curb to face of pole, or center of pole.

For arterial and collector streets, street light pole may not be located closer than three feet from back of curb to face of pole or center of pole.

Shifting of pole locations to avoid minor conflicts (sidewalks, channels, other utilities, driveways, fences, etc.) in the field, shall be limited to a maximum of 10 feet parallel, or three feet perpendicular to the street with City approval of the new location. The new street light locations shall maintain the minimum clearances from overhead and underground utilities, irrigation systems and back of street curbs. Shifting of the street light poles outside of the above limits will require submittal of recalculated photometrics. New street light locations will require proper “as-built” documentation.

801.11 Direct Buried Poles

Backfill around direct buried poles shall be ABC material compacted in lifts using pneumatic or vibratory equipment. Compaction shall be to 95 percent minimum standard proctor. Density as defined by ASTM D-2922 and D-3017.

Embedded pole bottoms shall be uniformly half lap wrapped with Scotch 50 corrosion protection tape or approved equal, up to two inches below hand hole.

801.12 Pole Types

Arterial roads, roads of regional significance, commercial collectors and other City designated roads shall use the architectural style steel pole, shoebox luminaire dark bronze in color, pedestal mount, with a luminaire mounting height of 40 feet.

Pole types and dimensions shall be approved in the submittal process. Contractors shall submit technical material specifications for City review and approval

All poles and mast arms shall be steel construction with a galvanized finish, gray color (except for the architectural style) material submittals required.

801.13 Certificate of Occupancy

No Certificate of Occupancy shall be approved by the City until all street lights are energized and as-builts received.

801.14 Sidewalks

Meandering sidewalks must be constructed in such a manner as to maintain a two foot clearance of street light locations as designed. Street light pole location shall take precedence over sidewalk locations.

801.15 Luminaries

Luminaries including photocells shall be of a type approved by the City. Ballast shall be autotransformer, constant wattage, high PF with a multi-tap ballast. Material submittals required.

Unless otherwise directed on the plans, the photometric distribution for local, residential streets shall be Type II. All other streets shall be a Type III photometric distribution.

801.16 Driveway Clearance

Street light poles shall be a minimum of five feet from the edge of a driveway wing.

801.17 Fire Hydrant Clearance

There shall be a minimum five feet of clearance between fire hydrants and street light poles.

801.18 Other Clearance Items

Contractor to make sure pole and mast arms have proper clearance from overhead utility lines in accordance with the utility provider's specifications.

801.19 Right-of-Way

Street lights shall be installed in the right-of-way unless approved otherwise.

801.20 Variance

Lighting analysis shall be required for street dimensions and/or street light pole spacing that vary from the approved construction plans regarding roadway widths, spacing, and layout. This will be required for pole locations shifting more than 10 feet. See section 801.10 (Pole Location)

801.21 Foundation Elevation

All finished pole concrete pedestal foundations and adjacent electric junction pull boxes shall be set at sidewalk grade unless otherwise noted.

801.22 Survey Staking

It is the Developer's responsibility to provide a registered land surveyor to stake light poles and junction box locations.

End of Section

THE FOLLOWING PART 900, TRAFFIC SIGNALS IS HEREBY ADDED TO THE MAG SPECIFICATIONS TO READ AS FOLLOWS:

PART 900 TRAFFIC SIGNALS

SECTION 901 TRAFFIC SIGNALS

901.1 General Specifications

A. See City of Avondale, as listed in this section and available on the City of Avondale Development and Engineering Services Department website.

B. See Section 100, General Conditions for additional requirements.

901.2 Electrical Service

For electrical service requirements, contact the local utility provider for the specific area at least 60 working days before service is required. A City building permit will be required.

901.3 Foundation Elevation

Top of all signal structure foundations shall be at the same elevation as the adjacent top of curb or not more than four inches above the adjacent pavement with no existing curb.

901.4 Illuminated Street Name Signs (IISNS)

Contractor shall furnish mounting brackets and shall install internally illuminated street name signs (IISNS), both sides, in accordance with the City Standards, details and specifications (manufactured by Flouresco, Inc. or approved equal). The background for the IISNS shall be standard green, with the street name inscribed in white letters with Clearview font. The sign will include block numbers as shown on the plans. Cabinet shall match pole color. Three foot by eight foot flag mounted on Arizona Department of Transportation style poles or four foot by 10 foot flag mounted on trombone style poles. All legend block numbers and sign layout to be preapproved by City staff prior to manufacturing.

A. Workmanship: All items shall be new; the material and workmanship shall be of the best quality for the purpose.
B. Drawings: All signs shall be made in accordance with the details on the plans or drawings furnished by the City Development and Engineering Services Department. All sign layouts shall be the Contractor's

responsibility and shall be subject to the City Development and Engineering Services Department's approval.

C. Warranty: Any sign delivered under contract which does not conform to these specifications shall be replaced by the Contractor at no cost to the Engineer.

D. Materials and Fabrication

(1) Powder Coating: Aluminum frame and telescoping bracket shall be covered with opaque electrostatically applied TGIC POWDER COATING.

(a) Thickness: The thickness of the TGIC Powder Coating fused to the aluminum frame and telescoping bracket shall be 0.002 inch minimum. Thickness shall be determined in accordance with ASTM Designation D-1400, or other methods of equivalent or greater accuracy. The referee method, in case of dispute, shall be photomicrography.

(b) Color: Color shall be cocoa brown TGIC Powder Coating on the mounting bracket and frame unless otherwise specified.

E Sign Sheeting

(1) 3M Diamond Grade Reflective Sheeting (prismatic lens sheeting) with green EC film applied over and graffiti film.

(2) Color shall be white letters on green background with City Logo.

(3) The application and screening procedures must be in accordance with the sheeting manufacturer's specifications. May be applied or screen printed.

