

**SPECIAL PROVISIONS
FOR
PIMA COUNTY DEPARTMENT OF TRANSPORTATION**



**Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements
Pima County Project No. 4RRVPA**

**Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C**

*****August 31, 2016***
Includes Addendum 1 Revisions**

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These specifications were prepared under the direction of the following individuals:

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Their seals, affixed below, attest that those portions of these specifications which relate to the drawing sheet numbers appearing next to the seal were prepared under their direction.

Plan Sheets 1-16 (Roadway)



Plan Sheets 17-26 (Landscaping)



Plan Sheets 27-54 (Bridge)



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Appendix F – Geotechnical Evaluation (Provided on CD)

GENERAL NOTES

1. Project Location

This project is located within Section 8, Township 13 South, Range 13 East, Gila and Salt River Meridian, Pima County, Arizona

2. Scope of Work

The project consists of constructing a new pedestrian bridge crossing of Camino de la Tierra, its approach ramps and associated ancillary improvements to maintain access to the existing pathway and the existing trailhead and restroom facilities. The bridge structure will utilize salvaged precast pre-stressed concrete box beam girders from the Helmet Peak Bridge in the Town of Sahuarita, Arizona. The box beam girders are currently stored at the Pima County Storage Yard (CPC-Southwest Materials 6601 N Casa Grande Hwy, Tucson, AZ 85741).

The primary purpose of the project is to provide safe path connectivity across Camino De La Tierra along the south bank of the Rillito River.

3. Contract Time

The work specified shall be completed within **180** working days.

4. Maintenance & Protection of Traffic

The Contractor shall maintain traffic on a paved surface at all times during construction. Access for residential, commercial, church and school activities shall be maintained on a minimum of a graded and compacted surface. Access shall also be provided for mail deliveries and garbage pick-up. Pedestrian access shall be maintained throughout construction and temporary signage shall be erected to redirect pedestrians away from the construction zone. Payment for Maintenance and Protection of Traffic shall be included under Item No. 7010005 – Traffic Control.

5. Permits

Before undertaking work at any location covered by this project, the Contractor shall obtain all applicable permits, including but not limited to: water quality permits, air quality permits, street closure permits and permits for excavation/construction in the public rights-of-way, from the City of Tucson and Pima County. The Contractor is responsible for paying all applicable fees, taxes, and other costs for all work performed on this project and for obtaining permits.

Pima County is operating under a 404 Nationwide Permit with non-notification for this project. Copies of Nationwide Permit 14, Nationwide Permit General and Regional Conditions and 401 Water Quality Certification and General Conditions may be found in the SWPPP. The Contractor shall comply with all permit conditions.

Pima County has obtained a Notice of Intent to Clear Land Permit from the Arizona Department

of Agriculture. A copy of the permit can be found in the Appendix. The Contractor shall comply with all permit conditions.

The Contractor shall file a Notice of Intent to use the statewide Construction General Permit for Discharge to Waters of the United States and a Notice of Termination when the site is stabilized with the Arizona Department of Environmental Quality (ADEQ). The Contractor shall maintain and implement Pima County's Stormwater Pollution Prevention Plan under the Construction General Permit. The Contractor is directed to Section 810 of these Special Provisions and the Stormwater Pollution Prevention Plan for the project.

Prior to any ground disturbing activity, the Contractor shall obtain a Fugitive Dust Activity Permit from the Pima County Department of Environmental Quality. The Contractor shall implement standard specifications for dust suppression.

6. Storm Water/Ground Water Management

Stormwater pollution prevention coverage under the ADEQ Construction General Permit No. AZG2013-001 and notification of ADEQ is not required because there is less than 1 acre of disturbance. However, the Contractor shall be required to follow the pollutant discharge elimination practices detailed in the permit, including preservation of existing vegetation, implementation of effective erosion and sediment discharge controls and implementation of effective pollution prevention controls.

7. Construction Survey

Construction survey and layout will be provided by Pima County.

8. Existing Vegetation

The removal, salvage, or protection of vegetation shall be in accordance with the details shown on the project Demolition Plans. Existing vegetation on this project shall not be disturbed beyond those limits actually needed for construction purposes. Those items unnecessarily damaged shall be repaired or replaced at the Contractor's expense.

Existing vegetation which is identified on the project plans as to be preserved in place on this project shall be protected in place with fencing installed at the drip-line of the tree canopy per Section 201. Preservation fencing shall be installed prior to project clearing. This protected vegetation and vegetation beyond the project impact limits shall not be disturbed. Those items in these areas which are damaged shall be repaired, remedied or replaced at the Contractor's expense.

In some circumstances, vegetation from adjacent properties may obstruct construction, with branches or other plant parts leaning over into the right of way. This vegetation shall be managed per Section 201-3.05.

9. Disadvantaged Business Enterprise Goals

The minimum goal for participation by DBEs on this project is as follows:

7.36 Percent (4RRVPA)

The percentage of DBE participation shall be based on the total bid for the individual Project.

10. Specifications and Details

The work embraced herein shall be performed in accordance with the requirements of the following separate documents:

Pima County/City of Tucson, Standard Specifications for Public Improvements, 2003 Edition

Pima County/City of Tucson, Standard Details for Public Improvements, Latest Edition

Pima County/City of Tucson, Pavement Marking Design Manual, Latest Edition

Pima County/City of Tucson Signing Manual, Latest Edition

Pima County Street Lighting and ITS Conduit Design Manual, Latest Edition

Pima County Traffic Signal Design Manual, Latest Edition

U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition, and amendments, including Revisions I & II

Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, 2008 Edition

Arizona Department of Transportation, Highways Division, Part 2 - Bridge Group Structural Detail Drawings, current edition

11. Project Limits

The Contractor shall perform all work within the public right-of-way, legally obtained easements and property legally acquired by the Agency. The Contractor shall assume all responsibility and liability for any encroachment upon private property. The use of private property for construction yards will be allowed only if zoning requirements allows its use for this purpose. See Section 106-9 of these Special Provisions for further details regarding temporary construction yards.

12. Noxious and Invasive Vegetation

Prior to the start of construction and before ground disturbing or earthmoving activities occur, the Contractor shall treat noxious and invasive vegetation, particularly buffelgrass, in accordance

with Section 201-3.04. Invasive species eradication shall continue throughout the entire project from clearing and grubbing through final project acceptance.

13. Disposal of Materials

All construction debris, rubble, and other materials that are not recycled on the project, sent to a recycling facility, or taken by the Contractor, shall be disposed of by the Contractor at a waste disposal facility only. Costs associated with the disposal of these materials shall be incidental to the related items of work. Fees associated with the disposal of these materials shall be paid by the Contractor.

14. Contract Administration

Prior to submittal of contract administration documents, examples of which are listed below, the Contractor shall review all documentation for accuracy and compliance with the contract. Any variance from the plans and specifications shall be clearly noted and is subject to approval by the Engineer. A Contractor's transmittal letter shall accompany all submittals and shall include certification as to accuracy and compliance with the plans and specifications.

Contract administration submittals shall include, but are not limited to, the following examples: escrow agreements; subcontracts; purchase orders; certified payrolls for Contractor and subcontractors; force account billings; equal employment opportunity reports for Contractor and subcontractors; trainee preconstruction information; proof of apprenticeship; weekly individual training reports; rental equipment invoices; material invoices showing all unit prices; pay estimates; affidavit of certification of payments to disadvantaged business enterprise firms; requested lien releases; and consent from surety.

Monthly meetings may be scheduled with the Contractor at the discretion of the Engineer to discuss and resolve any problems associated with contract administration submittals. The monthly meetings shall be held at the Field Engineering Building at 1313 South Mission Road. Meetings shall continue on an accelerated basis after project construction completion until all contract administration issues are resolved.

Submittals that are not certified, or are incomplete, will be returned to the Contractor unprocessed for proper resubmittal and may result in payment delays, or partial payment, as deemed appropriate by the Engineer.

15. Work Hours/Noise Abatement Ordinance

Construction noise abatement and start/stop times shall be in accordance with Pima County Ordinance No. 1999-61: *Regulating the Excessive, Unnecessary and Annoying Noises in Pima County*. A copy of the Noise Ordinance is included in the Appendix.

16. Shoring and Bracing

There will be no separate payment for shoring and bracing, unless shown in the bidding schedule.

17. Archeological Features

In the event that human remains, including human skeletal remains, cremations, and/or ceremonial objects and funerary objects are found during excavation or construction in any part of the project area, ground disturbing activities must cease in the immediate vicinity of the discovery. Should artifacts or human remains be uncovered, the area will be taped off and further investigation by Pima County will follow. State laws ARS 41-865 and ARS 41-844 require that the Arizona State Museum (520-621-4795) be notified of the discovery by the Contractor so that cultural groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains. The human remains will be removed from the site by a professional archaeologist pending consultation and review by the Arizona State Museum and the concerned cultural groups.

The work is subject to delay in that location pursuant to ARS 41-844 while an examination takes place.

18. Hazardous Materials

If suspected hazardous materials are encountered during construction, work shall cease at the location and the Pima County Engineer shall be contacted at (520) 724-2814 to arrange for proper assessment, treatment, or disposal of those materials. The area will be taped off, and further investigation and clean up by Pima County will follow. No adjustments will be made due to work shut down. If potentially hazardous or contaminated materials are encountered, the Contractor shall stop work and remove all workers within the contaminated area. For life threatening situations, follow the procedures in the Safety Plan, as specified in Subsection 107-7.02.

19. Contractor's Staging or Storage Yard

No Contractor's staging area or storage yard has been identified for this project. It is the Contractor's responsibility to locate a staging area(s) and obtain approval of said area(s) from the Pima County Engineer. Staging areas and vehicle storage yards are not permitted in the washes within the project area. The Contractor will need to provide a SWPPP addendum to cover their offsite staging area and include the offsite staging area acreage of disturbance on their NOI. Refer to Section 106-9 for offsite staging outside of the right-of-way.

20. Construction Water/Dust Control

The Contractor shall provide potable water for use in construction, compaction and dust control. Reclaimed water may only be used if there is no discharge of this water to surface waters of the U.S. and the reclaimed water remains on-site. The Contractor shall notify the Arizona Department of Environmental Quality (ADEQ) for all discharges of reclaimed water to surface waters of the U.S. or off-site.

21. Utility Relocation

Utility relocation work not shown on the project plans or noted in the Special Provisions will be the responsibility of the appropriate utility. The Contractor is hereby notified that the utility companies, in conjunction with the contract work, will perform utility relocation work. The Contractor shall make every effort to cooperate fully with each utility company and acknowledges and agrees that delays to his operations may necessarily occur. Due to these delays that are anticipated by the utility companies, the Engineer shall consider requests by the Contractor for contract time extensions. The Contractor is also referred to Section 105-6 of the Standard Specifications, Cooperation with Utility Companies.

The Contractor shall consider the extent of utility work in preparing the contract bid and project schedule. It will be the Contractor's responsibility, prior to bidding, to contact the appropriate utilities to obtain additional information such as relocation as-builts, relocation sequencing, utility windows, construction time frames, and identification of areas requiring subgrade preparation by the Contractor prior to the start of utility work.

22. Erosion Control Measures

The Contractor's attention is directed to the requirements of Section 810 and Appendix A of the specifications and the following:

The Contractor shall phase or sequence construction activities to minimize the area of disturbance at any one time. Sediment and erosion control measures shall be installed before upgradient land is disturbed. Once an area of the project has been cleared, the Contractor is responsible for documenting in the SWPPP book all erosion control measure activities by the Contractor or others in the area that has been cleared.

The Contractor shall remove, dispose or realign temporary erosion control measures as directed by the Engineer. Subsequent removal, disposal or realignment of temporary erosion control measures will be incidental to the respective work item and no additional payment will be made.

23. Biological Requirements

The Contractor shall inspect under and around construction equipment for desert tortoise prior to start up each day. If a desert tortoise is found within the project area, the Contractor shall contact the County Engineer and guidelines found in Appendix L of the Stormwater Pollution Prevention Plan will be followed.

24. Contractor's Environmental Requirements and Mitigation Measures

The Contractor shall comply with the following mitigation measures as outlined in the Clearance Memo in Appendix B and as noted below.

- If suspected hazardous materials are encountered during construction, work shall cease at that location and the Engineer will be notified immediately to make arrangements for proper treatment or disposal of those materials.
- If previously unidentified cultural resources are encountered during activity related to the

construction of the project, the contractor shall stop work immediately at that location notify the Engineer and shall take all reasonable steps to secure the preservation of those resources. The Engineer will contact the Arizona Department of Transportation Environmental Planning Group, Historic Preservation Team, (602.712.8636 or 602.712.7767) and the Pima County Historic Preservation Division (724-6405) immediately, and make arrangements for proper treatment of those resources.

- In the event that human remains, including human skeletal remains, cremations, and/or ceremonial objects and funerary objects or archaeological materials are found during excavation or construction, ground disturbing activities must cease in the immediate vicinity of the discovery. State laws ARS 41-865 and ARS 41-844, require that the Arizona State Museum be notified of the discovery at (520) 621-4795 so that cultural groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains. The human remains will be removed from the site by a professional archaeologist pending consultation and review by the Arizona State Museum and the concerned cultural groups.
- If clearing, grubbing, or tree/limb removal will occur between February 15 and August 31, the contractor shall employ a qualified biologist to conduct a migratory bird nest search of all vegetation within 10 (ten) days prior to removal. Vegetation may be removed if it has been surveyed and no active bird nests are present. If active nests cannot be avoided, the contractor shall notify the Engineer to evaluate the situation. During the nonbreeding season (September 1–February 14), vegetation removal is not subject to this restriction.
- If active bird nests are found during the survey, the contractor will arrange for a licensed wildlife rehabilitator to relocate any eggs or nestlings from active nests or buffer any active nest with protective fencing within 3 (three) to 5 (five) calendar days of construction to comply with provisions of the Migratory Bird Treaty Act.
- If active bird nests are found during the survey, the contractor shall not commence with any vegetation removal or pruning until Pima County has confirmed that all eggs or nestlings have been relocated from the work area by a licensed wildlife rehabilitator and that contractor is cleared to proceed.
- To prevent the introduction of invasive species seeds, the contractor shall inspect all earthmoving and hauling equipment at the equipment storage facility and the equipment shall be washed prior to entering the construction site.
- To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.
- All disturbed soils not paved that will not be landscaped or otherwise permanently stabilized by construction shall be seeded using species native to the project vicinity.
- The contractor shall notify its employees prior to any disturbance where lead is present in

the paint below the 0.5 percent US Department of Housing and Urban Development/US Environmental Protection Agency action levels but above the US Department of Labor Occupational Safety and Health Administration detection level. As part of the notification, the contractor shall make the US Department of Labor Occupational Safety and Health Administration publication number 3142-12R 2004 Lead in Construction (<http://www.osha.gov/Publications/osha3142.pdf>) available to workers.

- If suspected hazardous materials are encountered during construction, work shall cease at that location and the Engineer shall be notified immediately to make arrangements for the proper treatment or disposal of those materials.

(101ABREV, 6/5/14)

SECTION 101 - ABBREVIATIONS AND TERMS

101-3 TERMS of the Standard Specifications are revised as follows:

Advertisement for Bids - Change this to “Advertisement Inviting Bids” with the same definition.

Change Order - Change to read: “A supplemental agreement.”

Contract Time - Change to read “**Construction Time**”. This change is applicable when the term “Contract Time” is used in all sections throughout the Standard Specifications.

Supplemental Agreement - Add the following: “All supplemental agreements will be issued in compliance with Section 11.16.010 of the Pima County Procurement Code.”

101-3 TERMS of the Standard Specifications is modified to add:

National Pollutant Discharge Elimination System (NPDES) - Authorized by the Federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The provisions of the NPDES permit issued for a construction project is also inclusive of the Arizona Pollutant Discharge Elimination System (AZPDES) provisions and requirements.

(101FHWA_MAJOR_ITEMS, 12/19/14)

SECTION 101 - ABBREVIATIONS AND TERMS

101-3 TERMS of the Standard Specifications is modified to add:

Major Items - A major item is an item whose total cost, determined by multiplying the bidding schedule quantity and the contract unit price, is equal to or greater than the amount indicated in the following table:

Original Total Contract Amount (Dollars)		Major Item Criteria
Equal to or greater than	But less than	Equal to or greater than the amount listed (dollars)
\$0.00	\$100,000	\$5,000
\$100,000	\$200,000	\$10,000
\$200,000	\$450,000	\$15,000
\$450,000	\$750,000	\$25,000
\$750,000	\$1,100,000	\$35,000
\$1,100,000	\$1,500,000	\$45,000
\$1,500,000	\$2,000,000	\$55,000
\$2,000,000	\$2,500,000	\$65,000
\$2,500,000	\$3,000,000	\$75,000
\$3,000,000	\$5,000,000	\$85,000
\$5,000,000	\$7,000,000	\$120,000
\$7,000,000	\$10,000,000	\$150,000
\$10,000,000	\$25,000,000	\$250,000
\$25,000,000	\$50,000,000	\$350,000
\$50,000,000	---	\$500,000

A major item will remain a major item unless it is completely eliminated.

Minor Item - A minor item is any item which is not a major item.

(102FHWA_NOBID, 11/19/13)

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

102-3 SUSPENSION FROM BIDDING of the Standard Specifications is modified to add:

The signature of the bid proposal by a bidder constitutes the bidder's certification, under penalty of perjury under the laws of the United States, that the bidder, or any person associated therewith in the capacity of owner, partner, director, officer, principal investor, project director, manager,

auditor, or any position involving the administration of federal funds, has not been, or is not currently, under suspension, debarment, voluntary exclusion or been determined ineligible by any federal agency within the past three years. Signature of the bid proposal also certifies, under penalty of perjury under the laws of the United States, that the bidder does not have a proposed debarment pending. In addition, signature of the bid proposal certifies that the bidder has not been indicted, convicted, or had a civil judgment rendered against (it) by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three years.

Any exceptions to the above paragraph shall be noted and fully described on a separate sheet and attached to the bid proposal.

(102BID_REQ, 5/26/06)

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

102-4 CONTENTS OF BID DOCUMENT the 2nd paragraph of the Standard Specifications is revised to read:

All papers bound with or attached to the bid document are considered a part thereof. Bid forms may be detached and submitted as the bid. It is the contractor's responsibility to include and execute all necessary bid forms.

102-9 AFFIDAVIT AND CERTIFICATION FORMS of the Standard Specifications is hereby deleted.

102-11 DELIVERY OF BIDS the last sentence of the Standard Specifications is hereby deleted.

(102FHWA_LOBY, 7/8/14)

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

102-17 Non-Collusion Certification is hereby added to the Standard Specifications
The bidder certifies that, pursuant to Subsection 112 (c) of Title 23, United States Code and Title 44, Chapter 10, Article 1 of the Arizona Revised Statutes, that neither it nor anyone associated with the company, firm, corporation, or individual has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of full competitive bidding in connection with the above referenced project.

The bidder further certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) No Federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, the making of any Federal loan, the entering into any cooperative agreement, and the extension,

continuation, renewal, amendment, or modification of any Federal contract grant, loan, or cooperative agreement.

- (2) If any funds other than Federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "*Disclosure Form to Report Lobbying*", in accordance with its instructions. Copies of Form-LLL, "*Disclosure Form to Report Lobbying*", are available at the Pima County Administration Building, Procurement Department - Design and Construction Division, 130 West Congress Street, Third Floor, Tucson, AZ 85701.
- (3) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000.00 and not more than \$100,000.00 for each such failure. This penalty also applies to any person or agency that fails to submit or amend the disclosure form (LLL), when required. Failure to submit the required certification may result in payment under this contract being delayed or denied.
- (4) The bidder also agrees, by submitting his or her bid or proposal, that he or she shall require that the language of this certification be included in all subcontracts and lower tier subcontractors shall certify and disclose accordingly.

The Agency will keep the prime contract's certifications on file as part of their original bid proposals. Each prime contractor shall keep individual certifications from all subcontractors and lower tier subcontractors on file. Certification shall be retained for three years following completion and acceptance of any given project.

Disclosure forms for the prime contractor shall be submitted to the Engineer at the pre-construction conference. Disclosure forms for subcontractors and lower tier subcontractors shall be submitted to the Engineer by the prime contractor along with the submittal of each subcontractor or lower tier subcontractor, as required under subsection 108-1, when said subcontractors exceed \$100,000.00. During the performance of the contract the prime contractor and any affected subcontractors shall file revised disclosure forms at the end of each calendar year quarter in which events occur that materially affect the accuracy of any previously filed disclosure form. Disclosure forms will be submitted by the Engineer to the Federal Highway Administration for further processing.

(103FHWA_NO_LOCAL_PREF, 4/1/14)

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

103-1 CONSIDERATION OF BIDS of the Standard Specifications is modified to add:

No part of these specifications shall be construed to:

- (a) To require the use of or provide a price differential in favor of articles or materials produced within the State, or otherwise to prohibit, restrict or discriminate against the use of articles or materials shipped from or prepared, made or produced in any State, territory or possession of the United States; or
- (b) To prohibit, restrict or otherwise discriminate against the use of articles or materials of foreign origin to any greater extent than is permissible under policies of the Department of Transportation as evidenced by requirements and procedures prescribed by the FHWA Administrator to carry out such policies.

(103FHWA_AWARD_LISC, 12-23-12)

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

103-2 AWARD OF CONTRACT of the Standard Specifications is modified to add:

This contract is funded, either wholly or in part, by federal funds, and the award of contract may be made contingent upon the successful bidder obtaining an appropriate license from the State Registrar of Contractors, in accordance with Arizona Revised Statutes 32-1101 through 32-1170.03. The license must be obtained within 60 calendar days following opening of bid proposals. No adjustment in proposed bid prices or damages for delay will be allowed as a result of any delay caused by the lack of an appropriate license.

Failure to acquire the necessary licensing within the specified period of time shall result in either award to the next lowest responsible bidder, or re-advertisement of the contract, as may be in the best interests of the Agency.

Licensing information is available from:

Registrar of Contractors
3838 N. Central, Suite 400
Phoenix, AZ 85012
Phone: (602) 542-1525

(103AWARD, 5/26/06)

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

103-4 RETURN OF BID BOND of the Standard Specifications is revised to read:

All bid bonds will be held until the contract has been awarded and the contract forms are executed by the bidder.

103-6 CONTRACTOR'S INSURANCE; INDEMNIFICATION of the Standard Specifications are superseded by Article IV of the Construction Services Agreement.

103-7 EXECUTION OF CONTRACT the 2nd paragraph of the Standard Specifications is revised to read:

The Agency shall execute the contract as soon as possible after receipt of the signed contracts, bonds and insurance certificates. No contract shall be considered as effective until it has been fully executed by all the parties thereto.

(104FHWA_CHANGE_CONDITION, 12/19/14)

SECTION 104 - SCOPE OF WORK

104-2 ALTERATIONS OF CONTRACT

104-2.01 By the Agency of the Standard Specifications is revised to read:

The Agency reserves the right to revise the contract at any time. Such revisions shall neither invalidate the contract nor release the surety. The contractor agrees to complete the contract as revised. The contractor shall not proceed with work for which a revision to the contract is required without prior approval from the Engineer. Once approval is received, the contractor shall proceed with such direction immediately, whether the Engineer considers that the contract has been revised or not.

It is the contractor's obligation to notify the Engineer in writing that a revision to the contract is necessary and provide such notification in accordance with Subsection 104-4. Whenever the words notice, notification, request or notify are used in this subsection, such notice or request shall be provided in accordance with the requirements of Subsection 104-4.

Supplemental Agreements will be issued for the reasons specified in 104-2.03 and 104-2.04 of the Standard Specifications, in addition to the following reasons:

(A) To accomplish extra work as defined in Subsection 101-3 and specified in subsection 104-3.

(B) If the work is suspended by order of the Engineer as provided below:

- (1) If the performance of all or any portion of the work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the contractor shall submit to the Engineer, in writing, a request for adjustment within seven calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.
 - (2) Upon receipt, the Engineer will evaluate the contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The contractor will be notified of the Engineer's determination whether or not an adjustment of the contract is warranted.
 - (3) No contract adjustment will be allowed unless the contractor has submitted the request for adjustment within the time prescribed.
 - (4) No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided or excluded under any other term or condition of this contract.
- (C) If there are significant changes in the character of work, as provided below:
- (1) The Engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Changes in quantities and alterations shall not invalidate the contract nor release the surety. The contractor agrees to perform the work as altered.
 - (2) If the alterations or changes in quantities significantly change the character of the work under the contract, whether such alterations or changes are in themselves significant changes to the character of the work or, by affecting other work, cause such other work to become significantly different in character, an adjustment, excluding anticipated profit, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the contractor in such amount as the Engineer may determine to be fair and equitable.
 - (3) If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided in the contract.
 - (4) The term "significant change" shall be construed to apply only to the following circumstances:

- (a) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or
 - (b) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any adjusted unit price for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity. Any adjustment in contract unit price for a decrease in quantity below 75 percent shall apply only to the actual amount of work performed, except that the product of the adjusted unit price and the reduced quantity of work performed shall in no case exceed the product of the original contract unit price and 75 percent of the Bid Schedule quantity.
- (D) To revise the contract time in accordance with Subsection 108-8.

If the Supplemental Agreement is to provide for an increase or decrease in the contract price or time, such increases or decreases will be determined in accordance with the requirements herein and Subsections 108-8 and 109-4.

104-2.02 Due to Physical Conditions of the Standard Specifications is revised to read:

104-2.02 Differing Site Conditions

- (A) During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.
- (B) Upon written notification, the Engineer will investigate the conditions and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the contractor of the determination whether or not an adjustment of the contract is warranted.
- (C) No contract adjustment which results in a benefit to the contractor will be allowed, unless the contractor has provided the required written notice.
- (D) No contract adjustment will be allowed under this clause for any effects caused on unchanged work.

(104MISC_WORK, 1/21/14)

SECTION 104 - SCOPE OF WORK

104-5 MAINTENANCE OF TRAFFIC the first paragraph of the Standard Specifications is modified to read:

Work considered under this Subsection includes, but is not limited to, sweeping, roadway and subgrade repair, safety feature repair, debris removal, repair of pedestrian features and other miscellaneous work necessary to provide a smooth and safe traveled way. The work herein listed shall be paid for as provided in Subsection 701-5.01.

Miscellaneous work shall include all coordination and notification necessary to complete the project. Such coordination shall include, but not be limited to: utility coordination, business and resident notification(s), and all other coordination necessary whether described on the project plans or Special Provisions or not.

Business and resident notification shall comply with the following:

No later than seven calendar days prior to the commencement of work, the contractor shall personally distribute notices of the Agency's intent to begin construction on the project. The notices shall be distributed to all businesses and residences abutting the project rights-of-way. Notices shall be distributed to businesses within their normal hours of operation and to residences between 8:00 AM and 6:00 PM. Notices shall not be placed in mailboxes. Where no response is obtained at a business or residence, the notice shall be left in a visible location at the front door.

(105REVIEW_OF_WORKSITE, 02-18-16)

SECTION 105 – CONTROL OF WORK

105-22 REVIEW OF WORKSITE is added to the Standard Specifications as follows:

(A) Incident. The contractor shall inspect the worksite at least fourteen (14) calendar days prior to the scheduled start of a construction activity for the purpose of identifying any aerial, surface, and underground utility facility or utility activity that will impact (i.e. interfere, alter, or conflict) the work. Each impact hereinafter referred to as an "Incident" whether discovered prior to or during a construction activity shall be addressed in accordance with the procedures and requirements of this Section.

Inspection of the work site shall include, but not be limited to, the collection of field data on the horizontal and vertical location of underground facilities through ground markings (A.R.S. §§ 40-360.22), exposing of underground facilities, and evaluating field data against the project plans and construction methods for impacts.

(B) Reporting. The contractor shall fill out an incident report form and assign a sequential incident number. The report form may be obtained from the Agency's website or Engineer.

The report shall include the name of the utility facility owner (if not known, identify as

“unknown”), incident location (station/offset/elevation), date and time discovered, color photographs (preferably date and time stamped), description of incident including the impact on the performance of work and type of facility discovered (type of material, size, quantity, identifying marks).

(C) Notification. The contractor shall notify the Engineer, utility facility owner, and Agency Right-of-way/Utility Section of an Incident no less than fourteen (14) calendar days prior to the scheduled start date of the construction activity unless the Incident was discovered during the construction activity in which case notice shall be given immediately. Notice shall be deemed to have been duly given when the incident report (a) has been delivered in person or (b) upon confirmation of receipt when transmitted by facsimile or email.

If the utility facility owner is not known, the contractor shall contact the state one call notification center (Arizona Blue Stake, Inc.) for assistance in identifying the owner.

(D) Resolution/Mitigation. The Agency, upon receipt of notice, shall take the necessary action to address the incident by removal or relocation of the affected facility, altering the work, or stoppage of the activity.

The Agency shall allow the utility facility owner to resolve the incident within a time frame specified by the Engineer. If the utility facility owner is unable to perform, the Agency may, at its option, authorize the contractor to perform work to resolve or mitigate the incident by force account in accordance with the provisions of subsection 109-5(B).

(E) Submission of Additional Compensation. In the event that the contractor perceives that additional compensation has occurred as a result of an incident, the contractor shall immediately bring such matter to the attention of the Engineer for the earliest possible resolution, and the Engineer shall promptly notify the affect utility provider(s) and Agency Right-of-way/Utility Section of the request for additional compensation.

The contractor may request additional compensation by (a) filing a claim in accordance with the requirements and procedures under Subsection 105-18 or (b) if agreed to by the Engineer, submit for approval by the Engineer an itemization of additional labor, material, and equipment costs. Itemization of costs shall be documented on the incident report. The amount of payment shall be determined in accordance with the provision of subsection 109-5(B).

At the request of the Engineer, the contractor shall make available all documentation supporting the amount of additional compensation, and the Engineer shall make such documentation available to the utility provider upon request.

When quantifying additional compensation under item (b) above, the contractor shall submit to the Engineer as promptly as possible following completion and acceptance by the Agency the itemization of labor, material, and equipment, but in no event later than fourteen (14) calendar days, the contractor’s incurred costs which shall be considered complete and final compensation for the incident.

Failure on the part of the contractor to adhere to the procedures and requirements of this Section

will be cause for dismissal of the additional compensation request.

(F) Incident Log and Progress Meeting. The contractor shall maintain a utility incident log provided by the Agency. The log shall be kept current, reviewed at the weekly progress meeting, and included with the weekly construction progress meeting minutes.

(105AGENCY_SURVEY, 01/26/15)

SECTION 105 - CONTROL OF WORK

105-8 CONSTRUCTION STAKES, LINES, AND GRADES of the Standard Specifications is revised to read:

Unless the contract provides for construction survey and layout by the contractor, the Engineer shall set construction stakes establishing lines, slopes and continuous profile grade in road work and center line and bench marks for bridge work, culvert work, channelization work, protective and accessory structures and appurtenances and shall furnish the contractor with all necessary information relating to lines, slopes and grades. These stakes and marks shall constitute the field control by, and in accordance with, which the contractor shall establish other necessary controls and perform the work.

During the course of construction, the contractor shall submit requests for staking. The Agency will not be responsible for staking delays unless the Engineer is provided ten calendar days' notice before commencing work on an item and thereafter 48 hours' notice that stakes are needed.

When the contractor is aware of errors or suspects that there are errors in the staking, the contractor shall immediately bring them to the attention of the Engineer prior to beginning any work on the basis of the errors. The contractor shall take no advantage of any staking error.

The contractor shall furnish all traffic control, including flagging, for survey and staking operations in accordance with the requirements of Section 701.

The contractor shall be responsible for the preservation of all stakes necessary for complete and accurate layout and construction of the work including, but not limited to, reference points, and bench marks and, if any of the construction stakes or marks have been carelessly or willfully destroyed or disturbed by the contractor, the cost of replacing them shall be charged against the contractor and shall be deducted from the payment for the work.

The contractor shall be responsible for protecting existing monuments, such as section corners, quarter corners, intersecting street centerline monuments, and property corners identified on the project plans or discovered during construction and shall re-establish existing monuments destroyed or disturbed during the course of construction. Re-establishment of existing monuments shall be performed by a registered land surveyor. No measurement for payment will be made for protection and re-establishment of destroyed or disturbed existing monuments unless specifically identified on the plans or specifications. The cost is to be considered as included in prices for other items of work.

The Agency shall be responsible for the accuracy of lines, slopes, grades and other engineering work which it provides under this Subsection.

The contractor shall be responsible for maintaining all existing survey monuments including section line, right-of-way and roadway monuments. Survey monuments disturbed by construction activity shall be reestablished at no additional cost to the Agency. Survey monuments shall be reestablished in conformance with the requirements of Subsection 925-3.04(C).

The following procedure shall be followed for bluetop grade staking provided by the Engineer:

The contractor shall prepare the grade to within + 0.2 foot of the elevation specified on the project plans prior to requesting bluetops. Prior to achieving the bluetopping tolerance specified, the Engineer shall provide rough staking of the grade, on a one time only basis, if requested to do so by the contractor.

The Engineer shall check center line elevations at intervals of 100 feet or less as well as verifying the cross slope, if applicable.

When the Engineer verifies that at least 80 percent of the points checked are within the specified tolerance, density testing of the grade shall be conducted.

The Engineer shall set bluetops after verification that the results of density testing have achieved the specified values.

It is the contractor's responsibility to direct traffic away from the area being bluetopped and to protect all bluetops from being disrupted or destroyed by traffic until such time as the grade is accepted by the Engineer. The Agency shall provide one set of bluetops over a given area. In addition, Bluetops accounting for up to a maximum 25 percent of the original number shall be reset by the Agency. Bluetops required in excess of this maximum shall be charged against the contractor and deducted from payments due the contractor.

(105PLNS, 3/7/11)

SECTION 105 - CONTROL OF WORK

105-2 PLANS AND WORKING DRAWINGS the 11th paragraph of the Standard Specifications is revised to read:

All working drawings or prints shall be 22 inches in height and 34 inches in length. There shall be 1 1/4-inch margins on the left and right sides, and 1/2-inch margins on the top and bottom. A blank space, four inches wide by three inches high, shall be left inside the margin in the lower right hand corner. All drawings shall be made in such a manner that clear and legible copies can be made from them. When half-size copies are required, they shall be provided on standard 11 by 17 inch sheets.

(105FHWA_FNL, 10/23/13)

SECTION 105 - CONTROL OF WORK

105-17 ACCEPTANCE

105-17 (B) Final Acceptance the second paragraph of the Standard Specifications is revised to read:

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory or not complete, the Engineer shall give the contractor written notice of the unsatisfactory or uncompleted work and the contractor shall immediately correct such work. In such case, the Engineer shall also give the contractor written notice as to whether or not the work is substantially complete. Final acceptance will not be made until all completed plans and working drawings as required in Subsection 105-2 have been submitted and deemed acceptable by the Engineer. In addition, final acceptance will not be made until all "*Certification of Payments to DBE Firms*" affidavits, as required in the contract documents, have been submitted and deemed acceptable by the Engineer and the Arizona Department of Transportation Civil Rights Office.

(106MATERIAL, 5/17/12)

SECTION 106 - CONTROL OF MATERIAL of the Standard Specifications is revised to read:

106-1 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

The contractor shall furnish all materials required to complete the work, except materials that are designated in the Special Provisions to be furnished by the Agency as set forth in Subsection 106-12.

Only materials conforming to the requirements of the contract documents shall be incorporated into the work. Materials shall be new except as may be provided elsewhere in the contract documents. The materials shall be manufactured, handled and used in a workmanlike manner to insure completed work in accordance with the requirements of the contract documents.

In order to expedite the inspection and testing of materials, the contractor shall notify the Engineer of the proposed sources of materials prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the contractor shall furnish materials from other sources.

Whenever water is required on a project, as part of either a process or a product, it shall be free of contaminants which, in the judgment of the Engineer, constitute a health hazard to those individuals employed on the project and to the general public.

Untreated effluent shall not be utilized in any aspect of the work.

The contractor shall, at no additional cost to the Agency, obtain all permits required for utilizing treated effluent. When treated effluent is used on the project, the contractor shall notify the Engineer and all workers of this use.

106-2 ITEMS OF SPECIAL MANUFACTURE

The contractor shall furnish the Engineer a list of all items of special manufacture or items which are, or may be, in short supply and which will be incorporated into the work either at the time of the preconstruction conference, or at a time agreed to by the Engineer. Items of special manufacture shall include, but shall not be limited to, materials and equipment for traffic signal and lighting systems, steel bridge members, precast, pre-stressed concrete bridge members, or other structural components, and materials of special manufacture.

The items of special manufacture which have been agreed upon by the Engineer and the contractor shall be ordered by the contractor promptly so that they will be available as required and will not delay the work.

The contractor shall advise the Engineer regarding the dates of the orders and the dates that the items are expected to be received.

If there is any delay in the prosecution of the work because of a delay in the delivery of items of special manufacture, an extension of the contract time shall only be granted in accordance with Subsection 108-8 if the Engineer is completely satisfied that the contractor has made every effort to obtain the items in a timely manner.

106-3 LOCAL MATERIALS SOURCES

Sources of local borrow, base, surfacing materials or other similarly extracted materials shall be furnished by the contractor. When the contractor obtains material from other than a commercial source, it shall determine for itself the amount of equipment and work required to produce a material meeting the specifications.

When a non-commercial source is used, the contractor shall acquire the necessary rights to take materials from the source and shall pay all costs related thereto, including any which may result from an increase in length of haul. All costs of exploring and developing sources shall be borne by the contractor. The use of material from other than commercial sources shall not be permitted until tests on preliminary samples indicate general acceptability of the material. Additional samples may be required of the contractor for inspection and testing by the Engineer prior to approval of and authorization to use the source.

The use of material sources situated in the 100-year floodplain of any stream or watercourse shall be governed by the governmental entity or entities having jurisdiction over the floodplain. The location of any new material source or existing non-commercial material source proposed for use on the project shall be reviewed by the appropriate agency having floodplain management jurisdiction for the area in which the proposed source is located. The contractor shall obtain a letter from the floodplain management agency certifying that the location of the proposed source conforms to the requirements of their regulations.

Contractors seeking a floodplain material source are cautioned that Section 404 of the Federal Clean Water Act may prevent use of the source unless an appropriate permit is first obtained from the U.S. Army Corps of Engineers.

If a floodplain source is being considered for use, the contractor is advised to ensure that the source will be obtainable within the required time frame.

106-4 TESTS AND ACCEPTANCE OF MATERIALS

All materials shall be inspected, tested and approved by the Engineer prior to incorporation in the work. Any work in which materials not previously approved are used shall be performed at the contractor's risk and may be considered as unauthorized and unacceptable and not subject to the payment provisions of the contract. Failure of the Engineer to inspect or test any material shall not relieve the contractor from its obligations under the contract and any liability for injury or damage. Acceptance by the Engineer shall not relieve the contractor of its responsibility for conformance with the requirements of the contract documents.

Materials shall be sampled and tested for acceptance by a qualified representative of the Agency and at the expense of the Agency unless otherwise specified in the contract documents. Copies of all test results shall be furnished to the contractor's representative.

The contractor shall submit a request for materials testing a minimum of 24 hours in advance.

In the case where a density test fails to achieve the minimum requirement, one additional test will be conducted at that location after the contractor has reworked the area. Should this test also yield unacceptable results, additional retesting, after reworking by the contractor, will be conducted at the expense of the contractor. The unit charges for retests are available from the Engineer.

Whenever a reference is made in the specifications to an Arizona Test Method, it shall mean the test method of the Arizona Department of Transportation as found in their Materials Testing Manual that is in effect on the day the advertisement inviting bids for the work is dated.

Whenever a reference is made in the specifications to a Federal Specification, or to a specification or test designation of the American Association of State Highway and Transportation Officials (AASHTO), the American Society for Testing and Materials (ASTM), or any other recognized national organization, it shall mean the year of adoption or latest revision of the specification or test designation in effect on the day the advertisement inviting bids for the work is dated.

The contractor shall be solely responsible for quality control of all materials incorporated into the work.

106-5 CERTIFICATES

106-5.01 General. The contractor shall submit to the Engineer an original and two copies of either a Certificate of Compliance or a Certificate of Analysis, as required, prior to the use of any materials or manufactured assemblies for which these specifications or the Special Provisions require that such a certificate be furnished.

The Engineer may permit the use of certain materials or manufactured assemblies prior to, or without, sampling and testing if accompanied by a Certificate of Compliance or a Certificate of Analysis, as herein specified. Materials or manufactured assemblies for which a certificate is furnished may be sampled and tested at any time, and, if found to be not in conformance with the requirements of the plans and the specifications, will be subject to rejection, whether in place or not.

Certificates shall comply with the requirements specified herein and as contained in the ADOT Materials Testing Manual.

106-5.02 Certificate of Compliance

The Certificate of Compliance shall contain the following information:

- (1) A description of material supplied.
- (2) Quantity of material represented, by the certificate.
- (3) Means of material identification, such as label, lot number, marking.
- (4) Statement that the material complies in all respects with the specific requirements of the cited specifications, including the test method or the specification section or Special Provision. Certificates may cite both the test method and the specification/Special Provision section, if applicable.
- (5) The name, address, and telephone number of the manufacturer or supplier together with the signature and title of a person having legal authority to bind the manufacturer or supplier of the material. The signature shall be dated. A copy or facsimile reproduction is acceptable. However, the original certificate bearing the original signature shall be made available upon request.

The person signing the certificate shall be one of the following:

- An officer of a corporation
- A partner in a business partnership or an owner
- A general manager
- Any person having been given the authority by one of the above. The delegation of authority shall accompany the Certificate of Compliance in writing. The delegation of authority will be kept on file should subsequent certificates be received for that material on that project.

Each of the first four numbered items specified above, shall be provided by the firm or organization that is certifying the material prior to the signing as defined in item five, and all of the first four shall be in one type style or handwriting. No certificate shall be accepted that has been altered, added to, or changed in any way after the authorized original signature of the person that has legal authority to bind the firm or organization has been affixed to the original certificate. Materials or assemblies shall not be incorporated into the project without a valid certificate of compliance or proper testing.

The Agency reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

106-5.03 Certificate of Analysis. The Certificate of Analysis shall include all the information required in a Certificate of Compliance and, in addition, shall include the results of all tests required by the specifications.

106-6 INSPECTION OF THE PLANT

The Engineer may undertake the inspection of materials and material production facilities at their

source. The Engineer shall have full entry, during the hours of operation, to such parts of the material production facilities involved in the manufacture or production of the materials being furnished to the project. The Engineer shall have the appropriate training and certifications required for entry onto the materials production site. The Engineer shall have the full cooperation and assistance of the contractor and the contractor's material producer in conducting all inspections including any required safety orientation required by Federal and/or State regulations. Adequate safety measures shall be provided and maintained at the production facility in conformance with applicable occupational and safety regulations.

The Agency reserves the right to retest all materials which have been tested and accepted at the source of supply after the same have been delivered and prior to incorporation into the work and to reject all materials which, when retested, do not meet the requirements of the specifications.

106-7 SAMPLING DEVICE

All material extraction and processing equipment used in producing materials for the project shall be equipped with an appropriate sampling device or devices that can be operated, at all times and under all conditions, in a safe manner.

These devices shall be constructed and operated so that they will provide a representative sample which meets the sampling requirements for the material.

The sampling devices shall be equipped with necessary attachments so that they can be safely and conveniently collected and conveyed for testing.

The sampling devices shall be approved by the Engineer and shall be maintained in a satisfactory working condition so that samples may be taken at any time, as required by the Engineer.

106-8 PROPRIETARY PRODUCTS, TRADE NAMES AND SUBSTITUTIONS

The contract documents may contain references to equipment, materials or patented processes by manufacturer, trade name, make or catalog number. Such references shall be regarded as establishing a standard of quality, finish, appearance or performance or as indicating a selection based upon compatibility with existing equipment or materials and shall not be construed as limiting selection to a specific item or source.

The use of an alternative or substitute article of equipment, material or process which, for the purpose intended, is of equal quality, finish, appearance, or performance and which is compatible with existing equipment and materials, when required, may be considered at the sole discretion of the Agency.

Consideration of a contractor request for substitution shall not be processed prior to contract award, except as addressed herein.

Requests for substitution of materials, including other manufacturers than those listed in the contract documents shall be submitted in conformance with the requirements of Arizona Revised Statute 34-104.

After the award has been made, and within a time frame that will allow consideration and approval without delaying the work, the contractor may submit a written request for substitution. The request for substitution shall include all information necessary in order to ascertain the equality and suitability of the proposed substitution, including samples for testing, if required. Direct submittals from subcontractors, material vendors, or manufacturers shall not be accepted.

Requests for Value Engineering substitutions shall meet the requirements of Subsection 104-9.

Acceptance of substitutions shall not relieve the contractor from responsibility for complying with all other requirements of the advertisement inviting bids documents and coordinating substitution(s) with adjacent materials and/or other affected equipment.

The Contractor may be required to provide laboratory test data performed by a nationally recognized independent testing laboratory with experience in testing the material(s) being proposed. Laboratory tests shall include the material types used in the substitute item or system, including thickness and strength, with a direct comparison to the associated item or system specified, for capacities, capabilities, coatings, functions, life cycle usage, and operations.

The Agency shall evaluate the information submitted, perform tests when necessary and make comparisons. The Engineer shall then make the final decision as to the acceptability of the proposed substitution. The Agency shall not be liable for any delay in acting upon any request for substitution nor for any failure to accept any request pursuant to this substitution.

If acceptance of a substitution requires modifications to foundations, structures, piping, electrical or other related designs or existing facilities, these costs shall be borne by the contractor.

106-9 STORAGE OF MATERIALS

Materials shall be so stored as to insure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection.

Approved portions of the right-of-way may be used for storage purposes and for the placing of the contractor's plant and equipment, but any additional space required for this purpose shall be provided by the contractor at the contractor's expense.

Private property shall not be used for storage purposes without the following:

- written permission of the owner or lessee;
- all permits and approvals required by Federal, State and local laws and regulations;
- compliance with zoning, including a Temporary Use Permit if required, and;
- if requested by the Engineer, copies of such written permission and approvals

The contractor shall be solely responsible for all costs and compliance with all laws and regulations pertaining to storage of materials on private property.

All storage sites shall be restored to the ~~the~~ condition agreed to by the owner and the contractor at no additional cost to the Agency.

106-10 HANDLING MATERIALS

All materials shall be handled in such a manner as to preserve their quality and fitness for the work.

Aggregates shall be transported from the storage site to the work in tight vehicles so constructed as to prevent loss or segregation of materials after loading and measuring in order that there may be no inconsistencies in the quantities of materials as loaded and intended for incorporation into the work and the quantities of materials as actually received at the place where they are to be incorporated into the work.

106-11 UNACCEPTABLE MATERIALS

Unless otherwise directed by the Engineer, materials not conforming to the requirements of the specifications, whether in place or not, shall be rejected and shall be promptly removed from the site of the work at no additional cost to the Agency. No rejected material, the defects of which have been corrected, shall be returned to the work site until such time as approval for its use has been given by the Engineer.

106-12 AGENCY FURNISHED MATERIAL

The contractor shall furnish all materials required to complete the work, except those specified to be furnished by the Agency.

Material furnished by the Agency shall be delivered or made available to the contractor as specified in the Special Provisions.

The contractor shall receive, inventory, store, inspect, protect, distribute, and install Agency furnished material unless otherwise specified in the Special Provisions.

The cost of handling and placing all materials after they are delivered to the contractor shall be considered as included in the contract price for the item in connection with which they are used.

The contractor shall be held responsible for all material delivered to the contractor. Deductions shall be made from any monies due the contractor to make good any shortages or deficiencies, from any cause whatsoever and for any damage which may occur after such delivery, and for any late delivery charges.

106-13 WARRANTIES AND GUARANTEES

The contractor shall warrant and guarantee all the work against defective workmanship or materials for a period of one year commencing on the date of final acceptance of the work under the contract, ordinary wear and tear and unusual abuse or neglect excepted. In the case of a latent defect, the warranty shall commence on the date the defect is discovered, except that this warranty period shall not extend beyond the period allowed by law.

Any omission on the part of the Engineer to condemn defective work or materials at the time of

construction shall not be deemed an acceptance. Payment shall not be conclusive evidence of the completion of the work, either in whole or in part, or be construed as an acceptance of defective work or improper materials, or relieve the contractor from making good such defects. The contractor shall be required to correct defective work or materials at any time before full acceptance and within the warranty and guarantee period.

Should any defects develop within the warranty and guarantee period due to faults in workmanship or materials, the contractor shall, within 14 calendar days of receipt of written notice from the Engineer, begin making the necessary repairs. Such work shall include the repair or replacement of other work or materials damaged or affected by making the above repairs or corrective work, all to the satisfaction of the Engineer and at no additional cost to the Agency.

The contractor shall obtain such manufacturer's or producer's warranties or guaranties on all items, materials, electrical, or mechanical equipment consistent with those provided as customary trade practice. The form in which such warranties or guaranties are delivered to the contractor shall include the provision that they are subject to transfer to the maintaining agency as named by the Agency, and shall be accompanied by proper validation of such fact. Transfer of warranties or guaranties shall occur at the time of final acceptance of the work or equipment by the Agency.

In addition, a contractor warranty or guarantee shall be furnished providing for satisfactory in-service operation of the mechanical and electrical equipment and related components for a period of 12 months following project acceptance.

Should any defect develop during this 12 month period, the malfunction or defect shall be corrected by and at the expense of the contractor, including all labor, material, and associated costs.

The warranties and guarantees provided herein shall be in addition to and not in limitation of any other warranties, guarantees, or remedies required by law.

If the contractor fails to make any repair, adjustment, or other work that may be made necessary by a defect, the Agency may cause the work to be properly done, in accordance with the provisions of the Contract documents, and to pursue whatever recourse it deems necessary to recover, from the contractor, any additional expense or cost it may have incurred. The performance bond shall remain in full force and effect through the warranty and guarantee period.

106-14 APPROVED PRODUCTS LIST

The Approved Products List (APL) is a list of products which have been shown to meet the requirements of these Standard Specifications. The Approved Products List is compiled and maintained by the Arizona Department of Transportation and is deemed acceptable for use by contractors on Agency projects subject to the following:

Compliance with the provisions of Subsection 106-5 is required regardless of a product's listing on the Arizona Department of Transportation's Approved Products List.

The APL only provides documentation that the listed product(s) have been tested, evaluated, or examined under Arizona Department of Transportation standards and, as such, may be acceptable for use on Agency projects.

Trade or manufacturer's names which appear on the APL are cited only because the Arizona Department of Transportation considers them essential to the objectives of their APL. Neither the U. S. Government, the State of Arizona nor the Agency endorses products or manufacturer's so noted.

The APL is updated at regular intervals. Copies of the most current version are available on the internet at the Arizona Department of Transportation's web site, under their Product Evaluation Program.

The contractor shall verify that any products chosen for use from the Approved Products List are selected from the version which was most current at the time of the bid opening. Unless otherwise specified in the Special Provisions, products not appearing on the Approved Products List at the time of the bid opening may be used if they meet the requirements of the project plans and specifications, and are submitted for approval as specified in Subsection 106-8.

The Agency will neither be liable for any delay in acting upon any request for approval of a new product nor for any failure to accept any request pursuant to this Subsection.

When the Special Provisions limit product selection to only those listed on the Approved Products List, other products will not be evaluated or approved.

(106FHWA_DMAT, 4/30/14)

SECTION 106 - CONTROL OF MATERIALS

106-15 DOMESTIC MATERIALS (FEDERAL-AID PROJECTS ONLY) is hereby added to these Special Provisions:

Portland cement used on this project may be foreign or domestic. Certificates of Compliance and Certificates of Analysis for cement shall conform to the requirements of Subsection 106-5, and shall additionally identify whether the cement is foreign or domestic.

Steel and iron materials and products used on this project shall comply with the current "Buy America" requirements of 23 CFR 635.410.

All manufacturing processes to produce steel products used on this project shall occur in the United States. The iron used in the process shall be domestic. Raw materials used in manufacturing the steel products may be foreign or domestic. Steel not meeting these requirements may be used in products on this project provided that the invoiced cost to the contractor for such steel products incorporated into the work does not exceed either one-tenth of one percent of the total (final) contract cost or \$2,500, whichever is greater.

Any process which involves the application of a coating to iron or steel shall occur in the United States. These processes include epoxy coating, galvanizing, painting, or any other coating which protects or enhances the value of covered material.

The requirements specified herein shall only apply to steel and iron products permanently incorporated into the project. "Buy America" provisions do not apply to temporary steel items, such as sheet piling, temporary bridges, steel scaffolding and falsework, or to materials which remain in place at the contractor's convenience.

The contractor shall furnish the Engineer with Certificates of Compliance, conforming to the requirements of Subsection 106-5, which state that steel products utilized on the project meet the requirements specified. The Certificates of Compliance shall also certify that all manufacturing processes to produce steel products, and any application of a coating to iron or steel, occurred in the United States.

Convict-produced materials may not be used unless the materials were produced prior to July 1, 1991 at a prison facility specifically producing convict-made materials for Federal-aid construction projects.

(107HAZMAT, 4/29/14)

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC (HAZMAT)

107-7 SANITARY, HEALTH AND SAFETY PROVISIONS of the Standard Specifications is modified to add:

107-7.01 Hazardous or Contaminated Materials. Prior to construction, the Agency will make a reasonable effort to locate, identify and remove potentially hazardous or contaminated materials, including underground storage tanks, within a project area. Despite these efforts, some of these materials may still be found during the construction of the project. During construction operations, should material be encountered which the contractor believes to be hazardous or contaminated, the contractor shall immediately do the following:

- (1) Stop work and remove all workers within the contaminated area. For life threatening situations, follow the procedures in the Safety Plan, specified in Subsection 107-7.02.
- (2) Barricade the area and provide traffic control, if necessary, to prohibit unauthorized entry.
- (3) Notify the 911 Operator.
- (4) Notify the Engineer.
- (5) Notify the Pima County Office of Emergency Management at 520-724-9301

The contractor shall not resume work in the area suspected to contain hazardous or contaminated materials until approved by the Engineer.

The Agency will determine the extent and nature of the hazardous or contaminated area and specify a clean-up plan, if necessary. Once the Agency determines the limits of the area affected by the contaminated materials, work may then be resumed for the remaining areas of the project where contamination is determined not to present a significant hazard.

Substantial suspension of work as a result of the discovery of contaminated or hazardous materials within the project limits shall be in accordance with the requirements of Subsection 104-2.

The Agency will determine the contractor's qualifications to perform the work specified in the clean-up plan. If the contractor is not qualified to do the work specified in the clean-up plan, the Agency will obtain a contractor for cleanup. The Engineer will execute a written agreement to cover the additional work, in accordance with Subsection 104-2 of the specifications.

107-7.02 Safety Plan. The contractor shall submit a Safety Plan to the Engineer at the preconstruction conference detailing the procedures the contractor will implement to satisfy OSHA and any State Occupational Safety Guidelines related to the worker, as well as the public, in the construction of excavations, structures and confined air spaces, along with all other activities involved in the project and as identified by the Engineer.

The Safety Plan submitted by the contractor shall include proposed methods to prevent unauthorized persons from gaining access to the work areas.

The Safety Plan shall also address the training methods and procedures for ensuring compliance with all dust control measures required to prevent or minimize visual emissions from the contractor's operations and activities.

(107UTIL, 12/19/14)

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107-8 PUBLIC CONVENIENCE AND SAFETY of the Standard Specifications is modified to add:

When requested by the Engineer, the Contractor shall participate in any public or neighborhood meeting called by the Engineer or any other appropriate authority, for the purpose of informing the public concerning the nature, timing, status or scheduling of the work.

107-15.01 National Pollution Discharge Elimination System of the Standard Specifications is hereby deleted. See Section 810.

107-18 INSURANCE of the Standard Specifications is superseded by Article IV of the Construction Services Agreement.

107-21 CONTRACTOR’S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES of the Standard Specifications is modified to add:

The following utilities may have facilities in the project area:

Owner	Contact	Phone Number
AT&T	Joseph Forkert	(714) 963-7964
ADOT	Manuel Vasquez	(520) 237-5071, C (520) 349-8935
Century-Link (Formerly Qwest)	Wendell Nelson	(520) 292-7927, C (928) 260-3677
Comcast Cable Communications	Mario Sanchez	(520) 744-5477, C (520) 286-6412
Metro Water	Timothy Dinkel	(520) 209-2817, C (520) 576-8062
Pima County Regional Wastewater Reclamation Department	Louis Romero Field Engr. Inspections	(520) 724-6466 (520) 740-2651
Southwest Gas Corporation	Melanie Rice Kelly Fleenor	(520) 794-6043 (520) 794-6107
Tucson Electric Power	David Smith Warren McElyea	(520) 396-2728 (520) 918-8268
Tucson Water	Ed Lopez Field Engr Inspectins	(520) 837-2125 (520) 792-2648
Pima County Parks	George Kuck	(520) 877-6100

The existence and locations of underground utilities indicated on the plans are not guaranteed and shall be investigated and verified in the field by the Contractor before starting work. Excavations in the vicinity of existing structures and utilities shall be carefully done. At least two full working days prior to commencing excavation, the Contractor shall call Blue Stake Center, 1-800-STAKE-IT, between the hours of 7:00 a.m. and 4:30 p.m., Monday through Friday, for information relative to the location of buried utilities.

It shall be the responsibility of the Contractor to contact the utility companies in order for them to determine if there is a need to brace, shore, support and protect their facilities during the construction of the project.

Utility locations shown on the Plans are approximate, and all utilities are not necessarily shown. The possibility of conflicts with existing utilities-in-service exists. If conflicting utilities interfere with the Contractor's normal progress towards completion of this project, the Pima County Department of Transportation may, at its option, authorize the Contractor to relocate said conflicting utilities by force account in accordance with the provisions of Subsection 109-5.02 of these Special Provisions.

(108FHWA_SUBCONTRACTS, 12/06)

SECTION 108 - PROSECUTION AND PROGRESS

108-1 SUBLETTING OF CONTRACT of the Standard Specifications is modified to add:

The Contractor shall provide to the Engineer a complete copy of each subcontract and lower tier subcontract. Each subcontract and lower tier subcontract shall include all of the required contract provisions including, but not limited to, the *Equal Opportunity Provisions*, *FHWA Form 1273*, *Required Contract Provisions* and the *Wage Determination Decision*, if these Provisions are made part of the prime contract.

(108NPDES_NOI, 2/22/11)

SECTION 108 - PROSECUTION AND PROGRESS

108-3 Preconstruction Conference the seventh paragraph of the Standard Specifications is revised to read:

The Contractor shall also submit an implementation plan for stormwater pollution prevention, as set forth in Section 810 of these Special Provisions, on all projects requiring submittal of an Arizona Pollutant Discharge Elimination System or equivalent National Pollutant Discharge Elimination System (AZPDES/NPDES), Notice of Intent (NOI), or when such work is likely to create erosion or pollution problems.

(108LIQUID_DAMAGES, 10/14/14)

SECTION 108 - PROSECUTION AND PROGRESS

108.9 FAILURE TO COMPLETE THE WORK ON TIME the Schedule of Liquidated Damages table of the Standard Specifications is revised to read:

SCHEDULE OF LIQUIDATED DAMAGES			
Original Contract Amount (\$)		Liquidated Damages Per Day (\$)	
From More Than:	To and Including:	Calendar Day or Fixed Date:	Working Day:
0	100,000	430	600
100,000	500,000	640	900

SCHEDULE OF LIQUIDATED DAMAGES			
Original Contract Amount (\$)		Liquidated Damages Per Day (\$)	
From More Than:	To and Including:	Calendar Day or Fixed Date:	Working Day:
500,000	1,000,000	1,000	1,400
1,000,000	2,000,000	1,290	1,800
2,000,000	5,000,000	1,860	2,600
5,000,000	10,000,000	2,710	3,800
10,000,000	20,000,000	2,790	3,900
20,000,000	30,000,000	3,570	5,000
30,000,000	60,000,000	5,500	7,700
60,000,000	90,000,000	9,430	13,200

(109QUANTITY_MEAS, 3/29/11)

SECTION 109 - MEASUREMENT AND PAYMENT

109-1 MEASUREMENT OF QUANTITIES the first sentence of the seventh paragraph of the Standard Specifications is revised to read:

In computing volumes of earthwork, the differential digital terrain model (DTM) method shall be used.

109-1 MEASUREMENT OF QUANTITIES the eight paragraph of the Standard Specifications is revised to read:

When computing volumes of earthwork for payment, measurement for roadway excavation shall be made from the top of existing grade to the top of new roadway subgrade. The quantities of existing pavement for both asphaltic concrete and aggregate base are included in the calculation for roadway excavation. The Contractor is responsible for replacing the quantity of existing asphaltic concrete and aggregate base removed from the existing pavement section, at his own expense, if the material is utilized for purposes other than construction of embankments, as described in Section 203-9 of the Standard Specifications. This also includes the replacement of excavated materials removed in trench excavation or structural excavation but not incorporated into the construction of the roadway embankment.

109-2 SCOPE OF PAYMENT the last two paragraphs of the Standard Specifications are hereby deleted.

(109ALLOWANCE, 9/13/12)

SECTION 109 - MEASUREMENT AND PAYMENT

109-1 MEASUREMENT OF QUANTITIES of the Standard Specifications is revised to add:

The term “Force Account” or its abbreviation “FA” or “Dollar” or its abbreviation “USD” (US Dollar), when included in the bidding schedule as a unit of measurement, shall mean an allowance for the payment of the work in conformance with the provisions of Subsection 109-5.

109-5 EXTRA AND FORCE ACCOUNT WORK of the Standard Specifications is revised to read:

109-5 COMPENSATION FOR EXTRA AND FORCE ACCOUNT WORK

109-5.01 Extra Work. Unless determined by the Agency to be force account work, extra work shall be performed in accordance with the requirements and provisions of Subsection 104-3 and shall be set forth in a Supplemental Agreement or other acceptable written form of agreement.

Extra work shall be paid using any of the methods described as follows:

(A) Unit Prices.

- (1) Extra work which does not materially differ, as defined in Subsection 109-3, from work specified in the contract, shall be measured and paid for at the contract unit price(s);
- (2) Otherwise, compensation shall be made at a price agreed upon by the contractor and the Agency.

However, before proceeding with negotiations regarding any other method of pricing, an attempt shall be made to price the extra work in accordance with the unit prices provided in the bidding schedule.

(B) Detailed Estimate. In the case where the Engineer and contractor cannot reach a mutually acceptable agreement for pricing of the extra work, in accordance with the unit prices provided in the bidding schedule, the contractor shall submit a detailed cost analysis for the items of extra work which must include:

- (1) Estimate of labor effort by trade in man hours for each task.
- (2) Estimate of base labor and burdened labor rate.
- (3) Estimate of equipment cost including time requirements and rate.
- (4) Estimated cost of materials.
- (5) Estimated cost to be expended by subcontractors, prepared to the same level of detail as required in items (1) through (4) above.
- (6) Any other costs to which the contractor feels it is entitled. Each such cost shall be presented in detail similar to items (1) through (5) above.
- (7) Mark-up percentage, if used, for overhead, profit, or bond. The maximum allowable markup for the prime contractor shall be 15 percent for work performed by the prime contractor and 5 percent for work performed by subcontractors. The maximum allowable markup for the subcontractor is 15 percent, but in no event will the cumulative amount paid to the prime contractor and subcontractors for overhead, profit or other markups for any work exceed 20 percent of the estimate set forth in (1) through (4) above.

The contract price adjustment shall be based on the actual cost to the contractor as determined in (1) through (7) above, rather than as force account work, whenever possible.

Upon receipt of the contractor's estimate, the Engineer will immediately schedule negotiations.

In the case of a successful negotiation, the Engineer will prepare a Supplemental Agreement, or other acceptable written form of agreement, specifying the work to be done and the basis of compensation.

Upon receipt of the executed agreement, the contractor shall proceed with the work indicated therein.

The agreed upon prices shall be full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals required to complete the extra work set forth in the agreement.

Should negotiations prove unsuccessful in reaching an agreed upon price, the Engineer may authorize performance as force account work.

The Engineer may, at any time, direct the contractor to proceed with all of the work, or any part thereof, as force account work.

Force account work shall conform to the requirements specified in Subsection 109-5.02.

Should the extra work require an extension in the contract time, the contractor shall include this request in the submittal to the Engineer in fulfillment of the requirements of Subsection 108-8.

109-5.02 Force Account Work. When work is to be performed in accordance with the requirements and provisions of Subsection 104-3 and such work is to be paid for as force account work, the amount of such payments shall be determined in accordance with the provisions of this Subsection.

The contractor shall submit payrolls or other cost data documents for all force account work. There shall be no partial or full payments made for force account work until receipt of proper and correct documentation.

(A) Labor. For all labor, including foreman in direct charge of specific operations, but excluding general superintendence, the contractor shall be paid:

(1) Regular pay (RP) which will be determined as follows:

$$RP = (WR + FR) \times 1.5$$

Where:

WR = hourly wage rate as determined by payroll

FR = fringe benefit rate as determined by payroll

(The contractor shall provide the hourly wage rates and fringe benefit rate at the preconstruction conference. The rates will be verified by comparison to the contractor's payrolls.)

(2) Overtime pay (OT) which will be determined as follows:

$$OT = [(WR \times 1.5) + FR] \times 1.5$$

(3) Subsistence and travel allowances paid to workers as required by collective bargaining agreements or as approved by the Agency. Rates for lodging, meals and mileage shall not exceed the rates published by the Agency, or in the case where the Agency has no published rates, by the State of Arizona, at the time of the force account work. No markup will be allowed for profit or overhead.

