SPECIAL PROVISIONS
FOR

MC 85 AT 83RD AVENUE AND CENTER TURN LANE EXPANSION
(MC 85: 95TH AVENUE TO 75TH AVENUE)

AND

INTERSECTION IMPROVEMENT AT 79TH AVENUE AND MC 85

MCDOT

PROJECT NUMBER: TT0345 (PACKAGE 1)

AND

PROJECT NUMBER: TT0553 (PACKAGE 2)

ADDENDUM NO. 3

August 2018

SPECIAL PROVISIONS
FOR

MC 85 AT 83RD AVENUE AND CENTER TURN LANE EXPANSION
(MC 85: 95TH AVENUE TO 75TH AVENUE)

MCDOT

PROJECT NUMBER: TT0345

(PACKAGE 1)

ADDENDUM NO. 3

August 2018

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SPECIAL PROVISIONS
FOR
MC 85 at 83rd Avenue and Center Turn Lane Expansion
(MC 85: 95th Avenue to 75th Avenue)
PROJECT NUMBER: TT0345 (PACKAGE 1)
ADDENDUM NO. 3

LOCATION OF THE WORK: This project is located in Sections 1 through 24, Township 1E, Range 1E, on MC 85 (Buckeye Road) from one half mile west of 91st Avenue to 75th Avenue, including the crossroads of 91st Avenue, and 83rd Avenue in Phoenix and Tolleson, within Maricopa County, Arizona.

PROPOSED WORK: The work consists of widening the existing roadway to a five-lane facility including constructing drainage retention basins, lighting, traffic signal, signing, pavement marking, loop detector sensors, pedestrian sidewalk ramps, roadway curb and gutter improvements, milling and paving the existing pavement surfaces with Asphalt-Rubber Overlay, utility relocations and other miscellaneous work items are also included in this project.

CONTRACT TIME: The Contractor shall complete all project work within 550 calendar days beginning with the start date specified in the Notice to Proceed.

AVAILABLE INFORMATIONAL MATERIAL: The following information is made available as an attachment to the solicitation for bids:

Geotechnical Report*
Pavement Section Recommendations
Roadway Cross Sections

*Note: Soils information contained in the geotechnical report was obtained and used for design purposes. It is the responsibility of the Contractor to establish soils information for their bid and construction purposes. Borehole logs and materials testing data in the geotechnical reports are valid, but pavement designs in the pavement section report have been revised and the pavement sections in the plans are final.

SECTION 102 BIDDING REQUIREMENTS AND CONDITIONS

102.2 CONTENTS OF PROPOSAL PAMPHLET: The third paragraph of Section 102.2 replaced in whole by the following:

The plans, the standard specifications, the standard details, the special provisions, the contracting agency's supplements and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work.

The work described in the specifications and shown on the plans for this project, shall conform to the project Special Provisions which have been prepared in conjunction with the 2015 Edition Uniform Standard Specifications and Details for Public Works Construction published by the Maricopa Association of Governments (MAG) together with the 2015 City of Phoenix (COP) Supplement to the 2015 Edition Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction and the 2016 MCDOT Supplement to the MAG Standard Specifications and Details for Public Works Construction.

In the event a conflict exists between the Contract Documents the order of precedence shall be as follows:

Change Orders

Addenda

Special Provisions

Project Plans

2015 City of Phoenix (COP) Supplement to the 2015 Edition Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction

2015 City of Phoenix Supplemental Standard Details to the Maricopa Association of Governments Uniform Standard Specification and Details for Public Works Construction

2016 MCDOT Supplement to the MAG Uniform Standard Specifications and Details

2015 MAG Uniform Standard Specifications and Details for Public Works Construction

2016 MAG Uniform Standard Specifications, Standard Drawings and Standard Details

SECTION 104 SCOPE OF WORK, add the following:

Maricopa County Department of Transportation (County) has combined two projects into one. They are titled Package 1 and Package 2. There are two sets of plans and special provisions. There is one combined bidding schedule, one geotechnical report, and cross sections for Package 1.

PROPOSED WORK, PACKAGE 1 – TT0345

The work consists of widening MC 85 from approximately 95th Avenue to 75th Avenue and north and south along 83rd Avenue and 91st Avenue.

PROPOSED WORK, PACKAGE 2 – TT0553

The work consists of installing a traffic signal at 79th Avenue.

104.4 PARTNERING

The County intends to encourage the foundation of a cohesive partnership with the Contractor and its principal subcontractors and suppliers. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and completion within budget, on schedule, and in accordance with plans and specifications.

To implement this partner initiative, prior to starting of work and prior to the pre-construction conference, Contractor's management personnel and the County, through its authorized representatives, will initiate a partnering development seminar/team building workshop. Project personnel will make arrangements to determine attendees at the workshop, agenda of the workshop, duration, and location. Persons required to be in attendance will be the Engineer and key project personnel; the Contractor's on-site project manager, and key project supervision personnel of both the prime and principal subcontractors and suppliers. The design engineers and key local government personnel will also be invited to attend as necessary.

Follow-up workshops may be held periodically throughout the duration of the contract as agreed by the Contractor and the County.

The establishment of a partnership charter on a project will not change the legal relationship of the parties to the contract, nor relieve either party from any terms of the contract.

The County will reimburse the Contractor, based upon approved invoices and documented expenses such as taxes or bond cost charges to Contractor in connection with the Item PARTNERING, an amount not to exceed the ALLOWANCE shown in the Bidding Schedule. Expenses eligible for reimbursement are direct expenses incurred in providing facilities, facilitators, supplies, and materials for the seminar/team building workshops. No labor costs or additional mark-up for profit and/or fee for Contractor will be eligible for reimbursement.

SECTION 105 CONTROL OF WORK

105.6 COOPERATION WITH UTILITIES, add the following:

The following utilities are expected to be located within the limits of this project. The Contractor shall be responsible for coordinating any special inspectors required by the utilities while digging close to existing facilities. A complete list of utility potholes completed during the design phase of the project is provided in **Appendix A** for reference only. These utilities, along with the contact information, are listed below:

Utility Name	Contact Name	Phone Number	Type of Facility
El Paso Natural Gas/Kinder Morgan (Gas)	James Pigg	480-262-9337	Gas/Petroleum
El Paso Natural Gas/Kinder Morgan (Liquid)	Jeff Ferguson	480-272-1312	Gas/Petroleum
Level 3 Communication	Carlos Muniz	602-322-2162	Fiber
Century Link (Local)	Michael Vespucci	602-630-1429	Telephone
AT&T	Leon Ellis	480-844-6765	Telephone
Cox Communications	Kurtis Miller	623-328-3843	Cable/Fiber
Southwest Gas	Yvonne Aguirre	602-484-5338	Gas
Salt River Project (Irrigation)	Richard Johnson	602-236-4607	Irrigation
Salt River Project (Transmission)	Keith Pellien	602-236-4962	Electric (69 kV)
Salt River Project (Distribution)	Bruce Souder	602-236-0692	Electric (12 kV)
City of Phoenix	Jamie Erickson	602-261-8229	Water & Sewer
City of Tolleson	Dale Crandell	623-640-5202	Water & Sewer
MCDOT Utilities	LeShawn Charlton	602-506-9025	ITS

Southwest Gas

The Contractor shall provide a minimum of 36 inches of cover over the top of each gas pipe unless otherwise reviewed and approved by the Engineer. New facilities shall maintain at least three feet horizontal clearance and two feet vertical clearance to existing gas line facilities. The Contractor shall hand dig at the marked locations until the gas pipe has been found and exposed. Use care to avoid damaging or breaking the small electrical tracer wire that may be buried with the pipe.

Once mechanical trenching is in progress, do not dig within two feet of a gas pipe. This trenching shall be done by hand in order to prevent any damage to the gas pipe. In the event the Contractor should “hook” or otherwise strain a gas pipe while excavating, a call should be placed to 602-271-GASS (271-4277). Even though there may not be any apparent damage, the strain may have damaged the wrap or a portion of the buried pipe or fittings at other locations causing a leak in the surrounding area.

If a steel facility is exposed and the pipe coating is found to be in need of repair, please contact 602-271-GASS (271-4277) so a crew can be dispatched to rewrap the pipe. This service is at no cost to the Contractor so Southwest Gas can monitor the steel facilities and minimize the possibility of corrosion.

When the excavations are complete, all exposed gas pipes shall be protected. If the trench is more than three feet wide, the pipe shall be supported in a manner where the supporting material does not damage the pipe or its protective wrapping.

Guidelines for supporting exposed gas pipe:

- The pipe shall be protected from construction damage (avoid rocks/debris or tool/machine impacts).
- The pipe shall be supported to prevent excessive movement or strain (long lengths of exposed pipe shall be supported at a minimum every 8' to prevent excessive sagging; rigid I-beams across the trench with support straps can be used to hold the pipe in place). Final Support Plan approval from Southwest Gas is required prior to construction. The Contractor shall call the construction coordinator Yvonne Aguirre at least 24 hours prior to set up inspection of trench.
- Any trench with exposed gas pipe must have plating when work is not being done to prevent debris from hitting the pipe (Arizona Corporation Commission requirement).
- When work is complete, the pipe must be re-buried and re-compacted to meet Southwest Gas backfill requirements.
- Southwest Gas Inspectors will regularly visit the site to ensure safe practices are maintained.
- For parallel utility installations, it is recommended that shoring be used to prevent the existing gas trench from flowing/collapsing into the newly excavated trench.

Before backfilling, Southwest Gas requires six inches of bedding, one inch on the side and six inches of shading with sand or material free of rocks and able to pass through a 3/8-inch screen. Do not drop backfill directly on the exposed gas pipe. During the compaction of backfill, use extra care when directly over the gas pipe in order to avoid any damage.

The Contractor shall be aware that there may be abandoned steel gas lines within the project limits that may be coated with asbestos containing materials. Southwest Gas will remove and dispose of any abandoned steel gas lines that are exposed and in conflict with construction. The Contractor shall contact Southwest Gas at 602-271-GASS (271-4277) to coordinate the removal of the steel gas lines once excavation has begun.

The Southwest Gas system has Regulator Stations, rectifier stations, pipeline valves, line locating stations, test points and underground vaults each with protective valve box lids and vault manhole covers. According to the U.S. Department of Transportation's Pipeline Safety Regulations and Southwest Gas operating procedures, these facilities shall be accessible at all times.

Southwest Gas will paint yellow all protective valve box lids and vault manhole covers. The Contractor shall protect these facilities during construction. The Contractor shall adjust all valve box lids and vault manhole covers due to grading and paving operations per Southwest Gas details 211A and 220 as provided in **Appendix F**. Valve box lids and vaults shall indicate gas.

Contact Yvonne Aguirre 602-484-5338, for coordinating work and inspections. For emergencies, please call 602-271-GASS (4277).

No additional measurement or payment will be made for pipe supports as part of this project. Backfilling and bedding required to rebury exposed Southwest Gas pipelines in conjunction with crossing pipelines including storm drain and SRP Irrigation pipes shall be considered included in the cost of the installation of the pipeline.

Salt River Project (Irrigation)

Salt River Project Irrigation (SRPI) owns irrigation facilities throughout the project limits which include existing pipe, concrete ditches, earthen ditches, headwalls, manholes, and turnout structures. Relocation work for these facilities will be done in combination by both the MCDOT Contractor and SRPI forces. Work that will be done by SRPI will be limited to the pipeline delivery turnout structures. The Contractor will be responsible for all other SRPI relocation work as shown on the project plans and detailed on the SRPI relocation design plans provided in **Appendix G**. SRP will provide construction staking for Contractor. EPS Group (sub to HDR for Construction Administration) will run a QC and record locations for Record Drawings.

The Contractor shall coordinate with the SRPI Inspector noted on the plan set for: Any needed dry-ups for the relocation work, turnout structure connection; SRPI survey request, or other work that may require outages of SRPI facilities; SRPI access to the site for work that will be done by SRPI forces and for required SRPI inspections; Attendance to the SRPI preconstruction meeting; And adherence to all SRPI requirements as indicated in these specifications, included in the project plans, and standards and specifications as referenced in plans and specifications.

The SRPI 2019 dry-up is currently scheduled from Jan 10, 2019 through Feb 11, 2019. SRPI's annual dry-up is generally scheduled by the SRP Operations Division through the month of January, however, the Contractor will need to coordinate closely with the SRPI inspector for all work requiring a dry-up. Additional smaller dry-ups, if required within the SRPI system, must be granted by SRPI Operations, and will need to be coordinated with the SRPI inspector. Advance notice of 4 weeks shall be provided to SRPI and the Engineer for additional dry-ups unless otherwise approved by the Engineer.

Important Note: SRPI will not grant a Notice to Proceed for construction and inspection services until all utilities are relocated out of the way and SRP Land Division has provided a Clearance. Some of this utility relocation work will be done by the Contractor which include relocation of potable water facilities.

The contractor shall coordinate the SRPI relocation work with the relocation of private irrigation facilities in order to avoid disruption to farming activities. If temporary ditches are necessary to maintain deliveries from SRP or private irrigation ditches, they shall be designed, installed and maintained by the Contractor at no additional cost to the County. If construction of a temporary ditch is not possible to maintain the delivery, a pump around may be installed with the approval of the Engineer per Section 635.

The contractor shall lay pipe in such a way that provides clearance as indicated in Section 505.2 of these specifications. There will be no separate measurement or payment made

for the coordination and revisions to the piping layout in order to accommodate this clearance requirement.

Starting at MC 85 station 1237+37 and continuing west of 91st Avenue and north south along 91st Avenue, SRPI relocations cannot proceed until the USA Fee Land/Easement land exchange is completed. These areas are noted on the attached SRPI plan sheets labeled as Phase 1B. This will affect the construction schedule of the project improvements that need to be constructed over and adjacent to the existing SRPI pipelines to be relocated and removed. The roadway improvements throughout these areas of the project shall not begin without the approval of the Engineer. Expected completion of the USA Fee land exchange is December 31, 2018. For all irrigation relocation west of station 1237+37 additive alternate bid items have been added to the bid schedule as follows: 18" RGRCP, Class V (Additive Alternative Bid Item); 24" RGRCP, Class V (Additive Alternative Bid Item); 30" RGRCP, Class V (Additive Alternative Bid Item); 36" RGRCP, Class V (Additive Alternative Bid Item); 42" RGRCP, Class V (Additive Alternative Bid Item); 48" RGRCP, Class V (Additive Alternative Bid Item); SRPI Irrigation Manhole (Additive Alternative Bid Item); Headwall, Per SRP Details, 1-24" Pipe (Additive Alternative Bid Item); Headwall, Per SRP Details, 1-36" Pipe (Additive Alternative Bid Item); Headwall, Per SRP Details, 1-42" Pipe (Additive Alternative Bid Item); Trash Rack, Per SRP Details (Additive Alternative Bid Item). No additional measurement or payment shall be made for construction delays or remobilization expenses incurred by the contractor to construct any of the improvements shown on the project plans or SRPI relocation design plans within this area of the project. Updated plans for Phase 1B are currently not available for distribution. Additional work at 79th Avenue is required but not currently shown in the plans provided with the bid package. Construction of these items will be handled as additional quantities under existing bid items.

Salt River Project Power (Transmission)

Prior to construction, the Contractor shall contact the Salt River Project Safety Services to arrange for a safety meeting regarding work under transmission power lines. The contact number for SRP Safety Services is 602-236-8117.

Pole setup areas are shown on the project plans. The storage of construction equipment and materials at SRP pole setup areas or under transmission power lines is not allowed.

During construction, the Contractor shall communicate all construction activities within the vicinity of SRP Transmission facilities as they are scheduled including duration and scope of work. If no work is being performed in the vicinity of SRP transmission facilities the contractor shall not store equipment or materials in a way that would preclude access. SRP requires 24-hour/7 days-a-week access to the transmission power line facilities for routine equipment setup and maintenance. The contractor shall allow access accordingly.

Salt River Project (Distribution)

One month prior to construction of any pipelines within 10-feet of existing SRP distribution pole locations, the Contractor is to notify SRP of construction and evaluate the need for

the installation of pole bracing. SRP distribution will provide pole bracing as needed to provide support during the adjacent trenching operations accordingly. Once the Contractor and SRP Distribution have agreed that pole bracing is no longer necessary, the Contractor is to notify the Engineer and SRP in writing that the pole bracing can be removed. If a pole brace is removed and subsequently needs to be reinstalled, costs for reinstallation will be the sole responsibility of the Contractor. No additional measurement or payment will be made for coordination or providing access to SRP throughout the construction of the project.

The Contractor will be responsible for construction of SRP distribution conduit as detailed on the SRP distribution relocation design plans provided in **Appendix I**. Estimated quantities at the time of bid are as follows:

Total Trench = 3,100'
2.5" Conduit = 3,036'
3" Conduit = 890'
Switch Pad (76" x 50")= 1
Fuse Pad (57" x 70")= 1
3 Phase Xfmr Pad(90" x 66") = 1
1 Phase Xfmr Pad (42" x 42") = 1

Some of the specified materials may be provided by SRP distribution. The Contractor shall coordinate with SRP and the Engineer to confirm materials being provided prior to ordering. Measurement and payment for SRP distribution facilities will be made under the following bid items: 471.61210 SCH. 40 PVC ELECTRICAL CONDUIT, 2 ½" (TRENCHED), 471.61210 SCH. 40 PVC ELECTRICAL CONDUIT, 3" (TRENCHED) and 340.01213 CONCRETE PAD PER SRP PLANS. Trenching shall be considered incidental to conduit installation.

Level 3

The contractor will be responsible for removal of Level 3 facilities at the locations shown on the plans under bid item 350.01112 – Remove Pipe, Backfill, & Compact, D-12". The contractor shall contact Carlos Muniz at Level 3 at (602)-332-2162 (office), (623)-215-5129 (cell), or carlos.muniz@level3.com at least three business days prior to cutting and removal.

105.6.3 MEASUREMENT AND PAYMENT

No additional measurement or payment will be provided for Cooperation with Utilities.

SECTION 107 LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

107.1 COMPLIANCE WITH LAWS, add the following to the 2016 MCDOT Supplement to the MAG Uniform Standard Specifications:

All other requirements of Section 107 in the 2016 MCDOT Supplement to the MAG Uniform Standard Specifications will remain in effect.

Contractor, in connection with any activity under this Contract, shall not discriminate against any person on the grounds of race, color, religion, sex, national origin, age, disability, political affiliation or belief. Contractor shall include a clause to this effect in all subcontracts. Contractor shall also comply with all applicable provisions of the Americans with Disabilities Act of 1990.

Contractor and its subcontractors and their respective employees, agents, and representatives, when performing the work described in the Construction Specifications, shall comply with all rules and regulations set forth by the County, pertaining to the safety, loss control and environmental regulations, and shall perform the work in compliance with governmental laws and regulations pertaining to occupational health, and environmental protection, including any local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the contract.

Contractor is solely responsible for jobsite ("site") conditions during all phases of construction, beginning with Contractor's mobilization of equipment and/or personnel until the work has been accepted by the Engineer and a certificate of completion has been issued by the County. Contractor's responsibility for the site during the period specified above shall not be limited to Contractor's working hours and shall include but not necessarily be limited to the following:

- Physical condition of the site;
- Safety of Contractor's personnel at the site and all other persons entering the site or areas adjacent to the site;
- Security of Contractor's equipment and material; and
- Reasonable aesthetic appearance of the site.

Contractor shall ensure that internal combustion equipment is operated with a muffler of a type recommended by the manufacturer.

The Contractor shall ensure that contract operations are in compliance with procedures and requirements of the Maricopa County Air Pollution Control Rules and Ordinances with special attention given to the fugitive dust requirements. The Contractor shall pay any penalties imposed upon MCDOT where the violation is a direct result of actions or inactions by the Contractor, the contractor's employees or subcontractors.

107.1.1 Small Business Enterprise Program (SBE):

It is Maricopa County's policy to endeavor to ensure in every way possible that small business participation firms shall have the opportunity to provide professional services, materials, and contractual services to the County in a nondiscriminatory manner.

107.1.2 Environmental Mitigation Measures:

The Contractor shall adhere to all terms, conditions, and requirements contained in the Environmental Clearance. The Environmental Clearance and all related documents are located in **Appendix B** to these Special Provisions.

During project construction, MCDOT Environmental Program Branch shall be notified at (602) 506-8068 of any proposed changes in scope of work and/or work to be added outside the defined project limits, for evaluation of potential environmental impacts.

Payment for Environmental Mitigation Compliance will be made at the Contract Lump Sum Price. Payment shall be full compensation for performing all activities associated with fulfilling environmental mitigation measures that are not directly included within other pay items. Contractor will be compensated for this contract item at a rate of 15% of the contract lump sum with the first progress payment. The remaining 85% of the contract amount will be pro-rated over the entire length of the project.

107.2 PERMITS, add the following:

It is the Contractor's responsibility to obtain all permits and licenses, pay all fees, charges, and taxes and prepare all required notices for the lawful execution of the work. No separate measurement or payment for permits will be made with this project.

Permits for earth moving may be obtained from Air Pollution Control, Maricopa County Department of Environmental Management, 1001 North Central Avenue, Suite 100, Phoenix, Arizona 85004, Telephone Number (602) 506-6010, website http://www.maricopa.gov/aq/ or https://www.maricopa.gov/1919/Dust-Control-Permit-Applications-Rule-31. A copy of the earthmoving permit and dust control plan shall be submitted to the Engineer prior to commencement of any earthmoving activities.

In addition to Maricopa County permits, the Contractor shall comply with all City of Phoenix and City of Tolleson permitting and business licensing requirements, fees and annual renewals and the permits cited below.

Asbestos/National Emission Standards for Hazardous Air Pollutants (NESHAP) will be necessary for this project and can be obtain through the following websites:
(http://www.maricopa.gov/1701/Asbestos) NESHAP Form:
(http://www.maricopa.gov/DocumentCenter/View/5108)

107.2.1 AZPDES (NPDES) Construction General Permit Requirements, add the following to Section 107.2.1 of the 2016 MCDOT Supplement to the MAG Uniform Standard Specifications:

This project is subject to the Arizona Pollutant Discharge Elimination System (AZPDES) program's permit requirements for construction sites. The Contractor is responsible for obtaining applicable permits and complying with permit requirements.
All other requirements of Section 107 in the 2016 MCDOT Supplement to the MAG Uniform Standard Specifications will remain in effect.

107.2.2 Compliance with Maricopa County MS4 Stormwater Regulation:

This project is subject to the Maricopa County Stormwater Quality Management and Discharge Control Regulation. The Contractor shall be responsible for all activities

associated with obtaining construction permit approvals, construction permit compliance, post-construction permit application and payment of fees relating to and established by the regulation. Permit requirements and related information are available from the following internet website:

www.maricopa.gov/Stormwater

Unless a construction permit transfer is authorized by the Engineer the Contractor shall be responsible for the post-construction permit application and fees, and obtaining termination of coverage. The responsibility of obtaining post-construction permit coverage and post-construction permit compliance are not Contractor responsibilities.

Fines and penalties imposed by Maricopa County for Contractor's failure to comply with the Maricopa County Stormwater Quality Management and Discharge Control Regulation shall be paid by the Contractor.

Payment for Compliance with Maricopa County MS4 Stormwater Regulation will be made at the Contract Lump Sum Price. Payment shall be full compensation for performing all activities and payment of all fees including fines and transfer fees (if applicable) associated with the Maricopa County Stormwater Quality Management and Discharge Control Regulation not directly included within other pay items. Contractor compensation at 50% of the contract amount will be allowed with the first progress payment. The remaining 50% of the contract amount will be paid with the final project payment.

S**ection 107.5.3 HAZARDOUS MATERIAL HANDLING**, add the following:

107.5.3.2 MEASUREMENT AND PAYMENT

Environmental mitigation measures 12, 14 and 15 listed in Appendix B of project specifications shall be paid for under item 350.50005 "MISCELLANEOUS REMOVALS AND OTHER WORK" in accordance with Section 109.5 Actual Cost Work. All other environmental mitigation measures listed Appendix B shall be paid for under bid item 107.02100 unless separate bid items are included in the bid schedule.