F. Base Material

(1) Description: The base metal substrate shall be new sheet aluminum alloy 3003-H14 or 5052-H32. The thickness of the aluminum shall be .050 inch. The material shall be subject to inspection prior to degreasing and chromate conversion coating operations. Alloy and temper designations shall be verified by mill test certifications.

(2) Shearing: All sign panel edges shall be shear-trimmed or roll-slit to produce neat edges and square corners. Sign panel shall be straight within 1/32 inch from the straight plane. Edge delamination or incomplete coverage of the base metal substrate up to and coincident with the cut edge of the sign panel shall be sufficient basis for rejection of the entire sign panel.

(3) Pretreatment: All treatment tanks and/or spray applied systems must be preformed on the Contractor's premises, to ensure proper

adhesion of powder or reflective sheeting materials. All treatment tanks or spray applied systems shall be charged with fresh chemicals at least once a year. If pretreatment is performed by immersion methods, the tanks must be sufficient size to accommodate the complete panel. Titration equipment shall be available for the City Inspector to check the solutions' strengths. The cleaned and coated base metal shall be handled only by a mechanical device or by operators wearing clean cotton or rubber gloves. After cleaning and coating operations, the panels shall be protected at all times from contact or exposure to grease, oils, dust or other contaminates.

(4) The front and back surfaces of the aluminum base metal shall be cleaned, deoxidized, and coated with a light, tightly adherent chromate conversion coating free of any powdery residue. The base metal pretreatment process shall be in conformance with Section 5, "Recommended Processing Methods" of ASTM Designation B-449. The coating weight shall be (30-100 mg/sq. ft.) A class 1 coating.

G. Sign Message. The following letters/border sizes shall be used:

(1) Street legend 12 inch Clearview font;
(2) Suffix and block number legend eight inch uppercase Clearview font

H. Finish

(1) All finished signs shall have a smooth flat surface without defects or objectionable marks of any kind on either the front or the back faces. All letters and designs shall be clearly cut and sharply defined.
(2) The appearance of the sign face shall be uniform throughout and shall be free of wrinkles, gel, hard spots, streaks, extrusion marks, air bubbles or blemishes that may impair the serviceability, detract from the general appearance or color-matching of the sign when viewed from a distance of 25 feet.
(3) The finished sign shall be clean and free from all burrs, sharp edges, loose rivets and aluminum marks.
(4) Signs with any defects or damage that affect their appearance and serviceability will not be acceptable. All metal parts shall be fabricated in a uniform and quality workmanlike manner with all sign surfaces and edges free of defects. No repairs shall be made to the face sheet without the approval of the City Inspector.

I. Packaging

Packaging must be in accordance with the sheeting manufacturer's specifications. All signs shall be packaged in such a manner to insure delivery in perfect condition and shall be suitable protected for proper shipment and storage.

901.5 Traffic Control

Barricading, warning signs and traffic control shall comply with MAG Specification Section 107.7, as amended by the MAG Supplement and MAG Specification Section 401.2.

901.6 Grounding

Two ground rods shall be installed adjacent to electrical service panel with bare bond conductor attached per City Building Code requirements. A ground rod shall also be installed in center of controller cabinet foundation and in the main pull box.

901.7 Notification

City Development and Engineering Services Department shall be notified three business days in advance of every major phase of the construction work.

901.8 Controller and Controller Cabinet

2070 Type Controller with all signal system specification accessories required to run an eight phase operation in Model 332 cabinet per City Standards. Cabinet, controllers and all associated hardware necessary for assembling and testing the controller to be delivered to the City for assembly, programming and testing. Once programmed and tested the Contractor shall pick-up and install the cabinet and notify the City three business days prior to having the City install the controller.

901.9 Controller Orientation

Orientation of the controller cabinet and the main access door location to be approved by the City prior to installing the cabinet.

901.10 As-Built Drawings

The Contractor shall be responsible for preparing the final as-built drawings for the Traffic Signal Plans. The drawings shall be sealed by an Arizona Registered Civil Engineer, and/or Registered Land Surveyor (RLS).

901.11 Pavement Marking

Any pavement markings shown on the plans are for reference only. The signing and pavement markings shall be installed per the City approved signing and pavement markings plans.

901.12 Meter Cabinet

Meter cabinet shall include photoelectric cell (PEC) for street lights and IISNS per City Technical Specification available on the City website. Cabinet exterior to be anodized aluminum. An Uninterruptable Power Supply (UPS) system shall be part of the service pedestal.

901.13 Controller Cabinet Wiring

The controller cabinet shall be wired and labeled with the same phase number designation, as shown in the phase diagram. Each connector shall have all its pins brought to cabinet tie points. Controller cabinet wiring shall be per City color coding standards.

901.14 Emergency Vehicle Preemption

Emergency vehicle preemption shall be compatible with the design and brand used by the City per technical Specifications available on the City website. The controller cabinet shall be equipped with the required connector cable, software, and interface unit to accomplish emergency vehicle preemption operation.

901.15 Painting

Poles, exposed base plates, anchor nuts and bolts shall be painted “cocoa brown”, per Valmont powder coated standard and specification. Minimum acceptance painting specifications shall comply with Valmont paint specifications.

901.16 Manufacturers

All signal poles and mast arms shall be manufactured by Valmont or other prior approved equal by the City, unless otherwise specified on the construction plans.

901.17 Submittals

Contractor shall comply with MAG Specification Section 105.2 as amended by the MAG Supplement and details for all materials and equipment. All submittals shall be City approved before construction.

901.18 Street Light Luminaire

Street light luminaire fixtures shall be installed per the City of Avondale General Engineering Requirements Manual, Chapter Three.