(B) Materials. For all materials accepted by the Engineer and used in the work, the contractor shall be paid the actual invoice cost of such materials, including actual freight and express charges, less all offered or available discounts and rebates, notwithstanding the fact that they may not have been taken by the contractor. To the above cost shall be added a sum equal to 15 percent thereof.

The Agency reserves the right to furnish such materials as it deems appropriate, and the contractor shall have no claims for any costs, overhead or profit on such materials.

No partial payment will be allowed. The contractor shall be compensated for materials after the materials invoice is submitted along with any documentary backup for the cost of materials.

(C) Equipment. Only equipment which the Engineer considers necessary for the performance of work will be eligible for payment at the established rates, as defined below, and then only during the hours that it is operated, except as otherwise allowed elsewhere in these specifications. Equipment hours shall be recorded to the nearest one-half hour.

For the use of equipment owned by the contractor and approved by the Engineer, the contractor will be paid the rental rates, as modified herein, set forth in the Rental Rate Blue Book (RRBB) for Construction Equipment which is published by the Equipment Guide-Book Company, a division of Nielson - Dataquest, 1290 Ridder Park Drive, San Jose, California 95131, Phone (800) 669-3282. All rate determinations will be based on the Blue Book rental rate chapter revisions that are applicable at the time the equipment is being used.

(1) Rental Rates (Without Operators). The hourly equipment rental rate (HERR) will be determined by the following formula:

$$HERR = F \times [(1.15 \times R) / (176)] + HOC$$

Where:

F = Adjustment factor to R = 0.933.
R = Current RRBB Monthly Rate
HOC = Hourly operating cost

An overhead and profit adjustment of 15 percent of the rates provided in the Rental Rate Blue Book is included in the above formula. No additional profit or overhead will be allowed.

The hourly operating cost represents the major costs of equipment operation, such as fuel and oil, lubrication, field repairs, tires, expendable parts and supplies.

For each piece of equipment used, whether owned or rented, the contractor shall provide the Engineer with the following information: the manufacturer's name, equipment type, year of manufacture, model number, type of fuel used, horsepower rating, and attachments required, together with their size or capacity and any further information necessary to ascertain the proper rate.

When multiple attachments are included with the rental equipment, only the attachment having the higher rental rate will be eligible for payment, provided the attachment has been approved by the Engineer as being necessary to the force account work.

Rental charges will not be allowed for tools or equipment that show a daily rate less than five dollars or for unlisted equipment that has a value of less than four hundred dollars.

The above provisions apply to approved equipment of modern design and in good working condition. The equipment shall be handled and used to provide normal output or production. Equipment that is not in good working condition or is not of proper size for efficient performance of the work may be rejected by the Engineer. Equipment ordered for force account work shall be paid for until such time as the Engineer directs that the use of such equipment be discontinued or until completion of the work.

Unless otherwise specified, manufacturer's ratings and manufacturer-approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

If it is deemed necessary by the Engineer to use equipment not listed in the above publication, a suitable rate for such equipment will be established by the Engineer. The contractor may furnish cost data which might assist the Engineer in the establishment of such rental rate. The rental rates shall be agreed to in writing prior to the use of such equipment on force account work or paid for by invoices in the case of outside rented equipment.

(2) Stand-By Time. Equipment that is in operational condition and is standing by with the Engineer's approval for participation in force account work shall be paid for according to the following Stand-By Rate (SBR):

$$\text{SBR} = F \times (R/176) \times 1/2$$

Payment for "stand-by" will be limited to not more than eight hours in a 24 hour day or 40 hours in a normal week. No compensation shall be allowed for equipment that is inoperable due to breakdown. No payment shall be allowed for equipment that is not operating because work has been suspended in accordance with the specifications or because the work has been suspended by the contractor for the contractor's reasons.

(3) Outside Rented Equipment. In cases where a piece of equipment to be used is rented or leased by the contractor from a third party exclusively for force account work, the contractor will be paid as follows:

$$[\text{Rental Invoice} \times 1.10] + \text{HOC}$$

The above formula includes a ten percent markup to address overhead and incidental costs associated with furnishing equipment.

(4) Owner-Operated Equipment. Payment for rental of equipment owned and operated by persons other than the prime contractor or subcontractor will be based on the actual paid invoice.

An amount equal to ten percent of the total rental of the equipment, including the owner-operator, will be added for overhead, profit and all other costs incidental to furnishing and operating the equipment. The Engineer shall approve the rental rates prior to commencement of the work.

(5) Moving of Equipment. Payment for equipment rental will also be allowed for the time required to move needed equipment to the location of the force account work and to return it to its original location, when the equipment is moved under its own power. Loading and transportation costs will be allowed in lieu of moving times when equipment is moved by means other than its own power. Moving time back to the original location or loading and transportation costs shall not be allowed if the equipment is also used for non-force account work on the project.

For use of equipment moved onto the site exclusively for force account work, the actual cost of transferring the equipment to the site of the work and returning it to the original location shall be allowed, as specified herein, as an additional item of expense.

The original location of the equipment to be hauled to the site of the work shall be agreed to by the Engineer in advance.

Where the move of the equipment is made by common carrier, the allowance shall be the invoiced amount paid for the freight plus fifteen percent. If the contractor hauls the equipment with the contractor's own forces, rental will be allowed for the hauling unit plus the driver's wages and the cost of loading and unloading the equipment.

For the day that the equipment is moved to the work and the day on which the use of the equipment is discontinued, the maximum payment shall be only for the actual time that the equipment is in operation on force account work.

(D) Superintendence. No part of the salary or expense of anyone connected with the contractor's forces above the grade of foreman and having general supervision of the work will be included in the labor items as specified above, except when the contractor's organization is entirely occupied with force account work, which case the salaries of the superintendent and the timekeeper may be included in the labor item specified above when the nature of the work is

such that their services are required.

(E) Compensation. The compensation set forth herein shall be payment in full for work done on a force account basis, inclusive of an amount equal to 65 percent of the force account compensation times the applicable sales tax rate.

(F) Statements. All statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. If materials used on the force account work are not specifically purchased for such work but are taken from the contractor's stock, then instead of invoices, the statements shall contain or be accompanied by an affidavit of the contractor certifying that such materials were taken from stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the contractor.

The contractor and subcontractor will submit an equipment list for all equipment to be used during the contract, an equipment rate sheet, and a labor rate sheet, all within 30 days after contract award, but prior to the start of any force account work.

The contractor shall submit payrolls and other cost documentation for all force account work within 30 calendar days after completion of the work. No partial payment will be made. All invoiced work must have documentation for payment. Final payment will not be made for work performed on a force account basis until the contractor has furnished duplicate itemized statements of the cost of such force account work detailed to the following:

Name, classification, date, daily hours, total hours, rate and amount for each foreman and labor classification;

Designation, dates, daily hours, total hours, rental rate and amount for each unit of equipment;

Quantities of materials, prices and amounts;
Transportation charges on materials, FOB jobsite.

(G) Force Account Work by Subcontractor. When force account work is determined by the Engineer to require specialized labor or equipment not normally utilized by the contractor and such force account work is performed by subcontractors, the contractor shall be allowed a supplemental markup of five percent of the subcontractor's costs.

The contractor shall submit certified payrolls or other cost documentation for all force account work performed by subcontractors. There shall be no payments made for force account work until receipt of proper and correct documentation.

(H) Bonding. An amount of 0.5 percent of the total will be added for the Performance and Payment Bond. Should the contractor's actual, documented bond cost exceed the aforementioned percentage, the actual amount will be compensated, upon submittal of documentation to the Engineer.

(I) Taxes. Other taxes, as applicable, shall be reimbursable.

109-5.03 Non-Allowable Charges. When force account work is performed, the contractor's compensation under any Supplemental Agreement or other acceptable written form of agreement, will only be for that which is delineated in Subsection 109-5.02.

Whether the negotiated compensation is on a unit price, lump sum or force account basis, in no case will the contractor be reimbursed for the following items:

- Profit in excess of that provided herein;
- Loss of profit;
- Home office overhead;
- Consequential damages, including loss of bonding capacity, loss of bidding opportunities and insolvency;
- Indirect costs of expenses of any nature;
- Attorney's fees, claims preparation expenses or costs of litigation; or
- Interest

109-5.04 Disagreement on Cost. Should the contractor and Agency fail to agree on a method of compensation, the Agency, at its sole discretion, may have the work completed by parties or means other than the contractor. This decision by the Agency shall not invalidate the contract nor release the surety.

(109FHWA_RETENTION, 4/30/14)

SECTION 109 - MEASUREMENT & PAYMENT

109-7 PARTIAL PAYMENTS of the Standard Specifications is modified to add:

On federally funded projects only, as applicable under the Agency's DBE program, the prime contractors shall:

- 1) Incrementally reduce the amount of retention specified in the Standard Specifications to correspond with the value of retention for individual subcontractors which have satisfactorily completed their unit of work in accordance with Section 105-17(A).
- 2) Make prompt final payment to each of its subcontractors all monies, including retention, due the subcontractor within 14 days after the subcontractor has satisfactorily completed all of its work.

Non-compliance:

If prompt partial payment, or prompt final payment including any retention, is not made within the time frames established above, the Agency will retain \$500 per sub-contractor, per occurrence. Each additional month that payment is not made constitutes an additional occurrence. The amount withheld by the Agency will be released after the issue is resolved.

(109FHWA_CHANGED_CONDITION, 3/29/12)

SECTION 109 - MEASUREMENT AND PAYMENT

109-3 COMPENSATION FOR ALTERATIONS OR MODIFICATIONS TO THE CONTRACT WORK of the Standard Specifications is revised to read:

Altered work shall be performed as a part of the contract and shall be paid for at the same contract prices as for other parts of the work, unless the alterations in the details of construction or increases or decreases in quantities materially change the character of the work to be performed or the cost thereof. The term "materially change," for purposes of intent under the contract, is as defined as a significant change in Section 104-2 of these special provisions.

When no work is done under an item, no adjustment in the unit bid price shall be made. The item shall be eliminated in accordance with the provisions of Subsection 109-6.

Payment for work that has materially changed shall be made in accordance with the requirements of Subsection 109-4.

If the alterations made or increases in the quantities are of sufficient magnitude as to require additional time in which to complete the project, such time adjustment shall be made in accordance with the requirements of Subsection 108-8.

(110CONCRETE_REDUC, 9/12/12)

SECTION 110 - CORRECTIVE REQUIREMENTS FOR DEFICIENCIES

110-3 PORTLAND CEMENT CONCRETE

110-3.02 Compressive Strength the first paragraph and table 110-7 of the Standard Specifications is revised to read:

110-3.02 Class X, Class S and Class B Concrete

Compressive Strength. Class X, Class S and Class B Portland cement concrete will be accepted for compressive strength and paid for in accordance with Table 110-7. Concrete will be paid for by the square foot or by the cubic yard, complete in place, except that an reduction in the contract unit price, to the nearest cent, will be made for the quantity of concrete represented by 28-day compressive strength test results less than the specified requirement.

Concrete failing to meet at least 95 percent of the 28-day compressive strength specified or any concrete failing to meet the requirements of Subsection 1006-7.01 will be subject to the provisions of Subsection 1006-7.06.

Class S Portland cement concrete which fails to achieve the required 28-day compressive strength but meets the percent of the 28-day compressive strength noted in Table 110-4 may

be subject to rejection by the Engineer if it is determined that the deficient compressive strength is detrimental to the integrity of the structure.

**TABLE 110-7
 PORTLAND CEMENT CONCRETE (CLASS 'X', 'S' AND 'B')
 CONTRACT UNIT PRICE REDUCTION FACTORS
 FOR STRENGTH DEFICIENCIES**

3,000 psi and Below ⁽¹⁾		3,500 psi ⁽¹⁾		4,000 psi and Above ⁽¹⁾	
Percent of 28-day strength attained ⁽²⁾	Percent Reduction in Contract Unit Price ⁽³⁾	Percent of 28-day strength attained ⁽²⁾	Percent Reduction in Contract Unit Price ⁽³⁾	Percent of 28-day strength attained ⁽²⁾	Percent Reduction in Contract Unit Price ⁽³⁾
100 or more	0	100 or more	0	100 or more	0
97 - 99	3	98 - 99	2	99	1
94 - 96	6	96 - 97	4	98	2
91 - 93	9	94 - 95	6	97	3
88 - 90	12	92 - 93	8	96	4
85 - 87	15	90 - 91	10	95	5
< 85	30 (Note 4)	< 90	30 (Note 4)	< 95	30 (Note 4)

Note 1: Compressive strength as shown on the project plans or specified in the Special Provisions.
 Note 2: To nearest one percent.
 Note 3: For items measured and paid for by the cubic yard, the reduction shall not exceed \$150.00 per cubic yard.
 Note 4: The contract unit price reduction factor applies only if the concrete represented by the test results is allowed to remain in place.

(201NOX_PLANT_REM, 10/10/14)

SECTION 201 - CLEARING & GRUBBING

of the Standard Specifications is revised to read:

201-1 DESCRIPTION

The work under this section shall consist of clearing, grubbing, removal and/or treatment of noxious or invasive plant species, removing and disposing of all trees, brush, vegetation, including, stumps, debris, rubbish, miscellaneous structures not covered under other contract items, and other objectionable matter from within the right-of-way, bridge construction area(s), road approaches, areas through which ditches and channels are to be constructed, and such other areas as may be specified in the Special Provisions.

Removal and/or treatment of noxious or invasive plant species shall take place prior to the start of clearing and grubbing, in accordance with Subsection 201-3.04.

Clearing and grubbing shall be performed in advance of embankment construction and grading operations and in accordance with the requirements of these specifications.

All vegetation identified on the project plans as being preserved-in-place or transplanted-on-site shall be protected from damage or destruction caused by the Contractor's operations by protective fencing or flagging. The locations of vegetation so identified on the project plans are

approximate. Actual locations will be determined during the project walk-through specified in Subsection 201-3.01.

For the purpose of construction, existing vegetation on the project shall not be disturbed beyond the limits established in accordance with Subsection 201-3.01. In some circumstances, vegetation from adjacent properties may provide impediments to construction, with branches or other plant parts leaning over into the right of way. The extent of required pruning and/or removal of obstructive plant parts will be determined during the project walk through and treated as specified in Subsection 201-3.05.

All objects designated on the project plans to remain shall be preserved from injury or defacement. Property and landscape shall be protected and restored in accordance with the requirements contained in Subsection 107-12.

201-2 MATERIALS

201-2.01 Herbicides

The use of herbicides shall be approved by the Engineer prior to starting construction.

Herbicide use shall be in compliance with the manufacturer's instructions. Application of herbicides shall be by a licensed applicator, in compliance with the requirements of A.R.S.32-2314 and A.A.C. R4-29-204. The licensed applicator shall be approved by the Engineer prior to commencement of the work.

Herbicides proposed in the plan for use on projects adjacent to BLM and or USFS Lands shall be in conformance with the following current environmental documents, including:

"Final Vegetation Treatments Using Herbicides Programmatic Environmental impact Statement for BLM" available electronically at http://www.blm.gov/wo/st/en/prog/more/veg_eis.html;

or the *"Environmental Assessment for Management of Noxious Weeds and Hazardous Vegetation on Public Roads on National Forest System Lands in Arizona"*, available electronically on the Arizona Memory Project website (Arizona State Library):

http://azmemory.lib.az.us/cdm4/item_viewer.php?CISOROOT=/feddocs&CISOPTR=486&CISOBOX=1&REC=6

The Environmental Documents include lists of approved Herbicides, Mitigations and Best Management Practices.

201-3 CONSTRUCTION DETAILS

201-3.01 Clearing and Grubbing

The Engineer will establish the limits of areas to be cleared and grubbed, to be cleared but not grubbed, and/or areas, objects, landscape, or features that are designated to remain undisturbed. In general, the areas subject to clearing and grubbing shall include the road section, channels, ditches, structures, temporary approaches to bridges, detours and other areas shown on the project plans, or as directed by the Engineer. The Engineer will designate structures, debris, trees, brush and

vegetation to be cleared where grubbing is not required. Clearing beyond the limits of construction shall be only where specified or directed.

Prior to commencement of clearing and grubbing operations, the Contractor, accompanied by the Engineer, shall inspect the project limits, in order to confirm areas and vegetation to be left undisturbed or transplanted.

The Contractor shall flag all plants designated to be preserved-in-place and/or to be transplanted-on-site during the inspection. Designated plants may lie within and as well as be adjacent to the project limits. These areas shall be preserved with protective fencing, as described in Subsection 201-3.02. Flagging may be used to designate preserve in place areas prior to the installation of the protective fencing.

Removal of cacti and native plants shall be in accordance with the provisions of the "Native Plant Law" of the Arizona Revised Statutes, Chapter 7 and applicable local ordinances.

During the life of the contract the Engineer may order the clearing of any trees within the right-of-way that are determined to be hazardous or dead.

The Contractor shall prune all branches of trees less than 16 feet above any part of the roadway and less than 8 feet above or within 2 horizontal feet sidewalks, multi-use paths, traffic control cabinets and intersection site distance triangles and all branches which have been broken or injured during construction. All pruning shall be done by or be supervised by a certified arborist, in accordance with Section 806-3.05.

Whenever trees are felled or trimmed on/or adjacent to highways, all wood shall be immediately removed from the roadway or any area that would present a hazard to traffic. Grubbed stumps shall be moved immediately, at least 30 feet from the edge of pavement.

No trees, tree trunks, stumps or other debris shall be felled, sidecast or placed outside the limits of the right-of-way.

In embankment areas where the subgrade will be 5 feet or more above the original ground surface, trees, stumps and roots shall be cut off one foot or less above the original ground line or shall be completely removed as directed by the Engineer. No grubbing will be required unless in an area where a structure is to be built, piles are to be placed or driven, unsuitable material is to be removed or as may otherwise be specified in the project plans or Special Provisions.

Where trees or existing stumps are cleared and grubbing is not required, the tree trunk or existing stump shall be cut off not more than 6 inches above the original ground surface unless otherwise approved. Exposed stumps not required to be removed but which are within 30 feet of the edge of the pavement or are in a built-up area shall be chipped out to a depth of not less than 6 inches below the finished grade.

Cavities resulting from the grubbing or removal of stumps, trees, or other materials, except in areas to be excavated, shall be backfilled with material approved by the Engineer within seven calendar days after grubbing or removal of the stump, tree or other materials. The backfill material shall be uniformly compacted to a density of not less than 95 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer. The compacted surface shall remain firm and stable prior to and after placement of any cover material. Cleared organic and grubbed materials, debris, rubbish, and miscellaneous structures shall not be buried within the project limits.

All materials removed under this section shall be disposed of within seven calendar days after cutting, felling or removal unless otherwise approved, in writing, by the Engineer.

Burning of cleared organic materials is prohibited on or in proximity to the project site.

In the disposal of all tree trunks, stumps, brush, limbs, roots, vegetation and other debris, the Contractor shall comply with the requirements of Title 36, Public Health and Safety, Chapter 6, Article 8, Air Pollution of the Arizona Revised Statutes and with the Rules and Regulations for Air Pollution Control, Article 7, adopted by the Arizona Department of Health Services pursuant to the authority granted by Statute and as may otherwise be amended by local agency requirements.

Burning at other locations may be permitted only after the Contractor has obtained a permit from the Arizona Department of Health Services and from any other Federal, State, County or City Agency requiring such approval.

Unless otherwise specified in the Special Provisions, marketable timber and other vegetation not designated to remain shall become the property of the Contractor.

Combustible material free of invasive species may be reduced to chips of a maximum thickness of 1/2-inch and disposed of in areas between the slope lines and right-of-way lines as approved by the Engineer. The chips may either be buried or distributed uniformly on the ground surface and mixed with the underlying earth to such extent that the chips will not support combustion.

The roadway right-of-way and all other construction areas shall be left with a neat and finished appearance. No accumulation of material shall remain on, or adjacent to, the right-of-way or construction areas.

201-3.02 Vegetation Preserved-In-Place

Vegetation noted on the project plans to be preserved-in-place shall be pruned, as directed by the Engineer, to remove all damaged, deformed, diseased or dead growth. All pruning shall be done by or be supervised by a certified arborist in accordance with Section 806-3.05.

No construction material, equipment or vehicles shall be allowed within the drip line (edge of canopy) of trees to be preserved during the course of the construction.

Vegetation to be preserved-in-place shall be flagged, fenced and irrigated, as directed by the Engineer, to protect it from damage.

The Contractor shall provide and install all required fencing materials. Fencing will consist of high visibility orange, heavy duty High Density Polyethylene (HDPE) that is UV resistant. The fencing shall be four feet (4') tall. Fence posts will be either wood or metal and shall be suitable for the work intended and a minimum of six feet (6') long.

Fencing shall be installed at the drip line of each tree or group of trees. Fencing shall remain in place for the duration of construction operations. Fencing that is damaged or destroyed shall be repaired or replaced by the Contractor within 2 working days.

The Contractor shall be responsible for the protection of all vegetation which is to be preserved-in-place. Protection includes, but is not limited to, damage to major limbs, destruction of major root systems, scarring of the trunk and death.

Upon approval of the Engineer, the Contractor can correct minor damage to trees in conformance with the requirements of Subsections 806-3.06, 807-3.03 and this Subsection.

The Contractor, at no additional cost to the Agency, shall replace any vegetation identified as being preserved-in-place that is damaged or destroyed. Replacement vegetation shall be of the same genus and species and shall be of a similar caliper and canopy size. The Engineer shall approve all replacement plants prior to installation.

201-3.03 Salvaged and Transplanted Vegetation

The Contractor shall salvage vegetation that is flagged for transplanting. Salvage operations shall employ best local practice methods and experienced personnel, in conformance with Subsection 806-3.04(C).

When required, the Contractor shall construct a temporary holding nursery/area for plants salvaged from the site. The Contractor shall be responsible for all labor, materials, equipment, tools, and other resources necessary for the establishment and operation of the nursery. The nursery location shall be approved by the Engineer.

The on-site holding nursery shall be developed with an automatic drip irrigation system for all boxed trees and shrubs. The Contractor shall be responsible for the design, installation, operation, and subsequent removal of the irrigation system. The drip irrigation system shall be as approved by the Engineer. The Contractor shall provide a temporary water source for the holding nursery/ area and shall pay all fees for temporary connections, meters, and water used. All trees and shrubs shall be irrigated daily or at other interval approved by the Engineer. The daily application of water shall be sufficient to keep the entire soil volume within the root ball continuously moist. Irrigation applications shall be adjusted based on changes in weather conditions.

Temporary fences to control access to the holding nursery, if deemed necessary by the contractor, shall be furnished, installed, maintained, and subsequently removed by the contractor.

The Contractor shall guarantee the survival and health of all plants salvaged and replanted as part of this contract. The salvaged native plant guarantee period shall extend through the end of the Landscaping Establishment Period. All plants which die during the guarantee period, for reasons other than acts-of-God and/or causes deliberate shall be replaced by the Contractor with plants of the same size and species.

Replacements shall be provided at the Contractor's expense;

To satisfy the plant guarantee requirements, the plant shall:

Exhibit healthy growth throughout the plant structure;

Be free from significant die back within branches or portions of the plant;

Be reasonably free from insects or other infestations that would reduce the plant’s long-term potential for survival;

Be reasonably free from physical damage to the trunk, branches, or foliage that would reduce the plant’s long term potential for survival.

201-3.04 Noxious and Invasive Vegetation

Prior to the start of construction, the Contractor shall retain the services of a person, subject to the approval of the Engineer, knowledgeable in identification of noxious and invasive plant species, such as; a Landscape Architect, registered in the State of Arizona; a certified arborist; biologist, horticulturist, or botanist with a degree in a plant oriented natural resource field; or a person holding a State of Arizona Office of Pest Management Applicator License in Category B3 (Right of Way and Weed Control) to survey the limits of the project in order to determine the presence of noxious or invasive plant species. Should the survey determine that noxious or invasive plant species are present within the limits of the project the Contractor shall treat the areas designated. Such treatments shall be completed and approved by the Engineer before ground disturbing or earthmoving activities occur in those areas. Areas of noxious and invasive vegetation infestation shall be mapped on a project site map or aerial photo of the project and shall be provided to the Engineer before work begins and when work is completed. This map shall be updated throughout the duration of the project and placed in an appendix in the Stormwater Pollution Prevention Plan (SWPPP). In addition, all herbicides used at the site shall be listed in Section 1.11, Potential *Sources of Pollution*, of the SWPPP.

Noxious or Invasive Species that shall be treated include the following:

<u>Scientific Name</u>	<u>Common Name</u>
Acroptilan repens	Russian Knapweed
Alhagi maurorum	Camelthorn
Arundo donax	Giant Reed
Brassica tournefortii	Sahara Mustard
Bromus rubens	Red Brome
Bromus species	Other Brome species
Centaurea spp.	Starthistle species
Chondrilla juncea	Rush Skeletonweed
Cortaderia selloana	Pampas Grass
Cynodon dactylon	Bermudagrass
Eragrostis lehmanniana	Lehmann lovegrass
Erodium cicutarium	Redstem filaree
Hordeum murinum	Mouse Barley
Mesembryanthemum Nodiflorum	Slenderleaf Iceplant
Nicotina glauca	Tree Tobacco
Pennisetum ciliare	Buffelgrass
Pennisetum setaceum	Fountain Grass

Rhus lancea	African Sumac
Salsola species	Russian Thistle
Sorghum halepense	Johnsongrass
Sisymbrium ino	London Rocket
Sonchus asper	Spiny sowthistle
Tamarix spp.	Tamarix
Tribulus terrestris	Puncturevine

Removal of noxious and invasive plant species shall be by manual methods or, when appropriate, with the application of herbicides. Herbicides shall not be used in washes and right-of-way dip crossings classified as waters of the United States (WUS). Only manual removal of noxious and invasive species shall be allowed at these locations. Invasive species that are treated by herbicides can be left in place to decompose. Plants that are manually dug shall be put into large plastic bags with tie closures before removing from site. No portion of the root ball shall be left behind. Bags shall be disposed of in a landfill. Mowing or chopping of invasive species is prohibited.

In regard to buffelgrass and fountain grass, plants treated by chemical means must be green and actively growing for herbicides to be effective. Plants shall be sprayed when greater than 50% of the plant is green material. Only targeted plants shall be sprayed. Targeted plants shall be sprayed so that the herbicide coats all leaves but does not run off.

For projects that include a requirement for landscape establishment, eradication of noxious and invasive plant species will be required throughout the landscape establishment period.

The Contractor shall keep records of all herbicide applications, as outlined in Arizona Administrative Code R4-29-307. A copy of all Service Records shall be provided to the Engineer after each application. Treated areas shall be recorded on the project site map or project aerial photo as described previously. This map shall include all areas of noxious and invasive species removal, whether by manual or chemical means. The Contractor shall be responsible for the proper transport, storage, and application of all materials necessary for herbicide control treatments. Herbicides shall be applied by an Arizona licensed applicator in accordance with all federal, state, and local codes and regulations, as well as the recommendations of the manufacturer.

201-3.05 Vegetation from Private Property obstructing Construction

In some circumstances, vegetation from adjacent properties may obstruct construction, with branches or other plant parts leaning over into the right of way. Prior to the start of construction, the contractor shall determine which vegetation may impede construction and shall bring this to the attention of the Engineer. The Engineer shall consult with PCDOT's arborist to determine the extent of work and whether preservation, pruning, or removal is advisable.

The Engineer shall contact Pima County Community Relations (520-740-6410) regarding pruning and/or plant removal a minimum of four weeks in advance of the work needing to be done. Community Relations shall direct property owners to prune and/or remove obstructive plant parts within two weeks of the time they are contacted. If removal and/or pruning are not provided by the property owner within the specified date, the property owner shall be advised that pruning and/or removal will be done by Pima County. No pruning or removal of plant parts

from vegetation originating on private property shall be performed without proof of notification to the property owner by Community Relations.

If the Engineer determines that additional pruning and/or removal of plants is required during construction, the notification procedure described above shall be followed.

All pruning shall be performed or directed by a certified arborist in accordance with the requirements of Item 8061700.

201-4 METHOD OF MEASUREMENT

Clearing and grubbing will be measured either on a lump sum basis or by the acre. Measurement by the acre will be to the nearest tenth of an acre measured on a horizontal plane.

No direct measurement will be made for protecting vegetation preserved-in-place, payment for which is considered as incidental to and included in other contract items.

No direct measurement will be made for salvaged and transplanted vegetation, payment for which is considered as incidental to and included in other contract items.

No direct measurement will be made for providing services of a Certified Arborist and the person knowledgeable in identification of noxious and invasive species, payment for which is considered as incidental to and included in other contract items.

All work required to eradicate and control noxious and invasive plant species, as described herein, by either manual means or with herbicides, will be completed on an extra work basis, as approved and directed by the Engineer, in conformance with the requirements of Subsection 109-5.

All noxious and invasive plant species eradication in landscaped areas after construction shall be considered incidental to the work described in Section 807- Landscape Establishment.

Landscape pruning of vegetation will be measured by the hour, including the time that a registered arborist is on site, in accordance with the requirements of Item 8061700.

201-5 BASIS OF PAYMENT

The accepted quantities of clearing and grubbing, measured as provided above, will be paid for at the contract lump sum price or by the acre as designated in the bidding schedule, including furnishing, placing and compacting the material required to fill the cavities resulting from the removal of tree stumps or other materials; the removal and disposal, in accordance with the provisions of all laws and ordinances, of cleared trees, brush, vegetation, stumps, debris, rubbish, miscellaneous structures and other objectionable matter; and the removal, storage and replanting of plant materials designated to be salvaged.

When measured on a lump sum basis, payments will be made monthly in proportion to the amount of work done as determined by the Engineer.

No payment will be made for clearing and grubbing outside the specified limits, unless such work is directed by the Engineer.

When clearing and grubbing is not included as a contract pay item, full compensation for any clearing and grubbing necessary to perform the construction operations designated on the project plans or specified in the Special Provisions shall be considered as included in the price of other contract items.

Payment for eradication of noxious or invasive plant species will be made in accordance with the provisions of Subsection 109-5. Payment will be inclusive of all labor, materials, equipment, herbicides and other eradication measures, removal and proper disposal of eradicated material, mobilization, demobilization and remobilization necessary to complete the work in accordance with the project plans, these Special Provisions or as directed by the Engineer.

The control of plant species not included on State or Federal noxious and invasive lists will be paid only when control is directed by the Engineer.

Landscape pruning of vegetation, measured as provided above, will be paid at the contract unit price per hour, in accordance with the requirements of Item 8061700.

(201FENCING, 11/22/13)

ITEM 2010004 - PRESERVATION FENCING

1. DESCRIPTION

The work under this item consists of furnishing, installing, maintaining and removal of Preservation Fencing with warning signs in order to protect existing plants to remain in place, as shown in the Demolition Plans.

2. MATERIALS

Fencing will consist of high visibility orange, heavy duty High Density Polyethylene (HDPE) that is UV resistant. The fencing shall be four feet (4') tall. Fence posts will be either wood or metal and shall be suitable for the work intended and a minimum of six feet (6') long.

Warning signs shall be made of durable, weatherproof material. Lettering shall be 1" high, minimum and clearly legible. The text on the signs shall be as follows:



3. CONSTRUCTION DETAILS

All vegetation identified on the project plans as being preserved-in-place shall be protected from damage or destruction caused by the Contractor's operations by protective fencing. The locations of vegetation so identified on the project plans are approximate. Actual locations will be determined during the project walk-through specified in Subsection 201-3.01 of these Special Provisions.

The Contractor shall flag all plants designated to be preserved-in-place and/or to be transplanted-on-site during the inspection. Designated plants may lie within and as well as be adjacent to the project limits. These areas shall also be preserved with protective fencing, as described herein. Flagging may be used to designate preserve in place areas prior to the installation of the protective fencing.

The Contractor shall provide and install all required fencing materials. Fencing shall be installed at the drip line of each tree or group of trees, and shall remain in place for the duration of construction operations. Fencing that is damaged or destroyed shall be repaired or replaced by the Contractor within 2 working days.

Warning signs shall be attached securely to fence fabric in the upper half of the fence, and placed at 50-foot maximum intervals.

4. METHOD OF MEASUREMENT

Preservation fencing shall be measured by the linear foot of fence in place.

5. BASIS OF PAYMENT

Payment for preservation fencing, measured as provided above will be made at the contract unit price and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals required to furnish, install, maintain and remove the preservation fencing and warning signs.

(202PVMT_REM, 5/1/09)

SECTION 202 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202-3 CONSTRUCTION DETAILS

202-3.03 Removal of Pavement

202-3.03 (B) Bituminous Pavement of the Standard Specifications is modified to add:

All excavated bituminous pavement, including millings, shall be processed and reused as embankment. Should the Contractor elect to use the excavated bituminous pavement material for a different use, the Contractor shall replace the material at his own expense. Standard Specification 104-7 applies.

(202SIGN_REM, 5/29/09)

SECTION 202 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202-3 DESCRIPTION

202-3.06 Removal of Signs and Delineators the second sentence of this subsection of the Standard Specifications is revised to read:

The contractor shall dismantle the sign panels and delineators and remove the sign posts and concrete foundations from the ground in such a manner as to prevent damage to the posts.

SECTION 202 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202-1 DESCRIPTION of the Standard Specifications is modified to add:

The work shall include, but not be limited to those items listed on the Demolition Plan sheets of the project plans. Other items not presented on the Demolition Plan sheets, but required for construction, shall be considered incidental to the project.

Items include but not limited to: asphalt, curb and gutter, walls, handrail, signs, light pole foundations, and soil cement slabs at wall and bridge footings. Items visible on the surface, but partially buried, will be removed under this item to their full depth or as described in the project plans. Approximate quantities of soil cement removal are provided in the project plans for bidding purposes.

Bees, rattlesnakes and other pests may be located within debris piles and cleared vegetation. Removal of bees, rattlesnakes and other pests shall be the responsibility of the contractor and shall be considered incidental to the cost of the project, and the cost of the removal services shall be included in the unit cost of this item.

202-4 METHOD OF MEASUREMENT of the Standard Specifications is modified to add:

Cost for removal and disposal of items as described on the Demolition Plan sheets of the project plans shall be lump sum. This includes but is not limited to the cost of removal of bees, snakes and other pests, soil cement, asphalt, curb and gutter, walls, handrail, signs, light pole foundations and other visible items on the surface or indicated on the plans to be removed or removal in order to construct the proposed improvements. Cost for removal of items not specifically mentioned above but not required for construction of the project will not be measured for payment and are considered incidental to the project.

(203EARTH_QUANT, 5/19/09)

SECTION 203 - EARTHWORK

203-2 GENERAL of the Standard Specifications is modified to add:

The bidding schedule quantities for roadway excavation, drainage excavation, and borrow, if applicable, will be considered to be the final quantities for payment, unless adjusted in accordance with the requirements of Subsections 104-2 or 203-2.01.

203-2.01 Earthwork Adjustments is hereby added to the Standard Specifications:

Adjustments in the bidding schedule quantities for roadway excavation, drainage excavation or borrow may be initiated by the Contractor or the Engineer, if evidence indicates that the required quantity varies by an amount greater than five percent of the bidding schedule quantity. The Contractor shall advise the Engineer prior to construction, in writing, submitting evidence in the form of a construction survey or photogrammetric survey with cross sections, along with the measurement for the proposed adjustment, substantiated in accordance with Subsections 203-3, 203-4 and 203-8, requesting an adjustment in quantities. The Engineer will evaluate the amount of adjustment requested for approval, if any. The quantity upon which payment will be based will be the bidding schedule quantity plus or minus only that portion of the adjustment that exceeds five percent of the bidding schedule quantity.

Neither variations in shrink or swell of materials from those shown on the project plans, nor variations of shrink or swell from Contractor obtained sources will be reasons for establishing a quantity adjustment.

Adjustments in earthwork quantities due to revisions ordered by the Engineer will be isolated by measurement or calculations, in accordance with the requirements of Subsections 203-3, 203-4 and 203-8. The bidding schedule quantities will be adjusted by the amount of the ordered change, and will not be included in any other adjustment of the bidding schedule quantities as specified in this subsection.

203-3 ROADWAY EXCAVATION

203-3.04 Method of Measurement the first sentence of the first paragraph of the Standard Specifications is revised to read:

Measurement of roadway excavation for payment will not be required, unless adjustments are made in accordance with Subsection 203-2.01 herein. When adjustments are required, roadway excavation will be measured by the cubic yard in the original space occupied and the volume of the material removed will be computed by the average end area method.

203-3.05 Basis of Payment of the Standard Specifications is modified to add:

No adjustment to the contract unit price will be made because of increased excavation quantities resulting from the removal of unsuitable material.

203-4 DRAINAGE EXCAVATION

203-4.04 Method of Measurement the first sentence of the first paragraph of the Standard Specifications is revised to read:

Measurement of drainage excavation for payment will not be required, unless adjustments are made in accordance with Subsection 203-2.01 herein. When adjustments are required, drainage excavation will be measured by the cubic yard in the original space occupied and the volume of the material removed will be computed by the average end area method.

203-8 BORROW

203-8.04 Method of Measurement the first paragraph of the Standard Specifications is revised to read:

Measurement of borrow for payment will not be required, unless adjustments are made in accordance with Subsection 203-2.01 herein. When adjustments are required, borrow will be measured by one of two methods: (1) The cubic yard in the original space occupied, and the volume of the material removed will be computed by the average end area method. (2) The cubic yard in the final space occupied, and the volume of the material placed will be computed by the average end area method.

SECTION 203 - EARTHWORK

203-3 ROADWAY EXCAVATION

203-3.03 Construction Details the fifth paragraph of the Standard Specifications is revised to read:

The top 12 inches of the subgrade shall be scarified and compacted to a density of not less than 95 percent of the maximum density in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer, except that when asphaltic concrete or Portland cement concrete is to be placed directly on subgrade, the required density shall be 100 percent of the maximum density. The contractor is advised to review the project geotechnical report for additional information and recommendations.

203-5.03 Construction Details of the Standard Specifications is modified to add:

The retaining wall footing may bear on undisturbed native site soils or properly compacted site soils. If the footing will be in existing fill the existing soils should be over-excavated to a minimum of 1 foot below the bottom of the proposed foundation elevation. The exposed subsurface soils should be scarified to a depth of 8-inches: moisture conditioned to within 3 percent of optimum moisture content and compacted to a minimum of 100 percent of maximum dry density. The contractor is advised to review the project geotechnical report for additional information and recommendations.

(203OVEREXC_RECAMP, 1/4/12)

ITEM 2030502 EXCAVATION (OVEREXCAVATION AND RECOMPACTION)

1. DESCRIPTION

The work under this item consists of furnishing all labor, equipment and materials required to over excavate and recompact existing material in the areas and to the limits shown on the project plans.

2. MATERIALS (None Specified)

3. CONSTRUCTION REQUIREMENTS

Soil within the areas shown as overexcavation and recompaction shall be removed to the lines and grades shown on the plans, processed and restored to the areas it was removed from and recompact, in accordance with the project plans and the recommendations shown in the project Geotechnical Report. Recompaction of the soil within the limits of the over excavation zone shall be performed to achieve at least 95% of the dry density as determined in accordance with Arizona Test Method 225 (Standard Proctor). The recompact shall also comply with Sections 203 and 205 of the Standard Specifications.

4. METHOD OF MEASUREMENT

Excavation (overexcavation) shall be measured by the cubic yard based on the original space occupied.

5. BASIS OF PAYMENT

The accepted quantity of excavation (overexcavation), measured as provided above, will be paid for at the contract unit price per cubic yard and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, complete in place.

ITEM 2030507 BACKFILL (SPECIAL)

1. DESCRIPTION

The work under this item shall consist of furnishing, placing and compacting Backfill (Special) in the areas and to the limits shown on the project plans

2. MATERIALS

Backfill (Special) shall be in accordance with Subsection 203-5.02 (A) Structure Backfill of the of the Standard Specifications.

3. CONSTRUCTION REQUIREMENTS

The placement of Backfill (Special) shall comply with Sections 203-5.03 (B) of the Standard Specifications.

4. METHOD OF MEASUREMENT

Backfill (Special) shall be measured by the cubic yard.

5. BASIS OF PAYMENT

The accepted quantity of Backfill (Special), measured as provided above, will be paid for at the contract unit price per cubic yard and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, complete in place.

ITEM 2030907 - BORROW (DISCRETIONARY)

1. DESCRIPTION

The work under this item shall include furnishing and placing suitable material obtained from sites outside the project limits and right-of-way for use in embankments, shoulders, berms, dikes, pathways, and other similar purposes.

2. MATERIALS

Borrow material shall be of a quality suitable for the purpose intended, free of vegetation or other unsuitable material.

Borrow material placed within three feet (3') of final subgrade elevation shall comply with Subsection 203-5.02 Materials – (A) Structure Backfill of the Standard Specifications.

Borrow material placed below three feet (3') of final subgrade elevation of embankment shall comply with Subsection 203-9 Embankment Requirements of the Standard Specifications.

The contractor shall promptly advise the Engineer as to the source of borrow that he proposes to use and shall furnish equipment and personnel and shall obtain representative samples of the material under the supervision of the Engineer. At the option of the contractor, the material shall be tested by either the Agency or by an independent approved laboratory.

If testing is performed by a testing laboratory, the contractor shall arrange for the samples to be delivered to the testing laboratory. Tests shall be performed using appropriate test procedures referred to in sections of the specifications in which the specific material requirements are described.

The contractor shall make the arrangements necessary to see that the testing laboratory submits the results of the tests to the Engineer. He shall also submit to the Engineer sufficient material from the samples taken so that the test results may be verified, if necessary.

The cost of all sampling and testing, including the cost of supervision by the Engineer, shall be borne by the contractor until the testing has been satisfactorily completed.

Every effort will be made by the Agency to advise the contractor as quickly as possible that the source he proposes to use has been either approved or disapproved. The contract time will not be adjusted because of any time required by either the contractor or the Agency to sample and test the material and to determine the quality of the material.

The use of a borrow source will require written approval by the Engineer. No approval shall be assumed, nor will it be made, until the Agency has determined that the material not only meets the specified requirements, but is also compatible with the established project design criteria developed by it.

3. CONSTRUCTION DETAILS

Discretionary borrow material shall be placed in conformance with the requirements of Subsection 203-9.

4. METHOD OF MEASUREMENT

Borrow (Discretionary) shall be measured in tons or cubic yards by a method that is approved by the Engineer. The quantity included in the bidding schedule is discretionary and the Engineer will determine the quantity for payment based on the actual quantity used on the project.

Discretionary borrow measurement is made in addition to any of the following Items of work if it exists in the bidding schedule: Item 2050001 Grading Roadway for Pavement; Item 2050003 Roadway Grading; and/or Item 2050010 Pathway Grading.

5. BASIS OF PAYMENT

The accepted quantity of Borrow (Discretionary), measured as provided above, will be paid for at the contract unit price, complete in place including all materials, labor and equipment.

Price adjustment for variation in bid quantity per Subsections 109-3 and 109-4, and Section 203 of the Standard Specifications and Special Provisions does not apply to this bid item.

(303AB_RAP, 12/16/11)

SECTION 303 - AGGREGATE BASE COURSE of the Standard Specifications is revised to read:

303-1 DESCRIPTION

The work under this section shall consist of furnishing, placing and compacting an aggregate base course in conformance with the details shown on the project plans and the requirements of these specifications.

303-2 MATERIALS

Aggregate for aggregate base shall consist of stone, gravel, recycled asphalt pavement (RAP), salvaged Portland Cement concrete materials, or other approved inert material of similar characteristics, and shall be clean and free from vegetable matter and other deleterious substances.

The following test methods shall be applicable under this section:

AASHTO	T2	Sampling Aggregates
Arizona	201	Dry Preparation and the Sieving of Coarse and Fine Soils and Aggregates
AASHTO	T89	Test for Liquid Limit of Soils
AASHTO	T90	Test for Plastic Limit and Plasticity Index of Soils
AASHTO	T96	Test for Resistance to Abrasion of Small Size Course Aggregate by use of the Los Angeles Machine
Arizona	212	Percentage of Fractured Coarse Aggregate Particles

Aggregate base shall conform to the following gradation requirements unless otherwise specified in the Special Provisions:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch	100
3/4 inch	90 – 100
1/4 inch	45 - 75
No. 200	0 - 10

The plasticity index for aggregate base material shall not exceed 5.

At least 30 percent by weight of the coarse aggregate material shall have at least one rough and angular surface which has been produced by crushing when tested in accordance with the requirements of Arizona Department of Transportation Test Method 212.

Resistance to abrasion shall be in conformance with the following requirements:

- Maximum loss of 9 percent at 100 revolutions.
- Maximum loss of 40 percent at 500 revolutions.

The source of all salvaged recycled asphalt pavement (RAP), or Portland cement concrete materials shall be approved by the Engineer prior to use. Salvaged asphalt pavement and Portland cement concrete materials shall not contain hazardous materials. All metal reinforcement materials shall be removed from salvaged Portland cement concrete prior to its blending with stone, gravel, or other approved inert material of similar characteristics for use as aggregate base.

Salvaged asphalt pavement to be used in aggregate base material shall be produced by milling, pulverizing or crushing. Salvaged Portland cement concrete materials shall be produced by crushing.

When recycled asphalt pavement (RAP) or salvage Portland Cement Concrete are used as a component of aggregate base material, it shall be uniformly blended with stone, gravel or other inert material to form a homogeneous mixture, meeting the gradation and Plasticity Index requirements of this section. Fractured coarse aggregate particles and abrasion requirements shall apply to the aggregates other than the RAP or salvaged Portland Cement Concrete. The process used to blend the RAP or salvaged Portland Cement Concrete and aggregate shall be approved, in writing, by the Engineer. RAP or salvaged Portland Cement Concrete shall comprise not more than 50 percent of the blended material.

Sampling for gradation of aggregate base material comprised of virgin aggregate and salvaged materials shall be from the windrow. Sampling for plasticity index, fractured coarse aggregate particles, or abrasion shall be from a stockpile.

When determining the gradation of aggregate base material containing RAP or salvaged Portland Cement Concrete materials, drying to a constant weight shall be performed at a temperature of $140 \pm$ five degrees F.

303-3 CONSTRUCTION DETAILS

303-3.01 Placement. Aggregate base material shall have water added to it and shall be mixed and processed to produce a uniform blend of material before final placement. After processing, the material shall be placed and spread on the approved subgrade, subbase or base in a uniform layer or layers not exceeding 6 inches in compacted depth, unless otherwise approved, in writing, by the Engineer. The method of dumping or spreading shall be determined by the contractor. Uncontrolled spreading from piles dumped on the grade which result in segregation will not be permitted. The course shall not be placed in excess of 500 linear feet without being compacted.

303-3.02 Compaction. Each layer of aggregate base shall be compacted to a density of not less than 100 percent of the maximum density determined in conformance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer.

When determining maximum density and optimum moisture content for aggregate base material containing RAP or salvaged Portland Cement Concrete materials, drying to a constant weight shall be performed at a temperature of $140 \pm$ five degrees F.

303-3.03 Traffic and Contamination. The movement of highway traffic over the final surface of the aggregate base course may be permitted at locations designated by, and under such restrictions as directed by the Engineer, provided such movements take place prior to the final finishing of this course to the specified tolerance. The movement of construction equipment on this course may be permitted, at locations designated by and under such restrictions, as directed by the Engineer. At locations where permission is granted for such movement, the temporary surface of the course, upon which the construction traffic is running, shall be placed and maintained at least 2 inches above the final surface of the course. Just prior to paving and after all construction traffic, not required for the removal, has ceased, the 2 inch protective layer shall be removed, and the exposed surface of the course prepared and compacted to the specified tolerance. No payment will be made for furnishing, placing, maintaining, removing and disposing of the 2 inch thick protective layer; the cost thereof shall be included in the price bid for the aggregate base.

Should the aggregate base become mixed with the subgrade or any other material, through any cause whatsoever, the contractor shall, at no additional cost to the Agency, remove such mixture and replace it with the appropriate base material.

303-3.04 Finishing. The final layer of aggregate base shall be finished with equipment capable of shaping and grading the surface within the tolerance specified herein.

The finished surface of aggregate base shall not vary from the grades established by the Engineer by more than 0.02 feet.

The compacted layers of aggregate base shall be maintained in a condition satisfactory to receive any subsequent subbase, base or surfacing material or traffic, when so permitted.

Areas not within the allowable tolerance shall be corrected by scarifying, placing additional material, remixing, reshaping and re-compacting to the specified density and surface tolerance.

303-4 METHOD OF MEASUREMENT

Aggregate base will be measured for payment by the cubic yard in place, using plan dimensions.

303-5 BASIS OF PAYMENT

The accepted quantities of aggregate base, measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place including all labor, equipment, materials, tools, supplies and incidentals necessary to complete the work as well as the cost of adding water for compaction.

No separate payment will be made for losses of material resulting from compaction, foundation settlement, erosion or any other cause. The cost of such losses shall be considered as incidental to and included in the payment for aggregate base course.

No deductions will be made for the volumes occupied by manholes, catch basins, or other such objects.

(404BITUM_SM_PROJ, 10/4/10)

SECTION 404 - BITUMINOUS TREATMENTS

404-4 METHOD OF MEASUREMENT of the Standard Specifications is modified to add:

Bituminous treatments for tack coat shall not be measured separately, but shall be considered as incidental to the cost of other contract items requiring tack coat.

404-5 BASIS OF PAYMENT of the Standard Specifications is modified to add:

Separate payment for bituminous treatments for tack coat shall not be made, the cost being considered as incidental to the cost of other contract items requiring tack coat.

406AC_RAP, 8/28/14

SECTION 406 - ASPHALTIC CONCRETE of the Standard Specifications is revised to read:

406-1 DESCRIPTION

The work under this section shall consist of furnishing all materials, mixing at a plant, hauling, placing and compacting a mixture of aggregate, recycled asphalt pavement (RAP) if utilized, asphalt cement and approved mineral admixture to form a pavement course or for other purposes as specified and in accordance with the details shown on the project plans and the requirements of these specifications. Recycled asphalt pavement (RAP) may be utilized.

The Marshall Mix Design Method shall be the basic design for all proposed mix designs and testing procedures.

Asphaltic concrete shall be produced in a batch mixing plant, a continuous pugmill mixing plant or a drum drier mixing plant. Proportioning shall be either by hot-feed control or cold-feed control.

406-2 MATERIALS

406-2.01 General. The contractor may choose to utilize recycled asphalt pavement (RAP) in the production of hot mix asphalt concrete. If utilized, the RAP shall not exceed 15% of the total weight(s) of aggregate in the mix. The contractor shall obtain Agency approval of materials before any material is mixed at any plants. Approval of coarse and fine mineral aggregates shall be in accordance with Section 1001 - Material Source of the Standard Specifications.

406-2.02 Composition of Asphaltic Concrete Mixtures. The asphaltic concrete mix shall generally be composed of a mixture of aggregate, mineral admixture, asphalt cement and recycled asphalt pavement (RAP) if utilized.

For any asphaltic concrete mix required by the project plans or Special Provisions, the contractor shall develop and submit to the Agency, a job mix formula that satisfies the general criteria listed herein.

The optimum asphalt cement content for the gradation proposed shall be determined by the contractor using the Marshall Mix Design Method.

The resultant mixture shall meet the following properties:

TABLE 406-1

MIX DESIGN PROPERTIES

Mix Property	Mix Criteria	Test Method
Compaction (number of blows each end of specimen)	75	815
Wet Strength, psi, min	150	802
Index of Retained Strength, percent, min.	60	802
Stability, lb., min.	2000	815
Flow, 0.01 in.	8 - 16	815
Effective Voids, %	Note 1	815
VMA, %	Note 2	815
Absorbed Asphalt, %	0 - 1.0	815

NOTE 1: Effective air voids shall be $5.5 \pm 0.2\%$ for all arterial, collector and major street designations and $4.0 \pm 0.2\%$ for local streets.

NOTE 2: PAG Mix No.1 (Table 406-2) - 14.5% minimum
 PAG Mix No.2 (Table 406-2) - 15.0% minimum
 PAG Mix No.3 (Table 406-2) - 15.5% minimum

406-2.03 Aggregate. Aggregate shall consist of crushed gravel, crushed rock, recycled asphalt pavement or other approved material with similar characteristics, or a combination thereof, conforming to the requirements of these specifications.

(A) Mineral Aggregate. Fine mineral aggregate or blend material shall consist of natural sand or sand prepared from rock, or other approved inert materials, or a combination thereof, conforming to either the requirements of these specifications or as may otherwise be approved by the Engineer.

Mineral aggregate furnished for mix designs shall be representative of the source(s) and sampled from the materials stockpiles to be utilized in asphaltic concrete production. Mix designs shall be performed utilizing mineral aggregate, which conforms to the grading limits in Table 406-2 or in the case of batch type plants, from bin samples if authorized by the Engineer.

(B) Recycled Asphalt Pavement (RAP). Recycled asphalt pavement (RAP) is reclaimed and/or salvaged asphalt pavement which has been processed and stockpiled to minimize segregation. Additional processing may be done. The stockpiles shall be placed on a base sufficient to prevent contamination and provide adequate drainage.

When RAP is incorporated into the mix, the mix designs shall be performed utilizing mineral aggregate and recycled asphalt pavement (RAP), which conforms to the grading limits in Table 406-2 or in the case of batch type plants, from bin samples if authorized by the Engineer.

Mineral aggregate shall conform to the requirements found in Table 406-2 when tested in accordance with the applicable test methods.

TABLE 406-2

MINERAL AGGREGATE CHARACTERISTICS

Characteristic	Test Method	Requirement
Combined Bulk Specific Gravity	AASHTO T 85, Arizona Test Method 211	2.35 to 2.85
Combined Water Absorption	AASHTO T 85, Arizona Test Method 211	0.00 to 2.50
Sand Equivalent	AASHTO T 176	Note 2
Crushed Faces	Arizona Test Method 212	Minimum Values per Table 406-2
Abrasion (Note 1)	AASHTO T 96	100 Rev., Max. 9% 500 Rev., Max. 40%

Note (1): Abrasion shall be run on samples from each source of mineral aggregate.

Note (2): Minimum 50 for non-RAP mixes; Minimum 55 for RAP mixes.

Tests on aggregates outlined in Table 406-3 shall be performed on materials furnished for mix design purposes and composited to the mix design gradation, excluding recycled asphalt pavement (RAP) if utilized.

Mineral aggregate from a source or combination of sources which does not meet the requirements, according to the contractor's mix design proposal, for combined bulk specific gravity and/or combined water absorption up to a maximum of 3.0 percent, but meets the other requirements of Table 406-2 will be further considered for acceptance by the Engineer if: a) the total estimated cost of all asphaltic concrete components, using the mix design unit weight, asphalt cement content and mineral admixture percentage, does not exceed the total amount bid for these items by more than 5.0 percent; or b) a supplemental agreement is executed adjusting the unit prices of asphaltic concrete components such that the total estimated cost does not exceed the total amount bid by more than 5.0 percent.

406-2.04 Mineral Admixture. The mix design shall include a mineral admixture. The amount of mineral admixture used shall be a minimum of 0.5 percent, by weight, of the mineral aggregate, with the exact amount to be specified in the mix design. A maximum of 2.0 percent admixture will be permitted. Mineral admixture shall be Portland cement, blended hydraulic cement or hydrated lime conforming to the requirements of Table 406-3.

TABLE 406-3

MINERAL ADMIXTURE

<u>Material</u>	<u>Requirement</u>
Portland Cement, Type I or II	ASTM C 150
Blended Hydraulic Cement, Type IP	ASTM C 595
Lime	ASTM C 1097

A Certificate of Analysis, conforming to the requirements of Subsection 106-5, shall be submitted to the Engineer.

TABLE 406-4

COMPOSITION OF ASPHALTIC CONCRETE MIXTURES

Mix Designation Sieve Size	Percent Passing		
	No. 1	No. 2	No. 3
1"	100	--	--
3/4"	90-100	100	--
1/2"	72-90	90-100	100
3/8"	60-76	70-85	85-100
#4	48-62	54-68	55-75
#8	40-52 (Note 1)	44-52 (Note 1)	38-50 (Note 2)
#40	12-24	13-23	16-26
#100	--	--	--
#200 (Note 3)	3-7	3-8	3-8

Notes:

1. A minimum of 50 percent, by weight, of the material retained on the No. 8 sieve shall have at least one rough, angular surface, produced by crushing when tested in accordance with the requirements of Arizona Test Method 212a.
2. A minimum of 70 percent, by weight, of the material retained on the No. 8 sieve shall have at least one rough, angular surface produced by crushing when tested in accordance with the requirements of Arizona Test Method 212a.
3. The percent passing the No. 200 sieve shall include the amount of mineral admixture.

406-2.05 Bituminous Material. Unless otherwise specified in the Special Provisions, the bituminous material shall be an asphalt binder performance grade PG 70-10 when tested in accordance with the requirements of AASHTO Provisional Standard MP1. The pressure aging temperature shall be 110 °C.

A Certificate of Analysis conforming to the requirements of Subsection 106-5 shall be submitted and duplicate samples per shift shall be taken. In addition, the supplier shall determine the mixing and the compaction temperature ranges for each PG asphalt binder used for mix design purposes. The mixing temperature range is defined as the range of temperatures where the unaged asphalt binder has a rotational viscosity 0.17 ± 0.02 pascal seconds measured in accordance with ASTM D 4402. The compaction temperature range is defined as the range of temperatures where the unaged asphalt binder has a rotational viscosity 0.28 ± 0.03 pascal seconds measured in accordance with ASTM D 4402. The testing required by ASTM D 4402 shall be performed at 135 °C and 175 °C, and the results plotted on a semi-log graph with viscosity (logarithmic scale) versus temperature (arithmetic scale). PG asphalt binders that are polymer modified shall have mixing and compaction temperature ranges based on the manufacturer's recommendations if the mixing temperature range exceeds 163 °C and/or the compaction temperature range exceeds 149 °C as determined by the ASTM D 4402 procedure.

If it is determined by testing that bituminous materials used in asphaltic concrete production fails to meet the requirements of the AASHTO Provisional Standard MP1 for the specified grade, the contract unit price of the asphaltic concrete will be adjusted by the dollar amount per ton shown in Table 110-4, when the asphaltic concrete is allowed to remain in place. Should the bituminous material be in reject status, the contractor shall, upon request by the Engineer, supply an

engineering analysis of the expected performance of the material in which the bituminous material is incorporated. The engineering analysis shall detail any proposed corrective action and anticipated effect of such corrective action on the performance. Asphaltic concrete not allowed to remain in place shall be removed at no additional cost to the Agency and replaced with asphaltic concrete meeting the requirements of these specifications.

406-2.06 Mix Design Proposal.

(A) New Mix Designs. Utilizing mineral aggregate and recycled asphalt pavement (RAP), if utilized, which has been crushed, processed, separated and stockpiled, a mix design proposal shall be formulated and submitted by the contractor to the Engineer.

The proposal shall be based on the mix design criteria and other requirements herein specified, utilizing asphalt cement and mineral admixture of the type and from the sources proposed for use in the production of asphaltic concrete.

Marshall specimens shall be prepared and mix properties determined in accordance with Arizona Test Method 815 and Arizona Test Method 802. The mix design shall be prepared under the direct supervision of a Professional Engineer experienced in the development of asphaltic concrete mix designs and mix design testing.

The mix design proposal shall contain as a minimum:

- (1) The name and address of the testing organization and the individual responsible for the mix design development and testing.
- (2) The specific location(s) of the source(s) of mineral aggregate.
- (3) The supplier, refinery, and type of asphalt cement, and the source and type of mineral admixture, and the percentage of each to be used.
- (4) The anticipated mineral aggregate and recycled asphalt pavement (RAP) gradation in each stockpile.
- (5) Mix design gradation. The mix design shall contain the gradation of the mineral aggregate and recycled asphalt pavement (RAP), if utilized, as well as the mix gradation with the mineral admixture if it is used. If recycled asphalt pavement (RAP) is utilized, the mix design shall display both the gradation of the virgin aggregate without RAP and the virgin aggregate with RAP.
- (6) The results of all testing, determinations, etc., such as: specific gravity of each component, water absorption, sand equivalent, loss on abrasion, crushed faces, uncompacted void content, immersion compression results (Index of Retained Strength, wet and dry strengths), Marshall stability and flow, asphalt absorption, percent air voids, voids in mineral aggregate, and bulk density. Historical abrasion values may be supplied on existing sources.
- (7) The Viscosity-Temperature curve together with the laboratory mixing and compaction temperature ranges.

The mix design proposal shall be submitted and signed by a person authorized by the contractor to act in such matters on his/her behalf. The mix design proposal shall be submitted to the Agency a minimum of three weeks prior to the scheduled start of production.

The Engineer will review the mix design proposal to assure that it contains all required information. If it does not, it will be returned, within three working days, for further action and resubmission by the contractor.

(B) Previously Utilized Mix Designs. The contractor may propose to use an established mix design from a previously utilized source or a combination of sources. The previous mix design will be accepted upon request, within three working days, if acceptable evidence is provided with the request that the materials to be incorporated have not been changed and the mix design had been approved by the Agency within the last twenty four month period.

Evidence shall consist of analyses of stockpile gradations, sand equivalents and crushed faces and certification that crushing, screening or other processing methods are unchanged, that the asphalt cement is of the same source and type, and mineral admixture, if required, is of the same type. Such evidence and certification shall be considered as a complete mix design proposal in lieu of the requirements of Subsection 406-2.06 (A).

If the Engineer questions the evidence provided, he may require that samples be obtained of the various stockpiles sufficient for testing to verify the above information. Should such testing indicate results not meeting the requirements outlined in Table 406-6, Items 1 through 10, the Engineer will inform the contractor within three working days of receipt of the samples, and a new mix design proposal conforming to the requirements of Subsection 406-2.06 (A) will then be required.

406-2.07 Mix Design. Following submission of a complete mix design proposal by the contractor, samples of the produced mineral aggregate stockpiles and recycled asphalt pavement (RAP) stockpiles, if utilized, including any blend material, shall be obtained by the contractor and witnessed by the Engineer so that both parties are satisfied that samples are representative of the mineral aggregates to be utilized in the asphaltic concrete production.

Samples shall consist of approximately 600 pounds of mineral aggregate and recycled asphalt pavement (RAP), if utilized, in proportion to the proposed stockpile usage, along with five 1 gallon cans of the proposed asphalt cement. Mineral admixture of the type to be used in the mix shall also be furnished by the contractor. These samples shall be placed in sample sacks in the presence of the Engineer and fully identified, and shall then be transported, by the contractor, to the Agency's laboratory where they will be split and one-half set aside for a period of 30 calendar days for possible referee testing, after which they will be discarded.

Utilizing the samples, the laboratory will determine if the proposed mix design meets the requirements of Subsection 406-2.08. If the proposed mix design meets all the requirements, it will be the approved mix design.

If the proposed mix design fails to meet all the requirements necessary, it will be disapproved by the Engineer. The contractor, upon notification that the proposal is disapproved, shall prepare, and submit for approval, a new mix design proposal; however, should the contractor wish to protest the Engineer's decision, on the basis of a written request from said contractor, the samples set aside will be provided by the Agency to an independent, approved laboratory, selected from a list of three Arizona Department of Transportation certified laboratories named by the contractor in his written request, for referee verification testing within two working days of the contractor's request. The results of such testing shall be binding upon the Agency and the contractor. Testing will be paid for by the contractor; however, should such testing prove the proposal to be satisfactory, the Agency will approve the mix design proposal, reimburse the contractor for the private laboratory costs and issue an extension of the contract time for the time required for such testing.

The approved mix design shall specify a single percent of material passing each required sieve; the approximate percent of material to be used from each source including the recycled asphalt

pavement (RAP) source, if utilized; the type, source and percent of asphalt cement; the percent effective voids; the type and percent of any mineral admixture; the laboratory bulk density and any special treatment.

If approval of the mix design is contingent upon the use of a minimum or maximum percentage of special materials such as washed or imported aggregates, the approved mix design will also contain such stipulation.

406-2.08 Verification Testing. Mineral aggregate samples submitted for verification testing will be combined in the proportions specified in the contractor's proposed mix design. The resultant composite gradation will be compared to the proposed mix design gradation and the percentage deviations determined. The required action is determined from Table 406-5.

TABLE 406-5

ALLOWABLE DEVIATIONS FROM PROPOSED TARGETS

Sieve Size	Proceed	Adjust	Reject
3/8 inch or larger	± 3	$> \pm 3$ to ± 8	$> \pm 8$
No. 4* (Note 1)	± 2	$> \pm 2$ to ± 6	$> \pm 6$
No. 8 and No. 40	± 2	$> \pm 2$ to ± 6	$> \pm 6$
No. 200	± 0.5	$> \pm 0.5$ to ± 3	$> \pm 3$

* Note 1: No. 4 sieve size criteria is applicable to Mix No. 3 (Table 406-2) only.

If the deviations are such that they fall into the adjust column of Table 406-5, the contractor has the option to request artificial grading of the samples in accordance with the requirements of Arizona Test Method 244 or to resample the material. In lieu of re-sampling, the contractor may elect to submit new stockpile percentages.

When the final composite, including recycled asphalt pavement (RAP) if utilized, is determined, tests will be performed in accordance with Arizona Test Method 827 for conformance to the criteria of Table 406-6.

TABLE 406-6

VERIFICATION CRITERIA

Property	Allowable Deviation from Proposal Targets	Values
Sand Equivalent	-10 (Note 1)	Note 3
Crushed Faces, Percent	-----	Note 2
Abrasion 100 Revolutions	-----	Note 3
500 Revolutions	-----	Note 3
VMA, Percent	± 1.0	Note 4.
Effective Voids, Percent	± 1.5	3.8 Min.
Stability, Pounds	-----	1,750 Min
Flow, 0.01-Inch	-----	7-17
Index of Retained Strength, Percent	-----	60 Min.

