ARIZONA
DEPARTMENT OF
TRANSPORTATION

ADVERTISEMENT FOR BIDS

SPECIAL PROVISIONS

BIDDERS DOCUMENTS

TRACS/Proj. No.:

040 AP 330 F075401C 040-E-NFA
HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

Contracts and Specifications Group
205 S. 17TH Ave., 2nd Floor, M/D 121F
Phoenix, Arizona 85007-3217

ARIZONA DEPARTMENT OF TRANSPORTATION

ADVERTISEMENT FOR BIDS

BID OPENING: FRIDAY, JULY 17, 2026, AT 11:00 A.M. (M.S.T.)

TRACS NO	040 AP 330 F0754 01C
PROJECT NO	040-E-NFA
TERMINI	HOLBROOK – LUPTON HIGHWAY (I – 40)
LOCATION	McCARRELL - QUERINO

ROUTE NO.	MILEPOST	DISTRICT	ITEM NO.
I-40	330.6 to 342.2	NORTHEAST	104407

The amount programmed for this contract is $ 50,433,600. The location and description of the proposed work are as follows:

The proposed project is located on Interstate 40 in Apache County, in the Northeast District, located at Chambers and the US 191 traffic interchange. The project limits begin at milepost 330.6 and end at milepost 342.2. The project is located partially in Navajo Reservation. The proposed work consists of pavement rehabilitation, includes milling and filling the existing asphaltic concrete of roadway mainline and shoulders, and milled asphalt concrete treatment at designated unpaved crossovers. The work also includes guardrail installation, fence spot repairs, drainage work, bridge repairs, seeding, pavement marking, signing, installing ground-in rumble strips, delineators, traffic control and other related work.

This project is located on a Native American Reservation, in the Navajjo Reservation area, which may subject the contractor to the laws and regulations of the (RESERVATION'S NAME) and its TERO office. Contractors are advised to make themselves aware of any taxes, fees or any conditions that may be imposed by the (RESERVATION'S NAME) on work performed on the Reservation.

The time allowed for the completion of the work included in this contract will be 230 working days.

The Arizona Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to §§ 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Contract documents, and other project documents, if applicable, are available as electronic files, at no charge, from the Department's website through the ADOT Contracts and Specifications Group (https://azdot.gov/business/contracts-and-specifications/current-advertisements).

Documents will be available within one week following the advertisement for bids.

To submit a valid bid, the bidder must (1) have prequalification from the Department as necessary for the project, and (2) be included on the project Plansholder List as a Prime.

The Application for Contractor Prequalification may be obtained from the Contracts and Specifications website.

This project requires electronic bidding. If a request for approval to bid as a Prime Contractor is received less than five working days prior to bid opening, the Department cannot guarantee the request will be acted on.

This contract is subject to the provisions of Arizona Revised Statutes Section 42-5075 -- Prime contracting classification; exemptions; definitions.

No proposal will be accepted from any contractor who is not a duly licensed contractor in accordance with Arizona Revised Statutes 32-1101 through 32-1170.03.

Persons that require a reasonable accommodation based on language or disability should contact ADOT's Contracts and Specifications Office by phone (602) 712-7221. Requests should be made as early as possible to ensure the State has an opportunity to address the accommodation.

Las personas que requieran asistencia (dentro de lo razonable) ya sea por el idioma o discapacidad deben ponerse en contacto con ADOT (602) 712-7221.

The bidder shall provide an electronic proposal guaranty payable to the Arizona Department of Transportation for 10 percent of the amount of the bid.

Prior to the bid opening date, any questions pertaining to the project documents shall be submitted to the Department in a written format through the Bid Express (Bidx) website at https://www.bidx.com/az/lettings. Questions shall be submitted through the Questions and Answers (Q&A) link located within the corresponding letting date and project proposal number links. The Department may not answer all questions, and any decision on whether a question is answered will be within the sole discretion of the Department. Any questions received less than three working days prior to the bid opening date may not be answered.

The Engineering Specialist assigned to this project is: Rene Teran, rteran@azdot.gov, any correspondence with the Engineering Specialist is subject to posting onto Bidx through the project's Q&A link. Answers to questions will not be given verbally, but will be posted exclusively to the Bidx website.

Brahama Singh, PE,
Group Manager,
Contracts & Specifications

Project Advertised on: 06-02-2026

SPECIAL PROVISIONS

FOR

ARIZONA PROJECT

040 AP 330 F0754 01C

040-E-NFA

HOLBROOK – LUPTON HIGHWAY (I 40)

McCARRELL - QUERINO

PAVEMENT REHABILITATION

PROPOSED WORK:

Project F075401C is located on Interstate 40 in Apache County, in the Northeast District, located at Chambers and the US 191 traffic interchange. The project limits begin at milepost 330.6 and end at milepost 342.2. The project is located partially in Navajo Reservation. The proposed work consists of pavement rehabilitation. The work includes milling and filling the existing asphaltic concrete of roadway mainline and shoulders, and milled asphalt concrete treatment at designated unpaved crossovers. The work also includes guardrail installation, fence spot repairs, drainage work, bridge repairs, seeding, pavement marking, signing, installing ground-in rumble strips, delineators, traffic control, and other related work.

PROFESSIONAL ENGINEER SEALS:

These Special Provisions represent the combined efforts of the following organizations:

(1) Burgess & Niple, Inc. (2) J2 Engineering & Environmental Design
(3) ADOT Roadside Development

A representative of each organization has affixed their seal below, which attests that portions of these Special Provisions were prepared under their direction.

Burgess & Niple, Inc.
(Civil, Traffic Control, Pavement Marking & Signing, Structures)

J2 Engineering & Environmental Design
(Drainage)

ADOT Roadside Development Section
(Landscape & Erosion Control)

(SPC00ST, 03/19/26)

SPECIFICATIONS:

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

Arizona Department of Transportation, Standard Specifications for Road and Bridge Construction, Edition of 2021,

Arizona Department of Transportation, Roadway Engineering Group, Construction Standard Drawings, listed in the project plans, and available on the Department's website,

Arizona Department of Transportation, Traffic Engineering Group, Manual of Approved Signs, available on the Department's website,

Arizona Department of Transportation, Traffic Engineering Group, Temporary Traffic Control Design Guidelines, dated April, 2025, available on the Department's website,

Manual on Uniform Traffic Control Devices for Streets and Highways, 2023 edition and Arizona Supplement to the 2023 edition, dated January, 2026,

The Proposal Pamphlet which includes the following documents:

These Special Provisions,

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246), July 1, 1978, Revised November 3, 1980 and Revised April 15, 1981,

Title VI / Non-Discrimination Assurances,
Appendix A
Appendix E,

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246), July 1, 1978, Revised November 3, 1980 and Revised April 15, 1981,

Executive Order 2009-09, November 13, 2009,

Bidding Schedule,

Proposal,

Surety (Bid) Bond, 12-1303,

Certification With Regard to the Performance of Previous Contracts or Subcontracts, Subject to the Equal Opportunity Clause of Executive Order No. 99-4 and the Filing of Required Reports, Non-Federal Aid Projects, August 1, 2000,

Certification With Respect to the Receipt of Addenda,

Participation in Boycott of Israel Certification Form,

Forced Labor of Ethnic Uyghurs Ban Certification Form, Rev. November 2022.

BID SUBMISSION:

In submitting a bid, the bidder shall completely execute the following documents:

Proposal,

Bidding Schedule,

Surety (Bid) Bond, 12-1303,

Certification With Regard to the Performance of Previous Contracts or Subcontracts, Subject to the Equal Opportunity Clause of Executive Order No. 99-4 and the Filing of Required Reports, Non-Federal Aid Projects, August 1, 2000,

Certification With Respect to the Receipt of Addenda,

Participation in Boycott of Israel Certification Form, and

Forced Labor of Ethnic Uyghurs Ban Certification Form, Rev. November 2022.

PROPOSAL GUARANTY:

Each bidder is advised to satisfy itself as to the character and the amount of the proposal guaranty required in the Advertisement for Bids.

CONTRACT DOCUMENTS:

The bidder to whom an award is made will be required to execute a Performance Bond and a Payment Bond, each in 100 percent of the amount of the bid, an Insurance Certificate and the Contract Agreement.

A copy of these documents is not included in the Proposal Pamphlet; however, each bidder shall satisfy itself as to the requirements of each document.

The documents, approved by the Department of Transportation, Highways Division, are identified as follows:

Statutory Performance Bond, 12-1301, September, 1992

Statutory Payment Bond, 12-1302, September, 1992

Contract Agreement, 12-0912, August, 2000

Certificate of Insurance, 12-0100, June, 1998

A copy of each document may be obtained by making a request to Contracts & Specifications.

MATERIAL AND SITE INFORMATION:

Projects requiring materials, excavation, or site investigation may have additional information available concerning the material investigations of the project site and adjacent projects. This information, when available and applicable, may be examined in the Office of the Bridge Group-Geotechnical Services, located at 205 S. 17th Avenue, Phoenix, AZ 85007-3212. The contractor may contact Bridge Group at (602) 712-7481 to schedule an appointment to examine the information. This information will not be attached to the contract documents.

(NOGOAL, 06/09/16)

NONDISCRIMINATION:

Policy:

The contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract and the award of subcontracts and supply contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

(TITLEVI, 08/19/21)

STANDARD TITLE VI SPECIFIC ASSURANCES:

The Arizona Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

(NAVAJO, 04/15/03)

RELATIONS WITH THE NAVAJO NATION:

The project is located on lands controlled by the Navajo Nation which may subject the contractor to the laws and regulations of the Navajo Nation. Contractors shall make themselves aware of any labor requirements, taxes, fees, licenses, permits or conditions that may be imposed by the Navajo Nation on work performed in the area. Questions regarding Navajo-imposed taxes on construction work conducted on the Reservation should be addressed to the Office of Navajo Taxation.

On other projects in this area, the utilization of Native Americans has developed a reservoir of capable, trained workers. The contractor shall contact the Office of Navajo Labor Relations for assistance in hiring such workers. The contractor shall give preference in hiring to as many workers indigenous to the area as can be properly utilized in the processing of the work. The contractor shall provide a manpower projection identifying the type of crafts and trades that it expects to utilize, the approximate date that it expects to start work, and the name of one of its employees to be its contact.

The Navajo Nation has developed a centralized procedure for handling construction staging sites, pits, permits and environmental clearances. Contractors are advised to contact the Division of Natural Resources of the Navajo Nation for assistance in these matters.

Contractors interested in acquiring water for construction use are advised to contact the Navajo Water Code Section for assistance.

The Navajo Nation contact offices are identified as follows:

Labor:	Office of Navajo Labor Relations Phone: (928) 871-6800
Permits:	Division of Natural Resources Phone: (928) 871-6593
Taxes:	Office of Navajo Taxation Phone: (928) 871-6681
Water:	Navajo Water Code Section Phone (928) 729-4132

GENERAL REQUIREMENTS:

BLM Material Sources:

If the contractor elects to pursue the use of material sources on BLM land under Title 30 Code of Federal Regulations, it is at the contractor’s sole risk, and the Department bears no

responsibility for any delays or costs associated with the request to use material sources on BLM Land.

The Department will not request or pursue any “free-use permit” under Title 23 Code of Federal Regulations or any other arrangement with BLM on this project.

No extension in contract time or compensation will be granted for any attempt by the contractor to utilize BLM land.

Designated Staging Area:

Staging area shall be identified by the contractor.

No measurement or direct payment will be made to the contractor for any cost associated with using this location.

Use of Prohibited Products:

The contractor shall not commit any of the following actions:

(1) Deliver, install, or include any prohibited product under this contract.
(2) Propose to deliver, install, or include any prohibited product under this contract.
(3) Enter into a new contract to procure or obtain any prohibited product.

For the purpose of this Section, “Prohibited Product” is defined as any telecommunication or video surveillance equipment, systems, or services produced by:

(1) Huawei Technologies Company.
(2) ZTE Corporation.
(3) Hytera Communications Corporation.
(4) Hangzhou Hikivision Digital Technology Company.
(5) Dahua Technology Company.
(6) Any subsidiary or affiliate of the entities mentioned in this Section.

The contractor shall identify the known subsidiaries and affiliates of the aforementioned from the following Website: https://umd.service-now.com/itsupport?id=kb_article_view&sysparm_article=KB0014132&sys_kb_id=28015b70dbe0e3849382f1a51d96193f

Transition of Select AASHTO Standard Test Method to Arizona Test Method Equivalent:

Whenever reference is made in the specifications to an AASHTO Test Method, the reference shall be construed to mean it's equivalent Arizona Test Method as listed in the table below.

TEST METHOD TRANSITION TABLE	
AASHTO Standard	**Equivalent Arizona Test Method**
R 66	103
R 97	104
R 90	105
T 11, T 27	201
T 85	210
T 84	211
T 335	212
T 99	225
	226
T 224	227
T 191	230
T 272	232
T 310	235
T 288, T 289	236
T 176	242
T 99	245
T 272	246
T 304 Method A	247
T 24	317
T 329	406
R 68, T 245	410
T 355	412
T 166	415
R 47	416
T 209	417
T 287	421
T 269	424
T 308	427
	428

Environmental Mitigation Measures:

The contractor's commitments are identified in the Environmental, Permits, Issues, and Commitments (EPIC) Plan Sheet 1F. The contractor shall follow the requirements specified in the EPIC plan sheet 1F, Subsection 104.16 of the specifications and these Special Provisions.

In addition, the contractor shall pay attention to the project specific environmental commitments that are specified in Section 10 of the EPIC Plan Sheet 1F.

(101DEFN, 04/21/22)

SECTION 101 DEFINITIONS AND TERMS:

101.02 Definitions:

Acceptance: of the Standard Specifications is hereby deleted:

Characteristic: of the Standard Specifications is revised to read:

A measurable or an observable property of a material, product, or item of construction.

City, County, Township, or Town: of the Standard Specifications is hereby deleted:

Contract Bonds (Performance Bond and Payment Bond): the title and text of the Standard Specifications is revised to read:

Contract Bonds:

Surety Bonds that include Performance Bond and Payment Bond.

Highway, Street, or Road: of the Standard Specifications is revised to read:

A general term denoting a public way for purposes of travel, vehicular, pedestrian or by other means, including the entire area within the right-of-way.

Roadbed: of the Standard Specifications is revised to read:

The graded portion of a highway, prepared as a foundation for the pavement structure and shoulders.

Roadside Development: of the Standard Specifications is revised to read:

Activities which provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching and the placing of other ground covers; or such planting and other improvements as may increase the effectiveness and enhance the appearance of the highway.

State: of the Standard Specifications is revised to read:

The State of Arizona, acting through its authorized representatives.

(102BID, 03/19/26)

Section 102 BIDDING REQUIREMENTS AND CONDITIONS: of the Standard Specifications is revised to read

102.01 Contract Documents:

(A) General:

The Contract Documents, including but not limited to, Advertisement for Bids, Project Plans, and Proposal Pamphlets will be available in electronic format, on the ADOT Contracts and Specifications Group website. Any interested party may access the advertised Contract Documents.

(B) Advertisements for Bids:

The advertisement for bids may contain the following information:

- Programmed Amount,
- Project number and name of highway,
- Route number and mileposts,
- Date and time of opening of bids,
- Location of the project,
- General description of work,
- Specified contract time for completion of contract work,
- Statement of proposal requirements,
- Manner in which project plans and specifications may be obtained,
- Type and amount of proposal guaranty.

(C) Proposal Pamphlet:

The Proposal Pamphlet will include the location and general description of the contemplated construction, an approximate estimate of the quantities and types of work to be performed and/or materials to be furnished, a schedule of bid items for which unit prices are invited, the specified time for completion, any applicable Special Provisions or supplemental requirements, and all necessary bidding documents.

102.02 Prerequisites for Bidding:

(A) General:

To submit a valid bid, the bidder shall:

(1) Have prequalification from the Department as necessary for the project, in accordance with Subsection 102.02(B) of the specifications; and

(2) Be included on the project Plansholder List as a Prime in accordance with Subsection 102.02(C) of the specifications.

(B) Prequalification of Bidders:

Prior to submitting a bid, the bidder will (unless waived by the Department) be required to be prequalified with the Department to bid on the project. The submission of Prequalification information and determination of Prequalification shall be in accordance with the requirements of the Rules for Prequalification of Contractors as approved and adopted by the Department.

(C) Plansholder List:

It is the bidder's responsibility to ensure that their firm is on the Plansholder List as a Prime prior to submitting a bid.
Firms may register electronically requesting placement on the project Plansholder List as a Prime contractor as follows:

(1) Go to the ADOT Contracts and Specifications Group Website;

(2) Select "Current Advertisements";

(3) Identify the project of interest;

(4) Click on the "Register" icon;

(5) Select the "Bidder" radio button;

(6) Complete all required fields;

(7) Click "Save". This submits the request to the Department; and

(8) If all required information is provided, the "ADOT C&S Advertisement Registration Confirmation" Screen will appear. An email will also be sent to the email address provided acknowledging the receipt of the request.

Requests to be included on the Plansholder List as a Prime will be evaluated by the Department to determine whether the bidder is prequalified for the project. The Department cannot guarantee that requests to be on the Plansholder List will be considered if the request is submitted less than five working days prior to the bid opening. The Department will send an email to the email address provided notifying the contractor of the results of their request. The Department's email will state whether the request was approved or denied. More information regarding the Department's decision may be obtained by contacting the ADOT Contracts and Specifications Group.

If an individual from a firm submits a duplicate request to be placed on the Plansholder List, the request will be denied. The Department will register the contact person listed on the duplicate request to receive email notices of updates to the project. The Department will send an email to the email address provided notifying the contractor of the results of their request.

(D) Registration for Notifications:

Subcontractors, Vendor and other interested parties may electronically register to receive email notifications regarding updates or changes to specific advertised contracts.

To register:

(1) Go to the ADOT Contracts and Specifications Group Website;

(2) Select “Current Advertisements”;

(3) Identify the project of interest;

(4) Click on the “Register” icon;

(5) Select the “Other” radio button, as applicable;

(6) Select the “Yes” in response to the prompt “Are you interested in registering to be notified about any changes made to this advertisement?”;

(7) Complete all required fields;

(8) Click “Save”. This submits the request to the Department; and

(9) If all required information is provided, the “ADOT C&S Advertisement Registration Confirmation” Screen will appear and a confirmation email will be sent to the email address provided.

All registered parties will receive notifications when changes are made to the associated contract advertisement.

102.03 Suspension from Bidding:

The Department may suspend any person and any subsidiary or affiliate of any person from further bidding to the Department and from being a subcontractor or a supplier or otherwise participating in the work:

(A) If that person or any officer, director, employee or agent of that person is convicted, in this State, or any other jurisdiction, of a crime involving any of the following elements or actions:

1) Entering into any contract, combination, conspiracy or other unlawful act in restraint of trade or commerce;

2) Knowingly and willfully falsifying, concealing, or covering up a material fact by trick, scheme, or device;

3) Making false, fictitious, or fraudulent statements or representations;

4) Making or using a false writing or document knowing it to contain a false, fictitious, or fraudulent statement or entry;

5) Misrepresentation or false statement on any application for bonding;

6) Misrepresentation or false statement on any application for prequalification;

(B) If the Department makes a finding of any of the above or finds that the contractor is not a Responsible Bidder or a Responsible Contractor; or

(C) If the Department determines that a contractor, subcontractor, or supplier has repeatedly or willfully failed to comply with federal or state immigration laws.

Under this subsection, a person means any individual, partnership, joint venture, corporation, association, or other entity formed for the purpose of doing business as a contractor, subcontractor, or supplier.

102.04 Availability of Documents:

The following documents, if applicable, will be available in electronic format on the ADOT Contracts and Specifications Group website:

A. Project Plans.
B. Advertisement for Bids.
C. Proposal Pamphlet.
D. Cross Sections.
E. Earthwork Report.
F. Other Available Reports.
G. Existing Ground Digital Terrain Model (DTM).
H. Design Ground Digital Terrain Model (DTM).
I. Survey Control Sheet.

The project plans, proposal pamphlet, cross sections, earthwork report, survey control sheet, and any applicable reports are provided in PDF format. The Department makes no representation or warranties as to the compatibility, usability, or readability of the PDF documents with any system, software, hardware, or application package other than that on which the files were originally saved. The contractor bears the sole risk of any modifications, manipulations, or alterations to the plans, proposal pamphlet, and any applicable reports.

The existing ground DTM and the design DTM, if applicable, are provided in either DTM or DGN files for informational purposes only. The DTMs are not part of the contract documents. The contractor's use of the information in the DTMs is at the contractor's sole risk. The Department makes no representation or warranties as to the compatibility, usability, or readability of the DTMs with any system, software, hardware, or application package other than that on which the files were originally prepared. The version of Microstation used to save the DTMs is indicated at https://azdot.gov/business/engineering-and-construction/computer-aided-design-and-drafting-cadd.

The Department is providing the available electronic project documents to bidders for informational purposes in conjunction with work or services to be provided to the Department under the contract. Any use of the electronic files for any purposes other than for this project is prohibited.

102.05 Plansholder Eligibility:

The Department reserves the right to disqualify a prequalified contractor from being a Plansholder for any of the following reasons:

(A) Lack of competency or adequate machinery, plant and other equipment, as revealed by the financial statement and experience questionnaires required under Subsection 102.02 of the specifications.

(B) Incomplete work which, in the judgment of the Department, might hinder or prevent the prompt completion of additional work if awarded.

(C) Failure to pay, or settle satisfactorily, all bills due for work on other contracts.

(D) Failure to comply with any qualification regulations of the Department.

(E) Default under previous contracts.

(F) Unsatisfactory performance on previous work.

(G) Entering into any contract, combination, conspiracy, or other unlawful act in restraint of trade or commerce.

(H) Knowingly and willfully falsifying, concealing, or covering up a material fact by trick, scheme, or device.

(I) Making false, fictitious, or fraudulent statements or representations.

(J) Making or using a false writing or document knowing it to contain a false, fictitious, or fraudulent statement or entry.

(K) Misrepresentation or false statement on any application for bonding.

(L) Misrepresentation or false statement on any application for prequalification.

(M) Lack of sufficient ability or integrity to complete the contract.

102.06 Interpretation of Quantities in Bidding Schedule:

The quantities appearing in the bidding schedule, except as provided elsewhere, are approximate only and are prepared for the comparison of bids. Payment to the contractor will be made only for the actual quantities of work performed and accepted or materials furnished in accordance with the requirements of the contract. The scheduled quantities of work to be

done and materials to be furnished may each be increased, decreased, or omitted as hereinafter provided in Subsection 104.02 of the specifications.

102.07 Examination of Plans, Specifications and Site of Work:

The bidder shall examine the site of the proposed work and the contract before submitting a Proposal. If no site investigation is performed, the bidder is responsible for all site conditions that should have been discovered had a reasonable site investigation been performed. The submission of a Proposal will be considered conclusive evidence that the bidder is satisfied with the conditions to be encountered in performing the work and as to the requirements of the proposed contract.

The bidder shall take no advantage of any apparent error or omission in the plans, bid schedule items, estimated quantities, specifications, or other contract documents. In the event the bidder discovers such an error or omission, the bidder shall immediately notify the Department. The Department will then make such corrections and interpretations as may be deemed necessary.

Any request for explanation of the meaning or interpretations of the contract shall be submitted in adequate time to allow a reply to reach all bidders before submission of their Bid Proposal. If the Department determines interpretations or explanations are warranted, the response will be issued, if necessary, through an addendum to the contract documents, and will be made available to all prospective bidders before the time set for opening of Proposals.

The Department will not be bound by any statement or representation concerning conditions or description of the work unless they are included in the contract. Oral explanations, interpretations, or instructions given before the opening of the bids by Department employees or agents are not binding.

102.08 Preparation of Proposal:

(A) General:

The bidder shall prepare and submit its proposal using Department-approved bid preparation software.
Proposals shall be prepared and submitted in accordance with the requirements of Subsection 102.08(B) of the specifications.
The bidder shall submit its proposal using the electronic bid process described herein.

(B) Electronic Submittal:

(1) General:

In order to submit a bid electronically, a firm shall have obtained a bidder identification number from the Department, at the office of ADOT Contracts and Specifications Group, 205 South 17th Avenue, Maildrop 121F, Phoenix, AZ 85007, phone (602) 712-7221.

In addition, bidders shall subscribe to Info Tech, Inc., doing business as Infotech's Bid Express® service at www.bidx.com, an online bidding service, and obtain an online Digital ID. Bid Express can be reached at www.bidx.com, phone (888)-352-2439 and/or customer.support@bidx.com. The bidder shall also download and install a copy of the AASHTOWare Project Bids Bid Component from the internet at the Bid Express website. The version of the software currently used by ADOT can then be located by selecting the ADOT tab and the "AASHTOWare Project Bids" link under Downloads.

In order to obtain a Digital ID, bidders shall name at least one authorized signatory, as approved by the Department to commit the firm to the terms and conditions specified in the Proposal and the contract documents.

The bidder shall download the electronic copy of the project EBSX file, listed as an AASHTOWare Project Bids Data File on the Bid Express website. The file includes a schedule of items folder containing the bid schedule, a miscellaneous data folder containing the proposal and attachments, contractor authorization folder containing bidders's contact information, and a bid bond folder. The bidder shall review the proposal and complete the bidding schedule, as specified herein, and the attachments.

The bidder shall include with its bid an email address and recipient name as its contact information for the purpose of receiving the notice of award or other notices related to the bidding. The Department will send the notice of award, executed contract and other notices to the requested email address and recipient name.

It is the contractor's responsibility to provide the updated contact information to the Department if there are any changes to the above requested email address or recipient name prior to the award of the contract.
The bidder shall specify a unit price for each pay item for which a quantity is given in the bidding schedule. The software will automatically produce the extended amount, as the product of the quantity given and the specified unit price.

The bidder shall also download all addenda files issued and update the project file accordingly. The bidder shall be responsible for the successful submission of its electronic bid prior to the time specified for submission of bids. The bidder agrees that the Department bears no liability resulting from the bidder's failure to successfully submit an electronic bid.

(2) Procedure for Missing Bids:

If a bidder believes that its electronically submitted bid should have been read at the bid opening but was not read, the bidder shall notify the Department at CSGroup@azdot.gov of the apparent irregularity and provide its bid receipt for the bid in question no later than three hours after the time specified for submission of bids.

Upon proper notification of a missing bid by a bidder, the Department will notify all bidders that a missing bid has been reported. The Department will begin an investigation to determine the status of the bid, and will review all electronic bids received from Bid Express service.

The Department will direct Infotech to review their records and determine whether the missing bid was submitted. Infotech will make a determination about receipt of the bidder's missing bid.

If requested by the Department, Infotech will attempt to retrieve a copy of the encrypted bid from the bidder's computer.

The Department will partner with Infotech and implement best practices to configure the Bid Express service to decrypt the bid.

If the Department determines that a bid cannot be recovered, the Department will notify all bidders of its determination.

If a missing bid is recovered, the Department will determine the validity of the bid, and may recommend award of the contract to the bidder submitting the missing bid if appropriate. The Department will notify all bidders.

102.09 Non-Collusion Certification:

By submission of its bid electronically, the bidder makes the certification stated in the following paragraph, binding as if it had been signed by the bidder.

The bidder certifies that, pursuant to Subsection 112(c) of Title 23, United States Code and Title 44, Chapter 10, Article 1 of the A.R.S, neither it nor anyone associated with the company, firm, corporation, or individual has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid.

102.10 Irregular Proposals:

(A) Proposals may be considered irregular and may be rejected for any of the following reasons:

(1) If there is a submission of any kind which may tend to make the proposal incomplete, indefinite or ambiguous as to its meaning.

(2) If the bid is mathematically unbalanced.

(3) If the bid is materially unbalanced.

(B) Proposals will be considered irregular and will be rejected for any of the following reasons:

(1) If the bidder or surety fails to provide a proposal guaranty as specified in Subsection 102.11 of the specifications.

(2) If the bidding schedule does not contain a unit price for each pay item listed.

(3) If the bidder fails to meet the required goal for Disadvantaged Business Enterprises (DBE) established in the Special Provisions or show good faith effort as determined by the Department.

102.11 Proposal Guaranty:

The bidder shall provide an electronic proposal guaranty payable to the Arizona Department of Transportation for 10 percent of the amount of the bid.

The surety (bid) bond shall be executed by the bidder and a surety company or companies holding a certificate of authority to transact surety business in this State issued by the Director of the Department of Insurance. The agent for the surety shall be licensed to act as an insurance agent in Arizona.

Bidders shall provide an electronic proposal guaranty as described herein.

Two companies have established web-based surety processing procedures with Bid Express: Surety 2000 (https://surety2000.com/) and Sure Path Network (http://web.insurevision.com/). Bidders may contact these companies for additional information and requirements on electronic proposal guaranty.

102.12 Withdrawal of Proposals:

(A) General:

A bidder may withdraw its electronic submittal at a minimum 30 minutes prior to the time specified for bid opening in writing to the Contracts and Specifications Manager through the Contract and Specifications Group email at CSGroup@azdot.gov------

(B) Conditional Withdrawal:

When proposals for more than one contract are to be publicly read on any one date, a bidder may request in the event it is the apparent low bidder on a given contract or contracts, that one or more subsequent bids be withdrawn.

The bidder shall submit a written request for conditional withdrawal to the Contracts and Specifications Group Manager via email at CSGroup@azdot.gov a minimum of 30 minutes prior to the specified bid opening time.

102.13 Combination or Conditional Proposals:

At the Department’s discretion, proposals may be issued for projects either separately or in combination. Bidders may submit bids for the combination or for individual units within the combination, as allowed in the proposal. The Department reserves the right to award contracts based on separate or combination bids, whichever is most advantageous to the state. Only combination bids specifically authorized in the Department's proposal will be considered.

102.14 Public Opening of Proposals:

Proposals will be opened and read aloud at the time indicated in the advertisement for bid. Bidders, their authorized agents and other interested parties may attend the bid opening while they are read aloud. After the completion of the bid opening, the as-read bid results will then be made available through the ADOT Contracts and Specifications Group website.

102.15 Licensing:

It is the responsibility of the bidder to determine whether it has the appropriate contracting licenses to perform the work. For all projects except Federal-aid funded projects, the bidder shall have the proper licenses at the time of bid opening. The successful bidder's failure to meet with the necessary license requirements at the time of bid opening will result in the rejection of the bid.

On Federal-aid funded projects, the bidder is not required to have the licenses at the time of bidding, but it must procure the licenses from the State Registrar of Contractors, in accordance with A.R.S. 32 1101 et seq. before award can be made, and no later than 60 days after the date bids are opened. The bidder's failure to get the necessary licenses within 60 days after the bid opening date will result in rejection of the bid.

Licensing information is available from:
Arizona Registrar of Contractors
1700 W. Washington St. Suite 105
Phoenix, AZ 85007-2812
Phone: (602) 542-1525
Email: Webmaster@azroc.gov
www.roc.az.gov

102.16 Boycott of Israel:

All bidders are required to certify in their bid proposal on the "Participation in Boycott of Israel Certification" form either:

(A) The bidder does not participate in, and agrees not to participate in during the term of the contract, a boycott of Israel in accordance with ARS 35-393.01; or

(B) The bidder does participate in a boycott of Israel as defined in ARS 35-393.01.

The Department will not recommend award of the contract unless the bidder makes the certification described in subparagraph (A) of this Subsection.

102.17 Forced Labor of Ethnic Uyghurs Ban:

All bidders are required to certify in their bid proposal on the "Forced Labor of Ethnic Uyghurs Ban Certification Form" either:

(A) The bidder does not use the Forced labor of Ethnic Uyghurs as described in A.R.S. 35-394; or

(B) The bidder does use the Forced labor of Ethnic Uyghurs as described in A.R.S. 35-394.

The Department will not recommend award of the contract if the bidder makes the certification described in subparagraph (B) of this Subsection, unless the bidder uses an exempt contractor.

For the purposes of this subsection, a contractor is defined as an exempt contractor if it is a sole proprietorship; has fewer than 10 employees; and/or is a non-profit organization.

SECTION 104 SCOPE OF WORK:

104.04 Maintenance of Traffic: of the Standard Specifications is modified to add:

The contractor shall maintain a minimum of one lane of traffic in each direction during working hours. The contractor shall notify the ADOT project team of lane closures and restrictions at least 7 days in advance to allow for public notification. The Engineer may also restrict the times for closures for all activities to avoid times when special events are occurring near the project limits or for any other reason the Engineer deems necessary.

Except as otherwise indicated, construction activities requiring one or more lane closures shall be limited to the time period between 9:00 PM and 6:00 AM the following morning, Sunday through Thursday, except as otherwise permitted by the Engineer. Entrance and exit ramp closures are limited to any single exit and corresponding entrance ramp at a time. Any work not requiring a lane closure may be completed during daytime and weekend hours. Lane and ramp closures shall be performed within the allowable lane closure periods shown in Table 104-1.

Table 104-1 – Allowable Lane and Ramp Closure Periods

I-40	Weekday[1]	Weekend[2]
Single Lane Closure on Mainline	Monday 9:00 PM to Tuesday 6:00 AM	Sunday 9:00 PM to Monday 6:00 AM
	Tuesday 9:00 PM to Wednesday 6:00 AM	
	Wednesday 9:00 PM to Thursday 6:00 AM	
	Thursday 9:00 PM to Friday 6:00 AM	
Corresponding set of Entrance and Exit Ramps	Monday 9:00 PM to Tuesday 6:00 AM	Sunday 9:00 PM to Monday 6:00 AM
	Tuesday 9:00 PM to Wednesday 6:00 AM	
	Wednesday 9:00 PM to Thursday 6:00 AM	
	Thursday 9:00 PM to Friday 6:00 AM	

Single Lane Closure on Cross Streets and Frontage Roads	Monday 9:00 PM to Tuesday 6:00 AM	Sunday 9:00 PM to Monday 6:00
	Tuesday 9:00 PM to Wednesday 6:00 AM	
	Wednesday 9:00 PM to Thursday 6:00 AM	
	Thursday 9:00 PM to Friday 6:00 AM	
[1]Weekdays are defined as from Monday 6:00 AM to Friday 6:00 AM. [2]Weekend is defined as from Friday 6:00 AM to Monday 6:00 AM.		

No lane or complete roadway closures shall occur from 12:00 PM (noon) of the day preceding a holiday or holiday weekend through 6:00 AM of the day following a holiday or holiday weekend, based on the holidays identified in the general requirements. In addition, no lane or complete roadway closures shall occur for the whole day (12:00 AM (midnight) of the day until 12:00 AM (midnight) of the following day) of any special event identified in the general requirements.

Prior to construction, alterations to contract phasing, detours, and Maintenance and Protection of Traffic plans shall be reviewed by the Engineer at the preconstruction conference or a pre-activity meeting based on the contractor's preliminary schedule and proposed contract phasing.

The contractor shall prepare and submit traffic control plans to the Engineer for review and approval 14 calendar days prior to the start of the fog seal application. The traffic control plan shall conform to the requirements of Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD), 2009, the ADOT Traffic Control Design Guidelines, 2025, the Arizona Supplement to the (MUTCD) 2009, these Special Provisions and to Section 701 "Maintenance of Traffic Control" of the ADOT Standard Specifications for Road and Bridge construction, 2021.

If there is one inch or greater difference in elevation between adjacent travel lanes during construction and the roadway is open to traffic, a 6:1 asphalt taper transition between the lanes shall be provided as shown on in the Maintenance of Traffic plans. No measurement or direct payment shall be made for this work, the cost being considered as included in the price of the contract items.

The contractor shall preserve all existing roadway signs, sign supports, foundations, object markers, and milepost markers. The contractor shall replace any signs, sign supports, foundations, and markers, which are damaged as a result of construction activities at no additional cost to the Department.

Removal and replacement of guardrail shall be completed during the same shoulder closure. If guardrail is not replaced by the end of the designated work time, a shoulder closure shall be placed in any gap.

The contractor traffic control plans shall include detour plans for roadway closures during construction activities.

Cones will not be permitted for use as channelizing devices for nighttime work.

Temporary traffic control devices shall not be set up in advance of the start time of a closure unless approved by the Engineer.

The contractor shall coordinate all traffic control closures with the contractors on adjacent projects and in accordance with Subsection 105.09 of the Specifications.

Traffic control devices will not be permitted to remain stockpiled on the shoulder until the next closure.

State Holidays:

Holiday	Start Date	End Date
Independence Day	July 4, 2026	July 5, 2026
Labor Day	September 7, 2026	September 8, 2026
Columbus Day	October 12, 2026	October 13, 2026
Thanksgiving	November 26, 2026	November 28, 2026
Christmas	December 25, 2026	December 26, 2026
New Year's Day	January 1, 2027	January 2, 2027
MLK/Civil Rights Day	January 18, 2027	January 19, 2027
President's Day	February 15, 2027	February 16, 2027
Easter	March 28, 2027	March 29, 2027
Memorial Day	May 31, 2027	June 1, 2027
Independence Day	July 4, 2027	July 5, 2027
Labor Day	September 6, 2027	September 7, 2027
Columbus Day	October 11, 2027	October 12, 2027

(104SWEPA, 02/10/20)

SECTION 104 SCOPE OF WORK:

104.09 Prevention of Stormwater Pollution: of the Standard Specifications is revised to read:

(A) General:

The contractor shall follow the requirements of Section 402 of the Clean Water Act (CWA), 33 USC 1251. The CWA regulates discharge of pollutants into the waters of the United States and provides quality standards for surface waters. Section 402 of the CWA provides stormwater pollution prevention regulations.

The contractor shall minimize ground disturbance to the natural surroundings. No ground disturbing activities shall occur until all applicable permits have been obtained. The applicable permit requirements must always be met.

The contractor shall provide adequate information to the contractor's personnel, including employees of any subcontractors, to ensure that all personnel understand requirements of the applicable permits that are relevant to their job functions.

(B) Clean Water Act, Section 402, National Pollution Discharge Elimination System (NPDES):

(1) General Requirements:

This project is located within tribal lands and erosion control and stormwater pollution prevention are regulated by the Environmental Protection Agency (EPA).

The contractor shall be responsible for preparing and processing all documents and implementing the requirements of the National Pollutant Discharge Elimination System (NPDES) "General Permit for Stormwater Discharges from Construction Activities," for pollution prevention due to stormwater runoff during construction, issued by the Environmental Protection Agency (EPA). That document is hereinafter referred to as the Construction General Permit (CGP) and is available on EPA's website.

The work shall include providing, installing, and maintaining temporary and permanent pollution prevention control measures and removing and disposing of temporary pollution prevention control measures. Control Measures, as hereinafter referenced, shall be deemed to include pollution prevention control as described in the CGP. Control Measures may be temporary or permanent.

The contractor's schedule shall allow sufficient time for the following submittal, review, and approval times:

Table 104-1
Submittal, Review, and Approval Timeframes

Contractor submittal of Erosion Control Coordinator (ECC) qualifications	By the pre-construction conference
Department review and approval of ECC qualifications	within seven calendar days of receipt
Department review and approval of subsequent submittals (if required)	within seven calendar days of receipt
Contractor submittal of SWPPP to Engineer	By the pre-construction conference
Department review of subsequent submittals (if required)	within seven calendar days of receipt
Engineer/contractor joint review and approval of SWPPP	within 10 calendar days after contractor submittal of SWPPP with ADOT approval of the ECC
Approved Notice of Intent (NOI) submittal and review times	as described in the CGP

No increase in contract time will be granted for the contractor's failure to provide acceptable submittals within the specified timeframes.

(2) Stormwater Pollution Prevention Plan (SWPPP):

The SWPPP shall include all information and permit requirements specified in the CGP and shall also be consistent with applicable federal, tribal, state, or local programs.

Unless otherwise approved by the Engineer and documented in the SWPPP, the contractor shall not expose a surface area of greater than 750,000 square feet to erosion through clearing and grubbing, or excavation and filling operations within the project limits until temporary or permanent Control Measures for that portion of the project have been installed and accepted by the Engineer.

The contractor shall indicate each 750,000 square-foot sub-area in the SWPPP, along with proposed Control Measures for each sub-area. The SWPPP shall also include the sequence of construction for each sub-area, and installation of the required temporary or permanent Control Measures.

The contractor shall give installation of permanent Control Measures priority over reliance on temporary measures. Permanent Control Measures and drainage structures shall be installed as soon as possible in the construction sequencing of the project, preferably concurrent with construction of the related sub-area or drainage device.

The project plans may include erosion/sediment control plans and details along with a Control Measure Index Sheet (CMIS) to assist the contractor in preparing the SWPPP. The contractor and the contractor's ECC, or other qualified designee, as described in Subsection 104.09(B)(3), shall review the contract documents, and prepare the SWPPP for review by the Engineer. The contractor shall use the Department's SWPPP Template to prepare the SWPPP. The template is available on the Department's Water Resources website.

The SWPPP shall specify the mechanism whereby revisions may be proposed by the contractor or the Engineer throughout the project and incorporated into the plan, including the review and approval procedure. The Engineer and contractor shall jointly approve and sign each revision to the SWPPP before implementation. Any revisions made by the contractor to amend the approved SWPPP will require two to seven calendar days for review**.**

The contractor shall prepare the SWPPP for the Engineer's review including all information specified herein. The contractor shall submit the SWPPP to the Engineer at the preconstruction conference.