901.19 Signal Testing and Turn-on Procedure

A. The Contractor shall notify the City three business days prior to actuation of the traffic signal. The Contractor shall conduct a test, with the City Inspector, to insure that the individual traffic and pedestrian signal heads and indications are operating for the appropriate phase and in the appropriate sequences.

B. The Contractor shall be responsible for the installation of 36” X 36” W18-9Z, Y/B, WITH FLAGS and FLASHERS per City standards on all approaches to the new signalized intersection. The signs shall be installed a minimum of 500 feet in advance of the intersection at the back of sidewalk, or back of curb prior to signal activation on all approaches. Signs shall remain in place for a minimum of 30 days.

C. Signal shall be in flash mode for a minimum of 48 hours not including weekend days prior to full activation.

901.20 Certified Signal Technician

Any traffic signal construction, private or public, must be supervised by a certified IMSA Level II Signal Technician onsite throughout the duration of the construction.

901.21 Utility Trenching

The Contractor shall provide all trenching and pull boxes to the utility provider power source per the utility provider specifications. Any trenching, conduit and wire installation not provided by the utility provider, shall be the responsibility of the contractor.

901.22 Mounting Brackets

All type V and VII mounting brackets shall have terminal strips on the pole.

901.23 Conduit

All traffic signals conduits shall be Schedule 80 unless otherwise noted on the City approved construction plans. Traffic signal conduit configurations shall consist of two four inch conduits on all street crossing and a four inch conduit for each signal pole. All conduit runs between pull boxes shall be straight with minimal deflections. Bends greater than 45 degrees shall have a pull box at angle points.

For Traffic Signal Interconnect conduit refer to City of Avondale Standard Detail A1070 and A1071.

901.24 Traffic Signal Poles

All arterial to arterial street intersections and street intersections on Avondale Boulevard shall be Trombone Style poles and mast arms. All other signalized street intersections shall be per Maricopa County Department of Transportation (MCDOT) style unless otherwise directed by the City Engineer.

901.25 Traffic Signal Pull Boxes

All pull boxes shall be number seven with embossed no-skid pattern Fibrolyte covers. All covers shall be labeled “Traffic Signal”. Pull boxes for traffic signals shall be located within the street right-of-way.

901.26 Technical Data Submittals

Submittals to the City for Traffic Signals. Technical data on the following items shall be submitted to the City for review and approval prior to construction including, but not limited to the following:

A. Traffic signal poles and mast arms
B. Traffic signal heads complete
C. Mounting brackets, etc.
D. IISNS
F. Controller cabinet complete, including controller load switches, conflict monitor, etc.
G. All electrical cables, wiring, loop detectors if applicable, meter pedestal, etc.
H. Conduit and pull boxes
I. Traffic pole footings
J. Emergency vehicle preemption hardware complete.
K. Street light fixtures complete
L Pedestrian hardware, pushbuttons and heads
Video detection
M. Wireless communication equipment
N. Power service pedestal with battery backup system
O. Communication equipment (wireless and wired, as applicable)

901.27 Conflicts

Sidewalks and all other facilities in conflict shall be relocated or replaced as necessary to provide installation and access to signal poles.

901.28 Trombone Style Traffic Signal Concrete Footing

A. Design Data

(1) Building Code: 2000 IBC (or most recently adopted design standard)
(2) Wind Loading Criteria = 90 MPH, Exposure C, 1=1.00
(3) Site Class = D
(4) Earthquake Spectral Response Acceleration:
  (a) at short periods S_s 50 percentage
  (b) at 1 second periods S_1 = 13.4 percentage
  (c) 1 = 1.00
(5) Concrete 28 day strength: FC = 4,000 psi
(6) Reinforcing Steel: ASTM A615 FY = 60,000 psi
(7) Plain Bolts and Anchors: ASTM A307

B. Foundation Work

(1) Subsoils supporting or in direct contact with footings, or other foundation elements shall be protected against conditions that could cause movement or other detrimental effect to the structure as a whole or to any of its component parts.
(2) When working near existing and/or new construction, the Contractor shall exercise extreme caution so as not to undermine, disturb, damage or, in any way, cause undesirable movement, cracking, and/or settlement of the adjacent construction.
(3) All footings shall bear on undisturbed virgin soil or properly compacted backfill/granular fill as determined by a certified geotechnical engineer.

C. Concrete

(1) Contractor shall not splice reinforcement steel unless approved by the engineer of record.
(2) Reinforcing in footings shall be accurately placed before placing concrete. Reinforcement shall not be “floated” into footings.
(3) Concrete shall be regular weight (144 PCF) with type 1 cement, potable water. Concrete shall conform to ACI 301-latest edition.
(4) Concrete shall be vibrated in conformance with ACI 309. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled. Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer if applicable. Do not drag vibrators through the concrete. Do not flow concrete from one location to another by use of vibrator.
(5) All reinforcing steel shall be deformed new billets bars (A615, Grade 60). Bent cold, and detailed, fabricated, and held in place in accordance with the “Manual of Standard Practice for Detailing

Reinforcing Concrete Structures" (ACI 315 – Latest Edition) except as otherwise detailed or specified.

(6) Anchor bolts for column base plates shall be secured in place with the template and securely tied to reinforcing bars before placing of concrete. Deviations from this practice will not be tolerated without the consent of the City Engineer.

D. Special Inspection

Per IBC 2000, Section 1704, Special Inspection is required for the following items:

(1) Concrete
  (a) During the taking of test specimens (continuous).
  (b) After excavation of footings and placement of reinforcement steel are complete (periodic).
  (c) Verifying use of required mix design (periodic).
  (d) During the maintenance of specified curing temperature and techniques (periodic).

(2) Bolts in Concrete. Prior to and during the placement of concrete (continuous).