Wet strength, psi	-----	140 Min.
Absorbed Asphalt Percent	-----	1.0 Max.

- Note 1: In verifying previously used mix designs only.
- Note 2: Refer to Table 406-3.
- Note 3: Refer to Table 406-2
- Note 4: Refer to Table 406-1

Results of testing will be verbally furnished to the contractor within fifteen working days following the date of receipt of both an acceptable mix design proposal and the samples in the Agency laboratory. If the contractor elects to artificially adjust the gradation, then an additional two working days will be required for verification testing. The contractor will be verbally notified of failing test results within one working day of failure.

406-2.09 Mix Design Revisions. The contractor shall not significantly change his methods of crushing, screening, or stockpiling from that used during production of material used for mix design purposes without approval of the Engineer or submitting for approval, a new mix design proposal in accordance with Subsections 406-2.06 (A) and 406-2.07. Significant changes may include changes in the amount or type of materials rejected or wasted, changes in the amount of materials crushed, or reductions in the amount of crushed fines.

During production of asphaltic concrete, the Engineer shall independently test samples of the mineral aggregate. The mineral aggregate samples shall be obtained and tested in accordance with the requirements of Subsection 406-2.03 and Table 406-3. Should the results of the testing indicate values that fall outside the allowable deviation from the mineral aggregate characteristics specified in Table 406-6, Items 1 through 10, paving operations shall cease until a new mix design proposal, addressing the deficiencies and conforming to the requirements of Subsection 406-2.06 (A), is approved.

At any time after a mix design has been approved, the contractor may submit a new mix design proposal to the Engineer in accordance with Subsections 406-2.06 (A) and 406-2.07. If the revised mix design proposal is determined to meet all the requirements, the Engineer will approve the proposal and it shall be the approved mix design.

During the production of asphaltic concrete, the contractor, on the basis of field test results, may request a change to the approved mix design Target Values. The Engineer will evaluate the proposed changes and notify the contractor verbally of his decision within three working days of the receipt of the request. This verbal notification will be promptly verified, in writing, by the Engineer. If approved, the revised Target Values will be applied to the samples immediately following the request for Target Value changes. If the Engineer determines that the test results indicate that the asphaltic concrete previously sampled will perform satisfactorily, the Engineer may apply the revised Target Values to samples taken prior to the request for the Target Value change(s).

If, at any time, changes are made in the source of asphalt cement, source(s) of mineral aggregate, or proportional changes, in violation of approved mix design stipulations, production shall cease until the contractor has approval for a new mix design or complies with the approved mix design.

406-2.10 Time and Cost for Mix Designs and Verification Testing. The number of working days established for completion of the work includes fifteen days for the required verification of the first mix design proposal. Should this proposal be disapproved, the contract time shall be extended, if requested, for no more than 15 working days for formulating one new mix design proposal and verification testing by the Agency. Additional contract time will not be granted for subsequent mix design proposals and associated verification testing.

Once a mix design proposal has been verified and approved by the Engineer, the costs associated with verification testing for subsequent mix design proposals requested by the contractor shall be borne by the contractor.

406-2.11 Acceptance of Materials.

(A) General. The contractor's attention is directed to the requirements of the Standard Specifications in Subsection 105-12 under Removal of Unacceptable and Unauthorized Work and Section 110, Corrective Requirements For Deficiencies. The Agency reserves the right to suspend the work should the following occur:

- (1) Three or more consecutive Mixture Property or Compaction sample test results that are subject to pay adjustment(s).
- (2) Five or more Mixture Property or Compaction sample test results that are subject to pay adjustments within any ten consecutive samples.

If the Agency elects to suspend the work for any of these conditions, the contractor shall either submit a revised mix design in accordance with Subsection 406-2.06, or submit an engineering analysis. The engineering analysis shall detail the course of action necessary to correct deficiencies in the contractor's present production methods such that further production can be accomplished without penalties. If approved by the Engineer, the revised mix design or course of action proposed in the engineering analysis, shall be implemented, and the work may continue. Costs or delays due to the provisions of this subsection are not compensable.

The acceptance of the mineral aggregate gradation, the asphalt cement content and the effective voids shall be determined on the basis of the tests specified herein. The Engineer will determine the variance from the stated values of each mix characteristic based on the measured value of each characteristic. The Engineer shall use this variance to determine the appropriate monetary pay adjustment, or action, from Section 110, to be applied to the deficient mix quantity.

The Engineer, at any time, may increase the frequency of sampling and testing.

(B) Mineral Aggregate Gradation in Asphaltic Concrete. For each 500 tons or portion thereof of asphaltic concrete, at least one sample of mineral aggregate will be taken. The Engineer will split the sample in half, saving one half of the sample for 15 days. Samples will be taken in accordance with the requirements of Arizona Test Method 105 on a random basis, just prior to the addition of asphalt cement, by means of a sampling device which is capable of producing samples which are representative of the mineral aggregate. The device, which shall be approved by the Engineer, shall be furnished by the contractor. In any shift that the production of asphaltic concrete is less than 500 tons, at least one sample will be taken.

Samples will be tested for conformance with the mix design gradation target values in accordance with the requirements of Arizona Test Method 201.

The sand equivalent will be determined by the Engineer in accordance with the requirements of AASHTO T 176. The percent of crushed faces will be determined in accordance with Arizona Test Method 212.

(C) Asphalt Cement Content and Effective Voids. For each 500 tons or portion thereof of asphaltic concrete, at least one sample of the asphaltic concrete will be taken on a random basis. The Engineer will split the sample in half, saving one half for 15 days. Samples will be taken in accordance with the requirements of Arizona Test Method 104, Section 2, or ASTM 3665 current on the date of bid award.

The asphalt cement content will be determined in accordance with the requirements of Arizona Test Method 421 or Interim Arizona Test Method 427, using an ignition furnace. The asphalt cement content obtained will be compared to the mix design target value.

Marshall density and maximum theoretical density shall be tested in accordance with the requirements of Arizona Test Method's 410 (e) and 417 (d). Effective voids shall be determined in accordance with the requirements of Arizona Test Method 424, Section 2.

(D) Referee Testing. In the event the contractor elects to question the results obtained for a particular sample, the contractor may make a written request for additional testing of the sample within 15 days after the sample was obtained. The contractor may request additional testing for either the mineral aggregate gradation of the aggregate sample or the asphalt cement content and effective voids of the hot mix sample, or both. The additional testing shall be performed in an independent approved laboratory designated by the Engineer. The testing of the samples will be performed by the independent laboratory without knowledge of the specific project conditions such as the identity of the contractor or mix design laboratory, the test results obtained by the Agency or the mix design targets. The samples previously saved will be tested as specified in Subsection 406-2.11 (B) and (C). A new Total Pay Adjustment Amount will be determined for the sample. The results of the additional testing will be binding on both the contractor and the Agency. The Agency will pay for the testing; however, if the dollar pay adjustment amount of the sample does not improve or is reduced, or the sample remains in reject, payment to the contractor for asphaltic concrete, after the application of all penalties shall be reduced by an amount equivalent to the cost of the testing.

406-3 CONSTRUCTION DETAILS

406-3.01 Quality Control. Quality control shall be the responsibility of the contractor. The Engineer reserves the right to obtain samples of any portion of any material at any point of the operations for testing.

406-3.02 Stockpiling. The contractor will not be allowed to feed the hot plant from stockpiles containing less than two full days of production, unless only two days production or less remain to be done or special conditions exist where the Engineer deems this requirement waived.

Mineral aggregate and recycled asphalt pavement (RAP), if utilized, shall be separated and stockpiled so that segregation is minimized. Construction of stock piles shall conform to the requirements of Subsection 1006-2.06 (A) (1), (3) and (4).

406-3.03 Proportioning. Mixing plants shall conform to the requirements of AASHTO M 156, except as modified herein. The contractor shall provide documentation by calibration charts or other approved means that the mineral aggregate, recycled asphalt pavement (RAP), if utilized, asphalt cement and mineral admixture is being proportioned in accordance with the approved mix design.

If a mineral admixture is necessary to produce asphaltic concrete that meets the design criteria, the mineral admixture shall be mechanically mixed with the mineral aggregate prior to combining the mineral aggregate and asphalt cement. The Engineer may direct a spray of water be applied either

to control the loss of the mineral admixture or to comply with any mix design requirements for set mixing of aggregate and admixture.

If a drum mix plant is used, the mineral admixture shall be added and thoroughly mixed by means of a mechanical mixing device prior to the mixture entering the drum drier. The mineral mixture shall be weighed across a weigh belt or an approved alternative weighing system, with a weigh totalizer prior to entry into the mechanical mixing device. The mechanical mixing device shall be a pugmill type mixer consisting of at least two motorized shafts with mixing paddles. The mixing device shall be designed such that the mixture of aggregate and admixture is moved in a near horizontal direction by the mixing paddles without the aid of conveyor belts for a distance of at least 3 feet. Mixing devices which permit the aggregate to fall through mixing blades onto a belt or chute are not acceptable. The mixing device's rated capacity in tons per hour shall not be exceeded by the rate of aggregate feed to the mixer. The mixer shall be constructed to prevent the leakage of the contents. The mixer shall be situated in the aggregate delivery system at a location where the mixed material can be readily inspected on a belt prior to entry into the drum. The mixing device shall be capable of effective mixing in the full range of asphaltic concrete production rates. If a batch plant is used, the mineral admixture shall be added and thoroughly mixed in the pugmill prior to adding asphalt cement.

The contractor shall furnish daily documentation to the Engineer that the required amount of mineral admixture has been incorporated into the asphaltic concrete.

A positive signal system and a limit switch device shall be installed in drum drier plants at the point of introduction of the admixture. The positive signal system shall be placed between the metering device and the drum drier, and utilized during production whereby the mixing shall automatically be stopped if the admixture is not being introduced into the mixture.

Unless specified in the mix design approved for the project, no fine material which has been collected in the dust collection system shall be returned to the mixture unless the Engineer, on the basis of tests, determines that all or a portion of the collected fines can be utilized. If the Engineer so determines, he will authorize, in writing, the utilization of a specific proportion of the fines; however, authorization will not be granted unless the collected fines are uniformly metered into the mixture.

Mineral aggregate, recycled asphalt pavement (RAP), if utilized, mineral admixture, and asphalt cement shall be proportioned by volume, by weight, or by a combination of volume and weight.

When mineral aggregate, recycled asphalt pavement (RAP), if utilized, mineral admixture, and asphalt cement are proportioned by weight, all boxes, hoppers, buckets or similar receptacles used for weighing materials, together with scales of any kind used in batching materials, shall be insulated against the vibration or movement of the rest of the plant due to the operation of any equipment so that the error in weighing with the entire plant operating shall not exceed two percent for any setting nor one and on-half percent for any batch. Bituminous material shall be weighed in a heated, insulated bucket suspended from a springless dial scale system.

When mineral aggregate, recycled asphalt pavement (RAP), if utilized, mineral admixture, and asphalt cement are proportioned by volume, the correct portion of each mineral aggregate size introduced into the mixture shall be drawn from the storage bins by an approved type of continuous feeder which will supply the correct amount of mineral aggregate and recycled asphalt pavement (RAP), if utilized, in proportion to the asphalt cement and so arranged that the proportion of each mineral aggregate size can be separately adjusted. The continuous feeder for the mineral aggregate and recycled asphalt pavement (RAP), if utilized, shall be mechanically or electrically actuated.

406-3.04 Drying and Heating. A recording pyrometer or other approved recording thermometric instrument sensitive to a rate of temperature change not less than 10° F per minute

shall be placed at the discharge chute of the drier so as to record automatically the temperature of the asphaltic concrete or mineral aggregate. A copy of the recording shall be available to the Engineer at the end of each shift.

The moisture content of the asphaltic concrete immediately behind the paver shall not exceed one percent. The moisture content will be determined in accordance with Arizona Test Method 406. Drying and heating shall be accomplished in such a manner as to preclude the mineral aggregate and recycled asphalt pavement (RAP) from becoming coated with fuel oil or carbon.

406-3.05 Mixing. The production of the plant shall be governed by the rate required to obtain a thorough and uniform mixture of the materials. Mixing shall continue until the uniformity of coating, when tested in accordance with the requirements of AASHTO T 195, is at least 95 percent.

A positive signal system shall be provided to indicate the low level of mineral aggregate and recycled asphalt pavement (RAP), if utilized, in the bins. The plant will not be permitted to operate unless this signal system is in good working condition. Each bin shall have an overflow chute or a divider to prevent material from spilling into adjacent bins.

The temperature of asphaltic concrete upon discharge from the mixer shall not exceed 325° F. If the asphaltic concrete is discharged from the mixer into a hopper, the hopper shall be constructed so that segregation of the asphaltic concrete will be minimized.

406-3.06 Placing and Finishing.

(A) General Requirements. The handling of asphaltic concrete shall at all times be such as to minimize segregation. Any asphaltic concrete which displays segregation shall be removed and replaced.

All wheels and tires of compactors and other equipment shall be wiped, when necessary, with an approved product in order to prevent the picking up of the asphaltic concrete.

Before asphaltic concrete is placed, the surface to be paved shall be cleaned of objectionable material, and a bituminous tack coat shall be applied, if directed by the Engineer.

A light coat of bituminous material shall be applied as directed to edges or vertical surfaces against which asphaltic concrete is to be placed.

The base or subgrade upon which the asphaltic concrete is to be placed shall be prepared in accordance with the applicable requirements for the material involved and maintained in a smooth and firm condition until placement. Asphaltic concrete shall not be placed on a frozen or excessively wet base or subgrade.

At any time, the Engineer may require that the work cease or that the work day be reduced in the event of weather conditions which would have an adverse effect upon the asphaltic concrete.

All asphaltic concrete shall be placed either as a leveling course or as a surfacing course. Leveling courses are defined as courses placed for the primary purpose of raising an existing paved or unpaved surface to a smooth plane. Surfacing courses are defined as courses placed to serve either as the traffic surface or as a surface upon which a finishing course or seal coat is to be placed.

The thickness of leveling and surfacing courses will be shown on the project plans. No change in thickness will be allowed without the written approval of the Engineer. When the project plans indicate a leveling course or surfacing course thickness greater than 4 inches, that course shall be placed in multiple lifts of equal thickness with no single lift having a compacted thickness of more than 4 inches.

The contractor shall furnish a delivery ticket for each type of asphalt concrete used in the construction of any project. The minimum information to be shown on each delivery ticket shall be the ticket number, date, project name, truck number, truck tare weight, truck gross weight, net tons, time of loading, and type of mix by name. Contractor product code numbers will not preclude or be an acceptable substitute for this information. An authorized representative of the contractor shall be responsible for each delivery ticket and shall sign each delivery ticket accepting the contractor's responsibility for the asphaltic concrete. The contractor shall furnish the delivery ticket to the Engineer at the time of placement.

(B) Hauling Equipment. The mixture shall be transported from mixing plants to the work site in tight vehicles having clean, smooth beds.

The inside surface of the vehicles used for the transportation of plant mixes shall be lightly coated, just before the vehicles are loaded, with either a whitewash of lime and water, soap solutions or detergents, as approved by the Engineer.

After application, excess fluid shall be drained from the truck bodies.

(C) Loading Asphaltic Concrete into the Paving Machine. If the asphaltic concrete is dumped from the hauling vehicles directly into the paving machine from trucks, care shall be taken to avoid jarring the machine or moving it out of alignment. No vertical load shall be exerted on the paving machines by the trucks. Trucks, while dumping, shall be securely attached to the paving machine.

If the asphaltic concrete is dumped upon the surface being paved and subsequently loaded into the paving machine, the loading equipment shall be self-supporting and shall not exert any vertical load on the paving machine. Substantially all of the asphaltic concrete shall be picked up and loaded into the paving machine.

(D) Placing and Finishing Asphaltic Concrete by Means of Self-Propelled Paving Machines. All courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines except under certain conditions or at certain locations where the Engineer deems the use of self-propelled paving machines impracticable.

In order to achieve, as far as practicable, a continuous operation, the speed of the paving machine shall be coordinated with the production of the plant.

Self propelled paving machines shall be provided with an activated screed or strike-off assembly. The machine shall be capable of spreading and finishing courses of bituminous plant mix material in lane widths applicable to the specified typical section and thicknesses shown on the project plans. When screed extensions are permitted by the Engineer for placement of mainline pavement, such extensions shall be of the same design as the main screed. The screed or strike-off assembly shall be heated as necessary to produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture. When laying mixtures, the paver shall be capable of operating at forward speeds consistent with satisfactory placement of the mixtures.

Screeds shall include any strike-off device operated by tamping or vibrating action which is effective without tearing, shoving or gouging the mixture and which produces a course with a uniform texture and density for the full width being paved. Screeds shall be adjustable as to height and crown and shall be equipped with a controlled heating device for use when required.

Tapered sections not exceeding 8 feet in width, or widened sections not exceeding 4 feet in width may be placed and finished by other means as approved by the Engineer.

The mixture shall be laid upon an approved clean, dry surface, spread and struck off to the established grade and elevation. Approved bituminous pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable. Bituminous pavers shall be in the charge of an experienced operator.

If there are areas to be paved which are small and scattered, a paver may be dispensed with and the course spread by hand methods if approved by the Engineer. For such areas, the mixture shall be dumped, spread and leveled to give the required section and compacted thickness.

Before any rolling is started, the loose mat shall be checked, any irregularities adjusted, and all unsatisfactory material shall be removed and replaced.

(E) Automatically Actuated Control System. Except under certain conditions or at certain locations where the Engineer deems the use of automatic controls impracticable or unnecessary, all courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines equipped with an automatically actuated control system.

The system shall control the elevation of the screed at each end by controlling the elevation of one end directly and the other end indirectly, either through controlling the transverse slope or alternately, when directed, by controlling the elevation of each end independently.

The controls shall automatically adjust the screed and increase or decrease the mat thickness to compensate for irregularities that are in the surface being paved. The controls shall be capable of maintaining the proper transverse slope and be readily adjustable so transitions and super-elevated curves can be satisfactorily paved. The controls shall operate from suitable fixed or moving references as prescribed herein.

The transverse slope and longitudinal grade screed controls of the bituminous paver may be manually adjusted, where permitted by the Engineer, and according to the requirements specified herein.

The paving machine(s) shall be at the job site or locally available sufficiently ahead of the start of paving operations to allow for examination by the Engineer. Any paving machine found worn or defective either before or during its use shall be immediately repaired to the satisfaction of the Engineer or replaced.

The control system shall be capable of working with the following devices:

Ski-type device at least 30 feet in length, supported throughout its entire length.

Short ski.

500 feet of control line.

Joint matcher shoe.

When the control line is used it shall be set and maintained taut by the contractor to the grade and alignment established by the Engineer.

Failure of the control system to function properly shall be cause for the suspension of the asphaltic concrete operations if so directed by the Engineer.

406-3.07 Joints. The finished pavement at all joints shall comply with the surface smoothness requirements, specified in Subsection 406-3.10, when tested with a straightedge placed across the joint, and exhibit the same uniformity of texture and compaction as other sections of the course.

The placement of successive courses shall be such that all joints are offset at least 6 inches from the joint of the lower pavement course, unless otherwise approved by the Engineer.

(A) Transverse. The placement of the courses shall be as continuous as possible to limit the number of transverse joints. The transverse joints in adjacent lanes shall be staggered a minimum of 10 feet. The transverse joint shall be formed by cutting back on the previous run to expose the full depth of the course. The exposed edge of the existing course that will become part of the joint shall be the full thickness of the course, straight and vertical. The joint shall be formed by using a power driven saw or other approved apparatus to cut, in a neat line, the cold existing pavement course to its full thickness to expose a fresh face.

(B) Longitudinal. Placement of the surface course shall be carefully planned to assure that the longitudinal joints in the surface course will correspond with the edges of proposed traffic lanes. Other joint arrangements will require approval of the Engineer. When traffic is maintained on the roadway during paving operations, the mixture shall be laid such that no more than 100 feet of the pavement edge will be exposed at the end of the working day. The Engineer may permit an exposed edge of this type in excess of 100 feet providing that the edge is adequately protected against damage by vehicles and equipment.

Joints shall be formed by a slope shoe and subsequently hot lapped. The edge of the asphaltic concrete mat, comprising the initial placement for the longitudinal joint, shall be formed using a sloping metal plate attached to the edge of the self propelled paving machine's screed. The beveled edge produced by the sloping plate shall have a six inch horizontal length for a mat thickness of 2 inches. Mat thicknesses other than 2 inches shall use a sloping metal plate that provides a horizontal length acceptable to the Engineer.

When compacting the initial mat, the wheel of the compactor shall not extend more than two inches onto the beveled area.

Prior to placement of the adjoining asphaltic concrete mat, the contractor shall have an infrared heater mounted to the side of the paving machine. The infrared heater shall pre-heat and soften the beveled edge of the previously placed material to the satisfaction of the Engineer. The adjacent mat shall be placed such that the screed of the paving machine overlaps the beveled edge area of the first mat and extends onto the initial mat a minimum of 2 inches beyond the beveled area.

The excess asphaltic concrete that extends onto the finished surface of the initial mat shall be pushed back onto the freshly placed mat using hand lutes. Care shall be taken when conducting hand work to avoid indenting the area along the longitudinal joint or causing segregation to the freshly placed asphalt concrete material. The longitudinal joint shall be compacted while the mixture is still hot, in conformance with the temperature requirements of Subsection 406-3.08 (D).

When compacting along the longitudinal joint, the wheels of the compaction equipment shall extend onto the previously placed mat at least 2 inches.

The placement of longitudinal joints in successive courses shall be such that joints are offset at least one foot from the joint of the immediate underlying pavement course, unless otherwise approved by the Engineer.

406-3.08 Compaction.

(A) Temperature Requirements. Asphaltic concrete placed in nominal thicknesses of 1-1/2 inch or less shall be placed only when the temperature of the surface on which the asphaltic

concrete is to be placed is at least 65° F. Asphaltic concrete immediately behind the laydown machine shall be a minimum of 250° F.

Asphaltic concrete placed in nominal thicknesses greater than 1-1/2 inches shall be placed only when the ambient temperature is at least 40° F and rising. Placement shall be stopped when the ambient temperature is below 45° F and falling. Asphaltic concrete immediately behind the laydown machine shall be a minimum of 250° F.

(B) Equipment. Compacting and smoothing shall be accomplished by the use of self-propelled equipment. Compactors shall be pneumatic tired and/or steel wheel.

The rollers shall be in good mechanical condition, and capable of operating at speeds slow enough to avoid displacement of the mixture. The number and weight of rollers shall be sufficient to satisfactorily compact the mixture while it is still in a workable condition. The use of equipment which results in excessive crushing of aggregate will not be permitted. Vibratory rollers shall be of a type specifically designed for the compaction of bituminous concrete.

Compactors shall be operated in accordance with the manufacturer's recommendations. Compactors shall be designed and properly maintained so that they are capable of accomplishing the required compaction.

Static steel wheel compactors used on mainline paving shall weigh not less than eight tons.

Pneumatic tired compactors shall be the oscillating type with at least seven pneumatic tires of equal size and diameter. Wobble-wheel compactors will not be permitted. The tires shall be spaced so that the gaps between adjacent tires will be covered by the following tires. The tires shall be capable of being inflated to 90 pounds per square inch and maintained so that the air pressure will not vary more than five pounds per square inch from the designated pressure. Pneumatic tired compactors shall be constructed so that the total weight of the compactor will be varied to produce an operating weight per tire of not less than 5,000 pounds. Pneumatic tired compactors shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the compaction process.

(C) General Requirements. Immediately after the bituminous mixture has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking or shoving. When the compaction procedure used by the contractor fails to produce results acceptable to the Engineer, the procedure shall be adjusted to obtain the desired results. Rollers shall move at a slow and uniform speed in accordance with the manufacturer's recommendations.

Any displacement occurring as a result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture as required. Care shall be exercised in rolling not to displace the line and grade of the edges of the bituminous mixture. To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with small quantities of detergent or other approved material, but in no case shall a solvent having any affect upon the bituminous pavement be used.

Along forms, curbs, headers, walls and other areas not accessible to the rollers, the mixture shall be thoroughly compacted with mechanical tampers as directed by the Engineer.

Suitable means shall be provided to keep pavers and other equipment and tools free from bituminous accumulations. The surface of the pavement shall be protected from drippings of oil, kerosene, or other materials used in paving and cleaning operations.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture which shall be compacted to conform with the surrounding area. Any area showing the excess of deficiency of bituminous material shall be corrected to the satisfaction of the Engineer.

(D) Rolling Method Procedure. For courses of 1-1/2 inches or less in nominal thickness, compaction shall consist of an established sequence of coverage using specified types of compactors. A pass shall be defined as one movement of a compactor in either direction. Coverage shall be the number of passes necessary to cover the entire width being paved.

The rolling sequence, the type of compactor to be used and the number of coverages required shall be as follows:

Rolling Sequence	Type of Compactor		No. of Coverages	
	Option		Option	
	No. 1	No. 2	No. 1	No. 2
Initial	Static Steel	Vibrating Steel	1	1
Intermediate	Pneumatic Tired	Vibrating Steel	4	2-4*
Finish	Static Steel	Static Steel	1-3	1-3

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

The Engineer shall select the option for compaction and, when pneumatic tired compactors are used, will verify, the tire pressure is in accordance with the manufacturer's recommendations.

When Option No. 1 is used, one pneumatic tired roller shall be furnished for each 300 tons of asphaltic concrete placed per hour.

Steel wheel compactors shall not be used in the vibratory mode for courses of 1 inch or less in nominal thickness nor when the temperature of the asphaltic concrete falls below 180° F.

Initial and intermediate compaction shall be completed before the temperature of the asphaltic concrete falls below 200° F. All edges shall be rolled by a method approved by the Engineer.

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

(E) Compaction Control. Compaction control for courses greater than 1 1/2 inches in nominal thickness shall be defined as the responsibility of the contractor, and shall be based on the anticipated rate of production and placement to determine the number and types of compactors and the sequence and manner in which they are to be used to achieve the specified density.

Responsibility for compaction control shall rest solely with the contractor.

Compaction shall be determined from samples taken utilizing mechanical coring equipment in accordance with the requirements of Arizona Test Method 104, Section 3. Cores shall be a minimum of four inches in diameter. The core samples shall be tested for acceptance in accordance with the requirements of Arizona Test Method 415. Compaction of a course shall continue until the compacted density of the Asphaltic Concrete achieves a minimum of 95 percent of the laboratory compacted density as determined by Arizona Test Method 410a. The laboratory density shall be the average of the laboratory densities determined from samples taken from the same day's production.

Compaction, other than finish rolling, shall be completed before the temperature of the asphaltic concrete falls below 200° F . All edges shall be rolled by a method approved by the Engineer.

406-3.09 Compacting Miscellaneous Items and Surfaces. Asphaltic concrete used in the construction of curbs, spillways, and spillway inlets, ditches, catch basin entrances, median strips, sidewalks or other similar miscellaneous items or surfaces shall be compacted using compactors, hot hand tampers, smoothing irons, mechanical vibrating hand tampers or with other devices to the extent considered necessary by the Engineer.

406-3.10 Surface Requirements and Tolerances. All courses of asphaltic concrete shall be compacted as required, smooth and reasonably true to the required lines, grades, and dimensions.

Leveling course surfaces shall not vary more than 1/4 inch from the lower edge of a 10 foot straightedge when the straightedge is placed parallel to the center line of the roadway.

Surfacing course surfaces shall not vary more than 1/8 inch from the lower edge of a 10 foot straightedge when the straightedge is placed parallel to the center line of the roadway, nor shall the surface vary more than 1/4 inch on any portion of the pavement surface when a 10 foot straightedge is placed transverse to the center line.

406-4 METHOD OF MEASUREMENT

Asphaltic concrete will be measured by the ton for mainline paving and by either the ton or the square yard for miscellaneous areas of paving as noted in the bidding schedule, for the specific use listed therein.

When measured on the basis of tonnage, such measurement will be for asphaltic concrete actually used, complete-in-place, and shall include the weight of mineral aggregate, recycled asphalt pavement (RAP), if utilized, asphalt cement, and approved admixtures.

Measurement, as provided above, will include asphaltic concrete used in the construction of intersections, turnouts, driveways, median strips, sidewalks, multi-use paths or other miscellaneous items or surfaces.

406-5 BASIS OF PAYMENT

The accepted quantities of asphaltic concrete, measured as provided above, will be paid for under the appropriate bid items at the contract unit price or adjusted unit price, complete-in-place.

Due to fluctuating asphalt cement prices the unit price for asphaltic concrete will be adjusted based on the criteria and formula below.

The price for bituminous material or asphalt cement used in the asphalt concrete mixture will be determined monthly by the Agency based on the selling prices of asphalt cement published by the Arizona Department of Transportation, Contracts and Specifications Section (ADOT memorandum). The established price for bituminous material used in the asphaltic concrete mixture will be made available by the Agency upon request.

The "initial cost" for asphalt cement of all types, grades, etc. on projects will be the established price based on the ADOT memorandum for the selling prices during the month the bids are opened.

An adjustment in compensation will be made for either an increase or decrease in the price of asphalt cement as shown in the latest memorandum, current as of the date of use, as compared to the "initial cost".

The tons of asphalt cement that are paid for on an invoice basis to which the adjustment will be applicable are the tons which have been delivered to the project and subsequently incorporated into the work. The adjustment will be applicable on the date of use.

No additional compensation will be made for any additional or increased charges, costs, expenses, taxes, etc., which the contractor may have incurred since the time of bidding and which may be the result of any increase in the "initial cost" of asphalt cement.

After the expiration of the specified completion time set forth in the contract or as may be extended in accordance with the provisions of Subsection 108-8 of the Standard Specifications any adjustment in compensation made for asphalt cement incorporated into the work will be on the basis of the price of asphalt cement shown in the latest memorandum on the date of the expiration of the specified completion time, as hereinbefore specified.

Adjustment Formula:

("Date of Use" cost of asphalt cement - "Initial" cost of asphalt cement) x % asphalt cement in mix design

EXAMPLE: "Initial" cost at bid opening = \$100 per ton
"Date of Use" cost = \$120 per ton
% asphalt cement in mix design = 5.2

Unit Price adjustment to Asphaltic Concrete = $(120-100) \times 0.052$
= 20×0.052
= \$1.04 increase in the contract unit price for asphaltic concrete

Should testing determine the asphalt cement deficient in meeting the requirements specified in Section 1005 of the Standard Specifications, the asphaltic concrete, representing the half-shift or half-shifts in which such a deficient material was utilized, shall be evaluated as to acceptance in accordance with the requirements of Subsection 110-2.03.

Deficiencies in mineral aggregate gradation, asphalt cement content, asphaltic concrete thickness or compaction will be evaluated in accordance with the criteria established in Subsection 110-2.

ITEM NO. 5101401 – POTABLE WATER PIPE, PVC, 1”, DR 14 (CL 305)

1. DESCRIPTION

The work under this item shall consist of furnishing all labor, equipment and materials required to install Polyvinyl Chloride (PVC) pipe at the locations shown on the project plans, in accordance with the details shown on the project plans, and in accordance with the requirements of these Special Provisions.

2. MATERIALS

Pressure Class. Unless otherwise specified on the plans or in the special specifications, PVC pipe shall be pressure class 305, dimension ratio 14 (DR 14)(cast iron O.D.).

All pipe materials shall conform to the requirements of Subsection 510-3.04(D)(4) (pg. 330).

The materials and costs related to connecting to existing pipe shall be considered included in the cost of pipe.

3. CONSTRUCTION REQUIREMENTS

Installation of the pipe shall be in accordance with the requirements of Subsection 510-3 (pg. 318), AWWA Manual 23, and these Special Provisions.

4. METHOD OF MEASUREMENT

PVC pipe will be measured by the unit Linear Foot (LF) in accordance with Subsection 510-4 (pg.349).

5. BASIS OF PAYMENT

The accepted quantities of PVC pipe, measured as provided above, shall be paid for as described in Subsection 510-5 (pg. 350).

(515UTL_POTHOLE, 6/12/12)

ITEM NO. 5150005 - UTILITY POTHOLING, Depth less than Twelve Feet (12')

ITEM NO. 5150007 - UTILITY POTHOLING, Depth Twelve Feet (12') and greater

1. DESCRIPTION

The work under these bid items, herein after referred to as “potholing”, consists of furnishing all labor, equipment, and materials required in exposing utility facilities as required under State regulations (i.e. “Blue Stake”) and as directed by the Engineer.

2. MATERIALS

All materials shall conform to the requirements of the Agency for backfilling and patching existing roadway surfaces.

3. CONSTRUCTION REQUIREMENTS

All procedures for potholing such as, but not limited to, traffic control, cutting existing roadway surfaces, backfill, and patching existing roadway surfaces, shall conform to the requirements of the Agency.

Areas disturbed during potholing are to be restored to their original condition.

Unless otherwise agreed to by the Engineer, potholing shall be done no less than fourteen (14) calendar days in advance of conducting an excavation or construction to avoid possible delay in the progress of the Work. Should a utility facility or obstruction be uncovered and determined to conflict or interfere with the Work, the contractor shall notify the Engineer and facility owner (if known) immediately

The contractor shall maintain a record of pothole information including utility name, horizontal location, vertical elevation, size, and material type of utility facility uncovered. If a pothole does not uncover a utility facility, the pothole should be noted as “dry”. All pothole locations are to be surveyed and tied to the horizontal and vertical control unless otherwise directed by the Engineer. The contractor shall provide pothole information to the Engineer upon request.

4. METHOD OF MEASUREMENT

Potholing will be measured as a unit for each pothole whether or not an underground utility facility was uncovered.

No measurement will be made for potholes not approved by the Engineer.

5. BASIS OF PAYMENT

The accepted quantities of potholing, measured as provided above, will be paid for at the contract unit price per each. The price shall include full compensation for the work complete, including traffic control, area restoration, pavement cutting, excavating, backfilling, pavement patching, and surveying unless construction surveying is provided by the Agency.

No payment will be made for potholes not approved by the Engineer.

Price adjustment for variation in total bid quantity per Subsections 109-3 and 109-4 of the Standard Specifications do not apply to work under these bid items.

(515UTL_IMPACT_ALLOWANCE, 9/13/12)

ITEM 5150101 - UTILITY IMPACTS ALLOWANCE

1. DESCRIPTION

The work under this item will be at the direction of the Engineer and shall consist of furnishing all labor, equipment, and materials required for modifying, adjusting, protecting, and supporting utility facilities not included in the bid documents, and which impact, interfere or conflict with the construction of the project.

2. MATERIALS (None Specified)

3. CONSTRUCTION DETAILS

All work under this item shall be as directed by the Engineer.

4. METHOD OF MEASUREMENT

The work under this item shall be completed on an extra work basis, in conformance with the provisions of Subsection 109-5 of these Special Provisions.

5. BASIS OF PAYMENT

Payment for unforeseen utility relocation impacts will be made in accordance with the provisions of Subsection 109-5 of these Special Provisions.

SECTION 601 CONCRETE STRUCTURES:

601-3.02(A) Design and Drawings: the second to last paragraph of the Standard Specifications is revised to read:

Modifications of girders to support falsework and forming will not be allowed except as approved by the Engineer. This includes connections of any type in girder webs and flanges to support deck forming. Through-holes of any type in girder flanges will not be permitted. When modification of girders to support the deck falsework and forming has been approved by the Engineer, shop drawings for both the girders and the falsework and forming shall be submitted concurrently so that the review and approval of the drawings can be coordinated.

601-3.05(D) Finishing Bridge Deck: of the Standard Specifications is revised to read:

(1) General:

Bridge decks that will be covered with a special riding surface or waterproofing membrane shall be lightly textured with a burlap drag during the plastic concrete state, after the finishing operation and smoothness test, as specified below, and prior to the curing process. Bridge decks exposed directly to traffic shall be grooved or tined as specified in Subsection 601-3.05(D)(2).

The finishing operation shall be completed before the water sheen disappears. The deck surface shall be finished to a smooth floated surface, free of mortar ridges, hollows, and any other projections. Water shall not be applied to the deck surface at any time during floating or finishing except that a fine fog mist may be applied as approved by the Engineer.

Fogging equipment shall be capable of applying water to the concrete in form of a fine fog mist in sufficient quantity to curb the effects of rapid evaporation of mixing water from the concrete. The fine fog mist shall be applied at a distance not to exceed 12 inches from the surface. Application by brushes or any other method that concentrates water will not be permitted.

Excess concrete, mortar, or paste produced by the finishing process shall not be discarded into areas of the bridge deck that will be covered by sidewalks, medians, curbs, or parapets, or otherwise incorporated into the work, but shall be removed and disposed of properly.

The finished surface of the concrete shall be tested with a 10 foot straightedge placed on the deck surface. For deck surfaces exposed directly to traffic, the surface plane shall not vary by more than 1/8 inch, as measured from the bottom of the straightedge. Deck surfaces to be covered with a special riding surface or waterproofing membrane shall not vary by more than 1/4 inch, as measured from the bottom of the straightedge.

Deck surface areas tested during the plastic state that do not meet the smoothness criteria specified above shall be corrected immediately, refinished, and retested. All corrected areas shall be textured to match the finish of the surrounding deck surface.

Should the deck surface require additional corrections or repair after the concrete has cured, as determined by the Engineer, such work shall be in accordance with Subsection 105.04. If the bridge deck corrections require mechanical grinding, all corrected areas shall be re-textured with sawed grooves to match the finish of the surrounding deck surface. After such corrective grinding and re-grooving is completed, the minimum remaining cover over the reinforcing steel shall be not less than 2 1/4 inches.

(2) Grooving and Tining:

(a) General Requirements:

Unless longitudinal grooving is specified on the plans, the contractor shall texture the bridge deck, approach slab, and anchor slab with transverse grooves.

Grooves shall be placed with tine brooming while the concrete is still plastic; however, if an item for Bridge Deck Texturing (Sawed Grooves) is included in the bidding schedule, the bridge deck, approach slab, and anchor slab shall be textured with sawed grooves after the concrete has been cured.

A uniform textured surface of grooves shall be installed for the entire length of the bridge deck, approach slabs, and anchor slabs, except for those areas occupied by devices installed on the deck.

Widened bridge decks shall be finished to match the existing deck surface texture.

Bridge sidewalks shall be textured to a light broomed finish during the plastic concrete state.

(b) Tine Brooming:

Tine broom texturing shall occur after the Engineer has accepted the smoothness of the finished surface, and during the plastic concrete state, but prior to the curing process.

The tined grooves shall terminate at 12 inches \pm 3 inches from the face of curbs, bridge rails or median dividers along each edge of the bridge deck surface. Texturing shall be stopped 9 inches to 12 inches from any devices installed on the bridge deck, including scuppers and expansion devices, whether perpendicular to the tined grooves or skewed.

The apparatus producing the texture grooves in the plastic concrete shall be mechanically operated from an independent self-propelled bridge. The bridge shall be used for texturing only, and shall be supported on the same steel rails used for the screed equipment. The tine brooming equipment shall be capable of producing grooves which meet the dimensional requirements specified in Subsection 601-4.01.

The timing of the texture operation in the plastic concrete is critical. The texturing shall be completed before the surface is torn or unduly roughened by the texturing operation. Grooves that close following the texturing will not be permitted.

Hand tine brooms shall be provided and available at the job site at all times when texturing plastic concrete.

(c) Sawed Grooves:

(1) General:

Sawed groove texturing shall occur after the Engineer has accepted the finished surface, and after the concrete has cured for at least seven days, but before the roadway is opened to traffic. Grooving shall occur prior to the application of any concrete sealer if a sealer is specified in the contract documents.

A self-propelled texturing machine built for grooving of concrete surfaces shall be used for making the sawed grooves. The saw grooving equipment shall be capable of producing grooves which meet the dimensional requirements specified in Subsection 601-4.01.

Sawed groove texturing shall terminate at 12 inches \pm 3 inches from the face of curbs, bridge rails or median dividers along each edge of the bridge deck surface. Texturing shall be stopped 9 inches to 12 inches from any devices installed on the bridge deck, such as scuppers and expansion devices that are perpendicular to the grooves.

For skewed expansion devices on the bridge deck, the direction of the grooves as specified above shall not be altered, and texturing shall terminate no closer than six inches nor farther than four feet from the joint armor. The maximum gap in texturing, from one side to other of skewed expansion devices, shall not exceed five feet.

Overlapping of grooves by succeeding passes will not be permitted.

(2) Equipment:

The self-propelled texturing machine shall have diamond-tipped circular saw blades mounted on a multi-blade arbor, and shall have a depth control device that detects variations in the deck surface and adjusts the cutting head height to maintain the specified depth of the groove. The texture machine shall also include devices to control alignment. Single blade equipment may be authorized by the Engineer where multi-blade assemblies are not capable of sawing to within one foot of obstructions. Flailing or impact type grooving equipment shall not be used.

The grooving equipment shall be equipped with vacuum slurry pickup equipment which shall continuously pick up water and sawing dust, and pump the slurry to a collection tank.

(3) Construction:

The contractor shall submit a plan detailing the proposed layout of the texturing to the Engineer for approval at least seven days prior to the grooving operations. Spacing dimensions at the starting and ending point of each pass shall be noted. A description of the saw cutting equipment shall be included.

Prior to grooving operations, the contractor shall provide two gauges, designed for verification of groove depth, to the Engineer for approval. The gauges shall be accompanied by the manufacturer's instructions for their use. During grooving operations the contractor shall check the groove dimensions, under the observation of the Engineer, at random locations. If the minimum groove depth has not been achieved, the grooving operation shall stop and the necessary adjustments shall be made.

At the beginning of each work shift, the contractor shall furnish a full complement of saw blades for each texturing machine that are capable of cutting grooves of the specified width, depth, and spacing.

If during the work a single grooving blade on a machine becomes incapable of cutting a groove, the contractor shall continue work for the remainder of the work shift. The contractor will not be required to cut the groove omitted resulting from the failed blade. If two or more grooving blades on a machine become incapable of cutting grooves, the contractor shall cease operating the machine until it is repaired.

The contractor shall continuously remove all slurry from the equipment throughout the grooving operations with a vacuum pickup, and shall dispose of the slurry at an approved off-site location, and in accordance with applicable laws and ordinances for disposal. All textured areas shall be flushed with clear water as soon as possible to remove any slurry material not collected by the

vacuum pickup. Flushing shall be continued until all surfaces are clean and accepted by the Engineer.

The contractor shall repair all damage to the expansion devices caused by the grooving operation in a manner satisfactory to the Engineer. If the Engineer determines that the expansion device cannot be repaired in a manner which will allow proper functioning of the system, the contractor shall replace the device at no additional cost to the Department. The replacement shall be a new expansion device equal in all respects to the expansion device being replaced.

Damage to any other portion of the bridge deck, or to anything attached or embedded in the bridge deck, that is attributable to the contractor's operations shall be repaired in a manner satisfactory to the Engineer at no additional cost to the Department.

601-3.07 Supporting, Handling, and Transporting Precast Concrete Items: the title and text of the Standard Specifications are revised to read:

601-3.07 Supporting, Handling, Transporting, and Erecting Precast Concrete Items:

(A) General:

After prestressing, precast members for major structures shall be handled or supported at or near the final bearing points for storage.

Precast items shall be supported during transporting in a manner that will allow reasonable conformity to the proper bearing points. At all times, the items shall be handled or supported securely in an upright position.

Items that have been damaged in shipment will be rejected at the point of delivery.

Lifting devices shall not project above the surface of the item after placement unless they will be embedded in a subsequent concrete pour, will have a minimum concrete cover of two inches, and will not interfere with the placement of reinforcing steel or concrete.

(B) Bridge Girder Erection:

Girders shall be placed accurately on bearings to avoid creating eccentricities capable of initiating imbalance.

Girders with shapes that exceed a height to width ratio of two shall be temporarily braced. The girder width shall be determined from the outside dimension of the bottom flange.

The contractor shall secure such girders in position on the structure with temporary lateral bracing to resist loads as specified in the AASHTO Guide Design Specifications for Bridge Temporary Works. Lateral bracing shall be designed to allow for girder temperature movements. The bracing shall be placed prior to the release of the erection equipment from each girder.

Prior to erection of any girders, the contractor shall provide a lateral bracing plan, prepared and sealed by a professional engineer registered in the State of Arizona, for the Engineer's review. Such bracing plan shall be included with the working drawings specified in Subsection 105.03, and shall include supporting calculations. A girder pre-erection meeting will be scheduled following the review and prior to erection of any girders. All parties involved in the installation shall be represented, and no girders shall be placed until the plan has been approved.

No traffic shall be allowed under each newly erected girder until the girder has been laterally braced.

Temporary bracing shall remain in place until after permanent concrete diaphragms are installed at the bents, or the girder is integrated with a permanent feature that restricts the girder's lateral movement.

601-4.01 **Surface Texture:** of the Standard Specifications is revised to read:

The grooves for decks exposed directly to traffic shall be rectangular in shape and shall be 1/8 inch \pm 1/32 inch deep by 1/8 inch \pm 1/32 inch wide. Spacing of the grooves shall be 3/4 inches \pm 1/8 inch center to center. The textured groove depth will be measured in accordance with the requirements of Arizona Test Method 310.

601-5 **Method of Measurement:** the last paragraph of the Standard Specifications is revised to read:

No measurement or direct payment will be made for texturing of the bridge deck with a burlap drag or by tine brooming, the cost being considered as included in contract items.

Bridge Deck Texturing (Sawed Grooves), when included in the bidding schedule, will be measured to the nearest square yard. The area will be determined by the length of the bridge, approach slabs, and anchor slabs, multiplied by the width of the roadway between the face of curb or bridge rail on each side, less 2.0 feet. The quantity shown on the bidding schedule shall be considered final and will not be re-measured unless changes are specified by the Engineer, or if the Engineer or contractor determines that the constructed area varies by an amount greater or less than two percent of the quantity shown on the bidding schedule. Such adjustments, if required, shall be in accordance with Subsection 104.02.

No measurement or direct payment will be made for the temporary bracing of erected girders, or for preparation of the girder bracing plan, the costs being considered as included in contract items.

601-6 **Basis of Payment:** of the Standard Specifications is modified to add:

The accepted quantities of sawed groove texturing, measured as provided above, will be paid for at the contract unit price, complete in place, including all labor, tools, equipment and incidentals.

ITEM NO. 6014909 – PRECAST, PRESTRESSED BOX BEAM ERECTION

1. DESCRIPTION

The work under this bid item consists of furnishing all labor, equipment and materials required for access grading and pick-up, transporting, cleaning, fabricating and attaching anchor plates, and erecting salvaged precast, pre-stressed box beams as shown on the Plans and described herein.

2. MATERIALS

Structural steel for anchor plates and nelson studs shall conform to ASTM A36.

3. CONSTRUCTION REQUIREMENTS

Salvaged precast, pre-stressed box beams to be used on this project are located at the Pima County Storage Yard (Cal Portland Cement (CPC)-Southwest Materials 6601 N Casa Grande Hwy, Tucson, AZ 85741). The girders are located near the bottom of a CPC pit. CPC will grade a pad for use by the contractor to access the girders. The access pad will be on one-side, located immediately south of the girders. No other access point is available due to surrounding obstructions. It is the contractor's responsibility to utilize this pad or modify as needed to access the girders. Additional grading of the ramps and pad by the contractor is included in this item of work. The contractor shall coordinate any requirements of a crane operation.

The maintenance yard contains more salvaged box beams (approximately 30) than required for this project (21 box girders). The contractor shall lift, move, and place girders as needed for inspection and approval by the Engineer prior to transport. The contractor shall notify the Engineer and CPC one week prior to accessing the girders and to allow for the Engineer to review and select the salvaged box beams to be used on the project. The contractor shall restack remaining girders in similar arrangement as existing conditions. The contractor is made aware that special lifting and stacking requirements for structural stress distribution considerations may be required by the Engineer. The contractor shall transport girders from the maintenance yard to the project site and erect girders as shown on the plans.

With recent storm events, half the girders are resting in mud. As such, the cleaning of all girders will be necessary. The contractor shall remove all dirt, mud, debris or other detrimental material from all sides of the girders. The method of surface cleaning is subject to approval by the Engineer and shall include the use of a high-pressured water jet followed by a high-pressure air spray.

The cost for cleaning the girders and fabricating and attaching the anchor plates shall be considered part of the cost for erecting salvaged precast girders and no separate measurement or payment will be made for this work.

4. METHOD OF MEASUREMENT

Precast, Prestressed Box Beam Erection will be measured as a unit for each box beam erected.

5. BASIS OF PAYMENT

The accepted quantities of Precast, Prestressed Box Beam Erection, measured as provided above, will be paid for at the contract unit price per each. The price shall include full compensation for the work complete, including; pad and ramp grading, lifting, moving, cleaning, and loading of salvaged box beams at the maintenance yard for inspection, restacking the remaining box beams as required by the Engineer to address structural considerations, and loading, transporting, fabricating and attaching anchor plates, and erecting the salvaged box beams.

(604BRIDGE_EXP_JT, 7/12/12)

ITEM 6040201 BRIDGE EXPANSION JOINT

1. DESCRIPTION

The work under this item consists of furnishing and installing strip seal expansion joints in accordance with the project plans, this Special Provision, and the manufacturer's recommendations and instructions. Work shall include, but is not necessarily limited to, cleaning surfaces, furnishing and installation of frame rail with attachment devices, erection angles to maintain joint width and depth, providing and placing elastomeric concrete, providing strip seal expansion joint seating surface, furnishing and installing continuous neoprene strip seal, providing upturn at each end of the joint (if required), providing blockout in the concrete barrier for joint upturns (if required), miscellaneous steel cover plates, anchor bolts, and other miscellaneous items in accordance with the project plans and the requirements of these Special Provisions.

2. MATERIALS

Steel Frame Rails:

All steel frame rails shall be fabricated from ASTM A588 or A36 steel and shall provide a cross sectional area of 1.94 in².

The profile of the steel extrusion shall not include horizontal legs.

Frame rails welded together in any manner to gain their final shape are not allowable. Only steel retainer rails of one-piece construction will be permitted.

Neoprene Gland:

The manufacturer that supplies the expansion joint metal shall also be the manufacturer of the associated neoprene gland.

The sealing element shall be an extruded synthetic rubber utilizing virgin polychloroprene (neoprene) as the only polymer. The gland shall be tested and certified by the manufacturer to obtain the following properties:

Polychloroprene Material Properties:

PROPERTY	REQUIREMENT	METHOD
Tensile Strength, Min., psi (Mpa)	2000 (13.8)	D-412-62T
Elongation at break, Min.	250%	D-412-51T
Hardness, Durometer A	60 ± 5	D-2240 Modified
Ozone Resistance, 20% Elongation 300 pphm 104°F (40°C) (70 hrs.) Wipe surfaces with solvent to remove contamination	No cracks	D-1149
Heat Aging 70 hours at 212°F (100°C) Tensile Strength, Max. % decrease Elongation, Max % decrease Hardness, Max. Change	20 20 +10/-0	D-573
Oil Swell, ASTM Oil #3 70 hours at 212°F (100°C) Max weight increase	45%	D-471
Compression Set, 70 hours at 212°F (100°C)	40% max.	D-395 (B)
Low Temperature	Not brittle	D-746
Low Temperature Stiffening 7 days at +14°F (-10°C) Hardness Type A Durometer, Points change	0 to +15	

The gland shall be fabricated in the shop to fit the final dimensions of the joint as it occurs in the roadway. No field splices will be permitted.

Except as noted otherwise in this paragraph, the polychloroprene gland shall be shipped from the factory as one continuous piece. Molded shop splices for horizontal and vertical turns may be provided at the discretion of the manufacturer of the strip seal expansion joint system.

3. CONSTRUCTION REQUIREMENTS

Fabrication:

Fabrication of the strip seal expansion joint shall be performed by an AISC certified fabricator. All welding shall be performed in accordance with the Standard Specifications and D-1.5 of the AWS welding code. In the event of conflict between these two authorities, the AWS welding code shall govern.

The manufacturer of the strip seal expansion joints shall be a certified AISC Major Steel Bridge fabrication facility.

Welding procedures shall be submitted with shop drawings pursuant to Section 604-3.01 of these Special Provisions. The welding procedures shall identify in detail the procedures to be performed in fabricating the joint.

All steel surfaces not embedded in concrete shall be treated for corrosion protection by metalizing all of the steel surfaces. Backer rod shall be placed in the rail's seat cavity if painting is required.

The metal cavity of the expansion joint is to be fabricated utilizing a hot rolled technique. The cavity of the expansion joint shall not be machined.

The strip seal expansion joint manufacturer shall submit shop drawings for approval prior to fabrication. The shop drawings shall detail all dimensions, anchorages, welding procedures, and other data necessary to fabricate the joint. The shop drawings shall explicitly set forth the recommended means by which the strip seal expansion joint is to be aligned and set to grade.

Installation:

The Contractor shall strictly follow the manufacturer's recommendations and instructions as set forth in the shop drawings for setting the joint.

The neoprene gland will be shipped concurrent with the steel retainer rails and will be clearly identified as to the joint location corresponding to the gland. The Contractor shall be responsible for installing the neoprene gland in the field.

The contractor shall follow the manufacturer's installation instructions as set forth in the shop drawings and other published literature.

Polyurethane backer rods shall be placed in the seal cavity of the steel frame rails by the Contractor prior to placing concrete. The backer rod will remain in place until such time as the joint has been placed and final concrete placement has been made.

Supervision and Certification:

The strip seal expansion joint system shall be installed by the Contractor and continuously supervised by a qualified technical advisor from the approved bridge joint manufacturer.

The qualified technical advisor from the approved bridge joint manufacturer shall have recent experience in the installation of this type of strip seal joint system. The Contractor shall submit to the Engineer a written description of this experience for approval prior to the start of this work. The technical advisor shall provide a letter certifying the joint installation following completion.

4. METHOD OF MEASUREMENT

Strip seal expansion joints shall be measured as the distance along the centerline of the joint at the surface of the roadway or sidewalk from face-of-curb or barrier to face-of-curb or barrier. Measurement will be to the nearest linear foot. No measurement will be made for that portion of the deck joint assembly that extends through the curb or barrier. Portions of the deck joint assembly that extend beyond the measurement limits shall be considered incidental to the work.

5. BASIS OF PAYMENT

The accepted quantity of strip seal expansion joint, measured as described above, will be paid at the contract unit price which shall be full payment for furnishing all labor, materials, tools, and equipment necessary to perform the work as shown on the project plans and as specified herein.

ITEM NO. 6040203 – BRIDGE PAVEMENT JOINT REINFORCEMENT

1. DESCRIPTION

The work under this bid item consists of furnishing all labor, equipment and materials required for installing a high strength pavement geo composite membrane used to reinforce the pavement longitudinal joints between the bridge box beams.

2. MATERIALS

Materials for geo composite membranes shall conform to the requirements of Section 1014. Recommended minimum width is 20 inches.

3. CONSTRUCTION REQUIREMENTS

The contractor to prepare surfaces, apply bonding adhesives and install product per manufacturer's procedures. The contractor is also advised of the following manufacture recommendations: tack coat, placing asphalt concrete, use of warm-mix asphalt concrete, and compaction.

4. METHOD OF MEASUREMENT

Bridge Pavement Joint Reinforcement will be measured by the square foot installed.

5. BASIS OF PAYMENT

The accepted quantities of Bridge Pavement Joint Reinforcement, measured as provided above, will be paid for at the contract unit per square foot, which price shall be full compensation for the work, complete in place.

ITEM NO. 6040502 – BRIDGE RAILING (42” SPECIAL)
ITEM NO. 6040503 – BRIDGE RAILING (8’ SPECIAL)

1. DESCRIPTION

The work under these bid items, herein referred to as “bridge railing”, consists of furnishing all labor, equipment and materials required for constructing the bridge railing as shown on the Plans and described herein.

2. MATERIALS

Materials used for construction of the bridge railing shall be as shown on the Plans and conform to the requirements of Sections 604 and 1004 of the Standard Specifications.

3. CONSTRUCTION REQUIREMENTS

All work shall conform to Section 604 and other applicable sections and subsections of the Standard Specifications, these Special Provisions and project plans unless noted otherwise.

4. METHOD OF MEASUREMENT

Bridge Railing will be measure per linear foot of bridge railing constructed and will be measured along the face of the bridge railing.

5. BASIS OF PAYMENT

The accepted quantities of Bridge Railing, measured as provided above, will be paid for at the contract unit price per linear foot of each type of Bridge Railing installed. The price shall include full compensation for the bridge railings complete in place as described herein and shown on the project plans.

No additional measurement or payment will be made for miscellaneous materials required for attachment and installation of the bridge railing to the structure as shown on the Plans.

(607RDSIDE_SIGN_SUP, 5/2/11)

SECTION 607 - ROADSIDE SIGN SUPPORTS is hereby added to the Standard Specifications:

607-1 DESCRIPTION

The work under this section shall consist of furnishing and installing roadside sign supports in accordance with the details shown on the plans and the requirements of these specifications.

Sign supports shall consist of breakaway, perforated and U-channel signposts. The type, size and installation location of the signposts will be shown on the project plans.

607-2 MATERIALS

607-2.01 General. Certificates of Analysis conforming to the requirements of Subsection 106.05 shall be submitted for breakaway signpost shapes.

Certificates of Compliance conforming to the requirements of Subsection 106.05 shall be submitted for perforated signposts and U-channel signposts.

607-2.02 Breakaway Signpost Shapes. Posts shall be fabricated from structural steel conforming to the requirements of ASTM A 572, Grade 50 or ASTM A 588 at the option of the contractor. Base plates for the breakaway connections and friction fuse plates and back plates for the post hinge assembly shall be fabricated from the same type of structural steel selected for the signposts.

All plate holes shall be drilled and all plate notches shall be saw cut, except that flame cutting will be permitted provided all edges are ground. Flange holes shall be drilled or sub-punched and reamed. The posts shall be saw cut for the hinge and bolted as detailed on the plans.

Bolts, nuts and washers shall conform to the requirements of ASTM A 325.

Posts and plates shall be galvanized after fabrication in accordance with the requirements of ASTM A 123. Bolts, nuts and washers shall be cadmium plated in accordance with the requirements of ASTM B 766, or zinc plated in accordance with the requirements of ASTM B 633.

607-2.03 Perforated Signposts. Single and telescoping perforated posts shall be square tube fabricated from galvanized sheet steel. The sheet steel shall have a thickness of 0.105 inches (12 gauge) or 0.135 inches (10 gauge) as required by the project specifications. Sheet steel shall conform to the requirements of ASTM A 653 for either SQ Grade 40 or SQ Grade 50 Class 1, and be galvanized in accordance with the requirements of Coating Designation G-90. The posts shall have a wall thickness, including coating, of 0.097 to 0.116 inches for 12 gauge and 0.127 to 0.146 inches for 10 gauge.

Posts shall be welded directly in the corner by high frequency resistance welding or equal. The outside edges of the posts shall be scarfed as necessary to produce a standard corner radii of $5/32 \pm 1/32$ inch.

External welded surfaces and scarfed areas shall be re-galvanized after fabrication.

Holes $7/16 \pm 1/64$ inch in diameter shall be provided on one-inch centers along all four sides over the entire length of the post. The holes shall be laterally centered on the longitudinal centerline of each face. Hole positioning and spacing shall be the same on all four faces, such that the hole centerlines for each group of four holes shall pass through a common point on the longitudinal centerline of the tube. For telescoping posts, holes shall be in proper alignment to allow 3/8-inch diameter bolts to pass through the entire post.

The finished posts shall be straight and have a smooth, uniform finish. All consecutive sizes of

posts shall be freely telescoping for not less than 10 feet of their length without the necessity of matching any particular face to any other face.

Perforated signposts shall be manufactured by an approved manufacturer. A list of approved manufacturers of perforated signposts is shown on the Arizona Department of Transportation's Approved Products List (APL). Copies of the most current version of the APL are available on the internet from the Arizona Transportation Research Center (ATRC) through its PRIDE program (<http://www.azdot.gov/TPD/ATRC/apl/apl.asp>).

Bolts shall conform to the requirements of SAE Specification J 429, Grade 5, or ASTM A 449, Type 1. Nuts shall conform to the requirements of ASTM A 563, Grade A. Washers shall conform to the requirements of ASTM F 844.

Bolts, nuts and washers shall be zinc coated in accordance with the requirements of ASTM B 633 or cadmium plated in accordance with the requirements of ASTM B 766.

607-2.04 U-Channel Signposts. U-channel posts shall be fabricated from rerolled rail steel or hot-rolled carbon steel bars. U-channel posts, when used, shall be painted FHWA green. Prior to rerolling the rail steel, the rail nominal weight shall be 91 pounds per yard and shall meet the requirement of ASTM A 1 pertaining to quality assurance.

Yield Point of the steel shall be 80,000 pounds per square inch minimum.

The cast heat analysis of the steel shall conform to the following requirements:

Element	Composition (Percent)
Carbon	0.67 – 0.82
Manganese	0.70 – 1.10
Phosphorus: Max.	0.04
Sulfur: Max	0.05
Silicon	0.10 – 0.25

Posts shall be a uniform, modified, flanged channel-section as shown in the plans. Weight of the posts shall be three pounds per lineal foot, plus or minus five percent. The post shall be punched with continuous 3/8-inch diameter holes on one-inch centers. The first hole shall be one inch from the top and bottom of post.

The post shall consist of two parts, a signpost and a base post. The signpost lengths shall be supplied in six-inch increments up to 12 feet as required for the installation location. The base posts shall be 60 inches in length, pointed at one end, and have at least eighteen holes in the base post, starting one inch from the top and continuing at one-inch increments.

Posts shall be machine straightened to have a smooth uniform finish, free from defects affecting their strength, durability, or appearance. All holes and rough edges shall be free from burrs. The permissible tolerance for straightness shall be within 1/16 inch in three feet.

Posts shall be galvanized after fabrication in accordance with the requirements of ASTM A 123.

Bolts, nuts, washers and spacers shall be cadmium plated in accordance with the requirements of ASTM B 766 or zinc plated in accordance with the requirements of ASTM B 633.

For shipment, the posts shall be nested and fastened in such a manner that they will not slip. Care shall be taken during shipping to minimize the rubbing of posts together resulting in damage to the galvanized finished surface. Excessive damage to the finish of the posts during shipping or handling will result in rejection of the damaged posts. Posts shall be bundled in groups of no more than 100.

U-channel base posts shall be driven into the ground to a depth of 24 - 30 inches. Where rock is encountered, the rock shall be cored, drilled or removed to a minimum diameter of eight inches and to a depth sufficient to place Portland cement concrete two inches below the bottom of the base post and fill the hole to within one inch of the top. Solid rock coring or drilling is not required to continue beyond 24 inches in depth regardless of the depth at which the rock is encountered. The base post may be cut at the bottom prior to being set in Portland cement concrete where rock does not permit use of full-length base post.

607-2.05 Concrete. Concrete for breakaway signpost foundations shall be Class B, except that utility concrete may be used for foundations using stub post sizes S 3 x 5.7 and S 4 x 7.7. Class B concrete shall conform to the requirements of Section 1006 and utility concrete to requirements of Section 922. Concrete for perforated signpost foundations and U-channel signpost foundations, when required, shall conform to the requirements of Subsections 922-2 and 922-3.

Foundation stub posts shall be fabricated from the same type of steel selected for the appropriate signposts. Breakaway stub posts shall be galvanized a minimum of 12 inches down from the top of the stub. Galvanizing shall be in accordance with the requirements of ASTM A 123.

Reinforcing steel bars for breakaway signpost foundations shall conform to the requirements of ASTM A 615, Grade 40. Reinforcing steel wire shall conform to the requirements of ASTM A 82.

607-3 CONSTRUCTION REQUIREMENTS

Fabrication of the breakaway signposts, stub posts and base plates shall conform to the requirements of Subsection 604-3.02, except that shop drawings will not be required.

Breakaway signpost lengths will be determined by the Engineer at the time of construction staking and will be furnished to the contractor prior to ordering fabrication of the signposts.

Perforated and U-channel signpost lengths shall be determined by the contractor at the time of construction staking. Posts shall be cut to the proper lengths in the field. Splicing will be permitted for single perforated posts; however, splices will be limited to one per each post installation and the splicing shall be accomplished in accordance with the details shown on the plans. The minimum length of any spliced piece of post shall be two feet. U-channel posts, when used, shall be painted FHWA green.

Foundations for the breakaway signposts, perforated signposts and when required, U-channel posts shall be constructed to the details and dimensions shown on the plans. Concrete shall be placed in accordance with the requirements of Section 601 or 922, as the case may be. Excavation shall conform to the requirements of Subsection 203-5.03(A).

607-4 METHOD OF MEASUREMENT

Breakaway signposts will be measured by the linear foot for each size of post furnished and erected. The length of each size of post will be measured from the bottom of the upper base plate to the top of the post, measured to the nearest 0.1 feet. The total length of all posts of the same size will be rounded to the nearest foot.

Perforated signposts will be measured by the linear foot of each type of post furnished and installed. The length of each type of post will be measured from the top of the concrete post foundation to the top of the post, measured to the nearest 0.1 feet. The total length of all posts of the same type will be rounded to the nearest foot. Telescoping post members will be considered as one post after installation and will be measured separately. U-channel posts will be measured as each.

Foundations for signposts will be measured by the unit for each type of foundation constructed, except that concrete and excavation, when required for setting U-channel base posts, will be considered as part of the post.

607-5 BASIS OF PAYMENT

The accepted quantity of breakaway posts, perforated posts, U-channel posts and foundations for the signposts, measured as provided above, will be paid for at the contract unit prices complete in place.