108.3 CORRESPONDENCE TO THE CONTRACTOR, add the following:

108.3.1 Escrow of Bid Documentation:

The Contractor shall submit its Bid Documentation in a sealed container within three days of the Pre-Construction Meeting. The documentation shall contain all assumptions and calculations used to determine each of the unit prices and will be placed in escrow with a banking institution or other bonded document storage facility and preserved by that institution or facility as specified in the following subsections.

(A) Submittal of Bid Documentation:

The Contractor shall submit the Bid Documentation in a sealed container. The container shall be clearly marked "Bid Documentation" and show on the face of the container the Contractor's name and address, the date of submittal, the project number, and the contract number.

(B) Affidavit:

In addition to the Bid Documentation, the Contractor shall submit an affidavit, signed under oath by a representative of the Contractor authorized to execute Bid Proposals, listing each bid document submitted by author, date, nature, and subject matter. The affidavit shall attest:

1) that the affiant has personally examined the Bid Documentation,
2) that the affidavit lists all of the documents relied upon by the bidder in preparing the bid for the project, and
3) that all Bid Documentation is included in the sealed container submitted in escrow.

(C) Duration and Use:

Within three (3) days of Pre-Construction meeting, MCDOT and the Contractor will jointly deliver the sealed container and affidavit to a banking institution or other bonded document storage facility that is agreed upon by MCDOT and the Contractor for placement in a safety deposit box, vault or other secure accommodation.

The document depository agreement shall reflect that the Bid Documentation and affidavit shall remain in escrow during the life of the contract or until the Contractor requests that MCDOT verify a request for additional compensation or an extension of time based on its bid or unless a court order provides MCDOT permission to obtain the Bid Documentation. In the absence of such action and provided the contractor signs the final Standard Release Form, MCDOT will instruct the document depository to release the sealed container to the Contractor.

In accordance with the Contractor's representation that the sealed container placed in escrow contains all of the materials relied upon in preparing its bid, the Contractor agrees to waive the right to use any Bid Documentation other than that placed in escrow in disputes arising out of the contract.

(D) Format and Contents:

The Contractor may submit Bid Documents for escrow in the usual cost estimating format. It is not the intention of this specification to cause any bidder extra work during the preparation of the proposal, but to ensure that the Escrow Bid Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Bid Documents shall be written in the English language.

It is required that the Bid Documents clearly itemize the estimated costs of performing the work of each bid item contained in the bid schedule. Bid items are to be separated into

sub-items as required to present a completed and detailed cost estimate and allow a detailed cost review. The Bid Documents shall include all quantity take-offs, crew, equipment, calculations of rates of production and progress, copies of quotations from subcontractors and suppliers, and memoranda, narratives, consultant's reports, add/deduct sheets, and all other information included by the bidder to arrive at the prices contained in the bid proposal. Estimated costs shall be broken down into the bidder's usual estimate categories such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract cost as appropriate. Plant and equipment and indirect costs are to be detailed in the bidder's usual format. The contractor's allocation of plant and equipment, indirect costs, contingencies, markup and other items to each bid item shall be included.

All costs shall be identified. For bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed costs estimate, providing that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markups, as applicable, are allocated.

If the Bid Documents were developed using computer generated software, the contractor shall provide the documents in hard copy and shall identify the name and version of the computer software used.

Bid documents provided by MCDOT need not be included in the Bid Documents for escrow unless needed to comply with the requirements of this subsection.

(E) Confidentiality of Bid Documentation:

The Bid Documentation and affidavit in escrow are, and shall remain, the property of the Contractor. MCDOT has no interest in, or right to, the Bid Documentation unless the contractor requests that MCDOT verify its request for additional compensation or an extension of time based on its bid or unless a court order gives MCDOT permission to obtain the Bid Documentation. In the event of such requests or court orders, the Bid Documentation and affidavit will become the property of MCDOT until complete resolution of the reason for the request or court order is achieved. These materials, and all copies made by MCDOT, will be returned to the Contractor at the conclusion of litigation, or final resolution of all outstanding claims, upon execution of a final release. MCDOT will make every reasonable effort to ensure that the Bid Documentation remains confidential within MCDOT except that said documents may be used in court, arbitration or other dispute resolution proceedings. Otherwise, said documents will not be made available to anyone outside MCDOT.

(F) Cost and Escrow Instructions:

The cost of the escrow documentation depository storage facility will be borne by MCDOT. MCDOT will provide escrow instructions to the document depository consistent with this subsection.

(G) Payment:

Payment for the cost of escrow facility will be through Allowance Item 108.03000 BID DOCUMENT ESCROW.

There will be no separate payment for compilation of the data, providing the container or the cost of verification of the Bid Documentation. All costs shall be included in the overall contract bid price.

SECTION 110, **NOTIFICATION OF CHANGED CONDITIONS AND DISPUTE RESOLUTION**, is added per the MCDOT Supplement to the MAG Uniform Standard Specifications and Details.

SECTION 111 ENGINEER'S OFFICE FACILITIES:

Supplement or revise the 2016 MCDOT Supplement to the MAG Uniform Standard Specifications and Details as follows:

111.1 DESCRIPTION, add the following:

Type II Engineer Office Facilities and hook ups for a Quality Assurance Laboratory will be required for this project.

111.3.3 Telephones and Data Circuits, second paragraph is revised to read:

The dedicated computer line shall be a high-speed cell modem and include internet service. When high-speed internet service is available through a cell modem service, it shall be provided for the computer and the corresponding telephone line can be deleted.

111.3.4 Utilities for On-Site Quality Assurance Testing Lab

In addition to utilities provided to the Type II Engineering Office Facility, the Contractor shall also supply electrical and water hook-ups, and janitorial services for the operation of a materials testing lab for the duration of the Contract.

Minimum service requirements for the trailer are:

Electrical: 200 amp, 220V connection
Water: 60 psi, ¾" – 1" house connection

SECTION 205 ROADWAY EXCAVATION

205.2 UNSUITABLE MATERIAL, add the following:

Existing asphalt pavement that needs to be removed within the roadway excavation areas shall be considered unsuitable material.

SECTION 215 EARTHWORK FOR OPEN CHANNELS

215.1 DESCRIPTION, add the following:

Excavation (or fill) to develop the retention basins as depicted by the control points shown within the details of the drainage plans.

Excavation (or fill) to construct the maintenance road for the retention basins based on the control points and typical section detail shown on the drainage plans.

215.5 (A) Grading, add the following:

(4) Retention Basin side slopes in both cut and fill

215.7 MEASUREMENT, add the following:

Earthwork for the construction of the retention basins shall be measured based on per cubic yard of excavation. The measurement limit of excavation shall be to the tie in location of new retention basin to existing ground. The limits are shown on Detail DB on the plans.

Measurement for the construction of the maintenance road at locations shown on the plans shall be based on per linear foot of maintenance road. The measurement limits for the maintenance road are shown in Detail DB shown on the plans. The limits include construction of the road and adjacent swale.

215.8 PAYMENT, add the following:

Earthwork for the construction of the retention basins shall be paid for at the contract unit price per cubic yard of excavation. The price shall include, clearing, stripping, excavation, fill, backfill, compaction, grading, hauling and removal and disposal of excess excavated material and debris.

Construction of the maintenance road shall be paid for at the contract unit price per linear foot. The price shall include, clearing, stripping, excavation, fill, backfill, compaction, grading, hauling and removal and disposal of excess excavated material and debris.

SECTION 220 RIPRAP CONSTRUCTION

220.2 MATERIALS, add the following:

The type and color of riprap shall match the existing riprap used within the project area. The Contractor shall provide samples for review and approval prior.

SECTION 301 SUBGRADE PREPARATION

301.7 MEASUREMENT, add the following

No separate measurement will be made for stripping, scarifying, grading, excavating, hauling, filling, compacting, disposing of excess or unsuitable materials or pavement removal that is occurring in locations requiring subgrade preparation for new construction. The measurement and cost being included in item 205.01150 “ROADWAY EXCAVATION”.

Measurement for Subgrade Preparation will include the accepted area of new work on driveways that are surfaced with concrete pavement, asphalt pavement, aggregate base, or select materials and the corresponding area of non-surfaced graded driveways.

Any excavated material considered waste should be disposed of and no measurement or payment will be made. No separate measurement or payment will be made for asphalt removal within subgrade preparation areas. The measurement and cost being included in item 205.01150 “ROADWAY EXCAVATION”.

SECTION 309 LIME-CEMENT STABILIZATION OF SUBGRADE

Section 309 is deleted in its entirety from all standard specifications and replaced with the following:

309.1 DESCRIPTION:

This section shall consist of constructing a mixture of soil, lime, cement and water for the lime-cement stabilization of subgrade soils. The work shall be performed in conformity with the lines, grades thickness, and typical cross sections shown on the plans. This section generally follows MAG Section 309, but the construction process is modified by applying and mixing cement into the lime-subgrade soil mixture after mellowing, before final compaction. The purpose of cement addition is to reduce overall curing time of the stabilized subgrade.

According to the National Lime Association, “Stabilization: When adequate quantities of lime and water are added, the pH of the soil quickly increases to above 10.5, which enables the clay particles to break down. Determining the amount of lime necessary is part of the design process and is approximated by tests such as the Eades and Grim test (ASTM D3276). Silica and alumina are released to react with calcium from the lime to form calcium-silicate-hydrates (CSH) and calcium-aluminate-hydrates (CAH). CSH and CAH are cementitious products similar to those formed in Portland cement. They form the matrix that contributes to strength of lime-stabilized soil layers. As this matrix forms, the soil is transformed from a sandy, granular material to a hard, relatively impermeable layer with significant load bearing capacity. The process begins within hours and can continue for years in a properly designed system. The matrix formed is permanent, durable, and significantly impermeable, producing a structural layer that is both strong and flexible.”

309.2 MATERIALS:

309.2.1 Soil or Subgrade: For lime-cement stabilization applications, the soil or subgrade material used for this work shall consist of materials on the site or imported, and shall be free of roots, sod, weeds and stones larger than 3 inches and have a plasticity index (PI) greater than 10, when tested in accordance with AASHTO T-146 Method A, AASHTO T-89 Method A, and T-90.

309.2.2 Quicklime and Hydrated Lime: Lime used shall be either quicklime or hydrated lime and shall conform to the requirements of ASTM C977. If quick lime will be the lime source, hydration processed should be carried out in an enclosed reaction tank, and the resultant lime slurry shall meet the requirements of subsection 309.2.3. All lime shall come from a single source. If a source change is requested, a new mix design shall be submitted using lime from the proposed new source. The new design must be approved by the Engineer prior to use.

309.2.3 Lime Slurry: Lime slurry shall be a pumpable suspension of solids in water. The solids portion of the mixture, when considered on the basis of solids content, shall consist principally of hydrated lime of a quality and fineness sufficient to meet Section 309.2.2 requirements. A certificate of compliance shall be provided to the Engineer for each load of lime applied at the project.

309.2.4 Water: Water used for quicklime hydration, mixing or curing shall be of potable quality and shall be considered incidental to the items of work

309.2.5 Portland Cement: Portland cement shall comply with the Type II cement in MAG Section 725.

309.3 COMPOSITION:

309.3.1 Lime-Cement Stabilization Mix Design: Before commencing lime-cement treatment work, the Contractor shall submit for approval by the Engineer, a proposed mix design. The proposed mix design shall be prepared by a testing laboratory under the direction and control of a registered professional engineer. The mix design shall be determined using the soils or subgrade material to be stabilized and lime and cement from the proposed supplier, and shall report and comply with the following requirements:

Untreated Soil:

(a) Sulfates: Tested per ARIZ 733, AASHTO T-290, or ASTM C1580.

(b) Moisture-Density Relationship (Proctor): Tested per ASTM D698 Method A.

(c) Plasticity Index: Test method AASHTO T-146 Method A, AASHTO T-89 Method A, and T-90.

(d) Sieve Analysis and Minus No. 200 Wash: Test methods ASTM C136 and ASTM D1140.

Lime-cement Treated Soil:

(a) pH: Lime saturation content per ASTM C977 APPENDIX or ASTM D6276.

(b) Plasticity Index: Less than 3, per AASHTO T-146 Method A, AASHTO T-89 Method A, and T-90.

(c) Swell Potential: Maximum expansive potential of 1.0 percent ARIZ 249 using passing No. 4 sieve material. The maximum expansive potential shall be determined on a sample compacted to approximately 95 percent of the ASTM D698 Method A maximum dry density at approximately 2% below optimum moisture content. The sample should be confined under a 100 psf surcharge and inundated.

(d) Unconfined Compressive Strength: Minimum 160 psi per ASTM D5102 Procedure A, after five days curing at 100℉, sealed in air-tight condition.

(e) Mellowing time and mellowing moisture content for treated soil sections (b) and (c) to be determined by design engineer. Mellowing time and mellowing moisture content for treated soil section d determined by ASTM D5102.

(f) Hydrated Lime Content: The design engineer shall designate the minimum percentage of lime by dry weight of the dry soil to satisfy the criteria for Section 309.3.2 requirements. The percentage of lime specified shall be sufficient to allow for expected variations during the mixing process. A minimum of 3.0% hydrated lime and 2.0% of cement by dry weight of the dry soil is required for all mix designs. Increase lime content in trial design if the minimum content does not meet the requirements in sections (b) and (c).

309.4 CONSTRUCTION:

309.4.1 General: It is the primary requirement of this specification to secure a completed course of treated material containing a uniform blend of lime and cement, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses.

Prior to beginning any lime-cement stabilization, the subgrade shall be constructed and brought to grade and shall be shaped to conform to the typical sections, lines and grades as shown on the plans.

Lime and cement shall be applied in the proper sequence at the mix design rate for the depth of subgrade stabilization shown on the plans or requested by the Engineer.

When the design requires treatement to a depth less than 12 inches, the subgrade soil shall be treated in place and allowed to cure in place. After final mixing, the layer shall be compacted in one lift.

When the design requires treatment to a depth greater than 12 inches, the subgrade soil shall be treated in equal layers. The top layer(s) of soil shall be removed and stockpiled. The lower layer of soil to be treated shall then be treated and allowed to cure in place. After final mixing, the lower layer shall be compacted in maximum 12 inch thick compacted lifts. The stockpiled soil shall then be placed, treated, mixed and compacted in successive maximum 12 inch thick compacted lifts.

If the lime-cement stabilization is found to be in conflict with an existing or proposed utility line, the lime-cement stabilization shall be omitted and replaced with a half sack slurry, or approved equal. The half slack slurry shall be installed from the bottom of the aggregate base course layer to a depth of 8 inches below the aggregate base course layer or to the spring line of the utility, whichever comes first. The width of the half sack slurry application shall be 2 feet wider than the width of utility (one foot on each side) found to be in conflict.

309.4.2 Weather Limitation: Lime-cement treated subgrade shall not be constructed if the ambient temperature is below 40° F or when conditions indicate that tempe ratures may fall below 40° F within the first 24 hours of starting the treatment process .

309.4.3 Equipment: Contractor shall provide all equipment necessary to complete the work including grading and scarifying equipment, a spreader of the lime, slurry distribution trucks, mixing and pulverizing equipment (such as Bomag RS600C, equivalent or heavier, shall be used for mixing lime and cement with subgrade soil), sheepsfoot and pneumatic rollers, sprinkling equipment and trucks. Gravity feed or tailgate spreading, defined as not having automatic controls, will not be permitted. All equipment used for this work is subject to approval by the Engineer.

Cement spreader shall be a specially constructed device to distribute bulk cement at the specified rate. The spreader shall have the ability to maintain a consistent spread rate over variable travel speeds.

Slurry distribution trucks must be equipped with an agitator to keep the additive (Hydrated Lime, as appropriate) and water in a homogeneous suspension. Mixture shall be uniform in consistency from beginning to end of the distribution operation.

Equipment used shall be of a type sufficient to ensure that the soil subgrade is cut uniformly to the proper depth and shall have cutters that will plane the secondary grade to a smooth surface over the entire width of the cut. The machine shall be of such a design that a visible indication is given at all times the machine is cutting to the proper depth.

309.4.4 Application of Lime: Lime shall be spread in the form of lime slurry and only on that area where the mixing operation can be completed during the same working day. The lime application rate shall be at the design content to +0.5%, based on weight of dry soil. The Engineer reserves the right to vary the rate of application of lime from the mix design during the progress of construction as necessary to maintain a pH of the lime/soil mixture above 12.0 and the desired characteristics of the treated subgrade.

For all lime applications, the Contractor shall provide the Engineer with daily application quantities.

309.4.4.1 Quicklime Application: If quicklime is the lime source, hydration process should be carried out in an enclosed reaction tank, and the resultant lime slurry shall meet the requirements of subsection 309.2.3. Contractor shall exercise safety measures when mixing quicklime with water. The resultant lime slurry shall be applied in accordance with Section 309.4.4.3.

309.4.4.2 Dry Hydrated Lime Application: Water should be mixed to the dry hydrated lime to form lime slurry that meets the requirement of Section 309.2.3 before application.

309.4.4.3 Lime Slurry Application: Lime slurry shall be mixed in a portable mixing unit and spread with trucks equipped with an approved distribution system. Lime slurry shall be applied at a rate that will yield the required lime percentage determined by the mix design.

309.4.5 Mixing of Lime Slurry with Subgrade Soil: Immediately following lime slurry application, thoroughly mix the slurry into the subgrade to the full designed depth of stabilization with the pulverizing equipment.

The use of disc plows or blades are strictly prohibited except in areas specified by the Engineer. To ensure a complete chemical reaction of the lime and soil or subgrade, water shall be used as required to maintain moisture content at optimum to +4% above the optimum of the lime-cement treated mix design Proctor, prior to beginning compaction. During the interval of time between application and mixing, lime that has been applied, unmixed and exposed to the open air for 10 hours or more will not be accepted. No traffic other than the mixing equipment will be allowed to pass over the spread of lime until after completion of mixing. After mixing and prior to the initial compaction, clay lumps shall meet the following criteria:

	Percent
Minimum Passing 1-1/2 inch sieve	100
Minimum Passing No. 4 sieve	60

309.4.5.1 Temporary Compaction of Lime-Soil Mixture: After thorough mixing of lime and subgrade soil, the treated course should be lightly rolled to seal the lift, and left to cure for a minimum of 12 hours, or mellowing time, or the time as directed by Engineer. During this period, the treated lift shall maintain moisture content at optimum to +2% above the optimum.

309.4.5.2 Application of Cement: Prior to beginning any cement application, **the previously lime-treated subgrade shall be re-scarified to full depth and width of the treatment**. The quantity of cement shall be by weight as a percentage of the dry weight of the soil as determined by the lime-cement stabilization mix design or as directed by the Engineer, and shall be applied uniformly on the soil in a manner satisfactory to the Engineer. The allowable deviation in uniformity shall not exceed 10 percent. The entire

operation of spreading and mixing shall be conducted in such a manner as will result in a uniform soil, lime-cement and water mixture for the full design width and depth.

The percentage of moisture in the soil, at the time of cement application, shall not exceed the quantity that will permit a uniform and intimate mixture of the soil, lime and cement during mixing operations, and it shall not exceed the specified optimum moisture content for the lime-cement stabilization mix design.

309.4.5.3 Final Mixing: After application of cement, the previously lime treated subgrade soil shall be thoroughly mixed with the pulverizing equipment to full depth and width of the treatment as shown on the plans. Mixing and moisture conditioning shall be continued until the mixture is uniform in color and at a moisture content of optimum to +4% of optimum as determined in the lime-cement treated mix design Proctor. Any mixture of soil, lime and cement which has not been compacted and finished shall not remain undisturbed for more than 30 minutes but shall be agitated by remixing.

309.4.6 Final Compaction: Compaction of the lime-cement treated subgrade shall begin immediately after final mixing and after final gradation has been met. Final compaction of the treated subgrade shall be complete within two (2) hours of initial cement placement. The course shall be sprinkled, if necessary, and compacted to provide the density specified below as determined by the use of the Standard Proctor (ASTM D 698) Moisture I Density Relationship. Testing shall occur after the subgrade is brought to the required lines and grades shown on the Typical Sections and Plans.

Description	Density, Percent	Moisture, Percent
Lime-cement stabilized subgrade that will receive subsequent courses.	Not less than 95, except when shown otherwise on the Plans.	Optimum to plus 4% unless otherwise shown on the Plans.

The in-place compacted field density shall be determined in accordance with ASTM D1556, sand cone, or ASTM D6938, nuclear gauge. In the event of disputed results, the nuclear gauge density shall be correlated to the referee sand cone density while the nuclear water content shall be correlated to the referee ASTM D2216 water content. The adjustment for rock larger than the no. 4 sieve shall be performed in accordance with ASTM D4718. In-place density tests for quality assurance purpose shall be performed by the Engineer at the rate of one per 2000 linear feet of a paving lane. Contractor is responsible for the quality control tests. If the material fails to meet these density requirements it shall be reworked as necessary to meet said requirements. Reapplication of cement (dry spreading) will be required by the Engineer to aid in recovering lost strength from reworking. Throughout this entire operation, the shape of the course shall be smooth and in conformity with the Typical Sections shown on the Plans and to the established lines and grades. Should the material due to any reason or cause lose the required stability, density and finish before the next course is placed or the work is accepted, it shall be recompacted and refinished at the sole expense of the Contractor.

Finishing of the completed section shall be accomplished by rolling as directed with a pneumatic tire or other suitable roller sufficiently light to prevent hair cracking.

309.4.7 Thickness: The thickness of the lime-cement treated subgrade shall be determined by visual inspection and/or by depth tests taken at intervals so that each test shall represent no more than 1000 square yards per layer. If more than one layer, the method used to remove material to determine the depth of lime treatment may be by shovel and/or pick, coring or other method approved by the Engineer. Phenolphthalein solution shall be used to detect the presence of lime as the means of visual inspection. When the grade deficiency is more than 1 inch, the Contractor shall correct such areas in a manner satisfactory to the Engineer. Contractor shall replace, at no cost to the County, the material where depth tests are taken.

All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required, and reshaping and recompacting. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereupon or the work is accepted. Compaction and finishing shall be done in such a manner as to produce a smooth dense surface free of compaction planes, cracks, ridges or loose materials.

Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion, shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades.

309.4.8 Finishing and Curing: Immediately after completing compaction of the final course, clip, skin, or tight-blade the surface with a maintainer or subgrade trimmer to remove loosened material and dispose of it at an approved location. Seal the clipped surface immediately by rolling with a pneumatic tire roller until a smooth surface is attained. Add small increments of water as needed during rolling. Shape and maintain the course and surface in conformity with the typical sections, lines, and grades. Complete finishing operations within 2 hours. after final compaction.

Finished grade tolerances for subgrade and base will be in accordance with Section 301.4 per the MAG Specifications.

Cure by maintaining a thorough and continuously moist condition by sprinkling. When permitted, cure with an asphalt material applied at a rate of 0.05 to 0.20 gallon. per square yard as approved. Do not allow equipment on the finished course during curing except as required for sprinkling, unless otherwise approved.

Cure the finished section for 2 days before adding another course or opening to traffic unless otherwise directed. Apply subsequent courses within 14 calendar days of completion of final compaction of the underlying treated course unless otherwise approved.

309.4.9 Maintenance: The Contractor shall maintain, at his/her own expense, the entire lime-cement treated subgrade in good condition from the start of work until all the work has been completed, cured for a minimum of two (2) days and accepted by the Engineer.

The Contractor shall make provisions for maintaining the compacted subgrade in a moist condition during the curing time. The requirement is to maintain the in situ moisture at least two (2) percentage points above optimum conditions throughout the treated section. This is to be accomplished by frequent light sprinkling of the surface. During this curing time, all construction vehicles shall be prohibited from the subgrade for a minimum of the two (2) day curing period as defined in subsection 309.4.8. Aggregate base may be placed after two (2) days.

The Contractor shall maintain the completed subgrade within the limits of his contract in good condition, satisfactory to the Engineer as to grade, crown and cross section until such time as the surface course is constructed. All irregularities or other defects that may occur shall be repaired by the Contractor as his expense.

309.5 MEASUREMENT:

Measurement of the lime-cement stabilized subgrade shall be by the square yard (SY) of the stabilized area completed and accepted. Lime and cement used in the stabilization subgrade shall be measured by the ton actually used under bid items 309.02000 and 725.20000 respectively. Bid item 309.02000 is based off of the weight of dry hydrated lime. If quicklime is used as a lime source, the equivalent weight of hydrated lime shall be calculated by multiplying the dry weight of quicklime by a factor of 1.3. i.e. for each ton of dry quicklime that is used, payment will be made in the amount of 1.3 tons of hydrated lime.