(3) Duties and Responsibilities of the Special Inspector
  (a) The special inspector shall observe the various stages of construction to ensure the Contractor conforms with the approved design drawings and specifications.
  (b) The special inspector shall keep records of inspections and furnish inspection reports to the building official and the engineer of record. Inspections shall be performed and reports submitted at a frequency agreed upon by the permit applicant and the building official prior to start of work.
  (c) Inspection reports shall indicate the work inspected, and conformance to the approved construction documents. If discrepancies occur, the inspector shall notify the Contractor immediately for correction. If the discrepancies are not corrected, the inspector shall inform the building official and the engineer of record prior to Contractor completing that stage of construction.
  (d) A final inspection report shall be submitted, documenting the required special inspections and noting any discrepancy that was corrected during construction.

End of Section

THE FOLLOWING PART 1000, PAVEMENT MARKING AND SIGNING IS HEREBY ADDED TO THE MAG SPECIFICATIONS TO READ AS FOLLOWS:

PART 1000 PAVEMENT MARKING AND SIGNING

SECTION 1001 PAVEMENT MARKING AND SIGNING

1001.1 General Specifications

A. The work under this item will provide the final striping and marking of all pavements and the installation of traffic control signs as described herein in accordance with City of Avondale Standard Details and as shown on the plans.

B. Any striping other than the replacement of pre-existing striping shall be done in accordance with a plan prepared by a registered engineer and approved by the City Development and Engineering Services Department.

C. All construction shall conform to the requirements set forth in the MAG Supplement. Items not covered under the MAG Supplement shall conform to Maricopa County Department of Transportation (MCDOT) Pavement Marking Manual, Arizona Department of Transportation (ADOT) Standard Drawings, Details and Specifications, or the "Manual on Uniform Traffic Control Devices" (MUTCD) latest edition, and ADOT Supplement MOAS, as applicable. Sign requirements, guidelines and warranties shall be in accordance with the MUTCD most current edition.

See Section 100 General Conditions for additional requirements.

1001.2 Pavement Markings

A. Permanent lane striping shall be hot-sprayed thermoplastic material conforming to all requirements of ADOT Standard Specifications Section 704, latest edition. Crosswalks and stop lines shall be 60 mil extruded hot thermoplastic material conforming to ADOT Standard Specifications Section 704.

B. The actual width of the stripe shall be:

Plan Width	Actual Width
4 inches	4 inches to 4.5 inches
6 inches	6 inches to 6.5 inches
8 inches	8 inches to 9 inches
over 8 inches	+/- 1 inch

C. Pavement symbols, arrows and legends shall be preformed markings, Type I (Permanent) conforming to all requirements of ADOT Standard Specification Section 705, latest edition, unless noted otherwise on the plans.

D. Painting shall be provided on all median noses and at temporary pavement marking locations where indicated on the plans and standard details. Reflectorized paint materials shall be white or yellow as noted and shall meet ADOT Standard Specification Section 708. Glass beads shall be applied to all painted surfaces.

E. Raised pavement markers shall conform to requirements of ADOT Standard Specification Section 706, latest edition.

F. Obliteration of any existing pavement marking required for new work shall be accomplished per City engineering standards.

1001.3 Signing

A. All traffic signs shown on the plans to be installed after the roadway improvements are completed shall be mounted on square tubular sign posts as specified herein when existing street light pole cannot be used, due to spacing or lack thereof. Traffic signs can be banded to street light poles if within 40 feet of proposed sign locations, or as otherwise approved by City Traffic Engineering Division.

B. Sign mounting heights and offset from edge of roadway shall be as directed by the City Development and Engineering Services Department in compliance with MUTCD and FHWA. Sign blanks shall be 0.080 gauge anodized aluminum sheeting, unless noted otherwise herein. Sign faces shall be totally reflective and with legends conforming to FHWA standards.

C. All existing signs which are not reused shall remain the property of the City and will be carefully removed and delivered to the City Sign Shop. The Contractor shall remove any existing concrete bases using care not to damage the post.

1001.4 Steel Square Tubular Sign Post Assembly

A. The sign post assembly shall consist of the post (1¾ inch x 1¾ inch square tubing, length per sign type according to MUTCD), sleeve (2¼ inch x 2 ¼ inch x 12 inch long square tubing) and anchor (Two inch by two inch by 36 inch long square tubing).

B. Material: Tubing shall be roll formed of 12 gauge steel or of a gauge sufficient to supply a minimum yield strength of 40,000 psi. Tubing shall

conform to the Standard Specifications for Cold-Rolled Carbon Steel sheets, commercial quality, ASTM A-570, Grade 33 for plain finish, and ASTM A-446, Grade A galvanized finish.

C Sign Post Finish

Galvanized: All steel tubing shall be given a hot dipped zinc (galvanized) coating conforming to ASTM A-525, G-90. All exterior, interior and corner weld surfaces shall be thoroughly coated.

D. Shape: A cross section of the post shall be a square tube carefully rolled to size. Tubing shall be corner welded by high intensity resistance welding, in such a manner that neither the weld nor flash shall interfere with telescoping properties.

E. Holes or Knockouts: Hole or Knockout diameter shall be 7/16 inch plus or minus 1/64 inch on one inch centers, on all four sides of the post for its entire length. Holes or knockouts shall be on the centerline of each side in true alignment and placed opposite and adjacent to each other. Tolerance on hole or knockout spacing is plus or minus 1/8 inch in four feet. The sleeve and post tubing shall have the first two sets of knockouts pre-punched on one end.

F. Telescoping Properties: The finished post, sleeve and anchor shall be straight and have a smooth uniform finish. It shall be possible to telescope the post with each consecutive larger and smaller size of square tube, freely and for not less than 10 feet of their length without the necessary of matching any particular face to any other face. All ends shall be free from burrs and shall be cut square.