The contract unit price paid per linear foot for each size of breakaway signpost, each type of perforated signpost and each installation of U-channel post designated in the bidding schedule shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and erecting the signposts, complete in place, including galvanizing and furnishing all metal plates and hardware, all as shown on the plans and as specified herein.

The contract unit price paid per unit for each type of sign foundation designated in the bidding schedule shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing foundations, complete in place, including the steel stub posts, lower base plate and steel reinforcement (except for stub posts S 3 x 5.7 and S 4 x 7.7) for the breakaway signpost foundation; the portion of perforated post within the foundations; galvanizing the posts; and excavation, all as shown on the plans and specified herein.

(608SIGN_PANELS, 5/29/14)

SECTION 608 - SIGN PANELS is hereby added to the Standard Specifications:

608-1 DESCRIPTION

The work under this section shall consist of furnishing and installing sign panels in conformance with the details shown on the project plans and the requirements set forth herein.

The sign panels shall be of the following types:

- Extruded Aluminum Sign Panels with Direct-Applied, Digitally-Imaged or Demountable Characters
- Flat Sheet Aluminum Sign Panels with Direct-Applied, Digitally Imaged, Electronic-Cut or Silk-Screened Character
- Warning, Marker, and Regulatory Sign Panels

608-2 MATERIALS

608-2.01 General. Certificates of Compliance, conforming to the requirements of Subsection 106-5, shall be submitted for all materials required for fabricating sign panels, including retroreflective sheeting.

Shipment, storage, and handling of sign panels shall conform to the recommendations of the manufacturer of the sign panel components. Fabricated signs and overlay sheets shall be shipped on edge. Damage to the sign panel or legend resulting from banding, crating or stacking may be cause for rejection of the signs.

Characters shall not be attached to overlay sheets during shipment.

Signs shall be fabricated in accordance with the recommendations of the manufacturer of the sign sheeting. All processes and materials used to make a sign shall in no way impact the performance, uniform appearance (day and night), or durability of the sheeting, or invalidate the sign sheeting manufacturers' warranty.

All sheeting used for background and legends shall be from the same manufacturer, and shall be covered with a protective or anti-graffiti film from the same manufacturer. Protective and anti-graffiti film other than those specified by the manufacturer will not be allowed. Protective overlays and anti-graffiti films shall be applied according to the manufacturers' recommendations.

"D3-1" street name signs do not require the application of a protective or anti-graffiti film.

All text and numerals shall all be installed at the same orientation: either zero degrees or 90 degrees.

Design of letters and numbers shall be in accordance with the project plans with a tolerance of $\pm 1/16$ th of an inch.

608-2.02 Extruded Aluminum Sign Panels with Direct-Applied, Digitally-Imaged or Demountable Characters. Panels shall be fabricated from 12-inch wide aluminum extrusions formed from Aluminum Alloy 6063-T6 conforming to the requirements of ASTM B221 and fastened together by bolt connections as shown on the project plans.

Panel facing shall be covered with retroreflective sheeting of the color specified on the project plans. The retroreflective sheeting shall conform to the requirements of Section 1007.

The letters, numerals, symbols, borders and other features of the sign message shall be direct-applied, digitally-imaged or demountable, and shall conform to the requirements of Subsection 608-2.06, Screen-Printed, Direct-Applied or Electronic-Cut Characters or Subsection 608-2.07, Digitally-Imaged Characters.

Panel surfaces to be covered with retroreflective sheeting shall be prepared in conformance with the recommendations of the sheeting manufacturer. Panel surfaces not covered with sheeting shall be etched in conformance with the recommendations of the extrusion manufacturer to reduce glare from reflected sunlight.

After all fabrication has been completed, including the cutting and punching of holes, except holes for demountable letters, numerals, symbols and borders, the aluminum extrusions shall be degreased and the retroreflective sheeting shall be applied.

Aluminum extrusions shall be flat with 1/4 inch of tolerance allowed in an eight-foot length, with proportionally greater tolerances permitted on lengths greater than eight feet. Flatness tolerance across the face of each extrusion shall be 0.5 percent of the width.

Aluminum extrusions shall be bolted together on 12-inch centers with a maximum allowable gap of 1/32 inch between extrusions.

Shop fabricated sub-assemblies shall be rigidly braced for transportation and erection. Hardware utilized to fasten panels to supports shall conform to the panel manufacturer's recommendations. Each completed sign panel shall be provided with a side trim molding fabricated from extruded Aluminum Alloy 6063-T6 conforming to the requirements of ASTM B221. The trim molding shall be fastened to each individual 12-inch aluminum extrusion with two 5/32-inch diameter self-plugging aluminum blind rivets, 2-1/2 inches from either edge. The exposed surface of the side trim molding shall be treated by etching as recommended by the manufacturer to reduce glare from reflected sunlight.

Each completed sign panel shall be shipped with sufficient bolt clamps placed to install the panel on the sign posts as shown in the project plans. Bent bolt channels will be cause for rejection of the sign panel.

608-2.03 Flat Sheet Aluminum Sign Panels with Direct-Applied, Digitally-Imaged, Electronic-Cut or Silk-Screened Characters. Unless otherwise specified on the project plans or in the Special Provisions, panels shall be fabricated from 0.080-inch thick, 5052-H36 or 5052-H38 Aluminum Alloy conforming to the requirements of ASTM B209.

Panel facing shall be prepared and covered with retroreflective sheeting in conformance with the recommendations of the sheeting manufacturer. The color of the sheeting shall be as specified on the project plans.

The retroreflective sheeting shall conform to the requirements of Section 1007. Splicing of

retroreflective sheeting shall not be allowed on sign panels having a minimum dimension up to and including four feet.

Messages shall be reflectorized white or, if called for on the project plans, opaque black and shall be produced by either silk screening or direct-applying lettering as specified under Subsection 608-2.07 and 608-2.08.

608-2.04 Warning, Marker, and Regulatory Sign Panels. Panels shall be fabricated from flat sheet aluminum and shall be reflectorized as specified herein.

Unless otherwise Panels shall be fabricated in one piece from 0.080-inch thick, 5052-H36, 5052-H38 or 6061-T6 Aluminum Alloy conforming to the requirements of ASTM B209.

All surfaces of panels to be covered with retroreflective sheeting shall be prepared in conformance with the recommendations of the sheeting manufacturer. Retroreflective sheeting shall conform to the requirements of Section 1007.

Warning signs shall be reflectorized with yellow retroreflective sheeting.

Regulatory signs shall be reflectorized with silver-white retroreflective sheeting.

Reflectorized red signs shall be reflectorized with white retroreflective sheeting. The red color shall be produced by silk screening or electronic-cut film.

Regulatory signs with reflectorized red circles and slashes shall be reflectorized with white retroreflective sheeting. The red color shall be produced by silk screening or electronic-cut film.

Splicing of retroreflective sheeting shall not be allowed on sign panels having the minimum dimension up to and including four feet.

Sign panels shall be attached to the posts with 5/16-inch cadmium plated hardware as shown in the project plans. A nylon washer, conforming to ANSI Standard and having a diameter two times the bolt head diameter, shall be placed between the bolt head and panel face. Fastening nuts shall be nylon insert hex lock nuts.

608-2.05 Retroreflective Sheeting, Inks and Opaque Film. Retroreflective sheeting, sign-making inks, and opaque films shall conform to the requirements of Section 1007.

Signs shall be fabricated in conformance with the recommendations established by the manufacturer of the sign sheeting. All processes and materials used to make a sign shall in no way impact the performance, uniform appearance (day and night), or durability of the sheeting, or invalidate the sign sheeting manufacturers' warranty.

All sheeting used for letter and number text shall be of the same type and brand, and shall be installed at a zero-degree orientation.

608-2.06 Silk-Screened, Direct-Applied and Electronic-Cut Characters. Silk-screened-printed letters, numerals, arrows, symbols, and borders, shall be applied on the retroreflective sheeting background of the sign by direct or reverse screen process. Messages and borders of a color darker than the background shall be applied to the retroreflective sheeting by direct process. Messages and borders of a color lighter than the sign background shall be produced by the reverse screen process.

Opaque or transparent colors, inks, and paints used in the screen process shall be of the type and quality recommended by the manufacturer of the retroreflective sheeting.

The screening shall be performed in a manner that results in a uniform color and tone, with sharply defined edges of legends and borders and without blemishes on the sign background that will affect intended use.

Signs, after screening, shall be air dried or baked in conformance with the manufacturer's recommendations to provide a smooth hard finish. Any signs on which blisters appear during the drying process will be rejected.

Direct-applied letters, numerals, symbols, borders, and other features of the sign message shall be cut from black opaque or retroreflective sheeting of the color specified and applied to the retroreflective sheeting of the sign background in conformance with the instructions of the manufacturer of the retroreflective sheeting.

Direct-applied legend may be moved vertically 1/2-inch to avoid placing only a small amount of material over the adjacent extruded panel. The bottom of all characters for a line of legend shall line up within 1/8 of an inch.

Electronic-cut characters shall be cut from translucent acrylic sheeting using computerized automated cutting processes.

608-2.07 Digitally-Imaged Characters. Digitally-imaged characters shall consist of characters produced through ultraviolet jet-printing or thermal transfer. Signs with digitally-imaged characters shall be manufactured using matched component ink, transparent electronic-cuttable film, and/or overlay film as supplied by the reflective sheeting manufacturer. For digitally-imaged copy on white sheeting, the coefficient of retroreflection shall be not less than 70 percent of the original values for the corresponding integral color. When characters are spread over two adjacent extruded panels, the characters shall align with each other within 1/16th of an inch.

608-3 CONSTRUCTION DETAILS

608-3.01 Fabrication. Fabrication of the sign panels shall be in conformance with the details shown on the project plans and the requirements of these specifications. If additional details for sign panel fabrication are required, the contractor shall submit shop drawings in conformance with the requirements of Subsection 105-03.

Panels shall be cut to size and shape and shall be free of buckles, warps, dents, cockles, burrs and defects resulting from fabrication.

Fabricated signs shall be stored indoors and kept dry during storage. If packaged signs become wet, all packaging material shall be removed immediately and the signs allowed to dry. The signs may be repackaged using new dry materials. If outdoor storage is necessary, all packaging materials shall be removed. Signs shall be stored on edge, above ground, in an area where dirt and water will not contact the sign face. Materials used to support stored signs shall not contact sign faces.

608-3.02 Installation of Sign Panels. The sign panels shall be installed on overhead sign structures and roadside sign supports in conformance with the details shown on the project plans and in conformance with the recommendations of the manufacturer's of the sign panel components.

Minor scratches and abrasions resulting from fabrication, shipping and installation of panels may be patched; however, patching shall be limited to one patch per 50 square feet of sign area with

the total patched area being less than five percent of the sign area. Panels requiring more patching than the specified limit will be rejected. Patches shall be edge sealed by a method approved by the retroreflective sheeting manufacturer.

Sign panels shall be attached to the posts with hex head bolts as shown in the project plans; slotted head bolts shall not be used. A washer shall be placed between the bolt head and panel face.

For flat sheet panels, bolts shall be fastened with a washer and two standard nuts. The fender washer shall be placed against the sign post, the first nut shall be tightened against the fender washer, and the second nut shall be tightened against the first nut. Bolts shall be tightened from the back by holding the bolt head stationary on the face of the panel. Twisting of the bolt head on the panel face will not be allowed.

If directed by the Engineer, the contractor shall provide two copies of a detailed list of all new signs installed on the project. The list shall include the sign identification code, the date each sign was installed (month and year), the fabricator of the sign, and the materials used to make the sign (manufacturer, type of sheeting, ink and film). The list shall be provided in a commonly used electronic spreadsheet format, such as EXCEL, and the two copies shall be submitted on an approved data storage device. Signs shall be listed in numerical order by street name, direction, and station and, where more than one sign is installed at the same general location, a letter subscript.

Sign panels within the same sign assembly shall be placed at the same orientation along the roadway so that the entire legend of the signs appear uniform under normal viewing conditions, both day and night.

If directed by the Engineer, prior to or at the time of installation of each sign, the contractor shall place information on the back of the sign showing the sign identification code, the sign fabricator, the manufacturer of the sheeting used, and the month and year of the installation. The formatting of the required information shall be as shown on the project plans. The information shall be positioned to be readily visible from a vantage point outside the flow of traffic and not obstructed by sign posts, extrusions, stringers or brackets. All letters shall be made of a long life material such as a black opaque acrylic film. Signs not marked as required will not be eligible for payment.

Temporary traffic control signs are exempt from the installation information requirement unless noted otherwise on the project plans.

608-3.03 Inspection. An inspection of the completely installed sign panels will be made by the Engineer during the daytime and at night for proper appearance, visibility, color, specular gloss and proper installation.

Each sign panel face shall be cleaned thoroughly just prior to the inspection by a method recommended by the manufacturer. The cleaning solvent and cleaning material shall in no way scratch, deface or have any adverse effect on the sign panel components.

All apparent defects disclosed by the inspection shall be corrected by the contractor at no additional cost to the Agency. If color variations or blemishes between sign panel increments are visible from a distance of 50 feet either during the day or at night, the panels shall be removed and replaced at no additional cost to the Agency.

608-4 METHOD OF MEASUREMENT

Sign panels will be measured for payment by the square foot for each type or types of sign panels furnished and installed. The area of each sign panel, except for warning, regulatory and marker sign panels, will be measured per the dimensions shown on the project plans.

For warning, regulatory and marker sign panels, the area of each sign panel will be measured to the nearest square foot and the areas will be determined as follows:

The areas of each rectangular, square or triangular sign panel will be determined from the dimensions shown on the project plans. The area of irregular shaped signs, such as stop signs and route markers, will be determined by multiplying the maximum height in feet by the maximum width in feet, using the dimensions shown on the project plans.

Miscellaneous Work (Sign Panels) will be measured for payment on a lump sum basis.

608-5 BASIS OF PAYMENT

The accepted quantities of each type of sign panel, measured as provided above, will be paid at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place including furnishing and applying all retroreflective sheeting; fastening hardware; necessary sign supports; stringers and post tie; and all labor, equipment, materials, tools, supplies and incidentals necessary for the work in conformance with the requirements of this Section, the project plans or as may be directed by the Engineer.

The accepted quantities of Miscellaneous Work (Sign Panels), measured as provided above, will be paid at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place including all labor, equipment, materials, tools, supplies and incidentals necessary for the work in conformance with the requirements of this Section, the project plans, Special Provisions or as may be directed by the Engineer.

(610PAINTING, 7/28/11)

SECTION 610 - PAINTING of the Standard Specifications is revised to read:

610-1 DESCRIPTION

The work under this section shall consist of furnishing paint and other materials and painting concrete, structural steel or other surfaces where shown on the project plans in conformance with the requirements of these specifications. The work shall include preparation of the surfaces to be painted, the protection and drying of the paint coatings and the protection of pedestrian, vehicular or other traffic near or under the work from paint spatter and disfigurement.

610-2 MATERIALS

The various types of paints to be applied shall conform to the requirements of Section 1002, unless otherwise specified in the Special Provisions.

610-3 CONSTRUCTION DETAILS

610-3.01 Weather Conditions. Paint shall be applied only on thoroughly dry surfaces and only when the atmospheric temperature is in the range from 50° F to 100° F, inclusive, and when

the relative humidity is at or below 75 percent. Paint shall only be applied to a surface which is at least 5° F above the dew point. The surface temperature should remain above the minimum temperature specified above until the paint is thoroughly dry. Paint shall not be applied when the air is misty or when weather conditions exist which might damage the work. If fresh paint is damaged by the elements, it shall be replaced or repaired by the contractor at no additional cost to the Agency.

The contractor may provide suitable enclosures to permit painting during inclement weather. Provisions shall be made by the contractor to artificially control, within limits suitable for painting, the atmospheric conditions inside the enclosures.

610-3.02 Surface Cleaning.

(A) Metal Surfaces. All surfaces of structural steel or other metals, except galvanized surfaces, shall be cleaned prior to painting.

All surfaces of new structural steel or other metals which are to be painted shall be blast cleaned to a near-white finish in conformance with the Steel Structures Painting Council (SSPC) standard SP10, unless otherwise specified or approved in writing by the Engineer.

When repainting existing steel structures, the method of cleaning will be specified in the Special Provisions. Areas not designated for repainting which are damaged as a result of the contractor's operations shall be repaired by the contractor, at no additional cost to the Agency, and as approved by the Engineer.

(1) Blast Cleaning. All dirt, rust, old paint, mill scale and other foreign material shall be removed from steel or other metal surfaces with an approved blast cleaning apparatus. Blast cleaning shall be leave all surfaces with a dense, uniform anchor pattern or profile of 1.0 mils to 3.0 mils as measured with an approved surface profile comparator or pressed film replica tape.

Abrasives used for blast cleaning shall be clean dry sand, mineral grit, steel shot, or steel grit, at the option of the contractor, and shall be of a grading suitable to produce satisfactory results. The use of other abrasives will not be permitted unless approved in writing by the Engineer.

When blast cleaning is being performed near machinery, all journals, bearings, motors and moving parts shall be sealed against entry of abrasive dust.

Blast cleaned surfaces shall be primed or treated the same day blast cleaning is done, unless otherwise authorized by the Engineer. If cleaned surfaces rust or are contaminated with foreign materials before painting is accomplished, they shall be re-cleaned by the contractor at no additional cost to the Agency.

(2) Steam Cleaning. All dirt, grease, loose chalky paint or other foreign material which has accumulated on the previously painted or galvanized surfaces shall be removed with a steam cleaning apparatus which shall precede all other phases of cleaning. It is not intended that sound paint be removed by this process. Any paint which becomes loose, curled, lifted or loses its bond with the preceding coat or coats after steam cleaning, shall be removed to sound paint or metal surface by the contractor at no additional cost to the Agency.

A detergent shall be either added to the feed water of the steam generator or applied to the

surface to be cleaned. The detergent shall be of such composition and shall be added in such quantity that the specified cleaning is accomplished.

Any residue, detergent or other foreign material which may accumulate on cleaned surfaces shall be removed by flushing with fresh water.

Steam cleaning shall not be performed more than two weeks prior to starting painting operations or other phases of cleaning.

Subsequent painting shall not be performed until the cleaned surfaces are thoroughly dry and in no case in less than 24 hours after cleaning.

(3) Hand Cleaning. Wire brushes, either hand or powered, hand scraping tools, power grinders or sandpaper shall be used to remove all dirt, loose rust and millscale, or paint which is not firmly bonded to the surfaces.

(4) Water Blast Cleaning. Water blast cleaning shall be done in conformance with National Association of Corrosion Engineers (NACE) Standard RP-01-72 with normal water, no additives to the water will be allowed. All areas of oil and grease on surfaces to be coated shall be hand cleaned with clean petroleum solvents. The solution of solvent and contaminants shall be wiped clean and the surfaces allowed to air dry prior to the water blast cleaning. The contractor shall not use power spray equipment or similar methods to apply the solvent. All the surfaces to be coated shall be power washed with a water pressure of not less than 2000 psi and not greater than 5000 psi. The water blasting equipment shall have a minimum water usage of 5 gallons/minute.

Water blast cleaning shall be performed no more than two weeks prior to the start of painting operations or other phases of cleaning.

Subsequent painting shall not be performed until the cleaned surfaces are thoroughly dry and in no case less than 24 hours after cleaning.

(B) Concrete Surfaces. Prior to painting concrete surfaces, laitance and curing compounds shall be removed from the surface by abrasive blast cleaning in conformance with the requirements of ASTM D4259. The cleaned surface shall have a roughened, textured appearance consistent with the surrounding concrete surface.

Concrete surfaces shall be thoroughly dry and free of dust at the time the paint is to be applied. Any artificial drying procedures and methods shall be subject to approval by the Engineer.

(C) Surfaces Other Than Metal or Concrete. Prior to painting any surfaces other than metal or concrete, the surface shall be prepared in conformance with the manufacturer's recommendations and as approved by the Engineer.

610-3.03 Application. The contractor shall notify the Engineer, in writing, at least one week in advance of the date cleaning and painting operations are to begin.

Painting shall be accomplished in a neat and workmanlike manner.

Paint application on metal surfaces shall normally be applied by spraying with limited use of hand brushes or rollers except that aluminum paint, as specified in Subsection 1002-2.03, shall be applied by spraying only.

When concrete surfaces are to be painted, the contractor shall develop and prepare and submit an Application Plan complying with the manufacturer's written recommendations. The plan shall include:

- Qualification of workers.
- Application equipment.
- Safety and damage protection provisions.
- Proposed surface preparation methods.
- Ambient air temperature application range.
- Ambient surface temperature application range.
- Mixing requirements.
- Rate of application.
- Number of coats necessary (minimum of two coats) to obtain uniform coverage and appearance.

When painting concrete surfaces, the contractor shall apply the required coats of paint to an equivalent test specimen surface or directly to an approved area of the concrete surface to be painted. Application of paint to the test specimen or area shall comply with the submitted Application Plan. Once completed and dry, the painted test specimen or area shall be subject to the approval of the Engineer prior to commencing full scale painting.

The contractor shall refinish the test inspection areas to match the paint finish of the surrounding concrete surfaces.

Each application of paint shall be smoothly and uniformly applied such that no excess paint will collect at any point. Any skips, holidays, thin areas or other deficiencies shall be corrected before succeeding paint application(s). The surface of the paint being covered shall be free from moisture, dust, grease or any other deleterious materials which would prevent the bond of succeeding applications.

When paint brushes are used, they shall have sufficient body and bristle length to spread the paint in a uniform film.

Surfaces which are inaccessible shall be painted with daubers or by other means approved by the Engineer.

When rollers are used they shall be of a type which will not leave a stippled texture in the paint film.

Once mixed in conformance with the Application Plan, the paint shall be kept uniformly mixed during its application.

The handling and the application of paints shall be in conformance with all applicable occupational, safety and health standards, rules and regulations.

610-3.04 Protection Against Damage. The contractor shall provide protective devices as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

Paint or paint stains which result in an unsightly appearance on surfaces not designated to be painted shall be removed or obliterated by the contractor at no additional cost to the Agency, and as approved by the Engineer.

All painted surfaces that are marred or damaged as a result of operations of the contractor shall

be repaired by the contractor, at no additional cost to the Agency, and as approved by the Engineer, with materials and to a condition equal to that of the paint coating specified herein.

Upon completion of all painting operations as well as any other work, the painted surfaces shall be thoroughly cleaned.

610-3.05 Painting.

(A) Metal Surfaces.

(1) General. All surfaces of new metals shall be painted with one shop coat (primer) and two field coats (intermediate coat and the top coat), unless otherwise specified.

The dry film thickness of the paint will be measured in place with a calibrated magnetic film thickness gauge in conformance with SSPC Standard PA2.

If the minimum dry film thickness is exceeded, it shall be limited to that which will result in uniform drying throughout the paint film.

(2) Primer. Primer shall conform to the requirements of Subsection 1002-2.01(B) and when applied the dry film thickness of the paint shall be not less than 2 mils, and sufficient to adequately cover any blast profile pattern.

A deep profile pattern from steel shot blasting may require additional applications of primer to obtain sufficient coating of the steel surface.

After the structural steel has been fabricated, blast cleaned and certified for acceptance by an approved laboratory, all surfaces, except metal surfaces which are to be embedded in concrete, shall be painted with primer.

Structural steel which is to be welded shall not be painted before welding is complete. If it is to be welded only in the fabricating shop and subsequently erected by bolting, it shall receive one coat of primer after the shop welding is finished. Areas of structural steel to be field welded shall be masked and the remainder of the steel shall be given one coat of primer.

As soon as practicable after being accepted by the Engineer and prior to removal from the shop, machine-finished surfaces shall be primed with a rust inhibitor which can be easily removed.

Surfaces of milled or finished iron and steel castings shall be given one shop coat of primer.

Erection marks for field identification of steel members and weight marks shall be painted upon surface areas previously painted with the primer.

(3) Intermediate Coat. The intermediate coat shall be appropriately tinted to contrast with the primer and shall conform to the requirements of Subsection 1002-2.01(C). The dry film thickness of the intermediate coat shall be not less than 2.0 mils.

After erection of steel structures has been completed, including all riveting, welding, bolting and any straightening of bent metal, all adhering rust, scale, dirt, grease or other foreign material shall be removed as specified under Subsection 610-3.02. All areas where the primer has been damaged or has deteriorated shall be thoroughly cleaned and spot painted with the same type of paint and same dry film thickness as specified for the primer.

When the spot painting coat is thoroughly dry, the intermediate coat shall be applied. In no case shall a succeeding coat be applied until the previous coat has dried throughout the full thickness of the paint film.

(4) Top Coat. The top coat shall conform to the requirements of Subsection 1002-2.01(D).

All small cracks and cavities which have not become sealed in a watertight manner by the intermediate coat shall be filled before the top coat is applied.

At the option of the contractor, the intermediate coat and the top coat may be applied in the shop. When finished coats are applied in the shop, the contractor shall repaint all damaged or deteriorated areas in the field as directed by the Engineer.

The dry film thickness of the top coat shall be not less than 2.0 mils.

(B) Concrete Surfaces: When painting is specified on the project plans or in the Special Provisions, Acrylic Emulsion Paint conforming to the requirements of Subsection 1002-2.04, shall be applied to the exposed concrete surfaces as herein listed, except that sidewalks, appurtenant curbs, down drains, and bridge deck surfaces shall be excluded.

All concrete shall be finished and cured in conformance with the requirements of the specifications prior to the application of paint.

(1) Cast-in-Place Box Girder Bridges. All surfaces of the superstructure, including the sides and bottoms of the box girders, shall be painted.

(2) Pre-cast I-Girder Bridges. Bridge structures with vehicular traffic passing beneath at posted speeds of less than 55 miles per hour, or with pedestrian traffic beneath, shall be painted on all surfaces of the superstructure including both sides and bottoms of the pre-cast girders and the underside of decks.

Bridge structures with vehicular traffic passing beneath at posted speeds of 55 miles per hour or more, and with no pedestrian traffic beneath, shall be painted on all surfaces of the superstructure with the exception of the sides of the interior girders, the interior side of exterior girders, and the underside of the deck.

(3) Pre-cast Box and Slab Girder Bridges: All surfaces of the superstructure including the sides of exterior girders and the bottom surfaces of the box or slab girder when exposed to traffic view shall be painted.

(4) Bridge Substructure and Walls: All surfaces of bridge piers, including the pier caps and bottoms of integral pier caps, piles, columns, parapet walls and abutments, concrete retaining walls and noise barrier walls shall be shall be painted to at least one foot below finished grade.

(5) Barriers: All surfaces of bridge barriers and the sides and tops of permanent barriers not adjacent to the traveled way shall be painted.

(C) Surfaces other than Metal or Concrete: Surfaces other than metal or concrete shall be painted as recommended by the paint manufacturer and as approved by the Engineer.

610-3.06 Painting Damaged Galvanized Coating. Areas of galvanized coating damaged due to welding after fabrication or due to handling, shall be roughened by sanding or acid wash. The roughened areas shall be painted with at least one full coat of zinc paint, conforming to the requirements of Subsection 1002-2.02.

610-3.07 Painting of Miscellaneous Steel Items. All miscellaneous steel items that are not elements of bridges, cantilever sign supports, or bridge truss sign structures, may be hand cleaned and have the required field paint coats applied in the shop.

610-4 METHOD OF MEASUREMENT

No direct measurement will be made for painting with the exception that when the bidding schedule contains specific items under this section on a unit basis, measurement will be made by the units designated in the bidding schedule.

610-5 BASIS OF PAYMENT

Unless contained as a specific item or items in the bidding schedule, no separate payment will be made for painting as described and specified herein and on the project plans, the cost of which is considered as incidental to and included in the payment for contract items in the bidding schedule into which this work is incorporated.

Whether a specific item or items is contained in the bidding schedule or not, no separate payment will be made for independent laboratory tests, surface preparation, and supplying samples, the cost of which is considered as incidental to and included in the payment for contract items in the bidding schedule into which this work is incorporated.

(701TRAF_LSUM, 2/13/14)

SECTION 701 - MAINTENANCE AND PROTECTION OF TRAFFIC

701-1 DESCRIPTION of the Standard Specifications is revised to add:

The Contractor shall be responsible for the control, direction, and safety of vehicular and pedestrian traffic in all work areas, and shall provide all necessary equipment and personnel for this work. Traffic control and site access arrangements shall be subject to the approval of the Owner and governmental agency with jurisdiction of the jobsite.

701-4 METHOD OF MEASUREMENT of the Standard Specifications is revised to read:

Basic Maintenance and Protection of Traffic, Construction Elements will be measured as a single, complete, lump sum Item 7010005 - Traffic Control.

Basic maintenance and protection of traffic shall consist of the preparation and approval of a traffic control plan and furnishing, installing, maintaining, moving, and removing barriers, barricades, warning signs, delineators, lights, cones, installation of temporary pavement markings for the maintenance of traffic and/or construction sequencing, the removal of existing pavement markings and raised pavement markers by obliteration, the covering of any existing signs, impact attenuation devices, and other traffic control devices in order to provide safe and efficient passage through and/or around the project construction site and protect the public and workers from injuries and property damage for the duration of the project. The cost for maintaining all traffic control materials, labor and equipment is included under lump sum item 7010005 - Traffic Control, except for the following individual bid items: Item 7010025 - Flashing Arrow Panel; Item 7010027 - Changeable Message Board; Item 7010075 - Flagging Services (Civilian); Item 7010077 - Flagging Services (Uniformed Officer)(Off Duty); and Item 7010079 Official Police Vehicle (Off Duty). Flashing Arrow Panel and Changeable Message Boards will be measured separately as Each/Day. Flagging Services (Civilian), Flagging Services (Uniformed Officer) (Off Duty), and Official Police Vehicle (Off Duty) will be measured separately per Hour.

701-5 BASIS OF PAYMENT of the Standard Specifications is revised to read:

The accepted quantity of Basic Maintenance and Protection of Traffic, Construction Area Elements and Provide Detour will be paid for at the contract lump sum price under Item 7010005, Traffic Control. The lump sum bid price submitted by the Contractor shall be full compensation for the work of maintenance and protection of traffic and work site access planning and control. The lump sum bid price shall also be estimated for the entire duration of the contract time that accounts for both the contract working days and non-working calendar days.

The accepted quantities for Flashing Arrow Panel, Changeable Message Board, Flagging Services (Civilian), Flagging Services (Uniformed Officer) (Off Duty), and Official Police Vehicle (Off Duty), measured as provided above, will be paid for at the contract unit price included in the Bidding Schedule. Price adjustment for variation in total bid quantity per Subsection 109-3 and 109-4 of the Standard Specifications do not apply to work under these bid items.

The Contractors attention is called to the following work considered incidental to Item 7010005: Installation of temporary pavement markings for the maintenance of traffic due to construction sequencing. No direct payment shall be made for temporary striping called for in Section 701-4. This work shall be considered incidental to other traffic control related items.

Adjustments in compensation for the original contract period will not be made to the lump sum Item 7010005 - Traffic Control. The lump sum amount of this Item of work will be paid to the contractor for the original contract period regardless of the contractor's construction schedule; early construction completion; impacts to contractor's construction schedule critical path; increase or decrease in line item quantities; weather limitations; utility conflict; material change in the character of the work; etc.

Adjustments in compensation for work performed after the expiration of the original contract period and within an approved contract time extension will be made at the discretion of the Engineer for the approved time extension period.

703DELINEATORS_MARKERS, 5/27/14

SECTION 703 - DELINEATORS AND MARKERS

703-1 DESCRIPTION

The work under this section shall consist of furnishing and installing delineators, reference marker s, object marker s, snow markers and milepost markers in conformance with the details shown on the plans and in accordance with the requirements of these specifications .

The types of delineators and markers to be installed and the locations will be shown on the project plans.

703-2 MATERIALS

703-2.01 General

Certificates of Compliance conforming to the requirements of Subsection 106.05 shall be submitted.

703-2.02 Metal Posts

Posts for delineators and for all markers, including mileposts or reference markers installed on freeways shall conform to the details shown in the project plans.

703-2.03 Concrete

Concrete for the milepost or reference marker foundations shall be utility concrete conforming to the requirements of Section 922.

703-2.04 Metal Plates

Metal plates for the various types of object markers shall conform to the details shown on the plans and shall be fabricated in one piece from 0.063-inch thick aluminum-alloy sheet 3003-H 14, 5052-H 38, or 6061-T6, all conforming to the requirements of ASTM B209.

703-2.05 Paint

Paint for use on the metal plates shall conform to the requirements of Section 1002 for the type and color of paint specified on the plans.

703-2.06 Retroreflective Sheeting

Retroreflective sheeting for delineators and markers shall conform to the requirements of Section 1007.

The type of retroreflective sheeting to be applied shall be as specified on the plans.

703-2.07 Prismatic Reflectors

Prismatic reflectors for delineators and markers shall conform to the requirements of Section 1008.

The type of prismatic reflectors to be used shall be as specified on the plans.

703-2.08 Hardware

Steel bolts and nuts of the types shown on the plans shall be galvanized in accordance with the

requirements of ASTM A153 or shall be cadmium plated in accordance with the requirements of ASTM B766.

703-3 CONSTRUCTION REQUIREMENTS

Metal posts shall be cut and perforated to the sizes and shape shown on the plans. The finished posts shall be straight with a permissible tolerance in straightness of 1/16 inch per three (3) feet of post length.

Posts on which galvanizing has been damaged in transporting, handling or erecting shall be repaired by the contractor at its expense in accordance with the requirements of Subsection 610-3.06.

Metal plates shall be cut to size and shape and the holes punched for mounting all in accordance with the details shown on the plans. The surfaces and edges of the plates shall be free of buckles, warps, dents, cockles, burrs, and defects resulting from fabrication.

Posts shall be set vertically to line at the locations designated on the plans. Posts, except mileposts or reference marker posts requiring concrete foundations, shall be set firmly in the ground by a method that will not bend the post or deface the top of the post. If ground conditions are such that the posts cannot be driven without damaging the posts, pilot holes shall be required. Metal plates shall be installed after the posts have been set in place.

Posts shall be placed in the ground to the depth shown on the plans.

Foundations for the milepost or reference marker posts installed on freeways shall be constructed to the details and dimensions shown on the project plans. Excavation shall conform to the requirements of Subsection 203-5.03(A).

Existing markers and delineators that are to remain in place and which have been damaged by the contractor shall be replaced with new ones at its expense.

703-4 METHOD OF MEASUREMENT

Delineators and markers will be measured by the unit for each type of delineator and marker furnished and installed.

703-5 BASIS OF PAYMENT

The accepted quantities of delineators and markers, measured as provided above, will be paid for at the contract price each for the type of delineator or marker designated in the bidding schedule, which price shall be full compensation for the work complete in place.

ITEM NO. 7310600 – RELOCATE LIGHT

1. DESCRIPTION

The work under this item consists of furnishing all equipment, labor and materials required to relocate a light at the location shown on the plans and in accordance with the details shown on the plans and the requirements of these specifications.

2. MATERIALS

Street lighting supports and foundations shall conform to the requirements of Section 731-2.

3. CONSTRUCTION REQUIREMENTS

At the locations shown on the project plans, the contractor shall relocate the existing 17'-6" tall light pole and fixture in accordance with the plans, Section 731 of the Standard Specifications, and as directed by the Engineer. This item shall include a new foundation, excavating and backfilling for the foundation, hardware, miscellaneous components and all labor, materials and incidentals required to complete the work.

4. METHOD OF MEASUREMENT

Relocate Light will be measured for as a unit each.

5. BASIS OF PAYMENT

The accepted quantities of Relocate Light measured as provided above, will be paid for at the contract unit price each, which price shall be full compensation for the work, complete in place, including a new foundation. No separate payment will be made for excavation, backfilling, hardware, miscellaneous components and incidentals required to complete the work, the costs being considered as included in the contract item.

(803LANDSCP_BORROW, 3/13/13)

SECTION 803 - LANDSCAPE BORROW AND PLATING MATERIAL of the Standard Specifications is revised to read:

803-1 DESCRIPTION

The work under this section shall consist of grading surfaces, eradicating grasses, weeds and undesirable vegetation; furnishing, hauling, placing and compacting imported material for establishing the required elevations and grades in landscape areas and for plating embankment slopes, dikes and other designated areas in accordance with the details shown on the project plans and the requirements of these specifications.

803-2 MATERIALS

803-2.01 Landscape Borrow and Plating Material. Landscape borrow and plating material shall be secured from commercial sources or from contractor furnished sources unless otherwise designated in the Special Provisions. Topsoil shall be in conformance with the requirements of Subsection 804-2.

803-2.02 Decomposed Granite and Granite Mulch. Decomposed granite and granite mulch shall be free of lumps or balls of clay and shall not contain calcareous coatings, caliche, organic matter or foreign substances. All material shall be from a single production source and shall present a uniform appearance throughout the project. The gradation and color of the decomposed granite and granite mulch shall be as indicated on the project plans.

The contractor shall deliver, to a location on the project site approved by the Engineer, a minimum, five pound sample of the decomposed granite or granite mulch for approval by the Engineer prior to hauling any quantity of the material to the site.

803-2.03 Rock Mulch. Rock mulch shall be free of calcareous coating, caliche, organic matter or other foreign substances. The gradation and color of the rock mulch shall be as indicated on the project plans.

The contractor shall submit a one cubic yard sample of the rock mulch to a location within the project site, as directed by the Engineer, for approval prior to hauling any quantity of the material to the site.

803-2.04 Stabilizer. Materials for stabilizing landscape borrow, plating material, decomposed granite or granite mulch shall be as specified on the project plans.

803-2.05 Pre-Emergent Herbicide. Pre-emergent herbicide shall be “Surflan” or approved equal. The Contractor shall submit copies of the manufacturer’s product data for the herbicide prior to its delivery and/or application on the project site.

803-3 CONSTRUCTION REQUIREMENTS

803-3.01 Landscape Borrow and Plating Material. Prior to placing material, the areas shall be cleared of all weeds, brush, trash, and rock two (2) inches or larger in diameter and other objectionable material. Undesirable vegetation, grasses and weeds shall be eradicated by the use of both an approved herbicide and mechanical methods in conformance with the requirements of Section 201.

Landscape borrow shall be placed in horizontal layers not exceeding 8 inches in depth prior to compaction. Water shall be added or removed in order to obtain the required density. Each layer of landscape borrow shall be compacted to a density of not less than 85 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer.

Unless otherwise specified in the project plans, landscape borrow that will serve as subgrade for decomposed granite, granite mulch or landscape rock shall be graded to provide a smooth, uniform appearance, acceptable to the Engineer, particularly in areas between curb and sidewalk/multi-use path and/or sidewalk/multi-use path and right-of-way.

Plating material shall be spread and shaped to conform to the lines, grades and cross sections as shown on the project plans or as established by the Engineer. The material shall be watered and compacted in accordance with the requirements of the Special Provisions.

803-3.02 Decomposed Granite and Granite Mulch. Decomposed granite and granite mulch shall not be placed until the required irrigation system(s), preliminary weed control, and acceptable finish grading and planting operations have been completed within the area.

The surfaces upon which the decomposed granite or granite mulch is to be placed shall be graded smooth and compacted to a density of not less than 85 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer. The area of the planting pits shall be "water settled". Areas which shall not be compacted will be designated by the Engineer.

Areas on which decomposed granite or granite mulch is to be placed shall be graded to the lines and grades shown on the project plans, be reasonably smooth and firm, and be approved by the Engineer prior to placement operations commencing. Prior to placement of decomposed granite or granite mulch material, the area shall be cleared of grasses and weeds, to the satisfaction of the Engineer.

All deleterious material and rocks larger than 1-1/4 inches in any dimension shall be removed and disposed of by the contractor.

The decomposed granite or granite mulch shall be evenly distributed over the designated areas to the depths detailed on the project plans or in the Special Provisions. The compacted depth of the decomposed granite or granite mulch shall be within 1/2 inch of the depth specified on the project plans. The finished surface of the decomposed granite or granite mulch shall be 1/2 inch minimum and 1 inch maximum below the surface of adjacent sidewalk, multi-use paths or concrete foundations and the tops of adjacent curbs. All areas to receive decomposed granite or granite mulch shall be approved by the Engineer prior to placement of the decomposed granite or granite mulch.

Vehicles used for spreading, grading, and raking the decomposed granite or granite mulch shall have one set of wheels with floatation tires having a minimum width of 18 inches to provide uniform compaction of the decomposed granite or granite mulch.

All equipment operations for spreading and grading, raking, chemical application, water settling, and any other operations shall be conducted in a manner that uniformly maximizes the wheel compaction of the vehicle over the entire surface and provides a uniform surface appearance throughout the project.

After placing, spreading and rough grading of the decomposed granite or granite mulch within the designated areas, the decomposed granite or granite mulch shall be raked to evenly blend the different gradation sizes. Following approval by the Engineer, the contractor shall apply water to saturate the decomposed granite or granite mulch sufficient to achieve the optimum moisture content to aid compaction and remove fine material from the surface.

Final compaction and finishing of the decomposed granite or granite mulch shall be accomplished with a 200 pound roller followed by raking the surface to smooth any irregularities and obtain a uniform, blended appearance acceptable to the Engineer.

The contractor shall apply one application of an approved pre-emergent herbicide on all decomposed granite or granite mulch areas following placement of the granite. Water to activate the pre-emergent herbicide shall be applied to the areas of herbicide application in accordance with the manufactures recommendations.

The contractor shall keep a record of all pre-emergent herbicide applications; the type of herbicides used; the rate and method of application; and the date and location of such applications. A copy of this record shall be submitted to the Engineer after each application.

Erosion which occurs within the decomposed granite or granite mulch areas shall be corrected by the contractor and approved by the Engineer prior to final acceptance.

803-3.03 Rock Mulch. The surfaces upon which the rock mulch is to be placed shall be excavated or filled to the grades and elevations shown on the project plans, fine graded and compacted to 85 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual, as directed and approved by the Engineer. All deleterious material shall be removed and disposed of by the contractor.

The size, gradation, type and/or color of the rock mulch shall be as specified on the project plans.

The contractor shall stake out or paint the boundary of all areas to receive rock mulch. The Engineer shall approve the boundary, and subgrade lines and grades prior to placement of the rock mulch.

A pre-emergent herbicide shall be applied, by an applicator licensed in the State of Arizona, to staked areas and watered in accordance with the manufacturer's printed instructions and with the approval of the Engineer. Site and atmospheric conditions at the time of application of the pre-emergent herbicide shall conform to the requirements of the manufacturer's printed instructions as well as state and federal regulations.

The rock shall be placed in an even application, tightly packed, to provide complete coverage of the area shown on the project plans so that soil will not be visible between rocks.

After placing and grading the rock mulch, the contractor shall water the mulch with a light spray to remove fine material from the surface to an extent satisfactory to the Engineer. Any re-grading that is necessary after placement of the rock mulch shall be at no additional cost to the Agency.

Care shall be taken in the placement of the rock mulch so as not to disturb or damage any plant material, adjacent surfaces or irrigation equipment.

803-3.03(A) Rock Mulch (Special). When required on the project plans, special rock mulch is to be applied prior to seeding, in accordance with the details shown on the plans in the locations specified. Prior to application of Rock Mulch (Special), the area is to be prepared in accordance with Section 803-3.03 Rock Mulch of these specifications, with the exception that no pre-emergent

herbicide shall be applied. The area shall also be prepared in accordance with Section 805-3.02(B) (Seeding Class II) of the Standard Specifications.

After the aforementioned preparation, Rock Mulch (Special) shall then be spread over the percentage of ground surface in accordance with the detail shown on the project plans. The detail will specify the percentage to be covered with rock, as well as the percentage to be left bare. Rock Mulch (Special) is to be spread in a random pattern, with the intent of imitating natural desert ground surface.

Only upon completion of the Rock Mulch (Special) installation may seeding application in accordance with Section 805-3.02(B) commence.

803-4 METHOD OF MEASUREMENT

Decomposed granite and granite mulch will be measured by the square yard or by the cubic yard of material in place and at the specified thickness.

Rock mulch will be measured by the square yard of material in place and at the specified thickness.

Rock Mulch (Special) will be measured by square yards of material in place and at the specified thickness. The area measured for payment will include the bare areas between the rock within the perimeter of the Rock Mulch (Special) area.

Landscape borrow and plating material will be measured either by the cubic yard or square yard.

When cubic yards are used, landscape borrow and plating material will be measured in its original position by the Engineer, and the volume will be computed by methods approved by the Engineer.

No measurement will be made for removal of grasses and weeds by either mechanical means or herbicides.

803-5 BASIS OF PAYMENT

The accepted quantities of decomposed granite and granite mulch, measured as provided above, will be paid for at the contract unit price specified in the bidding schedule and will be considered as compensation, in full, for the item complete in place.

The accepted quantities of rock mulch, measured as provided above, will be paid for at the contract unit price specified in the bidding schedule and will be considered as compensation, in full, for the item complete in place.

The accepted quantities of Rock Mulch (Special), measured as provided above, will be paid for at the contract unit price specified in the bidding schedule, and will be considered as compensation, in full, for the item, complete in place. The seeding of Rock Mulch (Special) will be paid under the appropriate seeding item of work.

The accepted quantities of landscape borrow and plating material measured as provided above, will be paid for at the contract unit price specified in the bidding schedule and will be considered as compensation, in full, for the item complete in place.

Payment is considered to include all labor, equipment, materials, tools, supplies and incidentals necessary for the work in conformance with the requirements of this Section. The project plans, Special Provisions or as may be directed by the Engineer.

No separate payment will be made for removal of grasses or weeds, either by mechanical means or herbicides, the cost of which is considered as incidental to and included in the payment of contract items in the bidding schedule for which this work is required.

(805HYDROSEEDING, 3/3/14)

SECTION 805 - SEEDING

805-1 DESCRIPTION of the Standard Specifications is modified to add:

The work covered by this section shall also include the preparation of soil within areas to be seeded, the hydroseeding of disturbed area with native plants (Class II), and the installation of a temporary, degradable erosion control blanket (in designated areas).

805-2 MATERIALS

805-2.08 Hydroseed Mix is hereby added to the Standard Specifications:

The hydroseed mix shall include the following components:

Item: Application Rate (Per Acre):

Native Plant Seed Lbs. of Pure Live Seed (PLS) per acre for Class II Seeding

Wood Fiber Mulch 2000 Lbs. per acre

Ammonium Phosphate 200 Lbs. per acre
(16-20-0) Fertilizer

805-2.09 Erosion Control Blanket is hereby added to the Standard Specifications:

Erosion control blankets shall be of the biodegradable blanket type. The blanket shall be a machine produced mat of straw or wood excelsior fiber covered on the top and bottom sides with photo degradable extruded plastic or woven biodegradable nettings having maximum openings of 0.5" x 1.0". Erosion control blankets shall have a functional longevity of 10 months. Erosion control blankets shall be as manufactured by North American Green, Model S150, or approved equal.

805-3 CONSTRUCTION REQUIREMENTS

805-3.02(B) Seeding (Class II) of the Standard Specifications is modified to add:

In areas specified on the project plans to receive special rock mulch prior to seed application, see Section 803 - 3.03 (A) - Rock Mulch Special of these special provisions.

805-3.03 Hydroseeding of the Standard Specifications is modified to add:

Hydroseeding shall occur twice. The first hydroseed application will occur when the construction schedule can allow it. A second application is necessary, and shall be scheduled to take

advantage of seasonal benefits (approximately 6 months after the first application, and not more than one year after first application). This second application will focus on applying the same amount of hydroseed as was applied during the first application. However, the location of the second application shall be directed by the Engineer, and shall focus on areas with little to no seed mix germination or otherwise unacceptable areas.

The surface area to be seeded shall be prepared in accordance with Section 805-3.02 (B) Seeding (Class II) of the Standard Specifications, with the exception that the fourth (4th) sentence of the second (2nd) paragraph, referring to removing loose stones larger than 4 inches, is hereby deleted.

805-3.05 Erosion Control Blanket is hereby added to the Standard Specifications:

Upon completion of the hydroseeding operations, erosion control blankets shall only be installed over those seeded areas that are indicated on the landscape plans to receive erosion control blanket. The blanket shall be installed as detailed on the project plans and per the manufacturer's written instructions and recommendations. The blanket shall be installed as soon as possible after seeding. The Contractor shall be responsible for reseeded any seeded areas disturbed by the installation of the blanket or that area eroded prior to the installation of the blanket.

805-4 METHOD OF MEASUREMENT of the Standard Specifications is revised to read:

The initial application for Seeding (Class II) will be measured either by the square yard of ground surface, to the nearest 100 square yards seeded, or by the acre to the nearest 0.1 acre, complete-in-place.

The second application for Seeding (Class II) will be measured either by the square yard of ground surface, to the nearest 100 square yards seeded, or by the acre to the nearest 0.1 acre, complete-in-place.

Erosion Control Blankets will be measured by the square yard, complete-in-place.

805-5 BASIS OF PAYMENT of the Standard Specifications is revised to read:

Accepted quantities of seeding, measured as provided for above, will be paid for at the contract unit price indicated in the Bidding Schedule and will be considered as compensation, in full, for the item complete in place, including all labor, equipment, materials, tools, supplies and incidentals necessary for the work in conformance with the requirements herein, the project plans or as may be directed by the Engineer. Price adjustments for variation in total bid quantity per Subsections 109-3 and 109-4 of the Standard Specifications do not apply to work under this item.

No direct measurement or payment will be made for the preparation or the preservation of seeding areas, the cost being considered as included in the cost of the contract item.

Accepted quantities of erosion control blankets, measured as provided for above, will be paid for at the contract unit price indicated in the Bidding Schedule and will be considered as compensation, in full, for the item complete in place including all labor, equipment, materials,

tools, supplies and incidentals necessary for the work in conformance with the requirements herein, the project plans or as may be directed by the Engineer.

When multiple mobilizations are required to accomplish seeding as specified herein, the cost will be included in the price bid for the seeding. No adjustments will be made to the contract for the number of seeding mobilization activities. Should the contractor fail to provide seeding for a sub-area as specified herein, the Engineer will immediately notify the contractor of such non-compliance. Should the contractor fail to immediately remedy the unstabilized area, the Engineer may suspend work until such seeding stabilization has been completed, or proceed to provide the necessary seeding stabilization. The entire cost of such work will be deducted from the monies due or to become due to the contractor. In addition, no adjustment to the contract time will be made for suspensions resulting from the contractor's failure to provide seeding for a sub-area within the time periods specified herein.

(806TREES_SHRUBS, 9/17/14)

SECTION 806 - TREES, SHRUBS, AND PLANTS

of the Standard Specifications is revised to read:

806-1 DESCRIPTION

The work under this section shall consist of furnishing and planting trees, shrubs, vines, cacti, and other plants (nursery stock) and transplanting trees, shrubs, vines, cacti, and other plants (collected stock and/or local stock), all as designated on the project plans. The work shall also include the layout and preparation of planting pits, trenches and beds, including excavating and backfilling; the delivery, storage, handling and protection of all planted and unplanted stock and other materials; amendments, all mulching, fertilizing, watering, staking, pruning and wrapping; the cleanup of the area, application of pre-emergent herbicide; removal and disposal of noxious or invasive species and undesirable vegetation; application of rodent repellent or barriers; disposal of unwanted and deleterious materials; and care and maintenance all in accordance with the details shown on the project plans and the requirements of these specifications.

806-2 MATERIALS

806-2.01 General. Certificates of Compliance conforming to the requirements of Subsection 106-5(B) shall be submitted to the Engineer for all contractor furnished materials, unless otherwise specified.

806-2.02 Nursery Stock Plants. All plants shall be grown in a nursery and shall conform to the applicable requirements as specified in the current edition of the "Arizona Nursery Association Growers Committee Recommended Tree Specifications", subject to certain variations in size and measurement when specified on the project plans or in the Special Provisions.

Botanical plant names shall be in accordance with the current edition of "Standardized Plant Names" prepared by the American Joint Committee on Horticultural Nomenclature.

All plants shall be true to type and species shown on the project plans and at least one plant in each group of plants of the same species delivered to the project shall be tagged with a weatherproof label stating both the botanical and common name of the plants in that group.

All plants shall meet the minimum size standards of the “Arizona Nursery Association Growers Committee Recommended Tree Specifications.” Plants which do not meet the size specified on the project plans will not be accepted by the Engineer.

All plants specified as trees shall be upright, low-branching specimens with a minimum of three trunks. To be considered a multi-trunk tree, additional trunks shall originate either from the soil line or no higher than 12-inches above ground. The branch origination point is best measured from the center of the trunk being considered and the soil line of the container. Caliper of multiple trunk trees shall be determined by taking half the caliper of up to the three largest trunks. All persistent, thriving stems arising from the root crown or at a point just above the root crown shall be retained, and foliage shall be allowed to remain intact on branches close to the ground. Trees that do not meet this requirement shall not be planted. No standard single trunk trees shall be used.

All plants specified as tree pot containers shall have a height of either 15 or 24 inches. Fifteen inch tree pots shall have a root zone at least 13 inches in length. Twenty-four inch tree pots shall have a root zone at least 22 inches in length. The height of tree pot plants shall be as follows: a minimum of 12 inches measured from the top of the soil to the apical tip of the plant for 15 inch tree pots, and a minimum of 24 inches from the top of the soil to the apical tip of the plant for 24 inch tree pots. A maximum height does not apply for plants grown in tree pots as long as the plant is still viable and healthy. Each plant shall be capable of standing erect without support, after planting.

All plants specified as tall pot containers shall have a height of either 15 or 30 inches. Fifteen inch tall pots shall have a root zone 12 inches in length. Thirty inch tall pots shall have a root zone 26 inches in length. The height of tall pot plants shall be as follows: a minimum of 6 inches and a maximum of 18 inches measured from the top of the soil to the tip of the plant for 15 inch pots and a minimum of 12 inches and a maximum of 36 inches measured from the top of the soil to the tip of the plant for 30 inch pots. Each plant shall be capable of standing erect, without support, after planting.

Within thirty working days after the pre-construction conference, the contractor shall supply the Engineer with written verification that all the plant material necessary to complete the work as specified has been located and reserved. This verification will serve as proof of availability for all plant material required.

All plants shall be in healthy condition with normal symmetrical form, well-developed foliage, branches and cane systems at the time of delivery to the project. Plants shall be free from disease, insect eggs or infestations, disfiguring knots, bark abrasions, broken tops, branches or canes, damaged roots, sun, wind or frost injury, or other objectionable features. Plants pruned from larger sizes to meet specified sizes will not be accepted.

Plants which are furnished in containers shall have been growing in the containers for a sufficient period of time for uniform root development throughout the plants' ball, but the roots shall show no evidence of having been restricted or deformed.

The presence of any noxious or invasive species listed in Section 201-3.04, or any undesirable organism in the soil surrounding the plants, or any of the before mentioned conditions, may be cause for rejection of the plants.

Substitution of species and/or sizes of specified plants shall not be made unless evidence is submitted by the contractor, in writing, to the Engineer that plants of the species, quantity and/or sizes specified are not available during the contract period. The substitution of species and/or sizes shall be made only with prior written approval of the Engineer.

However, substitution of a larger size of the same species may be made by the contractor without the written approval of the Engineer. The contractor's substitution of a larger size of the same species, shall be made at no additional cost, either for the plants, their handling or planting, to the Agency.

All plants shall comply with Federal and State laws requiring inspection for diseases and infestations.

All shipments or deliveries of plant material grown out of state will be inspected at the nursery or growing site by the authorized State of Arizona authorities prior to delivery to the project. A copy of the state inspection record shall accompany all plant material grown out of state showing the plant material has been inspected for plant diseases and insects.

All plants shall be inspected by the Engineer upon delivery to the site and prior to placing in a nursery or planting. All rejected plants shall be removed from the project immediately upon rejection by the Engineer.

Nursery provided plants shall be as listed in the Special Provisions.

806-2.03 Agency Provided Plants. In addition to the general requirements listed above, plants listed as *Agency Provided* shall be provided by the Pima County Native Plant Nursery (PCNPN), located at 3500 W. River Road, Tucson, Arizona 85741. The contractor shall notify the Nursery Manager at (520) 877-6000 one month prior to the first pickup date, and at least 5 business days for subsequent pickups. The contractor shall arrange for pickup from this site, and delivery to the installation site. The contractor shall be responsible for the return of plant containers to the nursery.

The contractor has the option to refuse selected plants from PCNPN stock due to ill health, poor form or other specific reasons. Placement of PCNPN plants on the delivery vehicle constitutes acceptance of the plant material by the contractor. Any PCNPN provided plants above the 10% margin that die while under the duration of the contractor's construction and landscape establishment period, shall be replaced in kind by the contractor at no cost to the Agency.

The PCNPN will replace any deceased plant material free of charge regardless of container size. This guarantee covers plant material for a 180 day period after project landscape establishment when plants were properly installed according to county specifications. This guarantee does not include plant mortality due to poor contractor oversight or design flaws. The Engineer is responsible for determining if the plants were installed and maintained per specification or if mortality was due to unforeseen causes not at the fault of the PCNPN, i.e. vandalism. Failure to install plant material per specification, which has been established to ensure plant health and survivability, will void the replacement guarantee. This guarantee is for original plant material and does not cover replaced plant material.

The contractor shall return all containers to the PCNPN. This includes all hardware (wire and screens) associated with the tall pots. Failure to do so will result in the following charges to the contractor: \$2.00 per 3 or 5 gallon standard container; \$5.00 per 15 gallon container; \$5.00 per tall pot unit consisting of tall pot tube, tall pot hardware, and galvanized wire; \$2.00 per 15 inch Tree pot; and \$5.00 per 24 inch tree pot.

Agency provided plants shall be as listed in the Special Provisions.

806-2.04 Collected Stock. Collected stock shall be secured from sources outside the project limits for transplanting, and shall comply with the size, type and species requirements designated on the project plans or in the Special Provisions. When sources for collected stock are not designated, the contractor shall furnish the source.

Collected stock shall be healthy, free from noxious or invasive species listed in Section 201-3.04, insects, disease, defects and disfigurements, and shall be approved by the Engineer before transplanting operations are begun. Palm trees shall be free of scars and damage considered unsightly or unhealthy as determined by the Engineer.

The contractor shall comply with all State and Federal laws regarding the removal, sale, and transplanting of native plants.

806-2.05 Local Stock. Local stock shall be secured from within the project limits for transplanting and will be designated on the project plans, the Special Provisions or by the Engineer. All plants shall be approved by the Engineer before transplanting operations are begun.

806-2.06 Existing Plant Material. The contractor shall be responsible for maintaining all existing plants and providing an adequate water supply to any existing plants affected by construction activities. Existing plants that are removed, damaged or destroyed during construction shall be replaced with trees and shrubs of the same species at no additional cost to the Agency. Large existing plants removed will require large size replacements as directed by the Engineer.

806-2.07 Soil backfill. Soil backfill at tree pits and shrub pits, planting trenches and bedding shall consist of a clean, native site soil, with all rocks over 2” in diameter removed. Soil backfill shall be of a uniform mixture by volume, loose measure, of the following components per cubic yard: 18 cubic feet of existing soil, 3 pounds sulphur and 3 pounds of ammonium phosphate (16-20-0). Ammonium phosphate shall be of granular form of commercial grade and recent

manufacture and be delivered to the site in original, unopened containers bearing the manufacturer's statement of analysis. Fertilizer shall be blended uniformly and homogeneously into clean, native site soil prior to backfilling of tree and plant pits.

Backfilling mix for succulents, ocotillo and other cacti shall include 0.25 pounds of soil sulfur blended uniformly and homogeneously into clean, native site soil prior to backfilling of pits, as noted on project plans. Soil sulphur shall be granular or prilled agricultural grade, containing 99.5 percent sulphur and 0.5 percent inert ingredients ("Dispersion" or approved equal).

No mulch shall be included in planting pits.

806-2.08 Mulch. Mulch shall not be used.

806-2.09 Water. Water shall conform to the requirements of Subsection 805-2.04.

806-2.10 Chemical Fertilizer. Chemical fertilizer shall be Ammonium Phosphate (16-20-0) commercial fertilizer in granular form and of recent manufacture. It shall be delivered to the site in original, unopened containers bearing the manufacturer's guaranteed statement of analysis.

806-2.10 Lumber and Tree-Stakes. Tree-stakes and braces shall be sound, straight construction grade treated Douglas fir, lodge pole pine or other species approved by the Engineer. Douglas fir stakes and braces shall have nominal dimensions of 2 inches by 2 inches and lodge pole pine stakes shall have a diameter of 2 inches or greater. Tree-stakes and braces may be furnished either rough or dressed. Stakes shall be a minimum of 8 feet in length and shall be of a "Wolmanized" type, chamfered at one end, or approved equal.

806-2.12 Hardware. Nails, lag screws, staples, and other hardware shall be galvanized commercial quality. All bolts and lag screws shall be furnished with galvanized malleable washers.

Wire shall be new 12 gauge soft annealed galvanized steel wire.

Covers for wires shall be new, 3/4 inch minimum diameter vinyl or two-ply fabric-bearing rubber hose.

806-2.13 Rodent Protection. Rodent protection shall consist of either chemical or mechanical methods.

(A) **Chemical.** Chemical rodent control shall consist of a commercial type rodent repellent such as Game Stop, Hinder, Hinder-It, Repel, Ro-Pel, Thiram, Ziram, or approved equal.

(B) **Mechanical.** Mechanical rodent control shall be provided by wire fabric having 1-inch size spaces, 24 inches in height, with a black or dark brown PVC coating; landscape staples consisting of 1/8-inch diameter, stiff, galvanized wire, approximately 12 inches long, bent in half; and 12-gauge, galvanized annealed wire.

806-2.14 Existing Irrigation Systems. The contractor shall be responsible for maintaining all existing irrigation systems. Irrigation system components that are damaged or destroyed during construction shall be repaired or replaced at no additional cost to the Agency.

806-3 CONSTRUCTION REQUIREMENTS

806-3.01 Schedule and Planting Season. The contractor shall provide a tentative planting schedule to the Engineer at the pre-construction meeting and shall update this schedule as the project progresses. No later than 30 days after the contract is awarded, the Contractor shall meet with the PCNPN Manager and the Engineer to discuss planting schedule, plant pickup, return of containers, and guarantee limitations. At this meeting the Contractor will provide a time-window for picking up agency provided plants that is agreeable to the Engineer and the PCNPN Manager. The Contractor will provide the Engineer and the PCNPN Manager with meeting notes that include a schedule for picking up agency provided plants. The Contractor is responsible for notifying the Engineer and the PCNPN Manager immediately whenever changes in the planting schedule occur. The Contractor shall be responsible for, delivering, unloading, installing and fulfilling the guarantee requirements of agency provided plants. One month prior to planting, the contractor shall coordinate a firm schedule for picking up plants from the PCNPN that is within the previously agreed upon time-window for pick up

The schedule for planting trees and shrubs, within the contract time shall be at the discretion of the contractor. Planting during extremely cold, hot or windy periods shall be at the sole risk of the contractor. Plants which are damaged or die prior to final acceptance as a result of extreme weather conditions shall be removed and replaced, in kind, at no additional cost to the Agency.

If *Agency Provided* plants as described in Subsection 806-2.03 become unviable due to project delays, 4-10 active grow months may be necessary to establish replacement plants from the notice of delay. If the contractor cannot pick up agency provided plants from the PCNPN, then the contractor is responsible for payment of the full cost of the unviable plants and the replacement plants.

806-3.02 Excavation. The contractor shall be responsible for laying out all planting areas and staking all plant locations in reasonably close conformity to the dimensions and locations shown on the project plans. The Engineer shall approve the grading and shaping of all planting areas and plant locations prior to any excavating of planting pits, trenches or beds.

Plant locations shall be identified with a flag and name tag. Flagging and name tags shall remain in place after excavation of the plant pit or trench.

Prior to commencing plant pit or trench excavation activity, the contractor shall contact Arizona Blue Stake (800-STAKE-IT) in conformance with the requirements of Subsection 203-2.

In the event that existing field conditions such as subsurface utilities, pipes, structures, impervious materials or inadequate drainage necessitate relocation of planting areas, the Engineer will designate new locations. Adequate drainage for planting pits shall be based on a minimum percolation rate for the pit of 6 inches per hour.

Prior to excavating planting pits, planting trenches or beds for plants, these areas shall be graded as designated on the project plans, or as approved by the Engineer.

Planting pits and trenches shall be excavated to the dimensions indicated on the project plans or in the Special Provisions and shall have vertical sides and horizontal bottoms. When dimensions are not specified, the pits and trenches shall be excavated to a depth equivalent to the depth of the root ball. Tree pit width shall be the following: width of the container measured at the top plus 36", with the tree centered in the pit (i.e. provide 18" additional width around all sides of container). The width of pits for succulents, ocotillo, and cacti shall be the following: width of the container plus 16", with the plant centered in the pit (i.e. provide 8" additional width around all sides of container).

Planting pits for tree pots shall be excavated to the specified dimensions with the sides of the pit roughened or scarified. Pits to accommodate tree pots shall be sized as follows: planting pits for 24 inch tree pots shall be augured with a 16 inch diameter augur to a depth of 30 inches; planting pits for 15 inch tree pots shall be hand-dug or augured to a diameter of 12 inches and to a depth of 18 inches.

Planting pits for tall pots shall be excavated to the specified dimensions with the sides of the pit roughened or scarified. Pits to accommodate tall pots shall be sized as follows: planting pits for 30 inch tall pots shall be augured with an eight-inch diameter augur to a depth of 36 inches; planting pits for 15 inch tall pots shall be augured with an eight-inch diameter augur to a depth of 20 inches.