Within 10 calendar days of the SWPPP submittal, the Engineer and contractor will jointly review the contractor's SWPPP. The contractor shall include any additional revisions directed by the Engineer. The SWPPP shall meet the terms and conditions of the CGP and be compatible with construction sequencing and maintenance of traffic plans.

When agreement has been reached, the Engineer and contractor's ECC will sign the SWPPP. The Engineer's signature will constitute approval of the SWPPP. Upon approval of the SWPPP, the contractor and the Engineer shall each file a Notice of Intent (NOI) as specified in Subsection 104.09(B)(6). The Engineer will provide a copy of the Department's NOI to the contractor to be included in the SWPPP.

The SWPPP shall be maintained in accordance with the CGP. A current copy shall be maintained at a location approved by the Engineer and amended as necessary from the time the contractor files its NOI until the NOT is submitted. The SWPPP shall be available for inspection by the entities identified in the CGP, and for use by the Engineer.

No condition of the CGP or the SWPPP shall release the contractor from any responsibilities or requirements under other environmental statutes or regulations.

In accordance with the CGP, the Engineer and the contractor shall confirm the frequency of inspections appropriate for the project. The contractor shall identify the frequency in the SWPPP. The contractor shall inform the Engineer when each inspection will be performed a minimum of 72 hours in advance so the Engineer can jointly perform the inspection if desired.

The contractor shall monitor rainfall on the site with a commercially manufactured rain gauge accurate to within 0.10 inches of rain. Rainfall records shall be maintained in the SWPPP.

Avoidance Areas

The contractor shall avoid all flagged and/or otherwise designated avoidance areas within or adjacent to the project area, as indicated in the table below:

Area No.	Mileposts	Side of road	Does 104.17 apply?
Avoidance Area 1	340.85 - 340.97	N side of north westernmost frontage; S side of eastbound	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 2	341.36 - 341.46	N side of northernmost frontage	Yes, at 50' and 55' buffers of site boundary within the APE
Avoidance Area 3	340.57 - 340.67	NW side of northern frontage; SE side of eastbound	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 4	341.85 - 341.96	Northernmost side of northern frontage	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 5	337.38 - 337.45	North side of northern frontage	Yes, at 50' and 55' buffers of site boundary within the APE
Avoidance Area 6	340.63 - 340.73	SE side of eastbound; NW of westbound	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 7	340.79 - 340.90	SE side of eastbound; NW side of northern frontage	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 8	341.25 - 341.32	NW side of frontage	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 9	342.82 - 343.00	N side of westbound; S side of eastbound	Yes, at 75' and 80' buffers of site boundary within the APE
Avoidance Area 10	342.91 - 342.99	SE side of eastbound; NW of westbound	Yes, at 75' and 80' buffers of site boundary within the APE

The contractor shall avoid all flagged and/or otherwise designated sensitive cultural resource areas within or adjacent to the project area.

Cultural Restricted Work Areas

Within designated cultural restricted work areas, the contractor shall not operate vehicles or heavy equipment. All work shall be completed on foot using hand tools, as indicated in the table below:

Area No.	Mileposts	Side of road	Does 104.17 apply?
Restricted Area 1	329.9 - 329.98	N side of eastbound onramp	No
Restricted Area 2	330.05 - 330.17	N side of northernmost frontage; N side of westbound offramp	No
Restricted Area 3	330.17 - 331.28	N side of northern frontage; westbound traffic frontage	No
Restricted Area 4	331.28 - 331.70	Both N and S sides of westbound traffic frontage road	No
Restricted Area 5	331.70 - 332.15	N side of westbound road	No
Restricted Area 6	332.71 - 333.15	N side of westbound frontage road	No
Restricted Area 7	333.15 - 333.33	N side of westbound frontage road and southside median	No
Restricted Area 8	333.52 - 333.63	N side of westbound offramp and median separating off ramp and frontage road	No
Restricted Area 9	333.63 - 333.75	N and S sides of westbound frontage road	No
Restricted Area 10	333.75 - 333.86	N side of westbound frontage and N side of westbound	No
Restricted Area 11	333.86 - 334.08	N side of westbound	No
Restricted Area 12	336.86 - 339.29	N side of westbound frontage road	No

Cultural Monitoring Work Areas

No ground disturbing activities and no operation of vehicles or heavy equipment shall take place within the following designated sensitive cultural resource areas without the presence of a qualified archaeological monitor:

Area No.	Mileposts	Side of road	Does 104.17 apply?
Monitoring Area 1	334.25 - 334.34	South side of eastbound	No, single layer at 75' from east site boundary and between west boundary and culvert within APE. Restrict all ingress and egress to western approach

The contractor shall contact the ADOT Environmental Planning Historic Preservation Team project lead Matt Mallery (480.493.6059) or the Environmental Commitments Coordinator (520.449.1985) at least 14 (fourteen) business days prior to the start of ground-disturbing activities to arrange for a qualified archaeologist to flag avoidance areas.

The Contractor shall coordinate via email or phone with the qualified archaeological consultant and communicate the construction schedule for the duration of ground disturbing work in those areas where monitoring is needed.

The Environmental Permits Issues and Commitments (EPIC) sheet, included in the project plans, will identify whether Endangered Species and Historic Properties are present within the project limits. If required, documentation will be attached to the Special Provisions.

(3) Erosion Control Coordinator (ECC):

The contractor shall designate an erosion control coordinator (ECC), to be responsible for approval and implementation of the SWPPP, as well as all other applicable requirements of the CGP. The contractor's ECC shall have the qualifications described in Subsection 104.09(B)(4).

The contractor shall not assume that the person proposed as ECC will be accepted by the Department merely because the experience and education requirements listed herein have been met.

After approval, the contractor shall designate the ECC as a duly authorized representative of the contractor in accordance with, and as defined in, the CGP. Documentation of the delegation of a duly authorized representative shall be included as part of the SWPPP.

The ECC shall be capable of identifying existing and predictable effects of the contractor's operations, and shall have complete authority to direct the contractor's personnel and equipment to implement the requirements described herein, including prompt placement of corrective measures to minimize or eliminate pollution and damage to downstream watercourses. Corrective measures shall be completed in the timeframe required by the CGP and included in the SWPPP as required by the CGP.

The ECC shall at all times be aware of the contractor's work activities, schedule, and effect of the work on the environment. Should the ECC not be present at the project site on a full-time basis, the contractor shall establish procedures to ensure that its ECC is promptly notified of any damage or displacement of the required erosion control measures, whether from construction, vandalism, or other causes.

The contractor bears all risks and liabilities for the failure of its ECC to properly implement the requirements of the CGP.

Failure of the contractor to properly maintain the Control Measures required in the approved SWPPP may be cause for the Engineer to reject the ECC and issue a stop work order, as specified in Subsection 104.09(B)(7).

(4) ECC Certification Requirements:

The ECC shall have successfully completed the mandatory two-day (16 hour) “Erosion Control Coordinator” training class (hereinafter referred to as the training class) provided by the Associated General Contractors (Arizona Chapter), phone (602) 252-3926. No other training can be substituted.

The training class certification is valid for three years. Within 60 days of the end of the three year period, in order to maintain the training class certification, the ECC shall successfully complete either a six-hour “Erosion Control Coordinator Refresher” class (hereinafter referred to as the refresher class), also provided by the Associated General Contractors (Arizona Chapter), or the two-day training class specified above. The refresher class will be required every three years thereafter, prior to the expiration date listed on the previous certificate. Should more than three years (and 60 day grace period) elapse from completion of either the training class or refresher class, the contractor’s ECC will be required to successfully complete the two-day training class in order to again be eligible for consideration.

In addition, the contractor’s ECC shall have documented experience equal to a minimum of one year from either of the following two categories:

(a) Experience in the implementation of SWPPPs. The ECC’s experience shall demonstrate full-time responsibility for directly supervising construction personnel in the installation, inspection, and maintenance of pollution prevention measures.

(b) Experience in stabilization of disturbed areas in environments similar to those on the project.

The contractor’s documentation shall provide details indicating the types of relevant experience, and shall provide the number of months of each type of experience to be considered for approval.

The contractor’s documentation shall also indicate that the proposed ECC has completed the training class or refresher class. To be considered for approval, the contractor’s documentation shall include a copy of the proposed ECC’s certification.

(5) Acceptance of ECC and SWPPP:

The contractor shall submit documentation indicating the qualifications of the ECC to the Engineer for approval no later than the pre-construction conference .The Engineer will review the proposed candidate’s information within seven calendar days. The contractor may begin development of the SWPPP prior to approval of the ECC. However no clearing, grubbing, earthwork, or other work elements that may be subject to the requirements of the CGP shall be started until the ECC has been approved, the SWPPP finalized and implemented, the NOIs completed and filed, and the CGP authorization received by the contractor and the Engineer.

(6) Notice of Intent:

After the project SWPPP has been approved by the Engineer, the Engineer and the contractor will each complete separate Notice of Intent (NOI) forms for the project. The contractor shall submit the NOI to the EPA as required by the EPA's CGP.

Unless notified otherwise by the EPA, the contractor will be authorized to begin implementation of the approved SWPPP 14 calendar days after acknowledgement of receipt of both NOIs is posted on EPA's NPDES website. Acknowledgement of receipt of both NOIs may be by email from the EPA or from the listing on the EPA's NPDES website showing the NOIs with an active status. Should additional information be required by EPA, the contractor is not authorized to begin SWPPP-related work until notice of eligibility is received from the EPA.

No adjustments to the contract time or costs will be made for the 14 calendar-day review period specified above. If the EPA approval process requires more than 14 calendar days, the contractor may seek, and the Engineer may grant, a non-compensable extension of time in accordance with the terms of Subsection 108.08.

(7) Non-Compliance:

The Engineer may reject the contractor's ECC if, in the opinion of the Engineer, the conditions of the CGP or the SWPPP are not being fulfilled. Rejection of the contractor's ECC shall be for failure to complete any of the following:

(a) Should the Engineer determine that the SWPPP is not being properly implemented; the contractor will be notified in writing of such deficiencies. The contractor's ECC shall fully implement, to the satisfaction of the Engineer, the requirements of the approved SWPPP within three working days.

(b) Should any corrective measures required in the CGP not be completed within the time periods specified therein, the Engineer will notify the contractor in writing. The contractor's ECC shall complete all required corrective measures within two calendar days of such notification, except that direct inflows of sediment into a watercourse shall be corrected within 24 hours.

(c) (Should the Engineer determine that routine maintenance of the project's Control Measures are not being adequately performed, the contractor will be notified in writing. Within three working days, the contractor's ECC shall demonstrate, to the satisfaction of the Engineer that such steps have been taken to correct the problem.

In the event of the ECC's failure to comply with the CGP or any of the above requirements, the Engineer will direct the contractor to stop all affected work and propose a new ECC as soon as possible. However, all Control Measures specified in the SWPPP shall be maintained at all times. No additional work on construction items affected by the SWPPP will be allowed until a new ECC has been approved by the Engineer. The contractor will not be allowed

compensation or an extension of contract time for any delays to the work because of the failure of the contractor's ECC to properly fulfill the requirements of the SWPPP.

(8) Notice of Termination:

Upon written approval of the Engineer, the contractor shall complete and submit a Notice of Termination (NOT) to the Engineer for approval. After approval by the Engineer, the contractor shall submit the NOT to EPA.

The NOT shall be submitted as described in the CGP.

A copy of the SWPPP and the NOT shall be provided to the Engineer within seven days of the contractor receiving acknowledgement from the EPA. The copies may be either electronic or hard copies.

(C) Blank

(D) Measurement and Payment:

Measurement and payment for work specified in the SWPPP will be made in accordance with the requirements of Section 810. Control Measures specified in the contract which are ~~is~~ to be accomplished under any of the other various contract items will be paid for as specified under those items.

If a force account pay item for Control Measures is included in the bidding schedule, the contractor may be reimbursed for such additional Control Measures proposed by the contractor but not included with the plans or specifications. Such additional Control Measures must be approved in writing by the Engineer before use. Items for Control Measures approved by the Engineer will be paid in accordance with Subsection 109.04(D). No measurement or payment will be made for such additional items not approved by the Engineer.

No measurement or payment will be made to the contractor for time spent in preparing, reviewing, and revising the SWPPP, or providing other required documentation, the cost being considered as included in the price of contract items. No measurement or payment will be made for inspections, training of personnel, the contractor's erosion control coordinator, the contractor's pollution prevention practices and requirements, or maintenance of the Control Measures during a suspension of work, the costs being considered as included in contract items.

Unless otherwise specified, no measurement or payment will be made for maintenance of temporary and permanent Control Measures, the cost being considered as included in contract items.

104.10 Contractor's Responsibility for Work: of the Standard Specifications is revised to read:

The contractor shall implement the requirements of the CGP for pollution prevention due to stormwater runoff during construction, as specified above in Subsection 104.09, Stormwater Pollution.

Until final written acceptance of the project by the Engineer, the contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from any other cause, whether arising from the execution or from the nonexecution of the work. The contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance. No reimbursement shall be made for work necessary due to the contractor's failure to comply with the requirements of the SWPPP.

Except as specifically provided under Subsection 104.04, in case of suspension of work from any cause whatever, the contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project and provide for normal drainage. The contractor shall maintain Control Measures in working order during any stoppage of work. Based on the nature of the work stoppage, the contractor and the Engineer shall determine the maintenance requirements. The contractor shall comply with the CGP including inspection of the project.

The contractor shall also erect any necessary temporary structures, signs or other facilities. During such period of suspension of work, the contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seedings and soddings, furnished under its contract and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

(104ENVIR, 06/17/21)

SECTION 104 SCOPE OF WORK:

104.12 Environmental Analysis: the fifth and sixth paragraphs of the Standard Specifications are revised to read:

If the contractor elects to do an environmental analysis and use any site, source, or access for the reasons listed above, they choose to do so at their own risk. It is the contractor’s responsibility to exercise due diligence when selecting these sites and areas. The contractor shall bear all costs associated with the use of proposed sites, sources, and accesses.

The contractor shall promptly advise the Engineer that it is preparing the environmental analysis and shall submit to the Engineer for review and consultation. The Department will review the submittal and send it to the appropriate agencies and/or jurisdictions for consultation or return it to the contractor for revision. The contractor shall allow a minimum of 60 calendar days after submittal, or subsequent resubmittals, to the Department for the Department to review the environmental analysis and to consult with the appropriate

jurisdictions and/or agencies. At the end of the review period, the Engineer will notify the contractor whether or not the environmental analysis is acceptable.

If the approval of the environmental analysis causes a delay to a controlling activity of the project due to the Department's actions in the aforementioned review process, the contractor may seek, and the Engineer may grant, an extension of time in accordance with the terms of Subsection 108.08 of the specifications. The time extension shall not exceed 30 working days for a working-day contract, or 45 calendar days for a calendar-day project. The time extension will not be considered unless the contractor can show evidence of the delay resulting due to the Department's actions in the review process. A time extension request will not be considered or granted for any other reason. No time extension will be granted for a fixed completion date contract.

104.12 **Environmental Analysis:** the items (G) and (O) of the seventh paragraph of the Standard Specifications is revised to read:

(G) The archaeological survey of the proposed source prepared by a person who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44716) and possesses a current permit for archaeological survey issued by the Arizona State Museum (ASM). The survey shall be prepared in a State Historic Preservation Office (SHPO) standardized format. The survey shall identify all historic properties within the area of potential effect (APE), as defined by the National Historic Preservation Act (36 CFR 800.4). This includes the materials source, processing area, and the haul road. Additionally, the survey report shall identify the effects of the proposed source on any historic properties within the APE, and recommend measures to avoid, minimize, or mitigate those effects. The survey report shall be prepared by the contractor in accordance with SHPO and ASM formatting style for the Historic Preservation Specialist's initial review. After the initial review, the Department will consult with the landowner, SHPO, and Tribes for a minimum of 35 days for the final approval of the survey report.

(O) A description of the impact on federally or state protected or other agency-specific special status wildlife and plants and their habitat, as defined in ADOT's consultant biological procedures on the Department's website. Compliance with the Arizona Native Plant Law shall be coordinated through the Arizona Commission of Agriculture and Horticulture.

104.12 **Environmental Analysis:** the eighth paragraph of the Standard Specifications is revised to read:

Guidance and forms for preparing the environmental analysis are available on the Department's website through the Environmental Planning Group, or by calling Environmental Planning Group at 602-712-7767.

(104VEPC, 03/20/25)

SECTION 104 SCOPE OF WORK:

104.13 **Value Engineering Proposals by the Contractor:** the third paragraph of the Standard Specifications is revised to read:

Any cost savings generated to the contract as a result of VEP offered by the contractor and approved by the Department will be shared between the contractor and the Department, with the contractor receiving 60 percent and the Department receiving 40 percent, as specified in Subsection 104.13(D) of the specifications.

104.13(C) **Conditions:** of the Standard Specifications is modified to add:

(13) The contractor may submit a previously approved VEP from another project.

104.13(D) **Acceptance, Rejection and Payment:** the seventh paragraph of the Standard Specifications is revised to read:

(6) The executed supplemental agreement shall provide that the contractor be paid 60 percent of the net savings amount as reflected by the difference between the cost of the revised work and the cost of the related construction required by the original contract computed at contract bid prices. The net savings will take into account the contractor's cost of developing the VEP and implementing the change, and reducing this amount by the Department's cost for investigating and evaluating the VEP, including any ascertainable collateral costs to the Department. Such collateral costs may include increased costs for maintenance, operation, related work items, additional work items, or elements of related or additional work items.

(104ENVST, 09/19/24)

SECTION 104 SCOPE OF WORK:

104.16 **Environmental Standard Work:** of the Standard Specifications is hereby modified as follows:

(E) Specific Vegetation Protection Program: is hereby added to the Standard Specifications:

The contractor shall control noxious and invasive plant species throughout the duration of the project in accordance with the requirements of these special provisions.

All disturbed soils that are not landscaped or otherwise permanently stabilized by construction shall be seeded in accordance with the requirements of Item 8050003 of these special provisions.

The contractor shall not disturb unpaved areas without the approval of the Engineer or as stated in the Environmental, Permits, Issues, and Commitments (EPIC) plan sheet 1F of the project plans. If any unpaved areas are disturbed as a result of the contractor's operation and without the approval of the Engineer, the contractor shall seed the areas with species native to the project vicinity. All seeded areas shall be covered by straw mulch with tacking agent. The contractor shall provide the seed mix to the Engineer for approval prior to placing any seeding. No measurement or payment will be made for seeding, the cost being considered as included in the price of contract items.

(104ACSP, 09/19/24)

SECTION 104 SCOPE OF WORK: of the Standard Specifications is modified to add:

104.17 Archaeological and Cultural Site Protection:

(A) General:

The contractor shall avoid archaeological or cultural sites within the project limits that have been pre-determined and fenced prior to the commencement of construction. The Department will furnish and install a dual-layered fencing system consisting of an outer fence and an inner fence. The outer fence serves as the primary perimeter boundary, providing initial deterrence and control of access, while the inner fence provides an additional layer of security for an archaeological or cultural site. Such pre-determined sites are referred to herein as "fenced cultural avoidance areas".

For the purposes of this subsection, the term "Disturbance" shall refer to any act of physical disturbance by the operations of the contractor to the fenced cultural avoidance areas. The contractor shall refer to Subsection 104.17(C) specified herein for categories of Disturbance.

The contractor shall exercise utmost care to ensure that the fenced cultural avoidance areas are not disturbed by the operations of the contractor. In addition, the contractor shall comply with the requirements specified in Subsections 107.05, 107.06, and 107.13 of the specifications.

The contractor will not be held liable if the Engineer determines that the Disturbance to the fenced cultural avoidance areas is not due to the actions of the contractor, subcontractor, or supplier.

(B) Archaeological and Cultural Site Protection Plan:

(1) General:

The contractor shall prepare a comprehensive Archaeological and Cultural Site Protection Plan, referred to herein as the “Plan”, which shall demonstrate how the contractor intends to avoid potential Disturbances. The Plan, at a minimum, shall contain the following information:

(a) Control measures to be implemented in handling equipment and access of personnel in proximity to the fenced cultural avoidance areas.

(b) Schedule, at a minimum, two weekly walkthroughs, or as determined by the Engineer, for monitoring and inspecting of the fenced cultural avoidance areas.

(c) Name and contact information of the Cultural Compliance Inspector(s).

(d) Proposed oversight of concurrent work activities that take place at more than one location.

The contractor shall submit the Plan at least five working days before the preconstruction conference, provided that the contract is executed by both the contractor and the Department. The Engineer will return the Plan as approved or disapproved within five working days of receipt. No construction activity shall commence within the project limits until the Plan has been approved.

The contractor shall be aware of the consequences that follow any Disturbance to the fenced cultural avoidance areas throughout the contract duration.

The contractor shall meet with the Engineer, and others as designated by the Engineer, during the preconstruction conference to discuss the following:

(a) Boundaries of the fenced cultural avoidance areas,

(b) Identify and address the potential impacts of the contractor’s operations, and

(c) Establish control measures to safeguard fenced cultural avoidance areas from Disturbance

(2) Cultural Compliance Inspector(s):

In the Plan, the contractor shall designate employee(s) as Cultural Compliance Inspector(s) to be responsible for implementation of the Plan throughout the contract duration. Any change to designated personnel shall be notified to the Engineer for approval immediately. The Cultural Compliance Inspector(s) shall observe all construction activities in proximity to the fenced cultural avoidance areas and enforce the requirements of the approved Plan to prevent Disturbance.

The Cultural Compliance Inspector(s) shall perform their duties as specified herein. The Cultural Compliance Inspector(s) may perform work in conjunction with site monitoring duties.

(C) Disturbance Categories and Controls:

(1) Categories:

The Disturbance of the fenced cultural avoidance areas are divided into two categories:

(a) A 2nd Degree Disturbance is defined as an intrusion beyond the outer fence. The Engineer will perform an investigation of the incident to make a determination, in consultation with others as is necessary. A 2nd Degree Disturbance is not considered a violation and is not subject to any sanctions specified herein.

(b) A 1st Degree Disturbance is defined as an intrusion beyond the inner fence that compromises critical parameters, including but not limited to, the security, safety, or integrity of the fenced cultural avoidance area. The Engineer will perform an investigation of the incident to make a determination, in consultation with others as is necessary. An occurrence of a 1st Degree Disturbance will be considered a violation. A 1st Degree Disturbance is subject to the sanctions specified herein.

(2) Controls:

The Engineer will coordinate with the ADOT Environmental Planning – Historic Preservation Team to complete the installation of fencing of the cultural avoidance areas. The Engineer will inform the contractor once the fencing installation has been completed prior to the commencement of any construction activity. The Department will assume maintenance responsibility of all items associated with the fencing.

If a Disturbance occurs, the contractor shall immediately stop work at that location. The Cultural Compliance Inspector(s) shall inform the Engineer immediately and document the Disturbance with the following information:

(1) Time and location of the event

(2) Description of construction activity that led up to the event

(3) Details about how the event actually occurred

(4) Names and positions of contractor and subcontractor employee(s) involved

(5) Witness statements, notes, photos, sketches, etc.

Any Disturbance will be investigated by the Engineer in consultation with others as is necessary. Upon completion of such investigation, a determination will be made as to whether the disturbance is a 2nd Degree Disturbance or 1st Degree Disturbance.

Both 2nd Degree and 1st Degree Disturbance will require the contractor to prepare and submit to the Engineer, for approval, an action plan that will prevent similar future incursions.

The contractor shall not resume work at that location until it is so directed by the Engineer.

(D) Sanctions:

The Department will assess sanctions, for each violation, in accordance with the requirements specified below:

1. For the first violation committed by the contractor, the Department will retain monies becoming due the contractor as sanctions as shown in Table 104.17-1:

TABLE 104.17-1 SANCTIONS FOR 1ST VIOLATION	
Contract Size (Dollars)	**Percent of the Original Contract Amount (%)**
0 to 1,000,000	10
>1,000,000 to ≤5,000,000	5
>5,000,000	3

2. For the second violation committed by the contractor, the Department will retain monies becoming due the contractor as sanctions as shown in Table 104.17-2:

TABLE 104.17-2 SANCTIONS FOR 2ND VIOLATION	
Contract Size (Dollars)	**Percent of the Original Contract Amount (%)**
0 to 1,000,000	12
>1,000,000 to ≤5,000,000	7
>5,000,000	5

3. A third violation committed by the contractor will result in the termination of the contract in accordance with the applicable requirements of Subsection 108.10 of the specifications.

SECTION 105 CONTROL OF WORK:

105.18 Opening of Sections of Project to Traffic: of the Standard Specifications is modified to add:

Damage to the project resulting from a third-party shall be reported to the Engineer. Damages to permanent project features, determined by the Engineer as eligible for payment in accordance with the requirements of Subsection 104.04 of the specifications, will be paid for in accordance with Subsection 109.04 of the specifications.

(107UINSLMTS, 02/20/25)

SECTION 107 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC:

107.14 **Insurance:** the sixth paragraph of the Standard Specifications is revised to read:

Without limiting any liabilities or any other obligations of the contractor, the contractor shall provide and maintain, if commercially available, the minimum insurance coverage listed below until all obligations under this contract are satisfied:

(A) General Liability insurance with a minimum combined single limit of $1,000,000 each occurrence applicable to all premises and operations, and a minimum general aggregate limit of $2,000,000. The policy shall include coverage for bodily injury, broad form property damage (including completed operations), personal injury (including coverage for contractual and employee acts), blanket contractual, independent contractors, products and completed operations. Further, the policy shall include coverage for the hazards commonly referred to as XCU (explosion, collapse and underground). The products and completed operations coverage shall extend for one year past acceptance, cancellation or termination of the work. The policy shall contain a severability of interests provision.

(B) Comprehensive Automobile Liability insurance with a combined single limit for bodily injury and property of not less than $1,000,000 each occurrence with respect to contractor's owned, hired, or non-owned vehicles, assigned to or used in performance of the work.

(C) Workers' Compensation insurance to cover obligations imposed by Federal and State statutes having jurisdiction of its employees engaged in the performance of the work, and Employers' Liability insurance with a minimum limit of $1,000,000. Evidence of qualified self-insured status will suffice for this subsection.

(107UTIL, 04/17/25)

SECTION 107 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC:

107.15 Contractor's Responsibility for Utility Property and Services: of the Standard Specifications is modified to add:

Copies of existing ADOT permits, subject to availability, may be obtained from the ADOT Area Permit Supervisor as listed below:

NORTHEAST DISTRICT

(928) 524-5455
(928) 524-5400

2407 Navajo Blvd.
Holbrook, AZ 86025

Email address:
northeastpermit@azdot.gov

The following agencies and utility companies have facilities in the area but are not anticipated to be in conflict:

CenturyLink (Lumen)
Kevin Wagner
(815) 245-9640
kwagner@terratechllc.net

CenturyLink (Lumen) has existing underground fiber facilities within the project limits and shall be protected in place.

Navajo Tribal Utility Authority (NTUA) Power
Art McCabe
(928) 729-6143
artm@ntua.com

NTUA has existing overhead and underground electric facilities within the project limits and shall be protected in place.

Navajo Tribal Utility Authority (NTUA) Fiber
Don Williams
(928) 729-6445
donw@ntua.com

NTUA has existing underground fiber facilities within the project limits and shall be protected in place.

Navajo Tribal Utility Authority (NTUA) Water & Wastewater
Jedidiah Roanhorse
(928) 729-6253
jedidiahr@ntua.com

NTUA has existing underground water and wastewater facilities within the project limits and shall be protected in place.

Table Top Telephone
Brenda Vento
(520) 993-0223
brendav@tabletoptel.com

Table Top Telephone has existing overhead fiber and telecommunications facilities within the project limits and shall be protected in place.

Power lines may exist at various locations throughout the project; however, they are not anticipated to be in conflict. The contractor shall keep a safe distance from all facilities. All work at or in close proximity to any utility lines shall be performed in accordance with all Federal, State and local laws and regulations, including but not limited to:

(1) Arizona law regarding “Underground Facilities” (A.R.S. 40-360.21 through .32).
(2) Arizona law regarding “High Voltage Power Lines and Safety Restrictions” (A.R.S. 40 360.41 .45).
(3) The Occupational Safety and Health Administration.
(4) The National Electric Safety Code.

RAILROAD STATEMENT:

- There is a railroad within ½ mile of the project limits. There is no railroad work on this project. The railroad was notified.

107.15(F) Sewage Discharge Damage Assessments: of the Standard Specifications is revised to read:

The Department will assess sanctions in accordance with the Table 107.15-1 below for each 24-hour period, or portion thereof, for each unplanned breakage that occurs in an active sanitary sewer line as a result of the contractor's operation. The rate of these sanctions is based on the type and quantity of effluent discharged as determined by the Engineer.

These sanctions do not relieve the contractor from any of its responsibilities under the contract, including any liquidated damages that may be assessed under Subsection 108.09 of the specifications for late completion of the project.

The sanctions specified in this subsection will be independent of any penalties imposed by others.

The contractor acknowledges that Regulatory agencies may assess or impose civil or criminal penalties on the contractor resulting from sewer discharges.

The Department will not be responsible for any civil or criminal penalties, fines, damages, or other charges imposed on the contractor by any regulatory agency or court for sewage discharges that are a result, directly or indirectly, of the contractor's work performed under this contract.

TABLE 107.15-1
SANCTIONS
(EACH 24-HOUR PERIOD, OR PORTION THEREOF)

Volume of Discharge	Raw Sewage or Industrial Wastewater	Treated Effluent
Less than 10,000 gallons	$5,000	$1,000
10,000 to 99,999 gallons	$10,000	$2,000
100,000 to 1 million gallons	$25,000	$3,000
Greater than 1 million gallons	$40,000	$5,000

These sanctions will be assessed for each 24-hour period, or portion thereof, until the contractor has completed all of the following tasks:

Stopped the discharge;
Repaired the damaged pipe;
Restored normal service; and
Fully cleaned and disinfected the site to the satisfaction of the Engineer.

Upon completion of tasks (1), (2), and (3) above, and prior to completion of Task (4), the sanctions for the current 24-hour period will be at the rate shown in Table 107.15-1. However, for each subsequent 24-hour period, the assessment will be 1/2 of the rate shown in Table 107.15-1.

The sanctions will continue at the reduced rate until the site has been fully cleaned and disinfected to the satisfaction of the Engineer.

As an example, the amounts assessed each 24-hour period for an unplanned discharge of 20,000 gallons of raw sewage, in which the contractor completes tasks (1), (2), and (3) within the second 24-hour period but does not complete full cleanup until the third 24-hour period, will be as follows:

First 24-hour period:	$10,000
Second 24-hour period:	$10,000
Third 24-hour period:	$5,000

For this example, the total sanction will be $25,000 ($10,000 + $10,000 + $5,000).

(108SUBLT, 10/20/22)

SECTION 108 PROSECUTION AND PROGRESS:

108.01 Subletting of Contract: the thirteenth paragraph of the Standard Specifications is revised to read:

If a subcontractor, of any tier, begins work on the contract prior to the contractor submitting the required documentation and receiving consent from the Engineer, the Department will retain $1,000 from monies due or becoming due the contractor. The money retained will be for each subcontractor, of any tier, that starts work without the consent of the Engineer. These sanctions will be in addition to all other retention or liquidated damages provided for elsewhere in the contract.

(108PRCN, 08/19/21)

SECTION 108 PROSECUTION AND PROGRESS:

108.03 Preconstruction Conference: the second paragraph of the Standard Specifications is revised to read:

At the preconstruction conference the contractor shall submit a progress schedule showing the order in which the contractor proposes to carry out the work, the dates on which the contractor and its subcontractors will start the work, including procurement of materials, equipment, etc.; the ordering of articles of special manufacture; the furnishing of drawings, plans and other data required under Subsection 105.03 of the specifications for the review and approval of the Engineer; the inspection of structural steel fabrication; and the contemplated dates for the completion.

108.04 Prosecution and Progress: the third paragraph of the Standard Specifications is revised to read:

At a mutually convenient location and time, the contractor shall meet weekly with the Engineer to discuss construction activities; however, a meeting may be waived if mutually agreed to, due to weather conditions, work progress, or for other reasons. At the meetings, the contractor shall provide the Engineer with a detailed, written schedule of construction activities and phases of work for the current week, forthcoming three week period as well as the construction activities which were performed during the previous week. This schedule shall detail the anticipated start dates and anticipated completion dates of work activities. The weekly schedule should reflect, at a minimum, all activities from the most recently updated project schedule. For work which was completed during the previous week, this schedule shall detail the actual start and completion dates of work activities as well as indicate the status of major ongoing activities. Upon the second occurrence of the contractor failing to provide an accurate schedule as describe herein and after written notification by the Engineer of the first occurrence, the Department will deduct $500 from the contractor’s progress payment per each occurrence thereafter. Minutes of the weekly meetings will be kept by the Engineer and a copy given to the contractor for review and acceptance.

(108TIME, 10/15/20)

SECTION 108 PROSECUTION AND PROGRESS:

108.08 Determination and Extension of Contract Time: the first paragraph of the Standard Specifications is revised to read:

The time allowed for the completion of the work included in the contract will be 230 working days, and will be known as the "Contract Time."

(108RSLD, 06/19/2025)

SECTION 108 PROSECUTION AND PROGRESS:

108.09 Failure to Complete the Work on Time: the Schedule of Liquidated Damages table of the Standard Specifications is revised to read:

SCHEDULE OF LIQUIDATED DAMAGES			
Original Contract Amount		**Liquidated Damages Per Day**	
From More Than:	**To and Including:**	**Calendar Day or Fixed Date:**	**Working Day:**
$ 0	$ 500,000	$ 300	$ 1,000
$ 500,000	$ 1,000,000	$ 850	$ 1,700
$ 1,000,000	$ 2,000,000	$ 1,250	$ 2,650
$ 2,000,000	$ 5,000,000	$ 2,100	$ 3,800
$ 5,000,000	$ 10,000,000	$ 3,300	$ 6,850
$ 10,000,000	$ 30,000,000	$ 7,300	$ 10,550
$ 30,000,000	$ 60,000,000	$ 9,350	$ 17,750
$ 60,000,000	$ 90,000,000	$ 19,900	$ 27,850
$ 90,000,000	-------	$ 27,450	$ 38,400

(108SCHLVL3, 08/19/21)

SECTION 108 PROSECUTION AND PROGRESS: of the Standard Specifications is modified to add:

108.12 Schedules:

(A) Definitions:

Activity:

A discrete, identifiable task or event that contributes to completing the project and can be used to schedule and monitor the work.

Activity ID:

A unique alphanumeric identification code permanently assigned to an activity.

Baseline Schedule:

A Critical Path Method (CPM) schedule illustrating the contractor's committed plan to complete the work within the contract time and used to compare the progress of the work.

Constraint:

A limitation placed on a scheduled activity that affects the start or end date of an activity.

Critical Path:

The longest continuous chain of activities which establishes the minimum overall project duration.

Critical Path Method (CPM):

A network-based planning technique that uses activity durations and relationships to calculate a schedule for the project.

Data Date:

The date from which a schedule is calculated, where all activities occurring earlier than the data date are complete and all activities occurring on or after the data date are planned.

Duration:

The estimated time required to complete an activity as recorded on the Project Schedule.

Float Suppression/Sequestering:

The process of utilizing zero free float techniques that allows an activity to start as late as possible by using all available free float of that activity, by the utilization of overly generous activity durations, or by using overly restrictive calendar non-working periods.

Free Float:

The amount of time an activity may be delayed without delaying the early start date of its successors.

Longest Path:

The longest continuous path of activities through a project, which controls project early completion.

Look-Ahead Schedule:

A computer-generated schedule that shows the previous week's work and the work planned for the current and next three weeks.

Milestone:

An activity, with no duration, that is typically used to represent the beginning, end, interim stages and significant events of the project, or contractually required dates.

Monthly Progress Schedule:

A monthly update to the approved baseline schedule.

Narrative:

A written report explaining the Project Schedule in detail, as specified in Subsection 108.12(F) of the specifications.

Predecessor:

An activity that affects the start or finish date of another activity with a logically tied relationship.

Preliminary Schedule:

A CPM schedule that shows the Baseline Schedule for the first 60 calendar days of contract time and, the work breakdown structure and milestones for the entire contract.

Project Schedule:

A logic-based critical path for all work leading up to and including substantial completion or final acceptance that is used for tracking the performance of the work. The term “Project Schedule” will refer to one or more of the following:

(a) Baseline Schedule,

(b) Monthly Schedule, or

(c) Recovery Schedule.

Record Schedule:

A CPM schedule that shows the actual start and finish date of each activity, durations, and all changes.

Recovery Schedule:

A CPM schedule that shows the activity changes to recover the time lost due to incompletion of the work within the contract time as specified in the Monthly Progress Schedule.

Scheduler:

An individual, who creates, maintains and revises the Project Schedule using applicable software.

Successor:

An activity whose start or finish date is affected by the logically tied relationship with another activity.

Time Impact Analysis (TIA):

A forward-looking, prospective schedule analysis developed to demonstrate the impact of a change to the current schedule on its longest path.

Total Float (Float):

The cumulative duration of time an activity may be delayed without delaying the contract time or a contractual milestone.

Work Breakdown Structure (WBS):

A framework for organizing and ordering the work activities into hierarchical groups.

(B) General:

The contractor shall prepare, furnish, and use the Project Schedule to plan, monitor, and report the progress of the work. The schedule shall demonstrate a detailed plan to complete the work in accordance with the contract time and be used in communication to coordinate activities among all affected parties.

The contractor shall provide a Scheduler to create and maintain all schedules, updates, Narratives, reports, and TIA related to this project. The Scheduler shall be proficient in CPM schedule development, analysis of resources applicable to the required detail of the Project Schedule, and shall be able to perform the required tasks using the specified software.

The Scheduler shall be present at all schedule meetings, in person or via teleconference, and made available for discussion or meetings when requested by the Engineer. The contractor project management personnel, subcontractors, and suppliers shall actively communicate with the Scheduler to develop and maintain accurate updates of progress and schedule revisions throughout the duration of the contract.

The Department's review and comment on a schedule for compliance with this specification does not do the following:

(1) Imply or constitute approval of particular construction methods or relieve the contractor of its responsibility to provide sufficient materials, equipment, and labor to complete the project in accordance with the contract;

(2) Attest to the validity of assumptions, activities, relationships, sequences, resource allocations, or other aspects of the schedule;

(3) Imply the contractor is entitled to a Supplemental Agreement extending the contract time or adjusting the contract price;

(4) Relieve the contractor from compliance with the requirements of the contract or result in the approval of a deviation, exception to or other variation from the contract. Failure to include an element of work required by the contract in the schedule does not release or relieve the contractor from responsibility to perform such work.

In preparing, developing and updating the Project Schedule the contractor shall not utilize:

(1) Float suppression techniques in the schedule, including interim dates imposed by the contractor other than project milestone(s);

(2) The inclusion of activities or constraints in a path or chain leading to a project milestone which are unrelated to the work as specified in the contract;

(3) Activity durations or sequences determined by the Department to be unreasonable in whole or in part.

The contractor shall not use preferential sequencing, whereby activities that could be performed concurrently and are established in the Project Schedule as sequential simply to consume float. The contractor shall not indicate artificial activity durations by inflating activities in the schedule to consume float and influence the Critical Path. Sequestering of float is cause for rejection of the contractor's schedule submittal. If float sequestering is identified, the contractor shall revise the schedule appropriately.

Total Float is a commodity available to both the Department and the contractor for sequential use until depleted and not for the exclusive use or financial benefit of either party. A schedule showing an early completion date shall show the time between the scheduled completion date(s) and the required contract completion deadline(s) as Total Float.

The Department will not be liable to the contractor for delays by any party when the contractor completes the work prior to expiration of contract time.

If a delay in performing the work is caused by the Department, the contractor shall immediately notify the Department in writing that a revision to the contract is necessary in accordance with Subsection 104.02 and Subsection 104.03 of the specifications. The contractor shall include a description of the cause of delay, the projected amount of Total Float to be used, and the revised Monthly Progress Schedule showing the use of the Total Float in the Monthly Progress submittal. The contractor shall work cooperatively with the Department, other contractors, and third parties to identify and implement, to the maximum extent possible, no-cost measures to recover all schedule delays, regardless of the cause of the delays.

The contractor shall coordinate with the Department, local governmental entities, utility companies, railroad companies, and any third party entities when developing and maintaining the Project Schedule. The contractor shall coordinate its planning and scheduling efforts as required to address conflicts and comments received from adjacent projects and other entities.

(C) Preliminary Schedule:

Before the preconstruction conference the contractor shall prepare and submit a Preliminary Schedule for the Engineer's review and approval. The Preliminary Schedule shall comply with Subsection 108.12(D) of the specifications for the first 60 calendar days of contract time and includes the WBS and milestones for the complete contract.

Along with the Preliminary Schedule, the contractor shall include its calendar for the contract period which shall show work days, calendar days, non-work days, and dates. The contractor shall not begin work until the Engineer has approved the Preliminary Schedule.