G. Anchor/Sleeve Installation: The Contractor shall install the anchor/sleeve by driving with a pneumatic hammer.

H. Pneumatic Hammer: The sign anchor and sleeve may be installed with a pneumatic hammer. The Contractor shall exercise extreme care to prevent deformation of the anchor tubing during installation. The sign post must be able to slide freely in and out of the anchor once it is in place.

1001.5 Advance Street Name Signs

A. Material

(1) Background shall be green, 3M Diamond Grade vinyl sheeting per FHWA standard specifications.
(2) Legend shall be silver, 3M Diamond Grade sheeting per FHWA standard specifications.

(3) The sign width shall be a standard 18 inches. The sign length shall be variable and sized according to legend. The minimum length shall be 42 inches and maximum length shall be 72 inches or other sizes determined by City Development and Engineering Services Department.
(4) All sheeting shall carry a 10 year guarantee not to lose more than 20 percent of initial reflectivity by the end of a 10 year period.

B. Sign Fabrication

(1) All letters and numbers shall be “Series C”. The first letter in each name shall be eight inch upper case. All other letters shall be eight inch lower case. In the event that a street name length will not fit on the maximum 72 inch blank, the letters shall be changed to “Series B”. The street designation such as, Road, Street, etc., shall be abbreviated and may be down sized to a minimum of six inches. These adjustments are to be made only when the street name is of such length that it will not fit on a 72 inch blank. All Series B and C lettering and numbers shall be in a Clearview font.

(2) All streets name shall be properly centered on a sign blank.

C. Sign Installation

(1) Sign installations shall be made in a high quality manner. All signs shall be level within two degrees. Sign poles shall be perpendicular to level plus or minus two degrees. Signs shall be installed at a height of four feet to the bottom of the sign.
(2) All signs shall be secured to each pole with no less than two each, 3/8 inch steel drive rivets.
(3) All signs over 60 inches in length will require three sign posts, equally spaced and centered on the sign.
(4) All signs must be clean and free of any contaminant upon completion of installation.
(5) The Engineer shall designate all sign locations.

1001.6 STREET NAME SIGNS

A. Materials

(1) Sheeting shall be FHWA Diamond Grade per FHWA Standard Specifications. Background color shall be green, legend color shall be white.
(2) Sign blanks shall be nine inch extruded aluminum blank, 0.091 gauge.

(3) Aluminum shall be chemically treated to meet ASTM B449 specification for corrosion resistance.

B. Arterial Street Sign Fabrication: (Arterial/Arterial; Arterial/Collector; Arterial/Residential Intersections)

The street name signs will be white 3M VIP Diamond Grade DG3 sheeting with green 3M Electronic Cutting (EC) Film applied over the sheeting. The sign material shall be applied to nine inch wide extruded aluminum. The street name and the number of letters in the name will determine the length of the sign with a minimum of 24 inches:

(1) All letters and numbers shall be Clearview font
(2) The street name will be laid out with the first letter being six inch high upper case and the other letters in the name being six high lower case
(3) Letters and numbers for block numbering and street direction shall be three inch high upper case with the same lettering font as the name
(4) All block numbering will be to the nearest hundredth
(5) The street designation (St, Av, Rd) shall be the same font as the rest of sign with the first letter being three inch upper case and the remaining letters be three inch lower case
(6) The designation shall be centered over the block numbers
(7) Refer to City of Avondale Standard Detail A1036

C. Residential Street Sign Fabrication: (Residential/Residential; Residential/Collector; Collector/Collector Intersections)

The street name signs will be white 3M VIP Diamond Grade DG3 sheeting with green 3M Electronic Cutting (EC) Film applied over the sheeting. The sign material shall be applied to nine inch wide extruded aluminum. The street name and the number of letters in the name will determine the length of the sign with a minimum of 24 inches.

(1) All letters and numbers shall be upper case Clearview font
(2) The street name will be laid out with all letters in the name being four inch upper case, centered on the sign
(3) Letters and numbers for street block numbers, street designation (ST, AV, CTR, DR, LN) and street direction shall be two inch upper case with the same font as the street name
(4) The block numbers shall be centered on the sign with a horizontal arrow next to the numbering
(5) All block numbering will be to the nearest hundred
(6) The street direction shall be in the top left corner with the designation in the top right corner

(7) If the street name is a number, then the street designation will also be a four inch upper case letter size on the same line as the street number name
(8) Each number will be followed with letters (4th, 3rd, 1st) as appropriate with the number and the lettering to be two inch upper case and the top of the letter aligned with the top of the number
(9) Refer to City of Avondale Standard Detail A1035

D. Other Traffic Signs (Stop, Regulatory, Warning Signs)

All signs shall conform to MUTCD, ADOT Supplement to MUTCD and ADOT Manual of Approved Signs requirements. Signs shall utilize 3M Diamond Grade DG3 reflective sheeting applied to 0.080 gauge anodized aluminum. All signs shall have 3M Series 1160A Graffiti Film applied.

E. Sign Brackets

Twelve inch post attachment bracket for extruded sign (post size 1 ¾ inch x 1 ¾ inch post) heavy duty cantilever bracket for attaching sign to light pole (0.80 thickness and extruded)

Twelve inch heavy duty cross bracket for extruded signs.

1001.7 Raised Pavement Markers (RPMs)

RPMs shall be used on all arterial and collector roadways unless existing where no street lights are installed, and on all curved road sections of roadway. All RPMs per MUTCD, MCDOT Specifications and ADOT where necessary. RPMs shall be installed per approved plans in accordance with MUTCD manual, MCDOT Specifications and when applicable ADOT specifications.