No additional measurement shall be made for installing half sack slurry for utilities encroaching into the lime-cement stabilized subgrade. The surface area treated with half sack slurry shall be measured per square yard as lime-cement stabilized subgrade. Lime and cement shall not be measured within slurry areas.

No separate measurement or payment will be made for stripping, scarifying, grading, excavating, hauling, filling, compacting, disposing of excess or unsuitable materials or pavement removal from the area to be stabilized. The measurement and cost being included in item 205.01150 “ROADWAY EXCAVATION”.

309.6 PAYMENT:

The lime treated soils measured as provided above, will be paid for at the contract price per square yard, which price shall be full compensation for the item complete, as herein described and specified.

Lime and cement will be paid for separately as measured above.

No additional payment for curing seal will be made, the cost being considered incidental to the square yard of lime treated subgrade installed.

No allowance shall be made for any materials used or work done outside the limits shown on the plans and typical sections. The work performed and material furnished as prescribed by this item and measured as provide in this item shall be paid for at the unit price bid for lime-cement stabilized soil, which price shall be full compensation for scarifying the soil materials; for handling; hauling and spreading the lime slurry; for mixing the lime slurry into the subgrade through pulverization; for roll sealing and curing the subgrade; for re-scarifying the lime modified subgrade; for handling; hauling and spreading the cement; for mixing the cement into the lime modified subgrade through pulverization; for establishing final gradation; for spreading and shaping the mixture; compacting the mixture, including all rolling required for this compaction; surface finishing; and for all manipulation, labor, equipment, appliances, tools and incidentals necessary to complete the work and carry out the maintenance provisions in this specification.

No additional payment shall be made for installing half sack slurry for utilities encroaching into the lime-cement stabilized subgrade. Areas where half sack slurry is used will be included in the area measured and paid for under the unit price for “LIME SLURRY STABILIZATION, 8” DEPTH”. No additional payment for lime or cement will be made in these areas.

SECTION 317 ASPHALT MILLING

317.2 CONSTRUCTION REQUIREMENTS, add the following:

Asphalt milling adjacent to valley gutters or curb and gutter shall include removal and disposal of built-up asphalt concrete, slurry seal, microsurfacing and similar materials from adjacent concrete valley gutters or concrete gutter pans.

SECTION 321 PLACEMENT AND CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

321.10.7 Pavement Smoothness (Rideability):

Pavement smoothness payment adjustments shall only apply to roadways with new asphalt pavement surfacing length greater than 0.5 miles, a functional classification of collector or higher, and a posted speed limit of 40 mph or greater. When the new asphalt pavement has a minimum of two courses of hot mix asphalt, each layer being 1.0 inch or greater, or when the pavement has a new overlay of at least 1.5 inches, the final pavement surface shall be evaluated for smoothness by the Engineer.

Prior to the placement of the final course of a new pavement, the Engineer will furnish the Contractor with a preliminary International Roughness Index (IRI) value that results from the Engineer's evaluation of the material placed to date. The actual time of this "preliminary" evaluation will be coordinated between the Engineer, the Contractor, and the MCDOT Road Management Section (RMS) Supervisor. This evaluation will be limited

to one (1) test run in a single lane in each direction of travel. The IRI value will serve as a guide to the Contractor in evaluating his current level of conformance with the smoothness specification. Preliminary IRI evaluations shall not be performed on road segments with profile milling, due to the extreme rough texture created by the profiler. The IRI value obtained after placement of the final course of pavement will be the basis for determining payment adjustments for smoothness. The smoothness adjustment will be in accordance with the Overlay Rideability Adjustment Schedule (Figure 1).

321.10.7.1 Evaluation Method: The MCDOT Road Management Section shall evaluate the final pavement surface for smoothness, using the MCDOT IRI vehicle equipped with an International Cybernetics Corp. Laser Road Profiler. The IRI value is the calculated measurement of the deviation of a pavement surface from a true planar surface. The IRI data is typically collected at the posted speed limit, however speeds may range from 20-60 mph. A zero IRI value would indicate a perfectly smooth pavement surface, while increasing IRI values would correspond to an increasingly rough pavement surface. IRI values will be calculated in inches of vertical displacement for every 0.10 mile lane segment and normalized to inches/mile. [Example: a 0.10-mile section yielding an actual vertical displacement of ten (10) inches would be normalized to an IRI value of 100 inches/mile.]

The final pavement surface being evaluated will be divided into 0.10-mile road segments and individual lanes. The final road segment will include any remaining portion of a segment not equaling 0.10 miles. [Example: 1.52 miles of pavement divides into 15 segments with the last one measuring 0.12 miles.] The IRI is calculated for each 0.10-mile segment and shall be averaged (three runs per lane) to determine the IRI value for that segment. All values obtained from the RMS IRI vehicle shall be final.

The following shall be subject to smoothness testing:

1. Roadway lanes that are 0.5 miles or greater in length.

2. Smoothness data will not be computed for the following project sections:

    - Lanes less than 0.5 miles in length.
    - Shoulders.
    - Pavement on horizontal curves that require the test vehicle to travel at speeds less than 20 mph.
    - Test segments with an irregularity such as bridge joints, cattle guards, drainage swales, railroad tracks, valley gutters, or other irregularity item as identified by the Engineer shall have a reduction in length of the test section by a minimum of 0.01 mile (53’), to exclude the irregularity from the data set.

3. Bridge decks shall be included only if paved as part of the project. If bridge decks are not included as part of the construction project, profile testing will be suspended before the first joint between the asphalt surfacing and the bridge/approach slab and restarted after the last joint between the bridge/approach slab and the asphalt surfacing.

4. Smoothness measurement testing will start and stop at the transverse joints of the project limits.

When requested by the Engineer, the Contractor shall provide traffic control for smoothness testing to allow the test vehicle to safely travel through signalized intersections and/or stop controls oriented in the test direction of travel.

The Contractor shall notify the Engineer within ten (10) working days after completion of all pavement repairs that the pavement is ready for smoothness testing. The Engineer will have the testing conducted within twenty (20) working days after notification by the Contractor. All asphalt concrete pavements shall conform to Section 321, 325, and/or 327 prior to smoothness testing.

When the smoothness measurements indicate corrective work is required, the Engineer shall notify the Contractor in writing within ten (10) working days after the completion of the smoothness testing. The Contractor shall have twenty (20) working days following such notification to make repairs to the pavement.

The Contractor shall notify the Engineer within ten (10) working days after completion of all pavement repairs that the pavement is ready for smoothness re-testing. The Engineer will conduct the testing within twenty (20) working days after notification by the Contractor.

No testing shall be conducted during rain or under other conditions deemed inclement by the Engineer. During testing the roadway must be free of moisture and other materials that might affect the evaluation. Any work associated with preparing the roadway for the evaluation, such as but not limited to sweeping, will not be measured for payment.

321.10.7.2 Payment Adjustment for Rideability: All asphalt concrete shall conform to Section 321 and 325 prior to final payment adjustment for smoothness. Positive adjustments for Rideability shall not be made for those areas subsequently reviewed and determined by the Engineer to be otherwise defective. The Area shall be considered defective if it does not conform to Section 321 and 325 requirements for Air Voids, Binder Content, Gradation, Density, and/or Pavement Thickness.

Payment adjustments shall be made under the contract item Rideability. Payment to the Contractor shall be based on the final IRI values adjusted according to Table 1 or Figure 1. Table 1 (New Construction Rideability Adjustment Schedule) shall be used for new construction and pavements constructed on reconditioned base or subgrade. Figure 1 (Overlay Rideability Adjustment Schedule) shall be used for single course overlays of 1.5” or greater. The adjustment will be applied to each one tenth mile (0.10 mi.) segment of each lane subject to smoothness testing. The rideability payment will be the indicated percent adjustment multiplied times the adjusted contract price for the surface course quantities of the hot mixed asphalt, asphalt overlay, or rubber asphalt overlay incorporated into the final construction.

Payment for Rideability will be distributed based on segment areas: the area of each lane segment will be the segment length times the segment width. The segment width shall be

the striped traffic lane width or modified lane width. The width for exterior lanes will be the striped traffic lane width modified to include the asphalt area of adjacent bicycle lanes, paved shoulders, and short auxiliary lanes. The width of the innermost traffic lanes will be the striped traffic lane width modified to include the asphalt area of adjacent asphalt paved medians and left turn bays.

Table 1 – NEW CONSTRUCTION
RIDEABILITY ADJUSTMENT SCHEDULE

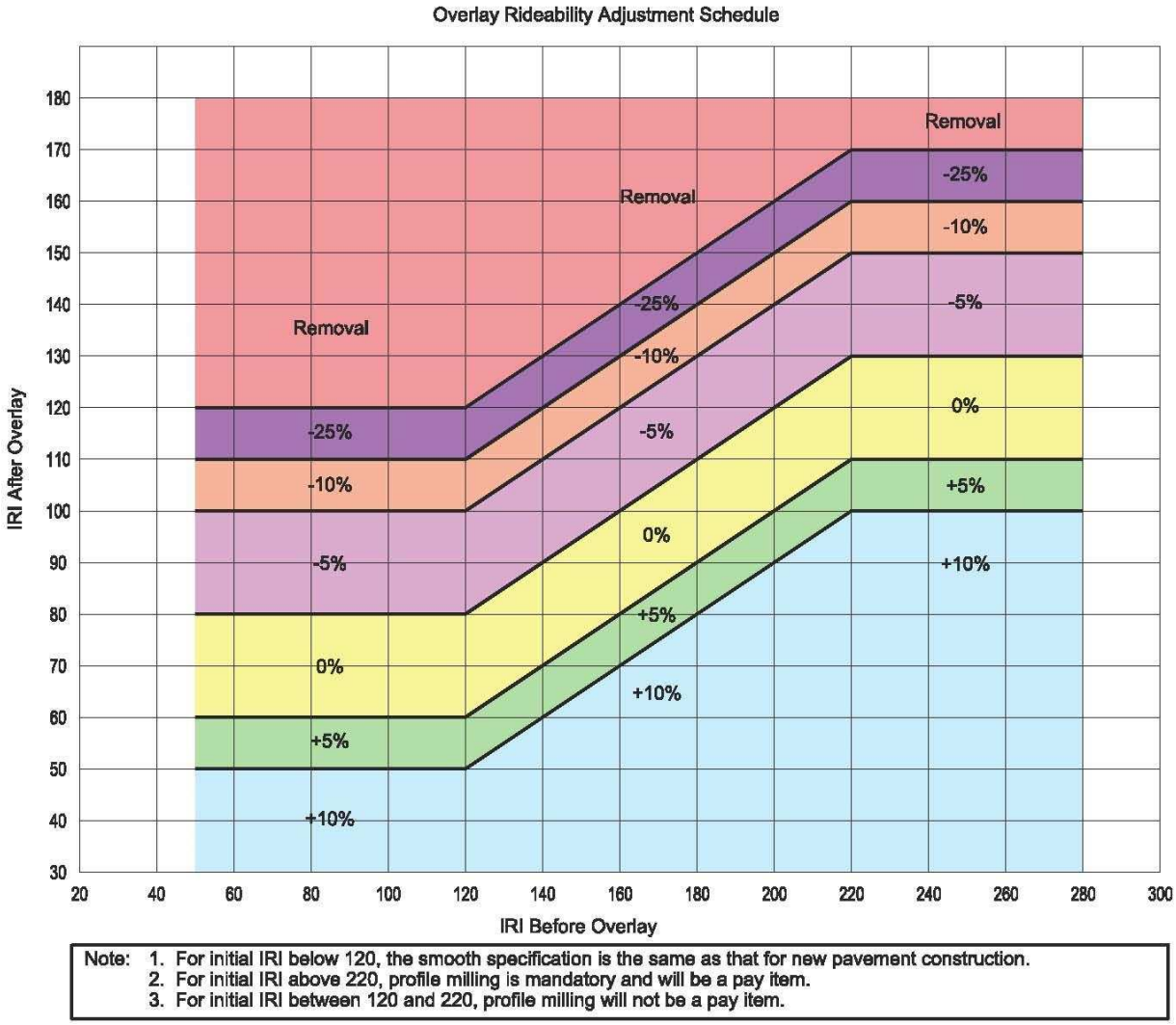
IRI (inches per mile)	PERCENT ADJUSTMENT
≤ 50	+10
51 - 60	+05
61 - 80	0
81 - 100	-05
101 - 110	-10
111 - 120	-25
>120	RxR Required

NOTES:

All IRI values will be rounded to the nearest whole number. (Example: 75.5 shall be rounded to 76.)

“RxR Required” is the Removal and Replacement of the defective area.

FIGURE 1



SECTION 325 PLACEMENT AND CONSTRUCTION OF ASPHALT-RUBBER ASPHALT CONCRETE

325.7 PLACEMENT:

325.7.1 SURFACE PREPARATION, add the following:

Prior to placing ARAC on existing pavement, existing raised pavement markers, thermoplastic markings shall be removed and areas designated for surface replacement or pavement repair shall be cut out and replaced. After pavement repairs and surface replacements have been completed and approved the entire surface shall be cleaned with a power broom. Removal of thermoplastic markings, removal of raised pavement markers, asphalt pavement replacement, and asphalt pavement repair shall be considered incidental to the ARAC and Microseal pay items.

Repairs required due to unforeseen subgrade problems or other causes not related to the Contractor's operations shall be repaired by the Contractor as directed by the Engineer. Payment for Engineer Authorized Repairs shall be measured and paid per Asphalt Pavement Replacement and Asphalt Pavement Repair - through Item Nos. 336.01100 Asphalt Pavement Replacement (Contingent) and 336.03210, Asphalt Pavement Repair (Contingent) respectively. Written authorization from the Engineer is required prior to commencement of the work.

Asphalt-Rubber Overlay shall be placed within 48 hours of any milling activities.

325.7.2 Placing and Construction Methods, add the following:

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

Safety Edge shall be constructed along all pavement edges in accordance with Section 321.8.9 and Detail No. 201 "Asphalt Pavement Edge Details" of the
MAG Uniform Standard Specifications and Details.

325.9 ACCEPTANCE, add the following:

325.9.5.2 Compaction Procedures:

325.9.5.2.1 Pavement Lift Thickness 1-1/2 Inches or Less, add the following:
Pavement coring shall be in compliance with Section 321.14 ASPHALT CORE METHOD. Assessment of penalties for deficient ARAC thickness shall be in accordance with Table 325-5.

325.9.5.2.2 Pavement Lift Thickness Greater than 1-1/2 Inches, add the following:
Pavement coring shall be in compliance with Section 321.14 ASPHALT CORE METHOD. Assessment of penalties for deficient ARAC thickness shall be in accordance with Table 325-5.

TABLE 325-5	
ARAC PAVEMENT THICKNESS PAYMENT REDUCTION For Thickness deficiency of more than 0.25 inches and less than 0.50 inches.	
Total Specified ARAC Pavement Thickness	Reduction in ARAC Payment
Less than 1.50 Inches	50%
1.50 Inches to 1.99 Inches	33%
2.00 Inches to 2.49 Inches	25%
For thickness deficiency of 0.50 inches or greater "Removal or EA" is required.	

325.9.6 Engineering Analysis (EA), replace Table 325-4 with the following:

TABLE 325-4		
ENGINEERING ANALYSIS PENALTIES for REMOVAL* LOTS/SUBLOTS LEFT IN PLACE		
Acceptance Criteria	**Acceptance Limits**	**Penalty When Contracting Agency is the Owner ($/Ton)**
Asphalt-Rubber Binder Content	Over 0.2% points from that Permitted	$9.00
Laboratory Air Voids (Measured at 75 blows)	Deviation from Target Greater Than ± 4.0%	$7.50

325.9.5.7 Rideability Testing: Rideability shall be tested in accordance with provisions of Section 321.10.7 Pavement Smoothness.

325.11 MEASUREMENT, add the following:

The tonnage of AC used to construct safety edges will be included in the AC measurement.

325.12 PAYMENT, add the following:

No separate payment will be made for paving the safety edge. The asphalt pavement material and placement in the safety edge shall be included in the contract item for Asphalt Concrete Pavement.

SECTION 336 PAVEMENT MATCHING AND SURFACING REPLACEMENT

336.2 MATERIALS AND CONSTRUCTION, add the following:

The Contractor shall do the required seal coating using an asphalt overlay, slurry seal, microsurfacing, or a modified asphalt emulsion, as directed by the Engineer. Slurry seals are not permitted on major and collector streets.

336.2.4.2 Adjustments, add the following:

The Contractor shall be responsible for adjusting to grade all new and existing manholes, valves, survey monuments, clean outs, etc., as directed by the Engineer. The Contractor shall remove all asphalt material and aggregate from this or prior work from all metal lids and covers encountered using a method approved by the Engineer. Debris will not be allowed to enter sanitary or storm sewers. All loose material shall be removed from the excavation site and the interiors of structures prior to resetting the frames.

The Contractor shall coordinate with the various utility companies regarding the adjustment and inspection of their facilities. Each utility company's specifications shall be adhered to during the adjustment. The Contractor shall be responsible for meeting any additional requirements of the utility companies.

Manhole frames shall be adjusted according to the MAG Standard Detail 422, except that the concrete collar shall extend up to the finished grade. Water valve, survey monument, and sewer clean out frames shall be adjusted in accordance with the City of Phoenix Supplement Standard Details P1270 and P1391. Gas valves shall be adjusted per Southwest Gas details in **Appendix F**.

336.4 MEASUREMENT, add the following:

There will be no separate measurement and payment for trench backfill. The cost of the backfill shall be considered included to the cost of other work items for which trench backfill is necessary.

336.5 PAYMENT, add the following:

Pavement replacement or repair in addition to what is shown on the project plans identified in the field by the Engineer shall be measured by the square yard and paid for under items 336.01100 "ASPHALT PAVEMENT REPLACEMENT (CONTINGENT)" and 336.03210 "ASHPALT PAVEMENT REPAIR (CONGENT)"

SECTION 338 PRICE ADJUSTMENT FOR BITUMINOUS MATERIALS

338.1 DESCRIPTION

Price adjustment shall be calculated based on price changes of bituminous material occurring between the date of bid opening and the date that the material is delivered or used. Price adjustment shall be bi-directional, potentially increasing or decreasing contract payments.

The term "bituminous material" as used herein shall include asphalt cement, liquid asphalt and emulsified asphalt and shall apply only to the following specific pay items requiring these materials: Asphalt Concrete Pavement, Bituminous Tack Coat, and Asphalt-Rubber Asphaltic Concrete Pavement.

The contract unit price for each item of bituminous material shall include all costs for furnishing, hauling, handling, spreading, and mixing of the material required, including the "initial cost" of bituminous material and all applicable taxes, bonds, and insurance premiums; but excluding any difference in the cost of bituminous material that occurs between the date of bid opening and the date that the material is delivered or used and the cost of taxes, bonds and insurance directly attributed to the price adjustment amount for bituminous materials.

The Contractor shall be responsible for all quality control testing.

338.2 MEASUREMENT

Asphaltic Concrete

The approved mix design designates a range of amount of bituminous material allowable for construction. If the amount of bituminous material exceeds the allowable range, the Contractor will not be compensated for the excess bituminous material. If the bituminous material is less than the allowable range and the asphalt concrete is found to be acceptable by the engineer, the bituminous material shall be subject to the price adjustment.

The tons of bituminous materials, which are present in asphalt concrete, shall be determined by tests using nuclear asphalt content gauge, extraction, ignition furnace, or other approved method. Tests shall be taken at least twice daily on a random basis. When only two tests are planned, they shall occur at placement of approximately 33% and 67% of the day's planned quantity. The arithmetic average of each day's bituminous testing that is found to be within or below the allowable range will be used to determine the amount of bituminous material present in the mix. If only one test is taken, the amount of bituminous material present in that sample will be used. The monthly production shall be the sum of the daily production.

Tack Coat

The tons of emulsified products to which the adjustment will be applicable will be the tons of the emulsified bituminous asphalt prior to dilution. The Contractor shall weigh the truck prior to and after placing the emulsion and will be paid based upon the difference in the weight.

338.3 PAYMENT:

The "initial cost" of bituminous material will be the monthly cost posted by the Arizona Department of Transportation (ADOT) based on prices of bituminous material published in the Asphalt Weekly Monitor, a publication by Poten & Partners, Inc. The bituminous material "initial cost" price is shown for each month. This price will be deemed to be the "initial cost" for bituminous material of all types, grades, etc., on projects on which bids are opened during the month. This data may be obtained from the ADOT website:

https://apps.azdot.gov/files/cns/pdf/historical_data.pdf

For each item with bituminous material for which there is a specific pay item, an adjustment in compensation will be made for either an increase or decrease in the price of bituminous material as shown on the ADOT website, current for the date of use of the material, as compared to the "initial cost".

Adjustments in compensation for emulsified asphalt will be made for the bituminous material prior to dilution.

The tons of bituminous material in asphalt-rubber binder to which the adjustment will be applied will be 0.80 multiplied times the total quantity of the item used. The adjustment will not apply to twenty (20) percent of the material assumed to constitute the rubber additive.

The tons of bituminous materials which 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 of the bituminous material.

Price Adjustment for Bituminous Materials shall include an adjustment for the actual change in cost of premiums on required payment and performance bonds, the actual change in cost of premiums for property damage and/or public liability insurance, and the change in sales tax (identified in Section 109.2) liability incurred as a result of the price adjustment for bituminous materials. The Contractor shall provide documentation to determine the adjustment for the actual change in cost of premiums on required payment and performance bonds, property damage and/or public liability insurance, and sales tax.

No additional compensation will be made for any additional or increased charges, costs, expenses, 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 bituminous material.

The Price Adjustment for Bituminous Materials will be made in the next regular monthly progress payment following actual use or application of the bituminous material and may cause an increase or decrease in payments.

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

340.2 MATERIALS, add the following:

Fibrous reinforcing meeting the requirements specified below shall be used in the concrete.

- Specific Gravity: 0.91
- Tensile Strength: 55ksi
- Fiber Length: Graded ¼” to ¾”

340.3 CONSTRUCTION METHODS, add the following:

The fiber mesh reinforcement shall be installed in accordance with the manufacturer’s specifications.

Expansion joints, unless otherwise specified, shall be constructed in accordance with the City of Phoenix Detail P1230 and/or applicable MAG details. They shall be in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk or curb and gutter, except in case of a curved alignment when they will be constructed along the radial

lines of the curve. The expansion joints shall be constructed to the full depth and width of the concrete and shall match the joints in the adjacent pavement, sidewalk or curb and gutter. The expansion joint material shall extend fully through the concrete from the surface to one inch into the subgrade. Joints shall be constructed at all radius points, driveways, alley entrances and at adjoining structures with a maximum interval of 50 feet between joints.

Contraction joints, unless otherwise specified, shall be constructed in accordance with City of Phoenix Detail P1230 and/or applicable MAG details and in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk or curb and gutter, except in case of a curved alignment when they will be constructed along the radial lines of the curb. They shall be constructed to a depth of 1-1/2'' at 10' intervals on all sidewalks regardless of the width. Unless an expansion joint is required, a contraction joint will coincide with each form joint. Sidewalk score marks, at least 1/2 inch deep are required at the midpoint of the contraction joint.

See **Appendix C** for City of Phoenix, MAG and City of Scottsdale Details.

340.6 PAYMENT, add the following:

Payment for the 10-inch fibrous reinforcement shall be considered incidental to the installation of the driveway and curbs. It will be included under Bid Item 340.01415, “CONCRETE RETURN TYPE DRIVEWAY, COP DETAIL P1243 MODIFIED 10” THICK FIBERMESH REINFORCED CONRETE” and 340.01112, VERTICAL CURB & GUTTER MAG DET 220, TYPE A, H=6” FIBERMESH REINFORCED, 10” THICK GUTTER PAN.

SECTION 350 REMOVAL OF EXISTING IMPROVEMENTS

350.2 CONSTRUCTION METHODS:

350.2.1 Utilities, add the following:

The Contractor shall take all measures and precautions necessary to remove the asbestos cement pipe in its non-friable condition. Asbestos-containing material shall be removed and transported to the disposal site so as not to create visible dust emissions.