In areas of caliche or hard digging conditions, 30 inch tall pot and 24 inch tree pot planting pits shall be over excavated to minimum depth of 36 inches and a minimum width of 48 inches. Twenty pounds of gypsum shall be evenly added to the bottom of the pit, and the pit completely backfilled with prepared soil and compacted to a minimum density of 85 percent and a maximum density of 90 percent. After the pit has been backfilled and compacted, the planting pit shall be augured as specified in the previous paragraph. Once auguring has been completed, the pit shall be filled with water and allowed to drain. Once drained, the pit shall be filled a second time and again allowed to drain prior to installation of the plant. The contractor shall notify the Engineer of any pit that does not drain within 48 hours.

Planting tree pot plants in soft, sandy, or cobble soils requires no special treatment above the afore listed specification for tree pot planting pits. The methods and means required to satisfy the planting pit specifications in soft, sandy, or cobble soils is at the discretion of the landscape contractor. After placing the tree pot plant in the pit, the pit shall then be backfilled with on-site native soil and thoroughly soaked at the end of each days planting session. Tree pot backfill may utilize on-site native soil providing the soil meets the requirements of Subsection 806-2.05.

In areas of very soft, sandy, or cobble soils, where the tall pot pit caves in as the augur is removed, filling the hole with water prior to planting is not necessary. The tall pot pit shall be augured 8 to 12 inches in diameter to the depth specified herein to loosen the soil column. The pit shall then be cleared to the specified diameter and the tall pot plant placed into the pit. The pit shall then be backfilled with on-site native soil while lifting the tall pot tube and filling the pit with water creating a slurry. The tall pot pit shall be thoroughly soaked at the end of each day's

planting session. Tall pot pit backfill may utilize on-site native soil as long as the soil meets the requirements of Subsection 806-2.05. Any subsurface obstructions, materials or substances which conflict with or impact the installation of plants or may be detrimental to plant health shall be excavated and removed to a minimum of one times the rootball container depth and three times the rootball container width unless otherwise noted on the project plans or in the Special Provisions.

When excavation of any planting pit is difficult and the Engineer determines that poor drainage may result, the pit shall be filled with water twice in order to check the drainage. Any pit which has not fully drained after each filling within a twelve hour period shall be deepened until proper drainage is achieved. If proper drainage cannot be achieved, the pit shall be moved or deleted, as determined by the Engineer. If required, this work shall be paid for in accordance with Section 104-2.

Excavation of planting pits, trenches and beds shall not be done when, in the opinion of the Engineer, the moisture content of the soil is excessive with respect to accepted horticultural practice.

806-3.03 Shipping and Handling Plants. Prior to shipping, all plants shall be dug, handled, prepared and packed for shipment with care and skill, in accordance with recognized standard practice for the kind of plant involved. The root systems of all plants shall not be permitted to dry out at any time. Plants shall be protected at all times against freezing temperatures, the sun and the wind while in transit. During transportation in closed vehicles, plants shall receive adequate ventilation to prevent "sweating". Plants delivered in a wilted condition will be rejected.

The contractor shall notify the Engineer at least 24 hours prior to the date of arrival of plants from a single Arizona plant source at the project site. The Engineer will inspect all plants for conformity with the specifications, and upon his acceptance, planting may begin. The Engineer may select at random no more than 3 container-grown plants of each species in every delivery to the site for root development inspection. Plants of the same species from different growers shall be considered as separate shipments. Upon inspection of root development of the selected plants, should the Engineer determine the roots have become restricted or deformed in their containers, all plants of that species in that shipment, including the inspected plants, will be rejected and shall be immediately removed from the site. The contractor's project supervisor shall be in attendance at all plant inspections.

Plants shall be furnished in containers, or as specified in the Special Provisions or on the project plans.

Plants delivered, inspected, and found acceptable for planting shall normally be planted within 24 hours after delivery to the project site. Plants which cannot be planted within 24 hours after delivery shall be stored as specified herein.

All temporarily stored plants shall be protected from extreme weather conditions and roots shall be kept moist.

806-3.04 Planting

806-3.04 (A) General. On landscaping projects with irrigation systems, no planting shall be done until installation and acceptance of the irrigation system in total or in increments. The initial watering and all subsequent watering of the planting(s) shall be done using the newly constructed irrigation system.

Plant material may require temporary irrigation systems acceptable to the Engineer for the initial watering of large plant material which are in addition to the designed irrigation system.

The contractor shall pay particular attention to the presence of noxious and invasive species listed in Section 201-3.04 in, or adjacent to, planting areas.

Planting pits excavated in areas where the presences of noxious or invasive species are observed shall be inspected to assure complete eradication of any roots or rhizomes which may have grown into the area of the pit. All eradication work and material shall be provided by the contractor, at no additional cost to the Agency.

The presence of any noxious or invasive species in the planting pit shall be grounds for immediate removal, disposal, and replacement of that plant.

Should the contractor encounter any unforeseen or unsuitable planting condition, it shall be immediately brought to the attention of the Engineer.

Prior to planting trees and shrubs, the contractor shall remove all container stakes. Stakes shall be removed carefully so as to not damage plants. Under no circumstance shall containerstakes be included when trees or shrubs are planted into the ground.

Backfill of planting pits shall be well worked about the roots and settled by watering and tamping. Backfill shall provide the required depression around the plant, as shown on the Standard Details or project plans, for watering basins.

Root hormone, B-1, Superthrive or an approved alternate shall be applied in accordance with the manufacturer's recommendations immediately upon completion of backfilling.

Lumber and tree stakes stored at the project site shall be neatly stacked on skids a minimum of 12 inches above the ground and shall be protected from the elements to prevent damage or warping.

806-3.04 (B) Nursery Stock. Planting shall not be done in soil that is excessively moist or otherwise in a condition not satisfactory for planting in accordance with accepted horticultural practice.

Plants in containers, bear root, balled and burlapped shall be planted and watered the same day the container, wrap or moisture protection is cut.

The contractor shall adequately water plants to maintain a healthy and vigorous growing condition during the planting period.

Plants shall be removed from containers in such a manner that the root ball is not broken. Plants with broken root balls or with root balls that fall apart while being planted shall be rejected.

Plants shall be planted plumb and shall be centered in the planting pit or trench. All planting pits shall have slanted sides and flat bottoms.

Backfill material shall be prepared according to the requirements of Subsection 806-2.06 or as otherwise noted in the Special Provisions and shall be carefully firmed around the root ball of the plant so as to eliminate all air pockets. Backfill material that is placed below the root ball shall be adequately compacted to prevent settlement of the plant after planting. Backfill shall not be compacted around the roots or ball of the plants during or after planting operations.

Clods or stones exceeding 2 inches in diameter and foreign matter deemed objectionable by the Engineer will not be allowed. All excess soil that has objectionable stones shall be disposed of off the project site in a manner acceptable to the Engineer. No additional payment will be made for the removal and disposal of objectionable stone, or soil containing foreign matter.

Any excess soil which is not used in the backfill of the planting pits may be evenly distributed in the landscape areas if it will not interfere with the final grading of these areas.

All planting areas shall be graded as specified to facilitate proper watering of all material, and leave a generally smooth appearance after completion of planting.

Plants shall be set to such depth that, after backfilling and watering, the top of the root ball and the level of the backfill will be at the surrounding grade as shown on the project plans. Any plant that settles more than 1-1/2 inches below the specified grade shall be reset or replaced. Any additional backfill material required shall be as specified in the Special Provisions and on the project plans.

Immediately after planting, all plants shall be thoroughly irrigated until the backfill soil around and below the root ball of each plant is saturated.

806-3.04 (C) Collected Stock and Local Stock. If slings or cables are used to support stock during transporting and planting, the trunk shall be protected at the points of contact with the slings or cables by the use of burlap, canvas, sections of automobile tire casing, or other suitable protective material.

Cables shall be so placed as to maintain proper support and balance at all times.

A tree spade is an acceptable method for digging and moving the stock.

Dead fronds, certain live fronds, and flower stalks and seed pods shall be removed on palm trees leaving a minimum crown of 6 to 8 tiers of live fronds on each tree. Crown fronds shall be pulled together and loosely, but securely, tied in an upward position to protect the heart of the

tree. The material shall be light manila rope or multiple strands of binder twine. Frond ties shall remain in place a minimum of 60 days after planting.

The contractor shall be responsible for preventing damage or death of the stock being moved both during the moving operation and after the planting operation is completed. Should sufficient damage occur to stock, the contractor shall replace the stock with the same species of equal size.

After planting, the contractor shall maintain all collected stock and local stock in established positions during construction and landscaping establishment periods.

The contractor shall ensure that palms have been chemically sprayed with an approved preventative treatment to inhibit development of bud rot during the planting operation and during periods of high humidity and warm temperatures. The treatment shall be applied to allow deep penetration into the palm tree hearts.

Care shall be taken such that no palm tree is dropped or mishandled during the planting operations. Bending the palm tree trunk or causing uneven contact of the tree trunk with another surface may damage the palm tree heart and eventually kill the tree.

806-3.05 Pruning. All plants shall be pruned at the direction of a Certified Arborist approved by the Engineer. Pruning shall conform to the requirements of *ANSI-A-300 (Part I)-2008 Pruning*, as published by the Tree Care Industry Association, Inc. (Telephone: 1-800-733-2622, website: www.tcia.org); and *Best Management Practices, Tree Pruning (Revised 2008)*, as published by the International Society of Arboriculture (Telephone: 1-217-355-9411, website: www.isa-arbor.com).

Pruning shall be kept to a minimum and shall only be undertaken to achieve the primary objectives established in *ANSI-A-300 (Part I)* as follows:

- restoration (removing dead, damaged or diseased branches);
- managing health;
- providing clearance or;
- reducing risk.

No more than 25% of the foliage shall be removed by pruning. Excessive branch removal on the lower two-thirds of a branch or stem is to be avoided. If excessive pruning is necessary to avoid conflicts with utilities, traffic, or other site element; the arborist shall notify the Engineer for approval prior to pruning. Pruning equipment that damages living tissues and bark beyond the scope of normal work practices shall be avoided.

Treatments shall not be used to cover wounds or pruning cuts, except when necessary for disease, insect, or mistletoe control.

806-3.06 Staking. No trees shall be staked except when directed by the Engineer. When staking is specified or directed, the work shall be performed as detailed on the project plans or Standard Details.

Tree-stakes shall be driven vertically, unless otherwise indicated on the project plans, at least 6 inches in firm, undisturbed ground at the bottom of the planting pit or trench. Stakes shall be positioned so as to clear the root system without disturbing the integrity of the roots.

Staking shall be as detailed on the project plans or as directed by the Engineer. The ends of all tree ties and wires shall be securely stapled to the stakes, braces or supports to prevent them from becoming a hazard.

Tree ties and support wires shall be periodically inspected and adjusted as necessary to prevent "girdling" or injury to tree trunks or branches and to allow the tree to move freely with the wind.

Trees shall be secured to the stakes with tree ties after backfilling and prior to irrigating in the manner detailed on the project plans or as specified in the Special Provisions.

All wire ties used on plant staking shall be stapled to stakes in a manner acceptable to the Engineer. Rubber hoses on tree ties shall be a minimum of 1 foot in length at each wire loop. All tie wire exposed to tree trunks shall be covered with hose or other material approved by the Engineer.

806-3.07 Care and Protection of Trees, Shrubs and Plants.

806-3.07 (A) General. Prior to the beginning of work under Section 807 - Landscaping Establishment; the contractor shall be responsible for maintaining and protecting all planting areas, as specified in Subsection 807-3.03, including the care and protection of trees, shrubs, and plants planted under this Section. Such care and protection shall include, but not be limited to, the watering of stock, removal of construction trash and debris, eradicating and removing noxious or invasive species as specified in the Special Provisions, repairing, adjusting, or replacing stakes and support wires, repairing weather damage or damage caused by the public, furnishing and applying sprays, dust, and/or cages to combat vandalism, disease, insects, rodents and pests and taking such precautions as necessary to prevent damage from cold, frost, sunburn or other hazards. All undesirable noxious or invasive species listed in Section 201-3.04 shall be eradicated with herbicides or manual methods during Phase I, and disposed of by the contractor in accordance with Subsection 807-3.03.

The contractor shall remove and replace, at no additional cost to the Agency, all dead plants and all plants that show signs of failure to grow or which are so injured or damaged as to render them unsuitable for the purpose intended, as determined by the Engineer. The Agency shall replace plants injured or damaged by frost when such injury or damage was caused despite the contractor's efforts to protect the plants. The contractor may, with the approval of the Engineer, delay replacement of plants killed by frost until such time that frost is not imminent.

Plants shall be staked in accordance with Subsection 806-3.05 and as detailed on the project plans.

806-3.07 (B) Application of Chemicals. Any person or persons applying herbicides will be considered as doing so for hire and shall be required to be licensed in accordance with the requirements of Title 3, Chapter 2, Arizona Revised Statutes, Article 6, Section 3-377.

All herbicide application shall be done in accordance with Section 201-3.04. The contractor shall notify the Engineer and obtain prior approval of the use of any chemicals for noxious or invasive species eradication. The types of herbicide to be used and the methods of application shall be in conformity with the Environmental Protection Agency requirements, labeling instructions, and shall be approved by the Engineer. The contractor shall keep a record of all applications, the type of herbicide used such as pre- or post-emergent, the rate and method of application and the date and location of such applications on forms acceptable to the Engineer. A copy of this record shall be submitted to the Engineer after each application.

Pre-emergent herbicides or manual control shall be used on noxious or invasive species in planting areas located within the project limits; but noxious or invasive species control within granite mulch, decomposed granite, or rock mulch shall be as specified under those items of work. All areas shall be kept free of noxious or invasive species. All planting areas within the project limits shall receive an approved pre-emergent herbicide, as specified under Subsection 803-3.02. The application of herbicide shall include all areas not covered under other items of the specifications.

Herbicides shall not be used in waters of the U.S. These include washes, the edge of the wash, dip crossings and conveyances to waters of the U.S. Only manual removal of noxious and invasive species shall be allowed at these locations. See Section 201-3.04.

806-3.07 (C) Rodent Damage. The contractor shall inspect newly installed plants daily for bark damage caused by rabbits or rodents. At the first sign of rabbit or rodent damage the contractor shall protect the plants using either of the following methods:

Chemical. The contractor shall apply a commercial type rodent repellent conforming to the requirements of Subsection 806-2.12 and the manufacturer's instructions. The repellent shall be re-applied as necessary to maintain its repellent properties in accordance with the manufacturer's recommendations.

Mechanical. The contractor shall construct wire perimeter protection around the plants as follows:

Material for wire perimeter protection shall conform to the requirements of Subsection 806-2.12.

Trees: Wrap wire fabric twice around the trunk.

Shrubs: Install wire fabric around shrubs with a minimum 12-inch distance between the trunk or tips of shrub branches to the wire fabric fence. Secure the wire fabric to itself with 12-gauge, galvanized annealed wire and to the ground with landscape staples driven to full depth into the soil through the bottom wire of the wire fabric.

Pre-emergent herbicides shall not be used in areas that will be seeded as shown on the project plans.

806-4 METHOD OF MEASUREMENT

Planted trees, shrubs, cacti and other plants, will be measured on a unit basis, for each type and size of plant designated in the bidding schedule.

Tree staking will be measured on a unit basis for each tree staked. Staking will be measured independently from tree planting.

806-5 BASIS OF PAYMENT

The accepted quantities of trees, shrubs, cacti and other planted plants, measured as provided above, will be paid for at the contract unit price each for the pay unit designated in the bidding schedule, complete in place.

The accepted quantities of trees, staked, measured as provided above, will be paid for at the contract unit price each for the pay unit designated in the bidding schedule.

Protecting trees and plants from rabbit or rodent damage, if directed by the Engineer, will be paid in accordance with Subsection 104-3.

No measurement or direct payment will be made for plants selected for inspection and not planted or for the care and protection of trees, shrubs cacti and other plants prior to the beginning of the Landscaping Establishment period, the costs being considered as included in the prices paid for plants accepted and paid for under the various contract bid items.

(806LNDSC_PRUNING, 10/28/10)

ITEM 8061700 - LANDSCAPE PRUNING

1. DESCRIPTION

The work under this Item shall consist of pruning existing trees designated to remain in place or trees previously salvaged. The work shall be done by or supervised by a certified arborist. The trees to be pruned shall be identified by the Engineer. The work shall be done by the arborist and one or more laborers. The work shall include providing necessary tools, and removing all debris from the area, and taking it to a proper disposal site.

2. MATERIALS (None Specified)

3. CONSTRUCTION DETAILS:

The work consists of pruning existing trees designated for preservation that may be in conflict with new work. Pruning work shall be performed in accordance with *ANSI-A-300 (Part I)-2008 Pruning*, as published by the Tree Care Industry Association, Inc. (Telephone: 1-800-733-2622, website: www.tcia.org); and *Best Management Practices, Tree Pruning (Revised 2008)*, as published by the International Society of Arboriculture (Telephone: 1-217-355-9411, website: www.isa-arbor.com). The Contractor is expected to familiar with accepted horticulture practices as defined by these guidelines. All pruning work shall be performed or directed by a certified

arborist.

Pruning shall be kept to a minimum and should only be done in order to achieve the following objectives (summarized from *ANSI A300 (Part 1)-2008*): Pruning shall be limited to the objectives of restoration (removing dead, damaged or diseased branches), managing health, providing clearance, or risk reduction. No more than 25% of the foliage shall be removed. Excessive branch removal on the lower two-thirds of a branch of stem is to be avoided. If excessive pruning is necessary to avoid conflicts with utilities, traffic, or other site element, the arborist is to bring this to the attention of the project engineer.

Pruning equipment that damages living tissues and bark beyond the scope of normal work practices shall be avoided.

Pruning cuts shall be made according to these practices: Pruning tools shall be sharp. Pruning cuts shall remove a branch at its point of origin, close to the trunk or parent branch. It shall not cut into the branch bark ridge or branch collar or leave a stub. Branches shall never be left cut mid-branch. When pruning to a lateral, the remaining lateral branch should be large enough to assume the terminal role. The final cut should result in a flat surface with adjacent bark firmly attached. When removing a dead branch, the final cut shall be made just outside the collar of living tissue. Tree branches shall be removed in such a manner so as to avoid damage to other part of the tree or to other plants or property. Severed branches shall be removed from the crown upon completion of the pruning, at times when the tree would be left unattended, or at the end of the workday.

Wound treatments shall not be used to cover wounds or pruning cuts, except when necessary for disease, insect, or mistletoe.

4. METHOD OF MEASUREMENT

Landscape pruning of existing trees will be measured by the hour, and will include the time the certified arborist is on site. The cost for the time spent in taking debris to the landfill or proper disposal site, including dumping fees will be considered incidental to the work.

5. BASIS OF PAYMENT

Landscape pruning, measured as provided above, will be paid at the contract unit rate per hour per person (arborist and one to three laborers), which includes full compensation for the work described herein.

SECTION 808 - LANDSCAPE IRRIGATION SYSTEM

808-1 DESCRIPTION of the Standard Specifications shall be modified to add:

Irrigation for this project will be supplied by two separate existing irrigation systems as described in the 'Rillito River, Tucson Arizona Esthetic Treatment, Erosion Control, Pedestrian Bridges/Trails, and Recreation Phase III' As-Built plans dated April 23, 2001. The existing irrigation system west of Camino de La Tierra Road is served by a potable water meter located off of Camino de La Tierra Road south of the entrance to the existing parking area. The existing irrigation system east of Camino de La Tierra Road is served by a reclaimed water meter located at La Cholla Boulevard and the north bank of the Rillito River. The Contractor shall reference these As-Built plans and coordinate with NRPR personnel a minimum of two weeks prior to any construction activities to ensure proper preparation of the existing systems.

All new trees and shrubs shall be irrigated by extending the existing irrigation lateral lines to provide full and complete coverage to all new plant materials. The Contractor shall notify the Engineer immediately if the existing irrigation systems are found to be insufficient or non-functioning. In the event new materials are required to provide full and complete coverage to all new plant materials, materials and construction requirements shall comply with Subsections 808-2 and 808-3 of the Standard Specifications and as specified herein.

808-2 MATERIALS

808-2.01(B) PVC Pipe is hereby added to the Standard Specifications:

All main line pipe shall be Schedule 40 PVC pipe and shall comply with the requirements of ASTM D1785. All lateral line pipe shall be Schedule 40 PVC pipe and shall comply with the requirements of ASTM D1785. All PVC sleeving shall be Schedule 40 PVC pipe and shall comply with the requirements of ASTM D1785.

Primers for use in conjunction with PVC pipe solvent weld connections shall comply with the requirements of ASTM F656. Primer shall be as manufactured by IPS Weld-On, Type P-70 or approved equal.

Solvent weld cement used for making PVC connections shall comply with ASTM D2564. The type and set-up time shall be as recommended by the manufacturer for the class, schedule and size of pipe being joined. Solvent weld cement shall be as manufactured by IPS Weld-On, Type 711, or approved equal.

Plastic pipe shall be delivered to the site in unbroken, banded or tied bundles, and shall be so packaged as to prevent damage to pipe barrels or ends. If pipe is delivered from a local warehouse the pipe need not be bundled or wrapped.

Upon delivery to the site, the Contractor shall inspect all pipe for possible shipping damage. All damaged pipe shall be immediately removed from the project site. Plastic pipe shall be handled and stored in accordance with the manufacturer's written instruction and recommendations.

808-2.01(C) PVC Fittings is hereby added to the Standard Specifications:

PVC fittings shall be made from Type I, Grade I, PVC compounds. Fittings shall be installed in accordance with the manufacturer's recommendations and these Specifications.

Solvent weld fittings for main line (pressurized) pipe shall be Schedule 80 PVC and shall comply with the requirements of ASTM D2467. Solvent weld fittings for lateral line pipe shall be Schedule 40 PVC and shall comply with the requirements of ASTM D2466.

Threaded PVC fittings and fittings used in the construction of remote control valve assemblies shall be Schedule 80 PVC fittings and shall comply with the requirements of ASTM D2464.

808-2.01(D) High Density Polyethylene Pipe and Fittings is hereby added to the Standard Specifications:

The work under these items consists of furnishing and installing high density polyethylene pipe (HDPE) to be installed complete, including excavation and backfilling, at the locations designated on the project plans, in accordance with the details shown and these Special Provisions.

Piping shall be Class 200 HDPE; DR 11-Type 4710-IPS. Size shall be the same as the mainline it is connecting to, either 1-1/2 inches or 2 inch, as shown on the plans.

Pipe shall have an integrally molded purple stripe for identification for use with reclaimed water.

Pipe shall be made from Type III, Class C, Category 5 Grade 34 material conforming to ASTM specification D1248, and shall further meet the requirements of ASTM D3350, cell classification 445574C.

All HDPE pipe shall bear the following markings:

1. SDR rating of the pipe
2. Manufacturer's name
3. Nominal pipe size
4. Pressure rating in PSI

Fittings for HDPE pipe and lateral fittings shall be compression polypropylene fittings specifically designed for connecting HDPE piping and for transitions between PVC and HDPE piping. Fittings shall be pressure rated for 232 PSI minimum. Fittings shall be as manufactured by FloplastInc, Harco or Cepex, Inc. or approved equal.

All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule where applicable.

808-2.03 Gate Valves of the Standard Specifications is modified to add:

Gate valves shall be constructed with a brass body and non-rising stem. Gate valve shall have FPT threaded inlet and outlet and shall be equipped with a hand wheel. Gate valves shall be as manufactured by Watts, Model WGV, or approved equal. Valve size shall be as noted or, if not noted, incoming line size. Gate valves shall be used for mainline (and remote control valve assembly) isolation valves that are 2" size and larger.

808-2.03(A) Ball Valves is hereby added to the Standard Specifications:

Ball valves shall be constructed with a brass body, stainless steel ball, and FPT threaded ends. Ball valves shall be equipped with a handle with a 90 degree swing for full closure and opening of the valve. Ball valves shall be as manufactured by Watts, Model FBV Series, or approved equal. Valve size shall be as noted, or if not noted, incoming line size. Ball valves shall be used for mainline (and remote control valve assembly) isolation valves that are 1-1/2" size and smaller.

808-2.03(B) Lateral Isolation Ball Valves is hereby added to the Standard Specifications:

Ball valves shall be constructed with a Sch. 80 PVC body with solvent weld ends. Ball valves shall be equipped with a handle with a 90 degree swing for full closure and opening of the valve. Ball valves shall be as manufactured by Spears, Lasco, Asahi or approved equal. Valve size shall be as noted, or if not noted, incoming line size. Ball valves shall be used for lateral and sub-mains to areas that may have irrigation discontinued after establishment.

808-2.04(A) Electric Remote Control Master Valve is hereby added to the Standard Specifications:

The Master Valve shall be of the electric remote control valve type. The valve shall have a normally closed configuration. The valve shall have a brass body with threaded (FPT) inlet and outlet. The valve shall be equipped with a contamination proof, self-flushing screen. The Master Valve shall be as manufactured by Griswold, Model DW-PRV, or approved equal.

808-2.04(B) Electric Remote Control Valve Assembly for Drip Zones is hereby added to the Standard Specifications:

Remote control valve assemblies for drip zones shall consist of a ball valve (or gate valve for sizes 2" and larger), screen filter, electric control valve, inline pressure regulator, access box, and related fittings.

Electric remote control valves shall be constructed of heavy duty glass-filled nylon and shall be pressure rated to 200 pounds per square inch. Valves shall be as manufactured by Rain Bird, Model PESB Series, or approved equal. Valve size shall be as noted on the project plans.

Ball valves shall be as specified in Section 808-2.03(A), herein. Gate valves shall be as specified in Section 808-2.03, herein.

Screen filter shall be as specified in Section 808-2.08, herein.

Inline pressure regulator shall be constructed of durable, heat resistant plastic capable of being installed below grade. Regulator shall have a preset outlet pressure of 40 psi and have 1" FPT threaded inlet and outlet. Inline pressure regulator shall be as manufactured by Rain Bird, Model PSI-M30X-100, or approved equal.

808-2.06 Backflow Prevention Unit of the Standard Specifications is modified to add:

Backflow preventer shall be of the reduced pressure principle type and shall be as manufactured by Febco, Model 825-Y Series, or approved equal. Backflow preventer size shall be as noted on the drawings.

808-2.06(A) Backflow Preventer Security Enclosure is hereby added to the Standard Specifications:

The backflow preventer security enclosure shall be fabricated from 1¼" Schedule 40 ASTM A-53 Grade A pipe and ½" spacing #13 flattened diamond pattern steel metal panels. The enclosure shall be equipped with hinges and U-bolt hasp for padlocking. Lock shall be all-weather padlock. A lock shield shall be provided to protect the lock from vandalism. The lock shield shall be constructed of 3/16 inch thick steel and shall measure approximately 2 inches by 4 inches. The lock shield shall be an integral part of the enclosure. Two keys shall be provided to the Engineer. Color shall be "Desert Tan." The enclosure shall have minimum internal dimensions of 10 inches wide, 24 inches high and 40 inches long.

808-2.06(B) Freeze Protection Materials for Backflow Prevention Device is hereby added to the Standard Specifications:

The backflow preventer shall be insulated with a cover as specified:

- (1) The insulated blanket shall be constructed of Calliope Polymeric Resin Coated Polyester Fabric that is 100% polyester plain weave with heat sealable pigmented coating.
- (2) The insulated blanket shall have a 5 year UV resistance warranty.
- (3) Insulation shall be compressed fiberglass, with a standard R-value of R-13
- (4) The insulated blanket shall be machine stitched with reinforced metal grommet on bottom for installation of padlock or sealing with wire.
- (5) The insulated blanket shall be sized to fit the backflow preventer without modification and as recommended by the blanket manufacturer.

808-2.07 Emitter Assembly of the Standard Specifications is modified to add:

Multi-outlet emitter assembly shall consist of a ½" PVC riser, emitter, and distribution tubing as detailed on the drawings. Emitters shall be multi-outlet, pressure compensating with self-cleaning flush action. Emitter shall have six 1-GPH outlets and a ½" FPT threaded inlet. Emitter shall be as manufactured by Rain Bird, Model XBT-10-6, or approved equal.

Single-outlet emitter assembly shall consist of a ½" PVC riser, emitter, and distribution tubing, as detailed on the drawings. Emitters shall be single-outlet, pressure compensating with self-cleaning flush action. Emitter shall have one 1-GPH outlet and a ½" FPT threaded inlet. Emitter

shall be as manufactured by Rain Bird, Model XBT-10, or approved equal. Single outlet emitters shall be used for the irrigation of individual shrubs, only.

Emitter flow rates shall be as shown on the project plans.

808-2.07(A) Emitter Distribution Tubing is hereby added to the Standard Specifications:

Emitter distribution tubing shall be constructed of UV resistant polyvinyl materials and shall have an outside diameter of 0.22" and an inside diameter of 0.16". Tubing shall be as manufactured by Agricultural Products Model PE220, or approved equal.

808-2.08 Filter of the Standard Specifications is modified to add:

The filter shall be of the "wye" pattern inline screen type filter with FPT threaded inlet and outlet. Filter body shall be constructed of durable non-corrosive components and shall be of the two-piece design to allow for the removal of the filter screen. Filter screen shall be 200 mesh and constructed of stainless steel. Filter shall have a minimum pressure rating of 150 psi. Size of filter shall be 1" unless otherwise noted. Screen filter shall be as manufactured by Agricultural Products, Model 4E-1. Filter shall be equipped with a stainless steel screen as manufactured by Agricultural Products, Model 4E-series or approved equal.

808-2.10 Controller of the Standard Specifications is modified to add:

The controller shall be as shown on the project plans. The number of stations shall be as noted on the project plans.

The controller shall interface with a two-wire decoder based irrigation system. The controller shall be grounded using a #8 ground wire and two ground rods or as recommended by the controller manufacturer. The size of the grounding rods shall be in accordance with the controller manufacturer's written instructions and shall be copper clad steel of 5/8" minimum diameter and eight (8) foot length. All ground rod connections shall be made using the Cadweld (exothermic or approved equal) method.

Wiring between the controller and valves shall be Paige Maxi Cable 2x14 gauge.

Field decoders shall be Rainbird FD 101TURF (for single valves), FD 102TURF (where two valves are located adjacent to each other) and FD 401TURF (where three valves are located adjacent to each other), or approved equal. A separate ground rod shall be provided where FD 401TURF decoders are used.

Rainbird LSP-1, or approved equal surge protectors shall be provided in a separate valve box at 500 foot maximum spacing or 8 valves (whichever is less), with ground rods provided at surge protectors and as recommended by the manufacturer. A Rainbird LSP-1 surge protector shall be provided in each controller enclosure.

Sensor decoders for the flow sensor shall be Rainbird Model SD 210TURF, or approved equal, with ground rods provided at sensor decoders and as recommended by the manufacturer.

808-2.10(A) Controller Security Cabinet is hereby added to the Standard Specifications:

The controller security cabinet shall be fabricated from 3/16” steel plate. The enclosure shall be equipped with ventilated doors and pry resistant lock cover. The enclosure shall be equipped with a 110 volt convenience outlet. The enclosure shall be as manufactured by Le Meur, Model LE-A-CR or approved equal. Color shall be “Desert Tan.” The control components and controller shall be assembled inside the cabinet by a manufacturer’s Certified Assembler.

808-2.11 Flush Cap Assembly is hereby added to the Standard Specifications:

The Flush Cap Assembly shall consist of a (S x MPT) Schedule 40 PVC fitting with a Schedule 40 PVC (FPT) cap. The assembly shall be fitted with a Schedule 40 PVC Ball Valve. The assembly shall be installed in a ten inch (10") diameter access box as detailed on the project plans.

808-2.12 Detectable Mainline Marking Tape is hereby added to the Standard Specifications:

The mainline marking tape shall be a five (5) mil thick, five-ply composition, polyethylene tape. The tape shall have a 20 gauge solid aluminum core that is fully encapsulated within the polyethylene material. The tape shall be three inches (3") wide and shall have the words “CAUTION - IRRIGATION LINE BELOW” printed at regular intervals. Tape color shall be green for potable water and purple for reclaimed water. The detectable marking tape shall be as manufactured by T. Christy Enterprises Inc., Model TA-DT-3"-G-I (potable water) or TA-DT-3"-P-RW (reclaimed water) or approved equal.

808-2.13 Valve Access Boxes is hereby added to the Standard Specifications:

Valve access boxes for gate valves, ball valves, remote control valves, master valves, flow sensors, and flush caps shall be manufactured from a combination of polyolefin and fibrous inorganic components. All access boxes shall be equipped with a heavy-duty cover that is fully supported by the access box. Covers shall be permanently marked with the word “IRRIGATION” and shall be capable of being bolted down for security purposes. Access boxes shall be as manufactured by NDS, or approved equals. Box sizes and types shall be as follows:

Master Valve	Jumbo Rectangular with extensions as-needed
Flow Sensor	Jumbo Rectangular with extensions as-needed
Mainline Isolation Valves	Standard Rectangular with extensions as-needed
Drip Zone Remote Control Valves	Jumbo Rectangular with extensions as-needed
In-Line Pressure Regulator	Standard Rectangular with extensions as-needed
Temporary Spray Zone Remote Control Valves	Standard Rectangular with extensions as-needed
Emitter Line Flush Caps	Ten-Inch Round
Lateral Isolation Ball Valves	Ten-Inch Round

808-2.14 Flow Sensor is hereby added to the Standard Specifications:

The flow sensor shall be capable of determining flow rates between 0.3 and 15 feet per second with an accuracy of (+/-) 1%. The flow sensor shall have a one inch brass body. The flow sensor shall be fully compatible with the controller and other control system components installed. The sensor shall be specifically designed for buried applications. Flow sensor shall be Rainbird Model FS100B or approved equal.

808-3 CONSTRUCTION REQUIREMENTS

808-3.01 General of the Standard Specifications is modified to add after the second paragraph:

The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in equipment usage, area dimensions or static water pressure exist that might not have been considered in the engineering. Such obstructions or differences shall be brought to the attention of the Agency's Representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.

All material and equipment shall be delivered to the job site in unbroken reels, cartons or other packaging to demonstrate that such material is new and of a quality and grade in keeping with the intent of these specifications.

Site Conditions:

All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and receive approval prior to proceeding with work under this Section.

Exercise extreme care in excavating and working near existing utilities. The Contractor shall be responsible for damage to utilities which are caused by his operation or neglect. Check existing utilities drawings for existing utility locations.

The Contractor shall coordinate installation of irrigation materials, including pipe, so there shall be no interference with utilities or other construction or difficulty in planting trees, shrubs, and ground covers. The Contractor shall coordinate with other contractors to ensure timely placing of necessary sleeves, wires and pipes under walks, curbs and paving.

This irrigation system has been designed to operate with a minimum static inlet water pressure as shown on the drawings. The Contractor shall take a pressure reading prior to beginning construction. The Agency's Representative shall be present at this reading.

The manufacturer of the irrigation 2 wire system shall have an active installation certification program. Care must be taken in the installation of the 2 wire irrigation system. No wiring of the system shall take place without prior training of irrigation installation staff. The installer must provide the certification to the Engineer prior to installation of irrigation wiring and decoders, or be supervised throughout construction by a certified installer.

808-3.01(A) System Layout is hereby added to the Standard Specifications:

Prior to the start of trench excavation, the Contractor shall lay out the irrigation system marking the locations of all meter(s), backflow preventers, controller(s), mainlines, isolation valves, master valves, flow sensors, remote control valves, sleeves, and related equipment. The layout shall be approved by the Engineer prior to the start of trenching and installation work. The Engineer shall have the authority to make changes to layout of the system if appropriate for field conditions.

The irrigation system shall be connected to water supply points of connection as indicated on the drawings.

Connections shall be made at approximate locations as shown on drawings. The Contractor is responsible for minor changes caused by actual site conditions.

The Engineer shall approve all emitter discharge locations and reserves the right to request that the Contractor make minor adjustments to emitter discharge locations or emitter discharge rate at no cost to the Agency.

All parts of the irrigation system and associated equipment shall be adjusted to function properly and shall be turned over to the Agency in operating condition.

808-3.01(B) Blue-Staking is hereby added to the Standard Specifications:

The Contractor shall request that the project site be Blue-Staked prior to the start of any irrigation excavation or trenching work. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as required by the Agency or appropriate utility company, at the Contractor's expense.

808-3.02 Trenching and Piping of the Standard Specifications is modified to add:

Underground piping shall be installed within trenches as detailed on the project plans. Pipe shall be laid on top of a minimum of three inches (3") of select bedding material. A minimum of six inches (6") of select bedding material shall provide coverage for all pipes. Detectable marking tape shall be installed above all mainline piping as detailed on the project plans.

Piping shall be snaked in the trench to allow for thermal expansion and contraction.

After all curing of solvent weld joint and after having received the approval of the Agency's Representative, the mainline shall be filled. Extreme care will be taken to slowly fill the piping while releasing entrapped air at the ends of the mainline.

Manufacturing's installation recommendations shall be strictly adhered to.

If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to the Agency.

Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots. Excavation in areas where 2-inch and larger roots occur shall be done by hand. All roots 2 inches and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped with burlap to prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts. Roots 1 inch and larger in diameter shall be painted with two coats of Tree Seal or equal. Trenches adjacent to trees should be closed within 24 hours, and where this is not possible the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

Male metallic threaded components are not permitted to be inserted in non-metallic female fittings.

HDPE pipe on top of the box culverts shall be installed as a single piece without splices. Fusion splices may be permitted only with the permission of the Engineer. Vertical transition to required depth and transition to PVC pipe shall be made using approved compression fittings. Transition to required depth may be made by angling the pipe downward at a 45 degree angle.

808-3.02(A) Pipe Sleeves is hereby added to the Standard Specifications:

Sleeves shall be provided in all locations where irrigation mainlines and/or laterals extend under roadways, drives, multi-use paths, sidewalks, or other paved surfaces. Sleeve sizes shall be as noted on the drawings. If sleeve size is not noted, the sleeve size shall be two standard pipe sizes larger than the pipe enclosed but in no case shall sleeve be less than two inch (2") size. The location of all sleeves under the roadway and multi-use path shall be clearly and accurately recorded on the as-built drawings. The Roadway Station where the sleeves are installed under the roadway shall be noted on the As-Built Drawings.

All sleeves shall be capped and kept clean of dirt and debris.

Excavation and backfill shall conform to the requirements specified in Section 3.03.

Sleeves shall have a minimum horizontal clearance of 12 inches from each other and other piping. Sleeves shall not be installed parallel and directly over another line. Sleeves shall have a minimum of 6 inches vertical clearance where they cross other lines.

808-3.10 Water Meter of the Standard Specifications is modified to add:

The water utility serving the site shall be contacted prior to the bid date for information pertaining to the Metered Water Service Application. The Contractor shall present the project plans to appropriate Water Utility personnel. Water company personnel will provide specific information pertaining to the cost of the proposed metered water service.

Following the award of contract, the Contractor shall contact the Pima County Planning and Development Services Department/Address Issuing Agency, and shall obtain an "address" for each required meter service. After the required address has been obtained, an "Application for

Metered Water Service", along with all applicable fees, including system equity fees, may be filed with the Water Utility. The Contractor shall determine whether the Water Utility or the Contractor is to install the water meter. The Water Utility will then schedule the installation of the required meters and services. The installation of service(s) and meter(s) will be performed by either the water utility forces or the Contractor. All water obtained from the new irrigation water service/meter(s) and used for irrigation or other purposes during project construction and during the landscape establishment period shall be paid for by the Contractor. Upon completion of the landscape establishment period responsibility for payment of water charges will be transferred to Pima County as directed by the Engineer. The Contractor shall notify the Engineer thirty (30) days prior to the end of the landscape establishment period in order for Pima County make all arrangements to assume the responsibility for payment of future water charges.

808-3.11 Backflow Preventers is hereby added to the Standard Specifications:

Backflow preventers shall be installed as detailed in the locations shown on the project plans. All backflow preventers shall be tested by an individual certified to perform such testing by the water utility. Certificates, signed by the tester and indicating that the devices are operating correctly, shall be filed with the Engineer and the water utility prior to the Contractor's use of water from the new water meter.

808-3.11(A) Backflow Preventer Security Enclosure is hereby added to the Standard Specifications:

A security enclosure shall be installed at each backflow preventer as detailed. The enclosure shall be positioned, relative to the backflow preventer, to allow for the opening and closing of the enclosure without interference with the backflow preventer.

808-3.12 Valves and Sensors is hereby added to the Standard Specifications:

All sensors and valves (master valves, gate valves, ball valves, remote control valves, flow sensors, etc.) shall be installed in access boxes as detailed. Use teflon tape on male threads of all threaded connections. Install access boxes such that the top of the box is parallel to and flush with the surrounding grade, or as detailed. Provide gravel sumps and brick footings as detailed. In locations where more than one box is to be installed in a given location, group boxes together and keep boxes within a uniform alignment. Provide adequate clearance around enclosed valve to allow for valve operation and/or removal. All valve boxes shall have bottoms and side openings wrapped with an approved geotextile fabric.

All electric control valves shall be tagged with permanent yellow tags made of polyurethane and shall measure 2.25" wide by 2.75 inches tall. Manufacturer imprinted markings shall measure 1 $\frac{1}{8}$ " tall and shall indicate valve number, controller, and an indication of what the valve is serving, tree or shrub.

808-3.13 Control System is hereby added to the Standard Specifications:

The controller and all related control system components shall be installed as detailed and in accordance with the control system manufacturer's written instructions. The work shall be under

the supervision or direction of a factory authorized technician. The Contractor shall be responsible for all installation and testing work as required for the operation of the system in accordance with the manufacturer's specifications.

Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines whenever possible. A spare wire shall be provided at the time of installation alongside the functioning wire.

An expansion curl shall be provided within 3 feet of each wire connection. Expansion curl shall be of sufficient length at each splice connection at each electric control, so that in case of repair the valve bonnet may be brought to the surface without disconnection of the control wires. Control wires shall be laid loosely in trench without stress or stretching of control wire conductors.

Field splices between the automatic controller and electrical control valves will not be allowed without prior approval of the Owner's Representative.

All control wiring installed under paving shall be installed in UL listed Schedule 40 electrical conduit. Conduit shall terminate at least 2 feet inside of a planting area. Conduit joints and fittings shall be solvent weld. Size shall be 2 inch minimum and larger as required and/or shown on the plans.

All control wire less than 500 feet in length shall be continuous without splices or joints from the controller to the valves. Connections to the electric valves shall be made within 18 inches of the valve.

All control wires shall be installed at least 18 inches deep. Contractor shall obtain the Owner's Representative's approval for wire routing when installed in separate ditch. Control wires may be installed in a common ditch with piping; however, wires must be installed a minimum of 4 inches below or to one side of piping.

Control wire passing under paved surfaces shall be installed in a separate dedicated Sch. 40 PVC conduit with long sweeps and pull boxes as required.

All wire connections for the two wire system shall be made using 3M DBR-DBY connectors or approved equal as recommended by the controller manufacturer. Splicing shall be in accordance with the manufacturer's instructions and current industry practices. In case of discrepancy, the manufacturer's instructions shall govern. Where splices do not occur at a valve location, the location shall be shown on the Record Drawings.

Ground rods shall be placed approximately 8 feet away from any decoder or surge protector. The leads from the decoder or surge protector shall be spliced to a #10 wire and extended to the ground rod and Cadweld connector.

Control system startup shall utilize the services of the controller manufacturer's authorized system technician.

808-3.13(A) Electrical Services to the Controllers is hereby added to the Standard Specifications:

The Contractor shall be responsible for the installation of the electrical services to the controller including the required connections at the service panel and controller. The conductors required shall be as noted on the project plans or as required by applicable code(s). All wiring shall be installed in one-inch (1") size (or larger) Schedule 40 PVC conduit. Pull boxes shall be provided and installed along the conduit path at intervals not exceeding two hundred feet (200'). All work shall be in accordance with the Pima County - City of Tucson Standard Specifications for Public Improvements, the special provisions, and applicable codes. The contractor performing the electrical work shall be licensed by the State of Arizona Registrar of Contractors and shall hold a license appropriate for the work to be performed.

808-3.14 Flush Cap Assembly is hereby added to the Standard Specifications:

Flush cap assembly shall be installed at the end of lateral lines as shown on the plans. Assembly shall be installed in a ten inch (10") diameter access box as detailed.

808-3.15 Operations and Maintenance Manual is hereby added to the Standard Specifications:

On or before the date of final inspection, the contractor shall deliver two individually bound copies of the project irrigation system Operations and Maintenance Manual. The manual shall include: index, controller programming and operations instructions, operation and maintenance instructions for all automated valves, sensors, and related equipment, replacement part lists for all installed equipment, make and model numbers for all equipment furnished, and detailed operating and maintenance instructions of major equipment. Descriptions of all installed materials and systems shall be provided in sufficient detail to permit maintenance personnel to understand, operate and maintain the equipment.

The Operations and Maintenance Manual shall also include copies of the manufacturers' warranties and guarantees for the materials and equipment installed.

The Operations and Maintenance Manual shall also include the name, mailing address, email address, and telephone number of the contractor's representative responsible for warranty issues associated with the irrigation system.

808-3.16 Turn-Over Equipment is hereby added to the Standard Specifications:

On or before the date of final acceptance of the irrigation system, the contractor shall turn-over to the Engineer three sets of keys or wrenches for access to the controller(s) and other equipment, hand-held remote control device(s), spare parts, materials, and equipment as noted on the project plans or as identified in these Special Provisions.

808-3.17 Irrigation System Warranty and Guarantee is hereby added to the Standard Specifications:

The Contractor shall warrant and guarantee the irrigation system installed to be free from defects in materials and workmanship for a period of two years starting on the date of final acceptance of the project, as specified in Subsection 105-17.04.

Warranty information shall be submitted to the Engineer as described herein.

All materials and equipment that are found to be defective during the warranty and guarantee period, for reasons other than vandalism, neglect, or improper operation by others, shall be repaired or replaced by the Contractor at no cost to Pima County. Repair or replacement work shall be completed within 10 calendar days of receipt of written notice. If work is not completed within this time period, Pima County may perform the work, or have others perform the work, and bill the Contractor for all direct expenses associated with the remedial work.

808-4 TESTING

808-4.01 Operational Testing is hereby added to the Standard Specifications:

Upon completion of the irrigation system installation, the Contractor shall perform an operational test of the irrigation system. The operational test shall be performed with the Engineer present. The test shall demonstrate that the controller, control valves, and all system applicators are operating correctly and providing adequate water to the landscape plantings. Irrigation system components found to be operating incorrectly shall be repaired or replaced prior to start of the Landscaping Establishment Period and at no cost to the Agency.

The irrigation system specified shall have a certification program before acceptance. The irrigation system shall be certified by the manufacturer before acceptance or payment by the Agency.

The main lines and/or pressure mains shall be subjected to 125 pounds per square inch pressure for a minimum period of 2 hours.

808-5 RECORD AND AS-BUILT DRAWINGS

808-5.01 As-Built Drawings is hereby added to the Standard Specifications:

The Contractor shall submit to the Owner's Representative, prior to Substantial Completion of the Work, as-built record drawings for the irrigation system installed. The drawings shall indicate the location of all meters, backflow preventers, mainlines, master valves, isolation valves, and sleeves/pipelines under paved surfaces. Sleeves under the pathway shall be identified by pathway station number. The location of valves and other system appurtenances shall be identified by two or more dimensions from fixed objects such as curbs, or utility structures. As-built drawings shall be prepared with ink on-mylar. The preparation of the mylar drawings shall be the Contractor's responsibility and shall be at the Contractor's expense.

A set of as-built drawings shall be maintained on the project site at all times. The as-built drawings shall be updated daily, as the work is performed. If the as-built drawings are not updated in an accurate or timely manner, the Engineer shall have the authority to order a stop to

the irrigation installation work. The stop shall remain in effect until such time as the as-built irrigation drawings are updated and/or corrected as specified.

808-6 METHOD OF MEASUREMENT of the Standard Specifications is revised to read:

The landscape irrigation system will be measured on a lump sum basis for the work complete in place.

808-7 BASIS OF PAYMENT of the Standard Specifications is revised to read:

The accepted quantity of landscape irrigation system, measured as provided above, will be paid for at the contract lump sum price, for which price shall be full compensation for the item(s) complete-in-place as described herein and on the project plans, including all labor, equipment, materials, tools, supplies, fees, and incidentals necessary for the work, in conformance, with the requirements of these Special Provisions, the project plans, or as may be directed by the Engineer.

No separate payment will be made for the preparation of as-built record drawings, the cost of which is considered as incidental to and included in the payment for contract items in the bidding schedule which require this work.

No separate payment will be made for supplying and installing incidental irrigation system components not listed in the bidding schedule but required to achieve a complete and functioning irrigation system. The cost of such incidental irrigation system components is considered as included in the payment for contract items in the bidding schedule into which these components are incorporated.

Payment will be made only after the irrigation system is certified by the manufacturer. This certification must be provided to the Agency.

(808MISC_LNDSC, 9/13/12)

ITEM NO. 8080111 - MISCELLANEOUS LANDSCAPE WORK ALLOWANCE

1. DESCRIPTION

The work under this item is intended to cover work added to the contract by the Engineer for miscellaneous landscape work to address field conditions and adjustments during the course of construction. Miscellaneous landscape work shall be work that was not covered by other items included in the project and shall be performed at the direction of the Engineer.

2. MATERIALS (None Specified)

3. CONSTRUCTION DETAILS (None Specified)

4. METHOD OF MEASUREMENT

The landscape work under this item shall be completed on an extra work basis, in conformance with the provisions of Subsection 109-5.

5. BASIS OF PAYMENT:

Payment for miscellaneous landscape work will be in accordance with the provisions of Subsection 109-5.

(810EROS_CON, 5/2/14)

SECTION 810 - EROSION CONTROL AND POLLUTION PREVENTION of the Standard Specifications is revised to read:

810-1 DESCRIPTION

810-1.01 General. On projects where an Arizona Pollutant Discharge Elimination System or equivalent National Pollutant Discharge Elimination System (AZPDES/NPDES) permit is required, the contractor shall implement the requirements of the permit for sediment and erosion control due to stormwater runoff during construction, as specified under the current AZPDES/NPDES Construction General Permit. The Agency and the contractor shall prepare and submit separate Notices of Intent (NOI) and Notices of Termination (NOT) forms for the project. The contractor shall copy their AZPDES NOI Application and NOI Certification to the owner of the Municipal Separate Storm Sewer System (MS4) (i.e. Pima County Department of Environmental Quality, City of Tucson Stormwater Management, Town of Marana Environmental Engineering, or the Town of Oro Valley Stormwater Utility). The contractor shall copy their AZPDES NOT Acknowledgement to the owner of the MS4 upon project stabilization. Copies of all NOI and NOT documentation shall be placed in to the SWPPP, along with verification that these were sent to the owner of the MS4. If the project lies in multiple MS4s, the NOI Application, Authorization, notification of sending the permit, and NOT shall be sent to all MS4s in which the project is located.

The Agency has prepared a Stormwater Pollution Prevention Plan (SWPPP), which includes a narrative description of the proposed measures to be implemented, sequence of construction activities, and a site-specific diagram indicating the proposed locations where erosion and sediment control devices or measures may be required during construction. The SWPPP also includes pollution prevention controls.

This SWPPP is included in the Special Provisions. A list of subcontractors and key field personnel contact numbers shall be placed into the SWPPP. The contractor shall also be responsible for assembling member(s) of a Stormwater Team. The Stormwater Team shall be responsible for modifications to the SWPPP, and for compliance with the requirements in the AZPDES permit. Members of the Stormwater Team shall be listed in the SWPPP, along with title, responsibility, and qualifications. A member of the contractor's Stormwater Team shall be available for inspections with an Agency Representative. Prior to the start of construction, each contractor and all subcontractors shall be asked to sign a certification that they understand all requirements of the AZPDES/NPDES permit. Signed certifications shall be placed into the SWPPP.

The work under this item shall include furnishing, installing, maintaining, removing and disposing

of temporary sediment and erosion control measures such as silt fences, check dams, sediment basins, netting, sediment logs/wattles, and other erosion control devices or methods as shown in the SWPPP and in the Special Provisions, including erosion and sediment controls for stockpiles, excavations, and spoils. This item also includes storage, handling, and disposal of construction materials and waste, and control and management of site litter.

Documentation in the SWPPP book required by the AZPDES permit shall also be included. This includes updating project maps and all appendices as required in the permit. It also includes placing the inspection report in the SWPPP book within 7 calendar days of completing the inspection.

Permanent erosion control will be constructed under the specific items found in the plans and listed in the Special Provisions and bid schedule.

810-1.01(A) Stormwater Implementation Plan

The contractor will provide an implementation plan describing the SWPPP activities associated with the construction sequencing of the project and how all requirements of the SWPPP will be accomplished during all phases of construction, including housekeeping requirements. All disturbed slopes that will not be stabilized within the SWPPP mandated 14 days must have temporary stabilization installed.

The implementation plan shall also include the contractor's training plan for their own Stormwater Team, as well as for remaining staff and sub-contractors. The contractor shall provide new employee training at least one (1) time per year and shall provide refresher training for existing employees directly involved in SWPPP activities at least once every two (2) years. The contractor's training plan shall cover all requirements included in the most current version of the AZPDES Construction General Permit and shall include at minimum:

- County ordinances related to stormwater and construction
- Requirements for structural and non-structural control measures on construction sites, such as erosion and sediment controls
- Construction control measures maintenance requirements
- Inspection procedures
- Enforcement procedures
- Requirements and restrictions related to other permits included in the SWPPP, including the 404 Permit, prohibiting stockpiling in drainage conveyances and washes
- Concrete Waste Management
- Hazardous waste management, including spill reporting and mitigation
- Proper storage of construction materials
- Proper storage of construction waste
- Litter control
- Management of stockpiles, excavations, and spoils
- Management of portable toilets
- Respect for project work boundaries and preservation fence limits
- Respect for existing vegetation
- Installation of sediment wattles and logs

810-1.02 Erosion Control. Erosion controls, both temporary and permanent, shall be installed in accordance with phasing provisions in the approved SWPPP and coordinated with the related construction. Erosion controls must be provided within 14 days of completion of land disturbance. This applies to each location within a project area.

Perimeter control is required before work begins for all down-slope and some side-slope boundaries, unless the project is designed with sediment basins.

Stockpiles, excavations, and spoils must have sediment control, except when actively worked. Sediments controls are required during weekends and evenings. Stockpiles, excavations, and spoils cannot be placed in washes, surface waters, curb and gutter, or streets leading to these conveyances.

All work specified in this subsection will be temporary for use during construction.

The contractor shall be responsible for maintaining all erosion and pollution control devices in proper functioning condition at all times.

When deficiencies in the erosion control devices or other elements of work listed herein are noted by inspection or other observation, specified corrections shall be made by the contractor by the end of the day or work shift, or as directed by the Engineer.

Work specified herein which is lost, destroyed, or deemed unacceptable by the Engineer as a result of the contractor's operations shall be replaced by the contractor at no additional cost to the Agency. Work specified herein which is lost or destroyed as a result of natural events, such as excessive rainfall, shall be replaced by the contractor and be paid for in accordance with the requirements of Subsection 109-3.

In cases of serious or willful disregard for the protection of the waters of the U.S. and/or natural surroundings by the contractor, the Engineer will immediately notify the contractor of such non-compliance. If the contractor fails to remedy the situation within 24 hours after receipt of such notice, the Engineer may immediately place the erosion and/or other pollution control elements in proper condition and deduct the cost thereof from moneys due the contract.

810-1.03 Other Pollutant Controls. The work shall include implementing controls to eliminate the discharge of pollutants, such as fuels, lubricants, bitumens, dust palliatives, raw sewage, wash water, silt laden water, irrigation runoff and other harmful materials into storm and other off-site waters. The work shall include the implementation of spill prevention and material management controls and practices to prevent the release of washoff of pollutants. These controls and practices shall be specified in the SWPPP and shall include delivery and storage procedures for chemicals and construction materials, material use, stockpile, excavation and spoils management, liquid and solid waste management, hazardous waste management, disposal and cleanup procedures, the contractor's plans for handling of potential pollutants, and other pollution prevention measures as required.

Handling procedures for potential pollutants shall also be included in the contractor's "good housekeeping" practices as specified herein. At the preconstruction conference, the contractor shall

specify “good housekeeping” practices and requirements, on-site and off-site tracking control, protection of equipment storage and maintenance areas, sweeping schedule of highways and roadways related to hauling activities, a construction sequence of major activities, Spill Prevention and Response Plan, and a listing of potential pollutants in the SWPPP.

The contractor shall document all treatment chemicals, i.e. polymers, flocculants or other cationic treatment chemicals used on the project. Documentation shall be in accordance with the current AZPDES/NPDES Construction General Permit and shall include a list of treatment chemicals used, justification for use, training provided in appropriate use, description of how they will be stored, dosage used, and a copy of Material Safety Data Sheets (MSDS).

Storage, handling and disposal of construction products, materials, and wastes shall comply with the current AZPDES/NPDES Construction General Permit. Control measures include the use of plastic sheeting under containers or bags of chemicals stored outside, providing adequately sized secondary containment under drums of chemicals, storing chemicals in water-tight, sealed containers that are labeled in accordance with applicable federal, state, tribal, or local requirements, and separating and labeling hazardous and non-hazardous waste. The contractor shall implement measures to minimize the potential for leaks and spills by installing barriers between material storage and traffic areas.

The contractor shall provide waste containers (e.g. dumpster or trash receptacles with covers/lids) of sufficient size and number to contain construction and domestic wastes. Domestic waste shall be cleaned up and disposed of daily in designated waste containers, and cleaned up immediately if overflowing.

If concrete washout activities occur and there is an AZPDES Construction General Permit (402 Permit) for the site, ADEQ’s Aquifer Protection Type 1.12 General Aquifer Protection Permit (APP) shall be followed. If there is no 402 permit and concrete washout activities occur, a separate APP permit shall be obtained by the contractor.

Vehicle/equipment washing is not an allowable discharge covered under the SWPPP. The contractor shall apply for and obtain a type 3.03 General APP if vehicle washing will be done on site. The contractor shall also provide copies of their Type 3.03 General APP Permit for vehicle/equipment wash down areas for placement into the SWPPP as well as any other permits required

The contractor must identify locations of the following on the SWPPP Site Map:

Vehicle/equipment wash down area, concrete wash out areas, staging yard/area, chemical storage area, equipment maintenance and repair areas, stockpile, excavation and spoils areas, portable toilets, equipment and construction material storage areas, and locations where potential pollutant sources (pesticides, water treatment chemicals) were used and stored.

810-1.04 Staging/Storage Yard. If the contractor has entered into a separate agreement with an owner or lessee of private property to obtain property for use as a storage or staging area, the contractor shall assume all responsibilities for compliance with the AZPDES/NPDES regulations for this property. The contractor shall ensure that activities at this location do not affect the

AZPDES permit held by the Agency.

The Agency shall state in its SWPPP that this area is under the control of the contractor.

810-2 MATERIALS

810-2.01 Silt Fence. Material requirements for silt fences, including posts, wire support fencing, and fasteners, shall be in accordance with Section 915. Geotextile fabric shall conform to the requirements of Subsections 1014-1 and 1014-8, except that the filter cloth shall be woven polypropylene, and the fabric Apparent Opening Size shall be between numbers 20 and 50 U.S. Standard sieve sizes, when tested in accordance with ASTM D 4751.

810-2.02 (Not Used)

810-2.03 Riprap and Rock Mulch. Riprap for culvert inlet and outlet protection and cut and fill transitions designated on the plans shall conform to the requirements of Section 913.

Rock mulch for headwall and wingwall treatments and rock check dams shall conform to the requirements of Section 913 and the details shown on the project plans.

810-2.04 Sand Bags and Gravel Bags. Sand and gravel bags, when filled, shall measure approximately 18 inches long by 12 inches wide by 3 inches thick, and weight approximately 33 pounds. Bags shall be manufactured from polypropylene, polyethylene, or polyamide woven fabric with the following characteristics:

Unit Weight, Minimum, oz. Per sq. yd.	4
Mullen Burst Strength, Exceeding, psi.	300
Ultraviolet Stability, Exceeding, %	70

Material used to fill sand bags shall be clean sand or a clean sandy soil free of silt, as approved by the Engineer.

Gravel fill shall be between 0.4 and 0.8 inches in diameter, and shall be clean and free from clay balls, organic matter and other materials.

810-2.05 Erosion Control Sediment Logs. Erosion control sediment logs shall be composed of weed-free, 100 percent virgin aspen wood excelsior or rice straw in a tube of non-biodegradable polyester or high-density polyethylene netting. Netting shall have a minimum durability of one year after installation, and shall be secured with metal clips or knotted ends at each end of the log to assure fiber containment. The nominal diameter of the logs shall be from 9 to 20 inches as specified on the plans. The length of the rolls shall be from 7 to 25 feet as specified on the plans.

810-2.06 Sediment Wattles. Sediment wattles shall be manufactured rolls composed of weed-free, 100-percent virgin aspen wood excelsior or rice straw, encased in a tube of long-term photodegradable plastic or biodegradable natural fiber netting with a maximum one-inch by one-inch grid. Netting shall have a minimum durability of one year after installation, and shall be secured with metal clips or knotted ends at each end of the log to assure fiber containment.

Sediment wattles shall have nominal diameters of 9, 12, or 18 inches, with lengths from 7 to 25 feet, as specified on the plans. Fibers shall be evenly distributed throughout the wattle.

810-2.07 Curb Inlet Guard. Curb drain inlet guards shall be manufactured systems composed of high density polyethylene (HDPE) support brackets, an HDPE outer jacket and an integrated particle filter. Segments shall be adjusted and overlapped to fit the drain opening.

810-2.08 Rain Gauge. Rain Gauges used to measure rainfall shall be wedge-shaped standard fence post rain gauge that measures a minimum of six (6) inches (150mm) of rainfall, such as a Tru-Chek Rain Gauge. An English scale should be provided on one face, with a metric scale on the other face. Graduation shall be permanently molded in durable weather resistant plastic. The minimum graduations shall be 0.01 inch (0.1mm). An aluminum bracket with screw may be used for mounting the gauge on the support.

810-2.09 Track Out Pad. Track Out Pads shall consist of clean fractured aggregate between 1" and 3" in size and 6" in depth.

810-2.10 AZPDES Sign Information. The contractor shall post the AZPDES Authorization number near entrances to the project. The Authorization number can be added to existing project signs near project entries, such as the RTA sign. Lettering is to be a simple and legible font, minimum 2" height. If the job trailer is not on the project site, the location of the job trailer shall also be provided on the sign using similar lettering. Lettering shall be of a waterproof type, such as ready to apply, waterproof, vinyl letters.

810-3 CONSTRUCTION REQUIREMENTS

Prior to the start of construction, the Engineer and contractor will jointly review the Stormwater Pollution Prevention Plan (SWPPP), make any revisions needed, and approve and sign the SWPPP. The contractor shall use the signed SWPPP provided at the pre-construction meeting, and implement the SWPPP as required throughout the construction and establishment periods. The Engineer and contractor will perform a minimum of one routine inspection of disturbed areas that have not been stabilized at least once every 14 calendar days *and* within 24 hours of the end of a 0.5 inch rainfall. Reduced inspection frequency can occur when the site has been temporarily stabilized. The reduced inspection frequency is once every 28 days *and* before predicted rainfall events *and* after 0.5 inch rainfall events.

After each inspection, the contractor shall document the findings and revise the SWPPP as necessary. The Engineer and contractor shall jointly approve and sign each revision to the SWPPP before implementation. The contractor shall complete revisions to the SWPPP within 15 calendar days following notification if ADEQ determines the SWPPP is deficient. The contractor shall amend the SWPPP, as needed and record inspection results in the SWPPP within 7 calendar days after an inspection by local, state or federal officials. Changes to the SWPPP must be implemented in the field within 7 calendar days, or before the next rainfall event.

Maintenance of erosion and sediment control devices will follow the schedule outlined in the current AZPDES/NPDES Construction General Permit. The contractor shall maintain all related erosion control elements in proper working order.

No condition of local grading ordinances or the SWPPP shall release the contractor from any responsibilities or requirements under other environmental statutes or regulations.

Erosion control and pollution prevention work specified in the contract which is to be accomplished under any of the various contract items will be paid for as specified under those items.

Final stabilization is met when all soil disturbing activities have been completed, temporary Best Management Practices have been removed and disposed of, and either a uniform perennial vegetative cover with a density of 70% of the native background has been established on all unpaved areas, or equivalent permanent stabilization measures are in place. Until final stabilization of the project, the contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from the nonexecution of the work. The contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final stabilization. No reimbursement shall be made for work necessary due to the contractor's failure to comply with the requirements of the SWPPP. The original completed SWPPP shall be returned to the Agency.

Except as specifically provided under Subsection 108-4, in the case of suspension of work from any cause whatsoever, the contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project, provide for normal drainage and shall erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the contractor shall properly and continuously maintain, in an acceptable growing condition, all newly established plantings, seedlings and soddings, furnished under its contract and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

Erosion control features shall be temporary or permanent, as designated herein. All temporary erosion control features specified for removal shall become the property of the contractor, and shall be removed and disposed of by the contractor upon final stabilization. During removal, all sediment shall be disposed of, and the area restored to a finished condition as shown on the plans, or as directed by the Engineer.

810-3.01 Silt Fences. Installation and maintenance requirements for silt fences shall be accordance with Section 915, unless otherwise specified.

810-3.03 Riprap and Rock Mulch. If, as a sediment and erosion control, riprap is used in culvert inlet and outlet protection and cut and fill transitions; and rock mulch treatments are used for headwalls, wingwalls, and rock check dams; they shall be installed in accordance with the project plans and details or as directed by the Engineer.

Rock shall be installed so as to conform to and completely cover the treatment area shown on the plans with a uniform, cohesive rock unit. The rock shall not impede flow into the treatment area and shall be feathered at the outflow.