1001.8 Pavement Marking and Signing General Notes

The following General Notes shall be included on the cover sheet of the Pavement Marking and Signing Improvement Plans:

A. The City of Avondale Engineering Department shall be notified three business days prior to starting any signing or striping work.
B. Unless otherwise specified, all pavement marking and traffic control signing installations and removals shall conform to the requirements set forth in the City of Avondale Supplement to MAG Specifications and Details. Items not covered under the City Supplement to MAG Specifications and Details shall conform to MCDOT Pavement Marking Manual, Arizona Department of Transportation (ADOT) Standard Drawings, Details and Specifications, or the “Manual on Uniform Traffic Control Devices” (MUTCD) latest edition, and ADOT Supplement MOAS,

as applicable. Sign requirements, guidelines and warranties shall be in accordance with the MUTCD most current edition.

C. The Contractor shall be responsible for the layout and installation of the permanent pavement markings following control points that have been set no more than 50 feet apart along the lines to be striped. Pavement marking dimensions are to center of the stripe for single line striping, and to center of the space between the two lines for double line striping. Where curb and gutter is present, dimensions are to the back of curb.

D. The pavement marking drawings are schematic only and not to scale. The Contractor shall follow all dimensions, notes, details and standards when installing pavement striping, markings and markers.

E. Temporary traffic control shall conform to the most recent editions of the City of Phoenix “Traffic Barricade Manual”, the “Manual on Uniform Traffic Control Devices” (MUTCD) and/or as directed by the City of Avondale.

F. Unless otherwise directed, all final location lane striping including crosswalks and stop bars shall be thermoplastic material applied at a minimum thickness of 60 mil. All pavement symbols, arrows, and lettering shall be thermoplastic, Type II (permanent) preformed pavement markings. Temporary pavement markings shall be reflectorized traffic paint. Temporary striping of a half street roadway shall be paint.

G. All signs shall conform to the (MUTCD) and shall be made from .080 inch thick aluminum. Sign posts and extensions shall be galvanized square perforated steel tubing per City standards. Height requirements per MUTCD.

H. All traffic control sign faces shall be constructed of prismatic lens grade reflective sheeting such as 3M diamond grade reflective sheet, unless otherwise noted.

I. All signs shall have a minimum clearance from edge of sign to the face of the curb of at least two feet; or if no curb exists, it shall be at least 10 feet from the edge of the pavement. All signs shall be placed so as to not interfere with pedestrian movement.

J. Any traffic control signage, including street name signs, which may be located within 10 feet of an existing street light pole, may be properly mounted to the pole with steel bands, with approval from the City. Sign locations and offsets may be adjusted by the City to improve visibility.

K. All concrete median curb noses shall be painted with yellow reflective safety paint from the front of the bullnose back 10 feet per MCDOT Pavement Marking Manual.

L. Raised Pavement Markers (RPM) shall be installed on arterial roadways without existing RPMs or roadways without full street lighting. All raised pavement markers shall be installed in accordance with ADOT Standard Drawings 4-M-2.02, 4-M-2.03.1, 4-M-2.03.2, and 4-M-2.04. Two-way Type M raised pavement markers shall be installed adjacent to fire hydrants per City of Avondale standards.

M. Any existing signage that is required to be relocated by the Contractor shall be removed, protected and stored for reinstallation by the Contractor. Damaged signage shall be replaced at the Contractor's expense. Any existing signs required to be permanently removed by the Contractor shall be salvaged for return to the City.

N. The Contractor shall remove all existing pavement markings and striping in conflict with the final striping plan, by ultra high pressure water (36,000 psi), or by slurry seal per MAG specification. All removal methods shall be done in conformance with E.P.A. requirements. If the removal of striping causes a depression of 1/8 inch or greater in the pavement surface, the Contractor shall fill and slurry seal the area per MAG Standard Specifications 713 and 715, Type II.

O. The Contractor shall clean the roadway surface to the satisfaction of the City by power broom, street sweeping, air jet blowing and/or water jet/truck prior to the placement of all pavement markings. The road pavement surface shall be absolutely dry. The air and pavement temperatures shall not be less than 55° F and 61° F for the placement of thermoplastic marking and Type I marking tape, respectively.

End of Section

THE FOLLOWING PART 1100, GRADING AND DRAINAGE IS HEREBY ADDED TO THE MAG SPECIFICATIONS TO READ AS FOLLOWS:

PART 1100 GRADING AND DRAINAGE

SECTION 1101 GRADING AND DRAINAGE

1101.1 General Specifications

See Section 100 General Conditions for additional requirements.

1101.2 Pad Certification

Developer's engineer shall submit certification of constructed building pad elevations prior to request for final inspection.

1101.3 Drywell Percolation

Drywells must be drilled a minimum of five feet into permeable porous strata. Inspection is required for the drywells before backfill and to verify installation of drainpipes and appurtenances before placement of rock. All drywells require field percolation tests stating the well shall drain at 0.1 cfs minimum. These test results shall be sealed by an engineer and submitted to the City.

1101.4 Grading and Drainage Plan Approval

Approval of Grading and Drainage plans provides for the construction of all surface improvements, including, but is not limited to retention areas and/or other drainage facilities, drainage ways, retaining walls, required drainage structures, subgrade for streets and building pad and finished floor elevations. The grading permit does not include the construction of storm drain or catch basins.

1101.5 Retention Basin Volume

Retention basins shall be constructed to the finished grades, side slope and provide the volumes per the approved construction plans. The allowable deviation from the approved finished grades of the retention basin are as follows:

Retention basin bottom = 0.4 feet plus or minus

Retention basin top = 0.2 feet plus or minus

Retention basin volume: The property owner shall provide the City with certified as-built dimensions of the retention basins and the actual volume of storage

provided. This must be based on as-built topographic surveys performed by an Engineer or Land Surveyor licensed in the state of Arizona. These as-built-volumes must reflect permanent, finished landscaping in place. The as-built retention volume must meet or exceed the required design volume specified in the approved drainage report. A Letter of Certification prepared by an Engineer licensed in the state of Arizona must be submitted to the City, stating that the provided volume meets or exceeds the required retention volume, and that the drainage facility is constructed in accordance with the approved construction plans. The volume of storage provided must equal or exceed the approved design volume before the City will issue a Letter of Acceptance.