(D) Baseline Schedule:

The contractor shall submit a Baseline Schedule within 30 calendar days after the acceptance of the Preliminary Schedule for Engineer's review and approval.

The Baseline Schedule shall be in the following format:

(1) Project ID: The schedule project ID shall match the filename format in Subsection 108.12(K) of the specifications. The project name shall be the route number followed by the project description.

(2) Activity ID: Each activity shall be assigned a unique identification number. Activity ID numbers shall not be changed or reassigned for the duration of the contract. Within each group of the WBS, activity ID's shall be numbered sequentially in increments of 10 in the order of their start date or by finish date of a finish milestone. Milestone activities shall begin with "M". Use 10 characters or less.

(3) Activity Name: Each activity shall be defined with a unique name that contains the description of work. Each name shall at a minimum consist of a verb or work function (i.e. remove, excavate, form, install), an object (i.e. curb, pipe, footing) and a location (i.e. street, station, bridge number). For example, "Install Barrier Dtl C – S1 120+25 Lt". The activity quantity may be included after location.

The contractor shall create an activity name using the following:

a) Use 50 characters or less;

b) Use "S1, S2, …" for stage naming if applicable;

c) Do not use all capital letters;

d) Keep names readable, but use abbreviations as needed. Do not use periods when abbreviating. All abbreviations shall be consistent; and

e) Location is not required if object name is specific, such as "CMP #201".

The contractor shall provide a list of abbreviations and acronyms. The work related to each activity shall be limited to one stage, one area, one traffic control phase, and one responsible party of the contract.

(4) Activity Code: Activities shall be assigned with project activity codes that will be used to classify, categorize and organize activities for reporting. Only use project level activity codes and not global or enterprise codes. At a minimum, all activities shall have an activity code for responsible party, stages, and phases. Additional activity codes shall be added if requested by the Department.

(5) Milestones: The contractor shall separately identify each project milestone, conforming to the scheduling requirements set forth in the contract.

(6) Constraints: The contractor shall not use date constraints to logically begin or complete a project activity unless specific calendar dates are shown in the contract. Specific contract dates may only be applied as a constraint to a milestone activity and input as either a “Start on or After” or “Finish on or Before” date. No other constraint types shall be allowed.

(7) Duration: Activity duration shall not exceed 20 calendar days unless approved by the Engineer. Activity durations shall be at least one calendar day. Durations shall represent the anticipated productivity rates that factor in all limitations to the productivity. Long lead activities such as procurement and Level of Effort activities may exceed 20 calendar days.

(8) Relationships: All activities shall have at least one predecessor and one successor except for the project start and project end milestones. Negative lags or negative floats shall not be allowed. Predecessors and successors shall not be linked to the same activity with different relationship types. The start of an activity shall have a Start-to-Start or Finish-to-Start relationship with preceding activities. The completion of an activity shall have a Finish-to-Start or Finish-to-Finish relationship with succeeding activities. Do not use Start-to-Finish relationships. Do not use Finish-to-Start relationships with a lag or overlap.

(9) If applicable, the schedule shall include but not be limited to all activities below:

(a) Mobilization/Demobilization;

(b) Right of Way Acquisition;

(c) Submittal development;

(d) Submittal review and acceptance;

(e) Submittal and approval of material samples and mix designs;

(f) Submittal and approval of shop drawings;

(g) Long lead items, material and equipment procurement;

(h) Procurement of permits;

(i) Environmental commitments and mitigation activities;

(j) Equipment and plant setup;

(k) Fabrication of special items;

(l) Erection and removal of falsework and shoring;

(m) Utility and railroad relocations;

(n) Cure times for concrete;

(o) Cure times for pavement before striping;

(p) Landscape and seeding establishment periods;

(q) Test periods;

(r) Major traffic stage changes;

(s) Substantial completion;

(t) Punchlist completion; and

(u) Final cleanup;

(10) The schedule shall be in detail to allow day-to-day monitoring and review of the contractor's operations. It shall show the order and interdependence of activities and the sequence of work.

(11) The contractor shall detail the Critical Path activities and logic ties in the schedule to show the work sequencing. The contractor shall use the CPM software to determine the controlling activities in the critical path. The critical activities shall be prominently distinguished on all reports by the use of color or pattern.

(12) The contractor shall provide the number of activities to assure adequate project planning and allow for monitoring and evaluation of work progress.

(13) The contractor shall provide activities as necessary to depict third-party work related to the contract. Third-party work activities may include but is not limited to railroads, utilities, real estate, and government agencies.

(14) Seasonal, winter shutdown, traffic, special event, environmental, or other contract restrictions shall be considered and included in the schedule for all work. These restrictions shall be addressed with project calendars and shown as non-work days for each major work type. Global calendars shall not be used. Examples of major work types are earthwork, concrete paving, structures, asphalt, drainage, landscaping, etc. The contractor shall include project calendar for curing time if applicable.

(15) The duration for each activity shall include the anticipated production rate and the time for anticipated weather stoppages. The contractor shall not reserve random non-work days in a project calendar to account for weather stoppages.

(16) The schedule shall have a Data Date of the start date shown in the Notice of Award letter.

(17) When processing the schedule in the software, the contractor shall use the following options:

(a) When scheduling progressed activities use Retained Logic;

(b) Calculate start-to-start lag from Early Start;

(c) Define critical activities as Longest Path;

(d) Compute Total Float as Finish Float = Late Finish – Early Finish; and

(e) Calendar for scheduling relationship lag as predecessor activity calendar.

(18) The bar chart schedule plot shall be accompanied by a schedule report of the network with a tabulation of the following data for each activity:

(a) Activity ID;

(b) Activity name;

(c) Original duration;

(d) Early start date;

(e) Early finish date;

(f) Late start date;

(g) Late finish date;

(h) Predecessors;

(i) Successors;

(j) Free float;

(k) Total float;

(l) Primary constraint date;

(m) Calendar; and

(n) Responsibility for activity - e.g., prime contractor, subcontractor, supplier, etc.

(19) Price Allocation: Price and bid item quantities shall be allocated throughout the project activities in the schedule. Some activities may not have a corresponding bid item, however all bid item quantities and prices shall be included to accurately reflect the contractor's price allocation for each corresponding activity. Bid items that are split into multiple activities shall have their corresponding quantity assigned as a material resource to each activity. Quantities shall not be duplicated. The sum of all quantities and price in the schedule shall match the bid tabs. The bid item number and description shall be included in the resource name. The contractor shall not artificially inflate, imbalance, or front-load items in the schedule. The contractor shall include a tabular schedule report of all prices associated with material resources.

(20) Resources: The contractor shall resource load the schedule by assigning every construction activity the appropriate labor, nonlabor, and material resources. The contractor shall base a labor resource on the total number

of workers, not total number of crews. A nonlabor resource shall be assigned for all major construction equipment to be used by the contractor and subcontractors in prosecuting the work. The resource quantity must represent the estimated effort in-place for the project activity. The contractor shall include a tabular schedule report of all resources assigned to each activity.

(E) Monthly Progress Schedule:

After the approval of the Baseline Schedule, the contractor shall submit a Monthly Progress schedule until the substantial completion of the project. The Monthly Progress Schedule and Narrative shall be prepared and submitted by the 15th day of the month. The Monthly Progress Schedule shall reflect progress up to the data date, forecast finish for in-progress activities and re-forecast early dates for activities planned in the next update period. The Monthly Progress Schedule shall meet all format requirements specified in Subsection 108.12(D) of the specifications and shall include the following:

(1) Actual start and finish dates for completed activities;

(2) Actual start dates, percentage complete, and remaining duration for activities in progress;

(3) All proposed activities, logic, and date revisions required to:

(a) Implement changes in the work;

(b) Detail all impacts on preexisting activities, sequences, and dates;

(c) Reflect the contractor’s current approach for work remaining;

(d) Incorporate delays that have been agreed upon between the Department and the contractor; and

(e) Incorporate accepted substitution proposals.

(4) Planned start and finish dates for activities that have not started.

The contractor shall show actual progress based on actual percentage completion of the activity addressed as “Percent Complete” with adjustments to remaining duration and non-calculated progress in the Monthly Progress Schedule. The contractor shall incorporate logic changes and work changes into the Monthly Project Schedule. Percent complete types shall be set to “physical”. Each Monthly Project Schedule submittal shall clearly and individually

define the progression of the work within the applicable timeframe by updating the current and planned project activities.

If work is performed out of sequence, the contractor shall implement logic changes to allow the out of sequence work to proceed. The contractor shall exclude all revisions for the contractor's convenience when reconciling an extension to a milestone. The contractor shall document changes, which shall be highlighted or identified, in the Monthly Progress Schedule.

The contractor shall impose no other date restrictions in the Monthly Project Schedule, unless the contractor provides an explanation of the basis for such date restrictions and such explanation is acceptable to the Department.

The contractor shall provide additional, separate, filtered reports of the project activities including the following:

(1) Bar chart schedule plot showing all critical path activities, long-term lane closures, and the status of these activities as of the date of the update.

(2) Bar chart schedule plot that compares the contractor's progress to planned progress for each activity.

(3) 30-Day look-ahead report listing all design document submittals.

(4) Total Float report displaying float from least to greatest for all activities with 14 day or less of total float.

(5) 60-Day look-ahead report identifying all required Department and governmental approvals.

(6) 60-Day look-ahead bar chart schedule plot sorted by WBS and activity early start dates including the responsible party.

(7) Monthly expenditure table and cash flow expenditure curve for the project.

If the Engineer requests a revision or justification, the contractor shall provide a revision or justification to the satisfaction of the Engineer within seven calendar days. Failure to comply with the schedule requirements specified herein, or provide revisions or justifications within seven calendar days for Engineer's approval will result in withholding 1.0 percent of the monthly estimate payments. The withheld 1.0 percent of the monthly estimate will be paid on the monthly estimate following the approval of the Monthly Progress Schedule with acceptable revisions or justifications.

Once the Monthly Progress Schedule is approved by the Engineer, the contractor shall use the approved Monthly Progress Schedule as the basis for the next Monthly Progress Schedule.

(F) Narrative:

With each Project Schedule submittal, the contractor shall prepare and submit a stand-alone schedule Narrative with details that explain the basis of the submitted Project Schedule. The schedule Narratives shall not be considered notification of delays, supplemental agreements, or other issues.

(1) For the Baseline Schedule, the Narratives shall include at a minimum:

(a) The contractor's site management plan and schedule of activities (e.g., lay down, staging, traffic, and parking);

(b) The use of construction equipment and resources for major items;

(c) The basis and assumptions for critical activity durations and logic;

(d) Compliance with temperature, weather and seasonal requirements. Show how and where this is applied and accounted for in the schedule;

(e) List all calendars used and describe their usage;

(f) Anticipated hours per shift, shifts per work day, and work days per week;

(g) Justification for all constraints used;

(h) Justification for an activity with a duration exceeding 20 Calendar Days;

(i) Contractor's approach used to apply relationships between activities, including a list of activity relationships with lags and the justification for the use of each lag (e.g., all ties are based on physical relationships between work activities [such as "rebar shall be placed before concrete is placed"] or relationships are used to show limited resources [such as "bridge two follows bridge one" because contractor has only one bridge crew]);

(j) A written construction phasing plan supporting the approach to the work outlined. The written construction phasing plan shall include at a minimum each phase for the maintenance of traffic (MOT), changes in traffic control, and the construction activities and disciplines to be performed under each construction phase. The construction phasing plan shall show dates of MOT phase changes that are coordinated with the schedule;

(k) The reasons for the sequencing of work, including a description of all limited resources, potential conflicts, and other items that may affect the schedule and how they may be resolved;

(l) Anticipated production rates for major activities including but not limited to earthwork, hauling, drainage, asphalt paving, PCCP, curb and gutter paving, barrier walls paving, etc. Each activity shall be shown with its activity ID, activity name, production rate, equipment used to achieve the production rate (include quantity of pieces of equipment with all attachments), and duration of activity;

(2) For Monthly Progress Schedules, Recovery Schedules, and Supplemental Agreement and TIA Schedules, as part of the Narrative, in addition to the information above, if changes were made, the contractor shall provide a report that includes at a minimum:

(a) Recap and explain progress and days gained or lost versus the previous progress schedule.

(b) Discuss all actions and corrections to be taken to achieve Baseline Schedule milestones.

(c) Explain in detail all critical path activities behind schedule and challenges that may arise with planned critical path activities. Explain all activities that have changed from a non-critical path to the critical path. Identify near-critical path activities that could become critical path activities.

(d) Describe changes in resources and productivity rates to be used on remaining work.

(e) Identify all delays, their extent, responsible party, and explain their causes. Include the amount of weather related delays.

(f) List all activities that have been added or removed from the schedule and an explanation of those changes.

(g) List and explain all changes in activities, sequence, durations, and logic ties. Explain changes caused by each Supplemental Agreement, schedule recovery plans and grouping of related contractor initiated revisions.

(h) Describe all coordination with utility companies and accomplishing utility work.

(i) All negative float shall be explained in detail.

(G) Recovery Schedule:

If the Project Schedule indicates a late completion of the work by 28 or more calendar days, the contractor shall prepare a Recovery Schedule which demonstrates how the contractor intends to reschedule the activities to regain compliance with the contract.

Within ten working days of receipt of the Engineer's written direction, the contractor shall submit the Recovery Schedule to the Engineer. The contractor shall not be required to prepare a Recovery Schedule if the contractor requests and demonstrates, in writing, entitlement to extension of a completion deadline due to a Department caused delay, and the Engineer concurs that a Recovery Schedule is not required at that time. If the Engineer disputes the contractor's entitlement to a completion deadline adjustment, the contractor shall, within five working days, submit a Recovery Schedule that does not include a completion deadline adjustment.

Within five working days after a rejection by the Engineer of the Recovery Schedule, the contractor shall resubmit a revised Recovery Schedule incorporating the Department's comments. When the Engineer accepts the contractor's Recovery Schedule, the contractor shall, within five working days after the Engineer's acceptance, incorporate such schedule in the Project Schedule, deliver the same to the Department, and proceed in accordance with the approved Recovery Schedule.

All acceleration costs required to bring the contract work back into compliance with project milestones and the contract time due to a contractor caused delay shall be borne solely by the contractor. Whenever a Recovery Schedule is required, the contractor shall provide the following information:

(1) Transmittal letter;

(2) Bar chart schedule plot;

(3) Electronic copy of the file used for the proposed Recovery Schedule; and

(4) Narrative describing all proposed changes to the Project Schedule in detail, with justification for the changes, including the following:

(a) Changes to activity original durations;

(b) Changes to activity relationships and schedule logic;

(c) Cause of schedule slippage and actions taken to recover schedule within the shortest reasonable time (e.g., hiring of additional labor, use of additional construction equipment, and expediting of deliveries);

(d) Float consumption;

(e) Identification of activities that have been added, deleted, or modified; and

(f) Changes to the Project Schedule's Critical Path.

(H) Revisions to Contract:

If the contractor receives a request for extra work from the Department or submits a contract change request in accordance with Subsection 104.02 of the specifications asserting that an event, situation, or change affects a Critical Path of the Project Schedule, the contractor shall prepare and submit a TIA showing the cumulative effect of the change on the completion or fixed milestone date along with a written report describing the time impact in a form satisfactory to the Department complying to Subsection 104.03 of the specifications.

Each TIA shall include a fragmentary network (fragnet) demonstrating the following information:

(1) How the contractor proposes to incorporate a time extension provided for in a Supplemental Agreement;

(2) The impact to the Project Schedule;

(3) The sequence of new and/or existing activity revisions that are proposed to be added to the Project Schedule that is in effect when the change or delay is encountered;

(4) The proposed method for incorporating the delay and its impact to the Project Schedule; and

(5) The computation of two finish dates. The first finish date shall be computed without consideration of impacts by the proposed revision. The second finish date shall be computed with consideration of impacts by the proposed revision.

If a proposed change in planned work results in altering the Critical Path or extending the schedule completion date, the contractor shall submit a Revised Schedule and a TIA within 15 calendar days of the proposed change.

(I) Record Schedule:

The contractor shall prepare a Record Schedule that includes actual start and actual finish dates for all activities. The Record Schedule, once approved, serves as the final update of the Project Schedule. The contractor shall include a written certification with the Record Schedule submittal signed by the Project Manager of the contractor in accordance with the following:

“To the best of my knowledge, the enclosed final update of the project Schedule reflects the actual start and completion dates of the activities for the project contained herein.”

The contractor shall submit the Record Schedule to the Engineer for review. Final acceptance will not be issued until the Record Schedule has been approved.

(J) Schedule Meetings and Three Week Look Ahead Schedule:

(1) Baseline Schedule Presentation Meeting:

At a time agreeable to the Engineer, the contractor shall conduct a Baseline Schedule presentation meeting within seven calendar days after submitting the proposed Baseline Schedule. The purpose of this meeting is for the contractor to present and explain the contractor’s schedule and construction phasing plan. At a minimum, the following is to be covered at the joint review of the schedule:

(a) WBS;

(b) Sequence of work - step through the schedule activity by activity;

(c) Construction phasing including traffic control phasing and changes;

(d) Resources to include number of construction personnel and production rates used; and

(e) Critical Path review.

(2) Weekly Project Meeting and Look-Ahead Schedule:

At the weekly project meetings, the contractor shall provide the Engineer with a detailed, Look-Ahead Schedule. The Look-Ahead Schedule is a computer generated bar chart schedule plot that shows the previous week's work and the work planned for the current and next three weeks. The contractor shall base the Look-Ahead Schedule on the Project Schedule and provide a greater breakdown of the Project Schedule activities for the purpose of materials inspection and testing. The Look-Ahead Schedule shall clearly note and explain all departures from the Project Schedule. The contractor shall reference the Project Schedule activity ID numbers, WBS, and define subsequent specific daily operations for all work activities scheduled to be performed during the four-week period. The contractor shall identify work being performed by Disadvantaged Business Enterprise (DBE) firms as separate activities. At least one day before the weekly construction activity meetings, the contractor shall submit weekly Look-Ahead Schedules to the Engineer.

(3) Project Schedule Update Meeting:

The contractor shall schedule a joint Project Schedule update meeting to review the Monthly Progress Schedule update on the 15th day of the month or within three days, excluding weekends and holidays thereafter as coordinated with the Engineer. The contractor shall host the meeting and provide an agenda. At a minimum the following items shall be discussed:

(a) The actual progress made until the data date of the schedule update. The review of progress shall include dates for activities actually started and completed, and the duration percentage of work remaining on each activity started. The percentage of work completed shall be calculated by using the quantity and production rate information.

(b) All changes from previously approved schedules.

(c) Actual and potential schedule conflicts.

(d) Supplemental Agreement work and work identified that may lead to supplemental agreement work.

(K) Submittals:

Two 11 x 17 inch hard copies and one pdf copy of each schedule in color listed herein shall be provided to the Engineer. The contractor shall furnish to the Engineer for project use an electronic copy of the schedule. The electronic copy shall be Primavera P6 .xml file format prepared in Primavera software.

The filename of schedules shall be submitted in the following format:

SCHEDULE FILENAME FORMAT	
Preliminary Schedule	TTTTT-YYMM-PSVV
Baseline Schedule	TTTTT-YYMM-BSVV
Monthly Progress Schedule #1	TTTTT-YYMM-MPS01VV
Monthly Progress Schedule #2	TTTTT-YYMM-MPS02VV
Recovery Schedule	TTTTT-YYMM-RCYSVV
TIA Schedule	TTTTT-YYMM-TIASVV
Record Schedule	TTTTT-YYMM-RCDSVV
3 Week Lookahead Schedule	TTTTT-YYMM-LASVV
Schedule Narrative	TTTTT-YYMM-NARVV
Note: (1) TTTTT: First 5 digits of project TRACS number. (2) YYMM: Current 2 digit year and month. (3) VV: 2 digit version number (01, 02, etc.).	

All bar chart schedule plots shall be in color and have a size and scale acceptable to the Engineer. Include a title block and a legend on each page. The plot layout shall include a schedule activity table with corresponding bar chart. The activity table shall be grouped by the WBS and include the activity ID, activity name, duration, start date, finish date, and total float. All activities in the bar chart shall be plotted on their start and finish dates. Show relationship lines and data date line. The bar chart shall be time-scaled in two-line format with a date interval set to year/month and type set to calendar.

The contractor shall provide two 8.5 x 11 inch hard copies of the narrative and monthly report with an electronic pdf copy.

The contractor shall provide a schedule log file generated by the software in a .txt file format with all schedule submittals. The log file shall have the same filename as the schedule file. The contractor shall review the log file prior to submittal to verify that the electronic schedule is in compliance with this specification.

(L) Software:

The automated system software shall be Primavera P6.

(109RRBB, 04/18/24)

SECTION 109 MEASUREMENT AND PAYMENT:

109.04(D)(3) Equipment: the first paragraph of the Standard Specifications is revised to read:

Equipment which the Engineer considers necessary for the performance of work will be eligible for payment at the established rates only during the hours that it is operated except as otherwise allowed elsewhere in these specifications. Equipment hours will be recorded to the nearest one-half hour. For the use of equipment owned by the contractor and approved by the Engineer, the contractor will be paid the rental rates, as modified herein, outlined in the Rental Rate Blue Book® (RRBB) for Construction Equipment which is updated by EquipmentWatch™, a division of Fusable, 3200 Rice Mine Road NE, Tuscaloosa, Alabama 35406, phone (888) 307-1713. All rate determinations will be based on the RRBB quarterly rate revisions that are applicable at the time equipment is being used.

(109FAEU, 08/15/24)

SECTION 109 MEASUREMENT AND PAYMENT:

109.04(D)(3)(a) Rental Rates (Without Operators): the equation of the first paragraph of the Standard Specifications is revised to read:

The hourly equipment rental rate (HERR) will be determined by the following formula:

$$HERR = F \times \left[\frac{1.15 \times R}{176}\right] + HOC$$

Where: F= Adjustment Factor to R is 0.933

R= Current RRBB Monthly Rate

HOC= Hourly Operating Cost

(109WFADF, 05/15/25)

SECTION 109 MEASUREMENT AND PAYMENT:

109.04(D)(6) Statements: the title and text of the Standard Specifications is revised to read:

109.04(D)(6) Forms:

The contractor shall prepare the Weekly Force Account Detail form for each week of force account activity. The Weekly Force Account Detail form is a standardized, fillable form made available by the Department on the ADOT Construction Group's website.

The form shall detail the labor, equipment, and material charges utilized to accomplish the force account work along with all supporting documentation. The contractor shall furnish copies of original receipts (paid invoice cost) for materials, rental equipment cost, including freight and transportation charges, copies of rental rate blue book equipment sheets and certified payrolls.

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

Force account work shall be tracked daily; however, the contractor shall compile no more than one full week's worth of daily records into a Weekly Force Account Detail form. Each reporting period runs from Saturday through Friday. The contractor shall submit the form within 30 calendar days of the respective week's force account performance. The completed form shall be submitted to the Engineer for review and approval. The Engineer will review the form and supporting documentation against the ADOT Inspector's Daily Force Account Reports, and will verify that the form is timely, complete, and accurate. Payment will not be made until the contractor has furnished applicable forms, detailing the costs of the force account work, including but not limited to the following information:

(a) Labor: name, classification, date, daily hours, hourly rate and fringe rate, and certified payrolls for each foreman and laborer.

(b) Equipment: dates, equipment number, description, operator name, hours used, approved stand-by hours, monthly rental rate, hourly operating cost and rental rate blue book sheets for each unit of equipment.

(c) Rental Equipment (Third Party): invoice, dates used, vendor name, description of equipment, operator name, hours used, invoice rate, hourly operating cost and rental rate blue book sheets for each rental equipment.

(d) Materials: invoice, date used, supplier name, description, quantity, unit of measure and unit cost.

(e) Transportation: freight and express charges on materials, FOB jobsite.

(109SUBPAY, 10/20/22)

SECTION 109 MEASUREMENT AND PAYMENT:

109.06(B)(5) Payment Reporting and Sanctions: the eighth paragraph of the Standard Specifications is revised to read:

For each month that the contractor fails to submit timely and complete payment information the Department will retain $5,000 as sanctions from the monies due to the contractor. After 90 consecutive days of non-reporting, the sanctions will increase to $10,000 for each subsequent month which the contractor fails to report until the information is provided. These sanctions will be in addition to all other retention or liquidated damages provided for elsewhere in the contract.

109.06(B)(8) Non-compliance: of the Standard Specifications is revised to read:

Failure to make prompt partial payment, or prompt final payment including any retention, within the time frames established above, will result in remedies, as the Department deems appropriate, which may include but are not limited to:

Sanctions. These sanctions will be in addition to all other retention or liquidated damages provided for elsewhere in the contract:

The Department will withhold two times the dollar amount not paid to each subcontractor;

If full payment is made within 30 days of the Department’s payment to the contractor, the amount withheld by the Department will be released; and

If full payment is made after 30 days of the Department’s payment to the contractor, the Department will release 75 percent of the funds withheld. The Department will retain the remaining 25 percent of the monies withheld as sanctions.

Additional Remedies. If the contractor fails to make prompt payment for three consecutive months, or any four months over the course of one project, or if the contractor fails to make prompt payment on two or more projects within 24 months, the Department may, in addition, invoke the following remedies:

Withhold monthly progress payments until the issue is resolved and full payment has been made to all subcontractors, subject to the sanctions described in paragraph (a) above;

Terminate the contract for default in accordance with Subsection 108.10 of the specifications; and/or

Disqualify the contractor from future bidding, temporarily or permanently, depending on the number and severity of violations.

In determining whether the sanctions will be assessed, the extent of the sanctions, or additional remedies assessed, the State Construction Engineer will consider whether there have been other violations on this or other contracts, whether the failure to make prompt payment was due to circumstances beyond the contractor's control, and other circumstances. The contractor may, within 15 calendar days of receipt of the decision of the State Construction Engineer, escalate the decision to the State Engineer. If the contractor does not escalate the decision of the State Construction Engineer, in writing to the State Engineer, within 15 calendar days of receipt of the decision, the contractor will be deemed to have accepted the decision and there will be no further remedy for the contractor. If the contractor escalates the decision to the State Engineer, and the contractor does not agree with the State Engineer's decision, the contractor may initiate litigation, arbitration or mediation pursuant to Subsection 105.21(D) and (E) of the specifications.

(109FUEL, 02/10/12)

SECTION 109 MEASUREMENT AND PAYMENT: of the Standard Specifications is modified to add:

109.12 Fuel Cost Adjustment:

(A) General:

The Department will adjust monthly progress payments up or down as appropriate for cost fluctuations in diesel fuel as determined in accordance with these special provisions.

A fuel cost adjustment will be made when fluctuations in the price of diesel fuel, in excess of 15 percent, occur throughout this contract. The Department will not provide such adjustments for fluctuations in the price of diesel fuel of 15 percent or less.

No adjustments will be made for fluctuations in the price of fuels other than diesel.

(B) Measurement:

The base index price of fuel will be determined by the Department from the selling prices of diesel fuel published by OPIS (Oil Price Information Service). The base index price to be used will be the price for Diesel fuel No. 2, Ultra Low Sulfur, PAD 5, City of Phoenix Rack. The reported average value for the Phoenix area will be used.

The base index price for each month will be the arithmetic average of the selling price for diesel fuel, as specified above, shown in the last four reports received prior to the last Wednesday of the month.

This price will be effective as of the last Wednesday of each month, and will be posted on the Department's website, at http://www.azdot.gov/Highways/cns/bitmat.asp, on or shortly after the last Wednesday of the month.

This price may also be obtained from Contracts and Specifications Services at (602) 712-7221.

This price will be deemed to be the "initial cost" (IC) for diesel fuel on projects for which bids are opened during the following month.

The current index price for diesel fuel in subsequent months will be the base index price, determined as specified above, for the current month. For example; an adjustment for diesel fuel used in May, if applicable, will be based on the "current price" (CP) for May as posted on the last Wednesday of May. The amount of adjustment per gallon will be the net difference between the "initial cost," adjusted by 15 percent, and the current index price. The monthly adjustment will be determined by the Engineer and included in the payment estimate as a fuel adjustment. For fluctuations in excess of 15 percent, fuel cost adjustments will only be made for current price index increases greater than 1.15 times the "initial cost" or for decreases less than 0.85 times the "initial cost." No calculation will be made for fluctuations in the current index price of 15 percent or less when compared to the "initial cost."

The number of gallons of diesel fuel used per month will be considered to equal 1.5 percent of the dollar amount of work reported by the contractor for each month. Such dollar amount will not include incentives earned by the contractor for pavement smoothness, thickness, or strength for Portland cement concrete pavements; for pavement smoothness or quality lots for asphaltic concrete pavements; for any other revenue derived from quality incentives; or for revenue accrued in the previous month for bituminous material cost fluctuations or diesel fuel price adjustments.

A monthly adjustment, if applicable, will be made on this quantity, as shown below:

$$S = \frac{0.015(Q)}{IC} \text{ x } (CP - AC)$$

Where; S = Monetary amount of the adjustment (plus or minus) in dollars
Q = Dollar amount of work completed for the month
CP = Current index price in dollars per gallon
AC = Adjusted "initial cost" (1.15 or 0.85 times IC) in dollars per gallon
IC = "Initial cost" as determined above, dollars per gallon

If adjustments are made in the contract quantities, the contractor shall accept any fuel adjustment as full compensation for increases or decreases in the price of fuel regardless of the amounts of overrun or underrun.

The value calculated above (plus or minus) will be adjusted to include sales tax and other taxes as applicable.

No additional compensation will be made for any additional charges, costs, expenses, etc., which the contractor may have incurred since the time of bidding and which may be the result of any fluctuation in the base index price of diesel fuel.

No adjustments will be made for work performed after Substantial Completion, as defined in Subsection 105.19, has been achieved.

(C) Payment:

Price adjustments will be shown on the monthly progress estimate, but will not be included in the total cost of work for determination of progress or for extension of contract time.

SECTION 109 MEASUREMENT AND PAYMENT: of the Standard Specifications is modified to add:

109.13 Measurement for Asphaltic Concrete Pavement Smoothness:

(A) General:

The final asphaltic concrete pavement surface shall be evaluated for smoothness by testing.

When a surface treatment other than ACFC or AR-ACFC, such as a chip seal coat, is to be placed on a new asphaltic concrete pavement surface as part of the project, the underlying new asphaltic concrete pavement surface will be evaluated for smoothness prior to the placement of the surface treatment.

When an ACFC or AR-ACFC surface treatment is placed on a new Portland cement concrete pavement (PCCP) as part of the project, the ACFC or AR-ACFC surface treatment will be evaluated for smoothness as specified herein, in addition to the PCCP smoothness requirements specified in Section 401 of the specifications.

At the completion of paving, the contractor shall notify the Engineer in writing that the pavement is ready for testing. The Engineer will then evaluate the pavement to be tested. If the Engineer determines that additional pavement preparation is required, the contractor shall perform such preparation as directed by the Engineer. The contractor shall ensure that the pavement to be tested can be driven safely at the design speed. Testing will not be performed on any portions that cannot be made safe for testing at the design speed, or on any lanes of less than 0.30 miles in length. If requested by the Engineer, the contractor shall broom the pavement immediately prior to testing. No measurement or direct payment will be made for preparing the pavement, the cost being considered as included in the price of contract items.

The Actual Smoothness Value (AS) for each 0.1 lane-mile increment will be determined, by the Department, in accordance with the provisions of Arizona Test Method 829.

Testing will not be done when the ambient air temperature is less than 40 degrees F, or during rain or other weather conditions determined to be inclement by the Engineer.

Traffic control costs during the initial smoothness testing period will be reimbursed under the provisions of Section 701 of the Specifications. Any additional traffic control costs incurred, outside the normal scope of work, due to pavement repairs and subsequent pavement smoothness measurements shall be borne solely by the contractor.

The testing will be performed within ten days after the Engineer has accepted the pavement for testing. The Engineer will notify the contractor of the test results no later than 10 days after the testing has been performed.

Testing will be performed on mainline traffic lanes, and will include the full length of the pavement placed under the contract. Unless otherwise specified in the contract documents, testing of distress lanes, shoulders, ramps, tapers, cross roads, and frontage roads will not be performed.

The existing pavement has the following smoothness values (inches per mile).

Route	MP	Average Smoothness (EB)	Average Smoothness (WB)
I-40	330.60 to 342.20	91.72	84.66

The Correction Value (CV) for this contract is 92 inches per mile.

Any 0.1 lane-mile increment having an Actual Smoothness Value (AS) equal to or greater than the Correction Value (CV) shall be repaired by the contractor at no additional expense to the Department.

If repairs are required, the contractor shall prepare a written proposal detailing corrective actions and submit the proposal to the Engineer within 10 working days after the contractor's receipt of test results. Within three working days, the Engineer will review the submitted proposal and either accept it, or reject it and ask for a new proposal. If rejected, the contractor shall, within 10 working days, prepare and submit a new proposal for corrective action, based on discussions with the Engineer. The Engineer will review, and either accept or reject, the new proposal within three working days of receipt.

Upon completion of any necessary repairs, the 0.1 lane-mile increments containing repaired areas will be re-tested in accordance with the provisions of Arizona Test
Method 829. Resultant values from re-testing will be used in determining the adjustment in payment to the contractor.

(B) Smoothness Score:

No adjustment in payment to the contractor will be made on this project. The target values are included on this project for information purposes to do testing and data collection.

The smoothness score, for each 0.1 lane-mile increment will be determined using the following formulas:

When AS < 40:

Smoothness Score (Positive) = [(40 - AS) / (40 + 2)] x 2,700

When AS >52:

Smoothness Score (Negative) = [(52 - AS) / (40 + 2)] x 1,200

The total smoothness score will be the summation of the individual scores for the respective 0.1 lane-mile increments, except the maximum total smoothness score for the project will be $9,000 per tested lane-mile.

For projects where pavement is removed and replaced to grade, followed by an ACFC or an AR-ACFC overlay, no smoothness measurements will be made for the following areas:

Pavement placed within 35 feet of the termini of the project.

Pavement placed within 35 feet of the approaches and departures for bridge structures not being overlain as part of the project.

For projects where pavement is removed and replaced to grade, followed by an overlay, followed by an ACFC or an AR-ACFC overlay, no smoothness measurements will be made for the following areas:

Pavement placed within 100 feet of the termini of the project.

Pavement placed within 100 feet of the approaches and departures for bridge structures not being overlain as part of the project.

Bridges and their approaches and departures that are overlain as part of the project will be subject to the smoothness requirements.

(109DRSCH, 02/10/20)

SECTION 109 MEASUREMENT AND PAYMENT: of the Standard Specifications is modified to add:

109.15 Draw Schedule:

At the preconstruction conference, the contractor shall submit a planned monthly Draw Schedule for the project. Payments reflected in the Draw Schedule shall be based on the value of the monthly work to be completed. No construction work shall begin and no payments will be made until the Draw Schedule is submitted and approved by the Engineer. Failure of the contractor to comply with this requirement constitutes a waiver of entitlement to additional compensation or a time extension.

Under no circumstances will the Department make payments to the contractor that exceed the actual value of the work completed.

(109BITUMADJ, 06/19/25)

SECTION 109 MEASUREMENT AND PAYMENT: of the Standard Specifications is modified to add:

109.16 Bituminous Price Adjustment:

(A) General:

The term "bituminous material" as used herein shall include asphalt binder, asphalt rubber and emulsified asphalt.

The Department will adjust monthly progress payments as appropriate for market fluctuations in the price of bituminous material.

A price for bituminous material will be determined monthly by the Department based on the selling prices published by the Asphalt Weekly Monitor, a publication of Poten & Partners, Inc. The price will be the arithmetic average of the high and low selling prices for bituminous material shown in the previous four reports for the Arizona/Utah and Southern California regions.

This value will be effective as of the last Wednesday of each month, and will be posted on the ADOT Contracts and Specifications Group website, on or shortly after the last Wednesday of each month.

This price will be deemed the “initial cost” (IC) for bituminous material for projects on which bids are opened during the following month. This price will also be deemed the "current price" (CP) for bituminous material for the following month for projects in construction.

(B) Measurement:

For each item of bituminous material for which there is a specific pay item, and for the bituminous material used in Asphaltic Concrete mixes, an adjustment will be made for each month that a quantity of bituminous material was used on the project.

The IC for the month in which the project was bid will be compared with the CP for the appropriate current month. The CP will be as posted on the Department’s website on the last Wednesday of each month, and will be used to adjust costs for bituminous material incorporated into the job during the following month (for example; bituminous material used in May will be adjusted, as specified herein, based on the CP for May as posted on the last Wednesday of April). Any difference in price between these two values will be applied to the quantity of eligible bituminous material incorporated into the work.

Determination of the eligible quantities of bituminous material for adjustment will be based on contractor-furnished invoices, except as described herein.

The tons of emulsified products to which the adjustment will be applicable will be the tons of the emulsified asphalt prior to dilution.

Adjustments in compensation for emulsified asphalts will be made at 60 percent of either the increase or decrease of IC. For emulsified asphalts containing polymer, adjustments in compensation will be made at 66 percent of either the increase or decrease.

The tons of Bituminous Material (Asphalt-Rubber) to which the adjustment is applicable will be 80 percent of the total quantity of the item used. The adjustment is not applicable to the 20 percent of the material which constitutes the crumb-rubber additive.

The tons of Bituminous Material (TR+) to which the adjustment is applicable will be 92 percent of the total quantity of the item used. The adjustment is not applicable to the 8 percent of the material which constitutes the crumb-rubber additive.

The tons of bituminous material in Asphaltic Concrete mixes, subject to price adjustment shall be calculated as follows, based on the approved mix design target values and the quantity of Asphaltic Concrete placed—regardless of the actual percentage of binder incorporated:

A monthly adjustment, if applicable, will be made on this quantity, as shown below:

$$PA = (CP - IC) \times ACP \times F$$

Where: PA = Price Adjustment monetary amount (plus or minus in dollars)
CP = Current index price (dollars per ton)
IC = Initial Cost at time of bid (dollars per ton)
ACP = Asphaltic Concrete Placed (tons)
F = Eligible Asphalt Cement %

The value calculated above (plus or minus) will be adjusted to include sales tax and other taxes as applicable.

(1) For mixes without reclaimed asphalt pavement (RAP):

F = Approved Mix Design Target Asphalt Cement %

(2) For mixes with RAP:
F = Approved Mix Design Target Asphalt Cement % – Mix Design RAP Asphalt Cement contribution %

(3) For mixes using PG TR+ Terminal Blend (8 % Crumb Rubber):
F = 0.92 x (Approved Mix Design Target Asphalt Cement %)

(4) For mixes using Asphalt-Rubber Blend (20 % Crumb Rubber):
F = 0.80 x (Approved Mix Design Target Asphalt Cement %)

(5) If the quantity of Asphaltic Concrete is measured by volume, the supplemental agreement establishing the method of measurement will specify the manner in which the tons of bituminous material eligible for the adjustment is determined.

(C) Payment:

Price adjustments will be shown on the monthly progress estimate, but will not be included in the total cost of work for determination of progress or for extension of contract time.

Price adjustments will be calculated using the measurement methods described above. Only the tons of virgin asphalt binder determined by those methods will be subject to a bituminous material price adjustment.

No price adjustment will be made for the RAP binder in the mix.

No price adjustment will be made for the 8% of binder comprising crumb rubber when (TR+) is used.

No price adjustment will be made for the 20% of binder comprising crumb rubber in the asphalt-rubber material blend.

No compensation will be made for changes that may have occurred since the time of bidding and which may be the result of any increase in the IC of bituminous material.

Adjustment in unit prices of items governed by this provision will be made in the next regular monthly progress payment following actual use or application of the bituminous material.

(201PAY, 07/15/21)

SECTION 201 CLEARING AND GRUBBING:

201-5 Basis of Payment: of the Standard Specifications is modified to add:

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

SECTION 202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS: the first paragraph of the Standard Specifications is hereby deleted:

202-3.03 (C) Bituminous Pavement Removal By Milling: the title of the Standard Specifications is revised to read:

202-3.03 (C) Bituminous Pavement Removal By Milling (When an Asphaltic Concrete Friction Course is not to be Placed on the Milled Surface):

Upon removal, the existing milled asphaltic concrete material, shall become the property of the Arizona Department of Transportation. The milled materials, not approved by the Engineer for use on the project, shall be hauled by the contractor to the disposal locations detailed below:

ADOT Stockpile Location:

Interstate 40 (I-40), EB
Approximate MP 335.00

Quantity of Millings Required:	All milled material not being used on the Project
Haul Distance (from midpoint of project):	Approximately 1.5 Miles
Contact:	Stetson Baker, Chambers Maintenance Supervisor [Email: sbaker@azdot.gov; Phone: (928) 688-2782]

Haul distances to the above identified stockpile locations are approximate and shall be verified by the Contractor.

The contractor shall contact the above listed person/s a minimum of two working days prior to transporting milled AC. The material shall be placed in an area designated for stockpiling asphaltic concrete as specified and directed by the Engineer.

The contractor shall provide at the disposal site equipment capable of handling and placing the salvaged material in stockpiles as directed by and to the satisfaction of the Engineer.