The Contractor shall provide the Maricopa County Department of Transportation Engineer certification that all non-friable asbestos cement pipe has been disposed of at an appropriate facility, and that the disposal facility takes adequate provisions to ensure the asbestos cement pipe does not become a regulated asbestos-containing material.

350.2.2 Others, add the following:

350.2.2.1 Well Sites:

Existing fence around well sites to be abandoned which encroach into the County's right-of-way shall be removed at locations designated by the engineer and temporary fencing shall be installed until the well is fully abandoned.

Work also includes the abandonment of the existing exempt well (Registration No. 55-624825, File No. A (01-01) 16AAA) located on the southwest side of MC85 and 91st Ave as shown on the plans. The well is not currently in use and is located within the proposed right-of-way. The well owner and representative is:

Well Owner:	MARWEST ENTERPRISES LLC
Owner Contact:	PETER W MARTENS
Owner Phone:	(480) 556-9984

The Contractor shall be responsible for all coordination; completion of the Notice of Intention to Abandon (NOIA) with ADWR; and all equipment, materials, labor, and payment of fees associated with abandoning the well. The Contractor shall also be responsible for all soil analysis and remediation necessary if soil contaminants exist within the well site. Soil staining is currently visible on the surface; however, the extent of the contamination is currently unknown. Contaminated soil shall be disposed of in accordance with all applicable federal, state and local codes and regulations. Measurement and payment for removal of the contaminated soil shall be paid for under 350.50005 "MISCELLANEOUS REMOVALS AND OTHER WORK".

When work is complete, the Contractor shall be responsible for coordinating and completing the Notification of Abandonment (within 30 days) to ADWR.

The Contractor shall meet the requirements as indicated in the ADWR Well Abandonment Handbook dated September 2008, provided in **Appendix D**.

The Contractor shall follow the Standard Abandonment Method for well abandonment as specified in the ADWR Well Abandonment Handbook dated September 2008.

Coordination with MCDOT and ADWR; payment of necessary fees; and all equipment, materials and labor for abandonment per the ADWR Well Abandonment Handbook dated September 2008 shall be measured and paid for at a contract lump sum price, included in the following Bid Item, for all work complete in place.

350.00900 "WELL ABANDONMENT"

350.3 MISCELLANEOUS REMOVAL AND OTHER WORK, add the following:

(P) Any and all items not specifically set forth as a separate pay item, including, but not limited to gates, grates, pull boxes, irrigation junction structures and bollards.

(Q) The Contractor shall remove and relocate all specified mailboxes in accordance with Maricopa County Standard Details 2065, 2067, and 2069.

(R) All swing gates shall be constructed in reference to the detail provided on in the plans. The bid price shall include all necessary items to construct the gate and no additional payment shall be made for additional materials necessary to construction.

(S) Any removal called for on the drainage plans. Drainage removals include existing catch basins, pipe, scuppers and spillways. The contractor shall decommission drywells called out on the plans in accordance with the ADEQ Drywell Decommissioning Guidelines (Revised June 2005).

(T) Additional removals of existing improvements and construction of new improvements for new developments within the project limits.

(U) The Contractor shall remove pull boxes at locations called out in the Plans. ITS pull boxes shall only be removed after the existing fiber optic cabling has been removed.

The Contractor shall remove conduit at locations called out in the Plans. ITS conduit shall be removed after the existing fiber optic cabling has been removed from the conduit.

The contractor shall repair all conduits damaged as a result of removing the ITS cables and conductors at no cost to the County.

The contractor shall dispose of the removed pull boxes, conduit, and fiber optic cabling at an approved off-site location at no cost to the County.

350.4 PAYMENT, add the following:

Additional removals of existing improvements and construction of new improvements for new developments within the project limits shall be measured based on their corresponding bid items provided in the bid schedule and paid for out of an allowance provided under bid item 350.50001 “ADDITIONAL DEVELOPMENT IMPROVEMENTS”.

Additional removals of existing improvements listed in the plans beyond the specified quantity shall be measured based on their corresponding bid items provided in the bid schedule and paid for out of an allowance provided under bid item 350.50005 “MISCELLANEOUS REMOVALS AND OTHER WORK”.

Any other miscellaneous removal not listed or not shown on the plans will be measured and paid for out of an allowance provided under bid item 350.50005 “MISCELLANEOUS REMOVALS AND OTHER WORK”.

Any work that may affect the project shall be coordinated with the appropriate Agency contact at least fourteen (14) days in advance.

350.4 PAYMENT, add the following:

If additional concrete slab removal beyond the quantity provided in item 350.02250 is necessary, the additional removal quantity shall be measured by the square foot and paid under item 350.02249 REMOVE CONCRETE SLAB (CONTINGENT). Concrete slab removal thickness can be found in Appendix E.

Additional removals of existing improvements and construction of new improvements for new developments within the project limits shall be measured and paid for based on their corresponding bid items provided in the bid schedule out of an allowance under bid item "350.50001, ADDITIONAL DEVELOPMENT IMPROVEMENTS".

SECTION 401 TRAFFIC CONTROL

401.2.4 Pavement Markings, add the following:

Painted temporary striping used for traffic control shall not be placed on the finished surface course of the roadway pavement. All temporary striping shall be done to MCDOT standards.

Pre-marking the roadway on the finished surface course prior to final striping shall be installed in compliance with section 462.3.2(A). If pre-marking is necessary for City of Phoenix sections of the project, the Contractor shall coordinate all pre-marking activities with the City of Phoenix prior to any installation. The Engineer shall notify the City of Phoenix Traffic Field Investigator unit (602) 262-4684 a minimum of fifteen (15) business days prior to having traffic pavement marking work commence.

401.2.5 Removal of Permanent Traffic Control Devices, add the following:

The Engineer shall notify the City of Phoenix Traffic Field Investigator unit (602) 262-4684 a minimum of fifteen (15) business days prior to having traffic signing work commence.

401.2.6 TEMPORARY TRAFFIC SIGNAL

401.2.6.1 DESCRIPTION

Installation of temporary traffic signal shall consist of a combination of MCDOT furnished signal equipment as detailed in Section 470 and Contractor furnished equipment to install a complete temporary traffic signal at the intersections of 91st Avenue and MC 85 and 83rd Avenue and MC 85 for the duration of the project.

The temporary traffic signal shall conform to all aspects of this specification the MCDOT Supplement to the MAG Specifications, MCDOT Traffic Signal and Intersection Lighting

Specifications, MCDOT Standard Details, MCDOT Traffic Signal Design Manual, the MUTCD and the MAG Uniform Standard Specifications for Public Works.

401.2.6.2 MATERIALS

All materials used for the temporary signal must be determined by the Engineer to be serviceable and in good working order prior to installation. All materials used must be inspected by the MCDOT Inspector prior to installation. This would include any replacement materials required throughout the course of the project.

401.2.6.2.1 Poles: Poles will be steel poles furnished by MCDOT and placed in the permanent locations as shown in the plans.

401.2.6.2.2 Span wire, tether wire, and line hardware:

Span wire assemblies shall include messenger wire, tether wire, all bolts, nuts, washers, clamps, cable straps, and other appurtenances as shown on the plans or necessary for proper installation.

401.2.6.2.3 Luminaries and Luminaire Mast Arms: Luminaire light fixtures and mast arms will be furnished by MCDOT.

401.2.6.2.4 Signal Head Assemblies: The Contractor shall furnish and install minimum two signal head assemblies per approach. Signal heads and material shall conform to the current MCDOT Supplement to the MAG and approved by the Engineer.

401.2.6.3 CONSTRUCTION REQUIREMENTS:

The temporary signal shall be installed prior to the removal of any of the existing signal equipment currently in use. The existing traffic signal shall be maintained and in operation during the installation of the new signal equipment and span wire assemblies. Contractor shall be responsible for the coordination of the installation and activation of the temporary signal as it relates to any other work being done as part of this project. Any traffic signal equipment which is the responsibility of the Contractor, will not be grounds for time extensions or additional costs to MCDOT.

Maintenance of the temporary signal will be the responsibility of the Contactor. The signal shall be maintained in a proper operating condition at all times. Any damage caused by the motoring public or severe weather conditions or any other acts of nature shall be repaired by the Contractor. Any damage to the signal as a result of construction activities, personnel or equipment associated with the project shall be repaired by the Contractor at no cost to MCDOT.

Repositioning of the temporary signal to accommodate construction activities shall be considered as part of the cost of the temporary signal. Prior to any modifications to the signal, a modification plan shall be prepared and submitted to the MCDOT Engineer or MCDOT representative for review and approval.

MCDOT shall be notified a minimum of ten (10) working days prior to any signal construction at the intersection. The Contractor shall coordinate with MCDOT Inspector

and MCDOT Signal Operation personnel to install new signal equipment and materials and the temporary signal equipment installation and receive prior approval for all modifications. The Contractor shall coordinate with MCDOT Signal Operation personnel and the power company for assistance to energize the temporary signal equipment. The temporary signal shall be in working condition, prior to any removal of the existing traffic signal.

401.4.1 Traffic Control Plan, add the following:

The Contractor submitted Traffic Control Plan (TCP) shall include Smarter Work Zone (SWZ) devices and the associated barricades for these SWZ devices. On days when SWZ devices are required by the Resident Engineer, the SWZ items shall be treated as necessary traffic control items required on the site. The SWZ devices shall be in accordance with Section 402, Smarter Work Zone System.

401.5 GENERAL TRAFFIC REGULATIONS, add the following:

401.5.1 Road Closure and Road Restrictions

Full Closures:

The Contractor shall provide written notification to the Engineer no less than two weeks in advance of full closures of any roadway. Full closures shall only be allowed on weeknights from 9:00 pm to 5:00 am Sunday to Thursday and on weekends from 10:00 pm Friday to 5:00 am Monday. No full closure will be allowed during special events or holidays or weekends which adjoin a holiday. This written notification shall include the days, times, duration, direction and limits of the closure. The contractor shall coordinate with the Engineer on the allowable times for the weekend full closure.

Two consecutive intersections shall not be closed at the same time.

Full closure of MC 85 shall not be allowed.

The Contractor shall coordinate with the City of Phoenix to determine if any coordination is required due to conflicts in detouring traffic onto local streets.

Portable message boards shall be installed two weeks prior to all full closures on all roadways affected by the full closure. Portable message boards shall be paid under bid item 401.06000.

401.5.8 Traffic Control and Construction Phasing: The construction along MC 85 (Buckeye Road), 91st Avenue, and 83rd Avenue may be divided into multiple phases to minimize the impact to traffic. Access to businesses and residents shall be maintained throughout the entire construction period.

Local Access Requirements - The Contractor shall maintain local access to all side streets, access roads driveways, alleys, and parking lots at all times and shall notify

residents 72 hours in advance of any restrictions which will affect their access. The Contractor shall restore the access as soon as possible. If the primary access cannot be restored in a timely manner, the Contractor shall provide an alternative which shall be pre-determined with the residents prior to imposing any restrictions. Where property has more than one point of access, no more than one access may be restricted or closed at a time. Any local street restrictions imposed shall be such that local area traffic circulation is maintained.

Business Access Requirements - Access shall be maintained to adjacent businesses at all times during their hours of operation. Access may be maintained by such measures as constructing driveways in half sections, or by providing bridging over new concrete. Properties with multiple driveway access shall not have more than one driveway access restricted at any given time. While the one driveway is restricted, access to the other adjacent driveways shall be maintained and unrestricted. Each individual driveway access restriction shall be no more than fourteen (14) calendar days. Any business restrictions shall be coordinated with the affected business in writing at least fourteen (14) days prior to imposing restrictions. Notification shall include the scope of the construction activities, duration of construction activities, and the possible interference with the day to day activities of the property. The contractor shall provide a reminder to each property and business operated affected by the pending restrictions at least 72 hours in advance of the closure. The contractor shall include “Business Access” signs where required as part of the traffic control plans or as directed by the Engineer.

Parcel 101-06-430 and 101-06-464 Requirements - Grantor and Grantee acknowledge and agree that the proposed construction shall, in part, affect access to two (2) buildings owned by Grantor (and/or its affiliate) located at 9310 West Buckeye Road (“9310”) First Industrial, LP- D22668 and 9180 West Buckeye Road (“9180”) FR AZ/TX, LLC - D22667, which are served by three (3) access drives abutting West Buckeye Road, designated for the purposes of this Section E from west to east along West Buckeye Road as (i) “Access Drive 1”, which primarily serves 9310 (First Industrial, LP - D22668), (ii) “Access Drive 2”, which is located between 9310 and 9180, and (iii) “Access Drive 3”, which primarily serves 9180 (FR AZ/TX, LLC- D22667), Grantee covenants to give written notice to Grantor's representative at least thirty (30) days before commencement of construction activities, and to coordinate construction so that at all times Grantor and Grantor’s (and/or its affiliate’s) agents, employees, tenants, guests and invitees shall have access to both the 9310 and 9180 properties. Further, at any time that Grantee’s construction activities may materially and adversely affect ingress and/or egress through any of Access Drive 1, Access Drive 2 or Access Drive 3, Grantee shall contact and consult with Grantor's representative to discuss and agree upon the timing of such construction activities and reasonably limit the duration of any restrictions on access. Notwithstanding the foregoing, in all events: (a) if ingress and egress through Access Drive 2 is materially and adversely affected by Grantee’s construction activities at any time, then Grantee shall perform no construction activities on Access Drive 1 and/or Access Drive 2 during such time; (b) if ingress and egress through Access Drive 1 is materially and adversely affected by Grantee’s construction activities at any time, then Grantee shall perform no construction activities on Access Drive 2 during such time; and (c) if ingress and egress through Access Drive 3 is materially and adversely affected by Grantee’s construction activities

at any time, then Grantee shall perform no construction activities on Access Drive 2 during such time.

The Contractor shall construct the southern portion of MC 85 first in order to provide additional width for existing lane closures and minimize the closures of through lanes. Alternate construction sequencing for MC 85 will not be allowed without the review and approval of the Engineer. The Contractor shall provide his construction phasing plan at or prior to the preconstruction meeting for review and approval.

The Contractor shall coordinate and verify all event schedules with adjacent cities, adjacent property owners, and MCDOT. The Contractor shall also coordinate construction activities to avoid impacting traffic operations during major events and seasonal peak times for the warehouses, other businesses, and residents.

Maintaining Existing Traffic Signals and Lighting Systems:

The Contractor shall phase the new traffic signal equipment construction to minimize downtime. This may include splice pits to integrate the new traffic signal equipment with the existing traffic signal system. Temporary traffic signals are required as part of the construction, the Contractor shall submit a traffic control plan showing the temporary traffic signal layout for review and approval by the Engineer. The cost of temporary traffic signals shall be paid under bid items 470.80001 (MC-85 and 91st Avenue) and 470.80002 (MC-85 and 83rd Avenue).

401.11 PAYMENT, the first sentence in the 2015 City of Phoenix Supplement to the 2015 MAG Uniform Standard Specifications is revised to read:

Payment for complete temporary traffic control will be made at the unit bid price in the proposal item TRAFFIC CONTROL.

401.11 PAYMENT, add the following:

No separate measurement or payment will be made for the installation of painted temporary striping. The cost will be considered included in the 401.01000 Traffic Control item.

No separate measurement or payment will be made for pre-marking the roadway. The cost will be considered as included in the applicable final striping bid items.

SECTION 402 SMARTER WORK ZONE SYSTEM

402.1 DESCRIPTION:

This project requires the contractor to plan for, deploy, and operate Smarter Work Zone (SWZ) technology at the project site for 120 calendar days, at a minimum, with the option for MCDOT extend the number of calendar days needed.

The Contractor shall assist MCDOT in evaluating the following anticipated benefits of using the SWZ system:

- Improve speed limit compliance through the work zone;
- Increase travel time reliability through the work zone;
- Reduce number of crashes in the work zone;
- Reduce queues resulting from the work zone; and
- Assess use of alternative roads.

If the use of this technology proves to be beneficial, MCDOT may continue to require these types of SWZ technologies on future projects.

MCDOT will not take possession of SWZ equipment when the project is finished, except for the MCDOT furnished DSRC equipment that needs to be removed and returned to MCDOT.

No specific manufacturer/vendor's equipment is pre-approved. The smart work zone special provision is an open specification of various types of equipment/systems that can be provided by multiple manufacturers/vendors in the smart work zone industry. Below is a list (in alphabetical order) of known smart work zone equipment providers that may be able to provide some or all of the different systems required, but the contractor is NOT limited to selecting from these providers:

- All Traffic Solutions
- Blyncsy, Inc.
- iCone Products, LLC.
- Renaissance Technologies, Inc.
- Street Smart Rental, Inc.
- TrafficLogix
- VER-MAC
- WANCO, Inc.
- Work Area Protection

On days when SWZ devices are required by the Resident Engineer, the SWZ items shall be treated as necessary traffic control items required on the site. The Contractor shall plan for, deploy, and operate Smarter Work Zone (SWZ) technology at the project site for 120 calendar days, at a minimum, with the option for MCDOT extend the number of calendar days needed per MCDOT's discretion. The Contractor shall assist MCDOT in evaluating the following anticipated benefits of using the SWZ system:

- Improve speed limit compliance through the work zone;
- Increase travel time reliability through the work zone;
- Reduce number of crashes in the work zone;
- Reduce queues resulting from the work zone; and
- Assess use of alternative roads.

The SWZ system is comprised of Inform, Advise, Warn, Check and Standalone Detection SWZ Locations within the project area and SWZ system software that is used by the Contractor to monitor and control the various SWZ system devices that are deployed at the SWZ locations.

The project also includes MCDOT furnished and Contractor installed Dedicated Short Range Communications (DSRC) for vehicle-to-infrastructure (V2I) two-way wireless communications equipment that is to be installed on and connected to the SWZ system portable device trailer's power supply. This DSRC communications equipment is for a separate system referred to as the Connected Vehicle Work Zone Notification System, that the SWZ system is not dependent on, being provided through the Commercial Vehicle Information Systems & Network (CVISN) project for providing better info for freight operators about work zones.

The following items shall be submitted at the preconstruction conference when reasonably feasible. When not submitted at the preconstruction conference, the submittal(s) shall be specifically shown in the work schedule. The submittals shall be scheduled at least 45 days prior to intended use and/or material transport to the project site.

(A) Cellular Communications Site Assessment Summary
(B) SWZ VMS System Algorithms and Messages
(C) SWZ Report Formats
(D) SWZ Variable Message Sign System application programming interface (API) file format and sample data sets for one way communications from the Variable Message Sign System to the Connected Vehicle Work Zone Notification System
(E) SWZ ARID (Anonymous Re-Identification Device) Detector System API file format and sample data sets for one way communications from the ARID Detector System to the Connected Vehicle Work Zone Notification System
(F) SWZ Speed Feedback System API file format and sample data sets for one way communications from the ARID Detector System to the Connected Vehicle Work Zone Notification System
(G) SWZ System User Manuals for Devices and Software
(H) SWZ System Training Curriculum
(I) SWZ User Access Privileges
(J) SWZ Alert Messages
(K) SWZ System Acceptance Testing Procedures
(L) SWZ Mode of Operation Deployment Schedule ("Normal" vs. "Baseline Data")

The Contractor shall be responsible for the safety of all SWZ materials and shall take all necessary precautions to avoid loss by vandalism, fire or theft, or damage by water, and shall bear the cost of replacing any such material that is lost, destroyed or damaged.

402.2 MATERIALS:

402.2.1 SWZ Equipment Requirements:

All SWZ equipment components that are intended to be located outdoors shall meet the following environmental requirements:

(1) System device components shall be NEMA-3R (Rainproof and sleet resistant) or IP22 (Protection against solid objects over 12mm and against direct spray up to 15 degrees from vertical) rated for outdoor use.

(2) System device components shall meet NEMA TS1/TS2 Environmental requirements for temperature.

(3) System device components that don't meet the above NEMA TS1/TS2 and NEMA-3R or IP22 shall be mounted within a NEMA-3R or IP22 rated enclosure that provides a ventilation system (i.e., temperature sensor, ventilation fan, dust filters, etc.) of sufficient capacity to prevent equipment inside from overheating or be explicitly designed to withstand and operate in seasonal high temperatures for the project area. The design of the provided capacity of this ventilation system shall account for the heat radiating from the enclosure mounted equipment and the historically high temperatures encountered within the summer season at Maricopa County, AZ.

All SWZ equipment components shall be provided fully functional and as an integrated part of the overall SWZ system and shall remain fully functional and integrated when deployed in the project area.

402.2.1 (A) "Inform" SWZ Location:

The "Inform" SWZ location is the first SWZ location that a driver traveling on MC-85 will encounter prior to the beginning of the work zone. There are two "Inform" locations, one for each direction of travel. "Inform" devices are deployed where there is an option for drivers to take an alternate route and thus avoid the work zone entirely. The message displayed on the "Inform" variable message sign is intended to provide information to drivers regarding the conditions of the work zone, such as congestion or crashes, queue warning, travel time, delay time, and available alternate routes to allow drivers to make informed decisions about their routing.

The Contractor shall provide "Inform" devices as a fully functional system component that includes the following elements and meeting the associated performance requirements identified in Section 402.2.2.

(1) One or two portable device trailers for each "Inform" SWZ location capable of transporting and mounting all the necessary system elements.

(2) A variable message sign (VMS) mounted to a trailer with mounting bracket to adjust the field of view from the variable message display sign. The variable message display area shall be a full matrix display and messages displayed shall be compliant with the FHWA Manual on Uniform Traffic Control Devices (MUTCD), 6F-2 - Portable Changeable Message Signs and display three lines of eight characters per line with each character a minimum size of five pixels wide- by seven pixels high. The size of the characters shall be adjusted to correspond with industry recommended sizes for the actual speed limits posted, in the signs field of view, per the approved traffic control plans and shall accommodate speed limits up to 50mph. The signs should be visible from 1/2 mile under ideal day and night conditions. Under low light level conditions, the sign shall automatically adjust its light source so as to meet the legibility requirements and not impair the drivers, vision. The pixels shall be constructed with Light Emitting Diodes (LEDs). The LEDs within the sign shall be visible to drivers that are in front of the sign and within a 30-degree cone of view from the sign.

(3) Non-intrusive, side-fire radar-based traffic detection sensor system with a telescoping pole that provides a minimum height of 20-feet and higher, if needed per detection sensor manufacturer's recommendations to avoid detection sensor coverage area concerns with vehicle occlusion on a roadway that has a significant amount of heavy truck traffic, and mounted to the same trailer as the "Inform" variable message display sign or on a separate trailer, that is configured with sufficient detection zones to cover all travel lanes (in both directions of travel at each trailer location) and can detect the travel lane closest to the trailer when the trailer and associated trailer barricades are deployed at the edge of this first travel lane. Each detection zone shall be configured to provide per-lane vehicle presence, volume, occupancy (queue detection), and speed data. The selection of which traffic detection sensor system manufacturer(s) and model number(s) to provided and the associated quantity needed on each trailer shall account for minimal recommended offset distance from nearest travel lane while still achieving detection data in all travel lanes. Requiring this trailer to be deployed at an offset that is beyond what is practical for the project work zone constraints shall be deemed unacceptable. The addition of an additional detector type, that provides similar performance (i.e., video detection, which can also detect speed, volume, and occupancy) for the nearest travel lane, is acceptable.

(4) ARID (Anonymous Re-Identification Device) sensor(s) that detects the Bluetooth and WiFi signals in both travel directions from vehicles, hands-free sets, mobile phones, and navigation systems.

402.2.1 (B) "Advise" SWZ Location:

The "Advise" SWZ location is the second SWZ location that a driver traveling on MC-85 will encounter prior to the beginning of the work zone. There are two "Advise" locations, one for each direction of travel. It is deployed just prior to the "Road Work Ahead" sign, before the beginning of any lane restrictions or active work spaces. The message

displayed on the “Advise” variable message sign is intended to provide information to drivers regarding work zone conditions, such as congestion or crashes, queue warning, travel time, delay time, and available alternate routes. The “Advise” SWZ location also provides a closed-circuit television (CCTV) camera system with pan, tilt, and zoom (P/T/Z) capabilities for the MCDOT traffic management center (TMC) operators and construction staff to monitor the traffic conditions alone the project corridor.

The Contractor shall provide “Advise” devices as a fully functional system component that includes the following elements and meeting the associated performance requirements identified in Section 402.2.2.