1101.6 Protection Devices

All drainage protective devices such as swales, interceptor ditches, pipes, protective berms, concrete channels or other measures designed to protect homes from storm runoff must be completed prior to any home construction.

1101.7 Street Curb and Gutter Temporary Ramps

No concrete removals shall take place at existing streets until paving operations begin. Contractor is responsible for "ramping" or protecting all existing concrete/asphalt. In addition, Contractor must provide for proper gutter drainage flow under any ramps by using steel or PVC pipe (schedule 80), size four inch minimum diameter. Gutter ramps to be constructed of cold mix asphalt. Dirt is not allowed. Entry/exit ramps shall extend a minimum of 25 feet into the parcel and shall be constructed of crushed angular rock minimum of six inches thick. Ramp length shall be determined by the site conditions. The ramp shall be wide enough to handle all construction traffic, 16 foot minimum width.

1101.8 Compaction

Grading Contractor responsible for soil compaction of perimeter fence wall foundations. A minimum 95 percent standard proctor density required.

1101.9 Certify of Occupancy

Clearance for occupation of any building shall not be approved until grading and drainage improvements are completed and approved.

1101.10 Drywells

All drywells to be registered with the Arizona Department of Environmental Quality (ADEQ). Contractor to contact ADEQ before drilling drywells.

Drywells shall be as follows:

(1) Residential, subdivision drainage retention basins shall be Torrent Resources, MaxWell IV Drywell, or approved equal
(2) Commercial areas shall be Torrent Resources, MaxWell Plus Drywell, or City approved equal
(3) Bulk petroleum sites, including, but not limited to gas stations, fuel islands, service stations, etc. shall be Torrent Resources, MaxWell Envibro System Drywell, or City approved equal

1101.11 Submittals

(1) Material submittals including but not limited to drainage structures pipe manholes, bedding, backfill, concrete mix designs, steel, etc.
(2) Pad density test results
(3) Trench density test results
(4) Street fill areas in excess of two feet density test required every one foot of lift
(5) Density tests for all wall footings
(6) All soil lab test results for the site
(7) As-built plans
(8) Drywell drilling log, percolation test results

1101.12 Arizona Pollutant Discharge Elimination System/Stormwater Pollution Prevention Plan

The Arizona Pollutant Discharge Elimination System (AZPDES) requirements under the Environmental Protection Agency (EPA), general permit for Arizona. All subcontractors shall comply with all AZPDES requirements under the supervision of the General Contractor, and shall submit a completed, signed subcontractor certification form, thereby designating themselves as co-permittees. The Contractor will be expected to develop the Stormwater Pollution Prevention Plan (SWPPP) and update/revise it as necessary throughout the construction of the project, in order to ensure compliance with the EPA permit requirements. Revisions to the SWPPP shall be subject to approval by the City prior to implementation. The SWPPP shall be kept at the project site at all times, and the final SWPPP shall be retained by the Contractor for three years following project completion and final acceptance.

The Contractor shall submit a completed, signed Notice of Intent (NOI) form (including signed subcontractor certification forms) to:

Arizona Department of Environmental Quality (ADEQ)
Water Permits Section/Stormwater NOI (5415B-3)
1110 W. Washington Street
Phoenix, Arizona 85007
or fax to (602) 771-4674

Failure by the Contractor (or any applicable subcontractors) to submit the NOI forms and certifications by the start of construction activities which leads to delays in meeting EPA requirements will result in delay of the start of construction. The NOI shall be posted at the construction site along with the SWPPP. No construction activities shall begin until all applicable storm water pollution control devices are in place. Any additional work caused by the Contractor's (or subcontractor's) failure to properly implement the SWPPP shall be the Contractor's responsibility. The Contractor shall keep a copy of the latest STORM WATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES as printed in the Federal Register at the jobsite at all times. The Contractor shall keep a copy of the STORM WATER BASELINE CONSTRUCTION GENERAL PERMIT COVERAGE NOTICE received from the EPA (after submittal of the NOI) at the jobsite at all times.

All SWPPP reports required under this contract shall be available to the public in accordance with the requirements of Section 308 (b) of the Clean Water Act. The Contractor shall make plans available to the public upon request through the EPA.

No conditions of the Arizona General Permit or the SWPPP shall release the Contractor from any responsibilities or requirements under other environmental statutes or regulations. Asphalt plant and concrete plants (including mobile plants) require separate AZPDES industrial permits.

Upon completion and acceptance of the work performed by a subcontractor co-permittee, either the Contractor or other subcontractors shall absolve such subcontractor of any involvement in, or responsibility for, any subsequent AZPDES violations on the project. Upon total project completion, acceptance, and de-mobilization, the Contractor shall submit a completed, signed NOT form to:

Arizona Department of Environmental Quality (ADEQ)
Water Permits Section/Stormwater NOI (5415B-3)
1110 W. Washington Street Phoenix, Arizona 85007
or fax to (602) 771-4674.

As a minimum, the Contractor shall inspect all storm water pollution control devices on the project on a monthly basis, and following each rainfall of ½ inch or more (as measured at the nearest Flood Control District of Maricopa County rain gauge, or approved onsite rain gauge). The Contractor is also encouraged to inspect devices following rainfalls of less than ½ inch, as it is the Contractor's responsibility to ensure the proper operation of each device.

The Contractor shall be responsible for all material, labor, and other incidentals related to furnishing, installing, and maintaining each item during project construction. Incidentals include, but are not limited to, periodic checks to ensure proper operation of pollution-control devices, maintenance, cleaning, repair, and

disposal of device following storm events or other water runoff on the project. The Contractor shall maintain a record of each inspection.