Accumulated debris shall be removed and disposed of by the contractor after each rain storm, or as directed by the Engineer.

Pipe treatments, headwall and wingwall treatments, and cut and fill transitions are permanent project features, which shall remain in continuous service after installation and project completion.

Rock check dams shall remain in service until the seeding work commences or until they are no longer needed, as approved by the Engineer. When use of a rock check dam is discontinued, the materials shall be removed and wasted on site in a manner that will not impede designed drainage flows, as approved by the Engineer.

810-3.04 Sand Bags and Gravel Bags. The work shall include supplying bags and sand or gravel, preparing the filled bags, and installing filled bags where shown on the plans or as approved by the Engineer.

Gravel bags shall be used for drain inlets surrounded by asphaltic concrete or paved surfaces.

Bags in the vicinity of curbs and catch basins shall be installed to 2 inches below the height of the adjacent curb to allow drainage into the drainage structure. Flow during a severe storm shall not overtop the curb. When sediment depth behind the bags reaches one-third the height of the bag, the sediment shall be removed and disposed of in accordance with local, state, and federal laws and permit requirements.

810-3.05 Erosion Control Sediment Logs. Erosion control sediment logs shall be installed in channel bottoms, around catch basins, as check dams, or on slopes, in accordance with the project plans and details, or as directed by the Engineer in accordance with the manufacturer's instructions. Stakes shall be located every two feet to secure the logs. Each stake shall be intertwined with the netting on the downstream side of the log and driven approximately two feet into the ground. Soil shall be tamped against the upstream side of the roll to assure that storm water is forced to flow through the log rather than under it. There shall be no gaps between the log and soil.

The ends of adjacent logs shall be abutted tightly together so that water cannot undermine the logs. If the width of the ditch/channel is greater than the length of one log, the ends of adjacent logs shall be overlapped a minimum of 24 inches.

When allowed by the SWPPP, sediment logs installed in drainage channel bottoms shall be perpendicular to the flow of the water, and shall continue up the channel side slope two feet above the high water flow line. Spacing of the logs shall be as specified in the project plans.

When sediment logs are used to construct check dams, the logs placed on the ground shall be buried four to six inches deep as shown on the project plans.

810-3.06 Sediment Wattles. Sediment wattles shall be installed on slopes as shown on the project plans, and in accordance with the manufacturer's instructions, or as directed by the Engineer. Trench depth shall be one-third the width of the wattle. Excavated material shall be placed along the downhill side of the trench. The wattle shall be in continuous contact with the bottom and sides of the trench. Sediment wattles shall be secured with wooden stakes spaced 5 feet apart and a maximum of 1 foot from the ends of the wattle. Stakes shall extend a minimum depth of 12 inches into the soil and a maximum height of 3 inches above the wattle surface. The

ends of adjacent wattles shall be abutted tightly together.

810-3.07 Curb Inlet Guard. Curb inlet guards shall be used at curb drain inlets as shown on the project plans and in accordance with manufacturer's instructions, or as directed by the Engineer. The guard shall be anchored using gravel bags.

When sediment in front of the guard reaches one-third the height, the sediment shall be removed and disposed of in accordance with local, state, and federal laws and permit requirements.

810-3.08 Rain Gauge. The rain gauge shall be located at or along the project site in open areas such that the measurement will not be influenced by outside factors (i.e., high winds, overhangs, gutters, trees, etc.). At least one rain gauge will be located within each linear mile (as measured along the centerline of the primary alignment) of the project where clearing, grubbing, excavation, grading, cutting or filling is being actively performed, or exposed soil has not yet been permanently stabilized. Gauges shall be mounted on a post at a height of 3 to 5 feet with the gauge extending several inches beyond the post. The top of the gauge shall be level.

810-3.09 Track Out Pad. The work under this item shall consist of furnishing all materials, tools, equipment, and labor necessary to install and remove the Track Out Pads at all construction entrances; locations to be determined by the contractor and approved by the Engineer.

At the completion of the project, the contractor shall remove the Track Out Pads and restore/re-grade the area to return the ground elevation and grading to existing conditions as close as possible.

810-3.10 AZPDES Sign Information. The work under this item shall consist of furnishing all materials and labor necessary to add the AZCON authorization number to signs at all major entrances to the project site. The wording shall read "AZCON - _____". Wording or diagrams showing the location of the job trailer shall also be provided. If there is no sign which this information can be added to, the contractor shall furnish a sign for this purpose.

810-4 METHOD OF MEASUREMENT

Work required by the SWPPP as included in the bid package, and as may be approved prior to construction, and "good-housekeeping" practices and requirements will be measured on a lump sum basis under AZPDES/NPDES (Original).

No measurement or direct payment will be made to the contractor for time spent in reviewing or revising the SWPPP, or providing other required documentation, the cost being considered as included in the price for the Item AZPDES/NPDES (Original).

If circumstances require changes to the approved SWPPP, and such changes are determined by the Engineer to be beyond the scope of AZPDES/NPDES (Original), extra work may be authorized under Item 8100012 - AZPDES/NPDES Allowance (Modified).

Permanent erosion control will be measured and paid under the specific items found in the plans and listed in the Special Provisions and bid schedule.

810-5 BASIS OF PAYMENT

Payment for AZPDES/NPDES (Original), measured as provided above, will be made at the contract lump sum price, which shall be full compensation for supplying and furnishing all materials, facilities, and services, and performing all work involved as specified herein.

Partial payments under this item shall be made in accordance with the following provisions:

- (1) When work shown on the (approved) SWPPP is in place, 50 percent of the amount bid for AZPDES/NPDES (Original) will be paid.
- (2) 40 percent of the bid amount will be paid incrementally over the life of the contract to cover maintenance. In the event that deficiencies exist with regard to Materials or Construction Requirements, Agency will withhold payment until such time as contractor mitigates the deficiencies.
- (3) The remaining 10 percent will be paid upon final stabilization of the project.

No additional payments will be made for this item of work.

The work under this item shall include furnishing, installing, maintaining, removing and disposing of temporary erosion control measures such as silt fences, check dams, straw barriers, and other erosion control devices or methods as shown in the Storm Water Pollution Prevention Plan (SWPPP) and in the Special Provisions. Control measures, such as wattles, placed around stockpiles, excavations and spoils, shall also be paid for under this lump sum item.

The work shall also include maintaining permanent erosion and sediment control measures such as culvert inlet and outlet protection, cut and fill slope transitions, headwall and wingwall treatments, and other permanent erosion control devices or methods as shown in the SWPPP. The cost of furnishing and installing these items will be paid under the specific items found in the plans and listed in the Special Provisions and bid schedule.

The work shall also include non-structural items relating to stormwater pollution prevention, including adequate storage, handling, and disposal of construction products, materials, and wastes, in accordance with the current AZPDES/NPDES Construction General Permit. This includes handling of chemicals in storage yards and throughout the site, concrete waste management, maintenance of portable toilets, and regular pickup of all trash and litter, regardless of cause.

The work shall also include maintaining documentation required in the current AZPDES/NPDES Construction General Permit.

The work shall also include regular inspections by the contractor at the frequency described in Section 810-3 and the SWPPP.

When circumstances require changes to the approved SWPPP and such changes are determined

by the Engineer to be beyond the scope of AZPDES/NPDES (Original), payment will be made in accordance with the requirements of Subsection 109-5 under Item 8100012 - AZPDES/NPDES Allowance (Modified).

(810LOGS_WATTLES, 5/28/13)

ITEM NO. 8100005 - SEDIMENT LOG (DISCRETIONARY)

ITEM NO. 8100006 - SEDIMENT WATTLE (DISCRETIONARY)

1. DESCRIPTION

The work under these items shall include furnishing, installing, maintaining, and removing of sediment logs and sediment wattles, as directed by the Engineer during the course of construction and not provided for in the original project SWPPP plans. This work is in addition to the work shown in the project SWPPP plans, and is solely at the discretion of the Engineer.

2. MATERIALS

Materials shall conform to the requirements of Section 810-2.05 and 810-2.06.

3. CONSTRUCTION DETAILS

Construction details shall conform to the requirements of Section 810-3.05 and 810-3.06, and placement of sediment logs and sediment wattles shall conform to the details shown on the project SWPPP plans, at the direction of the Engineer.

4. METHOD OF MEASUREMENT

The work under these items shall be measured by the linear foot of Sediment Logs and Sediment Wattles, complete in place, parallel to the central axis of the log or wattle.

5. BASIS OF PAYMENT

The accepted quantity of Sediment Log (Discretionary) and Sediment Wattle (Discretionary), measured as provided above, shall be paid for at the contract unit price, complete in place including all equipment, labor and materials.

Price adjustment for variation in total bid quantity per Subsections 109-3 and 109-4 of the Standard Specifications do not apply to work under these bid items.

(912SLOPE_PAVING, 7/19/12)

SECTION 912 - SHOTCRETE of the Standard Specifications is revised to read:

SECTION 912 – SLOPE PAVING

912-1 DESCRIPTION

The work under this section shall consist of furnishing all materials and installing slope paving on prepared surfaces of channels, ditches, slopes under bridge structures and to other similar construction at the locations and in conformance with the details shown on the project plans and the requirements of these specifications.

Slope paving includes plain concrete or shotcrete surfaces and rock-faced surfaces.

912-2 MATERIALS

912-2.01 Portland Cement Concrete. Portland cement concrete shall conform to the requirements of Subsection 1006-3.01 for Class B.

912-2.02 Shotcrete.

(A) Portland Cement and Water. Portland cement and mixing water shall conform to the requirements of Subsection 1006-2.01 and Subsection 1006-2.02 respectively.

(B) Aggregate.

(1) Fine Aggregate. Fine aggregate shall conform to the requirements of Subsection 1006-2.03 (B), except that the gradation shall be as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

(2) **Coarse Aggregate.** Coarse aggregate shall conform to the requirements of Subsection 1006-2.03 (C), except that the gradation shall be as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
1/2-inch	100
3/8-inch	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5

912-2.03 Admixtures. Admixtures may be used with the premixed mortar or the concrete and shall conform to the requirements of Subsection 1006-2.04.

912-2.04 Reinforcing Steel and Welded Wire Fabric. Reinforcing steel bars and welded wire fabric shall conform to the requirements of Section 1003.

912-2.05 Expansion Joint Filler. Materials furnished for expansion joint filler shall conform to the requirements of Section 1011.

912-2.06 Water Stops. Materials furnished for water stops shall conform to the requirements of Section 1011.

912-2.07 Rock. Rock for facing of slope paving shall conform to the requirements of 913-2.01 with the rock sample size being 500 pounds. Rock shall be angular in shape and have at least one broad, flat surface. Unless otherwise shown on the project plans or indicated in the Special Provisions, the gradation of rock for facing of slope paving shall vary in size from 4 to 8 inches.

The color for facing rock shall be designated on the project plans. The acceptability of the color shall be determined by the Engineer.

Rock that is deemed unsatisfactory by the Engineer shall be replaced with acceptable material at no additional cost to the Agency.

912-3 CONSTRUCTION DETAILS

912-3.01 Preparation of Subgrade. The subgrade on which the slope paving is to be placed shall be fine graded to the lines and grades shown on the project plans or as established by the Engineer. The subgrade area shall be thoroughly compacted as shown on the project plans to the satisfaction of the Engineer.

Prior to placement of concrete or shotcrete, the subgrade shall be uniformly moistened to prevent water being drawn from the freshly placed concrete or shotcrete. Water for moistening the subgrade shall be applied in a manner that does not cause erosion to the prepared subgrade. Should the prepared subgrade be damaged in any way by the moistening operation, the contractor shall repair all damage to the satisfaction of the Engineer prior to placement of slope paving.

912-3.02 Forms and Ground Wires. Forms shall be of plywood sheathing or other suitable material and shall be true to line and grade and sufficiently rigid to resist deflection during placement of the shotcrete. Forms shall be constructed to permit the escape of air and rebound during the gunning operation.

Ground or gauging wires shall be installed where necessary to establish the thicknesses, surface planes and finish lines of the shotcrete.

912-3.03 Reinforcement. Steel reinforcement and welded wire fabric shall be as shown on the project plans and shall conform to the requirements of Section 605.

Unless otherwise shown on the project plans, reinforcing steel shall be Grade 40.

Welded wire shall be spliced by lapping the welded wire fabric a minimum of 6 inches.

Welded wire shall be placed not less than 1 inch nor more than 3 inches from the edge of slope paving panels. Neither welded wire nor reinforcing steel shall protrude beyond any face of a slope panel.

Number 4 reinforcing bars, positioned at 12 inches on center, each way, may be substituted for welded wire fabric at the option of the contractor.

Both reinforcing steel and welded wire fabric shall be supported on devices approved by the Engineer and specific for the purpose. Supports shall provide the minimum ground clearance shown on the project plans and shall be spaced such that they provide uniform support for the reinforcing steel or welded wire fabric.

The contractor shall not lift the reinforcement or welded wire fabric at any time during the placement of concrete or shotcrete unless directed by or with the approval of the Engineer.

912-3.04 Placing Concrete. Portland cement concrete for slope paving shall conform to the requirements of Subsection 912-2.01.

Preparation for placement of Portland cement concrete slope paving shall conform to the applicable requirements of Sections 601, 605 and 1006.

Portland cement concrete shall be placed in the forms and struck off so as to provide a surface that will be at the proper elevation when the concrete is consolidated. The concrete shall be thoroughly consolidated, working the coarse aggregate away from the faces of the forms. The concrete shall be consolidated by means of approved mechanical vibrators or by tamping or spading by hand.

912-3.03 Placing Shotcrete. Shotcrete shall be mortar or concrete conveyed through a hose and pneumatically applied using either the dry mix process or the wet mix process.

The dry mix process shall consist of thoroughly mixing a proportional combination of dry fine aggregate and cement; conveying the mixture through a delivery hose to a special nozzle where water is added and mixed with the other materials immediately prior to its discharge from the nozzle.

The wet mix process shall consist of premixing by mechanical methods a proportional combination of Portland cement, aggregate, and water required to produce mortar or concrete; conveying the mortar or concrete through the delivery hose to the special nozzle where additional compressed air is added at the nozzle prior to its discharge.

(A) Equipment. Equipment for use with the dry mix process shall be capable of metering the fine aggregate-cement mixture into the delivery hose under close control and delivering a continuous, smooth stream of uniformly mixed material at the proper velocity to the discharge nozzle. The nozzle shall be equipped with a manually operated water ring for directing an even

distribution of water through the fine aggregate-cement mixture. The water ring shall be capable of ready adjustment to vary the quantity of water.

Equipment for use with the wet mix process shall be the pneumatic feed type; however, a positive displacement type may be used if permitted, in writing, by the Engineer. The pneumatic feed type shall be capable of discharging the premixed mortar accurately, uniformly and continuously through the delivery hose and to the gunning nozzle. The nozzle shall be fitted with an air ring for injecting additional compressed air into the premixed material flow. The size of the delivery hose shall be within the range of 1-1/4 to 2-1/2 inches.

(B) Air Supply. The air compressor shall have ample capacity to furnish an adequate supply of clean dry air for maintaining sufficient nozzle velocity for all phases of the work while simultaneously operating a blow pipe for clearing away the rebound. The air hose shall be equipped with a filter to prevent any oil or grease from contaminating the shotcrete.

A constant air pressure of not less than 80 pounds per square inch shall be maintained in the placing machine when using the dry mix process or at the nozzle when using the wet mix process and when the delivery hose length is 100 feet or less. The pressure shall be increased at least five pounds per square inch for each additional 50 feet of hose or fraction thereof.

(C) Proportioning and Mixing.

(1) **Dry Mix Process.** Dry mix material shall consist of one part Portland cement to not more than four parts fine aggregate measured either by weight or by volume. The fine aggregate shall contain not less than three percent or more than six percent moisture by weight.

The cement and fine aggregate shall be thoroughly mixed before being charged into the delivery equipment. If the contractor uses a drum-type mixer, the mixing time shall be not less than one minute. The mixed material shall be utilized promptly after mixing and any material that stands more than 45 minutes will be rejected and removed from the work site.

(2) **Wet Mix Process.**

(a) **Premixed Mortar.** Premixed mortar shall consist of not less than 6.0 sacks of Portland cement per cubic yard, fine aggregate and water mixed to a desired consistency, generally to a slump in the range of 1-1/4 to 4 inches.

The material may be mixed at a central mixing plant or at the project site. If mixing is done at the project site, the mixer shall be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous placing of the mortar.

(b) **Concrete.** Unless otherwise specified in the Special Provisions, the contractor shall determine the mix proportions and shall furnish concrete for pneumatic placement which contains a minimum of 658 pounds of Portland cement (i.e. 7.0 sacks) per cubic yard of concrete and which attains a minimum 28-day compressive strength of 3,000 psi. Fine aggregate and coarse aggregate shall conform to the requirements of Subsection 912-2.02. The total mix shall contain, by weight, 15 to 20 percent coarse aggregate. In no case shall the slump be greater than 4 inches.

If ready-mixed concrete is used, it shall conform to the requirements of ASTM C 94.

(D) Application. The velocity of the shotcrete as it leaves the nozzle shall be maintained uniform and at a rate approved by the Engineer for the given job conditions. The nozzle shall be held as

nearly perpendicular to the working surface and at a proper distance, generally between 2 and 5 feet, to insure maximum compaction with minimum rebound of the shotcrete.

Rebound or previously expended material in the shotcrete mix shall not be used in any portion of the work. All rebound shall be removed prior to final set and before placement of the shotcrete on adjacent surfaces.

Shotcrete shall not be applied during any precipitation which is of sufficient intensity to cause the in-place shotcrete to run. Shotcrete shall not be applied during wind conditions that cause separation of the nozzle flow.

Shotcrete shall not be applied when a descending ambient air temperature falls below 40° F nor until an ascending air temperature rises above 35° F. Temperature shall be taken in the shade away from artificial heat.

(E) Testing. Tests to determine the physical quality of the shotcrete will be performed by the Engineer periodically during the work, as required. Test panels and cores shall be prepared by the contractor as specified herein.

Test panels at least 12 inches square and as thick as the structure being constructed, but not less than 3 inches thick, shall be prepared by gunning shotcrete mix into a frame which has been placed on a piece of plywood that is flat and not warped, bowed or deformed in any way. Test panels shall be cured in the same manner as the production work, as specified in Subsection 912-3.06.

Unless otherwise specified in the Special Provisions, the Agency shall obtain three cores from each test panel in conformance with Arizona Department of Transportation Test Method 317. Cores shall have a minimum diameter of 3 inches and a length to diameter ratio (L/D) of at least 1.00 and shall be obtained under the observation of an Agency representative.

The cut surfaces of the cores will be carefully examined for soundness and uniformity of the material and shall be free from laminations and sand pockets.

The three cores shall be tested in conformance with the requirements of Arizona Department of Transportation Test Method 317. The cores shall have an average compressive strength of at least 3,000 pounds per square inch at 28 days.

912-3.04 Construction Joints. Unless otherwise shown on the project plans, 1/2-inch pre-molded expansion joint material, conforming to the requirements of Subsection 1011-6, shall be placed at 45 foot intervals on all slope paving. Weakened plane joints or scoring shall be provided at 15 foot intervals evenly spaced between expansion joints. Additionally, evenly spaced weakened plane joints or scoring shall be provided at 15 foot intervals vertically along the face of the slope paving.

All expansion joint material shall extend the full depth of the concrete or shotcrete being placed, and shall be flush with the top of the finished surface. Prior to concrete or shotcrete placement, expansion joint material shall be supported in a manner that will ensure tight joints. Neither reinforcing steel nor welded wire fabric shall extend through expansion joints.

912-3.05 Finishing.

(A) Portland Cement Concrete. Portland cement concrete shall be thoroughly worked to ensure that the coarse aggregate is below the surface and the mortar comes to the top. The surface shall then be finished to proper grade and cross-section with a float, troweled smooth and given a final

fine brush finish. The exposed edges of concrete panels and all joints shall be tooled to a 1/4 inch radius unless a larger radius is indicated on the plans.

(B) Shotcrete. After shotcrete has been placed as nearly as practicable to the required thickness and shape outlined by forms and ground wires, the surface shall be checked with a straightedge and any low spots or depression shall be brought up to proper grade by placing additional shotcrete in such a manner that the finished surface shall be smooth and uniform.

The exposed edges of shotcrete panels and all joints shall be tooled to a 1/4 inch radius unless a larger radius is indicated on the plans.

Unless otherwise specified in the Special Provisions, the surface of the shotcrete shall have a natural gun finish.

(C) Rock. Rock used for facing slope paving shall be embedded in the concrete or shotcrete slope paving by hand placement. Rock shall be placed in a single layer with the embedment being one-half the thickness of the rock such that the rock is solidly fixed in the surface of the slope paving. Rock shall be placed in the slope paving such that the spacing between rock is not more than 2 inches.

Rock shall be selected by size, shape and color in order to secure a fairly large, flat surfaced specimen which may be laid with a true, even surface and a minimum of voids and a surface appearance that is uniform.

Rock shall be placed with the flat surface uppermost and parallel to the surface of the slope paving. The largest dimension rock shall be placed along and in proximity to the base area of the slope paving. The spaces between the larger rock shall be filled with rock of suitable size, leaving the surface with a smooth, reasonably tight and consistent appearance conforming to the slope required. Any open joints shall be filled with rock spalls.

When rock faced slope paving is installed, the installation of Portland cement concrete or shotcrete shall be limited to an area that does not exceed the contractor's ability to embed and achieve secure bonding of the rock in the freshly placed concrete or shotcrete. Rock which does not bond securely to the concrete or shotcrete shall be removed and reinstalled in a manner and by such means acceptable to the Engineer to achieve a secure bond.

912-3.06 Curing. The surface of the Portland cement concrete or shotcrete slope paving, except rock faced slope paving, shall be kept continuously moist for at least seven days, beginning immediately after finishing, by any of the following means:

- A water spray or fog system capable of applying moisture continuously;
- Application of a liquid membrane forming compound; or
- Covering the concrete surface with polyethylene sheeting in conformance with the requirements of ASTM C 171.

If polyethylene sheeting is used, it shall be white opaque. Adjoining sheets shall overlap at least 12 inches and the lapped areas secured in order to provide an airtight and windproof joint.

If liquid membrane forming compound is used it shall be Type I conforming to the requirements of ASTM C 309. The application rate shall be no more than 100 square feet per gallon.

Rock faced slope paving shall only require curing when directed by the Engineer and, when so directed, only with the use of polyethylene sheeting.

912-4 METHOD OF MEASUREMENT

Slope paving of the types described in this Section and in the bidding schedule will be measured for payment by the square yard of surface area placed to the required thickness.

No direct measurement will be made for rock facing, the cost of which is considered as incidental to and included in the square yard payment for rock faced slope paving.

No direct measurement will be made of unexposed surfaces such as support slabs or joints, integral curb faces or cut-off walls the cost of which is considered as incidental to and included in the square yard payment for slope paving.

912-5 BASIS OF PAYMENT

The accepted quantities of slope paving, measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, including excavating, backfilling, fine grading, reinforcement, joint material, concrete, shotcrete, rock and all labor, equipment, materials, tools, supplies and incidentals necessary for the work in conformance with the requirements of this section, the project plans, Special Provisions or as may be directed by the Engineer.

(913MATERIALS, 4/1/11)

SECTION 913 – BANK PROTECTION

913-2 MATERIALS

913-2.01 Rock

(A) **General** the second sentence of the first paragraph of the Standard Specifications is revised to read:

The Bulk Specific Gravity (SSD) shall be determined in accordance with the requirements of AASHTO T-85 and shall be a minimum of 2.50.

(A) **General** of the Standard Specifications is modified to add:

The Engineer must approve the material and color in writing before any rock is delivered to the job site.

913-2.02 Metal Items

(A) **Wire Fabric** the second paragraph of the Standard Specifications is revised to read:

Woven wire fabric shall conform to the requirements of ASTM A 975-97, except that the minimum weight of zinc coating shall conform to the requirements of ASTM A 641, Class 3.

(C) **Tie Wires** the first sentence of the first paragraph of the Standard Specifications is revised to read:

Tie wires shall be of good commercial quality and the gauge (size) shall be as shown on the project plans, except that the minimum weight of the zinc coating shall conform to the requirements of ASTM A 614, Class 3.

(915TEMP_SILT, 9/14/12)

SECTION 915 - TEMPORARY SILT FENCE

915-4 METHOD OF MEASUREMENT of the Standard Specifications is revised to read:

There will be no separate measurement for this work. Work shall be incidental to work outlined in Section 810.

915-5 BASIS OF PAYMENT of the Standard Specifications is revised to read:

There will be no separate payment for this work. Payment will be covered under the items AZPDES/NPDES (Original) or AZPDES/NPDES Allowance (Modified), as outlined in Section 810.

(930INCIDENTAL_ITEMS_ALLOWANCE, 9/13/12)

ITEM 9300100 - INCIDENTAL ITEMS ALLOWANCE

1. DESCRIPTION

The work under this section is intended to cover miscellaneous work added to the contract by the Engineer during the course of construction. Miscellaneous work shall be work that was not covered by other items included in the project.

2. MATERIALS (None Specified)

3. CONSTRUCTION DETAILS

All work under this item shall be as directed by the Engineer.

4. METHOD OF MEASUREMENT

The work under this item shall be completed on an extra work basis, in conformance with the provisions of Subsection 109-5.

5. BASIS OF PAYMENT

Payment for incidental items of work will be made in accordance with the provisions of Subsection 109-5.

ITEM NO. 9300110 – MISCELLANEOUS WORK 1 (BRIDGE RAILING MOUNTED SIGN SUPPORT)

1. DESCRIPTION

The work under this item consists of furnishing all equipment, labor and materials required to install Bridge Railing Mounted Sign Supports at the locations shown on the plans and in accordance with the details shown on the plans and the requirements of these specifications.

2. MATERIALS

Support materials shall conform to the requirements of ADOT Section 607-2 and in accordance with the details shown on the plans.

3. CONSTRUCTION REQUIREMENTS

At the locations shown on the project plans, the contractor shall install new Bridge Railing Mounted Sign Supports in accordance with the plans, ADOT Section 607 of the Standard Specifications, and as directed by the Engineer.

4. METHOD OF MEASUREMENT

Bridge Railing Sign Supports will be measured as a unit for each support furnished and installed.

5. BASIS OF PAYMENT

The accepted quantities of Bridge Railing Sign Support measured as provided above, will be paid for at the contract unit price each, which price shall be full compensation for the work, complete in place.

ITEM NO. 9300113 – MISCELLANEOUS WORK 3 (RELOCATE POWER)

1. DESCRIPTION

The work under this item consists of furnishing all equipment, labor and materials required to remove and relocate approximately 60 linear feet of underground power conductors at the locations shown on the plans and in accordance with the details shown on the plans and the requirements of these specifications.

2. MATERIALS

Electrical materials shall conform to the requirements of Section 732-2 and in accordance with the details shown on the plans.

3. CONSTRUCTION REQUIREMENTS

At the locations shown on the project plans, the contractor shall remove and relocate the electrical conductor cable in accordance with the plans, Section 732 of the Standard Specifications, and as directed by the Engineer. Cable splicing and conduit connections are considered included in the scope of work.

4. METHOD OF MEASUREMENT

Relocate Power will be measured on a lump sum basis for the work complete in place.

5. BASIS OF PAYMENT

The accepted quantity of Relocate Power, measured as provided above, will be paid for at the contract lump sum price, for which price shall be full compensation for the work, complete-in-place as described herein and on the project plans, including all labor, equipment, materials, tools, supplies, fees, excavation, backfill, splicing, connections, and incidentals necessary for the work, in conformance, with the requirements of these Special Provisions, the project plans, or as may be directed by the Engineer.

ITEM NO. 9300127 – MISCELLANEOUS WORK 17 (LUMINAIRE) (SHOE BOX) (150W) (HPS)

1. DESCRIPTION

The work under this item consists of furnishing all equipment, labor and materials required to install Luminaire (Shoe Box) (150W) (HPS), at the locations shown on the plans and in accordance with the details shown on the plans and the requirements of these specifications.

2. MATERIALS

Street lighting materials shall conform to the requirements of Section 736-2.01 and is revised to include shoe box heads.

3. CONSTRUCTION REQUIREMENTS

At the locations shown on the project plans, the contractor shall install new Luminaire (Shoe Box) (150W) (HPS) in accordance with the plans, Section 736 of the Standard Specifications, and as directed by the Engineer.

4. METHOD OF MEASUREMENT

Luminaire (Shoe Box) (150W) (HPS) will be measured as a unit for each luminaire furnished and installed.

5. BASIS OF PAYMENT

The accepted quantities of Luminaire (Shoe Box) (150W) (HPS), measured as provided above, will be paid for at the contract unit price each, which price shall be full compensation for the work, complete in place.

(933HANDRAIL, 12/16/11)

SECTION 933 - BARRICADE RAILING of the Standard Specifications is revised to read:

SECTION 933 - HANDRAIL

933-1 DESCRIPTION

The work under this section shall consist of furnishing all materials and constructing handrail, including railing, posts, fittings, and anchorages. Handrail shall be fabricated, painted and installed at the locations and in conformance with the details shown on the project plans and the requirements of these specifications.

933-2 MATERIALS

933-2.01 Steel. Mill reports shall be furnished for all steel materials.

(A) Pipe. Pipe shall conform to the requirements of ASTM A 53, Grade B with the exception that hydrostatic testing will not be required.

The minimum wall thickness for steel pipe shall conform to the values noted in the table below:

<u>Nominal Pipe Size (NPS)</u> (inch)	<u>Nominal Wall Thickness</u> (inch)	<u>Schedule No.</u>
1 ½	0.145	40
2	0.154	40
3	0.216	40
4	0.237	40

The minimum wall thickness at any point shall not be more than 12.5% under the nominal thickness specified above.

The outside diameter at any point shall not vary from the dimension specified by the values listed below.

<u>Outside Diameter</u>	<u>Variance Under</u>	<u>Variance Over</u>
1 ½"	1/32"	1/64"
2" and larger	1%	1%

(B) Tubing. Tubing shall conform to the requirements of ASTM A 500, Grade B. The minimum wall thickness for steel pipe shall conform to the values noted in the table below:

<u>Pipe Size</u> (inch)	<u>Wall Thickness</u> (inch)	<u>Schedule No.</u>
1 ½	0.145	40
2	0.154	40
3	0.216	40
4	0.237	40

The minimum wall thickness at any point shall not be more than 12.5% under the nominal thickness specified above.

(C) Plates and Shapes. Steel plates and other miscellaneous shapes shall conform to the requirements of ASTM A 36.

933-2.02 Concrete. Concrete for post foundations shall conform to the requirements of Section 922.

933-2.03 Paint. Paint shall be a three-paint coating system and conform to the applicable requirements of Section 1002.

933-2.04 Cable and Fittings. Wire cable shall be 3/16 inch diameter galvanized steel.

Cable fittings shall consist of wire thimbles, wire clamps and wire turnbuckles as shown on the project plans. All fittings shall be galvanized.

933-3 CONSTRUCTION DETAILS

933-3.01 Fabrication. Fabrication of the handrail shall conform to the requirements and details shown on the project plans.

Welding shall conform to the latest A.W.S. specification for the material being welded. Joints shall be as shown on the project plans. All joints shall be ground smooth to produce a straight, uniform rail or post.

933-3.02 Installation. The contractor shall be responsible for the layout of the handrail using the control points established by the Agency. The contractor's layout shall be approved by the Engineer prior to commencing installation.

Handrail shall present a smooth, uniform appearance in its final position.

Shims shall be installed at posts and rails, where necessary, to provide uniform bearing and appearance.

Materials shall be carefully handled such that no piece will be bent, broken or damaged. Fabrication, handling, or installation methods which will deform or distort members shall not be used.

Post holes, when indicated on the project plans, shall be excavated in earth material or, in the case of concrete or soil cement, cored with a circular coring bit to the depth and dimensions indicated on the project plans.

When shown on the project plans or accepted by the Engineer at the written request of the contractor, sleeves, block-outs or steel base plates may be used as a post foundation. When deemed acceptable by the Engineer, the contractor shall provide a detail of the proposed sleeve, block-out or steel base plate post foundation installation for review and determination of acceptability by the Engineer.

Posts shall be placed in a vertical position. All posts shall be set in concrete foundations conforming to the details shown on the project plans and crowned at the top to shed water.

933-3.03 Painting. Painting of steel railing members shall be in conformance with the requirements of Section 610, with the exception that blast cleaning will not be required.

The prime shall be applied in the shop immediately after shop fabrication has been completed. When field erection has been completed, the same paint shall be applied in the field to touch up field connections and other areas where the prime has been abraded and to cover erection markings.

Unless otherwise indicated on the project plans, the top coat shall consist of paint of a color

similar to Sherwin Williams, Industrial Maintenance Coatings, MC-37 Sienna. The paint color shall be approved by the Engineer prior to use.

The reflective paint to be used on the ends of the railings shall be "Codit" or an approved equal.

The intermediate coat and top coat shall be applied to the completed work after all erection and touch up work has been completed.

Painting in open yards or upon erected structures shall not be done when the metal has absorbed sufficient heat to cause the paint to blister and produce a porous paint film.

All metal coated with unauthorized paint shall be thoroughly cleaned and repainted, to the satisfaction of the Engineer, at the expense of the contractor.

The primer shall be at least 1.5 mils thick when dry, and each intermediate coat and top coat shall be at least 1 mil thick when dry. No portion of the paint film shall be less than the thicknesses specified herein. The film thickness shall not be so great such that the appearance or service life of the paint is adversely affected.

When the touch up paint is thoroughly dry, the intermediate coat and top coat may be applied. In no case shall a succeeding coat be applied until the previous coat has dried throughout the full thickness of the paint film. The intermediate coat shall be lightened with a white pigment to provide a contrast between the intermediate coat and top coat.

Small cracks and cavities which have not become sealed in a watertight manner by the intermediate coat shall be filled with a paste mixture of Paint No. 1 and linseed oil prior to the top coat being applied.

933-3.04 Fencing Fabric. Fencing fabric shall be added to the handrail at the locations noted on the project plans or specified in the Special Provisions. Fencing fabric shall be 36 inches high and knuckled on both selvages. Fabric shall meet the requirements of Subsection 902-2.04.

Wire ties shall be zinc-coated or aluminum-coated steel of good commercial quality and shall be of the same gauge and breaking strength as the fencing fabric. Wire ties shall be 6-1/2 inches long and twisted around handrail posts such that twist is to the side opposite pedestrian traffic.

Tension bars and tension bands shall be fabricated from commercial quality steel and shall be zinc-coated in conformance with the requirements of AASHTO M111. Tension bars shall be 3/16 inch by 5/8 inch flat bars. Tension bands shall be 3/4 inch by 1-7/8 inch flat bars. Tension wire shall meet the requirements of Subsection 902-2.05.

933-3.05 Reflective Marking. Reflective markings shall be applied to the handrail at the locations specified by the Engineer. The reflective material shall be 3M Company No. 7211 Yellow Reflective Liquid, or approved equal.

933-4 METHOD OF MEASUREMENT

Handrail will be measured for payment by the linear foot, including joints.

Fencing Fabric will be measured for payment by the linear foot.

Access gates will be measured for payment by unit installed, complete in place.

Pedestrian gates and horse gates will be measured for payment by the unit installed, complete in place.

Reflective marking will be measured for payment by the unit installed with a unit being a single 2 foot long stripe.

933-5 BASIS OF PAYMENT

The accepted quantity of handrail, fencing fabric, pedestrian gates, horse gates, and/or reflective markings measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered compensation, in full, for all work complete in place including labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in conformance with the requirements herein, the project plans, Special Provisions or as may be directed by the Engineer.

No separate payment will be made for excavation, concrete foundations, painting, or other miscellaneous items required to construct handrail, the cost of which are considered as incidental to and included in the payment for contract items in the bidding schedule to which this work is associated.

(1002PAINT, 9/3/13)

SECTION 1002 - PAINT of the Standard Specifications is revised to read:

1002-1 REQUIREMENTS

(A) General. All paints furnished shall be ready mixed at the manufacturer's plant, except for aluminum paint and zinc paint, which shall be mixed at the project site or by the fabricator just prior to application. All paints shall be standard paint products of the manufacturer with published product data sheets and shall comply in all details with the paint specifications contained herein.

Ready-mixed paint shall be homogeneous, free of contaminants and shall be of a consistency suitable for the use for which it is specified. The pigment shall be finely ground and properly dispersed in the vehicle, according to the requirements of the type of paint, and this dispersion shall be such that the pigment does not settle appreciably, does not cake or thicken in the paint container, and does not become granular, jelled or curdled. Any settlement of pigment in the paint shall be easily dispersed with a paddle so as to produce a smooth uniform paint of the proper consistency. The manufacturer shall include, in the paints, the necessary additives for control of sagging, leveling, drying, drier absorption and skinning.

Paint shall be furnished in new, unopened air-tight containers, clearly labeled with the exact title of the paint, Federal Specification number when applicable, name and address of manufacturer, product code, date of paint manufacture and the lot or batch number. The containers shall meet U.S. Department of Transportation Hazardous Material Shipping Regulations.

Precautions concerning the handling and the application of the paint shall be shown on the label of all paint containers.

The primer, intermediate coat, and topcoat paint used in painting structural steel shall be supplied or manufactured by the same company, and the paint coats shall be compatible with each other, forming a complete paint system in conformance with the requirements of Subsection 1002-1 (B).

The contractor shall submit to the Engineer a Certificate of Compliance for each lot or batch of paint supplied, in accordance with Subsection 106-5.02, prior to the use. Product data sheets listing the paint constituents and their proportions, as well as Materials Safety Data Sheets (MSDS), are required for each paint material supplied prior to its use.

All applicable governmental regulations shall be adhered to during cleanup and the disposal of unused paint.

(B) Three-Paint Coating System. All three-paint coating systems, as specified in Subsection 1002-2.01, shall be ready-mixed at the manufacturer's plant.

Only approved paint systems will be allowed for use on structural steel. Paint systems listed on the Arizona Department of Transportation's Approved Products List (APL) shall be considered an approved paint system. The most current version of the APL can be found on the internet at the Arizona Department of Transportation's web site, under their Product Evaluation Program.

Paint supplied by an approved manufacturer with a different product code from that which was previously evaluated and approved will require evaluation to determine if it is acceptable. It is the responsibility of the manufacturer to submit the necessary samples for paint system evaluation and approval.

(C) Aluminum and Zinc Paints. Aluminum and zinc paints shall be mixed at the project site or by the fabricator just prior to application.

For safety purposes, aluminum paint shall be mixed only as needed and any unused paint shall be safely discarded and shall not be stored.

(D) Acrylic Emulsion Paint. Paints listed on the Arizona Department of Transportation's Approved Products List (APL) shall be considered an approved paint. For paints supplied which are not shown on the Approved Products List, a Certificate of Analysis showing conformance to Subsection 1002-2.04 for each lot or batch of paint supplied shall be submitted to the Engineer in accordance with Subsection 106-5.03, prior to its use.

1002-2 PAINTS

Lead, lead compounds, soluble barium compounds, or hexavalent chromium compounds shall not be used as raw materials in the paint formulas specified under this Section. Lead, lead compounds, soluble barium compounds, or hexavalent chromium compounds shall not be added to any paint formulas specified under this Section.

The use of halogenated solvents is not permitted.

Raw materials used in the paint formulas shall conform to the specifications designated by ASTM or by Federal or Military Specifications listed herein, except as otherwise specified herein. Subsequent amendments to the specifications quoted shall apply to all raw materials and finished products. No “or equal” substitutions for any specified material shall be made without the written consent of the Engineer.

A three-paint system shall be water-borne and each paint shall be ready-mixed by the manufacturer. The volatile organic content of the mixed paint shall not exceed 2.1 pounds per gallon.

Zinc paint shall be in accordance with Subsection 1002-2.02.

Aluminum paint shall be water-borne and shall be mixed in accordance with Subsection 1002-2.03.

All paints will be sampled and tested in accordance with Subsection 1002-3.

1002-2.01 Three-Paint Coating System.

(A) General. A three-paint coating system shall include a primer (Paint Number 1), intermediate coat (Paint Number 2), and topcoat (Paint Number 3) from the same system. A three-paint coating system will be tested as a complete system in accordance with Subsection 1002-3(B).

Each individual paint shall conform to all of the chemical and physical characteristics and properties as declared on the manufacturer’s product data sheet. In addition, the paint color shall be as specified in the project plans, and the consistency shall be in accordance with the manufacturer’s recommendations. The contractor shall use the checking and calibration procedures found in ASTM D4212 and verify the paint consistency with the Engineer prior to each application.

Each coating is intended for spray application. Limited application can be made by brushing or rolling if approved by the Engineer.

(B) Paint Number 1 - Primer. Paint Number 1 shall be used on blast cleaned steel surfaces for the first coat of a three-paint coating which must include Paint Number 2 and Paint Number 3 from the same system.

(C) Paint Number 2 – Intermediate Coat. Paint Number 2 for intermediate coats shall be used on primed steel surfaces as the second coat of a three-paint coating system which must include Paint Number 1 and Paint Number 3 from the same system. The paint shall be

appropriately tinted to contrast with the prime coat.

(D) Paint Number 3 – Topcoat. Paint for topcoats shall be used as the third coat of a three-paint coating system which must include Paint Number 1 and Paint Number 2 from the same system.

For topcoats, the gloss shall also be as specified on the project plans. The available colors for topcoats shall provide visual matches to the colors given in the Federal Standard No. 595. The colors shall be available in high-gloss enamels, if required.

When specified, a two-part aluminum paint conforming to Subsection 1002-2.03 shall be applied as the topcoat. The two parts shall be mixed in accordance with the manufacturer's label directions prior to use.

1002-2.02 Zinc Paint.

(A) General. Zinc paint shall be a zinc-dust, zinc-oxide primer conforming to the requirements of Federal Specification TT-P-641G, Type III, zinc dust, zinc oxide phenolic resin primer modified to conform to the requirements (1) through (8) below, and as otherwise specified herein.

The Volatile Organic Compound or solvent portion of the vehicle shall conform to the following requirements by volume:

- (1) Solvents with an olefinic or cyclo-olefinic type of unsaturation shall not exceed five percent.
- (2) The total of aromatic compounds with eight or more carbon atoms in the molecule, except ethylbenzene shall not exceed eight percent.
- (3) The total of ethylbenzene, toluene, and branched-chain ketones shall not exceed 20 percent.
- (4) A solvent which may be classified into more than one of the above groups shall be considered a member of the group having the lowest allowable concentration.
- (5) The total of (1), (2), and (3) shall not exceed 20 percent.
- (6) The volatile solvents shall contain no benzene or halogenated compounds.
- (7) All paints shall be completely miscible with mineral spirits conforming to Grade II of Federal Specification TT-T-291.
- (8) Mineral spirits, conforming to Grade II, of Federal Specification TT-T-291 shall be the preferred thinner for all paints specified in this Subsection. If necessary, other paint thinners conforming to the requirements of (1) through (6) above may be used.

If modified colors are required, pigments which do not contain lead, lead compounds, soluble

barium compounds, or hexavalent chromium compounds shall be used in amounts not exceeding ten percent of the total pigment weight and replacing an equal weight of zinc oxide.

This specification covers a ready-to-mix or semi-prepared primer for use on, or repair of, galvanized metal surfaces. The primer ingredients shall be furnished in two separate containers, one consisting of a liquid (zinc oxide-vehicle) and the other of zinc dust which is to be added to the zinc oxide-vehicle just prior to use. When the entire amount of zinc dust from one container is mixed with all of the zinc oxide-vehicle from another container, a primer, conforming to all the requirements of this specification, shall result. The mixed primer shall normally be a gray color characteristic of the composition, unless otherwise specified.

(B) Proportions. One gallon of zinc dust, zinc oxide primer meeting this specification will have the following characteristics, when the minimum figures are met, and the pigment is a mixture of 80 percent zinc dust and 20 percent zinc oxide:

<u>Constituent</u>	<u>Composition by Volume (gallons)</u>	<u>Composition by Weight (pounds)</u>
Zinc dust	0.1445	8.50
Zinc Oxide	+ 0.0455	+ 2.12
Total Pigment	0.1900	10.62
Nonvolatile Vehicle	+ 0.3544	+ 2.99
Total Solids	0.5444	13.61
Volatile (thinner and drier)	+ 0.4556	2.99
Total primer (gallon)	1.0000	16.60

(C) Qualitative Requirements. The mixed primer shall meet the following qualitative requirements:

Characteristics	Min.	Max.	Test Method
Pigment, percent by weight of primer	64	67	ASTM D723
Water, percent by weight of primer	---	0.1	ASTM D3960
Coarse particles and skins, percent by weight of pigment	---	4	ASTM D185
Consistency, Krebs-Stormer, shearing rate 200 r.p.m.	72	92	ASTM D562
Time to set to touch, hours	0.5	4	ASTM D1640
Time to dry, hours	---	18	ASTM D1640
Weight per gallon, pounds	16.4	---	ASTM D1475
VOC of mixed primer, lbs/gal.	---	3.5	ASTM D3690

(D) Pigment. The pigment composition in the mixed primer (except when colors other than gray are specified) shall be in accordance with the following:

Ingredients	Percent by Weight	
	Min.	Max.
Zinc Dust (ASTM D520, Type I)	79	89
Zinc Oxide (ASTM D79, American Process, Lead Free)	19	21

Upon analysis, the zinc dust shall show not less than 94 percent metallic zinc by weight. The pigment, extracted from the zinc oxide-vehicle and ignited, shall show on analysis not less than 98 percent zinc oxide by weight.

The total pigment (zinc dust plus zinc oxide) in the mixed primer shall contain a minimum of 74 percent metallic zinc and a minimum of 18 percent zinc oxide by weight. The sum of the percentage by weight of metallic zinc and zinc oxide in the total pigment of the mixed primer shall be not less than 97.

(E) Vehicle. The vehicle shall consist of 100 percent phenolic resin spar varnish, suitable for grinding with zinc oxide, and shall have an oil-to-resin ratio of approximately 2 to 1 by weight. The resin shall be 100 percent paraphenyl phenol-formaldehyde resin of the fortifying type, meeting the requirements of Federal Specification TT-R-271.

The vegetable oils shall consist of equal parts by volume of tung oil meeting the requirements of Federal Specification TT-T-775 and linseed oil conforming to Federal Specification TT-L-90. The volatile solvent used shall be any solvent system complying with Subsection 1002-2.02(A) and applicable air pollution regulations by weight per gallon Subsection 1002-2.02(C). Antiskinning agents may be present.

The vehicle shall contain not less than 50 percent solids by weight when tested according to Federal Standard No. 141, Method 4051.

1002-2.03 Aluminum Paint. This paint is a two-part waterborne leafing aluminum paint formulated for use on properly prepared metal surfaces exposed to the air. Aluminum paint shall conform to California D.O.T. Specification Formula PWB-160 or as otherwise specified herein. This paint may be utilized for the finish coat when the aluminum color is specified on the project plans. Aluminum paint must be compatible with the underlying paint coats. The quantity of aluminum paint mixed during any one day shall be limited to the quantity to be used during that day. The paint shall be mixed in accordance with the manufacturer's label directions prior to use.

For safety purposes, aluminum paint shall be mixed only as needed and any unused paint shall be safely discarded and shall not be stored.

(A) Composition. This paint shall be supplied with 1.5 pounds of the specified aluminum paste to one gallon of vehicle.

(B) Pigment.

- (1) **Ingredients:** Water Dispersible Aluminum Paste (1)
- (2) **Characteristics:** Non-volatile content, percent, ASTM D480 72 minimum

(C) Vehicle.

(1) Ingredients:	<u>% by Weight</u>
Acrylic Latex (2)	89.31
2,2,4-Trimethylpentanediol-1,3-monoisobutyrate	4.44
Ammonium Hydroxide (28%)	0.47
Defoamer (3)	0.35
Preservative (4)	0.05
Thickener (5) } Premix	approx. 0.12
2-(2-Methoxyethoxy)ethanol } Premix	5.26
(2) Characteristics:	<u>Requirements</u>
Density, grams per milliliter, ASTM D1475	1.01 to 1.03
Nonvolatile content, percent, ASTM D2369, B	36.5 – 38.5
Viscosity, centipoises, ASTM D2196, Test Method A (50 RPM, #3 spindle)	900 – 1200
High-shear viscosity, ASTM D4287, 0 to 5-P cone, shear rate 12,000 s ⁻¹	0.5 to 0.7
pH	9.0 – 9.5
(a) Hydro Paste® 830 (Silberline)	
(b) Maincote® HG-54D (Rohm and Haas)	
(c) Foamaster® AP (Henkel)	
(d) Proxel® GXL (ICI Americas)	
(e) Acrysol® RM-8W (Rohm and Haas)	

(D) Mixed Paint.

(1) Characteristics:	<u>Requirements</u>
Nonvolatile Content, volume percent (calculated using maximum mix water)	33 – 35
Drying time, 100 µm wet film, ASTM D1640	
Set to touch, hours	1/2 maximum
Dry through, hours	1 maximum

(E) Mixing Procedures. Add 0.5 gallons of potable water to the aluminum paste and mix to a smooth, lump-free consistency. Slowly stir in the vehicle. Mix well, but avoid incorporating air into the paint. Strain the mixed paint through a double layer of cheesecloth prior to use.

THE PAINT MUST BE MIXED FRESH EACH DAY. DO NOT STORE MIXED PAINT. DO NOT PLACE MIXED PAINT IN SEALED CONTAINERS.

(F) Application. The mixed paint shall be applied to a total dry film thickness of at least 2.0 mils. This coating is intended for spray application, however, limited application can be made by brush. Paint should not be applied when the ambient or surface temperature is above 100 °F or below 50 °F or when the relative humidity exceeds 75 percent.

(G) Clean-Up. Use tap water for clean-up. Ten percent ammonia, acetone, or other suitable solvent may be used to remove dried paint from spray guns and other equipment. All applicable governmental pollution regulations shall be adhered to during cleanup and for the disposal of unused paint.

1002-2.04 Acrylic Emulsion Paint. Acrylic emulsion paint shall be waterborne and conform to the requirements of Federal Specification TT-P-19 Paint, Acrylic Emulsion Exterior. Acrylic emulsion paint will be tested in accordance with Subsection 1002-3(D).

This paint may be tinted by using “Universal” or “all purpose” concentrates.

The color of the final coat of paint shall be as indicated on the project plans. If no color is specified on the project plans, the paint color shall approximate that of Paint Color Chip No. 30318, as specified by Federal Test Standard Number 595, when applied to either a concrete test specimen measuring 2-foot by 2-foot or to the surface of the concrete structure to be painted.

The Engineer will determine color acceptance by visual inspection.

1002-3 SAMPLING AND TESTING

(A) General. Any lot or batch of paint may, at any time, be sampled at random and tested for conformance to any of the chemical and physical characteristics and properties as declared by the manufacturer on the respective product data sheet. Also, complete three-paint coating system samples may be required at any time for follow-up evaluation using the performance test method employed in the original evaluation for approval of the system.

(B) Three-Paint Coating System. Paint coatings in Subsection 1002-2.01 will be tested as a complete three-paint coating system. Paint systems shall have an evaluation rating of 100 or greater, as described below, after being weathered in accordance with the requirements of ASTM D4587 and ASTM G53 in the Q-U-V Accelerated Weathering Tester (Fluorescent UV/Condensation Apparatus). Paint systems will be tested as follows:

- (1) Paint coatings will be applied to cold rolled steel panels (ASTM D609, Type 3, ASTM A366). The paint will be thinned to 75 ± 2 Ku consistency using demineralized water. Three coats, each approximately 2 mils thickness are applied to each of four panels according to ASTM D823. The fourth coated panel from each set will be inscribed with an “X” cut to the steel substrate and extending across the entire coated area.
- (2) The exposure cycle used with the weathering tester shall be D = 8 h UV/60 degree C followed by 4 h CON/45 degree C. One panel from each set of four shall be removed at 500 hours and another at 750 hours. The last two panels shall be removed at 1000 hours.
- (3) Paint systems will be evaluated on the basis of six measures of degradation which may be found to occur under the conditions of exposure. For each measure, a rating scale of from

one to five points will be applied. A rating of one point indicates the poorest performance and five points indicate the best performance. The rating from each measure is multiplied by a weighting factor, which represents the relative importance of that measure. The product is a score for that measure. The sum of the scores for all measures is the overall score for the system. All paint systems shall have an overall score of 100 or higher.

- (a) **Cracking/Flaking:** Three ASTM standard test methods are used to provide a measure of the degree of degradation in this area: ASTM D660, ASTM D661, and ASTM D772. The definitions and illustrations contained in these methods are used in combination for the rating scale. A weighting factor of three will be applied to the results of these tests.
- (b) **Blistering/Flaking:** Two ASTM methods are combined for this rating scale: ASTM D714 and ASTM D772. A weighting factor of three will be applied to the results of these tests.
- (c) **Corrosion:** A rating scale is derived from ASTM D610 for evaluating the degree of rusting. A weighting factor of three will be applied to the results of this test.
- (d) **Chalking/Erosion:** Two ASTM methods are combined for this rating scale: ASTM D4214 and ASTM D662. A weighting factor of three will be applied to the results of these tests.
- (e) **Adhesion:** The tape test is based on ASTM D3359 and the rating scale is from the Classification of Adhesion Test Results under Test Method B. A weighting factor of five will be applied to the results of this test.
- (f) **Flexibility:** This is a modified version of ASTM D522 using a 1-1/4 inch mandrel. The degree of cracking observed after bending is used for the rating. A weighting factor of five will be applied to the results of this test.

Paint may also be tested in accordance with the requirements of Arizona Department of Transportation Testing procedures, ASTM, and Federal Test Method Standard Number 141.

(C) Aluminum and Zinc Paint. Aluminum and zinc paint vehicles may be tested in accordance with the requirements of ASTM D2621, ASTM D2805, ASTM E1347, and Federal Test Method No. 141.

(D) Acrylic Emulsion Paint. Acrylic emulsion paints will be tested in accordance with the following procedure:

- (1) Resistance to Accelerated Weathering.** The paint will be applied to concrete mortar panels and weathered in a Q-U-V accelerated weathering tester, according to ASTM G53, for 300 hours utilizing UVB-313 lamps and the exposure cycle as specified in Subsection 4.3.5.2 of Federal Specification TT-P-19. The paint weathered in this manner shall show no appreciable change in color or appearance due to fading, chalking, or material reaction.

(2) **TT-P-19 Requirements.** All performance requirements of Section 3 of Federal Specification TT-P-19 will be met as specified when tested according to the applicable test methods as specified in Section 4 of Federal Specification TT-P-19.

(3) **Adhesion.** The acrylic emulsion paint will be applied to a concrete test specimen or to the final concrete surface and subjected to one or both of the methods of adhesion testing described below, after a minimum period of 7 days of sunlight after application.

Adhesion will be measured in accordance with the requirements of ASTM D3359. When Test Method A is used, a rating of 3A will be required. When Test Method B is used, a rating of 2B will be required.

(4) **Testing.** Random inspection testing of the completed paint finish will be performed by the Engineer according to the above performance requirements. Non-compliance with these test results will require remedial action, which may include substitution of the paint supplied, modification to the application plan, removal and repainting of the non-compliance section(s), or other action as deemed appropriate by the Engineer.

SECTION 1003 REINFORCING STEEL:

1003-1 General Requirements: the first paragraph of the Standard Specifications is revised to read:

Reinforcing steel shall be furnished in the sizes, shapes, and lengths shown on the plans and in conformance with the requirements of the specifications.

Certificates of Compliance conforming to the requirements of Subsection 106.05 shall be submitted for epoxy coated reinforcing bars, as well as uncoated reinforcing bars, wire, and welded wire fabric. In addition, for epoxy coated reinforcing bars, Certificates of Compliance shall be required from the coating manufacturer and Certificates of Analysis shall be required from the coating applicator.

1003-2 Reinforcing Bars: the first paragraph of the Standard Specifications is revised to read:

Except when used for wire ties or spirals, steel bars used as reinforcement in concrete shall be deformed and shall conform to the requirements of ASTM A 615. Unless otherwise specified, steel bars meeting the requirements of ASTM A 706 may be substituted for ASTM A 615 steel bars. When ASTM A 706 bars are used, tack welding of the reinforcement will not be permitted unless approved in writing by the Engineer.

1003-3 Wire: of the Standard Specifications is revised to read:

Steel wire used as spirals or ties for reinforcement in concrete shall conform to the requirements of ASTM A 82.

1003-5.02 Epoxy for Coating: the fifth paragraph of the Standard Specifications is
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revised to read:

The contractor shall furnish a Certificate of Compliance from the coating manufacturer, conforming to the requirements of Subsection 106.05. The Certificate of Compliance shall properly identify the batch and/or lot number, material, quantity of batch, date of manufacture, name and address of manufacturer, and a statement that the material is the same composition as the initial sample prequalified for use. The certificate shall also state that production bars and prequalification bars have been identically prepared and applied with epoxy powders.

1003-5.03 Application of Coating: the ninth and tenth paragraphs of the Standard Specifications are revised to read:

The contractor shall furnish a Certificate of Analysis from the coating applicator, conforming to the requirements of Subsection 106.05, with each shipment of coated steel. In addition to the requirements of Subsection 106.05, the Certificate of Analysis shall state that the coated items and coating material have been tested in accordance with the requirements of this subsection and that the entire lot is in a fully-cured condition.

The coating applicator shall be responsible for performing quality control and tests. This will include inspection and testing to determine compliance with the requirements of this subsection for the coating thickness, continuity of coating, coating cure, and flexibility of coating.

1005BITMAT, 11/23/11

SECTION 1005 - BITUMINOUS MATERIALS FOR SURFACING

1005-3 BITUMINOUS MATERIAL REQUIREMENTS

1005-3.01 Asphalt Cement of the Standard Specifications is modified to add:

Asphalt cement shall be performance grade (PG 70-10) asphalt binder conforming to the requirements of AASHTO Provisional Standard MP1. The pressure aging temperature shall be 110° C.

(1006PCC, 2/24/15)

SECTION 1006 PORTLAND CEMENT CONCRETE:

1006-1 GENERAL REQUIREMENTS

Portland cement concrete shall consist of a mixture of hydraulic cement, fine aggregate, coarse aggregate and water. Portland cement concrete may also contain air-entraining admixtures, chemical admixtures and a supplementary cementitious material.

The contractor shall determine the mix proportions and shall furnish concrete which conforms to the requirements of these specifications. All concrete shall be sufficiently workable, at the slump proposed by the contractor and within the specified range, to allow proper placement of the

concrete without harmful segregation, bleeding, or incomplete consolidation. It shall be the responsibility of the contractor to proportion, mix, place, finish, and cure the concrete properly in conformance with the requirements of these specifications.

1006-2 MATERIALS

1006-2.01 Hydraulic Cement. Hydraulic cement shall consist of either Portland cement or Portland-pozzolan cement.

Portland cement shall conform to the requirements of ASTM C150 for Type II, III or V. However, at the option of the manufacturer, processing additions may be used in the manufacture of the cement, provided such processing additions have been shown to meet the requirements of ASTM C465, and the total amount of such material used does not exceed one percent of the weight of the Portland cement clinker.

Portland-pozzolan cement shall conform to the requirements of ASTM C595 for Type IP (MS).

Hydraulic cement shall not contain more than 0.60 percent total alkali. The word alkali as used in these specifications shall be taken as the sum of sodium oxide and potassium oxide calculated as sodium oxide.

Certificates of Analysis conforming to the requirements of Subsection 106-5.03 shall be submitted.

Cement of different types or brands shall not be intermingled or used in the same batch. The contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which for any reason has become partially set or which contains caked lumps shall not be used.

The use of either sacked cement or bulk cement is permissible. The use of fractional bags of sacked cement will not be permitted unless the contractor elects to weigh the cement into each batch.

1006-2.02 Water. The water used shall be free from injurious amounts of oil, acid, alkali, clay, vegetable matter, silt or other harmful matter. Water shall contain not more than 1,000 parts per million of chlorides as Cl and not more than 1,000 parts per million of sulfates as SO₄.

Water shall be sampled and tested in conformance with the requirements of AASHTO T 26. Potable water obtained from public utility distribution lines will be acceptable

1006-2.03 Aggregates.

(A) General Requirements. When concrete is to be placed at elevations above 4,500 feet, the fine and coarse aggregate shall be subject to five cycles of the sodium sulfate soundness test in conformance with the requirements of AASHTO T 104. The total loss shall not exceed ten percent by weight of the aggregate. Tests for soundness may be waived when aggregates from the source have been previously approved and the approved test results apply to the current production from that source.

When aggregates show potential for alkali silica reaction (ASR), as indicated by expansions of 0.10% or greater at 16 days after casting when tested in conformance with ASTM C1260, sufficient mitigation for the expansion shall be determined in conformance with ASTM C1567.

Concrete aggregate shall be washed.

Mill tailings or material from mine dumps which have been in contact with processing chemicals shall not be used in the production of fine or coarse aggregate.

The handling and storage of concrete aggregate shall be such as to minimize segregation or the intermixing and contamination with foreign materials. Aggregates shall be stored separately. Different sizes of aggregate shall be separated by bulkheads or stored in separate stockpiles sufficiently removed from each other to prevent the material from becoming intermixed.

When aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and level. The bottom 1 foot layer of aggregate shall not be disturbed or used.

The handling and storage of concrete aggregate at the stockpile site shall be such as to minimize segregation. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible. Stockpiles shall be constructed by first distributing the aggregate over the entire base and then building upward in successive layers not more than 5 feet in depth. Aggregate shall not be dumped or spilled over the side of the pile. When a conveyor is used to stockpile aggregate in its final position, it shall be equipped with an adequate rock tremie or rock ladder to reduce segregation and it shall be moved continuously across the stockpile. The distance the material drops from the tremie shall not exceed 10 feet. Aggregate shall be distributed over the stockpile so that the formation of conical piles higher than 10 feet is prevented.

Contamination of concrete aggregate by contact with the ground at the job site shall be positively prevented. The contractor shall take the necessary measures to prevent such contamination. Such preventive measures shall include, but not necessarily be limited to, placing aggregate on hardened surfaces consisting of Portland cement concrete, asphaltic concrete, or cement treated material.

The following test methods will be used to evaluate the quality of aggregates for concrete:

Sampling	Arizona Test Method 105
Reducing field samples to testing size	AASHTO T 248
Potential for Alkali Silica Reaction (ASR)	ASTM C1260 & C1567
Clay lumps and friable particles	AASHTO T 112
Lightweight particles	AASHTO T 113 (See Note)
Organic impurities	AASHTO T 21
Aggregate gradation	Arizona Test Method 201
Soundness (Sodium Sulfate)	AASHTO T 104
Mortar Strength	AASHTO T 71(See Note)
Sand equivalent	AASHTO T 176
L.A. abrasion	AASHTO T 96
Fractured Coarse Aggregate Particles	Arizona Test Method 212
Note: AASHTO T 113 and T 71 are modified as specified in Subsections 1006-2.03 (B) and (C).	

(B) Fine Aggregate. Fine aggregate shall be natural sand or other approved inert material with similar characteristics composed of clean, hard, strong, durable, uncoated particles. Fine

aggregate shall be washed and shall conform to the requirements of AASHTO M 6, as modified by this Subsection.

The amount of deleterious substances in the washed fine aggregate shall not exceed the following limits by dry weight, when tested in conformance with the following test methods:

Clay lumps and friable particles	AASHTO T 112	0.5%
Lightweight particles	AASHTO T 113 (Except that the percent of lightweight particles shall be reported to the nearest 0.01 %.)	1.25% (0.25% Max. Coal and Lignite*)
* Only material that is brownish-black, or black, shall be considered coal or lignite.		

The total amount of all deleterious substances listed in the table above shall not exceed 1.25 percent by dry weight.

Fine aggregate shall meet the following gradation requirements when tested in conformance with Arizona Test Method 201.

Sieve Size	Percent Passing
3/8 inch	100
No. 4	95-100
No. 16	45-80
No. 50	0-30
No. 100	0-10
No. 200	0-4.0

Fine aggregate shall have an average sand equivalent value of not less than 75 when tested in conformance with the requirements of AASHTO T 176.

Fine aggregates shall be subjected to testing under AASHTO T 21 for organic impurities. Aggregates producing a color darker than the standard color shall be rejected unless the material passes the mortar strength specified in the following paragraph:

Fine aggregate shall be of such quality that, when made into mortar and subjected to the test for mortar-making properties, in conformance with the requirements of AASHTO T 71, the mortar shall develop a compressive strength at seven and 28 days of not less than 90 percent of that developed by a mortar prepared in the same manner with the same Type II cement and graded Ottawa sand having a fineness modulus of 2.40 plus or minus 0.10.

(C) Coarse Aggregate. Coarse aggregate shall consist of crushed stone, gravel, crushed gravel, or other approved inert material of similar characteristics, including cinders when specified, having hard, strong and durable pieces free of clay and other deleterious substances. The aggregate shall be washed.

The coarse aggregate gradation shall conform to the appropriate size designation of AASHTO M 43, as modified by the table below, when tested in conformance with the requirements of Arizona Test Method 201, Section 12(3), except the amount of material passing the No. 200 sieve shall not exceed 1.0 percent.

The amount of deleterious substances in the washed coarse aggregate shall not exceed the following limits by dry weight, when tested in conformance with the following test methods, except as noted:

Clay lumps and friable particles	AASHTO T 112	0.3%
Lightweight particles	AASHTO T 113 (Except that the percent of lightweight particles shall be reported to the nearest 0.01%)	1.25% (0.25% Max. Coal and Lignite*)
Material passing No. 200 sieve	Arizona Test Method 201	
* Only material that is brownish-black, or black, shall be considered coal or		

The total amount of all deleterious substances listed in the table above shall not exceed 1.25 percent by dry weight.