(1) One or two portable device trailers for each “Advise” SWZ location capable of transporting and mounting all the necessary system elements.

(2) A VMS mounted to a trailer with mounting bracket to adjust the field of view from the variable message display sign. The variable message display area shall be a full matrix display and messages displayed shall be compliant with the FHWA Manual on Uniform Traffic Control Devices (MUTCD), 6F-2 - Portable Changeable Message Signs and display three lines of eight characters per line with each character a minimum size of five pixels wide by seven pixels high. The size of the characters shall be adjusted to correspond with industry recommended sizes for the actual speed limits posted, in the signs field of view, per the approved traffic control plans and shall accommodate speed limits up to 50mph. The signs should be visible from 1/2 mile under ideal day and night conditions. Under low light level conditions, the sign shall automatically adjust its light source so as to meet the legibility requirements and not impair the drivers, vision. The pixels shall be constructed with LEDs. The LEDs within the sign shall be visible to drivers that are in front of the sign and within a 30-degree cone of view from the sign.

(3) Non-intrusive, side-fire radar-based traffic detection sensor system with a telescoping pole that provides a minimum height of 20-feet and higher, if needed per detection sensor manufacturer’s recommendations to avoid detection sensor coverage area concerns with vehicle occlusion on a roadway that has a significant amount of heavy truck traffic, and mounted to the same trailer as the “Advise” variable message display sign or on a separate trailer, that is configured with sufficient detection zones to cover all travel lanes (in both directions of travel at each trailer location) and can detect the travel lane closest to the trailer when the trailer and associated trailer barricades are deployed at the edge of this first travel lane. Each detection zone shall be configured to provide per-lane vehicle presence, volume, occupancy (queue detection), and speed data. The selection of which traffic detection sensor system manufacturer(s) and model number(s) to provided and the associated quantity needed on each trailer shall account for minimal recommended offset distance from nearest travel lane while still achieving detection data in all travel lanes. Requiring this trailer to be deployed at an offset that is beyond what is practical for the project work zone constraints shall be deemed unacceptable. The addition of an additional detector type, that provides

similar performance (i.e., video detection, which can also detect speed, volume, and occupancy) for the nearest travel lane, is acceptable.

(4) ARID sensor(s) that detect the Bluetooth and WiFi signals in both travel directions from vehicles, hands-free sets, mobile phones, and navigation systems.

(5) A CCTV camera with P/T/Z capabilities mounted to the same telescoping pole as the side-fire radar-based traffic detection sensor system, or mounted to a separate telescoping pole that provides a minimum height of 20-feet.

402.2.1 (C) "Warn" SWZ Location:

The "Warn" SWZ location is the third SWZ location that a driver traveling on MC-85 will encounter. There are two "Warn" locations, one for each direction of travel. It is positioned within the beginning of the work zone at a point just downstream of the first arterial roadway crossing to warn drivers, that just turned into the work zone, and drivers continuing to traveling along MC-85, of the current posted legal speed limit and the speed at which they are currently driving. This device trailer contains a speed feedback sign in conjunction with a static posted speed limit sign and a forward-firing radar detector.

The Contractor shall provide "Warn" devices as a fully functional system component that includes the following elements and meeting the associated performance requirements identified in Section 402.2.2.

(1) One portable device trailer for each "Warn" SWZ location capable of transporting and mounting all the necessary system elements.

(2) A static MUTCD compliant enforceable speed limit sign, at the top, posting the legal speed limit that has been identified for the work zone.

(3) A static sign stating "YOUR SPEED" with a multi-colored LED variable speed message display that displays the actual real-time speed of the vehicle currently driving within the detection zone of the trailer mounted traffic speed detector. The color of the speed message shall be yellow when the driver is traveling at or below a pre-set speed threshold and red or blue when the traveling speed is above the speed threshold.

(4) Non-intrusive, forward-firing radar-based traffic speed detection sensor system.

402.2.1 (D) "Check" SWZ Location:

The "Check" SWZ location is the fourth SWZ location that a driver traveling on MC-85 will encounter. There are two "Check" locations, one for each direction of travel. It is positioned in areas that have a high concentration of construction workers present and downstream of the "Warn" device trailer. The "Check" device trailer provides driver feedback, such as speed feedback as compared to the work zone speed limit. The "Check" device trailer location shall be moved a few times per work day/night, as

necessary within the 2nd half of the work zone and where a high concentration of workers are anticipated to be working. This device trailer contains a speed feedback sign in conjunction with a static posted speed limit sign and a forward-firing radar detector.

The Contractor shall provide “Check” devices as a fully functional system component that includes the following elements and meeting the associated performance requirements identified in Section 402.2.2.

(1) One portable device trailer for each “Check” SWZ location capable of transporting and mounting all the necessary system elements.

(2) A static MUTCD compliant enforceable speed limit sign, at the top, posting the legal speed limit that has been identified for the work zone.

(3) A static sign stating “YOUR SPEED” with amulti-colored LED variable speed message display that displays the actual real-time speed of the vehicle currently driving within the detection zone of the trailer mounted traffic speed detector. The color of the speed message shall be yellow when the driver is traveling at or below a pre-set speed threshold and red or blue when the traveling speed is above the speed threshold.

(4) Non-intrusive, forward-firing radar-based traffic speed detection sensor system.

402.2.1 (E) “Stand-Alone Detection” SWZ Location:

The “Stand-Alone Detection” device location is the first SWZ location that a driver traveling on a road perpendicular to MC-85 will encounter before crossing or turning onto MC-85. There are four “Stand-Alone Detection” locations, two for each of the two alternate routes perpendicular to MC-85. It is approximately 0.25 miles north and south of MC-85 and positioned on the north and south bound side of the arterial road (i.e., the location north of MC-85 will be on the northbound side and the location south of MC-85 will be on the southbound side). The primary purpose of this detector location is to count the number of cars traveling away from the MC-85 intersection downstream from the “Inform” or “Advise” locations. Note that both downstream locations for this detector will be tested at various points throughout the deployment phase per the direction of the Engineer, so all possible locations must be accounted for in the TCP. Secondary purposes include counting the number of cars heading towards MC-85 and queue detection of vehicles approaching MC-85. There will be one pair (north and south sides) of “Stand-Alone Detection” device locations for the selected major arterial road alternate route that is available to MC-85 eastbound drivers. There will be a second pair of “Stand-Alone Detection” device locations for the selected major arterial road alternate route that is available to MC-85 westbound drivers. The major arterial roads that are selected (for eastbound direction alternate routes and for the westbound alternate route) shall each be directly prior to the work zone travel lane changes (i.e., lane restriction taper) for the respective MC-85 direction of travel.

The Contractor shall provide “Stand-Alone Detection” SWZ devices as a fully functional system component that includes the following elements and meeting the associated performance requirements identified in Section 402.2.2.

(1) One portable device trailer for each “Stand-Alone Detection” SWZ location capable of transporting and mounting all the necessary system elements.

(2) Non-intrusive, side-fire radar-based traffic detection sensor system with a telescoping pole that provides a minimum height of 20-feet and higher, if needed per detection sensor manufacturer’s recommendations to avoid detection sensor coverage area concerns with vehicle occlusion on a roadway that has a significant amount of heavy truck traffic, and mounted on the trailer, that is configured with sufficient detection zones to cover all travel lanes (in both directions of travel at each trailer location) and can detect the travel lane closest to the trailer when the trailer and associated trailer barricades are deployed at the edge of this first travel lane. Each detection zone shall be configured to provide per-lane vehicle presence, volume, occupancy (queue detection), and speed data. The selection of which traffic detection sensor system manufacturer(s) and model number(s) to provided and the associated quantity needed on each trailer shall account for minimal recommended offset distance from nearest travel lane while still achieving detection data in all travel lanes. Requiring this trailer to be deployed at an offset that is beyond what is practical for the project work zone constraints shall be deemed unacceptable. The addition of an additional detector type, that provides similar performance (i.e., video detection, which can also detect speed, volume, and occupancy) for the nearest travel lane, is acceptable.

(3) ARID sensor(s) that detect the Bluetooth and WiFi signals in both travel directions from vehicles, hands-free sets, mobile phones, and navigation systems.

402.2.1 (F) Portable Device Trailers

The Contractor shall provide portable trailers capable of transporting all the necessary system elements and capable of mounting fully functional SWZ devices, as identified for each of the respective SWZ locations (“Inform,” “Advise,” “Warn,” “Check,” and “Stand-Alone Detection”) along the roadside. Each device trailer shall provide the following common elements:

(1) A trailer number that is unique (i.e., trailers deployed in the project area shall not have the same number as other deployed trailers) and is visible from the first vehicle travel lane adjacent to the deployed trailer.

(2) A solar-powered distribution assembly (PDA) with sufficient battery capacity to support all trailer mounted components for a period of seven days without sunlight. This power distribution assembly shall include intelligence for monitoring the power of the batteries and shall send a "critically low on power" type alarm message, via the trailer mounted cellular communications gateway, to the remote system server.

All necessary cables and devices needed for interconnecting the trailer mounted devices to this powered distribution assembly shall also be provided.

(3) A SWZ cellular communications gateway with sufficient communications data ports and an associated cell phone provider data plan that can support all the communication needs of the trailer mounted SWZ devices within the project area. All necessary cables and devices needed for interconnecting the trailer mounted devices to this gateway shall also be provided. It shall be the Contractor's responsibility to perform a site assessment of the project area and pick a cellular network provider that had sufficient data network capacity and coverage needed for this project. The Contractor shall submit to the engineer for approval a Cellular Communications Site Assessment Summary document identifying the project areas evaluated, the cellular network provider selected, and a statement indicating that there is sufficient data network capacity and coverage needed for this project.

(4) A GPS device that collects and reports trailer location data to identify the actual trailer location and can be integrated within the cellular communications gateway or connected to this gateway as a stand-alone device. The GPS device shall provide location data within 10 meters or less of the actual trailer location. All necessary cables and devices needed for connecting to cellular communications gateway shall also be provided.

(5) Cable mounting provisions shall be provided within the trailer for securing cables during system operation and during transport to a different location.

(6) Mounting provisions to haul the trailer and associated trailer mounted devices from one location to the next without needing a separate vehicle to transport any of the components that are intended to be mounted on the trailer.

(7) The device trailer shall be street legal, have functioning break lights connected to it when being towed, support driving speeds of 75 mph when being towed, and provided with a standard size trailer hitch.

(8) The device trailer shall have adjustable leveling legs that can completely support the weight of a fully loaded trailer. The adjustable height of the legs should be able to raise the trailer wheels a minimum of 4" between the bottom of the wheels and a flat/level surface that the trailer is standing on. The device trailer shall have a minimum of two level gages (length and width positions) to Indicate when the trailer is level.

(9) When in operation with all stabilizing devices in place, the device trailers shall be capable of withstanding wind gusts up to 80 mph without overturning or changing orientation.

(10) MCDOT furnish and Contractor installed Dedicated Short Range Communications (DSRC) radio and associated DSRC cellular communications gateway that are connected to the trailer's PDA.

402.2.2 SWZ System Software and Performance Requirements:

The Contractor provided SWZ system shall be comprised of the following systems integrated together as one complete system, as four separate systems, or any combination thereof:

(1) Variable Message Sign System: This system is comprised of a Contractor hosted remote server and database that is integrated to the variable message signs, side-fire radar-based traffic detection sensors, and GPS devices at the "Inform," "Advise," and "Stand-Alone Detection" SWZ locations.

(2) Speed Feedback System: This system is comprised of a Contractor hosted remote server and database that is integrated to the speed feedback sign, forward-firing radar detector, and GPS devices at the "Warn" and "Check" SWZ locations.

(3) CCTV System: This system is comprised of a Contractor hosted remote server that is integrated to the CCTV camera and P/T/Z devices at the "Advise" SWZ locations.

(4) ARID Detector System: This system is comprised of a Contractor hosted remote server and database that is integrated to ARID detector devices at the "Inform," "Advise," and "Stand-Alone Detection" SWZ locations.

The MCDOT furnish and Contractor installed DSRC radio and cellular communications gateway that is connected to the portable device trailer's power distribution assembly (PDA) will be a completely separate system with software that the Contractor does not have to provide or configure.

402.2.2 (A) Variable Message Sign System Requirements:

The Contractor provided hosted remote server and databases shall include the following minimum functionality:

(1) A secured Web interface application software that allows TMC operators and other project stakeholders to log into the Contractor provided server, from a PC connected to the internet, using unique identifying credentials assigned to each person, for access to the system graphical user interface (GUI). Through this GUI, project stakeholders shall have the ability to monitor the status of the system devices and access the data being archived by the system. Users that have been granted higher access privileges, based on pre-defined user log-in credentials, shall also have the ability to change the messages that are being displayed on each VMS.

(2) The VMS control software shall support displaying a single message over two display cycles (i.e., part of the message on the first cycle and the remaining part of the message on the second display cycle).

(3) Mobile device application software that allows field personnel out on the project site and other project stakeholders to log into the Contractor provided server, from a mobile application on their cell phone (i.e., an android and apple mobile device) connected to the internet, using unique identifying credentials assigned to each person, for access to the system GUI. Through this application, project stakeholders shall have the ability to monitor the status of the system devices. Users that have been granted higher access privileges, based on pre-defined user log-in credentials, shall also have the ability to change the messages that are being displayed on each VMS.

(4) Configurable with a trailer number to identify all field devices (with the exception of the CCTV camera assembly, ARID detector, and DSRC System) that are mounted to the trailers at the “Inform,” “Advise,” and “Stand-Alone Detection” SWZ locations and have the respective trailer number tagged to all archived data sets from these trailer mounted field devices.

(5) A GUI map that auto-populates the trailer location on the map, based on the GPS coordinates received from the trailer mounted GPS device. The GUI shall be configured to include the device location name (i.e., “WB MC-85 Advise” location), the trailer number, and a list of devices on the trailer.

(6) GPS coordinates received from the GPS device on the portable device trailer shall be archived with the associated trailer number tag at a minimum frequency of once daily at the beginning of each work day and each time devices are moved.

(7) Receive and archive "critically low on power" type alarm message, with trailer number and time stamp, and forward this alarm to the operator(s) using the Mobile Devices Application Software and via emails and text messages to a list of pre-defined stakeholders that want to receive the message.

(8) Monitor and archive "loss of communications" type alarms, with trailer number and time stamp, and forward this alarm to the operator(s) via emails and text messages to a list of pre-defined stakeholders that want to receive the message.

(9) Receive and archive detector speed data using one minute averages, at a minimum, for each travel lane (i.e., each detection zone).

(10) Receive and archive detector volume data using one minute intervals, at a minimum, for each travel lane (i.e., store the sum of the number of vehicles counted within each one minute interval per detection zone).

(11) Receive and archive detector occupancy (queue detection) data for each travel lane (i.e., compute the length of time a vehicle queue was detected for each detection zone and archive this data). The interval in which this data is archived shall include the length of time (the duration) for each vehicle queue with start and end time stamps.

(12) Provide a GUI that shows the current message being displayed on each VMS that is deployed.

(13) Provide a GUI that is configured to include a library of pre-approved VMS messages for each location type (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, and EB MC-85 Advise) and supports both user selectable messages (from the message library) and system generated messages based on pre-approved system algorithm parameters.

(14) Log the operator's credentials into the system's historical database each time an operator changes a message being displayed on a VMS and archive all new message being displayed with the associated time stamp. The operator's credentials that are logged for system generated message changes shall be something like "system algorithm."

(15) Provide a system algorithm that calculates and archives vehicle travel time data using one minute averages, at a minimum, for each of the following:

(a) WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
(b) EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
(c) WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
(d) EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations
(e) Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
(f) Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
(g) Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
(h) Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
(i) Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
(j) Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
(k) Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
(l) Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.

(16) Provide a system algorithm that automatically changes the VMS messages being displayed on each VMS based on a pre-approved algorithm that calculates real-time traffic conditions and displays the appropriate message (i.e., stopped traffic

ahead, alternate route, travel time, etc.) for each VMS location, based on the traffic conditions calculated. The Contractor proposed system algorithm shall include, at a minimum, four different traffic condition thresholds with an associated hierarchy of message types for each threshold that the system will display.

(17) Generate the following weekly system reports in Microsoft Excel format or some other type of Engineer approved format that allows MCDOT to easily populate the data into a Microsoft Excel spreadsheet, using the copy and paste functionality of a personal computer. Each of the following reports shall clearly identify the calendar week that the data within the report represents, a descriptive report name that distinguishes the report from other reports generated, identifies the type of data provided in the report, and provides the day of week and time of day (or time interval) for each data set contained within the report:

(a) VMS Message History: This report shall identify the time of day each message on a VMS changed, the actual wording of the new message being displayed, and the credentials of the operator that changed the message. This report shall also identify when there was no message being displayed (i.e., operator blanking the sign and when the sign was powered off). This report shall be organized per VMS location using the trailer number with associated GPS coordinates and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform and EB MC-85 Advise).

(b) System Alarm History: This report shall identify the time of day each trailer had an alarm type message (i.e., critically low on power, loss of communications, etc.). This report shall be organized per trailer number with the associated GPS coordinates of the trailer at the time the alarm was received. The type of alarm message, including low power, loss of communications, and other types, shall also be identified with the time of day, trailer number, and trailer location.

(c) Detector Speed Data: This report shall identify the vehicle speed data collected using one minute averages, at a minimum, for each travel lane (i.e., each detection zone). This report shall be organized using the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only, NE Detector Only, and SE Detector Only). The associated GPS coordinates of the trailer at the time the data was received shall be included with the trailer number or location name. The data for each trailer location shall be organized per detection zone (i.e., per travel lane) and it shall be clear in the report which direction of travel is covered by each detection zone.

(d) Detector Volume Data: This report shall identify the detector volume data collected using one minute intervals, at a minimum, for each travel lane (i.e., provide the sum of the number of vehicles counted within each one minute interval per detection zone). This report shall be organized using the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only,

NE Detector Only, and SE Detector Only). The associated GPS coordinates of the trailer at the time the data was received shall be included with the trailer number or location name. The data for each trailer location shall be organized per detection zone (i.e., per travel lane) and it shall be clear in the report which direction of travel is covered by each detection zone.

(e) Detector Occupancy (Queue Detection) Data: This report shall identify the detector queue detection data for each travel lane (i.e., provide the length of time / duration for each vehicle queue with start and end time stamps) This report shall be organized using the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only, NE Detector Only, and SE Detector Only). The associated GPS coordinates of the trailer at the time the data was received shall be included with the trailer number or location name. The data for each trailer location shall be organized per detection zone (i.e., per travel lane) and it shall be clear in the report which direction of travel is covered by each detection zone.

(f) Travel Time Data: This report shall identify vehicle travel time data using one minute averages, at a minimum, for each for each of the following:

- WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
- EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
- WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
- EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations
- Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Other possible travel time combinations, as directed by MCDOT.

(18) Provide an application programming interface (API) for one way communications from the Variable Message Sign System to the Connected Vehicle Work Zone Notification System that is being furnished by the CVISN project. The API shall transmit/push the following data, in one minute intervals, to the Connected Vehicle Work Zone Notification System using Extensible Markup Language (XML), JavaScript Object Notation (JSON), or another approved open-standard file format:

(a) VMS Message Data: The actual wording of the message currently being displayed on each variable message sign deployed on the project, with the corresponding time-stamp, GPS coordinates of the sign, trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform and EB MC-85 Advise).

(b) Detector Speed Data: The current vehicle speed data using one minute averages, at a minimum, for each travel lane (i.e., each detection zone), with the corresponding time-stamp, GPS coordinates of the associated detector device, the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only, NE Detector Only, and SE Detector Only). It shall be clear in the data provided which direction of travel is covered by each detection zone.

(c) Detector Volume Data: The current detector volume data using one minute intervals, at a minimum, for each travel lane (i.e., provide the sum of the number of vehicles counted within each one minute interval per detection zone), with the corresponding time-stamp, GPS coordinates of the associated detector device, the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only, NE Detector Only, and SE Detector Only). It shall be clear in the data provided which direction of travel is covered by each detection zone.

(d) Detector Occupancy (Queue Detection) Data: The current detector queue detection data for each travel lane, with the corresponding time-stamp, GPS coordinates of the associated detector device, the trailer number and/or the location name (i.e., WB MC-85 Inform, WB MC-85 Advise, EB MC-85 Inform, EB MC-85 Advise, NW Detector Only, SW Detector Only, NE Detector Only, and SE Detector Only). It shall be clear in the data provided which direction of travel is covered by each detection zone.

(e) Travel Time Data: The current vehicle travel time data using one minute averages, at a minimum, with the corresponding time-stamp, GPS coordinates of the associated detector devices for each of the following:

- WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
- EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
- WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
- EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations

- Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Other possible travel time combinations, as directed by MCDOT.

402.2.2 (B) Speed Feedback System Requirements:

The Contractor provided hosted remote server and databases shall include the following minimum functionality:

(1) A secured Web interface application software that allows TMC operators and other project stakeholders to log into the Contractor provided server, from a PC connected to the internet, using unique identifying credentials assigned to each person, for access to the system GUI. Through this GUI, project stakeholders shall have the ability to monitor the status of the “Warn” and “Check” system devices and set the speed threshold level that changes the color of the speed message to yellow when the driver is traveling at or below the threshold and changes the color to red or blue when the traveling speed is above the speed threshold.

(2) Configurable with a trailer number to identify all field devices (with the exception of the DSRC System) that are mounted to the trailers at the “Warn” and “Check” SWZ locations and have the respective trailer number tagged to all archived data sets from these trailer mounted field devices.

(3) A GUI map that auto-populates the trailer location on the map, based on the GPS coordinates received from the trailer mounted GPS device. The GUI shall be configured to include the device location name (i.e., “WB MC-85 Warn” location), the trailer number.

(4) GPS coordinates received from the GPS device on the portable device trailer shall be archived with the associated trailer number tag at a minimum frequency of once daily at the beginning of each work day and each time devices are moved.

(5) Receive and archive "critically low on power" type alarm message, with trailer number and time stamp, and forward this alarm to the operator(s) via emails and text messages to a list of pre-defined stakeholders that want to receive the message.

(6) Monitor and archive "loss of communications" type alarms, with trailer number and time stamp, and forward this alarm to the operator(s) via emails and text messages to a list of pre-defined stakeholders that want to receive the message.

(7) Receive and archive detector speed data using one minute averages, at a minimum, for each “Warn” and “Check” SWZ location.

(8) Provide a system algorithm that automatically displays the current speed of the vehicle that is currently within the detection zone.

(9) Generate the following weekly system reports in Microsoft Excel format or some other type of Engineer approved format that allows MCDOT to easily populate the data into a Microsoft Excel spreadsheet, using the copy and paste functionality of a personal computer. Each of the following reports shall clearly identify the calendar week that the data within the report represents, a descriptive report name that distinguishes the report from other reports generated, identifies the type of data provided in the report, and provides the day of week and time of day (or time interval) for each data set contained within the report:

(a) System Alarm History: This report shall identify the time of day each trailer had an alarm type message (i.e., critically low on power, loss of communications, etc.). This report shall be organized per trailer number with the associated GPS coordinates of the trailer at the time the alarm was received. The type of alarm message, including low power, loss of communications, and other types, shall also be identified with the time of day, trailer number, and trailer location.

(b) Detector Speed Data: This report shall identify the vehicle speed data collected using one minute averages, at a minimum, for each “Warn” and “Check” SWZ location. This report shall be organized using the trailer number and/or the location name (i.e., WB MC-85 Warn, WB MC-85 Check, EB MC-85 Warn, and EB MC-85 Check). The associated GPS coordinates of the trailer at the time the data was received shall be included with the trailer number or location name.

(10) Provide an application programming interface (API) for one way communications from the Speed Feedback System to the Connected Vehicle Work Zone Notification System that is being furnished by the CVISN project. The API shall transmit/push the detector speed data, in one minute intervals, with time stamp,

trailer name, and associated GPS coordinates to the Connected Vehicle Work Zone Notification System using Extensible Markup Language (XML), JavaScript Object Notation (JSON), or another approved open-standard file format.

402.2.2 (C) CCTV System Requirements:

The Contractor provided hosted remote server shall include the following minimum functionality:

(1) A secured Web interface application software that allows TMC operators and other project stakeholders to log into the Contractor provided server, from a PC connected to the internet, using unique identifying credentials assigned to each person, for access to the P/T/Z controls and video stream of each camera location.