ITEM 2020047 – REMOVAL OF SIGNS:

Description:

The work under this item shall include removing existing sign assemblies as shown on the plans. A sign assembly shall include the sign panels, posts, and foundations.

Construction Requirements:

Sign assembly removals shall be in accordance with the requirements of Subsection 202-3 of the Specifications.

Method of Measurements:

REMOVAL OF SIGNS will be measured per unit each for each location regardless of the number of posts, panels and foundations.

Basis of Payment:

The accepted quantities of REMOVAL OF SIGNS, measured as provided above, will be paid at the contract unit price each, which price shall be full compensation for the work.

ITEM 2020053 – REMOVE (GUARDRAIL END TERMINAL)
ITEM 2020054 – REMOVE (GUARDRAIL END ANCHOR)
ITEM 2020116 – REMOVE (GUARDRAIL TRANSITION)

Description:

The work under these items shall consist of the removal and satisfactory disposal of all existing guardrail end terminal, guardrail end anchor, and guardrail transition which conflict with new items of work.

Construction Requirements:

Removal shall meet the requirements of Section 202 of the specifications. Existing items to remain that are damaged or destroyed as a result of the contractor's operations shall be repaired or replaced by the contractor at no additional cost to the Department.

Guardrail end terminal, guardrail end anchor, and guardrail transition removal shall include complete removal of posts, concrete foundations, and foundation tubes, and subsequent backfill of the remaining holes with moist soil in compacted lifts, as approved by the Engineer.

Materials that are not to be salvaged become property of the contractor and shall be hauled off site to the satisfaction of the Engineer.

Method of Measurement:

Remove (Guardrail End Terminal), Remove (Guardrail End Anchor), and Remove (Guardrail Transition) will be measured by the unit each for each guardrail end terminal removed and for each guardrail end anchor removed.

Basis of Payment:

The accepted quantity of work for Remove (Guardrail End Terminal), Remove (Guardrail End Anchor), and Remove (Guardrail Transition), measured as provided above, will be paid for at the contract unit price per each, which price shall be full compensation for the work, complete in place.

ITEM 2020115 – REMOVE (SIGN PANEL):

Description:

The work under this item shall include removing existing sign panel assemblies, which includes the sign and all mounting hardware, as shown on the plans.

Construction Requirements:

Sign panel assembly removals shall be in accordance with the requirements of Subsection 202-3 of the Specifications. The existing foundation and sign post shall be protected in place.

Method of Measurement:

REMOVE (SIGN PANEL) will be measured by the unit of each location regardless of the number of panels or the number of mounting brackets or size of the panel for each assembly.

Basis of Payment:

The accepted quantities of REMOVE (SIGN PANEL), measured as provided above, will be paid for at the contract unit price per each assembly, which price shall be full compensation for the work, complete in place.

ITEM 2020252 – REMOVE BRIDGE DECK SURFACE (MECHANICAL MILLING):

Description:

The work under this item shall consist of removing the concrete deck surface by mechanical milling at the locations and in accordance with the details shown on the project plans.

Mechanical Milling Equipment:

The contractor shall use power-driven, self-propelled mechanical milling equipment that is the size and shape that allows traffic to pass safely through areas adjacent to the work.

The contractor shall also use equipment that is:

- Equipped with a cutting mandrel with carbide tipped cutting teeth designed for mechanical milling concrete to close tolerances.
- Equipped with grade and slope controls operating from a string line or ski and based on mechanical or sonic operation.
- Capable of removing concrete to an accuracy of 1/16 inch.
- Provided with conveyors capable of rear or front loading to transfer the milled material from the roadway to a truck.

Construction Requirements:

The mechanical milling equipment shall have a complete set of new teeth at the beginning of the job, and the teeth shall be replaced as necessary to perform the work satisfactorily.

The contractor shall provide personnel on each side of the milling equipment to monitor the operation, and they shall maintain radio communication with the operator at all times during the work. The contractor shall take every measure necessary to protect the top reinforcement bars from damage. If any reinforcement bars are damaged by the milling operation, it shall be repaired by the contractor at no cost to the Department.

The milled surface shall provide a texture suitable for use as a temporary riding surface. Mechanical milling methods shall produce a uniform finished surface and maintain a constant cross slope between extremities in each lane. The surface shall have a transverse pattern of 0.2 inch center to center of each strike area. The difference between the ridge and valley of the mat surface shall not exceed 1/16 inch.

Hydrodemolition will not be considered for removal of the deck surface.
The contractor shall provide positive drainage to prevent water accumulation on the milled deck. When removing material at ends of milled sections, the contractor shall bevel the transverse edges to produce a smooth surface. The contractor shall bevel back the longitudinal vertical edges greater than 2 inches that are produced by the removal process and left exposed to traffic. Bevel them back at least 3 inches for each 2 inches of material removed. Use an attached mold board or other approved method.

The surface of the deck following the milling shall be abrasive blast cleaned. The deck shall be dry when blast cleaning is performed. The contractor shall not direct traffic onto the milled surface until the removal is complete.

If the milled surface becomes contaminated at any time prior to placement of the overlay, the surface shall be cleaned by abrasive blasting. Where abrasive blasting is being performed within 10 feet of a lane occupied by public traffic, the residue, including dust, shall be removed immediately after contact between the abrasive and the surface being treated. Removal of the residue shall be performed by a vacuum attachment operating concurrently with the abrasive blasting operation.

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices necessary to prevent oil or other deleterious material from being deposited on the deck. All removed materials shall become the property of the contractor.

Any other equipment or method like scarifiers, coldplaners, scabblers, and similar types of equipment or procedures that leave fractured aggregate or otherwise damage the concrete surface to remain shall not be used. Adequate means shall be used to prevent water or dust from flowing across traffic lanes, or into waterways.

Quality Acceptance:

The contractor shall ensure that the mechanical milling operation produces a uniform surface texture that is true to line, grade, and cross section. The milled surfaces shall be inspected visually and by straightedge. A 10-foot straightedge shall be kept near the mechanical milling operation to measure surface irregularities of the milled deck surface.

Any areas exceeding 1/8 inch between the ridge and valley of the mat surface shall require that the underlying layer be removed and replaced with material as directed by the Engineer at no additional cost to the Department.

Method of Measurement:

Mechanical milling deck surface will be measured by the square yard.

Basis of Payment:

The accepted quantity of mechanical milling deck surface, measured as provided above, will be paid for at the contract unit price per square yard, which price shall be full compensation for the work, complete in place.

(202LEAD, 10/21/21)

SECTION 202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202-3.11 Removal of Lead-Based Striping and Paint Material: of the Standard Specifications is modified to add:

The Department has tested the paint material on existing items that are scheduled for removal. Painted items that contain lead-based paint material include the Ortega Road bridge superstructure (#00816).

202-3.11(A) Lead Abatement Subcontractor: The third paragraph of the Standard Specifications is revised to read:

The lead abatement subcontractor shall have three years of documented experience performing related work with the aforementioned, valid certification.

202-3.11(B) Removal Plan: of the Standard Specifications is modified to add:

The Ortega Road bridge superstructure (#00816) shall not be disturbed in any way until the removal plan has been approved in writing by the Engineer.

(203SHLDBU, 02/17/22)

SECTION 203 EARTHWORK:

203-11.03(A) Placement: the first paragraph of the Standard Specifications is revised to read:

Shoulder build-up material shall be placed and shaped along the edge of pavement in accordance with the details shown on the project plans, the applicable requirements of Subsection 203-10.03(A) of the specifications, and as directed by the Engineer. Rubbish, debris, and other objectionable matter shall be removed prior to placement of shoulder buildup

material. Vegetation shall be cleared as necessary to accommodate placement of shoulder buildup material, but minimized to the maximum extent practicable.

203-11.05 Basis of Payment: the last paragraph of the Standard Specifications is revised to read:

No additional measurement or direct payment will be made for clearing vegetation, removing rubbish, debris, and other objectionable matter, the construction or compaction of temporary slope fillets, or for borrow used for shoulder build-up, the costs being considered as included in the price of shoulder build-up.

(404BITUM, 08/18/22)

SECTION 404 BITUMINOUS TREATMENTS:

404-1 Description: of the Standard Specifications is revised to read:

The work under this section shall consist of furnishing all materials and constructing or applying bituminous treatments at the locations designated on the plans and in accordance with the requirements of the specifications and in conformity to the lines shown on the project plans or established by the Engineer.

The bituminous treatments include one or a combination of prime coat, tack coat, and fog coat. The bituminous treatments also include emulsified asphalt chip seal and hot applied chip seal both either with or without fog coat.

When a “hot applied” chip seal is called for on the plans and specifications, it refers to a chip seal using a performance grade asphalt cement or a crumb rubber asphalt as the bituminous material.

404-2.02 Aggregate Materials:

(A) General: the second and third paragraphs of the Standard Specifications are revised to read:

With the exception of precoated cover material, aggregate material shall be sampled for gradation acceptance from the final stockpile prior to being incorporated into the work. The aggregate for the precoated material shall be sampled prior to precoating.

(B) Blotter Material: of the Standard Specifications is revised to read:

Blotter material shall be natural or manufactured sand, volcanic cinders, or other approved material and shall be free of deleterious materials or foreign substances.

The gradation shall meet the following requirements when tested in accordance with the requirements of Arizona Test Method 201:

Sieve Size	Percent Passing
3/8 inch	100
No. 4	80 - 100
No. 16	45 - 80
No. 200	0 - 5.0

(C) Cover Material: of the Standard Specifications is revised to read:

Aggregate for cover material shall be clean gravel or crushed rock, shall be free of clay, and shall not contain calcium carbonate, caliche, synthetic materials, organic matter, or foreign substances. Cover material shall not be obtained from sweepings of previously applied cover material.

The gradation shall meet the following requirements when tested in accordance with the requirements of Arizona Test Method 201.

Sieve Size	Percent Passing	
	Class 1	Class 2
3/4 inch	100	
1/2 inch	97 – 100	100
3/8 inch	70 – 100	97 – 100
1/4 inch	0 – 10	70 – 100
No. 8	0 – 5	0 – 5
No. 200	0 - 2.0	0 - 2.0

Cover material shall meet the following requirements:

Aggregate Characteristics	Test Method	Requirement
Abrasion	AASHTO T 96	100 Rev., Max 9% 500 Rev., Max 40%
Carbonates	Arizona Test Method 238	Maximum 20%
Fractured Coarse Aggregate Particles	Arizona Test Method 212	Minimum 75% one fractured face, determined on plus No. 8 material
Flakiness Index	Arizona Test Method 233	Maximum 20%
Bulk Oven Dry Specific Gravity	Arizona Test Method 210	2.350 – 2.850
Water Absorption	Arizona Test Method 210	0.0 – 2.5%

(D) Precoated Cover Material: of the Standard Specifications is revised to read:

For hot applied chip seals, the cover material shall be precoated with any grade of PG asphalt cement which meets the requirements of Section 1005 of the specifications. The precoating shall be accomplished by mixing at a central plant until the aggregate is evenly coated. The cover material shall have a minimum temperature of 250 degrees F at the time of precoating with asphalt cement. The cover material shall be precoated with approximately 0.40 to 0.60 percent asphalt cement, by weight of the aggregate. The final percentage of asphalt cement used for precoating will be as directed by the Engineer. Precoated cover material shall be dust free upon completion of coating and shall remain dust free prior to being incorporated into the work.

The aggregate for precoated cover material shall meet the requirements in Subsection 404-2.02(C) of the specifications prior to precoating with bituminous material.

No precoated cover material shall be stockpiled following precoating with asphalt cement for more than five calendar days prior to placement, unless otherwise approved by the Engineer.

404-2.03 Bituminous Treatment Material Types and Application Rates: of the Standard Specifications is modified to add:

The type of bituminous material for tack coat and approximate application rate shall be as specified in Subsection 404-4.02 of the specifications.

The type of bituminous material for fog coat shall be CSS-1 and shall be applied at the approximate rate of 0.08 gallons per square yard. Blotter material shall be applied at the approximate rate of 2.0 pounds per square yard.

The bituminous material application rates provided in this Subsection are approximate, and are to be used for bidding purposes, and shall be modified as required herein. Final application rates for all materials shall be those required to ensure the most favorable outcome, as approved by the Engineer.

404-3 Construction Requirements:

404-3.01 Seasonal and Weather Limitations: of the Standard Specifications is revised to read:

(A) General:

At any time, the Engineer may require that the work cease or that the work day be reduced in the event that weather conditions, either existing or expected, are anticipated to have an adverse effect upon the bituminous treatment.

Placement shall cease for the remainder of the day if sustained wind velocities in excess of 15 MPH occur at the project site.

(B) Prime Coat:

Bituminous material used for prime coats shall be applied to an existing aggregate surface only when the ambient temperature in the shade is at least 70 degrees F and when the existing aggregate surface is slightly damp.

(C) Fog Coat:

Bituminous material used for fog coats shall be applied to an existing pavement surface only when the surface is dry, the pavement surface temperature is at least 60 degrees F but does not exceed 175 degrees F, and the ambient temperature at the beginning of the application is at least 50 degrees F and rising but does not exceed 110 degrees F. The application of bituminous material shall be stopped when the ambient temperature is 55 degrees F or less and falling.

(D) Chip Seal:

The contractor's bid submittal and initial construction schedule shall adhere to the beginning and ending dates shown in Subsection 404-4.04(A) of the specifications. Bituminous material used for chip seal coats shall only be placed when the existing pavement surface is dry, the surface temperature is at least 85 degrees F, and the ambient temperature at the beginning of the application of bituminous material is at least 65 degrees F and rising. The application of bituminous material shall be stopped when the ambient temperature is 70 degrees F or less and falling.

No placement of bituminous material for chip seals shall occur if ambient temperatures are forecasted to be at or below 40 degrees F at any time during the day or night after placement.

For hot applied chip seals, no placement shall occur if ambient temperatures exceed, or are forecasted to exceed, 110 degrees F the day before, the day of, or the two days after placement.

404-3.02 Equipment:

(A) Distributor Truck: the first sentence of the first paragraph of the Standard Specifications is revised to read:

Distributor trucks shall be so designed, equipped, maintained and operated that bituminous material at the specified temperature may be applied uniformly on variable widths of surface at readily determined and controlled rates from 0.03 to 1.00 gallons per square yard, with uniform pressure, and with an allowable transverse variation from any specified rate not to exceed 10 percent or 0.02 gallons per square yard, whichever is less.

(A) Distributor Truck: the first sentence of the fourth paragraph of the Standard Specifications is revised to read:

Distributor truck spray bars shall be equipped with the appropriate size nozzles adjusted to the proper angle with the associated adjustment wrench to achieve maximum overlap of spray and an even application.

(B) Power Brooms: of the Standard Specifications is revised to read:

Power brooms shall be of the rotary or pickup type, capable of completely removing excess blotter material, and cleaning without gouging or tearing the surface.

(D) Aggregate Spreaders: of the Standard Specifications is revised to read:

The application of blotter material shall be accomplished by means of a sand slinger or other equipment approved by the Engineer.

The application of cover material shall be accomplished by means of a calibrated spreader. The spreader shall be a self-propelled, computerized rate-controlled unit capable of an application width of 14 feet or greater. The spreader shall be in good mechanical condition, capable of applying the correct aggregate application rate uniformly across the spread width.

Chip spreader boxes shall be calibrated to ensure consistent discharge across all of the chutes except where the discharge is intentionally adjusted to compensate for site conditions and construction operations.

404-3.03 Traffic Control: of the Standard Specifications is hereby deleted.

404-3.04 Preparation of the Surface: of the Standard Specifications is revised to read:

The surface to be treated shall be thoroughly cleaned prior to applying bituminous material. Man holes, utility covers, and catch basins shall be protected prior to and during application of bituminous material. Self-propelled rotary power brooms, pickup brooms, and hand brooms shall be used immediately in advance of applying the bituminous material.

When a bituminous treatment is to be applied to an existing aggregate surface, the surface shall be uniformly smooth, firm and reasonably true to grades and cross sections as shown on the project plans, and shall be so maintained throughout the placing of the bituminous treatment. In no event shall a bituminous treatment be placed on a soft, uneven base. All holes, depressions or irregularities shall be repaired. All loose and unsuitable material shall be removed and replaced by suitable material, which shall be compacted to produce a dense uniform surface conforming to the adjacent area.

When required, the existing aggregate surface on which the bituminous treatment is to be placed shall be lightly bladed, watered and compacted immediately prior to the application of bituminous material. In extremely dry areas, additional light applications of water may be required prior to the application of the bituminous material to facilitate penetration of the bituminous material.

404-3.05 Application of Bituminous Material: the first, second and third paragraphs of the Standard Specifications are revised to read:

The types, grades, and approximate rates of application of bituminous material shall be as specified in Subsections 404-2.03 of the specifications. The application rates for chip seal

coats shall be determined by the contractor in accordance with the requirements herein, subject to approval by the Engineer.

The rates to be applied may vary substantially because of different surface conditions within the project limits. The actual bituminous material application rate shall not vary more than 10 percent from the application rate specified or approved by the Engineer.

The bituminous material shall be uniformly applied to the prepared surface at the rate specified or approved by the Engineer and in one application.

404-3.05 Application of Bituminous Material: the seventh, eighth and ninth paragraphs of the Standard Specifications are revised to read:

In the event that any spots are missed in the application, or any areas develop that do not have a uniform spread or penetration, such areas shall be remedied without delay.

Care shall be taken to prevent the spraying or splattering of bituminous material on adjacent pavements, structures, curb, guardrail, vegetation, or any other object outside of the area designated for spraying.

Removal and disposal of unused bituminous material shall be the contractor's responsibility and at no cost to the Department.

404-3.06 Application of Blotter Material: of the Standard Specifications is revised to read:

The approximate application rate of blotter material, when required as a part of a bituminous treatment, shall be as specified in Subsection 404-2.03 of the specifications; however, the Engineer will specify the exact rate to be applied based on the characteristics of the bituminous treated surface. The specified application rates are based on the wet weight of material.

Blotter material, at the time of spreading, shall be wet but free from running water. Blotter material shall be spread uniformly to the treated surface in one or more applications for a total application rate as specified. Blotter material shall be applied at a time acceptable to the Engineer and before opening to traffic.

Any oversized aggregate or foreign material picked up during stockpiling or loading operations shall be eliminated before entering the spreader. Supplemental spreading or smoothing shall be done by hand methods where necessary.

Prior to final acceptance and when ordered by the Engineer, the contractor shall remove and dispose of any excess blotter material. Removal and disposal of excess blotter material shall be the contractor's responsibility and at no cost to the Department.

404-3.07 Joints: of the Standard Specifications is revised to read:

(A) General:

Transverse joints with the preceding work, at intersections, and at all existing pavements and structures shall be made by a method approved by the Engineer prior to the start of the work.

Longitudinal joints shall be overlapped between 2 to 6 inches.

Regardless of the width of the roadway to be sealed, the number of longitudinal joints shall be kept to a minimum. Longitudinal joints shall be located to the greatest degree obtainable to coincide with the painted lines between traffic lanes.

(B) Chip Seal:

Unless otherwise directed by the Engineer, transverse joints with the preceding work shall be made by placing building paper over the end of the previous application, and the joining application shall start on the building paper. Once the application process has progressed beyond the paper, the paper shall be disposed of as directed by the Engineer. Transverse joints at other locations shall be made by a method approved by the Engineer prior to the start of the work.

Joints shall be cleaned as deemed necessary by the Engineer prior to the application of bituminous material in the adjacent strip.

404-3 Construction Requirements: of the Standard Specifications is modified to add:

404-3.08 Opening to Traffic:

In the construction or application of bituminous treatments, no traffic or equipment will be permitted on the treated roadway surface until it has been established to the satisfaction of the Engineer that the treated roadway surface will not be damaged or marred under the action of traffic. No traffic of any description shall be allowed on any bituminous treatment until approved by the Engineer.

404-4 Prime Coat: the title and text of the Standard Specifications is revised to read:

404-4 Bituminous Surface Treatment:

404-4.01 Prime Coat:

The type of bituminous material and the approximate application rate shall be as specified in Subsection 404-2.03 of the specifications. The Engineer may adjust the actual application rate based on specific trials and visual observations performed on test areas for different base conditions.

When it is deemed necessary, areas having excess bituminous material shall be blotted with material as directed by the Engineer.

When directed by the Engineer, the surface of the completed prime coat shall be rolled with a pneumatic-tired roller.

The integrity of the prime coat shall be maintained at all times until the next course is placed or until final acceptance. In the event traffic has caused holes or breaks in the surface, such holes or breaks shall be repaired by the contractor.

404-4.02 Tack Coat:

Tack coat shall be applied prior to placing a bituminous mixture on a primed surface, an existing bituminous surface, or an existing Portland cement concrete pavement surface. Tack coat shall also be applied between each layer of bituminous mixtures. A light coat of bituminous material shall also be applied to edges or vertical surfaces against which a bituminous mixture is to be placed.

The contractor shall choose the bituminous material to be used for tack coat. The Engineer must approve the contractor's choice of bituminous material prior to its use.

The rate of application for the specific usage will be specified by the Engineer. The following table shows approximate tack coat application rates:

Type of Bituminous Material	Approximate Tack Coat Application Rates: Gallons / Square Yard		Payment Factor
	Prior to Placing ACFC or AR-ACFC	All Other Tack Coats	
Emulsified Asphalt (Special Type) – See Note (1) Below.	Not Allowed	0.12	0.7
Emulsified Asphalt (Other than Special Type)	0.08	0.08	1.0
Asphalt Cement	0.06 to 0.08	0.06 to 0.08	1.0
Note: (1) Emulsified Asphalt (Special Type) shall consist of Type SS-1 or CSS-1 emulsified asphalt diluted with water to provide an asphalt content of not less than 26 percent.			

The Engineer may adjust the application rate.

If emulsified asphalt of any type is used, it shall have broken before the bituminous mixture is placed.

Tack coat shall be applied only as far in advance of the placement of the bituminous mixture as is necessary to obtain the proper condition of tackiness. All traffic on a tack coat surface shall be minimized to the greatest extent possible. In no event shall more tack coat be applied in one day than will be covered by the bituminous mixture during that same day.

404-4.03 Fog Coat:

The type of bituminous material and the approximate application rate shall be as specified in Subsection 404-2.03 of the specifications. The material shall be diluted with one part water to one part bituminous material. The specified application rate is based on the diluted material. The Engineer may adjust the actual application rate based on specific trials and visual observations performed on test areas for different pavement conditions.

When specified in Subsection 404-2.03 of the specifications, blotter material shall be applied following the application of bituminous material.

404-4.04 Chip Seal Coat:

(A) General:

The contractor shall prepare their bid submittal and initial construction schedule, submitted at the Preconstruction Conference as described in Subsection 108.03 of the specifications, based on the following beginning and ending dates for placement of the chip seal.

Average Elevation of Project, Feet	Beginning and Ending Dates
0 – 3499	March 15 – May 31
0 – 3499	September 1 – October 31
3500 – 4999	May 1 – September 30
5000 and over	June 1 – August 31

Any proposed placement deviating from the beginning and ending dates shall be detailed in the written schedule of construction submitted at the weekly meeting described in Subsection 108.04 of the specifications. No contract time extension will be granted for placement outside of the beginning and ending dates. Any placement deviating from the beginning and ending dates shall be at the sole risk of the contractor.

The type of bituminous material and the approximate application rate shall be as specified in Subsection 404-2.03 pf the specifications. The type of cover material shall be as specified in Subsection 404-2.03 of the specifications.

The contractor shall determine the application rates and corresponding quantities of bituminous material and cover material for chip seal coat in accordance with Arizona Test Method 819. Application rates are subject to approval by the Engineer. Areas and locations anticipated to require adjustment to the rate(s) shall also be identified.

The application rates and performance of emulsified asphalt chip seals shall be evaluated using the Sweep Test in accordance with ASTM D7000.

The performance of hot applied chip seals shall be verified using the Vialit Retention Test in accordance with EN 1272-3, modified as necessary to account for the specific characteristics of the proposed chip seal.

The actual application rate shall be such that the aggregate is embedded approximately 70 percent (80 percent above 4,000 feet elevation) and excessive tracking of bituminous material does not occur under construction equipment or when opened to traffic.

The actual rate of cover material to be applied shall be such that no more than 5 percent of the chips applied are removed during sweeping and approximately 20 percent void space exists between the aggregate particles once realigned after opening to traffic.

The proposed application rate(s), locations requiring adjustment, and the associated basis for each adjustment, shall be submitted to the Engineer for approval no later than five days following completion of the Pre-Activity Walkthrough as described in Subsection 404-4.04(B) of the specifications and at least five days prior to placement of the test strip.

The basis for any anticipated adjustments shall include use of one or more of the following:

(a) Sand Patch tests performed in accordance with *STP762 Pavement Surface Characteristics and Materials;* Haydon, C.E. (ASTM, 1982),
(b) Appendix B of Chip Seal Guide for Application and Construction; Pavement Preservation Committee of the Arizona Chapter of The Associated General Contractors (AGC-Arizona Chapter, 2013),
(c) Arizona Test Method 742 for mean macrotexture.

The approved application rate(s) and adjustments shall be clearly marked at the corresponding locations and remain visible to equipment operators prior to placement.

At least 10 days prior to chip seal placement, the contractor shall submit a minimum 75-pound sample of uncoated cover material to the Engineer for testing. In addition to the submitted cover material, the contractor shall also submit 3 full gallons of emulsion (5 to 8 gallons for hot applied) in 1-gallon cans in accordance with the requirements of Arizona Test Method 103. The contractor shall also submit 40 pounds of granulated rubber if included in the bituminous material.

(B) Pre-Activity Walkthrough:

Prior to placement, the contractor shall conduct a Pre-Activity Walkthrough with all parties expected to work on the chip seal.

Locations where adjustments in application rate may be appropriate shall be documented.

A location for a test strip, approximately 1,000 feet in length shall be identified. If additional test strip locations are desired due to varying surface conditions, these shall also be identified.

Other factors or site conditions such as turn or deceleration lanes, changes in surface characteristics, crack fill, and recent patchwork which may affect placement of the chip seal coat shall also be identified. A description of any affecting conditions and the corresponding locations and action to be taken to minimize their impact shall be documented.

In addition to the requirements herein, the items contained on the checklists provided in AGC-Arizona Chapter's Chip Seal Guide for Application and Construction shall be considered.

(C) Chip Seal Test Strip:

Prior to the start of placement, all equipment used in the placement of the chip seal coat shall be verified to be in satisfactory operating condition and in accordance with the requirements herein.

Cover material shall be verified to have appropriate moisture and be in a condition consistent with that in which it existed at the time initial acceptance samples were obtained. Bituminous material certifications shall be verified to indicate that the required type of material is on hand. The bituminous material shall be at the proper temperature prior to application.

The chip seal test strip shall be a minimum of 500 linear feet. The existing pavement surface to receive the test strip shall be verified to have been adequately swept and cleaned and meeting the requirements herein. Anticipated application rates shall have been marked and clearly visible to equipment operators.

During placement of the test strip, all equipment shall be observed to confirm proper operation. The application rate of both the bituminous material and cover material shall be measured and verified using a catch-and-weigh “tarp” method. The application rate of the bituminous material shall also be measured and verified by means of a volume per area calculation using the distributor trucks calibrated thermometer and volume measuring gauge or device.

Rolling shall immediately follow placement of the cover material and be verified to be in conformance with the requirements herein.

For emulsion chip seals, the contractor shall broom the surface to remove excess cover material only after the emulsion has fully broken and cured sufficiently for maximum chip retention.

Prior to any subsequent placement, the test strip shall be observed to have adequate embedment of the cover material without excessive void space between the chips, stacking of chips, or accumulation of chips on the shoulders. If the condition of the test strip is not acceptable, adjustments shall be made as appropriate, and an additional test strip shall be performed.

(D) Application of Bituminous Material for Chip Seal:

The following bituminous material application requirements for chip seal are in addition to the requirements specified in Subsection 404-3.05 of the specifications.

Bituminous material shall not be applied a distance ahead of the chip spreader that results in excessive lag of the rollers allowing hot applied bituminous material to cool or emulsified bituminous material to break prior to achieving adequate embedment of the cover material.

When inclement weather is expected, only the amount of hot applied bituminous material which can receive adequately embedded cover material, or only the amount of emulsified asphalt that can receive adequately embedded cover material and has sufficiently broken, shall be placed prior to the start of inclement weather.

(E) Application of Cover Material:

Cover material shall be immediately and uniformly spread over the freshly applied bituminous material such that aggregate particles are securely adhered and will not roll, tumble, or be picked up during the rolling process. Any oversize aggregate or foreign material picked up during stockpiling or loading operations shall be eliminated before entering the aggregate spreader hopper. Supplemental spreading and smoothing shall be done by hand methods where necessary.

When emulsified asphalt is used, the cover material shall be at a saturated surface-dry condition at the time of spreading.

For hot applied chip seals, and when project conditions require, precoated cover material shall be at a sufficient temperature to facilitate adequate embedment.

(F) Rolling Cover Material:

Following the spreading of cover material, the surface shall be promptly rolled with self-propelled pneumatic-tired rollers. A minimum of three rollers shall be provided; however, a sufficient number of rollers shall be provided to cover the entire width of the material spread in one pass of the compactors and rolling shall continue until a minimum of three passes has been completed.

For chip seals with a hot applied bituminous material the first roller pass shall occur as soon as possible but no longer than 2 minutes after applying the aggregate. The third pass shall be completed quickly enough to embed the aggregate before the binder cools, and no longer than 15 minutes after the binder is applied.

(G) Removal of Loose Cover Material:

The cover material shall be removed by means of a power broom which shall be in good condition and of a design suitable for the work. The action of the broom shall be such that particles which are stuck to the bituminous material will not be dislodged.

For chip seals with an emulsified bituminous material, initial removal of all loose cover material shall not commence prior to two hours after placement or at such time that the Engineer has determined that the emulsion has sufficiently cured.

For chip seals with a hot applied bituminous material, the removal of loose cover material shall commence approximately 30 minutes after the final rolling is completed.

Initial removal of loose cover material shall occur prior to opening to traffic. All loose cover material shall be removed from the paved surface by brooming within 24 hours after application.

After the traffic free period as specified in Subsection 404-4.04(H) of the specifications, but prior to final removal of loose cover material, all traffic permitted by the Engineer shall not exceed 25 miles per hour.

If the Engineer determines that conditions are not conducive to obtaining the best results, brooming shall be discontinued until the Engineer has considered all conditions and has determined the best time for the removal of the cover material.

(H) Minimum Traffic-Free Period:

The minimum traffic-free period for a newly applied emulsion chip seal coat shall be three hours. The contractor's hauling equipment may use the new seal coat surface during the traffic free period at a speed not to exceed 15 miles per hour but shall not make sharp turns of brake abruptly.

(I) Fog Coat on New Chip Seals:

When specified in Subsection 404-2.03 of the specifications, a fog coat shall be placed on the new chip seal following the curing period. The type of bituminous material and the approximate application rate shall be as specified in Subsection 404-2.03 of the specifications. The material shall be diluted with one part water to one part bituminous material. The specified application rate is based on the diluted material. The Engineer may adjust the actual application rate based on specific trials and visual observations performed on test areas for different pavement conditions.

When specified in Subsection 404-2.03 of the specifications, blotter material shall be applied following the application of bituminous material.

(J) Contractor Quality Control:

The contractor shall be responsible for the chip seal design, performing quality control testing on materials, and designating an individual charged with constant observation and monitoring.

Need for an adjustment to application rates or a correction to process or equipment shall be communicated immediately to the necessary personnel.

The initial condition of equipment, materials, and the project and pavement surface conditions shall be documented. The performance and results of the test strip shall be documented. Observations of monitoring activities and quantification of application rates during the test strip and production shall be documented no less frequently than every other placement run.

The cause for any adjustments, including quantifying tests performed, the adjustments made, and the result of such adjustments with regard to acceptability and performance of the chip seal coat shall be documented.

404-5 Tack Coat: of the Standard Specifications is hereby deleted.

404-6 Fog Coat: of the Standard Specifications is hereby deleted.

404-7 Chip Seal Coat: of the Standard Specifications is hereby deleted.

404-8 **Method of Measurement:** the fourth paragraph of the Standard Specifications is revised to read:

The contractor shall be responsible to determine the amount of cover material that will be required to complete the work from the source(s) from which the cover material is obtained.

404-8 **Method of Measurement:** the sixth paragraph of the Standard Specifications is revised to read:

Measurement for payment will be made only for the quantity of bituminous material and for the quantity of aggregate material used in accordance with the requirements of the specifications.

404-9 **Basis of Payment:** of the Standard Specifications is revised to read:

The accepted quantities of the work under this section, complete in place, measured as provided above, will be paid for at the contract unit price as designated in the bidding schedule, except the contract unit price for the quantities of bituminous material will be adjusted on the basis of the test results in accordance with the requirements of Section 1005 of the specifications.

No measurement or direct payment will be made for precoating the cover material, material for precoating, rolling and removal of loose cover material, and removal of loose blotter material.

The contract unit price for each item of bituminous material except tack coat will be considered to include all costs for furnishing, hauling, handling, spreading, and mixing of the material as required.

The unit price for bituminous tack coat is deemed to be the cost to furnish, transport, and store asphalt cement or emulsified asphalt at the project location. Payment for bituminous tack coat will be made at the unit price multiplied by the respective payment factor listed under Subsection 404-4.02 of the specifications, and adjusted to the nearest dollar.

Unless otherwise specified, the accepted quantity of bituminous tack coat, measured as provided above, will be paid at the contract unit price per ton adjusted as provided above which price shall be full compensation for furnishing, transporting, and storing the exact type, grade or designation of bituminous tack coat specified by the Engineer.

Unless otherwise specified, the accepted quantity of time to apply bituminous tack coat, measured as provided above, will be paid for at the contract unit price per hour which payment shall be full compensation for applying bituminous tack coat.

The bidding schedule quantity for tack coat is based on an estimated application rate of 0.06 gallons per square yard for each application shown on the project plans.

The unit price of bituminous material will be adjusted in accordance with the requirements of Subsection 109.16 of the specifications based on the "initial cost" of bituminous material between the date of bid opening and the date that the material is used on the project.

No measurement or direct payment will be made for furnishing, applying and removing blotter material, furnished in conjunction with the application of a prime coat.

No measurement or direct payment will be made for the maintenance or repair of a prime coat surface.

(409ACMS, 06/19/25)

SECTION 409 ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL): of the Standard Specifications is revised to read:

409-1 Description:

The work under this section shall consist of constructing Asphaltic Concrete (Miscellaneous Structural), hereinafter asphaltic concrete, by furnishing all materials, mixing at a plant, hauling and placing a mixture of aggregate materials, reclaimed asphalt pavement (RAP) if used, mineral admixture, and bituminous material (asphalt cement) to form a pavement course or to be used for other specified purposes, in accordance with the details shown on the project plans and the requirements of the specifications, and as directed by the Engineer.

The contractor shall acquire and make all arrangements for a source or sources of material, furnish a mix design which will meet the design criteria specified hereinafter, and provide all the equipment, materials, and labor necessary to complete the work.

409-2 Materials:

The bidding schedule quantity of asphaltic concrete is based on an estimated unit weight of 155 pounds per cubic foot.

409-2.01 Mineral Aggregate:

Mineral aggregate shall conform to the following requirements when tested in accordance with the applicable test methods.

Mineral Aggregate Characteristics	Test Method	Requirement
Combined Bulk Oven Dry Specific Gravity	Arizona Test Method 251	2.350 - 2.850
Combined Water Absorption	Arizona Test Method 251	0 – 3.0%
Abrasion	AASHTO T 96	100 Rev., Max 9% 500 Rev., Max 40%
Sand Equivalent	AASHTO T 176 (After thoroughly sieving the sample, no additional cleaning of the fines from the plus No. 4 material is required.)	Minimum 55
Fractured Coarse Aggregate Particles	AASHTO T 335	Minimum 70% (plus No. 4 material)
Carbonates (1)	Arizona Test Method 238	Maximum 20%

Notes:

(1) Testing for carbonates only applies if either of the following conditions exist:

(a) The asphaltic concrete is the designed final pavement surface normally used by traffic; or

(b) The asphaltic concrete, temporary or otherwise, will be subject to traffic for more than 60 days.

The gradation will be determined in accordance with AASHTO T 11 and AASHTO 27, and shall conform to the requirements given below.

Mix Design Grading Limits						
Sieve Size	Percent Passing					
	Lift Thickness Less Than 1½ Inches		Lift Thickness 1½ to 2 Inches		Lift Thickness Greater Than 2 Inches	
	Without Admixture	With Admixture	Without Admixture	With Admixture	Without Admixture	With Admixture
1 Inch					100	100
3/4 Inch			100	100	90-100	90-100
1/2 Inch	100	100	90-100	90-100	---	---
3/8 Inch	90-100	90-100	70-85	70-85	70-85	70-85
No. 8	41-55	42-56	41-51	42-52	41-51	42-52
No. 40	9-19	10-20	---	---	---	---
No. 200	2.0-5.0	3.0-6.5	2.0-5.0	3.0-6.5	2.0-5.0	3.0-6.5

409-2.02 Bituminous Material:

Asphalt cement shall be a performance grade (PG) asphalt binder, conforming to the requirements of Section 1005 of the specifications. The type of asphalt binder shall be PG 70-28.

The percent of asphalt cement used shall be based on the weight of total mix (asphalt cement, mineral aggregate, and mineral admixture).

The contractor shall provide the laboratory mixing and compaction temperature ranges to the mix design laboratory for each PG asphalt binder used for mix design purposes. The laboratory mixing temperature range is defined as the range of temperatures where the un-aged asphalt binder has a rotational viscosity of 0.17 ± 0.02 Pascal·seconds, measured in accordance with AASHTO T 316. The laboratory compaction temperature range is defined as the range of temperatures where the un-aged asphalt binder has a rotational viscosity of 0.28 ± 0.03 Pascal·seconds, measured in accordance with AASHTO T 316. The testing required in AASHTO T 316 shall be performed at 275 degrees F and 350 degrees F, and a viscosity-temperature curve developed in accordance with ASTM D2493. The viscosity-temperature curve shall be included in the mix design report. For PG asphalt binders that have a maximum laboratory mixing temperature exceeding 325 degrees F or a maximum laboratory compaction temperature exceeding 300 degrees F, the laboratory mixing and compaction temperature ranges shall be specified in writing by the asphalt binder supplier. The laboratory mixing and compaction temperature ranges, as well as the actual laboratory mixing and compaction temperatures used, shall be reported on the mix design. The contractor shall ensure that the asphalt binder supplier information required in this paragraph is provided to all appropriate parties in a timely manner, and that copies are included in the mix design report. The laboratory mixing and compaction temperatures are for mix design purposes only. Field mixing and compaction temperatures are specified in Subsection 409-3 of the specifications.

409-2.03 Mineral Admixture:

Mineral admixture shall be either Portland cement, blended hydraulic cement, or hydrated lime conforming to the following requirements:

Material	Requirement
Portland Cement, Type I or II	ASTM C150
Blended Hydraulic Cement, Type IP or 1L	ASTM C595
Hydrated Lime	ASTM C1097

The mineral admixture content shall be 2.0 percent, by weight, of the mineral aggregate. However, a minimum of 1.0 percent mineral admixture may be used if the contractor submits test information showing a lowered percentage of mineral admixture produces mix design results for Index of Retained Strength of at least 60 percent and a Minimum Wet Strength of 150 pounds per square inch when tested in accordance with Arizona Test Method 802.

The certification and acceptance of Portland cement, blended hydraulic cement, and hydrated lime shall be in accordance with ADOT Materials Practice and Procedure Directive No. 13, "Certification and Acceptance of Hydraulic Cement, Fly Ash, Natural Pozzolan, Silica Fume, and Lime".

409-2.04 Mix Design:

Utilizing mineral aggregate which has been crushed, processed, separated, and stockpiled, a mix design shall be formulated and submitted by the contractor to the Engineer. The mineral aggregate samples used for mix design purposes shall be representative of aggregate materials to be used during production.

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

Mix designs shall be developed utilizing a minimum ratio of three (3) for the lift thickness to nominal maximum aggregate size. The mix design shall be prepared by or under the direct supervision of a professional engineer experienced in the development of mix designs and mix design testing. Reclaimed asphalt pavement (RAP) may be used in the mixture if properly designed per Arizona Test Method 833. Limits for the usage of RAP shall be per ADOT Materials Practice and Procedure Directive No. 20, “Guidance on the Use of Reclaimed Asphalt Pavement (RAP) in Asphaltic Concrete”. The mix design engineer shall meet the requirements given in ADOT Materials Practice and Procedure Directive No. 4, “Asphaltic Concrete Mix Design Proposals and Submittals”. The mix design shall be provided in a format that clearly indicates all the mix design requirements and shall be sealed, signed, and dated by the mix design engineer.

The mix design shall be prepared by a mix design laboratory that has met the requirements of ADOT Materials Practice and Procedure Directive No. 19, “ADOT System for the Evaluation of Testing Laboratories”.