The percent of wear of coarse aggregate at 500 revolutions, when tested in conformance with the requirements of AASHTO T 96, shall not exceed 40.

1006-2.04 Admixtures.

(A) General Requirements. The contractor shall furnish Certificates of Compliance conforming to the requirements of Subsection 106-5.02 for each type of admixture furnished.

Calcium chloride, as a separate admixture, shall not be acceptable.

All concrete admixtures shall be stored in suitable containers in conformance with the manufacturer's recommendations. All liquid admixtures shall be protected from freezing. Liquid admixtures that have frozen shall not be used.

Admixtures shall be uniform in properties throughout their use in the work.

If more than one admixture is used, the admixtures shall be compatible with each other so that the desired effects of all admixtures used will be realized.

(B) Air-Entraining Admixtures. Air-entraining admixtures shall conform to the requirements of ASTM C260.

Air-entraining admixtures shown on the Arizona Department of Transportation's Approved Products List (APL) shall be used. The most current version of the APL can be found on the internet at the Arizona Department of Transportation's web site, under their Product Evaluation Program.

Air-entraining admixtures having a chloride concentration of 10,000 parts per million (one percent by mass of the admixture) or less, as determined in conformance with Arizona Test Method 738, are acceptable unless otherwise specified.

(B) Chemical Admixtures. Chemical admixtures shall conform to the requirements of ASTM C494.

Chemical admixtures shown on the Arizona Department of Transportation's Approved Products List (APL) shall be used. The most current version of the APL can be found on the internet at the Arizona Department of Transportation's web site, under their Product Evaluation Program.

Chemical admixtures having a chloride concentration of 10,000 parts per million (one percent by mass of the admixture) or less, as determined in conformance with Arizona Test Method 738, are acceptable unless otherwise specified.

(C) Supplementary Cementitious Material (Fly Ash, Natural Pozzolan, and Silica Fume).

Supplementary cementitious materials shall be approved prior to their use in conformance with Materials Policy and Procedure Directive "Certification and Acceptance of Hydraulic Cement, Fly Ash, Natural Pozzolan, and Silica Fume".

Fly ash and natural pozzolan shall conform to the requirements of ASTM C618 for Class C, F or N mineral admixture, except that the loss on ignition shall not exceed 3.0 percent.

Fly ash, when used as a replacement for Portland cement, shall have an R factor less than 2.5. The R factor is defined as $(C - 5\%)/F$, where C is the calcium oxide content expressed as a percentage and F is the ferric oxide content expressed as a percentage. Fly ash shall not contain more than 1.5 percent available alkali as defined in ASTM C311.

Silica fume shall conform to the requirements of ASTM C1240.

When a supplementary cementitious material with a calcium oxide content greater than 15 percent is used, or when the Special Provisions specify sulfate resistant concrete, the cement intended to be used shall be tested for sulfate expansion in conformance with ASTM C1157 and ASTM C1012. For moderate sulfate resistance, the maximum expansion shall be 0.10 percent at six months. For high sulfate resistance, the maximum expansion shall be 0.05 percent at six months and 0.10 percent at one year.

When Class C fly ash is used, the cement intended to be used shall be tested for sulfate expansion in conformance with ASTM C1157 and ASTM C1012 and shall have a maximum expansion of 0.05 percent at six months and 0.10 percent at one year.

1006-2.05 Concrete Curing Materials. Liquid membrane curing compounds shall conform to the requirements of AASHTO M 148. Type 2 compound, with either a Class A or Class B vehicle, shall be used for concrete pavement, bridge decks and approach slabs. Type 1-D compound, with either a Class A or Class B vehicle, shall be used for other concrete items.

Certificates of Compliance conforming to the requirements of Subsection 106-5.02 shall be submitted.

1006-3 DESIGN OF MIXTURES

1006-3.01 Design Criteria. Portland cement concrete shall conform to the requirements specified in Table 1006-1 for each of the classes listed therein.

TABLE 1006-1				
Concrete Class	Minimum 28-Day Compressive Strength Required: psi (Note 1)	Hydraulic Cement Content: lbs. per cu yd. (Minimum - Maximum) (Notes 2, 3, & 4)	Maximum Water/Cement Ratio	Slump Range inches
B	2,500	470 - 658	None	
S	2,500	520 - 752	0.55	(Note 6)
	3,000 (See Note 5)			
	3,500			
	4,000			
	4,500 and greater	564 - 752	0.50	

Note 1: Testing for compressive strength of cylinders for all classes of concrete shall be in conformance with the requirements of Arizona Test Method 314.

Note 2: A supplementary cementitious material (fly ash, natural pozzolan, or silica fume) conforming to the requirements of Subsection 1006-2.04(D) may be used at the option of the contractor only when Portland cement is used. The use of a supplementary cementitious material is not allowed for replacement of cement when Portland-pozzolan cement [Type IP (MS)] is used. A maximum of 25 percent of the required weight of Portland cement may be replaced with fly ash or natural pozzolan. A maximum of 10 percent of the required weight of Portland cement may be replaced with silica fume, or a maximum of 10 percent silica fume may be added to the required weight of Portland cement. When supplementary cementitious material is used as a replacement for Portland cement, the replacement shall be made on a 1 pound to 1 pound basis. If performance enhancement of the concrete, such as the mitigation of an alkali silica reaction or for increased sulfate resistance is necessary, additional quantities of fly ash or natural pozzolan may be incorporated into the concrete without a corresponding Portland cement replacement, if approved by the Engineer.

Note 3: The hydraulic cement content shall be as shown unless otherwise specified.

Note 4: Concrete to be placed under water, tremie concrete, shall conform to the requirements for the class and strength required except the minimum hydraulic cement content shall be increased by 50 pounds per cubic yard of concrete.

Note 5: Unless otherwise shown on the project plans.

Note 6: The proposed slump shall be chosen by the contractor. Concrete at the proposed slump shall be sufficiently workable to allow proper placement without harmful segregation, bleeding, or incomplete consolidation.

Air-entraining admixtures will be required for all classes of concrete placed at or above an elevation of 3,000 feet. The amount of entrained air in the concrete mixture shall not be less than four percent nor more than seven percent by volume.

Air-entrainment is not required for minor precast structures, precast pipe, and precast, prestressed structural members supporting a concrete deck slab or impervious overlay. Air-entrainment is also not required for any precast items constructed using the dry pack or no-slump method.

For elevations below 3,000 feet, air-entraining admixtures may be used at the option of the contractor and the amount of entrained air in the concrete shall not exceed 7 percent by volume.

Concrete that fails to conform to the entrained air content requirements listed above for the respective elevation as determined by the Engineer, shall be rejected prior to placement.

Unless specifically required, water reducing admixtures may be used at the option of the contractor.

The coarse aggregate size designation for Class S and Class B concrete shall be chosen by the contractor and approved by the Engineer and shall conform to the size designation and grading requirements of AASHTO M 43. In choosing the size designation, the maximum size of coarse aggregate shall not be larger than 1/5 of the narrowest dimension between sides of adjacent forms, or 2/3 of the minimum clear spacing between reinforcing bars, or 1/3 the depth of the slab, whichever is the least. However, coarse aggregate used in Class S concrete for drilled shaft foundations shall meet the requirements for size designation Number 67 when tested in conformance with AASHTO T 27.

If two or more stockpiles are utilized to manufacture an AASHTO M 43 size designation, at the time of proportioning for mixing, the aggregate from each stockpile shall be measured by weight and proportioned so that the resulting mixture of coarse aggregate meets the requirements for the chosen size designation. The percent of fractured coarse aggregate particles shall be at least 30 when tested in conformance with the requirements of Arizona Test Method 212.

1006-3.02 Design Procedures. At least two weeks prior to the appropriate concreting operation, the contractor shall furnish a mix design for each class of concrete and each strength of Class S concrete for review and approval. More than one mix design for each class of concrete and each strength of Class S concrete may be submitted for approval provided specific items and locations of intended uses accompany the mix design. The contractor shall substantiate each mix design by furnishing test data and providing all details of the mixtures proposed for use.

The mix design shall be prepared under the direct supervision of, and signed by, a registered Professional Engineer Registered in the State of Arizona, a NICET Level III or higher certified technician in the concrete subfield, or an ACI certified Concrete Laboratory Testing Technician Grade II. Individuals responsible for the preparation and submittal of mix designs shall have experience in the development of mix designs and mix design testing.

The complete, solid volume mix designs, submitted for approval, shall include all weights and volumes of all ingredients. The brand, type, and source of hydraulic cement and admixtures, the coarse aggregate size number designation, source of aggregates, the specific gravities of all ingredients, the proposed slump, the water/cement ratio, a product code to identify the mix design, and the intended use of each mix design shall be an integral part of each mix design.

Changes in the approved mix designs or product codes may be made by the contractor with the approval of the Engineer.

In no case shall the approval of a mix design relieve the contractor of the responsibility for the results obtained by the use of such approved mix design.

Mix designs from previous or concurrent projects may be submitted for approval.

A new mix design shall be submitted for approval any time the test results of an approved mix design indicate that the concrete will not meet the required 28-day compressive strength.

1006-4 CONCRETE PRODUCTION

1006-4.01 General Requirements. For each class of concrete and each Class concrete strength designation, the contractor shall furnish a delivery ticket for each batch of concrete. The minimum information to be shown on each delivery ticket shall be the batch weights or mix design product code, date, time batched, truck identification or number, name or identification of batch plant, name of contractor, name and location of project, the volume of concrete, the amount of permissible additional water to meet the design water/cement ratio and the number of revolutions that the concrete has been mixed at the mixing speed of a truck mixer.

1006-4.02 Proportioning.

(A) Hydraulic Cement. Separate scales shall be provided to weigh the hydraulic cement. A load indicating device, positioned so as to be easily visible to the Engineer and accurate to ± 0.2 percent of scale capacity, shall be provided to weigh all hydraulic cement. The batching accuracy shall be within ± 1.0 percent of the required weight. Dial scales or a load cell, providing a digital printed readout, will be required for weighing all hydraulic cement.

The cement shall be conveyed by means of an enclosed conveying system and the weighing hopper shall be equipped with one or more vibrators as required to ensure the complete discharge of all cement from the hopper after each batch is weighed.

(B) Water. Water shall be measured by volume or by weight. Measurement by volume may be by metering.

Scales shall be accurate within ± 0.2 percent of scale capacity. Volumetric measuring devices shall have an accuracy of ± 1.5 percent. The batching devices shall be capable of routinely batching water within ± 1.5 percent.

(C) Aggregates. All aggregates shall be proportioned by weight.

Suitable dial scales shall be provided by the contractor to weigh each size of aggregate. The load indicating devices for the scales shall be positioned so as to be easily visible to the Engineer and accurate to ± 0.2 percent of scale capacity. The weighing equipment shall have a batching accuracy of ± 2 percent of the required weight. The weighing equipment shall be arranged so as to permit the convenient removal of excess material from the weighing hopper and the equipment shall be arranged to enable the operator to have convenient access to all controls. The scales and load indicating devices shall be so equipped and graduated that the weights of materials being weighed can be accurately determined.

Every expedient shall be made to obtain and preserve uniform moisture content in the coarse and fine aggregates. The moisture content shall not vary more than three percent during any day's

production. The estimated percent of free moisture in each of the coarse and fine aggregates shall be determined by the contractor using acceptable test methods.

The moisture content of the aggregate shall be such that no free drainage of water from the aggregate will be visible during transportation from the stockpile to the point of mixing. Aggregate containing excess moisture shall be stockpiled prior to use until it is sufficiently dry to meet the above requirement.

In the event that either the coarse or fine aggregate has a moisture absorption rate of more than 1.5 percent, the materials shall be thoroughly prewetted and allowed to drain in advance of use until the moisture content is stable.

(D) Admixtures. The equipment and the procedures used to measure admixtures and dispense them into the concrete batch shall be approved by the Engineer prior to use.

Dry admixtures shall be measured by weight, with a separate scale having a load indicating device positioned so as to be easily visible to the Engineer and accurate to within ± 1.0 percent of the amount being weighed. Paste or liquid admixtures shall be measured either by weight or by volume. Only mechanical dispensing equipment shall be used for adding admixtures. Dosage rates shall conform to the manufacturer's recommendations or approved rates, or as determined from field trial batches.

Dispensers for admixtures shall have sufficient capacity to measure at one time the full quantity required for each batch. Admixtures shall be added in conformance with the manufacturer's recommendations and in a manner such that the admixture is incorporated uniformly in the concrete mixture. The amount of liquid admixtures shall not vary from the required amount by more than ± 3.0 percent.

Equipment for measurement shall be designed for convenient confirmation of measurement accuracy. If more than one liquid admixture is used, each admixture shall be dispensed by separate equipment unless otherwise permitted, in writing, by the Engineer.

When a supplementary cementitious material (such as fly ash, natural pozzolan, or silica fume) is specified in the mix design, it may be weighed cumulatively with the hydraulic cement on the same scale. If the same scale is used, the hydraulic cement shall be weighed first, then the supplementary cementitious material. If the same scale is not used, a separate scale with a load-indicating device, positioned so as to be easily visible to the Engineer and accurate to ± 0.2 percent of scale capacity, shall be provided to weigh the supplementary cementitious material.

When the quantity of hydraulic cement exceeds 30 percent of the full capacity of the scale, the batching accuracy of mixtures containing supplementary cementitious material shall be such that the quantity of the hydraulic cement, and the cumulative quantity of the hydraulic cement plus the supplementary cementitious material, is within ± 1.0 percent of the sum of their designated batch weights.

Supplementary cementitious material shall be conveyed by means of an enclosed conveying system, and the weighing hopper shall be equipped with one or more vibrators as required to ensure the complete discharge of the supplementary cementitious material from the hopper after each batch is weighed.

1006-4.03 Mixing.

(A) General Requirements. The concrete may be mixed in a stationary mixer, either at a central mixing plant or at the site or it may be mixed in a truck mixer, either at a central mixing plant or at the site. Concrete may be mixed in a mobile mixer at the site for Class S and Class B concrete, provided written permission of the Engineer is granted.

Each mixer shall meet the specified requirements for type and size and shall have attached in a prominent place, a manufacturer's plate showing the gross volume of the mixer and the recommended speeds of the mixer for mixing and for agitating.

The mixer shall be equipped to measure accurately mixing water, and to control the time when the water enters the mixer during the mixing cycle. If the measurement of the water cannot be visually verified, such as by a sight glass on the water storage tank, the equipment shall have a manually operated outlet valve allowing external measurement to verify indicated quantities.

Mixer blades may be periodically checked for wear. All blades over 3/4 inch below the original dimension shall be relined or replaced.

Truck mixer or truck agitators used for mixing or transporting mixed concrete shall be capable of discharging concrete at a consistent rate without manual or mechanical assistance.

Each batch plant shall be equipped to control the time when the water enters the mixer during the mixing cycle. Batch and mixing time shall be from the time hydraulic cement is combined with water.

Mixers shall be cleaned at suitable intervals. Water used for cleaning the mixer shall be discharged prior to further batching.

Equipment having components made of aluminum or magnesium alloys, which would have contact with plastic concrete during mixing and transporting, shall not be used.

All concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement.

All concrete produced shall meet the uniformity requirements in Table 1006-2, Concrete Uniformity. Tests shall be conducted when required by the Special Provisions or as directed by the Engineer. It will not be necessary to verify that mixing equipment meets the uniformity requirements unless evidence of non-uniform concrete is observed or the contractor requests a reduced mixing time for stationary mixers.

TABLE 1006-2 CONCRETE UNIFORMITY	
TEST	PERMISSIBLE VARIATION (Concrete Samples Taken at Two Locations In the Batch)
Weight calculated to an Air-Free Basis.	2.0 pounds per cubic foot
Air Content, % by volume of concrete.	1.0 percent

Slump: Average slump 4 inches or less	1.0 inch
Average slump greater than 4 inches	1.5 inches
Coarse aggregate content, portion by weight of each sample retained on a No. 4 sieve.	6.0 percent
Unit weight of air-free mortars based on average for all comparative samples tested.	1.6 percent
Average compressive strength of 7 days for each sample based on average strength of all comparative test specimens.	10.0 percent
NOTE: Samples shall be taken at the point of discharge of the concrete mixer.	

(B) Mixing in a Stationary Mixer. After measurement is made of the materials in the required proportions and amounts, the batch of concrete materials shall be placed in the mixer. The flow of water into the mixer shall be uniform with a portion of the water entering in advance of the cement and aggregates and all of the water entering within the first 15 seconds of the mixing time.

The volume of concrete mixed per batch shall not exceed the capacity of the mixer as shown on the manufacturer's plate. No spillage of concrete will be allowed during the process of mixing. While mixing, the mixer shall be operated at the speed shown on the manufacturer's plate as the mixing speed.

The mixing time shall be not less than 60 seconds for one cubic yard and shall be increased 15 seconds for each additional cubic yard or fraction thereof for Class S and Class B concrete.

The mixers shall have an automatic timing device which locks the discharge equipment until the required mixing time has been completed. The mixer shall be operating at mixing speed at the time that all ingredients enter the mixer to ensure the immediate beginning of the mixing cycle. Mixing time shall end when the discharge chute opens. The contents of the mixer shall be completely discharged before the succeeding batch is placed in the mixer.

Any concrete discharged before the mixing time is completed shall be disposed of by the contractor at his expense.

Mixed concrete shall be transported in truck mixers, truck agitators or in non-agitating trucks having special bodies.

When truck mixers or truck agitators are used, the concrete shall be continuously agitated from the time of loading until the time of discharge. Agitation shall be by rotation of the drum at the speed shown on the manufacturer's plate as agitating speed.

The truck mixer or truck agitator shall be loaded and operated within a capacity not to exceed 80 percent of the gross volume of the drum. The rate of discharge shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully opened.

Discharge from the truck mixer or truck agitator shall be completed within 90 minutes from the time batched unless the concrete has received an approved hydration stabilizer. The addition of the hydration stabilizer shall be noted on the delivery ticket and shall be in conformance with the manufacture's recommendations.

Bodies of non-agitating trucks shall be smooth, mortar-tight, metal containers and shall be capable of discharging the concrete at a satisfactory controlled rate without segregation. If discharge of concrete is accomplished by tilting the body, the surface of the load shall be retarded by a suitable baffle. Covers shall be provided when needed for protection.

The haul road used by non-agitating trucks shall be free of holes, washboarding or any other features that would cause segregation in the mix.

Discharge from non-agitating trucks shall be completed within 45 minutes from the time concrete is batched.

Concrete hauled in open-top vehicles shall be protected against rain, or exposure to the sun for more than 30 minutes when the ambient temperature exceeds 85° F.

(C) Mixing in Truck Mixers. Truck-mixed concrete shall be mixed entirely in the truck mixer and shall be mixed at the batch plant or at the site.

Truck mixers shall be operated within a capacity not to exceed 63 percent of the gross volume of the drum and at speeds shown on the manufacturer's plate as mixing and agitating speeds.

Each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum at mixing speed after all materials have been loaded into the drum, except that when approved by the Engineer, the maximum of 100 revolutions may be increased. Any revolving of the drum beyond the maximum number of revolutions shall be at the agitating speed. Mixing shall begin within 10 minutes after the cement has been combined with either the aggregate or water.

The truck mixer shall be equipped with an electrically or mechanically activated revolution counter by which the number of drum revolutions may be verified. The counter shall be of the "continuous registering" type, which accurately registers the number of revolutions. It shall be mounted on the truck mixer or just inside the truck cab, so that it may be safely and conveniently read from beside the truck. The revolution counter shall be reset to zero after all materials have been loaded into the drum.

Discharge from the truck mixer shall be completed within 90 minutes from the time batched unless the concrete has received an approved hydration stabilizer. The addition of the hydration stabilizer shall be noted on the delivery ticket and shall be in conformance with the manufacture's recommendations.

If additional mixing water is required to maintain the mix design water/cement ratio, the concrete shall be mixed by a minimum of 30 revolutions of the drum at mixing speed after the water has been added, prior to discharge of any concrete for placement. Any additional mixing water and required mixing revolutions shall be recorded on the invoice specified in Section 1006-4.01. This additional mixing may be in excess of the maximum revolutions previously specified.

(D) Mixing in Mobile Mixers. Concrete mixing in mobile mixers for Class S and Class B concrete shall be performed in conformance with the requirements of AASHTO M 241.

1006-4.04 Consistency. The contractor shall furnish Class S and Class B concrete having the slump shown on the approved mix designs with a permissible variation of ± 1 inch; however, the permissible variation will be ± 2 inches when an approved high range water reducing chemical admixture conforming to Type F or G requirements of ASTM C494 is used.

Concrete that fails to conform to the consistency requirements will be rejected.

When concrete is pumped, samples for consistency will be taken both as the concrete leaves the mixer and at the pump hose discharge. If the Engineer determines that there is a good correlation between the results of consistency tests on samples obtained from the mixer and from the pump hose, the Engineer may discontinue sampling from the pump hose; however, the Engineer may take periodic samples from both sources to verify the correlation of test results.

1006-5 WEATHER LIMITATION

1006-5.01 General Requirements. Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to cause a flow or wash of the concrete surface or have a detrimental effect on the finished concrete and acceptance parameters.

Placing of concrete shall immediately cease if the hauling vehicles or any equipment or pedestrian traffic tracks mud on the prepared base or changes the allowable subgrade dimensional tolerances for slabs placed on subgrade for Class S and Class B concrete.

1006-5.02 Concrete Placement in Hot Weather. The temperature of the concrete mixture immediately before placement shall not exceed 90° F or 86° F when used for drilled shafts.

Concrete that fails to conform to the maximum temperature requirement in hot weather when the air temperature is above 90° F and rising, shall be rejected prior to placement.

Forms, subgrade and reinforcing steel, shall be sprinkled with cool water just prior to placement of concrete.

Mix water may be cooled by refrigeration, liquid nitrogen, or well-crushed ice of the size that will melt completely during the mixing operation,. Crushed ice may be substituted for part of the mix water on a pound for pound basis.

1006-5.03 Cold Weather Concrete Placement. The temperature of the mixed concrete immediately before placing shall not be less than 50° F.

Concrete shall not be placed on or against ice-coated forms, reinforcing steel, structural steel, conduits or construction joints, nor on or against snow, ice, or frozen earth materials.

Concrete operations shall be discontinued when a descending air temperature in the shade, and away from artificial heat, falls below 40° F. Concrete operations shall not be resumed until an ascending air temperature in the shade, and away from artificial heat, reaches 35° F, unless otherwise approved by the Engineer.

Mixing and placing concrete shall continue no later in any day than that which will allow the contractor sufficient time to place and protect the concrete already poured before the air temperature drops to 35° F.

(A) Placement Below 40° F. The Engineer may allow concrete operations to continue although the air temperature at any time during the placement period, in the shade and away from artificial heat, is below the limit permitted above. Where concrete operations are so allowed, the contractor shall use equipment to heat the aggregates or water, or both, prior to mixing.

If aggregates are heated, the minimum temperature shall be 60° F and the aggregates shall have no chunks of ice or frozen aggregate present. Equipment used to heat the aggregates shall be such that consistent temperatures are obtained throughout the aggregate within each batch and from one batch to another. Water shall not be heated in excess of 150° F unless the water is mixed with the aggregate prior to the addition of cement to the batch.

Cement shall not be heated nor shall salt or chemical admixtures be added to the concrete mix to prevent freezing.

The Engineer may require the contractor to measure the concrete temperature, at the point of placement, if the ambient air temperature falls below 45° F. The temperature of the concrete shall be at all times maintained above 50° F at the point of placement.

When concreting operations are allowed to continue when the air temperature has fallen below the limits permitted in the shade and away from artificial heat, the contractor shall provide adequate insulation or heat, or both, to protect the concrete immediately after placement. This protection shall be to the extent required to maintain a concrete surface temperature of not less than 50° F for a period of 72 hours after placement and at not less than 40° F for an additional 96 hours.

(B) Placement During Non-Cold Weather Periods. During periods not defined as cold weather, but when freezing temperatures may occur, the concrete surfaces shall be protected against freezing for a minimum of 24 hours after placement.

When artificial heating is required, the heating units shall not locally heat or dry the surface of the concrete. A written outline of the proposed protection method shall be submitted to the Engineer for approval.

The placing of concrete will not be permitted until the Engineer is satisfied that all the necessary protection equipment and materials are on hand at the site and in satisfactory working condition.

Concrete requiring cold weather protection shall have such protection removed at the end of the required period in a manner that will permit a gradual drop in the concrete temperature.

1006-6 CURING CONCRETE

1006-6.01 Curing Cast In Place Concrete.

(A) General Requirements. All cast in place concrete shall be cured by one or by a combination of more than one of the methods specified herein and curing shall begin immediately after completion of machine or hand finishing of the fresh concrete.

Curing shall be continued for a period of at least seven days after placing of either Type II Portland cement or Portland pozzolan cement has been used, or for at least three days if Type III Portland cement has been used.

Surfaces requiring a Class II finish shall not be cured by the Liquid-Membrane Forming Compound Method until after the finishing operations are completed.

No traffic, hauling, storing of material or other work shall be allowed on any concrete surface during the required curing periods.

(B) Water Curing Method. All surfaces not covered by reasonably waterproof forms shall be kept damp by applying water with a nozzle that so atomizes the flow of the water that a fog mist and not a spray is formed until the surface of the concrete is either covered with a curing medium or sprinkling of the surface is permitted for the curing period. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface.

Burlap, rugs, carpets, or earth or sand blankets may be used as a curing medium to retain the moisture during the curing period. The curing medium shall be kept continuously wet by sprinkling with water for the entire curing period. Application of the curing medium shall not begin until such time that placement can be made without marring the surfaces of the concrete.

If a curing medium is not used, the entire surface of the concrete shall be kept damp by the application of water with an atomizing nozzle as specified above until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for the entire curing period.

In no case shall curing be interrupted by more than one hour during the curing period.

(C) Liquid-Membrane Forming Compound Method. All surfaces not covered by reasonably water proof forms shall be cured by the liquid-membrane forming compound method. The curing compound shall be applied to the concrete immediately following the surface finishing operation in one or more applications totaling a rate of not less than 1 gallon per 100 square feet unless otherwise specified.

The curing compound shall form a continuous unbroken surface.

If the membrane film is broken during the curing period, the broken area shall be given a new application of compound.

In no case shall curing be interrupted by more than one hour during the curing period.

(D) Forms in Place Method. Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for the entire curing period.

All joints in the forms and the joints between the end of forms and concrete shall be kept moisture-tight during the curing period.

Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods approved by the Engineer.

(E) Curing Bridge Deck. The top surface of bridge decks shall be cured by the liquid-membrane forming compound method and by the water curing method. The curing compound shall be applied progressively immediately following the surface finishing operation. Liquid-membrane forming compound shall be applied at a rate of 1 gallon per 100 square feet. The curing compound shall form a continuous unbroken surface.

Water curing shall be applied not later than four hours after the completion of the deck finishing operations and shall be applied as specified herein.

The top surface of bridge decks that will be covered with a special riding surface or water proofing membrane shall be cured by the water curing method only. Water curing shall be applied progressively immediately following the surface finishing operation as specified herein.

1006-6.02 Curing Precast Concrete

(A) General Requirements. The contractor may cure precast concrete in conformance with the requirements specified above for curing cast in place concrete or, if it elects, the curing of precast concrete may be performed by external heating. This may be accomplished by the use of low-pressure steam or radiant heat with moisture.

If curing of the concrete is accomplished by low-pressure steam or radiant heat with moisture, curing will be considered completed after termination of steam or radiant heat curing. Rapid temperature changes in the concrete shall be avoided during the cooling period.

If curing of the concrete is accomplished by the water curing method, the liquid-membrane forming compound method, or the forms in place method, such curing shall be continued for a period of at least seven days after placement of the concrete. The curing time may be reduced to a minimum of three days when a Type III Portland cement has been used.

(B) Low-Pressure Steam Curing. After placement of the concrete, precast items shall be held for a minimum two-hour presteaming period. If the ambient air temperature is below 50°F, steam shall be applied during the presteaming period to hold the air surrounding the precast item at a temperature between 50°F and 90°F.

To prevent moisture loss on exposed surfaces during the presteaming period, precast items shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.

Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner to prevent the loss of steam and moisture.

Steam at the jets shall be low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders or forms. During application of the steam, the ambient air temperature rise within the enclosure shall not exceed 40°F per hour. The average curing temperature throughout the enclosure shall not exceed 160°F and shall be maintained at a constant level for a sufficient length of time so as to ensure the development of the required compressive strength by the age of 28 days in concrete items which are not to be prestressed. For items which are to be prestressed, the constant temperature shall be maintained for sufficient time necessary to develop the concrete compressive strength required for prestressing. The ambient curing temperature shall not exceed 175°F at any point. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

Temperature recording devices that will provide an accurate continuous permanent record of the ambient curing temperature shall be provided. A minimum of two temperature recording

devices or one for every 200 feet of continuous bed length will be required for checking temperature.

In the event, the side forms are removed before the precast unit has obtained the required release compressive strength. The curing method shall be continuous in maintaining the temperature and moisture level as described above, within the enclosure, as nearly as practical. There shall not be a delay in re-covering the girder or pre-stress member.

(C) Radiant Heat With Moisture. Radiant heat shall be applied by means of pipes circulating steam, hot oil or hot water, or by heating elements or electric blankets on the forms. Pipes, blankets or elements shall not be in contact with the concrete surfaces.

Moisture shall be applied in such a manner as to keep the top surface of the precast unit continuously moist during the curing period by fogging or spraying. Moisture shall be maintained by a cover of burlap or cotton matting and further covered by a waterproof tarpaulin with an insulating cover.

Temperature limits and the use of recording thermometers shall be the same as curing with low-pressure steam. Application of the heat cycle may be accelerated to meet climatic conditions upon the approval of the Engineer. A temperature sensing device shall be placed two inches, $\pm 1/2$ inch, from the heated form.

1006-7 ACCEPTANCE SAMPLING AND TESTING

1006-7.01 General. A delivery ticket, meeting the requirements of Subsection 1006- 4.01, shall be provided for each load of concrete delivered to the project. An authorized representative of the contractor shall be responsible for receiving and signing each delivery ticket at the site of concrete placement, thus accepting and acknowledging the contractor's responsibility for the concrete as meeting the specifications noted herein, prior to the concrete being placed. After signing, the representative shall immediately furnish the delivery ticket to the Engineer.

Rejection of concrete will occur due to improper temperature, slump, and/or air content for the concrete mixture delivered to the site. The Engineer at his discretion may allow the failed concrete mixture, already placed, to remain in place subject to acceptance by compressive strength or may require its removal.

Rejection of concrete will also occur due to insufficient compressive strength. Concrete compressive strength requirements consist of the specified strength which the concrete shall attain before various loads or stresses are applied and a minimum strength at 28 days.

Acceptance and penalties for placed concrete which meets the above mixture requirements or is allowed to remain in place shall be determined by the results of the 28 day compressive strength. Sampling and testing for compressive strength will be performed on all classes of concrete furnished, including each strength specified on the project plans for Class S concrete.

1006-7.02 Sampling and Testing of Concrete. A sample of concrete for determination of temperature, slump, and air content as well as for fabrication of test cylinders for compressive strength determination at 28 days will be taken at random at the sampling frequency specified herein for each type of concrete.

Samples of concrete shall be of sufficient size to perform all the required tests and fabricate the necessary test cylinders. The samples shall be taken in conformance with the requirements

of AASHTO T 141, except that concrete for Class S or B shall be sampled only once during discharge in the middle portion of the batch.

At the discretion of the Engineer, a sample may be obtained at the beginning of the discharge or uniformity testing, in conformance with Subsection 1006-4.03(A) may be conducted if, in the Engineer's opinion, the properties of the concrete do not appear to be within the specification limits for slump or temperature.

If concrete is pumped to facilitate placement, at the discretion of the Engineer, samples may be taken from the truck and pump hose discharge to determine that the compressive strength specifications are met in the structure, and to correlate temperature, slump and air content results. If the correlation is satisfactory and meets with the approval of the Engineer, sampling may continue from the most convenient location with occasional re-testing for correlation. Rejection of concrete due to improper temperature or slump may occur at either the truck or pump hose discharge; however, rejection of concrete due to improper air content will only occur due to a failing test for a sample obtained at the final point of discharge.

Temperature of the concrete mixture will be determined in conformance with ASTM C1064. Slump of the concrete mixture will be determined in conformance with AASHTO T 119. Air content of the concrete mixture will be determined in conformance with AASHTO T 152. All compressive strength test cylinders will be fabricated, cured, handled protected and transported in conformance with the requirements of AASHTO T 23. Testing for compressive strength of cylinders shall be in conformance with the requirements of Arizona Test Method 314.

For Class S concrete with a compressive strength requirement less than 4000 psi, or Class B concrete, a strength test will consist of the average strength of two test cylinders. However, if the compressive strengths of the two test cylinders differ by more than 10 percent from the average of the two, the strength test result shall be the cylinder with the highest compressive strength.

For Class S concrete with a compressive strength requirement equal to or greater than 4000 psi, the compressive strength of each sample shall be determined by averaging the results of the three test cylinders fabricated as specified in Subsection 1006-7.03. However, if the compressive strength of any one of the three test cylinders differs by more than 10 percent from the average of the three, its result shall be discarded and the compressive strength shall be the average of the remaining two cylinders. Should the individual compressive strength of any two of the three test cylinders differ by more than 10 percent from the average of the three, the results of both will be discarded and the compressive strength shall be the strength of the remaining cylinder.

1006-7.03 Sampling Frequency for Cast in Place Concrete. For Class S concrete with a compressive strength requirement less than 4000 psi, or Class B concrete, a sample of concrete for the required tests, as specified in Subsection 1006-7.02, will be taken for each 100 cubic yards, or fraction thereof, of continuously placed concrete from each batch plant or source.

For Class S concrete with a compressive strength requirement equal to or greater than 4000 psi, a sample of concrete for the required tests, as specified in Subsection 1006-7.02, will be taken on a daily basis for each 50 cubic yards, or fraction thereof, of continuously placed concrete from each batch plant.

For Class S or Class B concrete placed at elevations of 3,000 feet or above, air content testing shall be performed for each 50 cubic yards placed, regardless of the compressive strength requirement.

An additional sample or samples for any of the required tests may be taken at an interval of less than the sampling frequency specified above, at the discretion of the Engineer, on any batch or load of concrete.

No sample will be required for daily placements of 20 cubic yards or less unless directed by the Engineer.

The Engineer will determine the quality of concrete represented by each sample of concrete for any test performed.

1006-7.04 Sampling and Testing for Precast Concrete. A sample for a strength test will be taken at random for either each precast concrete member or for each day's production at the discretion of the Engineer, when the method of measurement is by the unit.

When a sample for a strength test is taken to represent a single day's production and not for each precast member, the degree of acceptance for all precast concrete members in that day's production will be established by the results of such test.

Samples of concrete for test specimens will be taken in conformance with requirements of AASHTO T 141. All test cylinders will be fabricated in conformance with the requirements of AASHTO T 23. Testing for compressive strength will be in conformance with the requirements of AASHTO T 22.

A strength test will consist of the average strength of two cylinders or 95 percent of the higher strength cylinder, whichever is greater.

1006-7.05 Sampling and Testing for Precast Minor Concrete Structures. Sampling and testing will be performed in conformance with the requirements of Subsection 1006-7.03 or the following:

A strength test on each precast unit produced will consist of the average rebound number as determined from readings taken on the precast unit with a rebound hammer. The average rebound number will be determined in conformance with the requirements of ASTM C805.

The compressive strength of the concrete will be determined from the average rebound number and the calibration chart established for the specific rebound hammer being used. The calibration chart will be established from rebound readings taken on concrete test cylinders fabricated at the precast plant and the actual compressive strength of the cylinders. The test cylinders will be fabricated in conformance with the requirements of AASHTO T 23. The compressive strength of the test cylinders will be determined in conformance with the requirements of Arizona Test Method 314.

1006-7.06 Acceptance for Compressive Strength. Class S and Class B cast in place and precast concrete will be accepted as meeting the specified 28-day compressive strength when represented by a compressive strength test conforming to the requirements of Subsection 110-3.01, subject to the unit price reduction factors for strength deficiencies found in Table 110-4.

All concrete failing to meet the above requirement will be rejected, in conformance with the provisions found in Subsection 106-11, unless the contractor, at no additional cost to the Agency, submits evidence that will indicate to the Engineer that the strength and quality of the concrete is such that the concrete should be considered for acceptance.

Upon written approval from the Engineer, the contractor may be permitted to obtain cores from the area represented by the deficient strength samples. If the contractor submitted evidence consists of concrete cores, the contractor shall obtain the three cores from the concrete represented by the failing strength test and deliver them to the Engineer in time to allow complete testing of such cores within 42 days after the placement of the concrete.

All cores shall be obtained and tested in conformance with the requirements of AASHTO T 24. All cores will be tested in the wet condition. The concrete represented by the cores will be considered acceptable to remain in place if the numerical average of the compressive strength of the three cores achieves at least the minimum acceptable compressive strength specified in Table 110-4. Concrete cores achieving at least the minimum acceptable compressive strength specified in Table 110-4 shall be subject to a unit price reduction specified by this table.

If the average compressive strength does not achieve the minimum acceptable compressive strength specified in Table 110-4, all concrete so represented shall be removed at no additional cost to the Agency.

If concrete is permitted to remain in place when the average compressive strength of three cores tested, at 42 days fails, to meet the minimum acceptable compressive strength specified in Table 110-4, it shall be paid for at 55 percent of the contract unit price.

1006-8 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The method of measurement and basis of payment will be in conformance with the provisions specified in the various Sections of these specifications that deal with concrete construction.

1007RETRO, 5/25/11

SECTION 1007 - RETROREFLECTIVE SHEETING of the Standard Specifications is revised to read:

1007-1 GENERAL REQUIREMENTS

Retroreflective sheeting shall consist of a retroreflective system having a smooth outer surface. The sheeting shall have a pre-coated adhesive on the back side protected by an easily removable liner, except for self-supporting products having a Class V backing, such as roll-up signs and some types of traffic cone collars. Sheeting shall conform to criteria listed in the most current version of ASTM D 4956 for the applicable type and class, unless otherwise specified.

Only those retroreflective sheeting, inks, and film products that are currently shown in the Arizona Department of Transportation's (ADOT's) Approved Products List (APL) shall be used. Copies of the APL are available on the internet from the Arizona Transportation Research Center (ATRC), through its PRIDE program.

A Certificate of Compliance, conforming to the requirements of Subsection 106-5, shall be submitted. The Certificate of Compliance shall identify the retroreflective sheeting type, backing class, make of sheeting, inks, and film intended for use in all manufactured devices, including signs, channeling devices, mileposts, object markers, guard rail markers, delineators and reference markers. The Engineer may accept all materials based on the certification or may require the contractor to furnish additional

information or laboratory test results. Additionally, the Engineer may perform measurements on materials to determine their compliance with these specifications. Signs and other devices that have sheeting, inks or films that do not meet these requirements shall be rejected and shall be replaced at no additional cost to the Agency.

1007-2 MATERIAL TYPES

Sheeting material types for warning signs, regulatory signs, and guide sign backgrounds shall be ASTM Type IX or XI sheeting.

In addition, all warning signs with yellow backgrounds shall use fluorescent retroreflective yellow sheeting.

For barricades, channelizers and other work zone devices, ASTM sheeting Types IV, VIII, IX, or XI shall be used.

ASTM sheeting Types IX or XI shall be used for route marker signs and auxiliaries (stand alone), and for milestone markers.

Sheeting for rigid orange work zone signs (fluorescent) shall be ASTM Types VIII, IX, or XI. Roll-up orange work zone signs shall use ASTM Type VI sheeting.

All work zone signs with orange backgrounds shall use fluorescent retroreflective orange sheeting, except that non-reflective sign materials may be used for temporary work zone signs where the signs will be clearly visible under available natural light.

For direct-applied characters, demountable characters and shields on guide signs, ASTM sheeting Types IX or XI shall be used.

ASTM sheeting Types IX or XI shall be used for object markers, guardrail markers, and delineators. Object markers for guardrail end treatments, and impact attenuators (fluorescent) shall use ASTM Types IX or XI.

Sheeting for Adopt-A-Highway signs and logo signs shall be ASTM sheeting Type I.

When more than one sheeting type is allowed, the contractor may use any of the types listed, provided that materials used for a particular application shall be of the same ASTM type, manufacturer, and product for all signs of the same type in the project.

Opaque films used with sheeting shall be acrylic type films.

Direct-applied and demountable black characters shall be non-reflective.

1007-3 VISUAL APPEARANCE, LUMINANCE AND COLOR REQUIREMENTS

Except as specified herein, the color of the sheeting, ink or film shall conform to the Agency's Signing Manual of Approved Signs, the Manual on Uniform Traffic Control Devices (MUTCD), and the plans.

All sheeting, inks and film used shall be uniformly colored so there is no visual variation in their appearance on the same sign or from sign to sign of the same colors.

Standard colors specified for sheeting, processing inks, and films shall, as applicable, match visually and be within the color tolerance limits required by Highway Tolerance Charts issued by the Federal Highway Administration. Additionally, for the retroreflective sheeting, unless otherwise noted, the Luminance Factor (Daytime Luminance) and Color Specification Limits (Daytime) shall conform to the applicable requirements of ASTM D 4956.

In addition to the luminance and color requirements, fluorescent orange sheeting and fluorescent yellow sheeting shall have the capacity to effectively fluoresce outdoors under low light conditions. For all applications requiring fluorescent orange sheeting or fluorescent yellow sheeting, the contractor shall provide a letter to the Engineer from the manufacturer certifying that the sheeting to be used is fluorescent.

1007-4 COEFFICIENT OF RETROREFLECTION

The coefficient of retroreflection shall meet the minimum requirements of ASTM D 4956 for the type of retroreflective sheeting specified.

All black opaque films shall have a maximum coefficient of retroreflection of 1.0 or less at an observation angle of 0.2 degrees and entrance angle of -4.0 degrees.

1007-5 COLOR PROCESSING

Transparent and opaque inks used for post or pre-screen printing of signs shall be of a type and quality specified by the sheeting manufacturer, and shall conform to the applicable requirements of the MUTCD and the Federal Highway Administration for traffic signs. The inks shall be applied in a manner, and with equipment, that is consistent with the ink manufacturer's recommendations. Additionally, the signs produced shall have a uniform legend of consistent stroke width and sharply defined edges, without blemishes that would negatively impact appearance, color or required retroreflectivity.

For sheeting applications using black ink, the maximum coefficient of retroreflection shall be 1.0 or less at an observation angle of 0.2 degrees and entrance angle of -4.0 degrees.

1007-6 Adhesive:

Reflective sheeting and film adhesives shall be Class I as specified in ASTM D 4956 and as modified herein.

Pressure sensitive adhesive shall be an aggressive tack type that requires no heat, solvent or other pre-application preparation of the sheeting or film for its adhesion to clean aluminum, plywood, or reflective sheeting surfaces. Pretreatment of plastic surfaces shall be done as recommended by the sheeting manufacturer.

The adhesive shall form a tight weatherproof durable bond that shall endure under all weather conditions

for the required time of durability for that material. During this period the material shall remain bonded to its surface without discoloration, cracking, crazing, peeling, blistering, dimensional change or alignment change.

1007-7 WEATHER TESTING

For the evaluation of sign sheeting products the Agency has adopted a desert environment, 45 degree, south-facing outdoor acceleration test method. Sheeting will be tested for the time periods specified in Subsection 1007-8. The Agency's test method will be considered to produce a two to one time-acceleration ratio for equivalent vertical exposure.

1007-8 DURABILITY REQUIREMENTS

Type IX and XI sheeting shall be weather-tested, as specified above, for a period of 60 months. Fluorescent orange colored sheeting used for construction zone signing, barricades, and channeling devices shall be weather-tested for a period of 18 months. All other sheeting shall be weather-tested for a period of 30 months. In all cases the related inks and films shall be tested along with the respective sheeting, and shall be subject to the same durability requirements as the sheeting.

Type IX and XI sheeting, related inks and films shall have a minimum ten year durability rating. All fluorescent orange sign sheeting shall have a minimum durability rating of three years. All other sheeting, films, and inks shall have a minimum durability rating of five years.

Type IV, VIII, IX, X, and XI sheeting, related inks and films shall have a minimum ten year durability rating. All orange sign sheeting shall have a minimum durability rating of three years. All other sheeting, films, and inks shall have a minimum durability rating of five years.

After weather testing for the periods specified above, sheeting and related inks and films shall show no significant degradation or reduced performance. Unacceptable degrees of degradation and reduced performance are as listed below:

- (1) Bubbles, wrinkles, cracks or breaks on any portion of the applied materials greater than three inches in length that result in a negative appearance or concerns of additional degradation.
- (2) Significant shrinkage that causes the material to curl or to pull away from the background.
- (3) Significant delaminating of any material or layer (sheeting to substrate, sheeting to sheeting, sheeting to film, ink to sheeting, film to sheeting, or film to film).
- (4) Significant visible discoloration, including clouding or chalking.
- (5) A loss of transparency of any transparent sheeting, ink or film.
- (6) A loss in opaqueness of any opaque ink or film.
- (7) Significant cracking, blistering, ripping, flaking, curling or chipping of any sheeting, ink or film.

(8) A loss of nighttime retroreflectivity as observed at night under normal conditions, or as defined and measured with a portable retroreflectometer at an observation angle of 0.2 degrees and entrance angle of -4.0 degrees. The measured coefficient of retroreflection shall be consistent with what would be expected of the type of material being measured, normal manufacturing variations, the time that the material has been in the field, and FHWA requirements.

Those sheeting products which have been evaluated for the time periods specified above using the Arizona Department of Transportation’s (ADOT’s) testing and evaluation program, and that have been shown to meet the durability requirements listed herein, are included on the Approved Products List (APL). Copies of the APL are available on the internet from the Arizona Transportation Research Center (ATRC), through its PRIDE program.

Manufacturer's guarantees or warranties on all traffic sign material shall be transferred to the Agency upon completion and acceptance of the project in accordance with the requirements of Subsection 106-13.

1007-9 APPLICATION

The sheeting, inks, clear coats (if required), and films shall be applied as specified by the manufacturer. The applied sheeting or film shall not have bubbles, wrinkles or foreign materials beneath the reflective sheeting, ink or film.

SECTION 1013 - BEARING PADS:

TABLE 1013-2: FABRICATION TOLERANCES: Item "7. Thickness" of the Standard Specifications is revised to read:

Table		1013-2	
FABRICATION TOLERANCES			
Parameters		Tolerances	
		(-)	(+)
7.	Thickness Top and Bottom Cover Layer (if required)	0	1/8 inch

(1013BEARING_PADS, 7/21/11)

SECTION 1013 - BEARING PADS

1013-2 ELASTOMERIC BEARING PADS

1013-2.01 General the fourth paragraph of the Standard Specifications is revised to read:

Elastomeric bearing pads shall be reinforced with steel laminates.

1013-2.01 General the fifth paragraph of the Standard Specifications is revised to read:

Bearings shall be furnished with the dimensions, material properties and elastomer grade required by the plans. Bearings which have thicknesses greater than 1/2 inch shall be reinforced with steel laminates. The design method (A or B) and the design load shall be shown on the plans and testing shall be performed accordingly. In the absence of more specific information, bearings shall be Grade 3, shall have an elastomer shear modulus of 130 psi, 55 durometer hardness, and shall be subjected to the load testing requirements corresponding to Method A design.

1013-2.03 Plain and Fabric Reinforced Elastomeric Bearing Pads of the Standard Specifications is deleted in its entirety.

1013-2.04 Steel Reinforced Elastomeric Bearing Pads the first paragraph of the Standard Specifications is deleted in its entirety.

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C

APPENDIX A

STORMWATER POLLUTION PREVENTION PLAN BOOKLET

(PROVIDED ON CD)

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
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APPENDIX B

CATEGORICAL EXCLUSION ENVIRONMENTAL CLEARANCE

(MITIGATION MEASURES AND APPROVAL LETTER)



Arizona Department of Transportation
Environmental Planning
ADOT Environmental Clearance

Date:	
2/25/16	
From:	
Sarah Karasz, Senior Environmental Planner, PAG Region	
To:	
RON MCCALLY, Project Management Group LEE MAKLER, Project Resource Office ERIC BOYLES, Local Public Agency Section SANDI GARRICK, Pima County	RON VAN OMMEREN, EcoPlan
Project Identification:	
Project Name: Rillito Riverpath and Camino de la Tierra Bicycle and Pedestrian Enhancements ADOT Project Number: 0000 PM PPM SL701 01C Federal-Aid Number: TEA-PPM-0(228)D STIP/TIP ID Number: 81.10, PAG, FY 2016-2020	Categorical Exclusion Approved : 2-26-16 2A - ADOT Approved c-list (Programmatic) <input checked="" type="checkbox"/> 2B - ADOT Approved d-list (State Documented) <input type="checkbox"/> 2C - FHWA Approved (FHWA Documented) <input type="checkbox"/>
Project Construction Administration:	
ADOT Project <input type="checkbox"/> LPA Project - ADOT Administered (AA) <input type="checkbox"/> LPA Project - Certification Acceptance (CA) <input checked="" type="checkbox"/>	

- No Environmental Commitments
- Environmental Commitments (attached as applicable.)

Environmental Planning

0000 PM PPM SL701 01C

TEA-PPM-0(228)D

Rillito Riverpath and Camino de la Tierra Bicycle and Pedestrian Enhancements

ENVIRONMENTAL COMMITMENTS

The following sentence, contractor's mitigation measures, permits and guidelines (as applicable) shall be included in the project special provisions:

- I. "The project mitigation measures are not subject to change without written approval from the Environmental Planning."
- II. Project Mitigation Measures

Pima County Responsibilities

- The Pima County project manager will contact the Arizona Department of Transportation Environmental Planning Group (602.712.7767 or 520-388-4250) 30 (thirty) days prior to bid advertisement to verify that the environmental clearance is still valid.
- Pima County project manager will contact the Arizona Department of Transportation Environmental Planning Group hazardous materials coordinator (602.920.3882 or 602.712.7767) 30 (thirty) days prior to bid advertisement to determine the need for additional site assessment.
- If previously unidentified cultural resources are encountered during activity related to the construction of the project, the contractor shall stop work immediately at that location notify the Engineer and shall take all reasonable steps to secure the preservation of those resources. The Engineer will contact the Arizona Department of Transportation Environmental Planning Group, Historic Preservation Team, 602.712.8636 or 602.712.7767) immediately, and make arrangements for proper treatment of those resources.
- If active bird nests are identified within the project limits, construction activities will avoid disturbing any active nest. Avoidance areas, if necessary, will be marked in the field with temporary fencing or T-posts with flagging by the approved biologist. The Engineer will confer with the approved biologist to determine the appropriate avoidance strategy until nestlings have fledged from the nest and the nest is no longer active.
- If any active bird nest cannot be avoided by vegetation clearing or construction activities, the Engineer will contact Pima County Environmental Quality (520.724.9201) to evaluate the situation.
- All disturbed soils not paved that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity.
- Pima County will provide a construction notice to Rillito Riverpath commuters in the general project area at least 2 (two) weeks prior to construction.

Contractor Responsibilities

- If suspected hazardous materials are encountered during construction, work shall cease at that location and the Engineer will be notified immediately to make arrangements for proper treatment or disposal of those materials.
- If previously unidentified cultural resources are encountered during activity related to the construction of the project, the contractor shall stop work immediately at that location notify the Engineer and shall take all reasonable steps to secure the preservation of those resources. The Engineer will contact the Arizona Department of Transportation Environmental Planning Group, Historic Preservation Team, (602.712.8636 or 602.712.7767) and the Pima County Historic Preservation Division (724-6405) immediately, and make arrangements for proper treatment of those resources.
- In the event that human remains, including human skeletal remains, cremations, and/or ceremonial objects and funerary objects or archaeological materials are found during excavation or construction, ground disturbing activities must cease in the immediate vicinity of the discovery. State laws ARS 41-865 and ARS 41-844, require that the Arizona State Museum be notified of the discovery at (520) 621-4795 so that cultural groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains. The human remains will be removed from the site by a professional archaeologist pending consultation and review by the Arizona State Museum and the concerned cultural groups.
- If clearing, grubbing, or tree/limb removal will occur between February 15 and August 31, the contractor shall employ a qualified biologist to conduct a migratory bird nest search of all vegetation within 10 (ten) days prior to removal. Vegetation may be removed if it has been surveyed and no active bird nests are present. If active nests cannot be avoided, the contractor shall notify the Engineer to evaluate the situation. During the nonbreeding season (September 1–February 14), vegetation removal is not subject to this restriction.
- If active bird nests are found during the survey, the contractor will arrange for a licensed wildlife rehabilitator to relocate any eggs or nestlings from active nests or buffer any active nest with protective fencing within 3 (three) to 5 (five) calendar days of construction to comply with provisions of the Migratory Bird Treaty Act.
- If active bird nests are found during the survey, the contractor shall not commence with any vegetation removal or pruning until Pima County has confirmed that all eggs or nestlings have been relocated from the work area by a licensed wildlife rehabilitator and that contractor is cleared to proceed.
- To prevent the introduction of invasive species seeds, the contractor shall inspect all earthmoving and hauling equipment at the equipment storage facility and the equipment shall be washed prior to entering the construction site.
- To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.

Contractor Responsibilities (cont.)

- All disturbed soils not paved that will not be landscaped or otherwise permanently stabilized by construction shall be seeded using species native to the project vicinity.
- The contractor shall notify its employees prior to any disturbance where lead is present in the paint below the 0.5 percent US Department of Housing and Urban Development/US Environmental Protection Agency action levels but above the US Department of Labor Occupational Safety and Health Administration detection level. As part of the notification, the contractor shall make the US Department of Labor Occupational Safety and Health Administration publication number 3142-12R 2004 Lead in Construction (<http://www.osha.gov/Publications/osha3142.pdf>) available to workers.
- If suspected hazardous materials are encountered during construction, work shall cease at that location and the Engineer shall be notified immediately to make arrangements for the proper treatment or disposal of those materials.

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C

APPENDIX C

PIMA COUNTY NOISE ORDINANCE

Chapter 9.30 – Regulation of Excessive, Unnecessary and Annoying Noises

9.30.010 Applicability.

This chapter shall not apply to any incorporated city, town or Indian reservation. It shall apply only within the unincorporated areas of the county.

9.30.020 Purpose.

It is hereby declared to be the policy of Pima County to prohibit excessive, unnecessary and annoying noises from all sources. At and above certain level, noises are detrimental to the health and welfare of the citizens of the county, and it is in the best interest of the citizens of Pima County that such noises be systematically eliminated. (Ord. 1999-61 § 1 (part), 1999)

9.30.030 Definitions.

The following definitions shall apply throughout this chapter unless a different meaning is clearly indicated by the context:

- A. Commercial property means any property occupied by business which sell, rent, trade or store goods, or which provide a service.
- B. Industrial property means any property occupied by land uses whose primary operation involves manufacturing, assembling, processing or otherwise treating raw materials, semi-finished products, or finished products for packaging and distribution to either wholesale or retail markets.
- C. Property line means the line which represents the legal limits of property (including an apartment, condominium, room or other dwelling unit) owned, leased or otherwise occupied by a person, business, corporation or institution. In cases involving sound from an activity on a public street or other public right-of-way, the property line shall be the nearest boundary of the public right-of-way.
- D. Residential property means any property, the dominant use of which is nontransient occupancy of residential dwelling units.
- E. Motor vehicle means any self-propelled vehicle operated within the county, including but not limited to licensed or unlicensed vehicles, automobiles, minibikes, go-carts, all terrain vehicles, and motorcycles.
- F. Emergency work means any work performed to prevent or alleviate physical trauma or property damage threatened or caused by an emergency which has or may result in a disruption of service and which is necessary to protect the health, safety and welfare of persons or property.

- G. Emergency vehicle means vehicles of the fire, police and public service departments and legally authorized ambulances and emergency vehicles of state departments or any political subdivisions thereof and vehicles of public service corporations.
- H. Person means a human being and, as the context requires, an enterprise, a public or private corporation, an unincorporated association, a partnership, a firm, a society, a government, a governmental authority or an individual or entity capable of holding a legal or beneficial interest in property.(Ord. 2001-127 § 1 (part), 2001; Ord. 1999-61 § 1 (part), 1999)

9.30.040 Impermissible sound levels.

In addition to the prohibited noises described in 9.30.050, 9.30.060 and 9.30.070, it shall be unlawful for any person to make or continue, or cause or permit to be made or continued, any excessive, unnecessary or offensive noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitivity residing in the area. (Ord. 2001-127 § 1 (part), 2001; Ord. 1999-61 § 1 (part), 1999)

9.30.050 Loud radios, sound sets, etc.

- A. It shall be unlawful for any person, including the owner or manager of a restaurant, bar, inn, or resort of any kind, to operate or permit to be operated any radio receiving set, phonograph, musical instrument, or sound producing or sound reproducing mechanism, at any time in such a manner as to permit the same to be heard at a distance of more than one hundred twenty-five (125) feet from the property line or motor vehicle where such radio receiving set, phonograph, or sound producing or sound reproducing mechanism is located, when the sound of such radio receiving set, phonograph, musical instrument, or sound producing or sound reproducing mechanism is operated in such a manner as to create an excessive, unnecessary or offensive noise that a reasonable person of normal sensitivity residing in the area is caused discomfort or annoyance.
- B. It shall be unlawful for any person, including the owner or manager of a restaurant, bar, inn, or resort of any kind, to operate or permit to be operated any radio receiving set, phonograph, musical instrument, or sound producing or sound reproducing mechanism, between the hours of 10:00 P.M. and 7:00 A.M. in such a manner that the sound from such radio set, phonograph, musical instrument, sound producing or sound reproducing mechanism may be heard beyond the property line from which it is operated or outside the motor vehicle in which it is operated in such a manner as to create an excessive, unnecessary or offensive noise that a reasonable person of normal sensitivity residing in the area is caused discomfort or annoyance. (Ord. 2001-127 § 1 (part), 2001; Ord. 1999-61 § 1 (part), 1999)

9.30.060 Vehicular noise.

- A. It shall be unlawful for any person within any residential area of this county to repair, rebuild or test any motor vehicle between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner as to create an excessive, unnecessary or offensive noise that a reasonable person of normal sensitivity residing in the area is caused discomfort or annoyance.
- B. No person shall operate or cause to operate any motor vehicle unless the exhaust system of such vehicle:
 - 1. Is free from defects which may cause sound level magnification,
 - 2. Is equipped with a muffler,
 - 3. Has not been modified in such a manner which will amplify or increase the sound level emitted by the motor of such vehicle above that emitted by a muffler originally installed on the vehicle as manufactured for initial sale.
- C. No person shall operate a motor vehicle in such a manner which creates the squealing of tires in the roadway. (Ord. 1999-61 § 1 (part), 1999)

9.30.070 Construction of buildings and other projects.

- A. Noise limitations: Subject to the provisions of section 9.30.040, it shall be unlawful for any person to operate equipment or perform any outside construction or repair work on buildings, structures or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist or any other construction type device except within the time periods specified below unless an appropriate permit has been obtained beforehand from the county.
- B. Construction start/stop times:
 - 1. Concrete work: From April fifteenth to October fifteenth, inclusive, concrete may be poured each day between the hours of 5:00 a.m. and 7:00 p.m. or at such other times as authorized by permit. From October sixteenth to April Fourteenth, inclusive, concrete may be poured each day between the hours of 6:00 a.m. to 7:00 p.m. or at such times as authorized by permit.
 - 2. Other type construction (residential zones): From April fifteenth to October fifteenth, inclusive, all other construction or repair work shall not begin prior to 6:00 a.m. and must stop by 7:00 p.m. each day in, or within five hundred (500) feet of, a residential zone or at such other times as authorized by permit. From October sixteenth to April fourteenth, inclusive, all other construction or repair work shall not begin prior to 7:00 a.m. and must be stopped by 7:00 p.m. each day in, or within five hundred (500) feet of, a residential property or at such other times as authorized by permit.

3. Other type construction (commercial and industrial zones): Construction and repair work in commercial and industrial zones, not within five hundred (500) feet of a residential property, shall not begin prior to 5:00 a.m. and must stop by 7:00 p.m. or at such other times as authorized by permit.
 4. Weekends and holidays excluded: Notwithstanding anything to the contrary herein, construction or repair work shall not begin prior to 7:00 a.m. and must stop by 7:00 p.m., and concrete pouring should not begin prior to 6:00 a.m. and must stop by 7:00 p.m. on any Saturday, Sunday or state or federal holiday, unless such other times are authorized by permit.
- C. Permits: Construction and repair work may be conducted at different times and at higher noise levels than otherwise permitted, if upon written application, a permit is obtained beforehand from the county administrator or his designee. The permit shall be kept on the work site and shown to county officials on request. In granting such permit, the county administrator or his designee shall consider if construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population levels or different neighboring activities; if obstruction and interference with traffic, particularly on streets of major importance, would be less objectionable at night than during the daytime; if the kind of work to be performed emits noises at such a low level as to not cause significant disturbance in the vicinity of the work site; if the neighborhood of the proposed work site is of such a character wherein sleep could be disturbed; if great economic hardship would occur if the work was spread over a longer time; if the work will abate or prevent hazards to life or property; if proposed early morning or night work is in the general public interest; and, he shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise emissions as he deems to be required in the public interest. No permit shall be required to perform emergency work as defined in section 9.30.030.
- D. Revocation of permits: The county administrator or his designee may revoke any permit granted hereunder upon complaint based upon substantial evidence that the construction activity caused significant disturbance in the vicinity of the work site. (Ord. 1999-61 § 1 (part), 1999)

9.30.080 Exemptions.

The following uses and activities shall be exempt from the provisions contained in this article:

- A. Heating and cooling equipment when it is functioning in accordance with manufacturer's specifications and is in proper operating condition provided that no unit may create an excessive, unnecessary or offensive noise causing annoyance or discomfort to a reasonable person of normal sensitivity within any sleeping or living area inside any dwelling unit;

- B. Landscape maintenance equipment when it is functioning in accordance with the manufacturer's specifications and with all mufflers and noise-reducing equipment in use and in proper operating condition;
- C. Nonamplified crowd noises resulting from activities such as those planned by school, governmental or community groups, or organized sports except for such noises generated at restaurants, bars, inns, or resorts of any kind;
- D. Noises of safety signals, warning devices and emergency pressure relief valves;
- E. Noises resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of emergency;
- F. Noises resulting from emergency work as defined in section 9.30.030;
- G. Noises from the normal operation of railroad trains;
- H. Noises from church chimes;
- I. Power plant equipment during normal operation;
- J. Noise created by any county vehicle, equipment or facility while being operated for official use;
- K. Operation of agricultural equipment in connection with farming operations;
- L. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations or air traffic control instructions issued pursuant to or within duly adopted federal air regulations, together with any noise created by aircraft operated under, or pursuant to, declaration of an emergency under federal air regulations. (Ord. 2001-127 § 1 (part), 2001; Ord. 1999-61 § 1 (part), 1999)

9.30.090 Penalty.

A violation of any provision of this article shall be deemed and is declared to be a public nuisance and any person who violates any of the provisions of this article shall be guilty of a class 1 misdemeanor. Each day a violation continues or exists shall be a separate offense subject to punishment as a separate class 1 misdemeanor. (Ord. 1999-61 § 1 (part), 1999)

9.30.100 Severability.

If any provisions of this ordinance, or the application thereof to any person or circumstance, is invalid, that invalidity shall not effect other provisions or applications of this ordinance which can be given effect without the invalid provisions or applications, and to this end the provisions of this ordinance are severable. (Ord. 1999-61 § 1 (part), 1999)

9.30.110 Effective date.

This ordinance will be in full force and effective after thirty days from the date of enactment.
(Ord. 1999-61 § 1 (part), 1999)

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C

APPENDIX D

PIMA COUNTY AND ADOT STANDARD DETAILS

NOTE:

SEE SHEET 2 OF 2 FOR END TREATMENTS

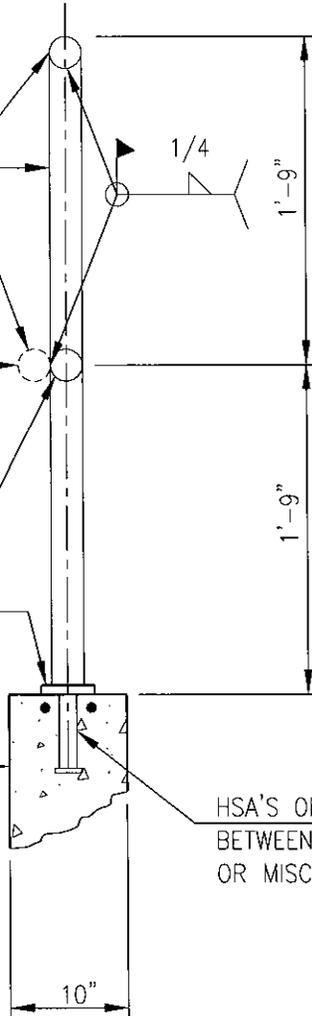
* 1-1/2" NOMINAL STEEL PIPE RAILS W/POST @ 5' O.C.

ALTERNATE LOWER RAIL LOCATION (SEE NOTE #4)

STANDARD LOWER RAIL LOCATION

ANCHOR PLATE SEE SHEET 2 OF 2 FOR OPTIONS

HEADWALL, CONC. WALL, ETC.



ANCHOR PLATE OPTION

*** NOTE:**

SEE SHEET 2 OF 2 FOR END TREATMENTS

* 1-1/2" NOMINAL STEEL PIPE RAILS W/POST @ 5' O.C.