(2) The ability to configure a minimum of five camera pre-set positions (i.e., five different fields of view).

(3) The ability to view the real-time video stream being generated by each camera.

(4) Generate the following weekly system reports in Microsoft Excel format or some other type of Engineer approved format that allows MCDOT to easily populate the data into a Microsoft Excel spreadsheet, using the copy and paste functionality of a personal computer. The following report shall clearly identify the calendar week that the data within the report represents, a descriptive report name that distinguishes the report from other reports generated, identifies the type of data provided in the report, and provides the day of week and time of day (or time interval) for each data set contained within the report:

(a) System Alarm History: This report shall identify the time of day each trailer had an alarm type message (i.e., critically low on power, loss of communications, etc.). This report shall be organized per trailer number. The type of alarm message, including low power, loss of communications, and other types, shall also be identified with the time of day and trailer number.

402.2.2 (D) ARID Detector System Requirements:

The Contractor provided hosted remote server and databases shall include the following minimum functionality:

(1) A secured Web interface application software that allows TMC operators and other project stakeholders to log into the Contractor provided server, from a PC connected to the internet, using unique identifying credentials assigned to each person, for access to the system GUI. Through this GUI project stakeholders shall have the ability to monitor the status of the system devices, and access the data being archived by the system.

(2) Configurable with a trailer number to identify all ARID detector device locations and have the respective trailer number tagged to all archived data sets from these devices.

(3) A GUI map that auto-populates the trailer location on the map, based on the GPS coordinates received from the ARID detector device or trailer mounted GPS device. The GUI shall be configured to include the device location name (i.e., “WB MC-85 Advise” location) and the trailer number.

(4) GPS coordinates received from the ARID detector device or GPS device on the portable device trailer shall be archived with the associated trailer number tag at a minimum frequency of once daily at the beginning of each work day and each time devices are moved.

(5) Monitor and archive "loss of communications" type alarms, with trailer number and time stamp.

(6) Calculate and archive ARID detector travel time data using one minute averages, at a minimum, for each of the following:

(a) WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
(b) EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
(c) WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
(d) EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations
(e) Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
(f) Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
(g) Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
(h) Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
(i) Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
(j) Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
(k) Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
(l) Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
(m) Other possible travel time combinations, as directed by MCDOT.

(7) Generate the following weekly system reports in Microsoft Excel format or some other type of Engineer approved format that allows MCDOT to easily populate the data into a Microsoft Excel spreadsheet, using the copy and paste functionality of a personal computer. Each of the following reports shall clearly identify the calendar week that the data within the report represents, a descriptive report name that distinguishes the report from other reports generated, identifies the type of data provided in the report, and provides the day of week and time of day (or time interval) for each data set contained within the report:

(a) ARID Travel Time Data: This report shall identify vehicle travel time data using one minute averages, at a minimum, for each for each of the following:

- WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
- EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
- WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
- EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations
- Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Other possible travel time combinations, as directed by MCDOT.

(b) System Alarm History: This report shall identify the time of day each trailer had an alarm type message (i.e., critically low on power, loss of communications, etc.). This report shall be organized per trailer number. The type of alarm message, including low power, loss of communications, and other types, shall also be identified with the time of day and trailer number.

(8) Provide an application programming interface (API) for one way communications from the ARID Detector System to the Connected Vehicle Work Zone Notification System that is being furnished by the CVISN project. The API shall transmit/push the following data, in one minute intervals, to the Connected Vehicle Work Zone Notification System using Extensible Markup Language (XML), JavaScript Object Notation (JSON), or another approved open-standard file format:

(a) ARID Travel Time Data: The current vehicle travel time data using one minute averages, at a minimum, with the corresponding time-stamp, GPS coordinates of the associated detector devices for each of the following:

- WB Travel time between WB MC-85 Inform and EB MC-85 Inform locations
- EB Travel time between EB MC-85 Inform and WB MC-85 Inform locations
- WB Travel time between WB MC-85 Advise and EB MC-85 Advise locations
- EB Travel time between EB MC-85 Advise and WB MC-85 Advise locations
- Travel time between WB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper.
- Travel time between WB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between WB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the WB lane restriction taper, if the Stand-Alone Detection is located downstream from the WB Advise location.
- Travel time between EB MC-85 Inform and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Inform and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper.
- Travel time between EB MC-85 Advise and the NB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Travel time between EB MC-85 Advise and the SB Stand-Alone Detection on the alternate route before the EB lane restriction taper, if the Stand-Alone Detection is located downstream from the EB Advise location.
- Other possible travel time combinations, as directed by MCDOT.

402.3 CONSTRUCTION:

The Contractor submitted Traffic Control Plan (TCP) shall include SWZ devices and the associated barricades for these SWZ devices. See Section 401 Traffic Control for additional requirements.

The Contractor shall identify two members of the construction crew as the primary and secondary SWZ System Managers who shall be responsible for maintaining the system operation and dealing with any issues or questions that may arise. The contact info

(mobile phone number and email address) of these SWZ System Managers shall be provided to the RE and TMC representatives. The SWZ System Managers shall be trained on deploying and operating all of the SWZ system equipment and Web interface applications.

402.3.1 SWZ System Mobilization and Demobilization:

The Contractor shall provide a staging area and deliver the SWZ system field equipment to the staging area a minimum of two (2) weeks prior to needing to deploy the equipment within the work zone. The Contractor is responsible for the equipment while it is stored in the staging area and any insurance deemed necessary.

The Contractor shall be responsible for picking up the SWZ field devices from the staging area and mobilizing the SWZ field devices at the work zone locations identified within the approved TCP.

The Contractor shall set up, configure, and perform acceptance testing activities to verify proper operation. The Contractor shall provide these activities each time one or more SWZ field devices are moved within the project area. The Contractor shall relocate system field devices in accordance with changes to the TCP and for system performance evaluation reasons.

Upon completion of the SWZ system deployment period, the Contractor shall demobilize the SWZ field devices and remove them from the project site.

402.3.1 (A) System Configuration:

The Contractor shall provide support from a local and/or remote location for the setup and configuration of the SWZ system. All on-site system configuration procedures shall be clearly documented within the approved SWZ System User Manuals submittal.

The Contractor shall coordinate with the Engineer and submit Contractor proposed VMS messages for approval. No message shall be displayed on a VMS sign without prior approval from the Engineer. The Contractor's SWZ VMS System Algorithms and Messages submittal shall include the proposed system algorithm with a minimum of four different real-time traffic condition thresholds (calculated based on SWZ system detector data) with an associated hierarchy of message types for each threshold that the system will display. The submittal shall include multiple message options message (i.e., stopped traffic ahead, alternate route, travel time, etc.) for each VMS location and for each real-time traffic condition threshold. The Contractor shall coordinate with the Engineer to pre-define alternate routes that may be used and include each of the associated alternate route messages in the submittal.

The Contractor shall coordinate with the Engineer and provide a SWZ User Access Privileges submittal that clearly identifies each user by first and last name and the associated level of access that each of these users will have when logging into the system

The Contractor shall coordinate with the Engineer and provide a SWZ Alert Messages submittal that clearly identifies all stakeholders by first and last name, the associated types of system generated alerts that each of these stakeholders want to receive, and the method (email and/or text) that the stakeholder wants receive the alert.

The Contractor shall provide a SWZ Report Formats submittal that includes a sample format for each type of required system report.

Each SWZ system deployment configuration shall include two basic modes of operation. This first mode of operation shall be referred to as “Normal Operation” and the second shall be referred to as “Baseline Data Operation.” Within the baseline data mode of operation, all the system devices shall be fully operational and there shall be no messages displayed on the VMS and speed feedback signs (i.e., all message displays are blanked). During this baseline data mode of operation, the system shall be collecting, archiving, calculating, and reporting all the required data the same way that is used during normal operation. The baseline data collecting periods of time shall be clearly documented within the system reports, to distinguish them from the data that was collected during normal operations. This baseline data mode of operation and the associated data is a key component for evaluating the system performance. The Contractor shall coordinate with the Engineer and submit a SWZ Mode of Operation Deployment Schedule that identifies when the system is scheduled to be in each mode of operation (i.e., “Normal Operation” vs. “Baseline Data Operation”).

The Contractor shall log into the SWZ system and confirm that the system setup and configuration has been completed and all SWZ field devices are operating as intended for the project area. Once this is confirmed, the Contractor shall send an email to the Engineer letting the respective stakeholders know that the system is set up, operating properly, and ready to start acceptance testing.

402.3.1 (B) System Acceptance Testing:

The Contractor shall preform and successfully pass system acceptance testing in accordance with the approved SWZ system acceptance testing procedures. The testing procedures submitted by the Contractor and approved by MCDOT shall demonstrate proper operation of all system and device configurations in accordance with the performance requirements. The testing procedures shall include the following:

(1) Initial system and device testing intended to demonstrate that the system provided successfully achieves all the required functionality, performance requirements, and reporting requirements. This initial system testing shall be at a test bed location provided by the Contractor where the field devices are deployed.

(2) Individual SWZ location types testing to verify the system and devices at each individual “Inform,” “Advise,” “Warn,” “Check,” and “Stand-Alone Detection” SWZ location is configured, reporting, and operating properly when moved in the project area after initial system setup.

402.3.1 (C) System Training:

The Contractor shall provide system training in accordance with the approved SWZ system training curriculum. The training curriculum submitted by the Contractor shall demonstrate proper system setup, testing, operational procedures. The training shall reflect the actual needs of the field personnel and other project stakeholders accessing the system. Training shall ensure that field personnel are up-to-date on the safest and most efficient methods for moving and setting up field devices in the project area.

The Contractor shall coordinate with the Engineer to identify mutually agreed to training dates/times for each training class. The Contractor provided training shall include the following, at a minimum:

(1) One four-hour training class, at the 2901 W Durango St, Phoenix, AZ 85009 MCDOT facility, for MCDOT TMC representatives that will be accessing the system for system evaluation purposes. The training shall be hands-on type training using a PC that is connected to the SWZ system server(s) via the internet.

(2) One four-hour training class, at the test bed location provided by the Contractor where the field devices are deployed, for Contractor field personal that will be deploying and operating the system and for MCDOT representatives that will be observing the system operation and acceptance testing.

All on-site system configuration procedures shall be clearly covered in the System Training provided.

402.3.1 (D) Lessons Learned Workshop:

Following the completion of the SWZ system deployment period, MCDOT will host a four-hour (4-hour) Lessons Learned Workshop in a MCDOT facility. The Contractor, MCDOT, and the SWZ equipment vendor(s) are required to participate in this workshop to discuss SWZ system functionality, how the system could be better used by the Contractor, and debrief SWZ deployment lessons learned.

402.3.2 System Operations and Maintenance:

The Contractor shall operate the SWZ system and provide technical support to MCDOT throughout the duration of the SWZ system deployment period. The Contractor shall be responsible for identifying and performing preventive maintenance of the SWZ system and for software/firmware updates addressing glitches, substandard performance, and requested system configuration changes, reporting changes, and VMS system algorithm and message changes that may be desired as part of the system evaluation process. The Contractor shall resolve demonstrated software and equipment failures.

The SWZ equipment vendor shall provide support from a local or remote location for operation while the equipment is deployed within a work zone. The Contractor shall provide on-site system operational functions using the Portable Operator Control Device

provided with the system. All on-site system operational and safety procedures shall be clearly documented within the submitted SWZ system user manuals.

While the SWZ system is set-up and operating in the project area, the SWZ equipment vendor, the MCDOT RE, the MCDOT TMC representative, and the Contractor superintendent shall coordinate via email if there are any problems or issues that arise after the initial set-up. The stakeholder that notices the issue shall initiate the email and copy all other stakeholders and resolution will be confirmed via email.

The Contractor shall provide the Engineer with responses to all questions and concerns, throughout the contract period and within 5 working days of notification if the SWZ equipment is not active in the project area, and within 24 hours or less when the SWZ equipment is deployed within the project area.

The Contractor shall be responsible for trouble shooting and fixing any problems with the MCDOT furnish and Contractor installed DSRC radio and cellular communications gateway equipment as it relates directly how the equipment is mounted to the portable device trailers and how the power for these devices are connected to the trailer's PDA.

The Contractor shall be responsible for modifying file format, trouble shooting and fixing any problems with the SWZ Variable Message Sign System API and the SWZ ARID Detector System API and associated data sets for one way communications to the Connected Vehicle Work Zone Notification System.

402.3.2 (A) System Reporting:

The Contractor shall submit weekly system reports, as identified herein, to the Engineer. The Contractor shall submit each of these weekly reports by the close of business the following business day. The following weekly reports shall be included in these submittals:

(1) Variable Message Sign System
  (a) VMS Message History report
  (b) System Alarm History report
  (c) Detector Speed Data report
  (d) Detector Volume Data report
  (e) Detector Occupancy (Queue Detection) Data report
  (f) Travel Time Data report

(2) Speed Feedback System
  (a) System Alarm History report
  (b) Detector Speed Data report

(3) ARID Detector System
  (a) ARID Travel Time Data report

402.4 MEASUREMENT:

The per day units of measurements, defined in this section, includes both required modes of operation ("Normal Operation" and "Baseline Data Operation").

(A) Measurement for SWZ System Mobilization and Demobilization shall be made on a Lump Sum basis. This lump sum measurement shall include all materials, equipment and labor necessary to facilitate SWZ system mobilization and demobilization per the contract documents. SWZ system includes but is not limited to the mobilization and removal of SWZ system devices, submittals, installing and removing DSRC equipment, and software including related modifications, configurations, acceptance testing, training and lessons learned workshop.

(B) Measurement for SWZ System Operations and Maintenance shall be measured per day for each day all the associated devices and software are fully functional with no loss of communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements and providing the required daily system reports. This per day measurement shall include all materials, equipment and labor necessary to operate and maintain a fully functional SWZ system per the contract documents.

(C) Measurement for each "Inform" SWZ Location shall be measured per day for each day all the associated devices and software are fully functional with no loss of communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements, and actively deployed in the project area. This per day measurement shall include all materials, equipment and labor necessary to achieve a fully functional "Inform" SWZ Location per the contract documents.

(D) Measurement for each "Advise" SWZ Location shall be measured per day for each day all the associated devices and software are fully functional with no loss of communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements, and actively deployed in the project area. This per day measurement shall include all materials, equipment and labor necessary to achieve a fully functional "Advise" SWZ Location per the contract documents.

(E) Measurement for each "Warn" SWZ Location shall be measured per day for each day all the associated devices and software are fully functional with no loss of communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements, and actively deployed in the project area. This per day measurement shall include all materials, equipment and labor necessary to achieve a fully functional "Warn" SWZ Location per the contract documents.

(F) Measurement for each "Check" SWZ Location shall be measured per day for each day all the associated devices and software are fully functional with no loss of

communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements, and actively deployed in the project area. This per day measurement shall include all materials, equipment and labor necessary to achieve a fully functional “Check” SWZ Location per the contract documents.

(G) Measurement for each “Standalone Detection” SWZ Location shall be measured per day for each day all the associated devices and software are fully functional with no loss of communications or power failures for 98% of the construction work day, including achieving all the associated performance requirements, and actively deployed in the project area. This per day measurement shall include all materials, equipment and labor necessary to achieve a fully functional “Standalone Detection” SWZ Location per the contract documents.

(H) No direct measurement of individual traffic control elements or devices will be made. All traffic control devices, unless otherwise noted, shall be considered as included in the measurement for the Traffic Control pay item, as specified in Section 401.

(I) No direct measurement of the following elements or devices will be made. All of the following elements and devices shall be considered as included in the measurement for the respective SWZ locations (Inform, Advise, Warn, Check, and Standalone Detection):

(1) Portable device trailers, including but not limited to unique trailer number, solar PDA, cellular communications gateway with cell phone provider data plan, GPS device, and MCDOT furnished and Contractor installed DSRC radio and associated DSRC cellular communications gateway.

(2) SWZ system software and performance requirements, including but not limited to variable message sign system, speed feedback system, CCTV system, and ARID detector system.

402.5 PAYMENT:

(A) Payment for SWZ System Mobilization and Demobilization will be made at the Contract Lump Sum Price. Payment shall be full compensation for performing all activities associated with fulfilling the SWZ system requirements that are not directly included within other pay items. Contractor will be compensated for this contract item at a rate of 20% of the contract lump sum after successful completion of all required submittals and acceptance testing. The remaining 80% of the contract amount will be prorated over the entire length of the SWZ system deployment period.

(B) Payment for SWZ System Operations and Maintenance will be made at the Contract Unit Price. Payment shall be full compensation for performing all

activities associated with operating and maintaining a fully functional SWZ system per the contract documents.

(C) Payment for each “Inform” SWZ Location will be made at the Contract Unit Price. Payment shall be full compensation for performing all activities associated with achieving a fully functional “Inform” SWZ Location per the contract documents.

(D) Payment for each “Advise” SWZ Location will be made at the Contract Unit Price. Payment shall be full compensation for performing all activities associated with achieving a fully functional “Advise” SWZ Location per the contract documents.

(E) Payment for each “Warn” SWZ Location will be made at the Contract Unit Price. Payment shall be full compensation for performing all activities associated with achieving a fully functional “Warn” SWZ Location per the contract documents.

(F) Payment for each “Check” SWZ Location will be made at the Contract Unit Price. Payment shall be full compensation for performing all activities associated with achieving a fully functional “Check” SWZ Location per the contract documents.

(G) Payment for each “Standalone Detection” SWZ Location will be made at the Contract Unit Price. Payment shall be full compensation for performing all activities associated with achieving a fully functional “Standalone Detection” SWZ Location per the contract documents.

SECTION 405 SURVEY MONUMENTS

405.3 CONSTRUCTION:

405.3.1 INSTALLATION, add the following:

The County will locate and tie-out the existing survey monuments. The Contractor shall furnish and install new survey markers in the asphalt concrete pavement at locations designated by the Engineer. The Engineer will have the new survey monuments punched and documented.

SECTION 420 CHAIN LINK FENCES

420.1 DESCRIPTION, add the following**:**
This work includes constructing, maintaining, and removing temporary fencing around private properties only, not contractor work zones. Temporary fence shall provide a secure, visible boundary adjacent to protected areas.

420.2 MATERIALS, add the following:

Unless otherwise indicated, type of temporary chain link fencing shall be the Contractor’s option.

Following types are acceptable:

1. New materials or previously used salvaged chain link fencing in good condition
2. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with base plates, or inserting in precast concrete blocks.
3. Fabric: Woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.

Gates: Provide vehicle gates based on property usage and access requirements, required for functional access to the site or as specified by the Engineer or property owner.

1. Fabricate of the same material as used for fencing.
2. Vehicle gates:
    a. Minimum width: 20 feet to allow access for emergency vehicles.
    b. Capable of manual operation by one person.

420.3 CONSTRUCTION METHODS

420.3.1 Fence Construction, add the following:

420.3.4 Temporary Fence Construction

Submittals:
Shop drawings shall be submitted for approval prior to any temporary fence installation indicating layout of temporary fencing, location and size of gates, existing pavement and roads, access to fire hydrants and hose connections, and other site specific conditions. The drawings shall be prepared after site observation and verification of existing conditions by the Contractor and Engineer.

Construction Layout:
Installation of temporary fencing shall not deter or hinder access to existing and new hose connections and fire hydrants.

3. Maintain 3 feet diameter clear space around fire hydrants.
4. Where fire hydrant or hose connection is blocked by fencing, provide access gate.

Access: Provide gates for personnel, delivery of materials, and access by emergency vehicles.

The Contractor shall field verify the proposed location of fencing with the Engineer and Property Owner.

Installation:
Chain link posts:

1. Space 10-feet maximum.
2. Drive posts, set in holes and backfill, cast concrete plug around posts.
3. For soft and unstable ground conditions, cast concrete plug around post.
4. Posts over pavement: Use Steel post plates or precast concrete blocks.
5. Gate posts: Use bracing or concrete footings to provide rigidity for accommodating size of gate.

Fabric: Securely attach to posts.

Gates: Install with required hardware.

MAINTENANCE:
Maintain fencing in good condition at all times. If damaged, immediately repair.

REMOVAL:
Remove temporary fencing upon completion of Work or when no longer required for security or control. Provide 60-days notice to property owners prior to removal to ensure that their new fencing and gates can be constructed prior to removal to ensure each property is secure at all times. Copy the Engineer on the notice accordingly. Backfill holes and compact. Holes in pavement shall be surfaced to match existing paving. Repair damage caused by installation of temporary fencing.

420.4 MEASUREMENT, add the following:

Temporary chain link fencing shall be measured in accordance with Section 109.5 Actual Cost Work.

420.5 PAYMENTS, add the following:

The price paid out of the allowance under the item noted below shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all the work involved in constructing and removing the fence or gates complete in place as needed or as specified by the Engineer. This shall include full compensation for furnishing the gates, together with all necessary gate posts, fittings and hardware, and doing all the work involved in installing the gates complete in place and subsequently removing them as specified. This shall also include maintaining the fence while it is in use.

Full compensation for clearing the line of temporary fencing and disposing of the resulting material, excavating high points in existing ground, and any other related work shall be considered as included in the price bid per linear foot of item 420.00181 “6’ HIGH TEMPORARY CHAIN LINK FENCE, MAG DET 160” and no additional allowance will be made therefore.

SECTION 430 LANDSCAPING AND PLANTING:

430.13 DECOMPOSED GRANITE AND RIVER RUN AREAS, add the following:

Decomposed granite shall be native, local, desert, decomposed granite at the size specified on the plans. For landscape restoration areas, the color and size shall match the existing decomposed granite. In areas where decomposed granite does not exist, the color shall be Madison Gold or as specified by the Engineer. The decomposed granite shall be from a single source, free from coating, clay, caliche or organic matter. The CONTRACTOR shall provide the Engineer with a sample of material for approval before installation.

CONTRACTOR must examine the subgrade, verify the elevations, and observe the conditions under which the work is to be performed. The existing grade shall be fine graded and raked free of organic matter and other debris one inch diameter and larger and then compacted.

Any existing weeds or Bermuda grass growing in designated landscape areas shall be treated with a post-emergent spray, such as Round-Up or approved equal. Any existing or new trees or vegetation shall be protected from the spray drift. There will be no separate payment for the weed spraying. Bermuda grass or weeds must be completely eradicated from all areas of the landscape and where designated by the Engineer. The CONTRACTOR shall remove all non-planted vegetation from all areas designated to receive decomposed granite (by chemical or mechanical means) and maintain the designated areas “vegetation-free” for a minimum period of 40 working days prior to placement of the decomposed granite, or as specified by the Engineer. Prior to placement of the decomposed granite, designated areas to receive decomposed granite shall be completely free of all grass, weeds, or other miscellaneous vegetation growth. All dead grass and weeds shall be removed and properly disposed. There will be no separate payment for the weed spraying.

All weed control products and herbicides shall be approved for use by the Engineer prior to any applications. The CONTRACTOR shall submit copies of all product manufacturer specifications and application rates to the Engineer for review and approval prior to application. Herbicides and weed control shall only be performed by a licensed applicator; CONTRACTOR shall supply information on applicator to the Engineer for approval.

The CONTRACTOR shall apply two (2) applications of pre-emergent. One application of pre- emergent herbicide as per manufacturer’s directions prior to installing granite and one application after granite has been installed, compacted, and raked level. The pre-emergent herbicide shall be applied in the manner recommended by the manufacturer to prevent germination of noxious weeds, and shall be equivalent to Gallery, Surflan, or an approved equal, and shall be applied at a rate per manufacturers recommendations. Pre-emergent herbicide shall be applied to the designated granite areas, prior to the final water settling

operation. The Engineer is to be notified prior to all pre- emergent applications. Water to activate the pre-emergent herbicide shall be applied to the areas of the herbicide application as recommended by the manufacturer's label. The amount of water specified by the manufacturer may be adjusted due to rainfall, if approved by the Engineer.