If approved by the Engineer, as an alternative to meeting the mix design requirements specified herein, a mix design meeting the requirements of the specifications for a Section 416 Asphaltic Concrete (End Product) (1/2 inch Special Mix), Section 416 Asphaltic Concrete (End Product) (3/4 inch Special Mix), Section 417 Asphaltic Concrete (SHRP) (End Product) (1/2 inch Mix), or Section 417 Asphaltic Concrete (SHRP) (End Product) (3/4 inch Mix) may be substituted for use. The type of asphalt binder used in the alternative mix design must be the same as that specified in Subsection 409-2.02 of the specifications. The alternative mix design may include reclaimed asphalt pavement (RAP) if properly designed per Arizona Test Method 833. If a mix design meeting the requirements of Section 417 is used, the number of gyrations for N-design used in the alternative mix design must be at least that which would be specified at the location where the Asphaltic Concrete (Miscellaneous Structural-Special Mix) is to be placed. The lift thickness for the alternative mix design shall conform to the following table.

Alternative Mix Design	Minimum Lift Thickness
Section 416 (1/2 Inch Special Mix)	1-1/2 Inches
Section 416 (3/4 inch Special Mix)	2 inches
Section 417 (1/2 inch Mix)	2 inches
Section 417 (3/4 inch Mix)	2-1/2 inches

The contractor may propose the use of a mix design that has been developed for a previous project. The proposed mix design shall meet the requirements of these specifications. The contractor shall provide evidence that the type and source of bituminous material, the type of mineral admixture, and the source and methods of producing mineral aggregate, and RAP material if applicable, have not changed since the formulation of the previous mix design. The contractor shall also provide current test results for all specified characteristics of the mineral aggregate, and RAP material if applicable, proposed for use. The Engineer will determine if the previously used mix design is suitable for the intended use and if the previous use of the mix design was satisfactory to the Department. The Engineer will either approve or disapprove the proposed mix design. Should the Engineer disapprove the use of the previously used mix design, the contractor shall prepare and submit a new mix design proposal in accordance with the requirements of these specifications.

A previously used mix design older than two years from the date it was formulated, sealed, signed, and dated shall not be allowed for use. Once approved for use on a project, a previously used mix design may be used for the duration of that project.

Test results used in the formulation of the mix design must be from testing performed no earlier than 45 days prior to the date the mix design is signed by the mix design engineer. Historical abrasion values may be supplied on sources provided the testing was conducted within the past two years.

The mix design shall be submitted to the Engineer under a cover letter signed by an authorized representative of the contractor.

The mix design shall be submitted to the Engineer for review a minimum of five working days prior to the start of production.

The mix design shall meet the following criteria when tested in accordance with the requirements of the following test methods:

Criteria	Requirement	Arizona Test Method
1.Voids in Mineral Aggregate: %, Range	14.5 - 18.5	(See Note 1)
2.Effective Voids: %, Range	3.8 - 4.2	(See Note 1)
3. Absorbed Asphalt: %, Range	0 - 1.0	(See Note 1)
Note: For mixes without RAP, Arizona Test Method 815. For mixes with RAP, Arizona Test Method 833.		

The Engineer reserves the right to adjust the asphalt content during production from the mix design value without additional compensation to the contractor in order to obtain desirable effective voids.

409-2.05 Sampling and Testing:

Sampling and testing the materials and mixture for quality control purposes shall be the contractor's responsibility. The contractor shall perform sufficient testing to assure that

mineral aggregate and asphaltic concrete are produced which meet all specified requirements. The Engineer reserves the right to sample and test the materials and mixture when necessary to determine that they reasonably conform to the requirements specified herein.

409-3 Construction Requirements:

409-3.01 General:

All courses of asphaltic concrete shall be compacted as required, smooth and true to the required lines, grades, and dimensions.

Smoothness of the final pavement surface shall be tested, and payment for smoothness made, in accordance with Subsection 109.13 of the specifications. In addition to the requirements of Subsection 109.13 of the specifications, the following requirements shall also be met:

(A) The surface of the final lift of asphaltic concrete placed under this section of the specifications shall be tested and shall not vary by more than 1/8 inch from the lower edge of a 10-foot straightedge when it is placed in the longitudinal direction (including across transverse joints), and when it is placed in the transverse direction across longitudinal joints;

(B) The surface of any lift of asphaltic concrete placed under this section of the specifications, other than the final lift, shall be tested and shall not vary by more than 1/4 inch from the lower edge of a 10-foot straightedge when it is placed in the longitudinal direction (including across transverse joints), and when it is placed in the transverse direction across longitudinal joints; and

(C) All deviations exceeding the specified tolerances above shall be corrected by the contractor, to the satisfaction of the Engineer.

The asphaltic concrete hot plant shall conform to the requirements of Section 403 of the specifications.

No fine material which has been collected in the dust collection system shall be returned to the mixture unless the collected fines are accurately and uniformly metered into the mixture. The temperature of asphaltic concrete or mineral aggregate upon discharge from the drier shall not exceed 325 degrees F, unless a higher temperature is recommended in writing by the asphalt binder supplier and approved by the Engineer.

The moisture content of the asphaltic concrete immediately behind the paver shall not exceed 0.5 percent. The moisture content will be determined in accordance with the requirements of AASHTO T 329.

Asphaltic concrete shall be placed only when the temperature of the surface on which the asphaltic concrete is to be placed is at least 65 degrees F.

At any time, the Engineer may require that the work cease or that the work day be reduced in the event that weather conditions, either existing or expected, are anticipated to have an adverse effect upon the asphaltic concrete.

All wheels and tires of compactors shall be wetted with water, or if necessary soapy water, or a release agent in order to prevent the sticking of asphaltic concrete. All other equipment surfaces shall be treated when necessary with a release agent. Only release agents evaluated through AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) are acceptable for use. The results from AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) testing, when tested in accordance with AASHTO T 383, shall conform to the requirements shown in the table below:

RELEASE AGENT TEST	REQUIREMENT
Asphalt Stripping Test Diluted Non-Diluted (Full Strength)	 No Stripping No Stripping
Asphalt Performance Test	Less than or equal to 10.0% after the third cycle

Release agents which degrade, dissolve, or in any way damage the bituminous material shall not be used. Diesel fuel shall not be used as a release agent.

Asphaltic concrete immediately behind the laydown machine shall be in a thoroughly mixed, free-flowing, and workable condition, be free of lumps and crusts, and have a minimum temperature of 275 degrees F.

All courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines except under certain conditions or at certain locations where the Engineer deems the use of self-propelled paving machines impractical.

The speed of the paving machine shall be coordinated with the production of the plant and an adequate number of trucks for hauling asphaltic concrete shall be available in order to achieve, as far as practical, a continuous operation.

Self-propelled paving machines shall spread the mixture within the specified tolerances, without segregation or tearing, true to the line, grade, and crown indicated on the project plans. Pavers shall be equipped with hoppers and augers which will distribute the mixture uniformly in front of adjustable screeds.

Pavers shall be equipped with a screed for the full width being paved, heated if necessary, and capable of spreading and finishing all courses of asphaltic concrete.

Pavers shall be equipped with automatic screed controls with sensors for either or both sides of the paver, capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing the automatic signals which operate the screed to maintain the desired grade and transverse slope.

Failure of the control system to function properly shall be cause for the suspension of the placing of asphaltic concrete.

The base or subgrade upon which asphaltic concrete is to be placed shall be prepared and maintained in a firm condition until asphaltic concrete is placed. It shall not be frozen or excessively wet.

Before asphaltic concrete is placed, the surface to be paved shall be cleaned of all objectionable material and tacked with bituminous material in accordance with the requirements of Section 404 of the specifications.

Longitudinal joints of each course shall be staggered a minimum of 1 foot with relation to the longitudinal joint of any immediate underlying course. Longitudinal joints shall be located within 1 foot of the center of a lane or within 1 foot of the centerline between two adjacent lanes.

The contractor shall schedule its paving operations to minimize exposed longitudinal edges. Unless otherwise approved by the Engineer, the contractor shall limit the placement of asphaltic concrete courses, in advance of adjacent courses, to one shift of asphaltic concrete production. The contractor shall schedule its paving operations in such a manner to eliminate exposed longitudinal edges over weekends or holidays.

409-3.02 Compaction:

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

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

Rolling Sequence	Type of Compactor		No. of Coverages	
	Option No. 1	Option No. 2	Option No. 1	Option No. 2
Initial	Static Steel	Vibrating Steel	1	1
Intermediate	Pneumatic Tired	Vibrating Steel	2 - 6*	2 - 4*
Finish	Static Steel	Static Steel	1 - 3	1 - 3

Note:

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

The Engineer shall select the option for compaction and, when pneumatic-tired compactors are used, will designate the tire pressure.

Steel wheel compactors shall not be used in the vibratory mode for courses of 1 inch or less in nominal thickness nor when the temperature of the asphaltic concrete falls below 180 degrees F. Steel wheel compactors shall weigh not less than 8 tons.

Initial and intermediate compaction shall be completed before the temperature of the asphaltic concrete falls below 200 degrees F. All edges shall be rolled with a pneumatic tired compactor, or other methods approved by the Engineer, while the mixture is still hot.

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

409-3.03 Acceptance:

Asphaltic concrete will be accepted complete in place, if, in the judgment of the Engineer, the asphaltic concrete reasonably conforms to the requirements specified herein. Asphaltic concrete that is not acceptable and is rejected shall be replaced to the satisfaction of the Engineer and at no expense to the Department.

409-4 Method of Measurement:

Asphaltic concrete will be measured by the ton for the mixture actually used, which will include the weight of mineral aggregate, bituminous material, and mineral admixture. Measurement will include any weight used in construction of intersections, turnouts, curbs, spillways and spillway inlets, ditches, catch basin entrances, median strips, sidewalks, or other miscellaneous items or surfaces.

409-5 Basis of Payment:

409-5.01 General:

The accepted quantities of asphaltic concrete, measured as provided above, will be paid for at the contract unit price per ton for the bituminous mixture complete in place.

No direct payment will be made for the bituminous material and mineral admixture in the asphaltic concrete, or the bituminous material for tack coat and application of tack coat, the price being considered as included in the price paid for asphaltic concrete.

Asphaltic concrete may be measured, by volume, upon the execution of a supplemental agreement which will specify the manner in which the volume is determined. The volume will include the volume of mineral aggregate, bituminous material, mineral admixture, and any necessary blending material.

409-5.02 Reduction for Noncompliance:

A reduction in payment to the contractor for asphaltic concrete will be made for quantities of asphalt cement (bituminous material) that do not meet the requirements of Section 1005 as determined by corresponding test results. Adjustments in payment will be made in accordance with the requirements of Table 1005-1.

(416ACES, 06/19/25)

SECTION 416 ASPHALTIC CONCRETE – END PRODUCT: of the Standard Specifications is revised to read:

416-1 Description:

The work under this section shall consist of constructing Asphaltic Concrete-End Product, hereinafter asphaltic concrete, by furnishing all materials, mixing at a plant, hauling and placing a mixture of aggregate materials, mineral admixture, and bituminous material (asphalt cement) to form a pavement course or to be used for other specified purposes, in accordance with the details shown on the project plans and the requirements of the specifications.

Reclaimed asphalt pavement (RAP), as defined in Subsection 416-3.04 of the specifications, may be used in the mixture provided all requirements of the specifications are met. References to the use of RAP in this section apply only if RAP is utilized as part of the mixture. ADOT Materials Practice and Procedure Directive No. 20, “Guidance on the Use of Reclaimed Asphalt Pavement (RAP) in Asphaltic Concrete”, shall be used in conjunction with the requirements of the specifications.

Warm Mix Asphalt (WMA) technologies may be used in the mixture at the option of the contractor provided all requirements of the specifications are met. WMA is defined as asphaltic concrete that is produced within the temperature range of 215 to 275 degrees F. WMA can be produced by one or a combination of several WMA technologies including plant water foaming processes, mineral additives, and chemical additives. The requirements for incorporating WMA technologies in the mixture are given in these specifications and in Materials Practice and Procedure Directive No. 23, “Requirements for the Use of Warm Mix Asphalt (WMA) Technologies in Asphaltic Concrete”.

The contractor shall acquire and make all arrangements for a source or sources of material, furnish a mix design which will meet the design criteria specified hereinafter, and provide all the equipment, materials, and labor necessary to complete the work.

416-2 Asphaltic Concrete Mix Design Criteria:

Mix designs shall be developed utilizing a minimum ratio of three (3) for the lift thickness to nominal maximum aggregate size.

Mix designs shall be developed by the contractor on the basis of the following criteria and tested in accordance with the requirements of the following test methods:

Criteria	Requirements			Arizona Test/AASHTO
	1/2" Mix	3/4" Mix	Base Mix	Method
1. Voids in Mineral Aggregate: %, Range	15.5 - 18.5	15.0 - 18.0	14.5 - 17.0	Note (2)
2. Effective Voids: %, Range	4.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2	Note (2)
3. Absorbed Asphalt: %, Range	0 - 1.0	0 - 1.0	0 - 1.0	Note (2)
4. Index of Retained Strength: %, Minimum	60 (Note 1)	60 (Note 1)	60 (Note 1)	Note (3)
5. Wet Strength: psi, Minimum	150	150	150	Note (3)
6. Stability: pounds, Minimum	2,000	2,000	3,000	Note (2)
7. Flow: 0.01-inch, Range	8 - 16	8 - 16	8 - 16	Note (2)
8. Mix Design Grading Limits				AASHTO T 11, T 27

	Percent Passing					
Sieve Size	1/2 inch Mix		3/4 inch Mix		Base Mix	
	Without Admix.	With Admix.	Without Admix.	With Admix.	Without Admix.	With Admix.
1-1/4 inch					100	100
1 inch			100	100	90 -100	90 - 100
3/4 inch	100	100	90 - 100	90 - 100	85 - 95	85 - 95
1/2 inch	90 - 100	90 - 100	---	---	---	---
3/8 inch	67 - 82	67 - 82	62 - 77	62 - 77	57 - 72	57 - 72
No. 8	40 - 48	41 - 49	37 - 46	38 - 47	32 - 42	33 - 43
No. 40	10 - 18	11 - 19	10 - 18	11 - 19	8 - 16	9 - 17
No. 200	1.5 - 4.5	2.5 - 6.0	1.5 - 4.5	2.5 - 6.0	1.5 - 3.5	2.5 - 5.0

Notes:

If the average elevation of the project is above 3,500 feet, the index of retained strength shall be a minimum of 70 percent.

For mixes without RAP, Arizona Test Method 815. For mixes with RAP, Arizona Test Method 833.

For mixes without RAP, Arizona Test Method 802 (as modified by Arizona Test Method 815). For mixes with RAP, Arizona Test Method 802 (as modified by Arizona Test Method 833).

The ratio of the mix design composite gradation target for the No. 200 sieve, including mineral admixture, to the effective asphalt content shall be within the range 0.7 to 1.3.

416-3 Materials:

For comparative purposes, quantities shown in the bidding schedule have been calculated based on the following data:

Special Mixes	3/4" Mix
Unit Weight, (lb./cu. ft.)	155

416-3.01 Mineral Aggregate:

(A) General:

Mineral aggregate shall consist of virgin aggregate, or a combination of virgin aggregate and aggregate from RAP (RAP aggregate). When the terms "mineral aggregate" or "aggregate" are used without being further described as "virgin" or "RAP", the intended meaning is the total aggregate material used in the mixture.

No individual stockpile or hot bin usage of either virgin aggregate or RAP aggregate shall be less than 3 percent of the total mineral aggregate.

(B) Virgin Mineral Aggregate:

The contractor shall provide a source in accordance with the requirements of Section 1001 of the specifications.

Coarse virgin mineral aggregate shall consist of crushed gravel, crushed rock, or other approved inert material with similar characteristics, or a combination thereof, conforming to the requirements of these specifications.

For areas or applications where Special Mix is not called for on the plans, fine virgin mineral aggregate shall consist of natural sand or of sand prepared from rock, or other approved inert materials, or a combination thereof, conforming to the requirements of these specifications.

For areas or applications where Special Mix is called for on the project plans, the following shall apply:

Fine virgin mineral aggregate shall be obtained from crushed gravel or crushed rock. All uncrushed material passing the No. 4 sieve shall be removed prior to the crushing, screening, and washing operations necessary to produce the specified gradation. The contractor shall notify the Engineer a minimum of 48 hours in advance of crushing the material to be used as virgin mineral aggregate, so all crushing operations can be inspected. Existing stockpile material which has not been inspected during crushing will not be permitted for use unless the contractor is able to document to the Engineer's satisfaction that the virgin mineral aggregate has been crushed. Any material inspected by the Department as crushed material for the project shall be separated from the contractor's other stockpiles and reserved for use throughout the project duration.

The contractor may blend uncrushed fine virgin aggregate up to a maximum of 15 percent of the total aggregate for mixes not containing RAP, or up to a maximum of 10 percent of the total aggregate for mixes containing RAP. The total composite of virgin fine aggregate shall meet the requirement for uncompacted void content. The uncrushed fine virgin aggregate shall be 100 percent passing the 1/4 inch sieve and contain not more than 4.0 percent passing the No. 200 sieve. Should the contractor modify the method of producing either the uncrushed or crushed fine aggregate, the Engineer shall be immediately notified and the materials sampled and tested for determination of uncompacted void content.

(C) RAP Mineral Aggregate:

RAP aggregate shall conform with Materials Practice and Procedure Directive No. 20 “Guidance on the Use of Reclaimed Asphalt Pavement (RAP) in Asphaltic Concrete”.

(D) Mineral Aggregate Characteristics:

Aggregates shall be free of deleterious materials, clay balls, and adhering films or other material that prevent the thorough coating with the asphalt cement.

Mineral aggregate shall conform to the following requirements when tested in accordance with the applicable test methods.

Mineral Aggregate Characteristics	Test Method	Requirement
Combined Bulk Oven Dry Specific Gravity (1)	Arizona Test Method 251	2.350 - 2.850
Combined Water Absorption (1)	Arizona Test Method 251	0 – 3.0%
Sand Equivalent (1)	AASHTO T 176 (After thoroughly sieving the sample, no additional cleaning of the fines from the plus No. 4 material is required.)	Minimum 55
Abrasion (2)	AASHTO T 96	100 Rev., Max. 9% 500 Rev., Max. 40%
Fractured Coarse Aggregate Particles (3)	AASHTO T 335	Minimum 70% (4) (at least one fractured face, determined on plus No. 4 material)
Uncompacted Void Content (1) (Special Mix Only)	AASHTO T 304 Method A	Minimum 45%
Carbonates (3) and (5)	Arizona Test Method 238	Maximum 20%

Notes:

When the mix design contains RAP, the requirements shall be for the virgin aggregate portion only.

Abrasion shall be performed separately on materials from each source of mineral aggregate, including RAP aggregate. All sources shall meet the requirements for abrasion.

When the mix design contains RAP, the requirements shall be for the composite of virgin and RAP aggregate.

When Special Mix is called for on the project plans, this value shall be minimum 85% with at least two fractured faces and minimum 92% with at least one fractured face, determined on plus No. 4 material.

Testing for carbonates only applies if either of the following conditions exist:

The asphaltic concrete is the designed final pavement surface normally used by traffic.

The asphaltic concrete, temporary or otherwise, will be subject to traffic for more than 60 days.

Tests on aggregates outlined above, except for abrasion, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation. When RAP is used in the mixture, RAP aggregates for testing shall be obtained from the RAP material using Method A of AASHTO T 164, prior to combining with the virgin aggregate.

416-3.02 Mineral Admixture:

Mineral admixture will be required. The amount used shall be 1.0 percent, by weight of the mineral aggregate, unless testing demonstrates that additional admixture is required in order to meet the mix design criteria for Wet Strength and Index of Retained Strength. A maximum of 2.0 percent admixture will be permitted. The exact amount of admixture required shall be specified in the mix design. Mineral admixture shall be either Portland cement, blended hydraulic cement or hydrated lime conforming to the following requirements.

Material	Requirement
Portland Cement, Type I, or Type II	ASTM C150
Blended Hydraulic Cement, Type IP or IL	ASTM C595
Hydrated Lime	ASTM C1097

The certification and acceptance of Portland cement, blended hydraulic cement, and hydrated lime shall be in accordance with ADOT Materials Practice and Procedure Directive No. 13, "Certification and Acceptance of Hydraulic Cement, Fly Ash, Natural Pozzolan, Silica Fume, and Lime".

416-3.03 Bituminous Material:

(A) General:

Bituminous material shall consist of performance grade (PG) asphalt binder (virgin binder), or a combination of virgin binder and binder from RAP (RAP binder). When the terms “bituminous material”, “asphalt cement”, “asphalt binder”, or “binder” are used without being

further described as “virgin” or “RAP”, the intended meaning is the total bituminous material used in the mixture.

The percent of asphalt cement used shall be based on the weight of total mix (asphalt cement, mineral aggregate, and mineral admixture).

(B) Virgin Bituminous Material:

Virgin asphalt cement shall be a performance grade (PG) asphalt binder, conforming to the requirements of Section 1005 of the specifications. The type of virgin asphalt binder shall be PG 70-28 PM or, if RAP is used in the mixture, the virgin asphalt binder shall be as required to meet the blending requirements in Subsection 416-3.03(C) of the specifications and Arizona Test Method 833.

The contractor shall provide the laboratory mixing and compaction temperature ranges to the mix design laboratory for each PG asphalt binder used for mix design purposes. The laboratory mixing temperature range is defined as the range of temperatures where the un-aged virgin asphalt binder has a rotational viscosity of 0.17 ± 0.02 Pascal·seconds, measured in accordance with AASHTO T 316. The laboratory compaction temperature range is defined as the range of temperatures where the un-aged virgin asphalt binder has a rotational viscosity of 0.28 ± 0.03 Pascal·seconds, measured in accordance with AASHTO T 316. The testing required in AASHTO T 316 shall be performed at 275 degrees F and 350 degrees F, and a viscosity-temperature curve developed in accordance with ASTM D2493. The viscosity-temperature curve shall be included in the mix design report. For PG asphalt binders that have a maximum laboratory mixing temperature exceeding 325 degrees F or a maximum laboratory compaction temperature exceeding 300 degrees F, the laboratory mixing and compaction temperature ranges shall be specified in writing by the virgin asphalt binder supplier. A viscosity-temperature curve will meet this requirement for written documentation if the viscosity-temperature curve is developed and submitted by the binder supplier and includes language that the recommended laboratory mixing and compaction temperatures are within acceptable ranges, and the submittal includes a statement indicating the maximum laboratory mixing temperature to which the binder can be heated without damage. The laboratory mixing and compaction temperature ranges, as well as the actual laboratory mixing and compaction temperatures used, shall be reported on the mix design. The contractor shall ensure that the asphalt binder supplier information required in this paragraph is provided to all appropriate parties in a timely manner, and that copies are included in the mix design report. The laboratory mixing and compaction temperatures are for mix design purposes only. Field mixing and compaction temperatures are specified in Subsections 416-6 and 416-7 of the specifications.

(C) RAP Bituminous Material:

RAP binder content shall be determined by AASHTO T 308. RAP binder shall consist of the asphalt binder portion of the reclaimed asphaltic pavement. A maximum of 30 percent RAP binder, by weight of total binder in the mix, may be used in mixes placed in a lower lift (minimum 2 inches below finished surface). A maximum of 24 percent RAP binder, by weight of total binder in the mix, may be used at all other locations.

When less than or equal to 17 percent RAP binder is used, by weight of total binder in the mix, no testing is required on the RAP binder. When greater than 17 percent RAP binder is used, by weight of total binder in the mix, the RAP binder shall be extracted, recovered, and tested in accordance with the requirements of Arizona Test Method 833. The virgin binder grade shall be modified if necessary to ensure the blend of virgin and RAP binder meets the PG grade specified in the Subsection 416-3.03(B) of the specifications. However, a change of only one virgin PG binder grade (6 degrees C on either or both the high and low temperatures) will be allowed from that shown in Subsection 416-3.03(B) of the specifications.

416-3.04 Reclaimed Asphalt Pavement (RAP):

RAP shall consist of salvaged, milled, pulverized, broken, or crushed asphalt pavement. If RAP is generated by milling, the minimum removal depth shall be 1-1/2 inches. The source of RAP may be from ADOT or other projects. The contractor shall be responsible for determining the suitability of the RAP for use in the mixture, regardless of its source.

RAP material shall pass the 1-1/4 inch sieve. For asphaltic concrete containing greater than 17 percent RAP binder, as determined by Ignition Furnace AASHTO T308, the RAP material shall be processed by one of the following: RAP material shall pass the 1-1/4 inch sieve and be fractionated into uniform coarse and fine stockpiles such that there will be a minimum amount of fines or formation of a single uniform RAP material stockpile passing the 5/8 inch sieve.

RAP shall be stockpiled so that segregation is minimized. When two RAP stockpiles are used, acceptable methods to prevent intermingling of stockpiles shall be provided.

The Engineer reserves the right to reject obviously defective salvaged material or salvaged material that is not representative of the material used in the mix design.

416-3.05 Warm Mix Asphalt Technologies:

Warm Mix Asphalt (WMA) technologies include plant water foaming processes, mineral additives, and chemical additives. WMA technologies shall be approved prior to their use in accordance with Materials Practice and Procedure Directive No. 23, “Requirements for the Use of Warm Mix Asphalt (WMA) Technologies in Asphaltic Concrete”.

416-4 Mix Design:

Utilizing mineral aggregate and RAP which has been crushed, processed, separated and stockpiled, a mix design shall be formulated and submitted by the contractor to the Engineer. The mineral aggregate and RAP samples used for mix design purposes shall be representative of materials to be used during production.

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

The mix design shall be prepared by or under the direct supervision of a professional engineer experienced in the development of mix designs and mix design testing. The mix design engineer shall meet the requirements given in ADOT Materials Practice and Procedure

Directive No. 4, “Asphaltic Concrete Mix Design Proposals and Submittals”. The mix design shall be provided in a format that clearly indicates all the mix design requirements and shall be sealed, signed, and dated by the mix design engineer.

The mix design shall be prepared by a mix design laboratory that has met the requirements of ADOT Materials Practice and Procedure Directive No. 19, “ADOT System for the Evaluation of Testing Laboratories”.

The contactor may propose the use of a mix design that has been developed for a previous project that is less than a year old with no additional requirements. The proposed mix design shall meet the requirements of these specifications. If the proposed mix design is greater than one year old but less than two years old, the contractor shall provide evidence that the type and source of bituminous material, the type of mineral admixture, and the source and methods of producing virgin mineral aggregate and RAP have not changed since the formulation of the previous mix design. The contractor shall also provide current test results for all specified characteristics of the mineral aggregate and RAP proposed for use. The Engineer will determine if the previously used mix design is suitable for the intended use and if the previous use of the mix design was satisfactory to the Department. The Engineer will either approve or disapprove the proposed mix design. Should the Engineer disapprove the use of the previously used mix design, the contractor shall prepare and submit a new mix design proposal in accordance with the requirements of these specifications.

A previously used mix design older than two years from the date it was formulated, sealed, signed, and dated shall not be allowed for use. Once approved for use on a project, a mix design may be used for the duration of that project.

The mix design shall contain as a minimum:

(A) The name and address of the testing organization and the person responsible for the mix design testing;

(B) The specific location(s) of the source(s) of mineral aggregate;

(C) The supplier, refinery, type of asphalt cement, and any modifiers including polymers. The source and type of mineral admixture. The percentage of asphalt cement and mineral admixture to be used;

(D) The anticipated mineral aggregate gradation in each stockpile;

(E) Mix design gradation. The mix design shall contain the mineral aggregate gradation, and also the gradation with mineral admixture;

(F) The results of all testing, determinations, etc., such as: specific gravity of each component, water absorption, sand equivalent, loss on abrasion, fractured coarse aggregate particles, uncompacted void content (for Special Mix), percent carbonates (if required), immersion compression results (Index of Retained

Strength, wet and dry strengths), Marshall stability and flow, asphalt absorption, percent air voids, voids in mineral aggregate, and bulk density; and

(G) Viscosity-temperature curve along with the laboratory mixing and compaction temperature ranges, as well as the actual laboratory mixing and compaction temperatures used.

When RAP is used in the mixture, the following additional information shall be included in the mix design:

(H) The specific location(s) of the source(s) of RAP;

(I) The anticipated RAP gradation, RAP aggregate gradation, and RAP binder content in each stockpile;

(J) If greater than 17 percent RAP binder is used in the mixture, the results of all tests on the recovered RAP binder, as well as all tests on the blend of virgin binder and recovered RAP binder;

(K) The percent RAP binder, virgin binder, and total binder in the mixture;

(L) The composite gradation of virgin and RAP aggregates, with and without mineral admixture. The composite gradation of the virgin aggregate and RAP, with and without mineral admixture;

(M) The results of all testing, determinations, etc., for the RAP, virgin aggregate, RAP aggregate, and composite of virgin and RAP aggregates as required, such as: specific gravity, water absorption, sand equivalent, loss on abrasion, fractured coarse aggregate particles, uncompacted void content (for Special Mix), and percent carbonates; and

(N) The viscosity-temperature curve along with the laboratory mixing and compaction temperature ranges for the blended binder, if greater than 17 percent RAP binder is used in the mixture, as well as the actual laboratory mixing and compaction temperatures used.

When Warm Mix Asphalt (WMA) technologies are used in the mixture, the additional mix design requirements specified in Materials Practice and Procedure Directive No. 23, “Requirements for the Use of Warm Mix Asphalt (WMA) Technologies in Asphaltic Concrete”, shall also be included in the mix design.

Test results used in the formulation of the mix design shall be from testing performed no earlier than 45 days prior to the date the mix design is signed by the mix design

engineer. Historical abrasion values may be supplied on sources provided the testing was conducted within the past two years.

The mix design shall be submitted to the Engineer under a cover letter signed by an authorized representative of the contractor.

A copy of the mix design and representative samples of the materials used in the mix design shall be submitted to the Engineer for calibration of the ignition furnace, and for the determination of sand equivalent and fractured coarse aggregate particles. When Special Mix is used, the uncompacted void content shall also be determined. Approximately 300 pounds of virgin mineral aggregate (proportional to the mix design gradation), 3 gallons of asphalt cement, and 1 gallon of mineral admixture shall be submitted. When RAP is used, a minimum of 40 pounds of representative RAP material and a minimum of 10 pounds of solvent-extracted RAP aggregate, per AASHTO T 164, Method A, shall be submitted. If RAP is fractionated, the RAP and RAP aggregate from each stockpile shall be kept separate. The Engineer shall witness the sampling of the virgin mineral aggregate and RAP. The mix design and samples shall be submitted to the Engineer at least five working days prior to the start of asphaltic concrete production.

The sand equivalent, fractured coarse aggregate particles, and (for Special Mix) uncompacted void content shall meet the requirements specified in Subsection 416-3.01 of the specifications. Additional testing of the uncrushed and crushed fine aggregate for uncompacted void content will be required if the method of producing either fine aggregate is modified.

If the mineral aggregate fails to meet the requirements specified herein, asphaltic concrete production shall not commence, and the contractor shall either submit a revised mix design which is representative of the materials produced or correct the deficiencies in the aggregate stockpiles.

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

If the contractor elects to change its source(s) of mineral aggregate or RAP, or adds or deletes the use of a stockpile(s) regardless of source, the contractor shall furnish the Engineer with a new mix design which meets the requirements specified hereinbefore.

If changes are made in the source or type of bituminous material, or the type of mineral admixture, the contractor shall provide verification testing results. Verification testing shall be performed at the original mix design asphalt content using the original mineral aggregate and RAP (if used), the proposed bituminous material, and/or the proposed mineral admixture. Three specimens shall be fabricated and tested for bulk density, maximum theoretical density, and effective voids. The percent effective voids shall be within $\pm$ 0.2 of the percent effective voids in the original design and also be within the current effective voids mix design specification limits. Verification testing results shall not replace target values shown in the original mix design. All target values from the original design shall be used in future production with the exception of any self-directed target value changes that are requested.

The verification process does not ensure that the contractor can meet the target values during production.

In addition to the verification testing specified above, verification testing for immersion compression may also be required. If there is a change in the type of mineral admixture, immersion compression testing is required. If there is a change in the source or type of bituminous material, immersion compression testing is required if the Index of Retained Strength of the original mix design is less than 10 percentage points greater than the specified minimum, or if the Wet Strength is less than 100 pounds per square inch greater than the specified minimum.

The contractor may make self-directed target changes to the approved mix design within the limits shown below. Requests for self-directed target changes shall be made in writing and acknowledged by the Engineer prior to start of production for a lot. Self-directed target changes shall meet contract requirements for mix design criteria and grading limits.

MEASURED CHARACTERISTICS	ALLOWABLE SELF-DIRECTED TARGET CHANGES
Gradation (sieve size): 3/8 inch No. 8 No. 40	 ±4% from mix design target value ±4% from mix design target value ±2% from mix design target value
Asphalt Cement Content	Within range of +0.4% to -0.2% from mix design target value
Effective Voids	None

The contractor may propose target changes to the approved mix design for the Engineer's approval. The Engineer will determine if the proposed target change will result in mix production that meets the contract requirements for mix design criteria and grading limits. For acceptance purposes, target changes will not be retroactive.

In no case shall the approval of mix design changes relieve the contractor of the responsibility for the results obtained by the use of such approved changes.

Should a mix design prove unsatisfactory to the contractor during production, the contractor shall furnish the Engineer with a revised mix design. For acceptance purposes, the revised mix design will not be retroactive.

The contractor shall not change its methods of crushing, screening, washing, or stockpiling from those used during production of material used for mix design purposes without approval of the Engineer or without preparing a new mix design.

416-5 Contractor Quality Control:

The contractor shall perform the quality control measures described in Subsection 106.04(C) of the specifications. At the weekly meeting, the contractor shall be prepared to explain and discuss how the following processes will be employed:

(A) Aggregate production, including crusher methods, pit extraction, and washing;

(B) RAP production, including milling, crushing, screening, and handling methods;

(C) Stockpile management, including stacking methods, separation technique, plant feed technique, stockpile pad thickness, and segregation prevention;

(D) Proportioning and plant control, including plant scale calibration, mix temperature control, storing method, and addition of admixture;

(E) Transporting and placing, including hauling distance and temperature control, segregation and non-uniform placement control, and joint placement and technique; and

(F) Compaction, including types and weight of rollers, establishing and monitoring of roller patterns, and temperature controls.

The contractor shall obtain samples and perform the tests specified in the following table:

CONTRACTOR QUALITY CONTROL TESTING REQUIREMENTS			
Type of Test	**Test Method**	**Sampling Point**	**Minimum Testing Frequency**
Virgin Mineral Aggregate			
Gradation	AASHTO T 27	Crusher Belt or Stockpile	1 per stockpile per day
Sand Equivalent	AASHTO T 176	Crusher Belt or Stockpile	1 per 2,000 Tons of total virgin aggregate (1)
Fractured Coarse Aggregate Particles	AASHTO T 335		
Uncompacted Void Content (2)	AASHTO T 304 Method A		
Reclaimed Asphalt Pavement			
Gradation, Moisture Content, and Binder Content	AASHTO T 308	Crusher Belt or Stockpile	1 per stockpile per day
RAP Aggregate			
Gradation	AASHTO T 11, T 27	Crusher Belt or Stockpile	1 per stockpile per day
Fractured Coarse Aggregate Particles	AASHTO T 335		1 per stockpile every other day
Asphaltic Concrete			
Gradation	AASHTO T 27 or T 308 (for both Non-Rap and RAP mixes)	Cold Feed, Hot Bins, Roadway, or Plant	1 per 1,000 Tons
Asphalt Content	AASHTO T 287, T 308 (for both Non-RAP and RAP mixes), or other approved methods	Roadway or Plant	1 per 1,000 Tons
Voids	AASHTO R 68, T 166, T 209, T245, T 269		1 per 1,000 Tons each day. Maximum of 4 per day.
Compaction	AASHTO T 355	Roadway	1 per 300 tons
Notes: Prior to the completion of the mix design, quality control tests on mineral aggregate shall be performed based on the anticipated percent use of each stockpile. Samples taken from individual stockpiles may be composited prior to performing the required tests, or testing may be performed on material from each stockpile and the composite test result for each required test determined mathematically. For Special Mix.			

416-6 Construction Requirements:

The contractor shall be responsible for the proportioning of all materials, for the hauling, placing, loading, spreading, and finishing of asphaltic concrete and for the applying of

bituminous material, such as tack coats, prime coats, and provisional seals, all in accordance with the appropriate portions of the specifications.

The asphaltic concrete hot plant shall conform to the requirements of Section 403 of the specifications.

During production, the percent RAP aggregate and percent RAP binder shall not exceed the maximum allowed in Subsections 416-3.01(C), 416-3.03(C), and 416-3.04 of the specifications. In addition, the percent RAP material shall be maintained to within plus 2 percent and minus 5 percent of the mix design value(s). When two RAP stockpiles are used, this tolerance shall apply to the total percent RAP material in the mixture, as well as the percent RAP material from each stockpile.

The temperature of asphaltic concrete or mineral aggregate upon discharge from the drier shall not exceed 325 degrees F unless a higher temperature is recommended in writing by the asphalt binder supplier and approved by the Engineer.

All courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines except under certain conditions or at certain locations where the Engineer deems the use of self-propelled paving machines impractical.

Self-propelled paving machines shall spread the mixture within the specified tolerances, without segregation or tearing, true to the line, grade, and crown indicated on the project plans. Pavers shall be equipped with hoppers and augers which shall distribute the mixture uniformly in front of adjustable screeds.

Pavers shall be equipped with a screed for the full width being paved, heated if necessary, and capable of spreading and finishing all courses of asphaltic concrete.

Pavers shall be equipped with automatic screed controls with sensors for either or both sides of the paver, capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing the automatic signals which operate the screed to maintain the desired grade and transverse slope.

Failure of the control system to function properly shall be cause for the suspension of the placing of asphaltic concrete.

The base or subgrade upon which asphaltic concrete is to be placed shall be prepared and maintained in a firm condition until asphaltic concrete is placed. It shall not be frozen or excessively wet.

At any time, the Engineer may require that the work cease or that the work day be reduced in the event that weather conditions, either existing or expected, are anticipated to have an adverse effect upon the asphaltic concrete.

All wheels and tires of compactors shall be wetted with water, or if necessary soapy water, or a release agent in order to prevent the sticking of asphaltic concrete. All other equipment surfaces shall be treated when necessary with a release agent. Only release agents evaluated through AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) are acceptable for

use. The results from AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) testing, when tested in accordance with AASHTO T 383, shall conform to the requirements shown in the table below:

RELEASE AGENT TEST	REQUIREMENT
Asphalt Stripping Test Diluted Non-Diluted (Full Strength)	 No Stripping No Stripping
Asphalt Performance Test	Less than or equal to 10.0% after the third cycle

Release agents which degrade, dissolve, or in any way damage the bituminous material shall not be used. Diesel fuel shall not be used as a release agent.

Longitudinal joints of each course shall be staggered a minimum of 1 foot with relation to the longitudinal joint of any immediate underlying course.

When surfacing courses are placed on 10 foot or wider shoulders which are to receive rumble strips, the contractor shall place any longitudinal joints approximately 1 foot away from the travel lane side of the rumble strip.

Longitudinal joints shall be located within 1 foot of the center of a lane or within 1 foot of the centerline between two adjacent lanes. Joints shall be formed by a slope shoe or hot-lapped, and shall result in an even, uniform surface.

Before a surface course is placed in contact with a cold transverse construction joint, the cold existing asphaltic concrete shall be trimmed to a vertical face by cutting the existing asphaltic concrete back for its full depth of the lift and exposing a fresh face. After placement and finishing of the new asphaltic concrete, both sides of the joint shall be dense and the joint shall be well sealed. The surface in the area of the joint shall conform to the requirements hereinafter specified for surface tolerances when tested with the straightedge placed across the joint.

All locations where plate samples are taken from the roadway shall be immediately repaired by the contractor utilizing hot asphaltic concrete. All holes where cores are taken shall be repaired within 48 hours after coring using a material approved by the Engineer. All holes shall be in a dry condition prior to repair. The patching material shall be thoroughly compacted in the holes by the contractor.

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

Before asphaltic concrete is placed, the surface to be paved shall be cleaned of all objectionable material and tacked in accordance with the requirements of Section 404 of the specifications. The cleaning of the surface, the tacking of the surface, and the type of bituminous material used shall be acceptable to the Engineer. The amount of bituminous material used shall be as directed by the Engineer.

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

The contractor shall schedule its paving operations to minimize exposed longitudinal edges. Unless otherwise approved by the Engineer, the contractor shall limit the placement of asphaltic concrete courses, in advance of adjacent courses, to one shift of asphaltic concrete production. The contractor shall schedule its paving operations in such a manner to eliminate exposed longitudinal edges over weekends or holidays.

The moisture content of the asphaltic concrete immediately behind the paver shall not exceed 0.5 percent. The moisture content will be determined in accordance with AASHTO T 329.

When Warm Mix Asphalt (WMA) technologies are used, the contractor shall comply with the manufacturer's recommendations for incorporating additives and WMA technologies into the mixture. The contractor shall comply with the manufacturer's recommendations regarding transporting, storage, and delivery of additives and water foaming processes. The contractor shall maintain a copy of the manufacturer's recommendations on file at the asphalt mixing plant and make those recommendations available for reference while using WMA technologies.