1101.13 Storm Water Pollution Prevention Plans Construction Permit

Reference Avondale Municipal Code Chapter 8, Article III for Storm Water Quality Protection as it related to earth work and grading and drainage work in the City.

A. Any entity applying for a permit, authorization, license, or permission for construction activity that will disturb one or more acres of land shall prepare a storm water pollution prevention plan (SWPPP) for the management of storm water discharges from the proposed construction site. The applicant shall refer to Volume III - Erosion Control of the Drainage Design Manual by the Flood Control District of Maricopa County, as amended, for guidance in developing the SWPPP. The SWPPP must indicate the addresses of all Maricopa County parcel numbers of all affected properties. Please see City Code Chapter 8-48 for the City's minimum, specific SWPPP requirements, in addition to what is required by the construction general permit.

B. Both structural and non-structural best management practices shall be implemented and maintained at the construction site. Any post-construction storm water management measure to be installed or completed during the construction period shall be designed and installed consistent with the city's general engineering requirements, and meet all applicable authorization and management requirements under state and federal law.

C. The applicant shall provide an accurate and complete SWPPP to the City's NPDES coordinator for review before a construction permit is issued by the city. In cases where an application is submitted for a grading permit, such permit shall not be issued until the City's NPDES coordinator has reviewed and approved the best management practices and the permit shall be made conditional upon compliance with the best management practices. If the City's NPDES coordinator determines that the SWPPP is inadequate, the City's NPDES coordinator may authorize and require additional best management practices or and/or configurations thereof.

D. The City's NPDES coordinator shall have the right to enter and inspect private/communal drainage facilities in accordance with the provisions of section 8-52 of this article. (Ord. No. 1188-606, § 5, 6-5-06)

E. Along with the SWPPP, the applicant shall submit to the City's NPDES coordinator the following:

(1) A copy of an accurate and complete (including signature) NOI issued to the permitting authority to seek coverage under the construction general permit.
(2) A copy of the Maricopa County Rule 310 (air permit) application approval for the project.
(3) A copy of Notice of Termination (NOT) sent to ADEQ once the construction is completed as defined in the General Permit.

1101.14 Best Management Practices Documentation

All land-disturbing activities at the construction site shall be completed in accordance with the SWPPP. The permittee shall implement all best management practices as described in the SWPPP and periodically inspect them to ensure that they are operating correctly and have not been damaged and/or altered. The permittee shall conduct periodic inspections and maintain an inspection log or report in accordance with the construction general permit by the permitting authority.

End of Section

THE FOLLOWING PART 1200, STORM DRAIN IS HEREBY ADDED TO THE MAG SPECIFICATIONS TO READ AS FOLLOWS:

PART 1200 STORM DRAIN

SECTION
1201
STORM DRAIN

1201.1 General Specifications

See Section 100 General Conditions for additional requirements.

1201.2 Material

Storm drain materials shall be per MAG Specifications as approved by the City.

1201.3 Rubber Gasket Reinforced Concrete Pipe (RGRCP)

Minimum class for RGRCP under streets shall be Class IV pipe.

1201.4 Manholes

All storm drain manhole lids shall read “Avondale Storm Sewer” and shall be non-rocking Neenah brand or city approved equal.

1201.5 Submittals

Technical data on the following items shall be submitted to the City for review and approval prior to construction. Included, but not limited to:

A. Pipe materials including all fittings, gaskets, and seal
B. Manhole materials including concrete mix designs, precast items, frame and cover gaskets, flexible gaskets, and steps
C. Bedding and other backfill materials
D. Trench density tests
E. Tabular as-built surveys for lateral and stub inverts.
F. TV video inspection, if required
G. Jet-vac cleaning records
H. As-built recording drawing plans
I. Reinforcing steel

1201.6 Pavement Replacement

Pavement replacement, eee Section 100 General Conditions.

1201.7 Start of Construction

No upstream storm drain construction shall start until the down stream storm drain system is completed and approved by the City. Pipe laying shall commence at the proposed outfall to the existing storm drain.

1201.8 As-Built Drawings

The Contractor shall submit a RLS certified as-built spreadsheet listing manhole number, corresponding MH invert elevations, pipe slopes, lateral, stub out fall elevations, top of cone shaft/flat top elevation, and rim elevations. All elevations shall be taken prior to backfill.

1201.9 Backfill

A. All storm drain and laterals shall be in accordance with MAG Specifications Part 600 or as modified here in.

B. Longitudinal trench backfill in new arterial roadways or adjacent to existing roadways or within the ultimate right-of-way and future roadways shall require full depth approved ABC material or 100 percent one sack CLSM as directed by the City. ABC backfill compaction shall be by an approved mechanical method with backfill material lifts: 12 inch lifts (loose) to be used in the top four feet of trench, 24 inch lifts (loose) to be used over four feet of trench depth per MAG Specification Section 601.4.

C. Transverse trench backfill in existing roadways or new arterials shall require full depth approved ABC or 100 percent one sack CLSM as directed by the City.

D. Compaction by water jetting or trench flooding per MAG Specification 601.4 is only allowed for water trench backfill and compaction in new local and collector street roadways within new developments. Backfill material lifts for water jetting or trench flooding shall not exceed four feet (loose) in depth, water consolidation shall not be allowed for backfill and compaction of waterline trenches or adjacent to existing roadways and new existing street roadways.

1201.10 Safety Rail

Install safety rails per MAG Standard Detail 145 at all headwall and scupper locations.

1201.11 Access Barriers

Headwalls with pipes greater or equal to 18 inches in diameter shall have access barriers. Provide separate detail drawing. Access barriers shall be flush mounted to the headwall and be child resistant.

End of Section