After the first application of pre-emergent, the granite shall be installed and shall be rolled or raked to remove any irregularities, tire marks etc. Installation shall provide a two-inch depth of decomposed granite after compacting. During the final spreading and final grading operations, all surfaces within the decomposed granite areas shall be passed over by the spreading and grading equipment a minimum of two (2) times. Equipment operations for spreading, grading, raking, chemical application, water settling, and any other operations shall be done in a manner that uniformly maximizes the vehicle(s) wheel compaction over the surface area. All vehicles used for spreading, grading and raking the decomposed granite shall have one set of wheels with floatation tires having a minimum width of 18-inches to allow equal compaction of the granite mulch. The use or application of granite by any method (conveyor belt etc.) shall not relieve the CONTRACTOR of providing granite compaction to a level approved by the Engineer. Methods of compacting such as rolling, water settling, etc., shall be approved by the Engineer.

After placing, spreading, compacting, and grading the decomposed granite the CONTRACTOR shall water settle the total thickness of the decomposed granite to remove the fine material from the surface. The water settling operation, noted above, shall be completed by applying water at minimum depth of one-half inch over the decomposed granite areas placed or as approved by the Engineer. This water settling technique can be used to water-in the second application of pre-emergent in compliance with pre-emergent Manufacturer recommendations and as approved by the Engineer.

Unless otherwise specified in the drawings, granite finish grade shall be one inch (1”) below top of curb or adjacent sidewalk surfaces.

CONTRACTOR shall supply and place decomposed granite in areas as designated on the plans. Graduation requirements for the decomposed granite 3/4” minus are as follows:

Decomposed Granite 3/4 Inch Minus

Sieve Size	Percent Passing
3/4 Inch	100
1/4 Inch	50-60

430.15 MEASUREMENT AND PAYMENT, add the following:

Measurement and Payment for Decomposed Granite (3/4" Minus) will be at the contract unit price bid per Square Yard for the inert materials as shown on the project plans, details, and special provisions and shall include all costs, materials, equipment, labor, and operations necessary for the installation and associated weed control and pre-emergent applications.

SECTION 433 NATIVE PLANT HYDROSEEDING

433.1 DESCRIPTION:

All disturbed areas within the project limits shall be seeded unless stated otherwise on the plans. The work under this item shall consist of furnishing all materials, preparing the soil and applying the seed-mulch mixture to all disturbed areas and as indicated on the plans, and initial establishment watering of the seed bed. The work shall be done in accordance with these special provisions. The Engineer may adjust the schedule and the location of the hydroseeding within the limits of the project. The Engineer shall establish the exact date to commence seeding and shall reserve the right to postpone seeding until conditions are suitable.

433.2 GENERAL:

The following materials shall be combined to form a seed-mulch mixture for application:

200 pounds of ammonium phosphate fertilizer (16-20-0) per acre.

Chemical fertilizer shall be a standard commercial fertilizer, suitable for application with approved equipment, containing the minimum analysis and in the physical form of 16-20-0. The first number shall represent the minimum percent of soluble nitrogen, the second number shall represent the minimum percent of available phosphoric acid and the third number shall represent the minimum percent of water soluble potash. Chemical fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked.

2000 pounds of wood fiber mulch per acre.

The wood fiber shall be natural wood fiber having the property of dispersing readily in water, heat processed in such a manner so that it does not contain any growth or germination inhibiting factors and shall have no toxic effect when combined with the seed or other materials. The fiber shall be dyed green to allow visual monitoring during application, using a dye which is non-injurious to plant growth. Wood fiber shall be delivered in undamaged containers labeled and bearing the name of the manufacturer and showing the air-dry weight content, the maximum being twelve percent (12%) plus or minus three percent (3%) at the time of manufacture, and with a pH range of 4.5 to 6.5.

A seed mixture (Type A: General Use) consisting of the following kinds of seeds with corresponding weights shall be used:

Seed Type A: General Use

SPECIES	COMMON NAME	LBS/ACRE
Ambrosia deltoidea	Bursage	4.0
Aristida purpurea	Purple Three Awn	2.0
Atriplex canescens	Fourwing Saltbush	0.5
Baileya multiradiata	Desert Marigold	1.5
Cassia covesii	Desert Senna	1.5
Encelia farinosa	Brittlebush	1.0
Eriogonum fasciculatum	Buckwheat, var. Polifolium	1.0
Eschscholtzia mexicana	Mexican Gold Poppy	2.0
Larrea tridentata	Creosote Bush	3.0
Lupinus sparsiflorus	Desert Lupine	2.0
Lyceum exertum	Wolfberry	1.0
Penstemon parryi	Parry Penstemon	0.5
Phacelia campanularia	Desert Bluebells	2.0
Plantago insularis	Indian Wheat	5.0
Sphaeralcea ambigua	Desert Globe Mallow	1.5
Zizyphus obtusifolia	Grey Thorn	1.5
Celtis Pallida	Desert Hackberry	3.0
Cercidum floridum	Blue Palo Verde	1.0
Olneya Tesota	Ironwood	3.0
Prosopis Velutina	Velvet Mesquite	1.0
Acacia greggii	Catclaw Acacia	3.0

Total Weight Per Acre	41.0

Application and Source Specifications

Application rates of seeds as specified are for Pure Live Seed (PLS). PLS is determined by multiplying the sum of the germination and hard or dormant seed by purity.

The seed source shall be from elevations below 3,000 feet. The seed shall be delivered to the project site in standard, sealed, undamaged containers. Each container shall be labeled in accordance with Arizona Revised Statutes and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Labels shall indicate the variety or strain of seed, the percentage of germination, purity and weed content and the date of analysis which shall not be more than nine (9) months prior to the delivery date. Weed content of seed shall not exceed 0.5 percent.

100 pounds of tackifier per acre.

Tackifier shall consist of organic muciloid liquid concentrate diluted with water and a psyllium base containing no agents toxic to seed germination. Addition of fertilizer to the slurry mix shall not change the properties of the tackifier. When applied, tackifier shall form a transparent crust permeable by water and air.

Sufficient water to form a homogenous mixture capable of being applied by commercial hydro mulching equipment.

The water shall be free of oil, acid, salts or other substances harmful to plants. The source shall be approved by the Engineer prior to use. The seed, fertilizer and mulch shall be allowed to mix a minimum of five (5) minutes prior to starting the application and applied within 30 minutes after mixing with water.

Perform seeding work only after other affecting groundwork is complete. All areas intended for hydroseeding shall not be treated with a pre-emergent control. Protect existing utilities, paving, irrigation systems and other facilities from damage caused by seeding operations. Where equipment can operate, the area to be seeded shall be prepared by disking, harrowing or by other approved methods of loosening the surface soil to a depth of four inches (4"). Remove and dispose of all stones four inches (4") in diameter or greater, sticks, roots, rubbish and other deleterious material. On slopes too steep for equipment to operate, the area shall be prepared by hand raking to a depth of four inches (4"). On sloping areas, all disking, harrowing and raking shall be directional along the contours of the areas involved. All areas which are eroded shall be restored to the specific condition, grade and slope as directed prior to seeding.

Seeding operations shall not be performed on undisturbed soil outside the clearing and grubbing limits of the project or on steep rock cuts. Seeding operations shall not be performed when wind would prevent uniform application of materials or would carry seeding materials into areas not be seeded.

The homogenous mixture shall be applied to the seeding areas by means of hydraulic-type equipment which shall provide continuous mixing and agitation action to the mixture of water, fertilizer, seed and wood fiber. The mixture shall be applied through a pressure-spray distribution system providing a continuous, non-fluctuating discharge and delivery of the mixture in the prescribed quantities.

Apply seed, mulch, fertilizer and tackifier in a two-step process.

Slurry mix of water, seed, 200 lbs./acre of fertilizer, 10 lbs./acre of tackifier and 200 lbs./acre of wood fiber mulch.

Apply remaining 90 lbs./acre of tackifier and 1800 lbs./acre of wood fiber mulch.

The CONTRACTOR shall provide, upon request of the Engineer, past performance data that indicates his equipment and procedures are suitable or shall demonstrate his performance. The Engineer has final approval as to equipment and procedure.

Any method of installation or use of materials not in conformance with these special provisions will be reinstalled, repaired or removed as directed by the Engineer at no additional cost to the County.

The work provided for will be found complete when the planted seeds yield minimum stand, as determined by the Engineer, based on the suppliers' specified germination rates and species used and the seeded areas are free from weeds and disease.

433.3 MEASUREMENT AND PAYMENT:

Hydroseeding shall be measured by the acres of ground surface seeded, and shall include preparation of the seed bed, furnishing and installing the seed-mulch mixture, and initial establishment watering of the seed bed.

Payment for this work will be at the contract unit price per acre under the bid item, 430.01201 "HYDROSEEDING – NATIVE SEED MIX”.

SECTION 435 LANDSCAPE AND IRRIGATION RESTORATION

435.1 DESCRIPTION:

The work under this item shall consist of restoring the existing landscape and irrigation in areas that are disturbed by construction as identified on the project plans. The decomposed granite installation for these areas is included in this bid item.

Contractor shall renew and replace the existing decomposed granite to match replaced decomposed granite within these restoration areas. Work in this bid item also includes any irrigation restoration associated with the disturbed areas.

435.2 MATERIALS:

Any disturbed existing irrigation system will require that the contractor re-construct the irrigation system using the emitters, sprinklers, valves, piping, fittings, controllers, wiring, and other components, of sizes and types to match existing equipment.

All replacement or repair materials shall match the existing materials that have been damaged. Irrigation materials and components shall be from the same manufacturer as originally installed. Emitters and sprinklers shall have the same volume output as original. PVC pipe may be from a different manufacturer but the grade shall be as originally installed. All mainline fittings shall be Schedule 80, all lateral fittings shall be Schedule 40. Salvage and reuse of existing materials is acceptable if they are in proper working order and good condition.

Landscape materials and decomposed granite shall be replaced to match existing conditions. Contractor shall walk site with Engineer to inspect Landscape and Irrigation Restoration areas prior to construction activities.

435.3 LANDSCAPE AND IRRIGATION RESTORATION:

Contractor shall verify exact limits of disturbance with Engineer in areas designated on the plans as Landscape and Irrigation Restoration Areas. All work shall be in accordance with these Special Provisions.

Contractor shall identify and coordinate limits of disturbance areas where appropriate with the Engineer prior to beginning of construction activities. Contractor shall contact the Engineer for review and approval of all Landscape and Irrigation Restoration materials. Contractor shall replace all existing landscape materials in all disturbed areas that are disturbed, damaged or removed as a result of this project and shall bring disturbed areas back to original condition. Contractor shall contact the Engineer for review and approval of Landscape and Irrigation Restoration materials prior to installation.

The work shall also consist of reconstructing, rerouting, modifying, or repairing the existing irrigation system in areas designated on the plans. The contractor shall be required to repair and/or replace all disturbed or damaged irrigation components, returning their operation to 100 percent within 24 hours following initial disturbance of the irrigation components. The existing irrigation that will be impacted includes the drip irrigation system for trees, shrubs and ground covers. The work shall include furnishing and installing the various irrigation sleeves, piping, drip emitters, gate valves, electric control valves, wiring, and valve boxes, in needed, including required

excavation and backfill at the designated locations shown on the project plans or as directed by the Engineer.

All work shall be in accordance with the details shown on the project plans, or as directed by the Engineer and the requirements of these Specifications. The existing irrigation components shall be protected and maintained in their current condition where feasible or repaired, replaced, extended and reconnected in areas including, but not limited to, those areas that are disturbed during the construction, areas shown on the project plans or as directed by the Engineer. The contractor shall be required to maintain water to all existing plant materials throughout the duration of the contract using repairs, reconnections, replacements or rerouting of the system as approved by the Engineer. The contractor shall ensure that the entire existing and new irrigation systems within the project limits are operational and functional and shall test and receive approval from the Engineer prior to proceeding with other related work. The Engineer shall inspect and give approval prior to backfilling.

The system shall be constructed to grades and conform to areas and locations as shown on the drawings.

Protection of Existing Vegetation:

The work shall include the protection of all existing plant material. Contractor shall take great care to protect in place all existing plant material. Contractor shall replace in like kind and size existing plant material removed, damaged, or destroyed at no cost to the Project and to the satisfaction of the Engineer. The contractor shall identify and the Engineer shall review existing plant materials within the disturbance areas. Salvage and relocate or replace all plant material in conflict with the construction as designated in Landscape and Irrigation Restoration Areas in like kind and size per the direction of the Engineer.

Verification of Conditions:

Prior to the start of construction, Contractor shall conduct onsite inspections of plants and vegetation with the Engineer, and identify and inventory the plants and vegetation that are to remain in place during this area tour. Field measure and stake Project improvements as needed for establishing the location and limits of disturbance.

Protecting, Restoring, or Modifying Irrigation System:

The work under this item shall consist of testing, reconstructing, or modifying the existing irrigation systems that are damaged by the construction or as designated on the plans for restoration. Prior to construction activities, the contractor shall stake areas that are designated to be disturbed. The contractor, along with the Engineer, shall meet with the maintenance representative, County, or County's representative, for each area within the project that is designated to be disturbed to determine where the existing and functioning irrigation system is located and how it is operated. The

contractor shall be required to repair and or replace all disturbed or damaged irrigation components to 100 percent operational. Contractor shall ensure that all reconnections (water and power) have been tested and approved by the Engineer prior to back filling. Prior to final acceptance and during the maintenance period specified, the contractor and the Engineer shall meet again with the designated representative to engage every irrigation system that has been disturbed or that is adjacent to this project. The contractor shall ensure that each system has been returned to a fully operational and functional system and that all deficiencies have been corrected.

The underground location of the irrigation facilities is unknown. The contractor shall take care to minimize disturbance to these areas.

All construction shall be coordinated to ensure that the existing irrigation system and its associated electrical controls are fully functional within 24 hours of modifications. Work activities that require more than 24 hours of outage shall be coordinated with the Engineer for approval and alternate irrigation methods such as truck watering or temporary systems shall be required as directed by the Engineer. The cost of alternate irrigation methods necessary due to extended irrigation system outages will be at the contractor's expense.

All work shall be in accordance with the details shown on the project plans, or as directed by the Engineer and the requirements of these Specifications. All work shall be inspected and approved by the Engineer prior to backfilling and shall comply with all the requirements of MAG Sections 430 and 440.

Repair/Restoration:

Contractor shall restore all landscape areas and other surface improvements that were to remain in place, but that have been damaged by the contractor's actions or omissions. Restore landscape areas as nearly as possible to the original condition.

Repairing Damaged Plants:

Where damage to vegetation has occurred, contractor shall prune plants in accordance with Tree Care Industry Association (TCIA) standards to remove branches from the work area, and where needed to maintain the health of the plant. Remove material in a manner that yields minimal impact and is approved by the Engineer.

Replacing Damaged Plants:

Contractor shall remove plants that were identified by the Engineer to remain in place, but that are damaged during the course of the work to an extent that they cannot be repaired; and replace the damaged plants with new plants of the same type and value. Remove and replace damaged plants as directed by the Engineer. Base the value of plants that are to be replaced on the criteria found in the Council

of Tree and Landscape Appraisers' "Guide for Plant Appraisal", as evaluated by the Engineer. Contractor shall remove and replace damaged plants at no additional cost to the Project. Plants shall be replaced at the following sizes or as directed by the Engineer:

Existing Plant Material Size	Replacement Size
Trees:	
2" Caliper	24" Box
4" Caliper	36" Box
6" Caliper	54" Box
All Existing Shrubs	5 Gallon

Clean up the ground areas under plants remaining in place as directed by the Engineer. Wash off foliage that becomes soiled, or when directed to do so by the Engineer. Remove materials that fall or flow into protected areas. Provide protective barriers as needed or as directed by the Engineer to prevent materials from falling or flowing into protected areas.

Waste Management:

Contractor shall gather and dispose of spoils and vegetative waste, including dead and damaged plants and the trimmings accumulated from the operations to clear and remove existing vegetation. Dispose of spoils and vegetative waste off-site in conformance with the regulations imposed by the local authorities, and in an area approved for such disposal by the local authorities.

Maintenance of Vegetation:

Contractor shall care for and maintain existing vegetation within protected areas. Provide water and labor as needed for plant health, growth, and for washing down soiled foliage. Provide fertilizer, deep root fertilization, pesticides, anti-desiccants, and other materials and labor as needed to maintain the existing plants in a healthy and growing condition. Provide plant maintenance for the duration of the Contract, until Final Acceptance.

Record Drawings:

The contractor shall keep and maintain separate record drawings ("field redlined record drawings"), corrected shop drawings, or other drawings necessary for the Engineer to show the landscape and irrigation work as constructed. These field redlined record drawings shall be kept on the worksite and they shall be maintained clear, accurate and current as changes occur that may differ with the bid set construction documents and addenda. All landscape and irrigation related elements buried or backfilled shall be recorded in the "field redlined record drawings" prior to burial and backfilling occurs. The contractor shall submit the updated field redlined record drawings with monthly pay estimates to the Engineer. Complete field redlined record drawings that the contractor maintains shall be submitted to the

Engineer in a format that will allow the Engineer to create the formal record drawings. The contractor shall submit the field redlined record drawings to the Engineer prior to the end of each construction phase. No extra measurement or direct payment will be made for this work; the cost being considered included in the price of the contract items.

435.4 MEASUREMENT AND PAYMENT:

Measurement and Payment for Landscape and Irrigation Restoration will be at the contract unit price as an Allowance under bid item 440.10001 LANDSCAPE / IRRIGATION RESTORATION. The price paid out of the allowance shall be full compensation for furnishing all labor, materials, tools and equipment, and performing all work necessary for the furnishing and full restoration of all plant materials, decomposed granite, drip and sprinkler irrigation, and other miscellaneous items to the satisfaction of the Engineer.

No separate measurement or payment will be made for excavation, removal, backfill, salvage, or disposal of removed materials associated with construction, or for the cost of earthwork required in areas designated for landscape and irrigation restoration, the cost of such work being considered included in the contract price for this item.

SECTION 440 SPRINKLER IRRIGATION SYSTEM INSTALLATION:

440.6.3 SLEEVING, add the following:

Extend sleeve ends twelve inches beyond edge of hard scape, driveways, or sidewalks. Cap sleeve ends and mark with stakes. Provide tracer wire through sleeve and secure to stake at surface grade at each end for future sleeve location. Sleeve ends shall be covered with duct tape prior to backfill.

Asphalt cut and patch operations necessary for sleeve installation shall be considered incidental to the sleeve installation. All asphalt cutting shall be done with proper equipment to allow straight and true cuts through the entire depth of the asphalt being removed. The CONTRACTOR shall replace any patch work if the patch compacts more than 1/2 inch or if any of the patches becomes dislodged within one year. All asphalt shall comply with MAG section 336.

SECTION 470 GENERAL REQUIREMENTS FOR TRAFFIC SIGNAL AND INTERSECTION LIGHTING SYSTEMS

470.5 MARICOPA COUNTY FURNISHED MATERIAL AND EQUIPMENT, add the following:

MCDOT will furnish the following materials and equipment for installation:

1. Traffic Signal Type A Poles
2. Traffic Signal Type F Pole with 20' Luminaire Mast Arm
3. Traffic Signal Type K Pole with 55' Mast Arm
4. Traffic Signal Type R Pole with 55' Mast Arm and 20' Luminaire Mast Arm
5. All Signal Luminaire Mast Arms and Luminaires
6. All Signal and Pedestrian Signal Indications Including Mounting Assemblies
7. Controller Cabinet Assembly
8. Metro Street Name Signs
9. Pedestrian Push Buttons with Signs
10. Video Detection Assembly

Traffic signal material and equipment furnished by Maricopa County Department of Transportation or tested by Maricopa County Department of Transportation will be made available at the following address:

Maricopa County Department of Transportation Warehouse
Procurement Distribution Center
2222 South 27th Avenue
Phoenix, Arizona 85009-6357

The Contractor shall contact the MCDOT Traffic Signal Supervisor at (602) 506-8660 five working days prior to desired pick-up date to confirm the item list, availability, date and time. Warehouse hours for pick-up and delivery are 6:00 am – 2:00 pm Monday through Thursday. A map of the warehouse loading area will be made available upon request.

470.6 REMOVAL AND SALVAGE OF EXISTING FACILITIES, add the following:

The Contractor shall remove and salvage all existing traffic signal equipment as specified in the project plans, or as directed by the Engineer. This work consists of furnishing all necessary equipment, materials, and labor for the removal of signal and pedestrian indications, luminaire mast arms and fixtures, traffic signal poles and mast arms, control cabinet, service pedestal, battery backup system cabinet, pedestrian push buttons, and video detection equipment. The work shall include the removal and disposal of the existing signal pole foundation. Salvageable material shall be dismantled and stockpiled, prior to project completion, as directed by the Engineer.

All equipment and materials to be salvaged shall be the property of the County.

All equipment damaged or destroyed by improper care or handling shall be replaced with new equipment. Unless otherwise specified, it shall be the responsibility of the Contractor to remove and dispose of all discarded materials not salvaged. Holes resulting from removal of pull boxes, foundations, and other material shall be backfilled and compacted

with material equivalent to the surrounding area or as designated by the Engineer.

470.8 CITY FURNISHED MATERIAL AND EQUIPMENT, add the following:

The City of Phoenix will furnish the following materials and equipment for installation:

1. Emergency Pre-emption Cables Only for the intersections of MC-85 and 91st Avenue and MC-85 and 83rd Avenue.

The Contractor shall contact the City of Phoenix Signal Shop Foreman for the fire pre-emption cables at least two weeks prior to desired pick-up date to confirm the item list, availability, date and time. The installation of the pre-emption cables shall be covered under item 478.01000. Pre-emption detection devices shall be installed in the future.

City of Phoenix	Contact Name	Work Phone Number	Mobile Phone Number
Traffic Services Superintendent	Kip Carroll	602-256-3119	602-908-0289
Signal Shop Foreman	Chris Parkllan	602-509-2423	

SECTION 474 TRAFFIC SIGNAL POLE INSTALLATION

474.1 DESCRIPTION, add the following:

The work under this section shall consist of furnishing and installing custom light poles, mast arms, foundations, and modifying multi-use poles in accordance with the plans, the referenced details, the special provisions, and these specifications.

Poles shall include a shaft, base, mast arms (if required), and other hardware required to support the street lighting apparatus or other supported items.

Foundations shall be spread footing or direct buried as determined by pothole in accordance with the Drawings. If spread footings are necessary to provide the required utility clearance, the Contractor shall provide shop drawings sealed by a registered professional engineer for review and approval by the Engineer.

474.3 TYPES OF POLES, add the following:

Types of light poles to be furnished are as follows:

1. POLE (STANDARD COP POLE, INSTALLATION, AND DETAILS) as detailed on drawings.

2. POLE (CUSTOM 9' TALL) as detailed on drawings.
3. POLE (CUSTOM 20' TALL WITH TENON MAST ARM) as detailed on drawings.
4. POLE (CUSTOM 32’ TALL WITH 10’ BURRY)

(E) Luminaire Mast Arms, add the following:

Mast arms shall be provided per drawings. All pole and mast arms shall be submitted with foundation for Engineer’s approval.

474.6 MEASUREMENT, add the following:

Custom poles shall be measured by the each installed complete in place. No additional measurement shall be made for potholes or spread footings for the installation of custom poles.

474.7 PAYMENT, add the following:

The accepted quantities of poles will be paid for at the contract unit price. No additional payment shall be made for potholes or spread footings necessary for custom poles. Payment shall be full compensation for the work, COMPLETE IN PLACE.

SECTION 480 INTELLIGENT TRANSPORTATION SYSTEM

CONSTRUCTION, add the following:

480.3.5 ITS Inventory:
The Contractor shall verify the condition of the existing MCDOT ITS infrastructure within the project limits and inventory the condition of the infrastructure for structural and functional integrity prior to the start of construction activities. The cost for conducting the inventory and the traffic control for the inventory shall be included in the Mobilization bid item. Traffic control plans shall be submitted to the Engineer for approval. The contractor shall allow a minimum of 14 days for the Engineer to review and approve the traffic control plans for the inventory. The contractor shall notify the Engineer in writing of the time and place of the inventory. The written notification shall be a minimum of two days prior to beginning the inventory. The Engineer may elect to accompany the contractor during the inventory.

The contractor shall prepare a list of the results of the inventory detailing needed repairs, replacement or modification, location of the damage and provide the list to the Engineer for review and approval prior to excavation. Existing damage, required repairs or modifications not indicated by the contractor as a result of the inventory and subsequently brought to the attention of the Engineer shall be repaired by the Contractor and compensated by MCDOT at the Contractor’s actual cost with no mark up. All required work to repair ITS infrastructure damage found during the inventory and listed by the contractor shall be completed prior to beginning any fiber optic cable installation.