416-7 Acceptance:

416-7.01 General:

In addition to the random acceptance samples taken from each lot, the Engineer may sample and reject material which appears to be defective. Such rejected material shall not be used in the work. The results of tests run on rejected material will not be included with the lot acceptance tests.

Acceptance will be on the basis of the following:

(A) Sand equivalent;

(B) Fractured coarse aggregate particles;

(C) Uncompacted void content (for Special Mix);

(D) Material spread;

(E) Gradation;

(F) Asphalt cement content;

(G) Effective voids;

(H) Stability;

(I) Compaction; and

(J) Smoothness

416-7.02 Sand Equivalent, Fractured Coarse Aggregate Particles, and Uncompacted Void Content of Mineral Aggregate:

During asphaltic concrete production, the Engineer shall obtain and test samples of material for the determination of the sand equivalent and fractured coarse aggregate particles. When Special Mix is used, the uncompacted void content shall also be determined. When RAP is used in the mixture, the sand equivalent and uncompacted void content shall be determined on the composite of virgin aggregates only. Samples shall be obtained from the cold feed belt prior to the addition of mineral admixture, or from the stockpiles when sampling from the cold feed belt is not possible.

When RAP is used in the mixture, the material for determining the fractured coarse aggregate particles shall come from an asphaltic concrete sample taken and tested in accordance with AASHTO T 308, as specified in Subsection 416-7.04(A) of the specifications. However, if the Engineer determines that excessive breakdown of the aggregate has occurred due to the use of the ignition furnace, the fractured coarse aggregate particles testing shall be performed on the combination of RAP aggregate, as obtained in accordance with AASHTO T 308, and virgin mineral aggregate.

Virgin mineral aggregate will be acceptable for sand equivalent if it meets the minimum requirements specified in Subsection 416-3.01 of the specifications.

The fractured coarse aggregate particles shall meet the minimum requirements specified in Subsection 416-3.01 of the specifications.

For Special Mix, the uncompacted void content shall meet the minimum requirements specified in Subsection 416-3.01 of the specifications. Additional testing of the uncrushed and crushed fine aggregate for uncompacted void content will be required if the method of producing either fine aggregate is modified.

If the mineral aggregate fails to meet the requirements specified herein, operations shall cease and the contractor shall have the option of submitting a revised mix design conforming to the requirements of Subsection 416-4 of the specifications or correcting deficiencies in the aggregate stockpiles.

416-7.03 Material Spread:

A spread lot shall be considered to be one-half shift of production. Lots encompassing more than one project shall be separated in accordance with Subsection 416-9(D) of the specifications.

The contractor shall record information pertaining to each spread lot on forms provided by the Engineer. Information shall include the project number, date and period of time that each

spread lot was placed, the spread lot number, beginning and ending station, the plans thickness, and tons placed in each lot. Completed spread lot forms shall be signed by the contractor and given to the Engineer at the end of each shift.

The Engineer will calculate the quantity required in each spread lot using the mix design bulk density unless a request is made by the contractor to use a production bulk density. If a request is made to use production bulk density, the first three non-rejected lots following the test lot will be used to determine the average production bulk density. All lots placed prior to establishing the average production bulk density shall be calculated using the mix design bulk density. For each new mix design used on the project, a new production bulk density may be requested by the contractor. In addition, if conditions warrant during asphalt production, the contractor may request establishment of a new average production bulk density. All requests to use a production bulk density shall be made in writing and approved by the Engineer prior to use. The same procedure will be used for determining average production bulk density in all cases. Changes to the bulk density for calculating spread quantities will not be retroactive.

The calculated quantity required in each spread lot will be compared to the actual quantity placed. A lot will be considered to be acceptable, with a zero pay factor, if the actual quantity placed varies by no more than -2.0 to +5.0 percent from the required quantity.

If the quantity in a lot is found to vary from the required quantity by -2.1 to -12.0 percent, the appropriate pay factor will be determined in accordance with Table 416-1. This pay factor will be utilized in determining the pay adjustment as outlined in Subsection 416-9 of the specifications.

416-7.04 Gradation, Asphalt Cement Content, Effective Voids and Stability:

(A) General:

A mixture properties lot shall be considered to be one shift's production. In the event a shift's production is less than 1,200 tons, multiple shifts may be combined to form a lot. When a lot consists of production from more than one shift, the following conditions apply: at least one sample shall be taken each shift, at least one sample shall be taken every 500 tons, and no mix design or target value changes shall be made within the lot. If changes are made in the mix design or target values, new lots will be established.

Four samples of the asphaltic concrete shall be taken for each lot by the contractor, under the observation of the Engineer, at random locations designated by the Engineer. Samples will be taken in accordance with the requirements of AASHTO R 97 Plate Method and delivered to the Engineer immediately after being taken. The minimum weight of the sample shall be 75 pounds. The Engineer will split the sample and save one-half for 15 days after written notification to the contractor of test results for that lot has been made. The material will be tested by the Engineer for the following properties:

Test Property	Test Method
Asphalt Cement Content	AASHTO T 308 (for both Non-RAP and RAP mixes) (See Notes 1 and 2 below)
Gradation	
Marshall Density and Stability	AASHTO R 68, T 245
Maximum Theoretical Density	AASHTO T 209
Effective Voids	AASHTO T 269

Notes:

A new calibration of the ignition furnace shall be performed for each mix design, and at any other time the Engineer directs.

Ignition furnace results will be corrected for asphalt cement content in accordance with Subsection 416-7.04(B) as required.

Acceptance testing results will be furnished to the contractor within four working days of receipt of samples by the Engineer.

A mixture properties lot placed with an average stability below 2,500 pounds for base mixes, or 1,750 pounds for 1/2 inch or 3/4 inch mixes shall be rejected, and shall be subject to an engineering analysis of anticipated performance in accordance with Subsection 416-9(E) of the specifications. Production shall cease until the contractor proposes a corrective action the Engineer finds acceptable. If the Engineer rejects the proposed corrective action, the contractor shall submit a revised mix design.

The target values for gradation, Asphalt Cement Content, and Effective Voids are given in the contractor's mix design. The Upper Limits (UL) and Lower Limits (LL) of acceptable production of each of the measured characteristics are as follows:

Measured Characteristics	LL (Note 1)	UL (Note 1)
Gradation (Sieve size):		
3/8 inch	TV - 8.0	TV + 8.0
No. 8	TV - 8.0	TV + 8.0
No. 40	TV - 5.0	TV + 5.0
No. 200	TV - 2.0	TV + 2.0
Asphalt Cement Content	TV - 0.50	TV + 0.50
Effective Voids	TV - 2.0	TV + 2.0

Notes:

The limits are used in the statistical calculations for Quality Index. Acceptance is controlled by the variability of the produced material and every effort should be made to strive for the applicable target value (TV).

The Engineer will determine the PT for each measured characteristic in accordance with Subsection 416-9(H) of the specifications, and utilizing Table 416-1 will determine the pay factor for each measured characteristic.

In the event the contractor elects to question the mixture property test results, the contractor may request referee testing in accordance with Subsection 416-9(I) of the specifications.

(B) Ignition Furnace Correction:

Ignition furnace testing results shall be corrected in accordance with ADOT Materials Practice and Procedure Directive No. 20, “Guidance on the Use of Reclaimed Asphalt Pavement (RAP) in Asphaltic Concrete”.

416-7.05 Compaction:

(A) Courses 1-1/2 Inches or Less in Nominal Thickness:

(1) General Requirements:

Asphaltic concrete shall be placed only when the temperature of the surface on which the asphaltic concrete is to be placed is at least 65 degrees F and the ambient temperature at the beginning of placement is at least 65 degrees F and rising. The placement shall be stopped when the ambient temperature is 70 degrees F or less and falling.

When Warm Mix Asphalt (WMA) technologies are not used in the mixture, asphaltic concrete immediately behind the laydown machine shall be a minimum of 275 degrees F.

When Warm Mix Asphalt (WMA) technologies are used in the mixture, the recommended temperature range for compaction during production shall be shown on the mix design and shall be approved by the Engineer.

All edges shall be rolled with a pneumatic tired compactor, or other methods approved by the Engineer, while the mixture is still hot.

(2) Equipment:

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

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

Steel wheel compactors shall weigh not less than 8 tons.

Pneumatic-tired compactors shall be the oscillating type with at least seven pneumatic tires of equal size and diameter. Wobble-wheel compactors will not be permitted. The tires shall be spaced so that the gaps between adjacent tires will be covered by the following tires. The

tires shall be capable of being inflated to 90 pounds per square inch and maintained so that the air pressure will not vary more than 5 pounds per square inch from the designated pressure. Pneumatic-tired compactors shall be constructed so that the total weight of the compactor will be varied to produce an operating weight per tire of not less than 5,000 pounds. Pneumatic-tired compactors shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the compaction process.

(3) Rolling Method Procedure:

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

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

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

Note:

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

The Engineer shall select the option for compaction and, when pneumatic-tired compactors are used, will designate the tire pressure.

One pneumatic-tired roller shall be furnished for each 300 tons of asphaltic concrete per hour.

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

Initial and intermediate compaction shall be accomplished before the temperature of the asphaltic concrete falls below 200 degrees F.

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

(B) Courses Greater than 1-1/2 Inches in Nominal Thickness:

Compaction control shall be the responsibility of the contractor. The number and types of rollers shall be the contractor's responsibility and shall be sufficient to meet these requirements.

All edges shall be rolled with a pneumatic tired compactor, or other methods approved by the Engineer, while the mixture is still hot.

A compaction lot shall be identical to the mixture properties lot described in Subsection 416-7.04 of the specifications. Lots encompassing more than one project shall be separated in accordance with Subsection 416-9(D) of the specifications. Each lot shall be tested for acceptance.

Twenty cores shall be taken for each lot by the contractor, under the observation of the Engineer. The Engineer will designate 10 random locations within the lot, and the contractor shall take two cores at each location; however, if more than one shift constitutes a lot, two cores shall be taken from a minimum of two random locations each shift, or as directed by the Engineer. The Engineer will save one core from each location for 15 days after written notification to the contractor of test results for the lot has been made. Randomly selected locations will be determined to the nearest 0.5 foot in the transverse direction and to the nearest foot in the longitudinal direction of the pavement course; however, the outside 1 foot of the unconfined pavement course will be excluded from testing as shown in Materials ADOT Practice and Procedure Directive (P.P.D.) No. 18, “Determining Sample Times and Locations for End Product Asphaltic Concrete”. Unless otherwise indicated in the project plans, shoulders shall be excluded from compaction lot testing on rehabilitation projects. Unless otherwise indicated in the project plans, placements without constant width including gore areas, tapers, and turn radii shall be excluded from compaction lot testing on all projects. P.P.D. No. 18 also addresses areas to be excluded relative to longitudinal joints. Areas excluded from testing will be compacted in accordance with Subsection 416-7.05(A) of the specifications. Cores shall be taken utilizing mechanical coring equipment in accordance with the requirements of AASHTO R 97. Cores shall be a minimum of 4 inches in diameter and shall be taken not later than two working days after placement of the asphaltic concrete. The cores shall be delivered to the Engineer immediately upon being taken. The bulk density of each core will be determined by the Engineer in accordance with the requirements of AASHTO T 166. The test results will be furnished to the contractor within four working days of receipt of cores by the Engineer. In areas where more than one lift is placed in the same lot, coring shall be accomplished through the full depth of the lifts after the final lift is placed, and the compaction density shall be based on the full depth of the lifts.

The target value for compaction shall be 5.5 percent in-place air voids. In-place air voids shall be determined in accordance with AASHTO T 269. The maximum theoretical density used in the determination of air voids will be the average of the four maximum theoretical densities determined for the lot in Subsection 416-7.04 of the specifications.

The Upper Limit (UL) is 8.0 percent in-place air voids and the Lower Limit (LL) is 3.0 percent in-place air voids. The Engineer will determine the PT for compaction in accordance with Subsection 416-9(H), and utilizing Table 416-1 of the specifications will determine the compaction pay factor.

In the event the contractor elects to question the core test results, the contractor may request referee testing in accordance with Subsection 416-9(I) of the specifications.

416-7.06 Smoothness and Surface Tolerances:

Asphaltic concrete shall be compacted as required, smooth and true to the required lines, grades, and dimensions.

The Special Provisions may require the smoothness of the final pavement surface to be tested in accordance with Subsection 109.13 of the specifications.

Regardless of whether testing in accordance with Subsection 109.13 of the specifications is specified or not, the following requirements shall be met:

(A) The surface of any lift of asphaltic concrete placed under this section of the specifications, shall be tested and shall not vary by more than 1/4 inch from the lower edge of a 10-foot straightedge when it is placed in the longitudinal direction (including across transverse joints), and when it is placed in the transverse direction across longitudinal joints; and

(B) All deviations exceeding the specified tolerances above shall be corrected by the contractor, to the satisfaction of the Engineer.

416-8 Method of Measurement:

Asphaltic concrete will be measured by the ton for the asphaltic concrete actually used, which will include the weight of mineral aggregate, asphalt cement, and mineral admixture. Measurement will include any quantity used in construction of intersections, turnouts, or other miscellaneous items or surfaces.

No separate measurement or payment will be made for mineral admixture, the cost being considered as included in the cost of the asphaltic concrete.

416-9 Basis of Payment:

The accepted quantities of asphaltic concrete, measured as provided above, will be paid for at the contract unit price adjusted by the appropriate pay factors as hereinafter provided.

When Warm Mix Asphalt (WMA) technologies are used in the mixture, no separate payment will be made for WMA additives or technologies, necessary hot plant modifications, or other associated costs.

For the purpose of determining acceptability and appropriate pay factors, each unit of asphaltic concrete will be included in three separate lots: a "spread lot", a "mixture properties lot", and a "compaction lot". The total unit price for any unit of accepted asphaltic concrete will be the contract unit price, adjusted by the applicable spread lot pay factor, mixture properties lot pay factor, and compaction lot pay factor.

The contractor may request to place the first lot of each mix type as a test strip. Requests to place a test strip shall be made in writing and acknowledged by the Engineer prior to start of

production. A test strip shall be limited to 1,000 tons and may only be placed on shoulders, ramps, cross roads, or other areas approved by the Engineer. A test strip shall be excluded from the mixture properties lot pay factor and the compaction lot pay factor; however, all other provisions of Subsection 416-9 of the specifications shall still apply to such areas.

The Engineer may exclude asphaltic concrete from the spread lot and from the spread lot pay factor calculations if the Engineer determines that the proposed use of the material or the existing surface conditions are not conducive to the use of spread lots.

The Engineer may exclude certain locations from the mixture properties lot and/or the compaction lot and from the random sampling used in determining the mixture properties lot pay factor and/or the compaction lot pay factor should the Engineer determine that the location of the work precludes normal construction operations.

(A) Spread Lot Pay Factor:

The spread lot pay factor will be determined in accordance with Subsection 416-7.03 of the specifications. If the quantity in a spread lot is found to vary by more than +5.0 percent from the required quantity, no payment will be made for the material which exceeds +5.0 percent, including asphalt cement and mineral admixture. If the quantity is found to vary by more than -12.0 percent from the required quantity, the spread lot will be rejected.

(B) Mixture Properties Lot Pay Factor:

The mixture properties lot pay factor shall be determined in accordance with the following procedure:

(1) The individual PT values and pay factors for Gradation, Asphalt Cement Content, and Effective Voids shall be determined as set forth in Subsection 416-7.04 of the specifications.

(2) A single pay factor shall be determined for Gradation and Asphalt Cement Content. that pay factor shall be the lowest pay factor for the individual measured characteristics for Gradation and Asphalt Cement Content.

(3) If no individual PT value in (1) above is less than 50, the mixture properties lot pay factor shall be the sum of the pay factor determined in (2) above and the Effective Voids pay factor. The negative pay factor for mixture properties shall not exceed $3.00 per ton. If any individual PT value is less than 50, the lot is in reject and the provisions in Subsection 416-9(E) of the specifications shall apply.

(C) Compaction Lot Pay Factor:

The compaction lot pay factor shall be determined as set forth in Subsection 416-7.05(B) of the specifications.

(D) Determination of Lot Pay Factors on Contracts Involving Multiple Projects:

When more than one project is included in a single contract, placement during a shift or half shift of production may encompass more than one project. In such case, the applicable spread lot pay factor, mixture properties lot pay factor, and compaction lot pay factor for each project shall be determined as follows:

(1) Spread lot pay factors will be determined separately for each project utilizing the procedure set forth in Subsection 416-7.03 of the specifications.

(2) The individual PT values and pay factors for Gradation, Asphalt Cement Content, and Effective Voids will be determined from the results of the random samples taken and tested in accordance with Subsection 416-7.04 of the specifications, regardless of which project(s) the samples fall within.

(3) PT values and pay factors for compaction, for those areas subject to Subsection 416-7.05(B) of the specifications, shall be determined from separate sets of core samples for each project utilizing the procedure set forth in that Subsection.

(4) The mixture properties lot pay factor shall be determined separately for each project in accordance with Subsection 416-9(B) of the specifications, utilizing the individual pay factors determined in (2) above.

(5) The compaction lot pay factor shall be determined separately for each project in accordance with Subsection 416-9(C) of the specifications, utilizing the pay factor determined in (3) above.

(E) Acceptability:

Asphaltic concrete included in any mixture properties lot possessing an individual PT value lower than 50 for Gradation, Asphalt Cement Content, or Effective Voids will be rejected. Asphaltic concrete included in any compaction lot possessing a PT value lower than 50 will be rejected.

Within 25 days, or as agreed upon by the Engineer, after receiving notice that a spread lot, mixture properties lot, or compaction lot of asphaltic concrete has been rejected by the Engineer, the contractor may submit a written proposal to accept the material in place at the applicable maximum negative pay factor(s). Maximum negative pay factors are defined as a minus $1.00 per ton for spread lots, minus $5.00 per ton for compaction lots, minus $3.00 per ton for mixture properties lots in reject for Gradation only, minus $5.00 per ton for mixture properties lots in reject for Asphalt Cement Content and/or Effective Voids only, and minus $5.00 per ton for mixture properties lots in reject for Asphalt Cement Content and/or Effective Voids and also Gradation. Positive mixture properties lot pay factors become zero when the

compaction lot is in reject and the material is allowed to be left in place. In addition, for any mixture properties lot that is in reject due to Asphalt Cement Content but allowed to remain in place, payment shall not be made for asphalt cement quantities in excess of the upper limit (UL) as determined in Subsection 416-7.04(A) of the specifications.

The proposal shall contain an engineering analysis of the anticipated performance (i.e. reduction in serviceability, in years) of the asphaltic concrete if left in place. The engineering analysis shall also detail the potential root cause of the problem, any proposed corrective action, and the anticipated effect of such corrective action on the performance. The engineering analysis shall only include acceptance or referee test results, as applicable to the standards specifications. The engineering analysis shall include the expected additional cost to the Department (over original performance life) to maintain the pavement at an acceptable condition. The engineering analysis shall include supporting information such as pictures of the area, control charts, plant and field records, etc. The engineering analysis shall be performed by an independent professional engineer experienced in asphaltic concrete testing and the development of asphaltic concrete mix designs. If a rejected mixture properties lot or a rejected compaction lot is submitted for referee testing by the contractor, the 25 days allowed to prepare an engineering analysis will begin upon notification of referee test results.

The contractor may submit a written proposal without an engineering analysis for Engineer’s evaluation and approval, that a mixture properties lot with a PT value lower than 50 on gradation and/or asphalt cement content be allowed to remain in place if the application of a Self-Directed Target Change as outlined in Subsection 416-4 of the specifications would bring the PT value to 50 or greater. This written request shall also include the proposed revised PT calculations. Upon Engineer’s verification and approval of the request, the material shall remain in place at the maximum negative pay factor(s) specified in this subsection for the mixture properties lot in reject.

Within three working days, the Engineer will determine whether or not to accept the contractor's proposal. If the proposal is not accepted, the asphaltic concrete shall be removed at no additional cost to the Department and replaced with asphaltic concrete meeting the requirements of these specifications. If the proposal is accepted, the asphaltic concrete shall remain in place at the applicable maximum negative pay factor(s), and any necessary corrective action shall be performed at no additional cost to the Department.

The Department reserves the right to suspend the work should any of the following conditions occur:

(1) The occurrence of two or more rejected lots within any 10 consecutive production lots.

(2) The occurrence of three consecutive negative mixture properties lot pay factors or three consecutive negative compaction lot pay factors.

(3) The occurrence of five or more pay factors that are negative either for a mixture properties lot or for a compaction lot within any 10 consecutive production lots.

If the Department elects to suspend the work for any of these conditions, the contractor shall either submit a revised mix design in accordance with Subsection 416-4 of the specifications, or submit for the Engineer's approval a written engineering analysis. The engineering analysis shall detail the course of action necessary to correct deficiencies in the contractor's present production methods such that further production can be accomplished without excessive amounts of asphaltic concrete in penalty or rejection. If approved by the Engineer, the revised mix design, or the course of action proposed in the engineering analysis, shall be implemented, and the work may continue. Costs or delays due to the provisions of this subsection are not compensable.

(F) Asphalt Cement:

No separate measurement or payment will be made for asphalt cement (bituminous material), the cost being considered as included in the cost of the asphaltic concrete.

A reduction in payment to the contractor for asphaltic concrete will be made for quantities of asphalt cement (bituminous material) that do not meet the requirements of Section 1005 as determined by corresponding test results. Adjustments in payment shall be made in accordance with the requirements of Section 1005 of the specifications.

(G) Smoothness:

When required in the Special Provisions, payment for smoothness shall be made in accordance with the requirements of Subsection 109.13 of the specifications.

(H) Statistical Acceptance:

The "Total Percentage of Lot within UL and LL (PT)" shall be determined in accordance with Subsection 109.11 of the specifications.

Pay Factors (PF) shall be determined by entering Table 416-1 with PT.

TABLE 416-1 PAY FACTORS					
Material Spread		**Mixture Properties and Compaction**			
Negative Variance %	**Pay Factor (Dollars per Ton)**	**PT**	**Pay Factors (Dollars per Ton)**		
			Gradation and Asphalt Cement Content	**Effective Voids**	**Compaction**
2.1 - 3.0	- 0.10	100	0.00	+ 2.00	+ 2.00
3.1 - 4.0	- 0.20	95 - 99	0.00	+ 1.00	+ 1.00
4.1 - 5.0	- 0.30	90 - 94	0.00	0.00	0.00
5.1 - 6.0	- 0.40	85 - 89	0.00	- 0.25	- 0.25
6.1 - 7.0	- 0.50	80 - 84	- 0.25	- 0.50	- 0.50
7.1 - 8.0	- 0.60	75 - 79	- 0.50	- 0.75	- 0.75
8.1 - 9.0	- 0.70	70 - 74	- 0.75	- 1.00	- 1.00
9.1 - 10.0	- 0.80	65 - 69	- 1.00	- 1.25	- 1.25
10.1 - 11.0	- 0.90	60 - 64	- 1.50	- 1.50	- 1.75
11.1 - 12.0	- 1.00	55 - 59	- 2.00	- 2.00	- 2.25
More than 12.0	Reject	50 - 54	- 2.50	- 2.50	- 3.00
See Subsections 416-9(A) and (E)		Less than 50	Reject-See Subsection 416-9(E)		

(I) Referee Testing:

(1) Referee Testing Performed for Mixture Properties Only:

Within 15 days after written notification to the contractor of test results for a particular mixture properties lot, the contractor may make a written request for referee testing. The referee testing shall be performed by an independent approved laboratory designated by the Department. The testing of the samples will be performed by the independent testing laboratory without knowledge of the specific project conditions such as the identity of the contractor or mix design laboratory, the test results by the Department, or the mix design targets for gradation and effective voids. The asphaltic concrete samples previously saved will be tested for the following properties:

Test Property	Test Method
Asphalt Cement Content	AASHTO T 308 (for both Non-RAP and RAP mixes)
Gradation	
Marshall Density and Stability	AASHTO R 68, T 245
Maximum Theoretical Density	AASHTO T 209
Effective Voids	AASHTO T 269

The results of the referee testing will be binding on both the contractor and the Department.

Using the referee testing results, the Engineer will determine new PT’s for all characteristics.

When referee testing is performed on a mixture properties lot, the referee test result for the average maximum theoretical density will be used to determine a new PT for compaction.

The Department will pay for the referee testing; however, if the combined pay factor of the lot (mixture properties plus compaction) does not improve or is reduced, or if either the mixture properties lot or compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete shall be reduced by the amount of the cost of the referee testing for the mixture properties of that particular lot.

(2) Referee Testing Performed for Compaction Only:

Within 15 days after written notification to the contractor of test results for a particular compaction lot, the contractor may make a written request for referee testing. The bulk density of each of the cores previously saved will be determined in accordance with the requirements of AASHTO T 166 by an independent testing laboratory designated by the Department. The testing of the cores will be performed by the independent testing laboratory without knowledge of the specific project conditions, such as the identity of the contractor or mix design laboratory, or the test results by the Department. The percent air voids will be determined in accordance with AASHTO T 269. The maximum theoretical density used in the determination of air voids will be the average of the four maximum theoretical densities determined for the lot in Subsection 416-7.04 of the specifications.

The results of the referee testing will be binding on both the contractor and the Department.

When referee testing is performed on the compaction lot, the Engineer will determine a new PT for compaction using the referee testing results.
The Department will pay for the referee testing; however, if the pay factor of the compaction lot does not improve or is reduced, or the compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete will be reduced by the amount of the cost of referee testing for the compaction of that particular lot.

(3) Referee Testing Performed for Both Mixture Properties and Compaction:

When referee testing is performed, as described above, for both the mixture properties lot and the compaction lot, the Engineer will use the referee test results to determine new PT's as specified in Subsections 416-9(I)(1) and 416-9(I)(2) of the specifications.

The Department will pay for the referee testing; however, if the combined pay factor of the lot (mixture properties plus compaction) does not improve or is reduced, or if either the mixture properties lot or compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete shall be reduced by the amount of the cost of the referee testing for the mixture properties and compaction of that particular lot.

(501PIPE, 01/20/22)

SECTION 501 PIPE CULVERTS AND STORM DRAINS:

501-3.02(A)(1) GENERAL: the last paragraph of the Standard Specifications is revised to read:

Bedding material for all metal pipe shall have a value of resistivity not less than 2,000 ohm-centimeters unless otherwise specified or approved by the Engineer. Bedding material shall have a pH value between 6.0 and 10.0, inclusive, for all metal pipe installations except aluminum. Bedding material for aluminum pipe installations shall have a pH value between 6.0 and 9.0, inclusive. Bedding material shall have a pH value between 6.0 and 12.0, inclusive, for all concrete or plastic pipe installations. Tests for pH and resistivity shall be in accordance with the requirements of Arizona Test Method 236.

(601PCC, 09/21/23)

SECTION 601 CONCRETE STRUCTURES:

601-3.03(C) Pumping Concrete: of the Standard Specifications is revised to read:

Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be of suitable type and shall have adequate capacity for the work. The concrete shall not flow either over or through any piping, fittings or equipment which is fabricated of aluminum or aluminum alloys. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. Excessive segregation due to high velocity discharge of the concrete will not be permitted. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there is no contamination of the concrete or segregation of the ingredients. Standby equipment shall be readily available to replace initial pumping equipment should breakdown occur.

(601CSDF, 02/19/26)

SECTION 601 CONCRETE STRUCTURES:

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

In the application and design of deck falsework systems, all bridge girders, new or existing, shall be braced or tied to resist any forces that would cause rotation and torsion in the girders caused by the placing of concrete for diaphragms or decks. The bracing system shall be included in the deck falsework design and shown on the deck falsework drawings. The contractor may choose not to provide a bracing system only when calculations demonstrate

that the existing bridge components already provide adequate resistance to rotation and torsion. The calculations shall include this check and clearly show that the bridge girders can resist rotation and torsion without additional bracing.

601-3.04(B)(3)(b) **Fabrication:** the second paragraph of the Standard Specifications is revised to read:

The deck joint assemblies' fabrication plant shall be certified under the AISC Quality Certification program as a Certified Bridge Fabricator-Simple (SBR), or higher.

601-3.05(D)(1) **General:** the first paragraph of the Standard Specifications is revised to read:

Bridge decks that will receive an overlay, sawed grooves, diamond grinding or waterproofing membrane shall be lightly textured with a burlap drag, broom finish, or other engineer approved drag type texturing during the plastic concrete state, after the finishing operation and smoothness test, as specified below, and prior to the curing process. Bridge decks exposed directly to traffic shall be grooved or tined as specified in Subsection 601-3.05(D)(2) of the specifications.

601-4.04 **Opening to Traffic:** the first paragraph of the Standard Specifications is revised to read:

No vehicular traffic will be allowed on the structure until at least 10 days after the last concrete has been placed in each continuous portion of a structure and until the compressive strength of all placed concrete has reached the required 28-day compressive strength on structures in which cast-in-place concrete has been used. For bridge deck joints and closure pours with specified early strength concrete intended to meet an accelerated traffic opening, the engineer may allow opening bridge to traffic, provided the specified early concrete strength specified in the contract document has been met.

ITEM 6010505 – BRIDGE REPAIR (SLOPE PAVING)

Description:

The work under this item shall consist of the removal and disposal of damaged concrete slope protection, filling voided areas under the repair areas, and furnishing and placing concrete or shotcrete and reinforcing steel to the repair areas.

Materials:

Shotcrete and reinforcing materials shall be as required in standard specification 912. Concrete materials shall be as specified in Standard Drawing SD 2.04 and specification 601.

Construction Requirements:

Perform repairs to the concrete slope paving as described in the plans. The Contractor shall identify, and the Engineer shall approve the locations and extent of the repair areas prior to the Contractor beginning work. Remove damaged areas by full depth sawcuts in the existing

concrete per specification 202. Fill voids under the repair areas with sand or an alternative material as approved by the engineer. Provide and install reinforcing steel in the repair areas as shown in the plans. Reconstruct the damaged portion of the slope paving by installing concrete as shown in Standard Drawing SD 2.4 or shotcrete as required in specification 912.

Measurement and Payment:

Bridge Repair (Slope Paving) will be measured and paid for per square yard of repair. The cost of determining the repair areas, access, material, labor, and equipment necessary to complete the work as described are incidental to the cost of the repair.

ITEM 6010506 – BRIDGE REPAIR (POLYESTER POLYMER CONCRETE):

1.0 Description:

The work under this item shall consist of furnishing and placing a Polyester Polymer Concrete (PPC) overlay system on a prepared surface in accordance with these special provisions and as shown on the project plans or as directed by the Engineer. PPC shall be comprised of a polyester resin binder, High Molecular Weight Methacrylate (HMWM) resin primer, and aggregate.

2.0 Materials:

The contractor shall submit a Certified Test Report for all the materials associated with the polyester polymer concrete overlay and accompanied by certified test reports from independent accredited laboratories.

The polyester polymer concrete shall consist of polyester resin binder and aggregate as specified below. It shall also include a compatible primer which when mixed with other specified ingredients and applied as specified herein, is capable of producing a polyester polymer concrete meeting the requirements of this specification.

2.1 Polyester Resin Binder

Polyester resin binder shall have the following properties:

1. Be an unsaturated isophthalic polyester-styrene co-polymer. The resin content shall be 12% +/- 1% of the weight of the dry aggregate.
2. Contain at least one percent by weight gamma-methacryloxypropyltrimethoxysilane, an organosilane ester silane coupler.
3. Be used with promoter that is compatible with suitable methyl ethyl ketone peroxide and cumene hydroperoxide initiators.
4. Have the values for the material properties shown in Table 6010506-1:

Table 6010506-1
POLYESTER RESIN BINDER PROPERTIES
(Tested Each Lot Sent to the Job)

Property	Test Method	Requirement
Viscosity *	ASTM D 2196	0.1x10-5 to 2.9x10-5 psi (0.075 to 0.20 Pa) RVT No.1 Spindle, 20 RPM at 77 °F
Specific Gravity *	ASTM D 1475	1.05 to 1.10 at 77 °F
Elongation	ASTM D 638	35 percent, minimum Type I specimen, thickness 0.25 +/- 0.03” at Rate = 0.45 inch/minute
	ASTM D 618	Sample Conditioning: 18/25/50+5/70
Tensile Strength	ASTM D 638	2,500 psi, minimum Type I specimen, thickness 0.25 +/- 0.03” at Rate = 0.45
	ASTM D 618	Sample Conditioning: 18/25/50+5/70

*Test must be performed before adding initiator

2.2 High Molecular Weight Methacrylate (HMWM) Primer:

Primer for the concrete surface shall be a wax-free low odor, high molecular weight methacrylate primer, and consist of a resin, initiator, and promoter. The primer shall conform to Table 6010506-2 and the promoter shall be as recommended by the System Provider.

Initiator for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, the metal drier shall not be mixed directly with the peroxide. The containers shall not be stored in a manner that allows leakage or spilling to contact the containers or materials of the other.

Table 6010506-2
HIGH MOLECULAR WEIGHT METHACRYLATE RESIN PROPERTIES

Property	Test Method	Requirement
Viscosity *	ASTM D 2196	0.1x10-5 to 2.9x10-5 Pa·s (0.075 to 0.20 Pa) RVT No.1 Spindle, 10 RPM at 77 °F
Volatile Content*	ASTM D 2369	30 percent, maximum
Specific Gravity *	ASTM D 1475	0.90 minimum at 77 °F
Flash Point	ASTM D 3278	180 °F minimum
Vapor Pressure*	ASTM D 323	0.04 inch Hg, maximum at 77 °F
PCC Saturated Surface – Dry Bond Strength (Adhesive)	** California Test 551, part 5	700 psi, minimum at 24 hours and 70 +/- 1 °F (with polyester concrete at 12% resin content by weight of the dry aggregate)

*Test must be performed before adding initiator
**Copies of California Test 551 are available online

2.3 Aggregates

Polyester concrete aggregate shall have the following properties:

1. Have a maximum of 45 percent crushed particles retaining on the No. 8 sieve when tested in accordance with AASHTO T335.
2. Provide fine aggregate consisting of natural sand.
3. Have a weighted-average aggregate absorption of no more than 1.0 percent when tested under AASHTO Test Methods T84 and T85.
4. At the time of mixing with resin, the aggregate moisture content shall not exceed one half of the weighted-average aggregate absorption when tested under AASHTO T255.
5. Comply with the requirements for the aggregate gradation shown in Table 6010506-3.

Table 6010506-3 AGGREGATE GRADATION
(Tested Yearly)

Sieve Size	Percent Passing
3/8”	100
#4	62-85
#8	45-67
#16	29-50
#30	16-36
#50	5-20
#100	0 – 7
#200	0 - 3

Sand for Abrasive sand finish shall have the following properties:

1. Be commercial-quality blast sand.
2. Have at least 95 percent passing the No. 8 sieve and at least 95 percent retained on the No. 20 sieve when tested under AASHTO T27.
3. Have an average absorption of not more than 1 percent when tested under AASHTO T85.

2.4 Composite System:

Table 6010506-4 COMPOSITE PROPERTIES
(Tested Every 2 Years)

Polyester Concrete		
Property	**Test Method**	**Requirement**
PPC Saturated Surface Dry Bond Strength	CT 551*	500 psi minimum at 24 hrs and 70F (without primer, at 12% resin content by weight of the dry aggregate, on Saturated Surface Dry Specimen)
Abrasion Resistance	CT 550*	<2g weight loss (at 12% resin content by weight of the dry aggregate)
Modulus of Elasticity	ASTM C 469	1,000 ksi to 2,000 ksi (at 12% resin content by weight of the dry aggregate)

*Copies of California Test 550 and 551 are available online

3.0 Construction Requirements:

3.1 Submittals:

The contractor shall submit the following: Overlay System, System Provider Qualifications, Contractor Qualifications, System Provider Technical Representative Qualifications, Overlay Placement Plan, Certificate of Compliance with laboratory testing for each property, and any other relevant documents for the overlay system at least 15 days prior to the delivery of any of the overlay materials. These submittals are for approval and shall be directed to the Engineer.

A. Overlay System:

The contractor shall submit two copies of the System Provider’s material information, written installation instructions, material safety data sheets, and independent test results for approval.

B. System Provider Qualifications:

The contractor shall install an overlay system with all components provided through a single System Provider with documented experience successfully supplying 5 projects of similar size and scope within the past 5 years. The contractor shall submit documentation of the System Providers project experience.

1. Provide construction date.
2. Overlay quantities.
3. Reference name and contact information of owner representative.

C. Contactor Qualifications:

The contractor shall submit documentation of successful projects placing structural concrete (bridge decks or concrete pavement) and PPC overlay systems to established grade lines using similar equipment as specified herein with the past 5 years. The documentation of contractor's qualifications shall include the following:

1. Project construction date.
2. Overlay quantities.
3. Reference name and contact information of owner representative.

If the contractor does not have 5 years of experience placing structural concrete and PPC overlay systems with at least 10 documented successful projects, the contractor shall arrange for a qualified System Provider Technical Representative with 5 years of documented experience with PPC to be on site throughout the duration of the project to ensure proper construction of the polymer concrete.

If the contractor has 5 years of experience placing structural concrete and PPC overlay systems with at least 10 documented successful projects, the qualified System Provider Technical Representative with 5 years of documented experience with PPC shall, at a minimum, be on site throughout the placement of the bridge deck overlay placement.

D. System Provider Technical Representative Qualifications:

The System Provider Technical Representative shall have a minimum of 5 years of experience with PPC and be completely competent in all aspects of the work, including all materials to install the overlay system. The Technical Representative shall have experience on a minimum of 5 successful projects of similar size and scope within the past 5 years. The contractor shall submit documentation of the System Providers Technical Representative's experience including the following:

1. Years of experience with polyester polymer concrete.
2. Project construction date.
3. Overlay quantities.
4. Reference name and contact information for owner representative

The Technical Representative shall be available on site to facilitate the installation of polyester polymer concrete. This includes, but not limited to, surface preparation, polyester polymer concrete application, and polyester polymer concrete cure.

E. Overlay Placement Plan:

The contractor shall submit an Overlay Placement Plan that includes the following:

1. Schedule of overlay work and testing for each bridge.
2. Staging plan described overlay placement sequence including:
   a. Contractor shall pave from the high side of the bridge to the low side; no gaps between passes will be allowed.
   b. Cold joints between passes shall be within 1 foot of the stripe lines or centered within the lane.
   c. Staging Plan Sheets shall describe overlay placement sequence including paving widths, anticipated paving lengths, paving directions, joint locations, and location of proposed trial overlay(s).
3. Description of equipment used for:
   a. Surface preparation including grinding and shot blasting.
   b. Applying HMWM resin.
   c. Measuring, mixing, placing, and finishing the polyester polymer concrete overlay.
   d. Applying sand.
   e. Method of protecting and finishing inlets and bridge drains.
4. Method for preventing leakage of primer onto areas of deck that have not received surface preparation.
5. Method for isolating expansion joints at the abutment and over the piers.
6. Method for measuring and maintaining overlay thickness and profile.
7. Tining plan showing tining locations and describing methods that will be used for hand tining.
8. Mainline tining shall be automated with the finisher.
9. Cure time for polyester polymer concrete.
10. Storage and handling of HMWM resin and polyester polymer concrete components.
11. Procedure for disposal of excess HMWM resin, polyester polymer concrete, and containers.
12. Procedure for cleanup and mixing and placement equipment

F. Equipment:

The contractor shall submit a documented history of the use of the paving machine to successfully place Polyester Polymer Concrete overlays on a major bridge project for review and approval by the Engineer.

3.2 Trial Application

Prior to constructing the overlay, one or more trial applications shall be placed on a new or previously constructed concrete base to determine the initial set time, and to demonstrate the effectiveness of the mixing, placing, and finishing equipment proposed. The location of the

trial application shall be predetermined and agreed upon prior to submitting the overlay placement plan and shall be approved by the Engineer. The bridge receiving the PPC overlay and the approach slabs cannot be used as a location for the trial application. Each trial application shall be the planned paving width, at least 6 feet long, and the same thickness as the specified overlay. The trail applications shall be tined as per the tining requirements in subsection 3.01(E) of these specifications. The set time can be determined when the in-place PPC cannot be deformed by pressing with a finger, indicating the resin binder is no longer in a liquid state. Conditions during the construction of the trial applications and equipment used shall be similar to those to be used for construction of the overlay. Trial applications shall be properly disposed of off-site by the contractor.

The number of the trial applications required shall be as many as necessary for the contractor to demonstrate the ability to construct an acceptable overlay section and competency in ability to perform the work.

Overlay pull bond testing shall be performed in accordance with the requirements of ASTM C1583 after 24 hours. The test results shall be the average of three tests, drilled a minimum of 0.25”, but not greater than 0.50” below the bond line, with strength greater than 250 psi, and a failure area greater than 50% failure in the substrate concrete of the surface area. Acceptable test results shall be achieved on a trial application before the installation may proceed.

3.3 Equipment

All equipment for cleaning the existing concrete surface and mixing and applying the overlay system shall be in accordance with the System Provider’s recommendation as approved by the Engineer prior to commencement of any work.