ALTERNATE LOWER RAIL LOCATION (SEE NOTE #4)

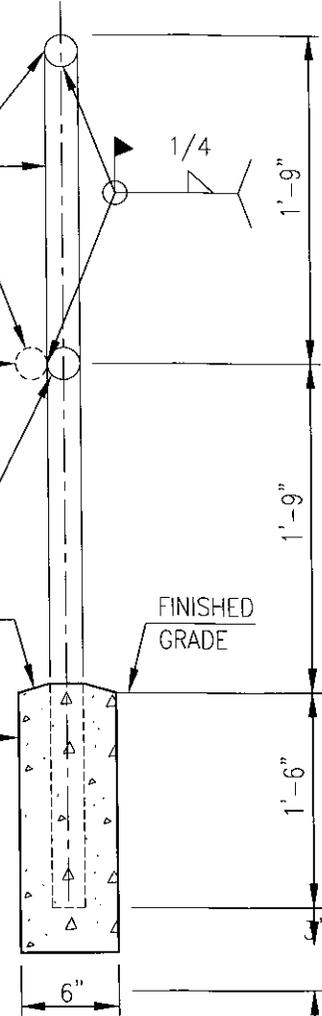
STANDARD LOWER RAIL LOCATION

SLOPE AWAY FROM POST

FINISHED GRADE

UTILITY CONC. PER STD. SPEC. 922

HSA'S OR THREADED RODS TO BE PLACED BETWEEN REINFORCING STEEL OF WINGWALL OR MISC. STRUCTURE.



GROUND INSTALLATION OPTION

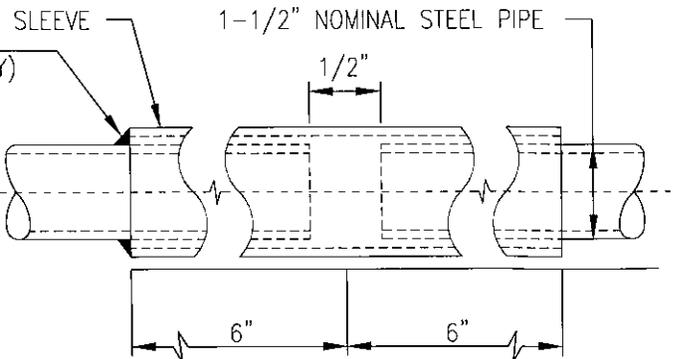
SECTION

- * - 1-1/2" NOMINAL STEEL PIPE = 1-1/2" I.D. STD. STEEL PIPE (SCHEDULE 40).
- 1-1/2" NOMINAL STEEL PIPE = 2" O.D. (SCHEDULE 40).

NOTES:

1. EXPANSION JOINTS FOR UPPER AND LOWER RAILS SHALL OCCUR AT THE SAME LOCATION.
2. EXPANSION JOINTS SHALL BE LOCATED AT A MAXIMUM OF 30 FOOT INTERVALS.
3. WHEN APPROVED BY THE ENGINEER, AN INTERNAL SLEEVE MAY BE USED AT THE EXPANSION JOINTS.
4. ALTERNATE LOWER RAIL LOCATION ON NON-ROADWAY SIDE WHEN APPROVED BY THE JURISDICTION'S TRANSPORTATION ENGINEER.

TACK WELD (ONE END ONLY)

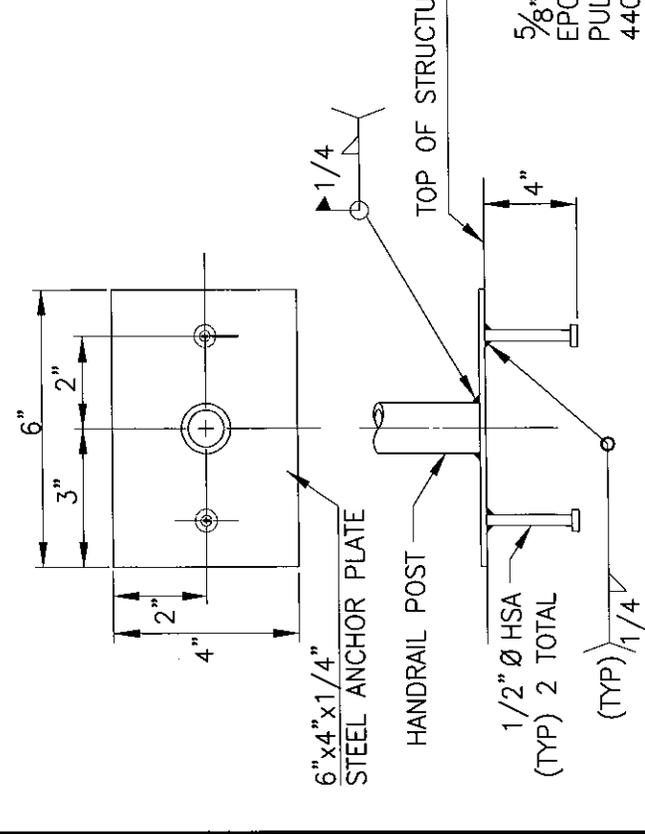
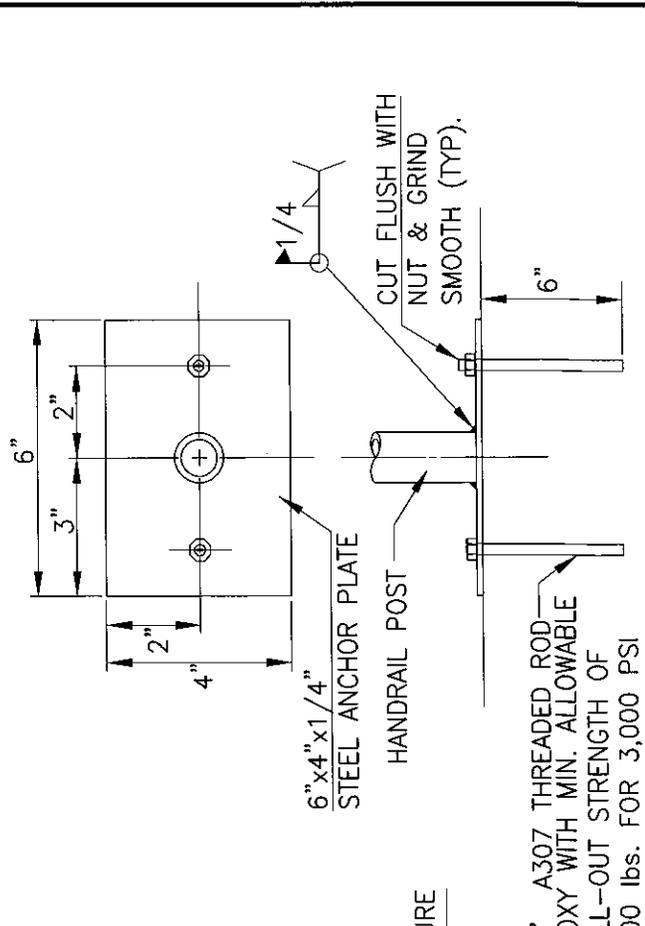
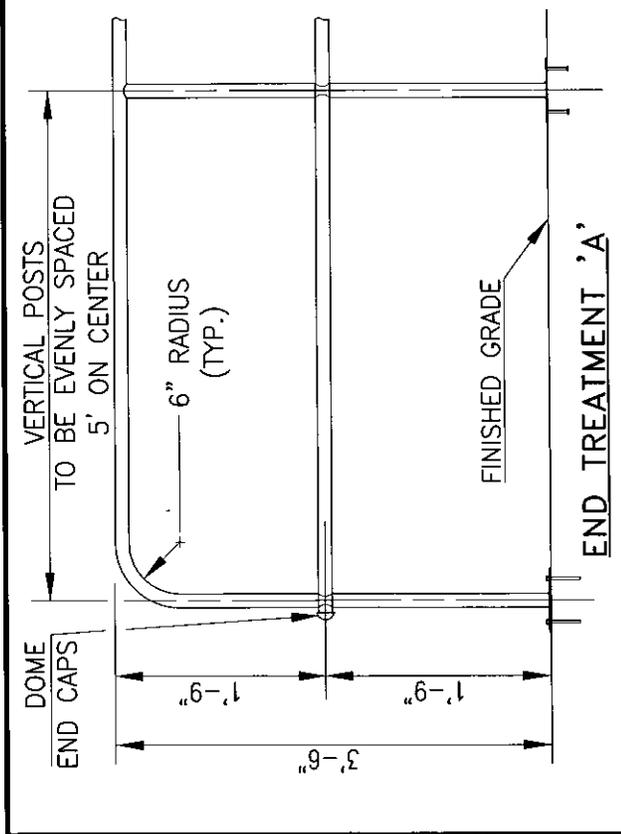
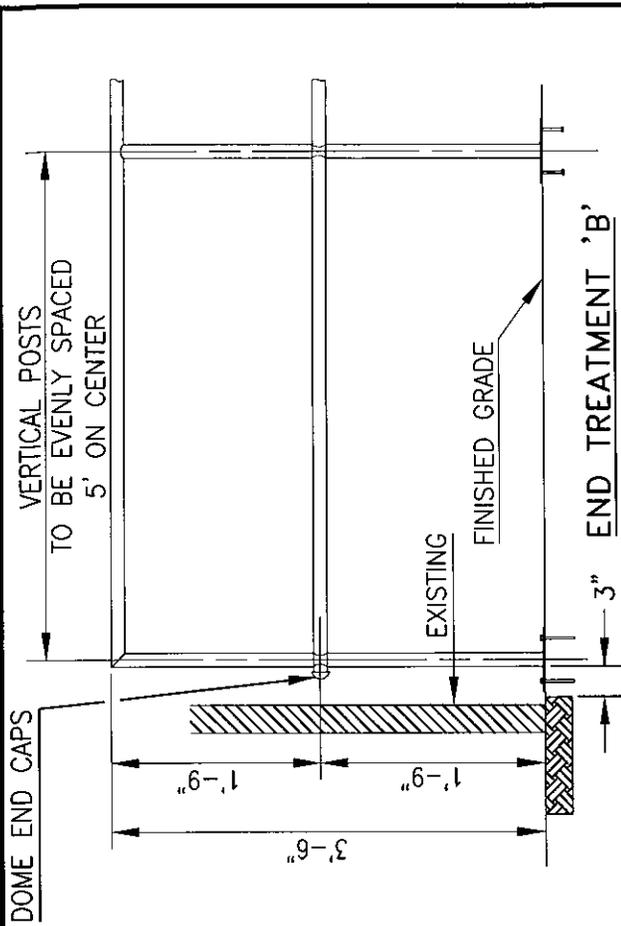


EXPANSION JOINT DETAIL



Pima Association of Governments

DETAIL NO.	STANDARD DETAIL	ISSUED:
105	HANDRAIL	10/88
SHEET 1 of 2		REVISED:
		09/15



5/8" A307 THREADED ROD
EPOXY WITH MIN. ALLOWABLE
PULL-OUT STRENGTH OF
4400 lbs. FOR 3,000 PSI
CONCRETE 2 TOTAL (TYP).

1/2" Ø HSA
(TYP) 2 TOTAL
(TYP) 1/4"

ANCHOR PLATE - OPTION 2

ANCHOR PLATE - OPTION 1



DETAIL NO.
105
SHEET 2 of 2

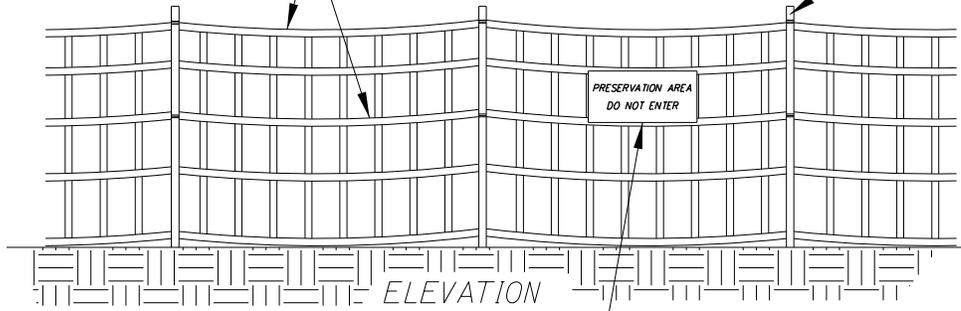
STANDARD DETAIL
HANDRAIL

ISSUED:
6/91
REVISED:
9/15

PRESERVATION FENCING.
ORANGE BARRIER
FENCING.

10'
MAX.

T-BAR
POST, TYP.

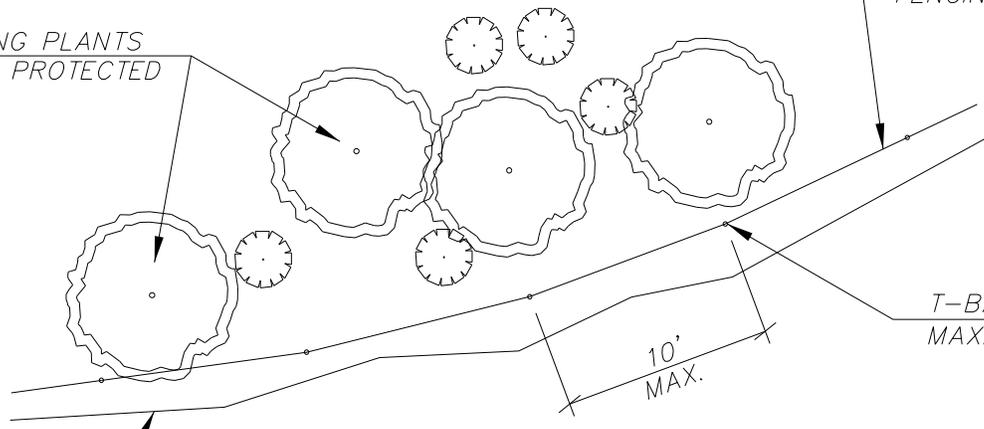


WARNING SIGN

**PRESERVATION AREA
DO NOT ENTER**

EXISTING PLANTS
TO BE PROTECTED

PRESERVATION
FENCING, TYP.



T-BAR POST, TYP.
MAX. SPACING 10'

10'
MAX.

LIMITS OF
DISTURBANCE

1. MATERIALS FOR FENCING AND WARNING SIGNS SHALL BE PER BID ITEM 2010004.
2. PLACE WARNING SIGNS ON PRESERVATION FENCING, PER BID ITEM 2010004.
3. PAYMENT PROVIDED UNDER BID ITEM 2010004.
4. WARNING SIGNS TO BE ATTACHED SECURELY TO THE FENCE FABRIC AND AT 50 FOOT MAXIMUM INTERVALS.

8

PRESERVATION FENCING DETAIL

201

SCALE: N.T.S.

PCDOT 03/20/2014

ISSUED:
03/14
REVISED:



STANDARD DETAIL
PRESERVATION FENCING DETAIL



DETAIL NO.
201
SHEET 1 of 1

GENERAL NOTES:
 Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.
 Design Specifications - AASHTO LRFD Bridge Design Specifications, 5th Edition 2010.

Design:
 Soil weight = 120 p.c.f.
 Backfill angle of internal friction = 33°
 Existing ground angle of internal friction = 30°
 All concrete shall be Class "S" (f'c = 3000 psi).
 Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All bends and hooks shall meet the requirements of AASHTO LRFD Article 5.10. All bend dimensions for reinforcing steel shall be out-to-out of steel. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

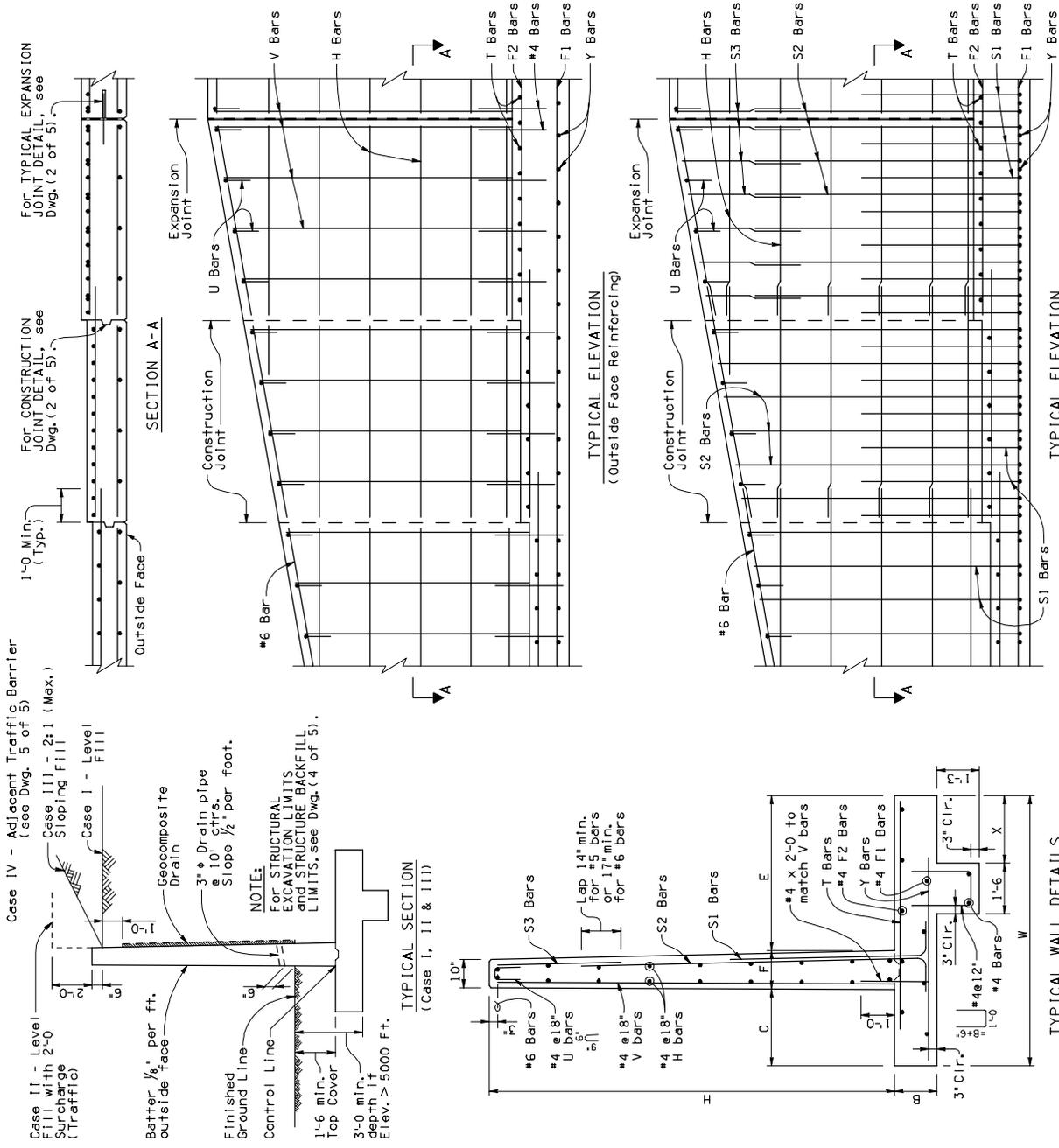
All reinforcing steel shall have 2 inch clear cover unless noted otherwise.
 Chamfer all exposed corners 3/4" unless noted otherwise.
 Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.

See Project Plans for wall layout, top of footing and finished grade elevations, footing step and wall joint locations. Construction joints shall match the locations of contraction joints.
 See Project Plans for wall surface treatment. Increase the wall thickness at the face for the depth of surface treatment.

Dimensions shall not be scaled from drawings.
 Pay item is measured as wall height H times length of wall, and pay item includes all labor and materials for excavation, backfill, drainage, concrete footing and wall with reinforcements.
 Item No. 9140178 RETAINING WALL
 (REINFORCED CONCRETE CANTILEVER)
 Measure: Square Foot

NOTE:
 For Retaining Wall Dimensions, Quantities and additional Details, see SD 7.01 (2 to 5).

ESTIMATOR <i>Shafiq H. Hasan</i>	ARIZONA DEPARTMENT OF TRANSPORTATION INTERNAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL
PROJECT NO. <i>Team A</i>	RETAINING WALL (REINFORCED CONCRETE CANTILEVER)
DATE	DRAWING NO. SD 7.01 (1 of 5)
LOCATION	SHEET NO. OF



NO.	REVISION	DESCRIPTION OF REVISIONS	DATE	BY	CHKD.
1					
2					
3					
4					

Note to Designer:
 The information contained in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without professional examination and verification of the suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

CASE I - LEVEL FILL

Dimensions		Steel List										CASE I			
H	W	B	C	F	E	X	S1	S2	S3	H	V	Y	F1	T	F2
Spacing	Bar Size	Length	Bar Size	Spacing	Length	Bar Size	Spacing	Length	Number	Length	Spacing	Bar Size	Number	Length	Number
4'	3'-0"	1'-0"	10"	1'-4"	8"	8"	5 12"	5'-6"	4 3'-9"	5 12"	2'-3"	2 5 12"	2'-3"	3 12'-0"	3 12'-0"
5'	3'-6"	1'-0"	10"	1'-8"	9"	9"	5 12"	6'-6"	6 4'-9"	5 12"	2'-9"	2 5 12"	2'-9"	3 13'-0"	3 13'-0"
6'	4'-0"	1'-0"	10"	2'-0"	10"	10"	5 12"	7'-6"	6 5'-9"	5 12"	3'-3"	2 5 12"	3'-0"	3 14'-0"	3 14'-0"
7'	4'-6"	1'-0"	1'-4"	10"	2'-4"	11"	5 12"	8'-6"	8 6'-9"	5 12"	3'-6"	3 5 12"	3'-3"	3 16'-0"	3 16'-0"
8'	5'-0"	1'-2"	1'-6"	10"	2'-8"	1-0	5 12"	9'-9"	10 7'-9"	5 12"	4'-0"	3 5 12"	3'-9"	3 18'-0"	3 18'-0"
9'	5'-6"	1'-2"	1'-9"	1'-0"	2'-9"	1'-2"	5 12"	10'-9"	10 8'-9"	5 12"	4'-3"	3 5 12"	3'-9"	3 19'-0"	3 19'-0"
10'	6'-0"	1'-2"	1'-9"	1'-0"	3'-3"	1'-4"	6 12"	11'-9"	12 9'-9"	5 12"	4'-9"	3 5 12"	4'-3"	4 21'-0"	4 21'-0"
11'	6'-6"	1'-2"	2'-0"	1'-0"	3'-6"	1'-6"	5 12"	12'-9"	14 10'-9"	5 12"	5'-0"	4 5 12"	4'-6"	4 23'-0"	4 23'-0"
12'	7'-0"	1'-3"	2'-0"	1'-0"	4'-0"	1'-8"	6 12"	13'-9"	14 11'-9"	5 12"	5'-3"	4 6 12"	5'-3"	5 25'-0"	5 25'-0"
13'	7'-6"	1'-3"	2'-3"	1'-0"	4'-3"	1'-10"	7 12"	14'-9"	16 12'-9"	5 12"	5'-9"	4 6 9"	5'-6"	5 27'-0"	5 27'-0"
14'	8'-0"	1'-3"	2'-3"	1'-2"	4'-7"	2'-0"	7 12"	15'-9"	18 13'-9"	5 12"	6'-3"	5 7 12"	7'-0"	5 29'-0"	5 29'-0"
15'	8'-6"	1'-3"	2'-6"	1'-3"	4'-9"	2'-2"	7 12"	16'-9"	18 14'-9"	6 12"	6'-3"	5 7 12"	7'-3"	5 30'-0"	5 30'-0"
16'	9'-0"	1'-4"	2'-6"	1'-4"	5'-2"	2'-4"	7 12"	17'-9"	18 15'-9"	6 12"	6'-9"	5 8 12"	8'-6"	6 33'-0"	6 33'-0"
17'	9'-6"	1'-4"	2'-9"	1'-5"	5'-4"	2'-6"	7 12"	18'-9"	18 16'-9"	5 12"	7'-0"	5 8 12"	8'-6"	6 34'-0"	6 34'-0"
18'	10'-0"	1'-5"	2'-9"	1'-6"	5'-9"	2'-8"	7 12"	19'-9"	18 17'-9"	6 12"	7'-0"	5 8 12"	8'-6"	6 35'-0"	6 35'-0"
19'	10'-6"	1'-6"	3'-0"	1'-6"	6'-4"	3'-0"	8 12"	20'-9"	18 18'-9"	6 12"	7'-6"	6 8 12"	9'-3"	7 39'-0"	7 39'-0"
20'	11'-0"	1'-6"	3'-0"	1'-8"	6'-4"	3'-0"	8 12"	21'-9"	18 19'-9"	6 12"	8'-0"	6 8 12"	9'-6"	7 41'-0"	7 41'-0"
21'	11'-6"	1'-7"	3'-3"	1'-9"	6'-6"	3'-2"	8 12"	22'-9"	18 20'-9"	6 12"	8'-3"	6 9 12"	10'-6"	7 43'-0"	7 43'-0"
22'	12'-0"	1'-8"	3'-3"	1'-10"	6'-11"	3'-4"	9 12"	23'-9"	18 21'-9"	7 12"	8'-9"	6 9 12"	11'-0"	7 46'-0"	7 46'-0"
23'	12'-6"	1'-9"	3'-6"	2'-0"	7'-0"	3'-6"	10 12"	24'-9"	18 22'-9"	8 12"	9'-0"	6 8 12"	10'-3"	7 47'-0"	7 47'-0"
24'	13'-0"	1'-10"	3'-6"	2'-0"	7'-4"	3'-8"	9 12"	25'-9"	18 23'-9"	8 12"	9'-3"	7 8 12"	10'-6"	8 50'-0"	8 50'-0"
25'	13'-6"	2'-0"	3'-9"	2'-4"	7'-5"	3'-10"	9 12"	26'-9"	18 24'-9"	8 12"	9'-9"	7 8 12"	10'-9"	8 53'-0"	8 53'-0"
26'	14'-0"	2'-3"	3'-9"	2'-6"	7'-9"	4'-0"	10 12"	27'-9"	18 25'-9"	8 12"	10'-0"	7 8 12"	11'-0"	8 55'-0"	8 55'-0"
27'	14'-6"	2'-6"	4'-0"	2'-8"	7'-9"	4'-2"	10 12"	28'-9"	18 26'-9"	8 12"	10'-3"	7 8 12"	11'-6"	8 60'-0"	8 60'-0"
28'	15'-0"	2'-9"	4'-0"	2'-10"	8'-2"	4'-4"	10 12"	29'-9"	18 27'-9"	8 12"	10'-9"	7 8 12"	11'-6"	8 64'-0"	8 64'-0"
29'	15'-6"	3'-0"	4'-3"	3'-0"	8'-2"	4'-6"	10 12"	30'-9"	18 28'-9"	8 12"	11'-0"	7 8 12"	11'-6"	8 67'-0"	8 67'-0"
30'	16'-0"	3'-3"	4'-3"	3'-2"	8'-7"	4'-8"	10 12"	31'-9"	18 29'-9"	8 12"	11'-3"	8 8 12"	11'-9"	9 71'-0"	9 71'-0"

* Total number of bars in cross section. * Factored Average Soil Bearing Pressure (psf).

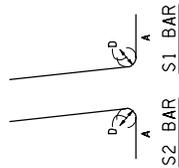
QUANTITIES

H	Concrete	Steel	Steel	Steel	Steel
	Cy./ln.Ft.	Lbs./ln.Ft.	Lbs./ln.Ft.	Lbs./ln.Ft.	Lbs./Splice
4'	.30	27	10		
5'	.35	31	12		
6'	.40	33	12		
7'	.45	37	14		
8'	.53	41	15		
9'	.61	43	15		
10'	.67	53	17		
11'	.72	56	19		
12'	.80	65	20		
13'	.86	77	21		
14'	.96	85	22		
15'	1.04	92	23		
16'	1.16	109	25		
17'	1.25	119	26		
18'	1.37	126	26		
19'	1.50	132	29		
20'	1.61	170	30		
21'	1.75	184	30		
22'	1.90	202	32		
23'	2.09	229	33		
24'	2.29	235	34		
25'	2.54	247	36		
26'	2.84	263	37		
27'	3.16	279	37		
28'	3.50	293	38		
29'	3.85	315	40		
30'	4.22	328	41		

NOTE:

Quantities are shown for information purposes only. The pay item is measured per square foot of wall. Quantities are for one L.F. of wall except for horizontal steel lap splices and footing steps. Steel quantities for horizontal lap splices shall be added for wall segments greater than 30 feet, additional wall segment greater than 30 feet. Horizontal splices shall occur at construction or contraction joints (1'-0" splices). Steel and concrete quantities for footing steps shall be added to those shown in the table.

Bar Size	A	D
5	1'-0"	3 3/4"
6	1'-0"	4 1/2"
7	1'-2"	5 1/4"
8	1'-4"	6"
9	1'-6"	9"
10	1'-10"	10"
11	2'-0"	11"

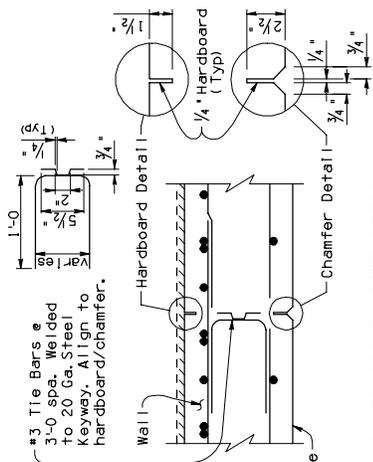


JOINT NOTE:

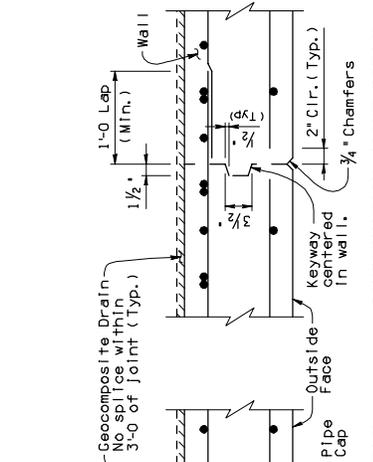
All retaining walls shall have construction joints on contraction joints spaced at not more than 30'-0" apart or as shown. Contraction joints may be substituted for construction joints for wall pours longer than 30'-0". Expansion joints shall be provided at intervals not exceeding 90'-0". Footings may be continuous with no joints (except at footing step locations).

NOTE:

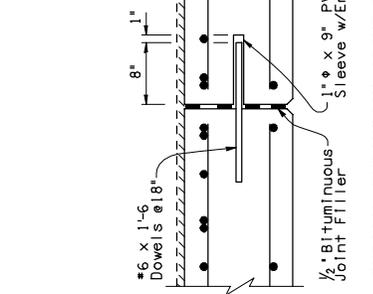
For General Notes, Typical Elevations, Sections, and Details see SD 7.01 (1, 3 and 4).



CONTRACTION JOINT DETAIL



CONSTRUCTION JOINT DETAIL



TYPICAL EXPANSION JOINT DETAIL

ESTIMATED BY: *Shafiq H. Hassan*
 APPROVED FOR DISTRIBUTION: *Tam A. Nohme*
 ARIZONA DEPARTMENT OF TRANSPORTATION
 INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP STRUCTURE DETAIL
 RETAINING WALL
 (REINFORCED CONCRETE CANTILEVER)
 DRAWING NO. SD 7.01 (2 of 5)
 SHEET NO. OF

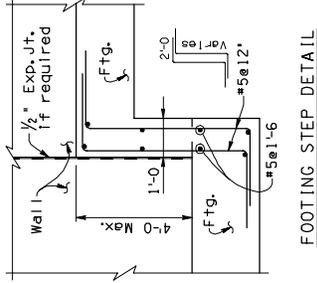
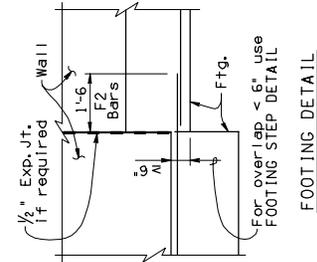
Note to Designer: The Retention Wall Detail has been prepared in accordance with recognized engineering practices and is for general use. It should not be used for specific application without component professional examination and verification of the suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

NO.	REVISION	DATE
1		
2		
3		
4		

CASE 11--LEVEL FILL WITH 2' SURCHARGE (TRAFFIC)

Dimensions		Steel List																								
H	W	B	C	F	E	X	S1	S2	S3	H	V	Y	F1	T	F2											
							Bar Size	Spacing	Length	Bar Size	Spacing	Length	Bar Size	Spacing	Length	Number										
4'	3'-6"	1'-0"	1'-0"	10"	1'-8"	1'-0"	5	12"	5'-6"	4	3'-9"	5	12"	2'-6"	2	5	12"	2'-6"	3	17000						
5'	4'-0"	1'-0"	1'-2"	10"	2'-0"	1'-0"	5	12"	6'-6"	6	4'-9"	5	12"	3'-0"	2	5	12"	2'-9"	3	18000						
6'	4'-6"	1'-0"	1'-4"	10"	2'-4"	1'-2"	5	12"	7'-6"	6	5'-9"	5	12"	3'-3"	3	5	12"	3'-3"	3	20000						
7'	5'-1"	1'-2"	1'-6"	10"	2'-9"	1'-4"	6	12"	8'-9"	8	6'-9"	5	12"	3'-9"	3	5	12"	3'-6"	3	23000						
8'	5'-8"	1'-2"	1'-8"	10"	3'-2"	1'-6"	6	12"	9'-9"	10	7'-9"	5	12"	4'-3"	3	5	12"	4'-0"	3	24000						
9'	6'-3"	1'-2"	1'-10"	10"	3'-5"	1'-8"	6	9"	10'-9"	10	8'-9"	5	12"	4'-6"	3	5	12"	4'-6"	4	25000						
10'	6'-10"	1'-3"	2'-0"	1'-0"	3'-10"	1'-9"	7	12"	12'-0"	12	9'-9"	5	12"	5'-0"	4	6	12"	5'-0"	4	27000						
11'	7'-6"	1'-3"	2'-3"	1'-0"	4'-3"	1'-10"	6	12"	12'-9"	14	10'-9"	5	12"	5'-9"	4	7	12"	5'-6"	5	28000						
12'	8'-0"	1'-3"	2'-6"	1'-2"	4'-7"	2'-0"	6	12"	13'-9"	14	11'-9"	5	12"	6'-0"	4	7	12"	6'-9"	5	29000						
13'	8'-6"	1'-3"	2'-6"	1'-3"	4'-9"	2'-2"	7	12"	14'-9"	16	12'-9"	6	12"	6'-9"	4	8	12"	7'-0"	5	32000						
14'	9'-0"	1'-3"	2'-6"	1'-4"	5'-2"	2'-4"	7	12"	15'-9"	18	13'-9"	6	12"	6'-9"	5	8	12"	8'-3"	6	34000						
15'	9'-6"	1'-4"	2'-9"	1'-5"	5'-4"	2'-6"	8	12"	17'-0"	18	14'-9"	6	9"	7'-0"	5	8	12"	8'-3"	6	36000						
16'	10'-0"	1'-5"	2'-9"	1'-6"	5'-9"	2'-8"	7	12"	17'-0"	18	14'-9"	6	9"	7'-0"	5	8	12"	8'-3"	6	39000						
17'	10'-6"	1'-6"	3'-0"	1'-7"	5'-11"	2'-10"	8	12"	18'-0"	17	10'-9"	6	12"	9'-0"	7	8	12"	8'-3"	6	40000						
18'	11'-0"	1-7	3'-0"	1-8	6'-4	3'-0"	8	12"	18'-0"	17	10'-9"	6	12"	9'-0"	7	8	12"	8'-3"	6	43000						
19'	11'-6"	1-8	3'-3	1-9	6-6	3-2	8	12"	18'-0"	17	10'-9"	6	12"	9'-0"	7	8	12"	8'-3"	6	45000						
20'	12'-0"	1-9	3-3	1-10	6-11	3-4	9	12"	19'-0"	18	11'-0"	6	12"	10'-0"	8	8	12"	8'-3"	6	48000						
21'	12'-6"	1-10	3-6	1-11	7-1	3-6	8	10"	14'-3"	6	10"	11'-3"	6	10"	9'-0"	6	10"	10'-9"	7	5000						
22'	13'-0"	1-11	3-6	2-0	7-6	3-8	9	12"	19'-0"	18	11'-0"	6	12"	10'-0"	8	8	12"	8'-3"	6	53000						
23'	13'-6"	2-0	3-9	2-2	7-11	4-0	10	12"	12'-9"	8	12"	16'-3"	6	12"	11'-3"	30	23'-9"	8	12"	9'-9"	7	8	6"	10'-6"	7	55000
24'	14'-0"	2-2	3-9	2-4	7-11	4-0	10	12"	12'-9"	8	12"	16'-3"	6	12"	11'-3"	30	23'-9"	8	12"	10'-0"	7	8	6"	10'-6"	7	58000
25'	14'-6"	2-4	4-0	2-6	8'-0"	4-2	10	12"	12'-6"	9	12"	19'-0"	6	12"	11'-3"	32	24'-9"	8	12"	10'-3"	7	8	6"	11'-0"	8	61000
26'	15'-0"	2-6	4-0	2-8	8'-4"	4-4	9	10"	11'-6"	9	10"	18'-6"	6	10"	13'-0"	34	25'-9"	8	12"	11'-0"	8	10	9"	13'-3"	9	67000
27'	15'-6"	2-9	4-3	2-10	8'-5"	4-6	10	12"	12'-3"	10	12"	19'-0"	6	12"	11'-3"	36	27'-9"	8	12"	11'-3"	8	10	9"	13'-6"	9	72000
28'	16'-0"	3-0	4-3	2-10	8'-5"	4-6	10	12"	12'-3"	10	12"	19'-0"	6	12"	11'-3"	36	27'-9"	8	12"	11'-3"	8	10	9"	13'-6"	9	75000
29'	16'-6"	3-3	4-6	3-3	8'-9"	4-10	11	12"	16'-3"	9	12"	23'-0"	6	12"	12'-3"	38	28'-9"	8	12"	11'-9"	8	10	9"	13'-6"	9	75000
30'	17'-0"	3-6	4-6	3-6	9'-0"	5'-0"	11	12"	15'-9"	10	12"	24'-0"	6	12"	12'-9"	38	29'-9"	8	12"	12'-0"	8	10	9"	13'-9"	10	79000

* Total number of bars in cross section. * Factored Average Soil Bearing Pressure (psf).



QUANTITIES

H	Concrete		Steel		Steel Lbs./Splice
	C.Y./L.N.F.	Lbs./Sq.Ft.	C.Y./L.N.F.	Lbs./Sq.Ft.	
4'	.32	27	10		
5'	.37	31	12		
6'	.42	34	12		
7'	.51	42	14		
8'	.56	51	15		
9'	.65	55	16		
10'	.73	64	18		
11'	.79	73	20		
12'	.88	78	20		
13'	.96	86	21		
14'	1.05	105	24		
15'	1.16	120	24		
16'	1.29	127	25		
17'	1.41	138	26		
18'	1.55	162	28		
19'	1.69	169	29		
20'	1.83	195	30		
21'	1.99	223	30		
22'	2.15	232	32		
23'	2.35	247	34		
24'	2.60	263	34		
25'	2.87	274	36		
26'	3.14	305	38		
27'	3.48	324	38		
28'	3.83	337	40		
29'	4.25	353	41		
30'	4.68	380	42		

NOTE: Quantities are shown for information purposes only. The pay item is measured per square foot of wall. Quantities are for one L.F. of wall except for horizontal steel lap splices and footing steps. Steel quantities for horizontal lap splices shall be added for wall segments greater than 30 feet, additional wall segment greater than 30 feet. Horizontal splices shall occur at construction or contraction joints (1'-0" splices). Steel and concrete quantities for footing steps shall be added to those shown in the table.

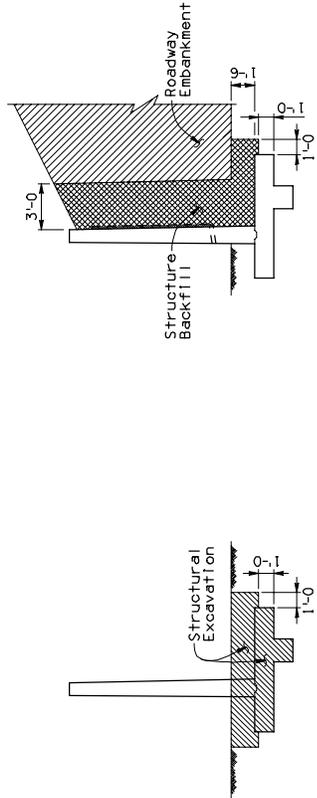
NOTE: For General Notes, Typical Elevations, Sections and Details see SD 7.01 (1, 2, and 4).

ESTIM APPROVED: *Shafi H. Hasan*
 ENGINEER FOR DISTRIBUTION: *Tean A. Nabme*
 ARIZONA DEPARTMENT OF TRANSPORTATION
 INTERMODAL TRANSPORTATION DIVISION
 BRIDGE GROUP STRUCTURE DETAIL
 RETAINING WALL
 (REINFORCED CONCRETE CANTILEVER)
 DRAWING NO. SD 7.01 (3 of 5)
 SHEET NO. OF

CASE III - 2:1 (MAX.) SLOPING FILL

Dimensions			Steel List										F2			
H	W	B	C	F	E	X	S1	S2	S3	H	V	Y	F1	T	F2	
							Bar Size	Bar Size	Bar Size	Number	Length	Bar Size	Number	Length	Number	
4'	3'-0	1'-0	1'-0	10"	1'-2	1'-0	5 12"	5 12"	5 12"	4	3'-9	5 12"	2-0	2 5 12"	2-3	3 1400
5'	3'-6	1'-0	1'-0	10"	1'-8	1'-0	5 12"	6 12"	6 12"	6	4'-9	5 12"	2-6	2 5 12"	2-9	3 1600
6'	4'-2	1'-0	1'-0	10"	2'-4	1'-0	5 12"	7 12"	7 12"	6	5'-9	5 12"	3-3	2 5 12"	3-3	3 1900
7'	5'-0	1'-2	1'-2	10"	3'-0	1'-3	5 12"	8 12"	8 12"	8	6'-9	5 12"	3-9	3 5 12"	4-0	4 2100
8'	5'-9	1'-2	1'-4	10"	3'-7	1'-6	6 12"	9 12"	9 12"	10	7'-9	5 12"	4-3	3 6 12"	4-9	4 2300
9'	6'-6	1'-3	1'-6	1'-0	4'-0	1'-9	6 12"	10 12"	10 12"	10	8'-9	5 12"	4-9	3 6 9"	5-3	5 2500
10'	7'-3	1'-3	1'-8	1'-0	4'-7	2'-0	7 12"	11 12"	11 12"	12	9'-9	5 12"	5-3	4 7 12"	7-0	5 2700
11'	8'-3	1'-4	1'-10	1'-2	5'-3	2'-3	7 12"	12 12"	12 12"	14	10'-9	5 12"	6-0	4 8 12"	8'-6	6 2800
12'	9'-0	1'-4	2'-0	1'-2	5'-10	2'-6	7 12"	13 12"	13 12"	14	11'-9	5 12"	6-6	4 8 12"	9'-0	7 3000
13'	9'-9	1'-6	2'-2	1'-4	6'-3	2'-9	6 12"	14 12"	14 12"	16	12'-9	5 12"	7-0	5 8 9"	9'-6	8 3300
14'	10'-6	1'-8	2'-4	1'-4	6'-10	3'-0	7 12"	15 12"	15 12"	18	13'-9	5 12"	7-6	5 7 6"	9'-3	8 3500
15'	11'-3	1'-10	2'-6	1'-4	7'-5	3'-2	7 14"	16 12"	16 12"	18	14'-9	5 12"	8-0	5 8 7"	10'-9	9 3800
16'	12'-0	2'-0	2'-8	1'-6	7'-10	3'-4	7 12"	17 12"	17 12"	20	15'-9	5 12"	8-6	6 8 6"	11'-0	9 4000
17'	12'-6	2'-2	2'-8	1'-6	8'-4	3'-6	8 14"	18 12"	18 12"	22	16'-9	5 12"	9-0	6 9 7"	12'-3	9 4400
18'	13'-6	2'-4	2'-10	1'-6	8'-8	3'-8	8 12"	19 12"	19 12"	24	17'-9	5 12"	9-3	6 9 6"	12'-9	10 4700
19'	13'-6	2'-6	2'-10	1'-8	9'-0	3'-10	9 14"	20 12"	20 12"	24	18'-9	5 12"	9-3	6 9 6"	13'-0	10 5100
20'	14'-0	2'-8	3'-0	1'-10	9'-2	4'-0	9 14"	21 12"	21 12"	26	19'-9	5 12"	10-0	7 10 7"	14'-6	11 5400
21'	14'-6	2'-10	3'-2	2'-0	9'-4	4'-2	9 12"	22 12"	22 12"	28	20'-9	5 12"	10-3	7 10 6"	14'-6	11 5700
22'	15'-0	3'-0	3'-2	2'-2	9'-8	4'-4	9 12"	23 12"	23 12"	30	21'-9	5 12"	10-9	8 10 6"	15'-0	11 6100
23'	15'-6	3'-4	3'-6	2'-4	10'-0	4'-6	9 12"	24 12"	24 12"	30	22'-9	5 12"	11-3	8 10 6"	15-3	12 6500
24'	16'-4	3'-8	3'-6	2'-6	10'-4	4'-8	10 14"	25 12"	25 12"	30	23'-9	5 12"	11-9	8 11 7"	16-9	12 6800
25'	17'-0	4'-0	3'-8	2'-9	10'-7	4'-10	10 12"	26 12"	26 12"	32	24'-9	5 12"	12-3	8 11 6"	17'-0	12 7200
26'	17'-6	4'-4	3'-10	3'-0	10'-8	5'-0	10 12"	27 12"	27 12"	34	25'-9	5 12"	12-6	9 11 6"	17-3	13 8000
27'	18'-0	4'-8	4'-0	3'-3	10'-9	5'-2	10 12"	28 12"	28 12"	34	26'-9	5 12"	12-6	9 11 6"	17-3	13 8000
28'	18'-6	5'-0	4'-3	3'-6	10'-11	5'-4	10 12"	29 12"	29 12"	36	27'-9	5 12"	13-3	9 11 6"	17-6	13 8300
29'	19'-4	5'-4	4'-6	3'-9	11'-1	5'-6	10 12"	30 12"	30 12"	38	28'-9	5 12"	13-9	10 11 6"	17-6	13 8500
30'	20'-0	5'-8	4'-9	4'-0	11'-3	5'-8	10 12"	31 12"	31 12"	38	29'-9	5 12"	14-3	10 11 6"	17-9	13 8800

* Total number of bars in cross section. * Factored Average Soil Bearing Pressure (psf).



STRUCTURE BACKFILL LIMITS
STRUCTURAL EXCAVATION LIMITS

QUANTITIES

H	Concrete	Steel	Steel	Steel
	Cy/Ln.Ft.	Lbs./Ln.Ft.	Lbs./Ln.Ft.	Lbs./Splice
4'	.30	27	10	
5'	.35	31	12	
6'	.41	33	12	
7'	.50	39	14	
8'	.56	50	16	
9'	.68	57	16	
10'	.74	72	18	
11'	.88	86	20	
12'	.96	91	21	
13'	1.13	108	24	
14'	1.28	124	25	
15'	1.44	139	26	
16'	1.65	153	28	
17'	1.81	183	29	
18'	1.97	214	30	
19'	2.20	229	32	
20'	2.44	255	34	
21'	2.69	296	34	
22'	2.96	318	36	
23'	3.35	324	38	
24'	3.77	362	38	
25'	4.25	405	39	
26'	4.72	419	42	
27'	5.22	429	42	
28'	5.77	456	43	
29'	6.35	470	45	
30'	6.95	484	45	

NOTE:
Quantities are shown for information purposes only. The pay item is measured per square foot of wall. Quantities are for one L.F. of wall except for horizontal steel lap splices and footing steps. Steel quantities for horizontal lap splices shall be added for wall segments greater than 30 feet, additional steel segments greater than 30 feet. Horizontal splices shall occur at construction or contraction joints (1'-0 splices). Steel and concrete quantities for footing steps shall be added to those shown in the table.

NOTE:
For General Notes, Typical Elevations, Sections and Details see SD 7.01 (1 to 3).

ESTIM APPROVED: *Shafi H. Hasan*
 ARIZONA DEPARTMENT OF TRANSPORTATION
 INTERMODAL TRANSPORTATION DIVISION
 BRIDGE GROUP STRUCTURE DETAIL

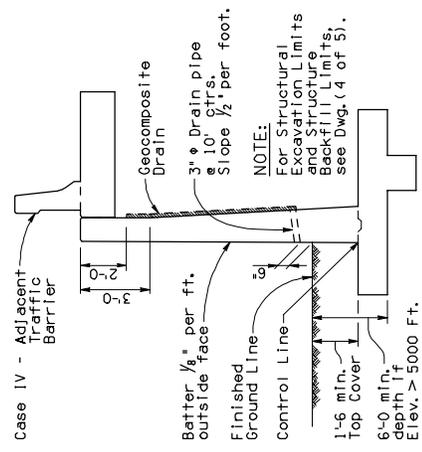
APPROVED FOR ESTIMATION: *Alan A. Nabholz*
 RETAINING WALL
 (REINFORCED CONCRETE CANTILEVER)

DATE: _____
 DRAWING NO.: SD 7.01 (4 of 5)
 SHEET NO.: _____ OF _____

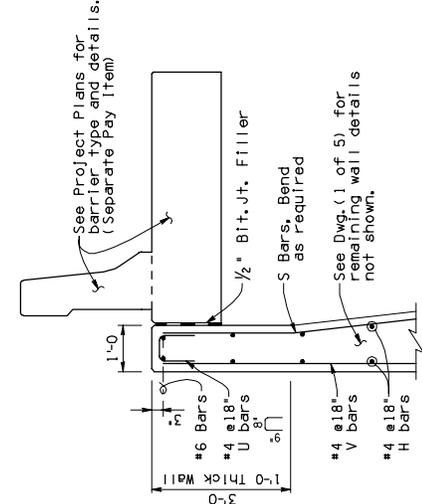
CASE IV - ADJACENT TRAFFIC BARRIER

Dimensions			Steel List																						
H	W	B	C	F	E	X	S1	S2	S3	H	V	Y	F1	T	F2										
							Bar Size	Length	Spacing	Bar Size	Length	Number	Bar Size	Length	Number										
4'	5'-0	1'-0	1'-6	1'-0	2'-6	1'-0	5	12"	5'-6	4	3'-9	5	12"	4'-0	4	5	12"	3'-6	4	1400					
5'	5'-0	1'-0	1'-6	1'-0	2'-6	1'-0	5	12"	6'-6	6	4'-9	5	12"	4'-0	4	5	12"	3'-6	4	1700					
6'	5'-6	1'-0	1'-6	1'-0	3'-0	1'-6	5	12"	7'-6	6	5'-9	5	12"	4'-0	4	5	12"	4'-0	4	2000					
7'	5'-6	1'-3	1'-6	1'-0	3'-0	1'-6	5	12"	8'-9	8	6'-9	5	12"	4'-0	4	5	12"	4'-0	4	2500					
8'	6'-0	1'-3	1'-9	1'-0	3'-3	1'-8	5	12"	9'-9	10	7'-9	5	12"	4'-4	4	5	12"	4'-3	4	2700					
9'	6'-6	1'-3	2'-0	1'-1	3'-5	1'-8	5	12"	10'-9	10	8'-9	5	12"	4'-10	4	5	12"	4'-6	4	2900					
10'	7'-0	1'-3	2'-0	1'-1	3'-11	1'-10	5	12"	11'-9	12	9'-9	5	12"	5'-2	5	6	12"	5'-0	5	3100					
11'	7'-6	1'-3	2'-3	1'-2	4'-1	2'-0	5	12"	12'-9	14	10'-9	5	12"	5'-6	5	6	12"	5'-3	5	3300					
12'	8'-0	1'-3	2'-3	1'-2	4'-9	2'-2	6	12"	13'-9	14	11'-9	5	12"	6'-0	5	7	12"	5'-9	5	3500					
13'	8'-6	1'-3	2'-6	1'-3	4'-9	2'-2	6	12"	14'-9	16	12'-9	6	12"	6'-4	5	8	12"	6'-3	5	3700					
14'	9'-0	1'-3	2'-6	1'-4	5'-2	2'-4	6	12"	15'-9	16	13'-9	6	12"	6'-8	5	9	12"	6'-3	6	3900					
15'	9'-6	1'-4	2'-9	1'-5	5'-4	2'-6	7	12"	16'-9	17	14'-9	6	12"	7'-0	5	9	12"	6'-3	6	4100					
16'	10'-0	1'-5	2'-9	1'-6	5'-9	2'-8	7	12"	17'-9	17	15'-9	6	12"	7'-4	5	8	9"	8'-3	6	4400					
17'	10'-6	1'-6	3'-0	1'-7	5'-11	2'-10	8	12"	18'-9	18	16'-9	6	12"	7'-8	6	8	8"	8'-3	7	4600					
18'	11'-0	1'-7	3'-0	1'-8	6'-4	3'-0	8	12"	19'-9	18	17'-9	6	12"	8'-0	6	8	6"	8'-3	7	4900					
19'	11'-6	1'-8	3'-3	1'-9	6'-6	3'-2	8	12"	20'-9	19	18'-9	6	12"	8'-4	6	8	6"	8'-3	7	5100					
20'	12'-0	1'-9	3'-3	1'-10	6'-11	3'-4	9	12"	21'-9	19	19'-9	6	12"	8'-8	6	8	6"	10'-9	9	5400					
21'	12'-6	1'-10	3'-6	1'-11	7'-1	3'-6	9	12"	22'-9	20	20'-9	7	9"	9'-0	6	8	6"	11'-0	8	5600					
22'	13'-0	1'-11	3'-6	2'-0	7'-6	3'-8	9	12"	23'-9	20	21'-9	7	9"	9'-4	7	9	6"	10'-6	8	5900					
23'	13'-6	2'-0	3'-9	2'-2	7'-11	4'-0	10	12"	24'-9	20	22'-9	8	12"	9'-8	7	9	6"	10'-6	8	6100					
24'	14'-0	2'-1	4'-0	2'-4	7'-11	4'-0	10	12"	25'-9	20	23'-9	8	12"	10'-0	7	9	6"	10'-9	8	6500					
25'	14'-6	2'-4	4'-0	2'-6	8'-0	4'-2	10	12"	26'-9	20	24'-9	8	12"	10'-4	7	9	6"	11'-0	9	6700					
26'	15'-0	2'-6	4'-0	2'-8	8'-4	4'-4	10	12"	27'-9	20	25'-9	8	12"	10'-8	7	10	9"	13'-3	9	7100					
27'	15'-6	2'-9	4'-3	2'-10	8'-5	4'-6	10	12"	28'-9	20	26'-9	8	12"	11'-3	36	27'-9	8	12"	11'-4	8	10	9"	13'-6	9	7500
28'	16'-0	3'-0	4'-3	3'-0	8'-9	4'-8	10	12"	29'-9	20	27'-9	8	12"	11'-8	8	10	9"	13'-6	9	8200					
29'	16'-6	3'-3	4'-6	3'-3	8'-9	4'-10	11	12"	30'-9	20	28'-9	8	12"	12'-3	38	28'-9	8	12"	11'-8	8	10	9"	13'-6	9	8200
30'	17'-0	3'-6	4'-6	3'-6	9'-0	5'-0	11	12"	31'-9	20	29'-9	8	12"	12'-0	8	10	9"	13'-9	10	8700					

* Total number of bars in cross section. * Factored Average Soil Bearing Pressure (psf).



TYPICAL SECTION (Case IV)



TYPICAL WALL DETAILS (Case IV)

QUANTITIES

H	Concrete	Steel	Steel	Steel	Steel
	Cy/Ln.Ft.	Lbs./Ln.Ft.	Lbs./Sq.Ft.	Lbs./Sq.Ft.	Lbs./Sq.Ft.
4'	.40	32	12		
5'	.44	35	14		
6'	.50	37	14		
7'	.58	40	15		
8'	.64	44	16		
9'	.71	53	16		
10'	.77	61	19		
11'	.85	66	20		
12'	.91	77	20		
13'	.99	87	22		
14'	1.07	108	24		
15'	1.19	110	24		
16'	1.31	123	25		
17'	1.43	152	28		
18'	1.57	169	28		
19'	1.71	185	29		
20'	1.85	209	30		
21'	2.00	221	31		
22'	2.16	256	33		
23'	2.35	280	34		
24'	2.60	291	34		
25'	2.86	304	36		
26'	3.13	313	38		
27'	3.46	344	38		
28'	3.81	356	40		
29'	4.21	360	41		
30'	4.63	395	42		

NOTE: Quantities are shown for information purposes only. The pay item is measured per square foot of wall. Quantities are for one L.F. of wall except for horizontal steel lap splices and footing steps. Steel quantities for horizontal lap splices shall be added for wall segments greater than 30 feet, additional steel segment greater than 30 feet. Horizontal splices shall occur at construction or contraction joints (1'-0 splices). Steel and concrete quantities for footing steps shall be added to those shown in the table.

ESTIM. APPROVED: *Shafiq H. Hasan*
 APPROVED FOR DISTRIBUTION: *Alan A. Nabame*
 ARIZONA DEPARTMENT OF TRANSPORTATION
 INTERMODAL TRANSPORTATION DIVISION
 BRIDGE GROUP STRUCTURE DETAIL
 RETAINING WALL
 (REINFORCED CONCRETE CANTILEVER)
 DRAWING NO. SD 7.01 (1 to 5)
 SHEET NO. OF

Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering practices and is for general use. It should not be used for specific application without the professional engineer's examination and verification of the suitability and applicability by a licensed component professional engineer. Contents within the inner border line shall not be altered.

NO.	REVISION	DATE
1		
2		
3		
4		

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	ISSUE		
2	EDIT NOTES		
3	REVISIONS		
4	REVISIONS		
5	REVISIONS		
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100	REVISIONS		

NOTES:

- Type 1 Object Marker: Typically used to mark objects within the roadway.
 OM1-1 (not used by ADOT): 18"x18" diamond panel, with a 3x3 symmetric pattern of yellow retroreflective elements on a retroreflective yellow background.
 OM1-2: 18"x18" diamond panel, with a 3x3 symmetric pattern of yellow retroreflective elements on a non-reflective black background.
 OM1-3: 18"x18" diamond, with a retroreflective yellow face.
- Type 2 Object Marker: Typically used to mark objects within or adjacent to the roadway.
 OM2-1H: 12"x6" rectangular panel, with three yellow retroreflective elements arranged horizontally on a retroreflective white background.
 OM2-1V: 6"x12" rectangular panel, with three yellow retroreflective elements arranged vertically on a retroreflective white background.
 OM2-2H: 12"x6" rectangular panel, with a retroreflective yellow face.
 OM2-2V: 6"x12" rectangular panel, with a retroreflective yellow face.
 OM2-2aH: 24"x6" rectangular panel, with a retroreflective yellow face.
 OM2-2aV: 6"x24" rectangular panel, with a retroreflective yellow face.
- Type 3 Object Marker: Typically used to mark objects within or adjacent to the roadway.
 OM3: 12"x36" rectangular panel, with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees.
 OM3-a: 24"x96" rectangular panel, with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees.
- Type 4 Object Marker: Typically used to mark the end of a roadway for which there is no alternate vehicular path. Type 4 object markers may be used independently or in conjunction with a gate or barricade.
 OM4-1 (not used by ADOT): 18"x18" diamond panel, with a 3x3 symmetric pattern of red retroreflective elements on a retroreflective red background.
 OM4-2: 18"x18" diamond panel, with a 3x3 symmetric pattern of red retroreflective elements on a non-reflective black background.
 OM4-3: 18"x18" diamond panel, with a retroreflective red face.
- OM101-1 Guardrail Marker: Typically used on the face of guardrail end terminals. Rectangular panel shaped to approximately match the shape of the guardrail end, with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees.
- OM101-2 Attenuator Marker: Typically used on the face of attenuation devices, 48"x24" or 36"x24" rectangular panel, with alternating black and retroreflective yellow stripes sloping at an angle of 45 degrees.

- Suffixes (OM3, OM3-a, OM101-1, OM101-2):
 L: Intended for use on the left side of a roadway where traffic is to pass to the right of the marker. The alternating black and yellow stripes slope downward from upper left to lower right.
 C: Intended for use in the center of a roadway where traffic is to pass on both sides of the marker. The alternating black and yellow stripes slope downward from the center to the lower left and lower right.
 R: Intended for use on the right side of a roadway where traffic is to pass to the left of the marker. The alternating black and yellow stripes slope downward from upper right to lower left.
- Guardrail and attenuator markers furnished or pre-installed by the manufacturer may be used, provided the color and pattern is in nominal conformance with the Manual of Approved Signs. For layout and design details of object markers, see the ADOT Manual of Approved Signs.
- Materials used for object markers shall conform to the Standard Specifications or project Special Provisions.
- If prismatic plastic reflectors are used, they shall conform to the Standard Specifications and conform to the sizes depicted in the Manual of Approved Signs. They shall be securely fastened to the panel with corrosion-resistant hardware such as rivets or bolts.
- If a post is used for mounting of an object marker, the object marker shall be affixed in accordance with the details depicted in Standard Drawing S-3.
- Type 2 object markers may be installed on flexible posts in accordance with the recommendations of the flexible post manufacturer.
- Guardrail and attenuator markers should be installed in accordance with the recommendations of the guardrail end device or attenuator manufacturer.
- All dimensions are nominal except as noted.

OBJECT MARKER	POST TYPE (If Used)
OM1	2S
OM2	2S or Flexible
OM3	2S
OM3-a	2T or 2/2S
OM4	2S

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION TRAFFIC SIGNING & MARKING STANDARD DRAWINGS	REVISION	6/14
SIGNATURES		DRAWING NO.	M-23
APPROVED FOR DISTRIBUTION		SHEET NO.	1 OF 1
ON FILE	OBJECT MARKER DETAILS		

NOT TO SCALE

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C

APPENDIX E

UTILITY CLEARANCE LETTER

March 30, 2016

Sandi Garrick
 Project Management Office
 Pima County
 201 N. Stone, 2nd Floor
 Tucson, Arizona 85701



**RE: Utility Clearance for Rillito Riverpath and Camino de la Tierra
 Pima County Project No. 4RRVPA
 Federal Project No. TEA PPM-0(228) D
 ADOT Tracs No. 0000 PM PPM SL701 01C**

Dear Ms. Garrick:

100% plans were sent on November 19, 2015 to utility companies identified by Arizona Blue Stake to have facilities within the proposed construction limits.

The following are the companies that have facilities within the area, their contact representative, and references to requirements they included in their review letters or e-mail responses.

Utility	Contact	Status
AT&T	Joseph Forkert (619) 200-7896 joef@forkertengineering.com	Clearance letter dated August 21, 2013. <i>Please be advised that AT&T Network Services has no active facilities within the vicinity of this project.</i>
ADOT	Manuel Vasquez (520) 349-8935	Phone conversation February 19, 2015. <i>No active facilities within the vicinity of this project.</i>
CenturyLink	Meron Kidane (520) 292-8210 Meron.kidane@centurylink.com	E-mail received March 12, 2015. <i>There is no conflict with CTL facilities.</i>
Comcast Communications	Mario Sanchez (520) 744-5477 Mario_sanchez@cable.comcast.com	Clearance letter dates April 3, 2015. <i>Comcast does face facilities located within the boundaries of your work. We are not in conflict within the scope of work.</i>
Metro Water	Tim Dinkel (520) 209-8210 tdinkel@metrowater.com	E-mail received April 9, 2015. <i>Facilities are not in conflict with the proposed improvements.</i>
PCRWRD	Louis Romero (520) 740-6466 Louis.romero@wvm.pima.gov	Clearance letter dated February 21, 2016.

		Existing public sewer facilities are located in close proximity to proposed construction and are of concern. The contractor must obtain a public sewer observation permit from PCRWRD's permit section per Pima County Ordinance 13.20.030(D). After the permit is obtained, the contractor shall contact the PCRWRD Field Engineering Chief Inspector by email at Eric.Olson@pima.gov to schedule a Pre-Construction meeting with the assigned Field Inspector or call Field Engineering at (520) 724-2651.
Southwest Gas	Kelly Fleenor (520) 794-6107 kelly.fleenor@swgas.com	Clearance letter dated February 27, 2015. SWG does not anticipate any direct conflicts with the submitted plans.
Tucson Electric Power	David Smith (520) 917-8766	Clearance letter dated March 26, 2015. No apparent conflicts with TEP existing electric facilities.
Tucson Water	Walter Breitenstein (520) 837-2120 walter.breitenstein@tucsonaz.gov	Clearance letter dated December 15, 2015. The project is found to have no conflicts with Tucson Water Facilities.

Please contact me at (520) 352-8630 or tim.rhine@kimley-horn.com should you have any questions or comments. Thank you for your assistance.

Sincerely,



Tim Rhine, P.E.
Project Engineer

Special Provisions
Rillito Riverpath and Camino de la Tierra
Bicycle and Pedestrian Enhancements

Pima County DOT Project No. 4RRVPA
Federal Project No. TEA PPM-0(228)D
ADOT TRACS No. 0000 PM PPM SL701 01C

APPENDIX F
GEOTECHNICAL EVALUATION
(PROVIDED ON CD)

Prepared By:
ATEK Engineering Consultants, LLC
111 South Weber Drive, Suite 1
Chandler, Arizona 85226

March 24, 2014
Project No. 130002