The contractor shall ensure that all MCDOT ITS infrastructure within the project limits remains operational and active during construction. No disruption to service will be permitted as a result of construction activities. If the contractor identifies that a disruption in service is required to perform the inventory, the contractor shall submit a list of devices where the disruption will occur.

The work to repair damaged ITS infrastructure found during the inventory shall be completed under the allowance number 480.00000.

480.3.6 Maintenance and Construction of MC 85 ITS Infrastructure:

The MC 85 Phase 1 project includes improvements to the existing ITS to accommodate the roadway widening of MC 85. The existing ITS is comprised of pull box, conduit, regional backbone communications, and backbone fiber optic cabling along the north side of MC 85 within the project limits.

Fiber connections and CCTV cameras exist at each traffic signal controller cabinet location. An existing wireless connection between antennas at MC 85/83rd Avenue and 83rd Avenue/I-10 (to the ADOT FMS) provides the primary communications connection to the MCDOT TMC.

In order to minimize the impact to ITS operations the Contractor shall construct the ITS improvements in 3 segments:

- Segment 1: Construct ITS improvements west of 83rd Avenue
    - Maintaining existing wireless connections at MC 85/83rd Avenue
    - Maintaining ITS infrastructure and communications east of 83rd Avenue

- Segment 2: Construct ITS improvements at the MC 85/83rd Avenue intersection
    - Relocate existing wireless antenna to new traffic signal
    - Existing wireless connection cannot be down (power or communications disruption) for more than 48 consecutive hours.

- Segment 3: Construct ITS improvements east of 83rd Avenue
    - Maintaining existing wireless connections at MC 85/83rd Avenue
    - Maintaining ITS infrastructure and communications west of 83rd Avenue

The Contractor shall construct Segment 1 independent of the other two segments (i.e. the Contractor shall construct Segment 1 improvements while maintaining existing communications in Segments 2 and 3, or vice versa).

No separate measurement or payment will be made for performing the work necessary to maintain the MCDOT ITS and regional communications.

SECTION 482 FIBER OPTIC CABLE AND EQUIPMENT:

482.3.1 Fiber Optic Cable, add the following:

(E) Removing and Reinstalling MCDOT ITS Cabling:
The Contractor shall remove existing MCDOT fiber optic cabling including existing cabels from existing conduit and reinstall the fiber optic cabling, after the ITS improvements have been completed, with proposed innerduct per the Plans. The existing MCDOT fiber optic cabling provides communications to Traffic Signal controllers along MC 85.

MCDOT requires a 5-day advanced notice for this work. A MCDOT representative shall be present at all times when the Contractor is performing the work.

Communications to the MCDOT traffic signal controllers along MC 85 shall not be offline for longer than 72 hours.

After the fiber optic cable is disconnected from the associated traffic signal cabinet or the existing splices are cut, the Contractor shall optical time-domain reflectometer (OTDR) test the fiber optic cable to determine if there is any existing damage. The results of the testing shall be provided to the Engineer.

The existing MCDOT fiber optic cabling shall be reused unless it is found to be damaged during the testing or if it is damaged by the Contractor during construction activities. If the fiber optic cabling is damaged during construction activities, it shall be replaced at no additional cost to the County.

Prior to disconnecting or removing any fiber optic cable, the Contractor shall furnish to the Engineer with the proposed removal and pulling procedures, maximum pulling tension, proposed pulling lubricants, and the lubricant manufacturer's procedures for use. The Contractor shall handle fiber optic cable carefully, taking care not to pull the cable along the ground, over or around obstructions or through unnecessary curves or bends. The Contractor shall not exceed fiber optic cable bend radius at any time. If the Contractor violates the bending radius of the cable, the entire length of cable from the previous splice point shall be removed from the project and a new cable shall be pulled at no cost to the County.

Manufacturer approved pulling grips, cable guides, feeders, shoes and bushings shall be used to prevent damage to the cable during installation.

The existing MCDOT fiber optic cable shall not be installed in any new pull box until the pull box has been approved for pulling by the Engineer.

Cables shall be pulled in the conduit with a split mesh cable grip or pulling eyes designed to provide a firm hold on the cable strength member. The cable shall not drag on the ground or pavement during installation. The contractor shall ensure that the tensile load on the cable does not exceed the allowed maximum by using a system that includes a means of alerting the installer when the pulling tension approaches the limit and displays the actual tension on the cable. The Contractor may supplement this procedure with a

break-away tension limiter set below the recommended tensile limit of the cable being pulled.

The contractor shall label and attach the cables to the racks and hooks with industry standard cable ties immediately upon entering the box. Cable ties should be tightened so that they prevent cable slippage but do not deform or damage the cable sheath. Each cable shall be independently coiled, tied, and racked. Label legend shall match existing conditions unless otherwise directed by the Engineer. The label shall be approved by the Engineer prior to installation. A cable passing through a pull box, whether spliced or not, shall have two labels, one near each exit/entry point within the pull box. The cable label shall be designed to slide along the cable. At a minimum, the cable labels shall include the word "CAUTION", cable type and number of strands/conductors, and the destination in each direction.

After the cable has been removed from the existing conduit, the cable shall be stored in a safe location and shall be laid in a "figure-eight" configuration to prevent kinking or twisting. The Contractor shall take care to relieve pressure on the cable at crossovers by placing cardboard shims (or equivalent method) or by creating additional "figure-eights". Contractor shall be responsible for protecting the cable from damage during construction activities. The existing fiber optic cable shall not be stored directly on the ground or pavement and out of direct sunlight.

(1) Testing Requirements:

Prior to removing the existing cable, the following test shall be performed:

Pre-Removal OTDR Tests: Conduct bi-directional tests using an OTDR for each fiber. This test will determine the condition of the existing fiber optic cables and provide a baseline that the contractor must meet or exceed. Test fibers at 1310 nm and 1550 nm using a launch cable no less than three times the pulse width used to shoot the cable. Submit OTDR traces for approval. Clearly annotate each splice and identify the measured loss.

After installation, the contractor shall perform the following tests:

Post Installation OTDR Tests: Conduct bi-directional tests using an OTDR for each fiber. Demonstrate that the attenuation for each fiber and splice, individually and as a whole, comply with the loss budgets determined prior to removing the fiber optic cable. Test fibers at 1310 nm and 1550 nm using a launch cable no less than three times the pulse width used to shoot the cable. Submit OTDR traces for approval. Clearly annotate each splice and identify the measured loss.

The contractor shall identify any unacceptable losses, and make corrective actions at no additional cost. Failed splices may be remade and re-tested for compliance. The contractor shall replace any cable in its entirety that is not compliant with these Specifications at no additional cost.

Following completion of all testing, and approval by the Engineer, the contractor shall compile and submit an electronic pdf file.

482.8 MEASUREMENT, add the following:

Removing and reinstalling MCDOT fiber optic cabling will be measured by the linear foot of cable removed in a straight line from center of pull box to center of pull box.

Reinstalling the fiber optic cable, cutting existing splices within the splice enclosure, resplicing, removing existing geotextile innerduct, installing split duct conduit to make existing conduit runs continuous, storing the fiber optic cable, equipment, labor, disconnecting, and testing the existing MCDOT fiber optic cabling shall not be individually measured, the work is considered included as part of other pay items.

SECTION 505 CONCRETE STRUCTURES

505.1 DESCRIPTION, add the following:

The work under this section shall consist of constructing concrete scuppers, spillways and catch basins at the locations shown on the Plans. The structure locations shown on the plans is the center of the structure at the face of curb. The type of scuppers, spillways and catch basins shall be constructed per the plans and shown details. Concrete used for the new spillways shall be Class A and shall follow the requirements set forth in section 725 of the of the MAG Specifications and Details.

505.1.1 MINOR STRUCTURES, add the following:

Catch basins being constructed at locations where existing catch basins where previously removed as part of this project shall be cast-in-place. The catch basins shall be constructed so the existing pipe elevations are maintained. The locations of these catch basins are shown on the plans.

505.2 SUBGRADE FOR CONCRETE STRUCTURES, add the following:

In locations where new spillways cross SRP irrigation pipe that will remain in place, contractor shall verify location of irrigation pipe and corresponding joint locations. The locations of these spillways are shown on the Scupper Design Summary Sheets (D1 and D2). Contractor shall notify engineer if existing SRP irrigation pipe, including the bell sections, are less than one foot clear to bottom of new spillway improvements. Contractor is hereby notified that spillway shifts may be required to gain one foot clearance from bottom of spillway to top of SRP irrigation pipe.

505.5.4.1 DOWEL PLACEMENT:

At locations where a new spillway abuts an existing spillway shown on the plans, the contractor shall provide dowels space no more than 12 inches on center in the center of the existing spillway thickness. Dowels shall be 12 inches long of #4 rebar with minimum

embed of 4.5 inches. Drill and epoxy dowels with Hilti Hit-Hy 200 adhesive or approved equal. The existing spillway slab shall be roughened to +/-1/4 inch amplitude prior to pouring new spillway.

505.11 MEASUREMENT, add the following:

Catch basins and scuppers will be measured by the number of each type of catch basin constructed and accepted. Concrete spillways will be measured by the number of linear feet of spillway measured along the middle of the spillway.

505.12 PAYMENT, add the following:

Payment shall be made at the contract unit price for each catch basin of the designated type(s).

Payment shall be made at the contract unit price for each scupper of the designated type(s).
Payment shall be made at the contract unit price for each lineal feet of spillway as designated on the plans and shall be full compensation for:

- Labor and materials for locating existing SRP irrigation pipe and joints.
- Coordination for any required shifting of the new spillways due to vertical clearance requirements with irrigation pipes and joints.
- Doweling into existing spillways.

SECTION 510 CONCRETE BLOCK MASONRY

510.1 DESCRIPTION, add the following:

Contractor shall construct a screen wall with a height of 6 feet above finished grade per City of Tolleson development requirements, ADOT Standard Detail SD 8.02 (H=6’-0” to 7’-11”), the Project Plans and these Special Provisions. The wall will be constructed per the project plans along the common property line with 8300 Buckeye, LLC to the north as stipulated in the original purchase agreement of the property which reads as follows:

“To construct a screen wall per City of Tolleson development requirements. The wall will be constructed of 8”x8”x16” CMU blocks with a 2’ x 10” tall concrete footing with a continuous #4 rebar, six (6) feet in height along the common property line with 8300 Buckeye, LLC to the north. The wall will be 554 linear feet in length. Grantee acknowledges and understands that there are two (2) private fire water supply stubs on the north property line of the Property that originate from the property located adjacent to the north property line of the Property, as generally depicted on Exhibit D-5 of that certain Development Agreement between Grantor and the City of Tolleson, Arizona, an Arizona municipal corporation, dated January 25, 2000 and recorded as Document No 2000-0115987, Official Records (the "Development Agreement"). Grantee hereby assumes the maintenance and repair responsibility for such private fire water supply stubs and shall be responsible to repair the same if damaged. Grantee will have the right, as Grantee's

sole cost and expense, to remove the private water supply stubs, provided that Grantee gives Grantor advance written notice of its intent to remove same and allows Grantor reasonable input as to the design and timing of such removal."

510.2 CONSTRUCTION, add the following:

The screen wall shall be constructed per ADOT Standard Detail SD 8.02 provided in **Appendix C**.

Provisions to maintain or abandon the existing waterline stubs shall be reviewed and approved by the engineer.

510.6 PAYMENT, add the following:

CMU Block Screen Wall will be measured by the linear foot for the number of linear feet acceptably constructed within the limits shown on the plans and directed by the Engineer. CMU Block Screen Wall, measured as provided above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for the work complete in place, including excavation, preparation of the subgrade, furnishing and placing reinforcing steel, CMU Block, footing construction/materials and waterline stub protection.

SECTION 516 IRRIGATION CLIP-TYPE PORT VALVES

516.1 DESCRIPTION:

Irrigation clip-type port valves shall be constructed per Detail U6 as shown in the project plans.

516.2 MEASUREMENT:

Irrigation clip-type port valves shall be measured per each installation complete in place.

516.3 PAYMENT:

The price paid per each clip-type port valve shall be full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing, fabricating, delivering, erecting, and forming valve openings in the concrete channel lining, complete in place, as shown on the plans.

SECTION 520 STEEL AND ALUMINUM HANDRAILS

520.1 DESCRIPTION, add the following:

Handrails are located at concrete headwalls and scuppers at locations shown on the plans.

SECTION 523 HEADWALL

523.1 DESCRIPTION:

The work under this section shall consist of constructing headwalls of the types and at the locations shown on the Plans.

523.2 MATERIALS AND CONSTRUCTION:

Concrete block masonry shall conform to Section 510 and concrete structures shall conform to Section 505.

523.3 MEASUREMENT:

Headwalls will be measured by the number of each type of headwall constructed and accepted.

523.4 PAYMENT:

Payment will be made at the contract unit price for each Headwall of the designated type(s).

SECTION 610 WATERLINE CONSTRUCTION:

610.1 DESCRIPTION, add the following:

Work shall include waterline relocations for existing potable water systems that are owned, operated, and maintained by the City of Phoenix, and City of Tolleson. Work includes placement/relocation of water distribution mains, water services, valves and boxes, and fire hydrants.

Work for City of Phoenix water relocations shall follow the City of Phoenix Supplement to the MAG Specifications and Details.

610.4 CONSTRUCTION METHODS, add the following:

Only City personnel shall operate isolation valves. All shut downs that may be needed will need to be closely coordinated with the respective city. All water shut downs will also need to be closely coordinated with the properties that will be affected. Shut down of waterline during summer months will not be permitted or during City water system maintenance. The Contractor shall coordinate with the appropriate city representatives for the schedule of such maintenance. The Contractor is hereby notified that a completely dry shut down cannot be guaranteed and will need to plan work and bid accordingly.

Contractor must have the proper coupling on site prior to interrupting service for pipe realignments. Romac couplings, or approved equal shall be used for connections to existing pipelines. Single-bolt couplings are not acceptable.

Existing valves that will be rendered obsolete after the relocation may be closed, plugged or closed off with a blind flange, left in place, and buried. In this case a 3" marker ball as manufactured by 3M or approved equal should be installed above the buried valve per manufacturer recommendations.

All valves and fire hydrants that are to be removed shall be salvaged and returned to the respective city. Contractor shall coordinate with the city for pickup of salvaged items.

City of Phoenix waterline, valve and fire hydrant relocations shown on the project plans will be constructed by the City of Phoenix. City of Phoenix valve adjustment and water meter relocations will be completed by the Contractor. The contractor is to coordinate and schedule the relocations with the City of Phoenix accordingly. No additional measurement or payment will be made for coordinating and providing access to the City of Phoenix for the relocations.

The Contractor will construct all City of Tolleson waterline, valve, fire hydrant and water service relocations at the locations shown on the plans. For water services the relocation shall be from the water main to the new meter box. The reconnection of the water service on private property to the new meter box will be the responsibility of the Contractor. The Contractor shall coordinate with the property owner for this reconnection.

Water Meter relocations are complete in place per Detail U3 including relocation of the meter, tap to existing water service line and tap to the existing water main including all trenching and patching necessary.

610.16 MEASUREMENT AND PAYMENT, delete the last sentence of Section (G) from the 2015 MAG Uniform Standard Specifications and Details for Public Works Construction and add the following:

The 6-inch ductile iron pipe and fittings required for making the connection from the main to the hydrant and the removal, storage, handling and reinstallation of the existing hydrant, shall be considered incidental and included in the relocation of the fire hydrant under item number 610.27000 "RELOCATE FIRE HYDRANT, MAG DET 360". This item shall be considered all-inclusive for removal, installation or reinstallation of existing fire hydrants and all necessary testing and sanitizing of appurtenances associated with fire hydrant installation.

610.16 MEASUREMENT AND PAYMENT, add the following:

(I) **Vertical Realignments**: All waterline vertical realignments shall be measured and paid for by the each complete in place which shall include all necessary appurtenances and removal of all existing pipe within the limits of the realignment.

SECTION 618 STORM DRAIN CONSTRUCTION WITH CONCRETE PIPE

618.7 PAYMENT, add the following

Pipe collars of any size for SRP Irrigation work shall be considered incidental to the pipe bid items associated with the work.

SECTION 621 CORRUGATED METAL PIPE AND ARCHES

621.1 DESCRIPTION, add the following:

Work shall include constructing slotted drain per ADOT standard detail C-13.60. The slotted drain shall connect to the new manhole shown on the plans.

621.3 INSTALLATION, add the following:

The slotted drain shall be joined with coupling bands as shown in ADOT standard detail C-13.60 to make joints water resistant. Prior to attaching the coupling band, sealant material shall be placed between the coupling band and the periphery of the pipe section ends.

Prior to backfilling and paving operations, the slotted drain shall be covered to prevent infiltration of material into the drain. Heavy tape, roofing paper, timber or other material may be used. Coverings shall be removed when the paving operations have been completed.

The slotted drain shall be backfilled with grout in accordance with ADOT standard detail C-13.60. The grout shall conform to the requirements of section 776 of the 2016 MAG Specifications and Details.

621.5 MEASUREMENT, add the following:

Measurement for the slotted drain will be the number of linear feet of drain, measured horizontally, from the end of the slotted drain pipe to the center of the catch basin.

621.6 PAYMENT, add the following:

Payment for the slotted drain will be made at the contract unit price bid per linear foot, to the nearest foot. The payment shall be compensation in full for furnishing and installing the slotted drain as specified, including removal of obstructions, excavation, backfilling, compacting, testing, and all incidental costs not specifically covered for the slotted drain.

SECTION 625 MANHOLE CONSTRUCTION AND DROP SEWER CONNECTIONS

625.1 DESCRIPTION, add the following:

625.1.3 Drywells:

Construction shall consist of furnishing all materials and constructing drywells in places detailed in plans. The drywells should be constructed per Detail DE and DF in the plans.

625.3 CONSTRUCTION METHODS, add the following.

625.3.4 Drywell Testing

The contractor is made aware that the total number of drywells shown in the plans may not be installed/constructed. The total number of drywells will be based infiltration test results taken from initial drywell installations. The infiltration results shall be taken by the drywell manufacturer and shall be provided to the Engineer and contractor as soon as possible. The Engineer shall determine the final number of drywells required to be installed. The contractor not/construct any drywell systems without direction and approval by the engineer.

625.4 MEASUREMENT, add the following:

Each drywell installed shall be measured as a complete unit. Additional depth beyond the basic depths will be measured in accordance with Section 109.5 Actual Cost Work.

625.5 PAYMENT, add the following:

Payment will be made at the contract unit price for each accepted drywell installed in place and fully operational with post-construction performance testing accepted by the Engineer. ADEQ registration of each drywell is required and is considered incidental and included within the unit price for installation of each drywell.

The final number of drywells and depth will be determined by the engineer and will be based on the infiltration test results. The contractor is made aware that some of the drywells shown in the project plans may not be installed with this project and/or additional depth may be necessary to achieve the proper release rates. An allowance has been established for additional depth beyond the basic depth if necessary to increase the release rates accordingly. Payment will be made out of this allowance past the basic depth of the drywell per Section 109. Contractor is to provide backup for payment accordingly.

SECTION 635 CONCRETE LINED IRRIGATION DITCH, add the following

SRP IRRIGATION BY-PASS PUMPING

Description:
The purpose of the allowance is to create a funding source for temporary by-pass pumping of SRP Irrigation delivery water. It is the intent of this project to perform work requiring dry SRP Irrigation pipelines to be done during SRP Irrigation scheduled dry-ups. Coordination with SRP and approval by the Engineer is required to utilize this allowance. Irrigation by-pass pumping as described in this section shall only be used after confirmation from SRP that a dry-up cannot be provided. Should SRP Irrigation dry-

ups not be available, this item covers materials and labor needed for by-pass pumping in order to achieve a dry-up condition of SRP Irrigation pipelines. Contractor shall be reimbursed for the associated costs of by-pass pumping work required to access existing/proposed SRP Irrigation facilities within the project limits.

Contract reimbursement from this allowance (in whole or in part) is not ensured. Contractor shall not anticipate, nor plan, for the amount from this allowance to be included in the total contract amount as part of this project.

Construction Requirements:

Scope:

Under this item the Contractor is required to furnish all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing flow around the work area for the duration of the SRP Irrigation or other work. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of a similar size and complexity as this project performed by his firm within the past three years. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

Engineering Submittal:

The Contractor shall prepare with the vendor a specific, detailed description of the proposed pumping system and submit it and the vendor's references at the preconstruction meeting.

The Contractor shall submit to the Engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing irrigation flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Contract Documents. No construction shall begin until all provisions and requirements have been reviewed by the Engineer.

Pumping Plans:

The plan shall include but not be limited to details of the following:

- Staging areas for pumps;
- Plugging method and types of plugs;
- Number, size, material, location and method of installation of suction piping;

- Number, size, material, method of installation and location of installation of discharge piping;
- Bypass pump sizes, capacity, number of each size to be on site and power requirements;
- Demonstration that the pumping system provides full (double flow) redundancy;
- Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
- Standby power generator size, location;
- Downstream discharge plan;
- Method of protecting discharge manholes or structures from erosion and damage;
- Thrust and restraint block sizes and locations;
- Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
- Method of noise control for each pump and/or generator;
- Any temporary pipe supports and anchoring required;
- Design plans and computation for access to bypass pumping locations;
- Calculations for selection of bypass pumping pipe size;
- Schedule for installation of and maintenance of bypass pumping lines;
- Plan indicating selection location of bypass pumping line locations.

Equipment:

All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.

The Contractor shall provide the necessary stop/start controls for each pump.

The Contractor shall include one stand-by pump of each size to be maintained on site. Back-up pumps shall be on-line, isolated from the primary system by a valve.

Discharge Piping - In order to prevent the accidental spillage of flows all discharge systems shall be temporarily constructed of rigid pipe with positive, restrained joints. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed.

System Description:

Bypass pumping systems shall have sufficient capacity to pump a peak flow of 500 cfs. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired. Bypass pumping system will be required to be operated 24 hours per day with staff on-site at all times monitoring flows.

The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performances of work.

The Contractor shall make all arrangements for bypass pumping during the time when the main is shut down. It is essential to the operation of the existing irrigation system that there be no interruption in the flow of irrigation throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the irrigation flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing irrigation downstream of his work.

The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

The Contractor shall provide all necessary means to safely convey the irrigation past the work area. The Contractor will not be permitted to stop or impede the main flows under any circumstances.

The Contractor shall maintain irrigation flow around the work area in a manner that will not cause surcharging of irrigation, damage to irrigation and that will protect public and private property from damage and flooding.

The Contractor shall protect water resources, wetlands and other natural resources.

Field Quality Control and Maintenance:

Test: The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer will be given 24 hours' notice prior to testing.

Inspection: Contractor shall inspect bypass pumping system every two hours to ensure that the system is working correctly.

Maintenance Service: The Contractor shall insure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.

Extra Materials: Spare parts for pumps and piping shall be kept on site as required. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

Preparation: Precautions:

Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the City and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.

During all bypass pumping operation, the Contractor shall protect the irrigation system from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the irrigation system caused by human or mechanical failure.

Installation and Removal:

The Contractor shall remove manhole sections or make connections to the existing irrigation and construct temporary bypass pumping structures only at the access location indicated on the Drawings and as may be required to provide adequate suction conduit.

Plugging or blocking of irrigation flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, it is to be removed in a manner that permits the irrigation flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

When working inside manhole or force main, the Contractor shall exercise caution and comply with OSHA requirements.

The bypass pipeline must be located off streets and sidewalks and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Engineer, the Contractor shall remove all the piping, restore all property to preconstruction condition and restore all pavement. The Contractor is responsible for obtaining any approvals for placement of the temporary pipeline within City right-of-way.

Measurement and Payment:
Payment for SRP Irrigation By-Bass Pumping will be made on an incremental basis as an allowance, bid item 635.04400 “SRP IRRIGATION BY-PASS PUMPING”

SECTION 710 ASPHALT CONCRETE

710.2 GENERAL, add the following:

Asphalt concrete is designated as Superpave ½” Mix, High Traffic; and Ashpalt Concrete Pavement Superpave ¾” Mix, High Traffic.

END OF SPECIAL PROVISIONS