A. Mixing Equipment:

A continuous mixer shall be used for all polyester polymer concrete overlay applications. The continuous mixer shall:

1. Employ an auger screw/chute device.
2. Be equipped with an automatic metering device that measures and records aggregate and resin volumes. Record volumes at least every five minutes, including time and date. Submit recorded volumes at the end of the work shift.
3. Have a visible readout gage that displays volumes of aggregate and resin being recorded.
4. Produce a satisfactory mix consistently during the entire placement.

A portable mechanical mixer of appropriate size for proposed batches, as recommended by the System Provider and approved by the Engineer, may be used for all PPC patching applications.

B. Finishing Equipment:

A self-propelled slip-form paving machine, which is modified or specifically built to effectively place the PPC overlay in a manner that meets the objectives and requirements of the project,

shall be used for all polyester polymer concrete overlay applications. The paving machine shall:

1. Employ a vibrating pan to consolidate and finish the PPC.
2. Be fitted with hydraulically controlled grade automation to establish the finished profile. The automation shall be fitted with substrate grade averaging devices on both sides of the new placement; the device shall average 15 ft in front and behind the automation sensors. The sensor shall be constructed to work with string-line control. It is acceptable to match grade when placing lanes adjacent to previously placed PPC.
3. Be equipped with controls capable of maintaining the screed at the specified transverse slope within plus or minus .01 percent.
4. Having sufficient engine power and weight to provide adequate vibration of the finishing pan while maintaining consistent forward placement speed.

Finishing of patches of deck removal areas shall be completed using hand finish tools to make it flush with the top of the deck surface.

3.4 Surface Preparation

Existing bridge decks shall be repaired prior to the application of the polyester polymer concrete overlay as shown on the project plans and as determined in the field.

Voids in the deck surface created by the removal of unsound concrete, unsound epoxy concrete patches and all asphalt concrete patches shall be filled with the same polyester concrete patches conforming to Item 9240014 – Force Account Work (Polyester Concrete Bridge Deck Repair). After patches have cured for not less than a minimum time required by the material manufacturer, or as directed by the Engineer; the entire deck, including patched areas, shall receive the overlay.

The concrete substrate shall be prepared for application of the overlay by shot-blasting in order to remove all existing grease, slurry, oils, point, dirt, striping, cure compound, membrane, or any other contaminants that could interfere with the proper adhesion of the overlay system.

The final prepared surface shall adhere to the following requirements:

1. The areas to be overlaid shall be cleaned by shot-blasting or abrasive sand-blasted in the event that the shot-blaster cannot access areas to be prepared. Cleaning shall not commence until all work involving the repair of the concrete deck surface has been completed and the deck is dry. All contaminants shall be picked up and stored in the vacuum unit and no dust shall be created during the blasting operation that will obstruct the view of motorists in adjacent roadways. The travel speed and/or number of passes of the shot- blasting unit shall be adjusted so as to result in all weak or loose surface mortar being removed and the aggregates of the concrete being exposed, as well as visible change in the concrete color. Cleaned surfaces shall not be exposed to vehicular traffic unless approved by the Engineer. If the deck becomes contaminated before placing the overlay, the contractor shall shot-blast or

abrasive sand-blast the contaminated areas to the satisfaction of the Engineer at no additional cost to the Department.

2. Any loose particle shall be removed prior to the overlay placement by magnets and compressed air and vacuuming such that no trapped particles remain. Power washing will not be allowed.
3. The areas to be overlaid shall be blown off with compressed air just prior to placement of the primer and shall be completely dry.
4. Surface Preparation Pull Bond Testing shall be performed by the contractor and submitted to the Engineer for acceptance.

3.5 Application of Overlay

Methods shown in these specifications are typical of general installations and may be modified per the System Provider's recommendations as approved by the Engineer. The application of the overlay shall not begin until the concrete deck is completely surface dry in accordance with ASTM D4263. The concrete surface temperature shall be between 40oF and 100oF. Night work may be required when temperatures cannot be met during the day. Stockpiled materials shall not be stored on the bridge deck.

A. HMWM Primer Application:

Immediately before placing primer, all exposed surfaces shall be completely dry and blown clean with oil-free compressed air. Exposed surfaces shall be protected from precipitation and heavy dew during and after the application of the primer.

After the exposed surfaces have been prepared and allowed to dry, primer shall be applied in accordance with the System Provider's recommendations. Primer shall be placed within 5 minutes of mixing at approximately 90sf/gal or the rate recommended by the System Provider.

Primer shall be uniformly spread to completely cover surfaces to be overlaid. Care shall be taken to avoid excess application that results in puddling. Excess material shall be removed or distributed to meet the required application rate. Primer shall be reapplied to any areas dry after 15 minutes of absorbing the material.

Primer shall not be allowed to leak onto areas that have not received surface preparation.

B. Polyester Polymer Concrete Application:

The polyester polymer concrete shall be applied after 15 minutes and within 2 hours after the primer has been applied. Accelerators or inhibitor may be required to achieve proper setting time of polyester polymer concrete. They shall be used as recommended by the overlay System Provider.

The polyester polymer concrete shall be placed prior to gelling or 15 minutes following addition of initiator, whichever occurs first, or within a more restrictive range if recommended by the System Provider.

The polyester resin binder shall be initiated and blended completely. Aggregate shall be added and mixed for at least two minutes when a portable mechanical mixer is used.

C. Curing

The overlay shall be allowed to be cured sufficiently before being subjected to loads or traffic of any nature that may damage the overlay. Cure time depends upon the ambient and deck temperatures. The overlay shall be considered cured to a traffic ready state after four hours following final finishing.

D. Correction for Smoothness:

Corrective work shall be performed using a method approved by the Engineer for areas of excess localized roughness. The finished surface of the concrete shall be tested in accordance with section 601-3.05(D) of the ADOT Standard Specifications.

All costs associated with corrective work will not be paid for separately but shall be included in the work, including but not limited to, profiling, diamond grinding, and additional polyester polymer concrete if diamond grinding removes more than ¼" of polyester polymer concrete in any location.

E. Replacement of Defective Overlay:

A defective overlay, or portion thereof, resulting in failing overlay pull bond test results (ASTM C1583) shall be removed and replaced at the contractor's expense. The contractor shall submit a written corrective work proposal to the Engineer, which shall include the methods and procedures that will be used. The contractor shall not commence corrective work until the methods and procedures have been approved by the Engineer. The Engineer's approval shall not relieve the contractor of the responsibility of producing work in conformity with the contract.

4.0 Method of Measurement:

Bridge Repair (Polyester Polymer Concrete Bridge Deck Overlay) will be measured by the square yard.

5.0 Basis of Payment:

The accepted quantities of Bridge Repair (Polyester Polymer Concrete Bridge Deck Overlay), measured as provided above, will be paid for at the contract unit price per square yard, which shall be full compensation for the work, complete in place, as described herein and as shown in the project plans and including construction and removal of the trial applications.

ITEM 6010510 – BRIDGE REPAIR (BLAST AND RECOAT EXPOSED REINFORCING)

Description:

The work under this item shall consist of the removal of loose and spalled concrete and the recoating of exposed reinforcing steel.

Materials:

Zinc Dust Paint – Meet the requirements of ASTM A780 except that aerosol spray applications will not be permitted.

Chromate Conversion Coating/Zinc Phosphate Solution – Verify compatibility with zinc dust paint and finish coat paint and according to manufacturer's recommendations.

Finish Coat Paint – Meet the requirements of the section 1002-2.06. The color shall closely match the color of the concrete adjacent to the repair areas and shall be approved by the Engineer.

Construction Requirements:

1. Schedule and conduct all work to provide pedestrian and vehicular traffic access according to the project Maintenance of Traffic requirements.
2. Locate and determine the areas of spalled concrete, loose concrete, and exposed and/or corroded reinforcing steel. Provide locations and areas to the Engineer for review and approval.
3. Remove all loose concrete at the identified repair areas.
4. Remove rust stains on remaining sound concrete by abrasive blasting. All blasting media must be contained.
5. Remove all heavy corrosion and scale from the reinforcing steel by abrasive blasting to the approval of the engineer. All blasting media must be contained. A minor amount of tightly adhered rust may be left in place.
6. Coat the reinforcing steel with paint containing zinc dust.
7. Passivate or etch the surfaces coated with zinc dust paint before applying the finish coat. Clean the surface with a degreaser to remove dirt and oil and apply a chemical treatment of a chromate conversion coating or a zinc phosphate solution which will create a protective layer on the zinc and provide better adhesion of the top coat. Verify that the chemical treatment is compatible with the top coat and performs all manufacturer's requirements.
8. Coat the entire repair area, including concrete and reinforcing steel with paint meeting the requirements of 1002-2.06. Blend the repair area paint into the surrounding area.
9. No concrete patching is proposed.

Measurement and Payment:

Bridge Repair (Blast and Recoat Exposed Reinforcing) will be measured and paid for by square foot of repair. The cost of determining the repair areas, access, materials necessary for the containment enclosures, installing and removing of the containment enclosures, removal, disposal, abrasive blasting, passivating zinc dust coating, paint, material, labor, equipment necessary to complete the work as described are incidental to the cost of the repair.

ITEM 6010511 – BRIDGE REPAIR (SEAL JOINTS AND CRACKS IN SLOPE PAVING)

Description:

The work under this item shall consist of the removal and disposal of existing joint sealer in slope paving joints, cleaning of the joints and cracks in the slope paving and filling the joints and cracks in the slope paving with new joint sealer.

Materials:

Silicone joint sealant conforming to the requirements of Subsection 1011-8.

Construction Requirements:

Seal joints and cracks in slope paving as described in the plans. The Contractor shall identify, and the Engineer shall approve the locations and extent of the repair areas prior to the Contractor beginning work. Clear all joints and cracks of vegetation and fully clean joints and cracks prior to installation of joint sealant. Install joint sealant according to manufacturer's recommendations.

Measurement and Payment:

Bridge Repair (Seal Joints and Cracks in Slope Paving) will be measured and paid for by linear foot of repair. The cost of determining the repair areas, access, material, labor, and equipment necessary to complete the work as described are incidental to the cost of the repair.

(601MTHSEAL, 12/15/22)

ITEM 6010603 – PENETRATING DECK SEALER (METHACRYLATE):

1.0 Description:

The work under this Item shall consists of furnishing and applying a methacrylate penetrating crack seal material (hereinafter called sealant material) on the entire bridge deck, approach slabs, and anchor slabs in accordance with the requirements of the project plans, the manufacturer's recommendations, and the requirements of these specifications.

2.0 Materials:

2.01 High Molecular Weight Methacrylate:

The penetrating crack sealer material shall be a two-component, low viscosity, 100 percent solids, high molecular weight methacrylate (HMWM) penetrating crack sealer conforming to the physical and performance requirements shown in Table 1.

Table 1	
Material Requirements of High Molecular Weight Methacrylate (HMWM) Crack Sealers	
Viscosity, ASTM D2196	25 cP (or less)
Tack Free Time, ASTM D1640	< 400 minutes (6.67 hours)
Compressive Yield Strength, ASTM D695	2500 psi 2-day minimum
Flash Point, ASTM D3278	180°F minimum
Tensile Strength, ASTM D638	1500 psi minimum

The contractor shall review and follow all of the manufacturer's recommendations on how to use and mix the products.

2.02 Broadcast Sand:

Provide a commercial-quality, dry-blast sand for a skid resistance surface. The size of the sand shall be such that 95 percent or more shall pass the No. 8 sieve, and 95 percent or more shall be retained on the No. 20 sieve.

3.0 Safety and Construction Requirements:

The application of sealant material shall not begin until the completion of the bridge deck repair work and the bridge deck has cured.

Prior to start of the work, the contractor shall submit a safety plan for use of the penetrating crack sealers. The plan shall identify personnel that have been trained by the manufacturer in the handling, transport, and mixing of the penetrating crack sealer. Personnel who have not been trained by the manufacturer shall not handle, transport, or mix the material, but may apply the crack sealer only under the direct supervision of manufacturer trained personnel. The manufacturer training shall include the following topics:

1. Proper handling, storage, and waste disposal methods to eliminate fire, reactivity and explosion hazards and protect personnel from injury caused by exposure to and contact with the components of the material.

2. Use of effective protective clothing, especially aprons, gloves, goggles, respirators, emergency devices, and adequate ventilation in storage areas.

3. Training in safe work habits, first aid procedures, effective measures for coping with emergencies, and accidents.

The safety plan shall identify the location of storage, the method of transporting the material to the project location, the proposed mixing location, and the mixing procedure to be used at the project site.

The safety plan shall identify processes and precautions used to protect the public. This may include controlling temperatures for storage of the product, protective clothing, equipment used in the handling and application of the material, the transportation procedures, the

transportation routes, safety protection plan in the event of a spill, fire, or required clean-up, and maintaining sound safety practices.

The Engineer will review the safety plan for use of the penetrating crack sealer products and will either approve it or return it to the contractor for corrections no more than 10 working days after receipt. The contractor shall then modify the safety plan, if necessary, and resubmit to the Engineer within five working days. The contractor shall allow five working days for each subsequent review. The contractor shall not commence work until the safety plan has been approved. No increase in contract time will be granted for the contractor’s failure to provide acceptable submittals of the safety plan.

The contractor shall follow the approved safety plan. If it is determined by the Engineer that the measures taken by the contractor are inadequate to provide for public safety, the contractor shall revise his operation. No further work shall be performed associated with the penetrating crack sealer until the public safety measures are adequate and, if required, a revised safety plan has been approved.

Application equipment shall be as recommended by the manufacturer. The spray equipment, tanks, hose, brooms, rollers, coaters, squeegees etc. shall be thoroughly cleaned, free of foreign matter, oil residue and water prior to applying the penetrating crack sealer to the bridge deck.

If the concrete deck requires repair, crack sealing shall not begin until all concrete deck repairs and any other corrective actions needed have been completed, and the repaired concrete has cured. The contractor shall furnish the Engineer with written instructions for surface preparation requirements, and a representative of the manufacturer shall be present to ensure that the surface condition meets the manufacturer's requirements.
All surfaces to be treated shall be thoroughly cleaned to remove dust, dirt, oil, wax, curing components, efflorescence, laitance, coatings, and other foreign materials. Cleaning equipment shall be fitted with suitable traps, filters, drip pans and other devices to prevent oil and other foreign material from being deposited on the concrete surface. The manufacturer or manufacturer's representative shall approve the use of chemicals and other cleaning compounds to facilitate removal of these foreign materials before use. All surfaces to be treated shall meet the manufacturer's requirements for surface condition prior to crack sealer application.

The penetrating crack sealer treatment shall be applied within 48 hours following surface preparation.

The concrete surface and ambient temperature during application shall be in the range of 50 degrees F to 90 degrees F unless otherwise approved by the Engineer or as specified by the manufacturer. The application temperature may affect the curing properties of the materials.

The sealer shall be applied at the application rate specified by the manufacturer. If a manufacturer application rate is not specified, the application rate shall not be less than 80 square feet per gallon. The material shall be spread evenly across the surface of the concrete in a manner to prevent puddles or excessive concentrations of material in small areas. If the applicator is unable to complete the entire application continuously, the location where the application was stopped shall be noted and clearly marked.

When applying the treatment, the contractor shall protect the adjoining surfaces of the structure that are not to be sealed by masking them off or by other means.

A system approved by the Engineer shall be used to provide a watertight seal for existing bridge joints and bridge drainage systems. Care shall be taken to not damage the water tight systems, during construction operations.

Broadcast sand shall be applied following the placement of a penetrating crack sealer on the bridge decks, approach slabs, and anchor slabs. Broadcast sand shall be applied within the period of time and at the rate recommended by the manufacturer. If there is no manufacturer recommended period of time for application of broadcast sand; the sand shall be applied within 20 minutes of penetrating crack sealer placement. If there is no manufacturer recommended application rate for broadcast sand; the rate of application shall be 2 pounds per square yard. If the sand does not adhere to the sealer, an additional application shall be made. All non-adhered sand shall be removed from the bridge deck, approach slabs, and anchor slabs by power sweeping. All non-adhered sand shall be removed from the bridge deck joints by vacuuming the joints.

Vehicular traffic shall only be allowed on the treated deck after meeting manufacturer’s requirements and upon approval by the Engineer.

Areas of penetrating crack sealer not applied according to the manufacturer’s recommendations or the specifications shall be removed and replaced at no cost to the Department.

4.0 Method of Measurement:

Penetrating Deck Sealer (Methacrylate) item will be measured by the square yard of bridge deck covered with sealant material.

5.0 Basis of Payment:

The accepted quantities of Penetrating Deck Sealer (Methacrylate) item, measured as provided above, will be paid for at the contract unit price per square yard, which price shall be full compensation for the work, complete in place, as shown on the project plans, as specified herein, and as directed by the Engineer.

No additional payment will be made for the development and preparation of the program for public safety associated with the use of the sealant material, the cost being considered as included in the price of the contract item.

No additional payment will be made for broadcast sand, the cost being considered as included in the price of the contract, regardless of how many applications the contractor applies in order for the sand to adhere to the sealer.

ITEM 6018101 – REINFORCED CONCRETE BOX CULVERT (SEAL CRACKS)

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment to repair existing cracks in the reinforced concrete box culvert (RCBC) and/or wingwalls as shown on the plans or as directed by the Engineer. Work includes crack assessment, excavation, routering (as required), sealing by epoxy injection or filling with non-shrink grout, concrete finishing, backfilling, and protection/curing to restore watertightness and durability. Every effort shall be made to avoid damage to the RCBC. Any damage caused shall be repaired at no additional cost to the Department. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

All materials used for crack repair shall be specifically manufactured and supplied for use in reinforced concrete structures. Unless otherwise directed by the Engineer, the acceptable repair materials include:

- Epoxy injection resins conforming to ASTM C881, suitable for sealing fine or structural cracks.
- Non-shrink cementitious grouts conforming to ASTM C1107, suitable for filling larger cracks, routed cracks, or deteriorated areas.

All products shall be non-metallic, non-corrosive, and used in accordance with the manufacturer’s recommendations. Ancillary materials (e.g., injection ports, surface seal compounds, primers, bonding agents) shall be compatible with the primary repair product. Only potable water shall be used for cleaning or mixing.

Construction Requirements:

- Clean cracks of dirt, debris, laitance, and other contaminants using a method appropriate for the selected repair material.
- Where required, router cracks to create a suitable reservoir for sealant or grout.
- Seal cracks using epoxy injection, non-shrink grout, or other approved material in accordance with the manufacturer’s recommendations.
- Finish repairs flush with adjacent concrete surfaces and free of excess material.
- Protect and cure repairs in accordance with manufacturer’s instructions.
- Construction techniques may vary provided the completed work results in a durable, watertight repair acceptable to the Engineer.

Method of Measurement:

Sealing cracks in the reinforced concrete box culvert will be measured by the linear foot of crack sealed, measured along the centerline of the repaired crack after completion and acceptance.

Basis of Payment:

The accepted quantities of culvert crack sealing, measured as provided above, will be paid for at the contract unit price per linear foot. This price shall be full compensation for furnishing all labor, materials, tools, equipment, crack preparation, epoxy injection or grout placement, surface finishing, curing, and incidentals necessary to complete the work as specified.

No separate payment will be made for maintenance or protection of the repair areas during construction. These costs shall be considered incidental to the work.

ITEM 6018102 – REINFORCED CONCRETE BOX CULVERT (REPAIR CRACKS)

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment required to repair cracks and localized deteriorated areas of the reinforced concrete box culvert (RCBC) and/or wingwalls as shown on the plans or as directed by the Engineer. Work shall include removal of unsound concrete, installation of reinforcing steel and/or dowels where directed, epoxy filling of dowel holes, placement of cementitious patching materials, crack sealing, finishing, and curing/protection. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

Materials for crack and patch repair shall be specifically manufactured for use in reinforced concrete structures and installed per manufacturer’s recommendations. Acceptable materials include:

- Epoxy adhesives and crack repair resins conforming to ASTM C881 for dowel anchorage and crack sealing.
- Non-shrink cementitious grouts or patching mortars conforming to ASTM C1107 for filling cracks, dowel holes, or patching deteriorated areas.

All products shall be non-metallic (unless reinforcing steel), non-corrosive, and compatible with each other. Only potable water shall be used for cleaning or mixing.

Construction Requirements:

- Remove unsound or deteriorated concrete as required to reach sound material.
- Clean cracks, surfaces, and drilled holes of dust, debris, and contaminants by a method suitable for the repair material being used.
- Where directed, install reinforcing dowels at the size, spacing, and embedment shown on the plans or as approved by the Engineer. Secure dowels with epoxy adhesive.
- Fill cracks, dowel holes, and patch areas with epoxy, non-shrink grout, or other approved cementitious repair material in accordance with the manufacturer's instructions.
- Finish repaired areas flush with surrounding concrete and cure/protect in accordance with the manufacturer's recommendations.
- Construction methods may vary provided the completed repairs are structurally sound, watertight, and acceptable to the Engineer.

Method of Measurement:

Repair of cracks in the reinforced concrete box culvert will be measured by the linear foot of crack repaired, measured along the centerline of the repaired crack after completion and acceptance.

Basis of Payment:

The accepted quantities of RCBC crack repair, measured as provided above, will be paid for at the contract unit price per linear foot. This price shall be full compensation for furnishing all labor, materials, tools, and equipment; removal of unsound concrete; dowel installation and epoxy anchorage; surface preparation; crack sealing; cementitious patching; finishing; curing; protection; and all incidentals necessary to complete the work.

No separate payment will be made for cleaning, leak control, access, or protection of repaired areas during construction; such costs shall be considered incidental to the work.

(605STRF, 8/21/25)

SECTION 605 STEEL REINFORCEMENT:

605-3.01 **General:** the sixth paragraph of the Standard Specifications is revised to read:

Reinforcement shall be accurately fabricated and placed as shown on the plans and shall be firmly held in place by wire ties at all intersections and splices with 16 gauge or heavier tie wires and with precast mortar blocks or ferrous metal chairs, spacers, metal hangers,

supporting wires, or other approved supports at the spacing necessary to maintain the specified clearance of the reinforcing steel. The use of pebbles, broken stone, concrete masonry blocks, brick, metal pipe, or wood blocks will not be permitted for the purpose of spacing or support.

The contractor has the option to submit a request detailing the use of contract or buried bars, including supporting drawings, for review and approval by the Engineer.

For reinforcement spacing is greater than or equal to 12 inches in either the longitudinal or transverse directions, the reinforcement shall be tied at a minimum every alternate intersection.

Where reinforcement spacing is less than 12 inches in either the longitudinal or transverse directions, the reinforcement shall be tied at a minimum, every third intersection.

The contractor may submit a request detailing an alternative tying plan for review and approval by the Engineer.

(608 PANEL, 06/19/25)

SECTION 608 SIGN PANELS:

608-1 Description: of the Standard Specifications is revised to read:

The work under this section shall consist of furnishing and installing sign panels in accordance with the details shown on the plans and the requirements set forth herein.

The sign panels shall be of the following types:

(A) Extruded Aluminum Sign Panels with Direct-Applied, or Demountable Characters;

(B) Flat Sheet Aluminum Sign Panels with Direct-Applied, Electronic-Cut, or Screen-Printed Characters;

(C) Warning, Marker, and Regulatory Sign Panels;

(D) Route Shields for Installation on Sign Panels; and/or

(E) EXIT ONLY Panels for Installation on Sign Panels.

608-2.02 Extruded Aluminum Sign Panels with Direct-Applied, Digitally-Imaged, or Demountable Characters: the title and the third paragraph of the Standard Specifications are revised to read:

608-2.02 Extruded Aluminum Sign Panels with Direct-Applied or Demountable Characters:

The letters, numerals, symbols, borders and other features of the sign message shall be direct-applied, or demountable, and shall conform to the requirements of Subsection 608-2.08 or Subsection 608-2.09 of the specifications.

608-2.03 Flat Sheet Aluminum Sign Panels with Direct-Applied, Digitally Imaged, Electric-Cut or Screen-Printed Characters: the title and the fifth paragraph of the Standard Specifications are revised to read:

608-2.03 Flat Sheet Aluminum Sign Panels with Direct-Applied, Electronic-Cut, or Screen-Printed Characters:

Messages shall be reflectorized white or, if called for on the plans, opaque black, and shall be produced by either screen printing, direct-applying, or electronic cutting, as specified under Subsections 608-2.09 of the specifications.

608-2.05 Route Shields (For Installation on Sign Panels): The first paragraph of the Standard Specifications is revised to read:

Route shields may be demountable or direct-applied.

608-2.06 EXIT ONLY Panels (For Installation on Sign Panels): the first paragraph of the Standard Specifications is revised to read:

EXIT ONLY panels may be demountable or direct-applied. Demountable EXIT ONLY panels shall be attached to the sign panel with self-plugging aluminum blind rivets.

608-2.10 Digitally-Imaged Characters: the title and the text of the Standard Specifications are revised to read:

608-2.10 Digital Printing of Signs:

Digital printing of signs shall utilize a matched component system, including appropriate software and drivers in accordance with an APL certified retroreflective sheeting manufacturer's warranty requirements. Finished signs shall consist of a UV-protective clear overlay applied to the entire face of the sign. Any overlays shall also be compatible with the retroreflective sheeting manufacturer's matched component system and warranty. Digitally printed signs shall conform to the requirements of ASTM D4956 for daytime and nighttime requirements, as well as the requirements of the Department's Traffic Engineering Guidelines and Processes (TGP) 380 and Section 1007 of the specifications.

ITEM 6080110 – REMOVE AND REINSTALL SIGN:

Description:

The work under this item shall consist of the removal of the existing sign panels, post and foundation and the reinstallation of the existing sign panels at a new location on a new sign post and foundation.

Construction Requirements:

Removal of the existing sign shall be per Section 202 of the Standard Specifications. Reinstallation of the existing sign panel shall be completed per Section 608-3; however, Section 608-3.01, which relates to new sign fabrication, shall not apply. Installation of the new sign post and foundation shall be per Section 607 of the Standard Specifications.

Method of Measurement:

REMOVE AND REINSTALL SIGN work will be measured as a single unit for each sign assembly removed and reinstalled.

Basis of Payment:

The accepted quantities of each sign assembly removed and reinstalled, measured as provided above, will be paid for at the contract unit price per each assembly.

(610PNT, 8/21/25)

SECTION 610 PAINTING:

610-3.02 (A)(2) Steam Cleaning: the first paragraph of the Standard Specifications is revised to read:

All dirt, grease, loose chalky paint, and other foreign material which has accumulated on previously painted surfaces shall be removed with a steam cleaning apparatus prior to all other phases of cleaning. It is not intended that sound paint be removed by this process. After steam cleaning, any paint which has become loose, curled, lifted, or loses its bond to the preceding coat or coats shall be removed to sound paint or metal surface by the contractor a t no additional cost to the Department.

610-3.02 (A)(3) Hand Cleaning: of the Standard Specification is revised to read:

Manual or powered wire brushes, hand scraping tools, power grinders, or sandpaper shall be used to remove all dirt, loose rust, mill scale, and paint which is not firmly bonded to the surfaces.

610-3.05 (A)(1) General: the second paragraph of the Standard Specifications is revised to read:

All paints used shall be appropriately chosen from among the types described in Subsection 1002-2 of the specifications and shall conform to the requirements given therein.

610-3.05 (B) Concrete Surfaces: the first paragraph of the Standard Specifications is revised to read**:**

When painting is specified on the plans or in the special provisions, paint conforming to the requirements of Subsection 1002-2.03 of the specifications, shall be applied to the exposed concrete surfaces tabulated below, except that sidewalks, appurtenant curbs, downdrains, and bridge deck surfaces shall be excluded.

(701LUMPSUM, 03/20/25)

SECTION 701 MAINTENANCE AND PROTECTION OF TRAFFIC:

701-1 Description: the first paragraph of the Standard Specifications is revised to read:

The work under this section shall consist of providing flagging services and pilot trucks, and furnishing, installing, maintaining, moving and removing barricades, warning signs, lights, signals, cones, temporary pavement markings and other traffic control devices to provide safe and efficient passage through and/or around the work and to protect workers in or adjacent to the work zone. The work shall be done in accordance with the requirements of Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and the associated Arizona Department of Transportation supplement. When referred to herein, these documents will be referred to as MUTCD and associated ADOT Supplement.

701-1 Description: the third paragraph of the Standard Specifications is revised to read:

Any traffic control plan included in the project plans shall govern unless an alternate plan, acceptable to the Engineer, is submitted by the contractor. If no traffic control plan is provided or if the contractor desires to deviate from the provisions for maintaining traffic as described in this section, it shall submit to the Engineer for the approval of a proposed sequence of operations and a compatible method of maintaining traffic.

701-3.01 General: of the Standard Specifications is modified to add:

At the preconstruction conference the contractor shall submit a log of all existing signs within the limits of the construction zone. The Department will verify the accuracy of the sign log. Throughout the duration of this project, all existing traffic signs shall be maintained by the contractor in accordance with Subsection 701-3.11 of the specifications.

The contractor shall coordinate all traffic control work on this project with any adjoining or overlapping projects during the construction activities. This may include barricade placement necessary to provide a uniform traffic progress.

701-4.01 **General:** the first paragraph of the Standard Specifications is revised to read:

The Department will reimburse the contractor for the work of maintaining and protecting traffic on a lump sum basis except for the following Elements of Work:

1) Changeable Message Boards

2) Temporary Impact Attenuation Devices

3) Temporary Concrete Barrier

4) Specialty Signs

5) Local Enforcement Officers

6) DPS Officers

7) Civilian Flaggers

8) Pilot Vehicles

9) Truck-Mounted and Trailer-Mounted Attenuators

No additional measurement for payment to the contractor will be made for any Elements of Work other than those listed above.

701-4.01 **General:** the first sentence of the third paragraph of the Standard Specifications is revised to read:

Elements of Work except those reimbursed under the lump sum item will be measured for payment as follows:

701-4.03(E) **Limitation of Measurement:** the second paragraph of the Standard Specifications is revised to read:

For all items except those reimbursed under the lump sum item, measurement will be made after the initial installation and once weekly thereafter for items in continuous use and at any other times changes are made in the use of traffic control elements listed under Subsection 701-4.01(B) of the specifications. The contractor shall notify the Engineer when any changes are made in the use or location of traffic control elements.

701-4.04 **Measurement of Work Elements:** Sub-paragraphs (D), (G), (H), (J), (K), (L), and (N) of the Standard Specifications are hereby deleted.

701-5 Basis of Payment for Elements of Work (Complete–in-Place): of the Standard Specifications is modified to add:

All elements of work necessary for the work of maintaining and protecting traffic, excluding Elements of Work listed in Subsection 701-4.01 of the specifications, shall be reimbursed as a single, complete item of work, which price shall be considered full compensation for the work, complete in place, including furnishing, removing, setting up, relocating, taking down, maintaining, and storing the devices.

Lump sum traffic control will be paid according to the schedule shown in Table 701-5 of the specifications.

Table 701-5
Payment Schedule for Lump Sum Traffic Control

Percent of Total Contract Amount Earned (Excluding Mobilization and Traffic Control)	Allowable Percent of Lump Sum Price for Maintenance and Protection of Traffic
5	20
25	40
50	60
75	80
90*	100
*Or substantial completion	

If the Engineer determines that the final contract amount earned will fall between 75 and 100 percent of the original contract amount, lump sum traffic control will be compensated at 100 percent once final acceptance is achieved.

In the event the Department revises the contract in accordance with Subsection 104.02 of the specifications due to a significant change in the character of work, and the revisions impact the Maintenance and Protection of Traffic, the lump sum price for Maintenance and Protection of Traffic will be adjusted as part of the contract revision under the relevant supplemental agreements.

No adjustments to the lump sum price for Maintenance and Protection of Traffic will be made for suspension of work for seasonal restrictions.

Revisions in the phasing of construction or maintenance of traffic control operations, requested by the contractor, may require traffic control to be installed in accordance with standards and/or designs other than those included in the plans. Such revisions or modifications to the traffic control plans shown in the contract shall be submitted by the contractor for approval by the Engineer. No additional payment will be made for the revised plans requested by the contractor.

701-5.03 Temporary Preformed Markings for Pavement: of the Standard Specifications is hereby deleted.

701-5.05 Obliterate Pavement Marking: of the Standard Specifications is hereby deleted.

701-5.06 Temporary Pavement Markers and Chip Seal Pavement Markers: of the Standard Specifications is hereby deleted.

701-5.07 Obliterate Pavement Markers: of the Standard Specifications is hereby deleted.

701-5.08 Temporary Delineators: of the Standard Specifications is hereby deleted.

701-5.10 Temporary Removal or Covering of Signs: of the Standard Specifications is hereby deleted.

701-6.01 Quantity Variances: of the Standard Specifications is revised to read:

Payment for variances in quantities of items listed in Subsection 701-4.01 of the specifications shall be in accordance with Subsection 104.02 of the specifications, except that, for decreases in quantities, Temporary Concrete Barrier (In-Use) will be considered as a major item.

701-6.03 Channelization Devices: of the Standard Specifications is hereby deleted.

701-6.04 Temporary Signs: of the Standard Specifications is hereby deleted.

701-6.06 Flashing-Arrow Panels, and Changeable Message Boards: the title and text of the Standard Specifications are revised to read:

701-6.06 Changeable Message Boards:

The accepted quantities of changeable message boards, measured as provided above, will be paid for at the unit bid price per day, which price shall be full compensation for the work, complete, including any grading and furnishing, operating, maintaining, and relocating the boards on the work site.

(701FLGSV, 03/20/25)

SECTION 701 MAINTENANCE AND PROTECTION OF TRAFFIC:

701-3.13 Flagging Services: of the Standard Specifications is revised to read:

Flagging services shall consist of 1) Department of Public Safety (DPS) officers with agency vehicles, 2) local enforcement officers with agency vehicles, 3) local enforcement officers without agency vehicles, and 4) civilian flaggers. Local enforcement officers and DPS officers include those who meet the requirements of a Peace Officer under ARS Title 38, generally including anyone certified by the Arizona Peace Officer and Training Board. If available, DPS officers shall be used on Interstate Highways and Urban Freeways. Local enforcement

officers will include uniformed officers from local police, tribal police, sheriff departments, or any other agencies that meet the requirements of a Peace Officer under ARS Title 38, generally including anyone certified by the Arizona Peace Officer and Training Board. An agency vehicle is defined as an agency-issued vehicle that meets the requirements of ARS Title 28. If local enforcement officers do not have access to an agency vehicle, a personal vehicle may be used, but it shall have a make and model similar in appearance of an agency vehicle, and shall be equipped with front and rear-facing red and blue lights. The personal vehicle, when applicable, shall be presented to the Engineer for acceptability prior to its use on the project by local enforcement officers. Approval of the personal vehicle will be at the sole discretion of the Engineer.

The contractor shall be responsible to procure DPS officers, local enforcement officers, and civilian flaggers. The Engineer will determine the types and the number of hours of flaggers as needed based on the project needs. Quantities shown on the traffic control plans and/or bidding schedule are approximate only and prepared for bidding purposes. When procuring DPS officers and local enforcement officers, the contractor shall contact the relevant agency at least two days, excluding weekends and holidays, before flagging services will be required. Such contact must be made between the hours of 7:00 A.M. and 5:00 P.M. (M.S.T.).

In the event that local enforcement officers or DPS officers are temporarily unable to provide flagging services, the contractor shall ensure that traffic control is maintained and all personnel are protected, either by providing civilian flaggers or through other means as approved by the Engineer. No adjustments to the contract will be allowed for any delays resulting from the unavailability of local enforcement officers or DPS officers.

Local enforcement and DPS officers shall not work more than 12 consecutive hour work shift without the permission of the State Construction Engineer unless an emergency situation exists which, in the opinion of the Engineer, requires that the officer remain in the capacity of a flagger.

The contractor shall furnish verification to the Engineer that all civilian flaggers have completed a recognized training and certification program. Flaggers certified by the American Traffic Safety Services Association (A.T.S.S.A.) or by the National Safety Council will be acceptable. Certification through other programs offering flagger training may be allowed upon by the State Construction Engineer’s approval. Flagger certification must be current and updated at least once every four years.

701-6.07 Pilot Services, and Flagging Services: of the Standard Specifications is revised to read:

The accepted quantities of pilot vehicles, measured as provided above, will be paid for at the unit bid price for pilot vehicles with driver, which price shall be full compensation for the work, complete in place including, but not limited to, furnishing and maintaining the vehicle and furnishing the driver. Any hour worked after the eight hour regular time will be considered straight-time and will not be paid as overtime pay.

The accepted quantities of flagging services provided by the local enforcement officers (with agency vehicle), DPS officers, and civilian flaggers, measured as provided above, will be paid for at the contract unit price, which price shall be full compensation for the work, complete in

place, including the agency vehicle. Any hour worked after the eight hour regular time will be considered straight-time and will not be paid as overtime pay.

The accepted quantities of flagging services provided by the local enforcement officers without an agency vehicle, measured as provided above, will be paid for at the contract unit price, which price shall be full compensation for the work complete in place. Any hour worked after the eight hour regular time will be considered straight-time and will not be paid as overtime pay. No measurement or payment will be paid for the vehicle, regardless of the type of vehicle is an agency vehicle or not, the cost being considered as included in the price of the contract item.

In addition, the Department has estimated an additional two hours of travel time per officer per day in the quantities shown in the bid schedule. However, if more than two hours of travel time per day is required, such additional hours will be compensated in accordance with the requirements of Subsection 104.02 of the specifications if approved by the State Construction Engineer. Travel time is considered to be supplementary to the hours worked by the officer during a work shift.

(703DTRMKR, 07/21/22)

SECTION 703 DELINEATORS AND MARKERS:

703-2.10 Flexible Delineator Posts: the fourth paragraph of the Standard Specifications is revised to read:

The flexible delineator posts shall be pigmented throughout the entire cross- section (or entire cross-section of the outer layer of multi-layered, multi-material units) so as to produce a uniform color which is an integral part of the material. The posts shall exhibit negligible color fading after 1,000 hours of Xenon Arc Exposure (ASTM G155). The posts shall be made of durable, ultraviolet-resistant, impact-resistant, non-warping, non-metallic, polymeric materials designed for a minimum of 120 months of outdoor service life.

(704TPMF, 10/17/24)

SECTION 704 THERMOPLASTIC PAVEMENT MARKINGS:

704-2.02(C) Filler: of the Standard Specifications is revised to read:

The filler shall be a white calcium carbonate or equivalent filler.

(705PVMRK, 09/21/23)

SECTION 705 PREFORMED PLASTIC PAVEMENT MARKING: the title and text of the Standard Specifications are revised to read:

SECTION 705 PREFORMED POLYMER PAVEMENT MARKING:

705-1 Description:

(A) General:

The work under this section shall consist of furnishing all materials, preparing the pavement surface and applying preformed reflectorized pavement marking tape, or preformed thermoplastic longitudinal edge lines, skip lines, stop lines, yield lines cross walks, legends and symbols to the pavement in accordance with the details shown on the project plans and the requirements of the specifications.

All markings shall be reflectorized with glass beads or other retroreflective particles uniformly distributed throughout the entire cross section and bonded to the top surface of the material. All markings shall comply with the retroreflectance requirements of Subsection 705-2.05 of the specifications. When glass beads are used to reflectorize markings, the glass bead properties shall also comply with Subsection 705-2.06 of the specifications.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted.

Preformed pavement marking tape or preformed thermoplastic longitudinal edge lines, skip lines, stop lines, yield lines, cross walks, legends, and symbols shall be limited to the following applications unless otherwise specified in the contract documents:

A list of approved manufacturers and distributors of Type I, II, III, and IV preformed pavement marking materials is shown on the Department's Approved Product Lists (APL). The most recent version is available on the Department's website from the ADOT Research Center, through its Product Evaluation Program.

(B) Preformed Pavement Markings - Type I (Permanent):

Type I shall be a general purpose high durability retroreflective, pliant, polymer layer for preformed long line and short line striping, symbols, and legends to be used for final permanent pavement markings. Type I shall be capable of performing as specified herein when subjected to high traffic volumes and severe wear conditions such as repeated shear action from crossover or encroachment on edge and channelization lines, starting, stopping, and turning movements.

(C) Preformed Pavement Markings - Type II (Temporary – Removable):

Type II shall be a removable preformed retroreflective pavement marking capable of performing as temporary pavement markings for long line and short line striping, symbols, and legends for the duration of a normal construction season. It shall be a nonmetallic mixture

of durable materials and shall be capable of being removed intact or in large pieces either manually or with a recommended roll up device. Type II shall be used on finished pavement surfaces where traffic control or channelization through the construction zone is temporary requiring removal prior to final pavement markings.

(D) Preformed Pavement Markings - Type III (Temporary –Nonremovable):

Type III shall be a nonremovable preformed retroreflective layer on a conformable metallic backing capable of performing as temporary long line pavement markings for the duration of a normal construction season. Type III shall be used in construction zones where removal is unnecessary due to placement of future paving courses or where pavement will be removed, obliterated or abandoned at the completion of the project.

(E) Preformed Thermoplastic Pavement Markings - Type IV (Permanent):

Type IV shall be a high durability, retroreflective, pliant, preformed thermoplastic product to be used for final permanent symbols, legends, and short line (transverse) stripes. Type IV shall be capable of performing as specified herein when subjected to high traffic volumes and severe wear conditions.

705-2 Materials:

705-2.01 Preformed Pavement Markings - Type I (Permanent):

(A) General:

Type I preformed pavement marking material shall consist of a prefabricated white or yellow layer of specified thickness and width that shall be capable of being affixed to Portland Cement Concrete or non-bleeding bituminous pavements per the manufacturer's requirements, either on the pavement surface or, when specified on the plans, inlaid into a cutout groove. The preformed polymer layer shall be weather resistant and through normal traffic wear shall show no appreciable fading, lifting, loss of skid resistance, or shrinkage or significant tearing, roll back, or other signs of poor adhesion throughout the useful life of the marking.

The polymer layer without adhesive shall be a minimum of 0.065 inch thick. The polymer layer as supplied shall be of good appearance, free of cracks and discolorations, and the edges shall be clean-cut and well-defined. The polymer layer shall have a precoated, factory-applied pressure sensitive adhesive backing. A surface preparation primer shall also be applied if recommended by the manufacturer. Whether the adhesive is precoated or supplied separately, the adhesive shall allow the polymer layer to be repositioned on the pavement surface to which it is applied before permanently fixing it in its final position with a downward pressure.

When an Oreo typecontrast pavement marking material is to be used as shown on the plans, the entire length of the pavement marking shall have 2 inch-wide borders on each side across the width of the reflective base pavement marking (white, yellow or other color). These borders shall be non-reflective and black in color. The contrast pavement marking material,

including the borders, shall conform to the requirements for durability, skid resistance, thickness, and adhesion specified in Subsection 705-2.01(C) of the specifications.

When a Lead-lag type contrast pavement marking material is to be used as shown on the plans, Lead-lag pavement markings shall be used only on Portland Cement Concrete pavement surfaces, or as directed by the Engineer.

All white and yellow Type I pavement markings shall be warrantied by the manufacturer to retain color and adherence to the pavement, and to retain a minimum retroreflectance of 100 millicandelas/m^2/lux for a minimum of two years for symbols, legends, and transverse pavement markings, and six years for longitudinal pavement markings. The warranty period shall begin after all pavement markings are installed and accepted by the Department. Failure to meet the specified retroreflectance on at least 90 percent of the longitudinal pavement marking in any 1000-foot segment, or 90 percent of a legend, symbol, or transverse pavement marking shall be considered a complete failure of that marking. The warranty shall state that the manufacturer will provide new material to replace defective Type I markings at no additional cost to the Department. The warranty shall also state that the replacement material shall conform to these specifications. The contractor shall submit a copy of the manufacturer's warranty to the Engineer along with the certificate of compliance required in Subsection 705-1(A) of the specifications.

(B) Composition Requirements:

The preformed pavement marking material shall consist of the following components:

Minimum Percent by Weight	
Resins and Plasticizers	20
Reflective Glass Beads*	20*
*Applicable only when glass beads are used to reflectorize Type I markings.	

(C) Physical Requirements:

(1) Color:

The pigments shall be selected and blended to provide a white or yellow marking layer which conforms to standard highway colors, when tested according to ASTM D6628, throughout the expected life of the layer.

(2) Bend Test:

The polymer layer shall be sufficiently flexible so that at a temperature of 78 to 82 degrees F an unmounted piece of material (without adhesive and paper backing), 3 by 6 inches in size, may be bent over a 1 inch mandrel until the end faces are parallel and 1 inch apart without showing any fracture lines in the uppermost surface.

(3) Tensile Strength:

The polymer layer (without adhesive or paper backing) shall have a minimum tensile strength of 40 pounds per square inch when a specimen 6 inches long by 1 inch wide is tested in accordance with the requirements of ASTM D638. The rate of pull of the test shall be 0.25 of an inch per minute. The test shall be conducted at a temperature between 70 and 80 degrees F. The elongation shall be no greater than 75 percent.

(4) Pull Test:

A 6-inch long by 1-inch wide section of the polymer layer (without adhesive and paper backing) shall support a dead load weight of 4 pounds for not less than five minutes at a temperature between 70 and 80 degrees F.

(5) Abrasion Resistance:

The polymer layer shall have a maximum loss in weight of 0.25 grams in 500 revolutions when abraded according to ASTM D4060.

(6) Skid Resistance:

The surface of the material shall provide a minimum resistance value of 45 British Pendelum Number (BPN) when tested according to ASTM E303.

705-2.02 Preformed Pavement Markings - Type II (Temporary - Removable):

Type II preformed pavement markings shall be a nonmetallic mixture of conformable materials and pigments intended for marking applications where removability is required. The marking material shall be white or yellow retroreflective layer conforming to standard highway colors.

The markings shall be precoated with a pressure sensitive adhesive capable of adhering to roadway surfaces under climatic and traffic conditions normally encountered in the construction work zone when applied in accordance with the manufacturer's instructions and without the use of heat, solvents or other additional adhesives. Newly applied markings shall be capable of being immediately exposed to traffic without pickup or distortion by vehicles. The markings shall be weather resistant and through normal traffic wear shall show no appreciable fading, lifting, shrinkage, tearing, and loss of skid resistance, roll back or other signs of poor adhesion throughout the useful life of the marking.

Temporary pavement markings shall be removable from asphalt and concrete pavement intact or in large sections by following the manufacturer's instructions. It shall be removable, either manually or with a rollup device, at pavement temperatures above 40 degrees F without the use of heat, solvents, grinding or sand blasting. Visible adhesive residue remaining after removal of temporary pavement markings shall be easily removable without damaging or scarring the pavement surface and without the use of solvents or grinding.

Pavement marking material without adhesive shall be a minimum of 0.045 inches thick. When supplied, the material shall be of good appearance, free from cracks, and edges shall be true, straight, and unbroken.

705-2.03 Preformed Pavement Markings - Type III (Temporary – Nonremovable):

Type III preformed pavement markings shall be a retroreflective layer on a conformable metallic backing intended for marking applications where removal is not a requirement. The marking material shall be white or yellow conforming to standard highway colors.

The markings shall be precoated with a pressure sensitive adhesive capable of adhering to roadway surfaces under climatic and traffic conditions normally encountered in the construction work zone when applied in accordance with the manufacturer's instructions and without the use of heat, solvents or other additional adhesives. Newly applied markings shall be capable of being immediately exposed to traffic without pickup or distortion by vehicles. The markings shall be weather resistant and through normal traffic wear shall show no appreciable fading, lifting, shrinkage, tearing, loss of skid resistance, roll back or other signs of poor adhesion throughout the useful life of the marking.

705-2.04 Preformed Thermoplastic Pavement Markings - Type IV (Permanent):

(A) General:

Preformed thermoplastic pavement markings shall be a resilient white, yellow, or other color thermoplastic material, composed of an ester-modified resin in conjunction with pigments, binders and glass beads that have been factory-produced as a finished product. The markings shall be resistant to the detrimental effects of motor fuels, lubricants, hydraulic fluids, and antifreeze. Preformed thermoplastic pavement markings shall be weather resistant and, through normal traffic wear, shall show no appreciable fading, lifting, or shrinkage or significant tearing, roll back, loss of skid resistance, or other signs of poor adhesion throughout the useful life of the marking.

The markings shall be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The marking shall have resealing characteristics, such that it is capable of fusing with itself or previously applied, worn thermoplastic pavement markings when heated with a common propane torch. The material shall not be brittle and must be sufficiently cohesive and flexible for one person to carry without danger of fracturing the material prior to application. Surface preparation primer shall also be applied if recommended by the manufacturer.

The material shall be supplied at a minimum thickness of 0.090 inches (90 mils). Symbols, legends, and short lines shall be capable of being affixed to bituminous and Portland cement concrete pavements by the use of the heat of a common propane torch. Any preheating requirements shall also be met by the use of the heat of a common propane torch and as recommended by the manufacturer.

Type IV preformed thermoplastic markings shall be suitable for use for one year after the date of manufacture when stored in accordance with the manufacturer’s recommendation. Type IV marking materials supplied to the jobsite shall clearly display the date of manufacture, and shall be applied within one year of this date.

(B) Composition Requirements:

The preformed thermoplastic pavement marking material shall consist of the following components:

Component	Percent by Weight	
	White	Yellow
Binder (Min.)	18	18
Titanium dioxide (Min.)	10	-----
Yellow Lead-Free Pigment (Min.)	-----	1.5
Reflective glass intermix beads	30 – 45	30 – 45

(C) Physical Requirements:

(1) Color:

The pigments shall be selected and blended to provide a white or yellow preformed marking that conforms to standard highway colors, when tested according ASTM D6628, throughout the expected life of the preformed marking.

(2) Bend Test:

The preformed thermoplastic shall have flexibility at 50 degrees F such that when a specimen, measuring 6 inches long by 1 inch wide, is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 degrees per second) over a 1 inch mandrel, no cracking occurs in the test specimen. The specimen shall be conditioned prior to testing at 50 ± 2 degrees F for a minimum of four hours. At least two specimens tested shall meet the flexibility requirements at 50 degrees F for a passing result.

(3) Tensile Strength:

The preformed thermoplastic material shall have a minimum tensile strength of 150 pounds per square inch when tested in accordance with the requirements of ASTM D638. The rate of pull of the test shall be 10 to 12 inches per minute. The test shall be conducted at a temperature between 70 and 80 degrees F. The elongation shall be no greater than 20 percent.

(4) Bond Test:

The material shall exhibit a bond strength to Portland Cement Concrete pavement equal to or exceeding 180 pounds per square inch when tested at 73 ± 3 degrees F in accordance with the ASTM D4796.

(5) Abrasion Resistance:

The plastic film shall have a maximum loss in weight of 0.25 grams in 500 revolutions when abraded according to ASTM D4060.

(6) Skid Resistance:

The surface of the material shall provide a minimum resistance value of 45 BPN when tested according to ASTM E303.

(7) Impact Resistance:

When tested in accordance with ASTM D256, Method A, a 1 inch by 1 inch by 6 inch sample shall not break when an impact energy of at least 1.0 joule is applied. The test specimen shall be prepared in accordance with ASTM D4960 and shall not be notched.

705-2.05 Retroreflectance:

All white and yellow pavement marking materials shall have the following minimum retroreflectance values when measured by the Department, using an LTL-X Delta Retrometer or similar device, within 30 days after application to the roadway surface:

Table 1	
Long Line Markings	**Retroreflectance (millicandelas/m^2/lux)**
White	500
Yellow	300

Table 2	
Symbols, Legends, Short Lines	**Retroreflectance (millicandelas/m^2/lux)**
White	350
Yellow	200

For sections determined to be deficient in retroreflectivity, the pavement markings shall be removed in a manner approved by the Engineer, and new markings shall be re-applied in accordance with the manufacturer's recommendations. For long lines, the limits of reapplication shall start from the location of a passing test, across the failure area(s), to the next passing test location. The minimum length of reapplication shall be 0.4 miles. For symbols, legends and short lines, the entire defective unit shall be reapplied.

705-2.06 Glass Bead Properties:

(A) General Requirements:

When glass beads are used to achieve retroreflectivity, the beads shall be manufactured from glass of a composition designed to be highly resistant to traffic wear and to the effects of weathering.

(B) Physical Requirements:

(1) Roundness:

The roundness of the glass beads shall be determined in accordance with the requirements of ASTM D1155. A minimum of 75 percent of the beads shall be waterwhite true spheres free from imperfections of all types including air inclusions, film, scratches, clusters, and surface scoring.

(2) Refractive Index:

The glass beads used with the preformed pavement marking material shall have a minimum refractive index of 1.50 when tested by a liquid immersion method (Becke Line Method or equivalent, as specified in ASTM C1648) at a temperature of 25 ± 5 °C.

(3) Gradation:

The gradation of the glass beads shall conform to AASHTO M 247 Type 1 and Type 3.

(4) Heavy Metal Concentration:

Heavy metal concentration in glass beads shall be as specified in the following table, when tested by an independent laboratory, approved by the Engineer, using EPA Method 3052 and EPA Method 6010B. A Certificate of Analysis conforming to Subsection 106.05 of the specifications shall be furnished to the Engineer prior to use.

Heavy Metal	Concentration
Arsenic	< 75 ppm
Antimony	< 75 ppm
Lead	< 100 ppm

705-3 Construction Requirements:

The contractor shall install preformed pavement markings at the locations shown on the project plans, as specified in the Special Provisions, or as directed by the Engineer. Preformed marking tape shall be applied manually or with the tape applicators approved by the tape manufacturer. All markings shall be applied in accordance with the manufacturer's recommendations and as specified herein. Preformed pavement markings shall not be applied over other markings or old paint unless specified in the project plans, directed by the Engineer, or allowed by the manufacturer and approved by the Engineer prior to application.

Preformed pavement markings shall be applied to surfaces that are free of moisture and thoroughly cleaned of loose, foreign or other material that may adversely affect bonding. The contractor shall remove all dirt, dust, grease, oil or other detrimental material from the road surface. The method of cleaning the surface is subject to approval by the Engineer and shall include sweeping and the use of high pressure air spray.

When preformed markings are to be applied to new Portland Cement Concrete pavement, any curing compound present shall be removed by means of a high pressure water jet or sandblasting, followed by sweeping and high pressure air spray. The curing compound shall be removed at least 2 inches beyond the entire perimeter of each marking to be installed. In addition, a manufacturer approved primer-sealer shall be applied to both old and new Portland cement concrete pavement prior to application of preformed markings. The primer-sealer shall be applied at the manufacturer's recommended application rates prior to placing the preformed marking. The primer-sealer shall be allowed to set up for the manufacturer's specified cure or evaporation time, and shall be free of solvent and water when the preformed marking is applied.

Preformed pavement markings shall be applied immediately after the surface has been prepared or as soon as possible after placement and completion of new pavement. When Type I, II, or III markings are used, the road surface temperature, at the time of application, shall not be less than 60 degrees F and rising and the pavement surface shall be absolutely dry. For Type III temporary markings, the weather conditions noted above may be waived, at the Engineer's discretion, to obtain a traffic stripe prior to allowing traffic to traverse the roadway. Type II markings shall not be installed within 24 hours of any rainfall. In addition, if the possibility of rain is anticipated, as predicted by the National Weather Service, during the time required by the Engineer for installation of Type II markings, the contractor shall apply primer-sealer prior to application of the marking, regardless of the type or age of pavement surface. Type IV markings shall be applied in accordance with the manufacturer’s recommendations for minimum temperature.

Despite the specified or recommended minimum surface temperature and surface condition, the Engineer may, at any time, require that the work cease or that the work day be reduced in the event that weather conditions, either existing or expected, are anticipated to have an adverse effect upon the preformed pavement marking.

The contractor shall use butt splices only and shall not overlap the marking material. All markings shall be thoroughly tamped with approved mechanical tampers.

For preformed thermoplastic pavement markings requiring heat application on asphaltic concrete surfaces, the materials shall be applied using the propane torch method recommended by the manufacturer.

The contractor shall immediately correct all misalignments when so ordered by the Engineer. The misaligned portions shall be removed and reinstalled in accordance with these specifications. All areas marked with preformed pavement markings shall be ready for traffic immediately after application.

Type II or Type III temporary pavement markings shall be maintained and replaced when necessary by the contractor until they are covered with the next overlay course or are removed because they are no longer applicable. The temporary pavement markings shall be removed immediately when no longer needed for traffic control or when the temporary pavement markings will be in conflict with the succeeding traffic pattern. This removal includes the removal of pronounced markings caused by the adhesive across lanes, transitions or tapers. Removable temporary marking material shall not be burned or ground off. Preformed pavement markings shall be removed by methods recommended by the

manufacturer and approved by the Engineer. Residual adhesive, ghosting, shadows or pavement scarring which might cause confusion during darkness or adverse weather conditions shall be removed immediately by the contractor when so ordered by the Engineer.

When Type I permanent pavement markings for final symbols, legends, and short lines are specified, Type I or Type IV pavement markings may be used, at the option of the contractor.

For the contrast pavement markings, the lead (white) reflective pavement markings shall be placed in 10-foot sections followed by 10-foot lag (non-reflective black) pavement markings. Lead-lag pavement markings shall be aligned longitudinally. Maximum gaps between the white and black reflective pavement markings shall not exceed 1 inch. All raised pavement markers should be placed midway between two white skip lines. Lead-lag pavement markings may be used only on the main line for lane line markings.

When the plans require Type I preformed long line or short line pavement markings to be placed in a groove, the contractor shall construct the sawcut groove in accordance with the requirements of the special provisions.

The application of preformed pavement markings shall be in accordance with the recommendations of the manufacturer of the material and these specifications. After application the pavement markings shall be immediately ready for exposure to traffic.

705-4 Method of Measurement:

Measurement of preformed pavement marking long lines and short lines will be made by the linear foot along the centerline of the pavement line and will be based on a 4-inch wide stripe. Measurement for pavement lines with a plan width greater or less than the basic 4 inches will be made by the following method:

$$\frac{\text{Plan Width of Striping (inches)} \times \text{Linear Feet}}{4 \text{ (inches)}}$$

If Oreo type contrast pavement markings are used, the Plan Width of Striping (inches) will be the width of the reflective base pavement marking (white, yellow or other color) plus the 2 inch-wide borders on each side across the width of the reflective base pavement marking. Measurement for Oreo type pavement markings will be based on the combined width of the black and white markings.

Preformed pavement marking symbols, such as diamonds; single, double, or triple arrows; or freeway arrows, will be measured by each unit applied, regardless of configuration. Each pavement symbol, as shown on the plans, will be considered a unit.

Preformed pavement marking legends, defined as a complete letter grouping such as "SCHOOL," "XING," "STOP," “RR,” or "ONLY", will be measured by each unit applied. Each pavement legend, as shown on the plans, will be considered a unit.

Preformed pavement route-to-route freeway legends, defined as complete number and directional letter groupings, will be measured by each unit applied. Each complete route-to-route freeway legend, as shown on the plans, will be considered a unit.

Removal of curing compound from new Portland cement concrete pavement and the application of primer-sealer shall each be measured by the linear foot for striping lines regardless of width, or unit each for symbols and legends, and in accordance with the items of work established in the bid schedule.

705-5 Basis of Payment:

The accepted quantities of preformed pavement markings, measured as provided above, will be paid for at the contract unit price for the type specified in the bidding schedule, which price shall be full compensation for the item, complete in place, including necessary pavement cleaning, primer, removal of Type II temporary markings, and maintaining Types II and III temporary markings in construction work zones.

No additional payment will be made for placement of Type I long line and short line pavement markings in sawcut grooves, the costs being considered as included in the contract price for the marking. Measurement and payment for sawcut grooves shall be in accordance with the special provisions.

Payment will be made for Type I and Type IV permanent pavement symbols, legends and short lines at the contract unit price, regardless of whether Type I or Type IV pavement markings are used.

The accepted quantities for removal of curing compound from new Portland cement concrete pavement and the application of primer-sealer, measured as provided above, will be paid for at the respective contract unit prices, under the items of work established in the bid schedule.

When Type II or III temporary preformed pavement markings are required for maintaining traffic through a construction work zone and are approved for use by the Engineer, but are not listed as pay items in the bidding schedule, they will be paid for in accordance with the provisions of Subsection 109.04 of the specifications.

Additional payment will be made for replacement of Type II or Type III temporary preformed pavement markings when the contractor is required by the Engineer to install marking materials on distressed pavements or during adverse weather conditions and subsequent failure occurs. Distressed pavement conditions are defined as alligator cracking, bleeding, or spalling of bituminous pavements and spalling of PCC pavements. Adverse weather conditions are defined as any occurrence where application is required at pavement temperatures less than 60 degrees F or when precipitation occurs within 24 hours before or after application. The Department will pay for the replacement, where failures occur, at the contract unit price for the initial occurrence.

In the event a second failure occurs when markings have been reapplied on distressed pavements or under weather conditions described above, the Engineer shall determine if conditions require primer, alternate methods of marking, or reapplication of preformed markings. Preformed markings will be paid for at the contract unit price. Primers or other

methods of markings deemed necessary by the Engineer to remedy second failures will be paid for in accordance with the provisions of Subsection 109.04 of the specifications.

(708 PTVCT, 07/17/25)

SECTION 708 WATERBORNE PAVEMENT MARKINGS:

708-2.01(D) Quantitative Requirements of Mixed Paints: the viscosity row of the Table 708-1 of the Standard Specifications is revised to read:

Table 708-1

	White	Yellow
Viscosity: Krebs Units at 77 ± 1˚ F, ASTM D562	70 - 95	70 - 95

(709PGMNT, 08/18/22)

SECTION 709 DUAL COMPONENT PAVEMENT MARKINGS:

709-2.02(A) Composition: of the Standard Specifications is revised to read:

The epoxy resin material shall be within the following compositional requirements:

Component	Percent by Weight	
	White	**Yellow**
White Pigment (Titanium Dioxide)	18 - 25	10 - 17
Organic Yellow Pigment	---	7 - 10
Epoxy Resin	75 - 82	73 - 83

The white pigmented pavement marking material shall be tested in accordance with ASTM D3723 and shall conform to the requirements specified in ASTM D476 (Type II).

709-2.02(K) Color: of the Standard Specifications is revised to read:

The colors of the applied markings shall comply with the requirements specified in ASTM D6628 and shall conform to the following:

The white color shall match Federal Test Standard Number 595B, color chip no. 37875; and

The yellow color shall match Federal Test Standard Number 595B, color chip no. 33583.

709-2.02(L) Yellowness Index: of the Standard Specifications is revised to read:

The initial yellowness index value of the white material shall be tested in accordance with ASTM E313. The sample shall be cured for 72 hours at room temperature (75 ± 2 degrees F) prior to testing. The initial yellowness index shall not exceed a value of 8.

The yellowness index value of the white material shall be tested in accordance with ASTM E313 and ASTM G154. The sample shall be cured for 72 hours at room temperature (75 ± 2 degrees F) and then exposed in the QUV chamber for 72 hours and 500 hours respectively. The yellowness index values shall not exceed the values shown in the table below.

Exposure Time (hours)	Yellowness Index
72	15
500	27

(710SWZ, 05/20/2021)

SECTION 710 SMART WORK ZONE SYSTEMS: the title and text of the Standard Specifications is revised to read:

SECTION 710 SMART WORK ZONE SYSTEM:

710-1 Description:

The work under this section shall consist of furnishing and installing a fully functional, automated, and portable Smart Work Zone (SWZ) system; operating, maintaining, and servicing the portable SWZ system; and relocating and removing various components of the system, as specified herein and in accordance with the project plans and specifications.

710-1.01 Abbreviations:

Wherever the following abbreviations are used in these specifications, the contract, or in other contract documents, they are to be construed the same as the respective expressions represented:

CCTV	Closed-Circuit Television
CMB	Changeable Message Board
DMS	Dynamic Message Sign
DLMS	Dynamic Lane Merge Subsystem
FMS	Freeway Management System
GPS	Global Positioning System
GPSLS	Global Positioning System Location Sensor
GUI	Graphical User Interface
O&M	Operations and Maintenance
PDA	Power Distribution Assembly
PTZ	Pan, Tilt, and Zoom
QWS	Queue Warning Subsystem

SAB	Smart Arrow Board
SFS	Speed Feedback Sign
SWZ	Smart Work Zone
TCP	Traffic Control Plan
TDC	Traffic Data Collection
TDCS	Traffic Data Collection Subsystem
TEES	Truck Entry/Exit Subsystem
TMCS	Traffic Monitoring Camera Subsystem
TOC	Traffic Operations Center
TTS	Travel Time Subsystem
VSL	Variable Speed Limit
VSLS	Variable Speed Limit Sign
WZDx	Work Zone Data Exchange

710-1.02 Definitions:

Wherever the following definitions are used in these specifications, the contract, or in other contract documents, the intent and meaning shall be interpreted as follows:

(A) SWZ System:

The SWZ system is a broad range of portable communications-based information and electronic technologies placed in and around work zones to enhance transportation and improve safety and mobility. The real-time information and automation provided by the SWZ system is used by contractors and transportation agencies to alter traffic control strategies and provide traveler information to better inform motorists of upcoming traffic conditions, allow motorists the opportunity to alter their travel routes, and/or modify the travel behavior within work zones. The SWZ system is comprised of one or multiple SWZ subsystems that operate together.

(B) SWZ Area:

The SWZ area is the area where SWZ field devices are deployed near, within, and/or around the project and work zone limits.

(C) Active Work Space:

The active work space is the area that is anticipated to have the largest concentration of field personnel within the work zone during a specific day or construction shift. The personnel working in active work space are exposed to the dangers of an errant vehicle.

(D) Work Zone:

The work zone is the entire area in which traffic control, which includes, static signs and SWZ field devices are implemented.

(E) Traffic Data Collection Subsystem (TDCS):

The TDCS is a component of the SWZ system that is capable of detecting, processing, and disseminating real-time traffic information such as vehicle speeds, traffic volumes, and travel time/delay within and in advance of the work zone for use by other SWZ subsystems, third-party traveler information systems, and/or to archive work zone traffic conditions. This subsystem could also include the use of third-party data, solely, or in combination with site specific gathered data.

(F) Queue Warning Subsystem (QWS):

The QWS is a component of the SWZ system that uses the real-time TDCS information to determine traffic queue lengths. The QWS warns approaching travelers of slowed or stopped traffic conditions through warning messages displayed on SWZ CMBs. When a queue begins to form, the QWS automates the display of warning messages on the associated SWZ CMB displays located in advance of the anticipated queueing areas. The QWS also alerts field personnel and remote SWZ system operators of the real-time queueing conditions.

(G) Dynamic Lane Merge Subsystem (DLMS):

The DLMS is a component of the SWZ system that uses the real-time TDCS information and SWZ CMBs, in advance of a lane closure, to instruct approaching travelers when to merge. When traffic volumes are high or a potential queueing condition is detected by the DLMS, the DLMS automates the display of messages that instruct drivers to merge later. When traffic volumes are low and a potential queueing condition is not detected in advance of the lane closure, the DLMS automates the display of messages that instruct drivers to merge earlier.

(H) Travel Time Subsystem (TTS):

The TTS is a component of the SWZ system that uses the real-time TDCS information and SWZ CMBs, in advance of the work zone, to determine the approximate travel time between the SWZ CMB location and another fixed point as shown on the project plans, or at the end of the work zone. The TTS automates the display of messages on each CMB to inform the drivers of the associated travel time (at predetermined locations) through the work zone. In addition, the TTS is capable of comparing real-time TDCS information to historical travel time information to estimate the approximate travel delay that a driver can expect, when traveling through the work zone.

(I) Traffic Monitoring Camera Subsystem (TMCS):

The TMCS is a component of the SWZ system that uses closed-circuit television (CCTV) cameras to provide real-time video streams that are monitored on-site by field personnel using a mobile display device and/or remotely by the Engineer, Traffic Operations Center (TOC) operators, and the District to view real-time roadway traffic conditions within the work zone.

(J) Variable Speed Limit (VSL) Subsystem:

The VSL subsystem is a component of the SWZ system that uses TDCS real-time traffic information and variable speed limit signs (VSLS) to dynamically reduce or increase

regulatory speed limits in the work zone. Regulatory speed limits are dynamically reduced in the active work space. Regulatory speed limits are dynamically increased within the same area of the work zone when the construction personnel are not present.

(K) Truck Entry/Exit Subsystem (TEES):

The TEES is a component of the SWZ system that uses the real-time TDCS information to determine the entry of construction vehicles to the roadway from the work area and warns approaching travelers of slow-moving vehicles ahead. The TEES may warn drivers by displaying a message on a SWZ CMB or by illuminating flashing warning lights attached to a static sign. Once the construction vehicle has entered the roadway and a pre-determined amount of time has passed, the TEES no longer displays the warning message until it detects another construction vehicle entering the roadway from the work area. The TEES also alerts the field personnel and remote SWZ system operators when the system is activated.

(L) SWZ System Software:

The SWZ system software is a software platform that can receive, store, analyze, send, and display real-time information from the TDCS, QWS, DLMS, TTS, TMCS, TEES and VSL subsystem field devices, Department furnished data from roadway sensors, or other third-party sources. The SWZ system software provides the required automation, GUI, user device applications, and system reports required to operate and maintain each respective SWZ subsystem deployed within the SWZ area.

710-2 Materials (Equipment, Workers, Devices and Facilities):

The SWZ system shall contain the selected SWZ subsystems including all necessary auxiliary field device equipment, the SWZ system software for each selected SWZ subsystem, the communications and third-party data services, system operations, maintenance, and support services to provide a complete SWZ system. The selected SWZ subsystems may consist of one or more of the following: TDCS, QWS, DLMS, TTS, TMCS, TEES, VSL, or other type of subsystem as indicated on the plans or specifications.

The auxiliary field device equipment shall include all appurtenances such as traffic detectors, changeable message boards, CCTV cameras, variable speed limit signs, static SWZ signs, device trailers, mounting assemblies, communications and geolocating devices, power assemblies, wiring, and accessories.

The communications services shall include all services needed for connecting the field devices to the remote SWZ system software and connecting the SWZ system software to the internet and communications service provider networks that the system users and Department representatives have access to for connectivity into the SWZ system.

The system operations, maintenance, and support services shall include all services required to deploy, integrate, configure, test, operate, and maintain the SWZ system communications and geolocating devices, third-party data services, field devices, and software for continuous operations in and around the project work zones.

710-2.01 General Requirements:

The contractor shall submit the SWZ system and the associated field devices as part of the TCP and safety plan.

Except as specified herein, all equipment, procedures used by workers, devices, and facilities shall conform to the requirements of Subsection 701-2 of the specifications.

(A) Documentation:

The contractor shall submit a SWZ material proposal at the preconstruction conference or when reasonably feasible. If the contractor's SWZ material proposal is not submitted at the preconstruction conference, each SWZ subsystem submittal shall be shown in the work schedule.

The contractor's SWZ material proposal shall include the following and any other necessary documents to fully describe the proposed SWZ subsystems and field device items:

(1) Certificate of Compliance:

A Certificate of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted for each SWZ subsystem assembly. The Department reserves the right to require Certificates of Compliance for the subsystem functionality provided within the SWZ system software, for each field device assembly component, and for third-party data sources.

The Department reserves the right to perform independent evaluations or tests on any SWZ System Software, equipment, or service supplied by the contractor in the work zone.

(2) SWZ Technician Credentials:

The credentials of the contractor's designated SWZ technician(s) skilled in the operation of all the SWZ system equipment and software shall be submitted to the Engineer for approval. There shall be a designated SWZ technician for each shift of work and the qualifications of the designated technician(s) shall demonstrate the following:

(a) The technician is locally available while the SWZ system is in use and able to respond to the SWZ system issues in person within one hour of notification.

(b) The technician has the training and experience necessary to perform all SWZ field equipment deployments, device configurations, system testing, trouble shooting, maintenance, and component level repair or replacement.

(c) The technician is employed by a contractor that has a minimum of 3 years of experience deploying SWZ technologies on projects with roadway construction valued at one million dollars or more, or has relevant experience that is approved by the Engineer.

If the contractor would like to replace one or more SWZ technician(s), then the new technician(s) shall be approved by the Engineer prior to assuming these duties on the project.

(3) Communications Site Assessment:

A communications site assessment shall be submitted to the Engineer for approval at least six weeks before mobilizing field equipment for deployment in the project area. The communications site assessment shall identify the specific communications service(s) that the contractor has selected for connecting the field devices to the remote SWZ system software and for documenting the contractor's approach for verifying these communications services are available within the project limits.

The results of this communications site assessment shall be summarized and indicate that the selected communications approach(es) provides sufficient data network capacity and coverage needed for proper SWZ system operations within and in advance of the work zone.

(4) System Configuration Plan:

The contractor shall submit a SWZ system configuration plan to the Engineer for approval at least six weeks before mobilizing field equipment for deployment in the project area. The plan shall describe the system logic and field device layout concepts to be used. The SWZ system configuration plan shall demonstrate the following:

(a) The general deployment locations of each subsystem element within the SWZ area such as, but not limited to, TDC, CMB assembly, VSLS assembly, traffic monitoring camera assembly, SAB assembly, SFS assembly, GPSLS assembly, and auxiliary SWZ equipment for each type of anticipated TCP. The plan shall include the role played by each of these device locations in the overall deployment concepts of the SWZ system.

(b) The operational logic used for each required SWZ subsystem (i.e., TDCS, QWS, DLMS, TTS, TMCS, TEES and VSL) that describes the system's response when various traveler information and system logic thresholds are reached. This shall include, but is not limited, to the following:

(i) Systems that generate alert messages, how the alert messages are received (via text and email), and the Department representatives that will receive the alert messages.

(ii) System logic configuration thresholds, limits, controls, and display messages that have been coordinated with the Department for initial system configuration.

(iii) Configuration thresholds, limits, controls, and display messages that can be changed by system users via the SWZ software

interface, and system safeguards that are in place to limit the ranges and messages that are selectable by these system users.

(c) Documentation and specification details for the deployed devices that support access or receipt of the WZDx information.

(5) SWZ System Operations and Maintenance Plan:

The contractor shall submit a SWZ system O&M plan to the Engineer for approval at least four weeks before mobilizing field equipment for deployment in the project area. The SWZ system O&M plan shall identify the contractor's means and methods for deploying, operating, and maintaining the SWZ system equipment and software. The SWZ system O&M plan shall demonstrate the following:

(a) A qualified SWZ technician locally available and assigned for every work shift. Contact information shall be provided for each SWZ technician so that the Engineer can notify the technician(s) of a SWZ system issue and the SWZ technician can respond to the SWZ system issue in person within one hour of notification.

(b) A customer support phone number, email address, and days/hours of support provided for the SWZ system software and each associated subsystem.

(c) A process in place for maintaining continuous operations of SWZ field devices, including but not limited to:

(i) Replacing batteries as needed.

(ii) Refueling fuel tanks before the fuel runs out.

(iii) Moving equipment to keep pace with moving or changing construction activities, changing traffic queuing conditions, TCP changes, or as directed by the Engineer or contractor.

(iv) Adjusting SWZ system software configurations, setting different software logic thresholds and limits, setting days/times and system activities with the software scheduler, selecting different display messages to be posted on the SWZ CMB, changing user alerts and recipients receiving the alerts, changing system software users and levels of access, and making changes to the system logic, configuration, and users in general.

(v) Maintaining a SWZ system equipment maintenance log for all associated O&M activities.

(vi) Repairing or replacing equipment that has been damaged, stolen, or has become an inoperable component of the overall SWZ system.

(6) SWZ Software User Training Curriculum Outline and Schedule:

A SWZ Software User Training Curriculum Outline and Schedule shall be submitted for each SWZ subsystem assembly. The training curriculum and contractor provided training shall reflect the actual needs of the Department's system users and field personnel and include the following sections:

(a) Theory of Operation
(b) Field Device Layout Concepts and Associated Data Collection
(c) System Logic, Limits, and Safeguards
(d) GUI and Operating Procedures
(e) System User Access Levels and Permissions
(f) System Alerts and Types of Alert Messages
(g) Generating System Data Reports and Graphics
(h) SWZ Software Customer Support Services
(i) Procedures for Reporting Concerns or Requesting Changes with the SWZ Software Configuration and Field Device Deployments

The contractor shall coordinate with the Engineer to identify mutually agreed upon training dates and times for each training class.

(7) SWZ Software User Access Privileges and Alert Messages:

The contractor shall coordinate with the Engineer and provide a SWZ User Access Privileges submittal that clearly identifies each Department 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 each Department stakeholder by first and last name, the associated types of system generated alerts they will receive and the method (email or text) the alert is received.

(8) SWZ System Data Reports:

The contractor shall submit an example set of each required SWZ system data report to the Engineer for approval at least two weeks before deploying SWZ field equipment in the project area. The example set shall demonstrate the contractors proposed format for each report, the types of data included within each report, the frequency of the data within the report (i.e., once per minute, five minutes, etc.), and the time period to by covered by each individual report (i.e., each report represents a days' worth of data, a weeks' worth of data, etc.). The SWZ system data reports shall be submitted on a weekly basis, in the approved format, and contain the actual work zone data collected during that week of SWZ system deployment.

In accordance with the ADOT Work Zone Safety & Mobility Policy, to monitor and measure work zone impacts during construction, the SWZ system data report shall include the following sets of data:

(a) Travel delay
(b) Queue lengths

(c) Crash occurrences

Each SWZ system data report shall include the geolocation(s) that the data is associated with.

If the intelligence of the SWZ subsystem(s) required in the project plans and specifications does not generate the above sets of data and the associated reports, then the SWZ system provided shall have the ability to support manual entry of this data and the ability to archive and generate reports of the manually entered data.

The contractor's SWZ system data reports shall include any other information that may be required for each type of SWZ subsystem deployed.

(9) Subsystem Acceptance Testing Procedures:

A system acceptance testing procedures submittal shall be submitted for each SWZ subsystem assembly to demonstrate proper operation of all subsystems and device configurations. The testing procedures shall include the following:

(a) Initial System and Device Testing

Initial system and device testing is intended to demonstrate that each subsystem component provided and its associated configurations for the project work zone successfully achieves all of the required functionality, performance, and reporting requirements.

(b) Individual SWZ Field Device Location Testing

Individual SWZ field device location testing is intended to verify that a specific field device is configured correctly, communicating, and operating properly when moved in the SWZ area after initial system setup.

(10) Certificate of Analysis:

A Certificate of Analysis conforming to the requirements of Subsection 106.05 of the specifications shall be submitted for each SWZ subsystem assembly each time the contractor deploys an associated field device component and completes the associated tests in accordance with the approved subsystem acceptance testing procedures.

(B) Auxiliary SWZ Equipment:

Auxiliary SWZ equipment is considered incidental components that may be required to achieve a fully functional SWZ system. The following are some common types of auxiliary equipment and their associated minimum requirements:

(1) SWZ System Communications:

All SWZ systems shall provide the necessary communications devices and services to connect the field devices to the remote SWZ system software and to connect the SWZ system software to the internet and communications service provider networks. The SWZ system

communications shall provide continuous service to the devices of the system operators, users, and Department representatives.

The SWZ system communications devices and services provided shall be in accordance with the approved communications site assessment, as described in Subsection 710-2.01 (A)(3) of the specifications. The SWZ system communications devices and services shall provide sufficient data network capacity and coverage needed for proper SWZ system operations within the SWZ area.

(2) Safety Protocols for Smart Devices:

All SWZ systems shall be deployed in accordance with the following safety protocols for smart devices:

(a) Each device shall be up to date prior to being deployed with latest release of operating system (OS)\firmware and relevant security patches. Update releases shall be tracked and deployed routinely to keep device OS\firmware current.

(b) WiFi networks in use shall only be configured to use WPA2 PSK w/ AES and use complex passphrases; diceware passphrases are preferred and rotating pass-phrases is a good practice.

(c) SNMP capabilities shall be disabled if not intended for use; SNMPv3 shall be configured for use if SNMP is needed (when device is capable).

(d) Syslog shall be configured and used to monitor deployed devices.

(e) Telnet shall be disabled, SSH shall be enabled and restricted to SSHv2 only. Keys used for encryption shall be at least 2048 bit.

(f) Trusted Certificate Authority generated SSL\TLS certificates shall be used on web management UIs to ensure end to end encryption. If possible, the following SSL\TLS version, SSLv 1, 2, 3, and TLS v1.0,1.1 shall be disabled.

(g) The use of strong ciphers shall be required for both TLS and SSH encryption, any medium or low strength ciphers (i.e. RC4, DES\3DES, etc.) shall be disabled or kept at a lower priority.

(h) Default\built-in account usernames and passwords shall be changed to follow complexity settings. (e.g. default admin). If possible, these built-in accounts shall be disabled.

(i) Users or administrators shall be provided with unique accounts for login purposes and shall be configured to comply with the following complexity settings, when the device is capable:

i Previous 24 passwords remembered and can't be re-used

ii 30-day maximum password age before resetting is required

iii 15 character minimum length (Diceware pass phrase preferred)

iv Passwords must use at least 2 numbers and 2 special characters

v Must be stored encrypted, and cannot be stored using reversible encryption

vi Account must be locked-out for 30 minutes upon 3 invalid logon attempts

(j) The gateway (i.e., cell modem/router) that is handling the remote communications to the local smart devices shall be secured by setting up firewall rules so that the gateway communicates only with the pre-defined devices, known trusted IP addresses, and keeps out unauthorized traffic.

(3) Geolocation of SWZ System Devices and Information:

The geolocation of intelligent field devices and data sets reported shall be provided using a GPS device accurate within 3 meters (9.84 feet) of the actual location or by some other method for geolocating devices and information, as approved by the Engineer. The GPS device used for the TDC, CMB, VSLS, traffic monitoring camera, SAB, SFS, and intelligent field device assemblies, shall be considered auxiliary SWZ equipment that is incidental to these device locations. The GPSLS assembly is a standalone GPS device location and shall not be considered an auxiliary integral part of any other intelligent field device.

All SWZ systems shall provide a GUI that displays the actual deployed location of each intelligent device, including the standalone GPSLS assemblies, that is communicating with the SWZ system software using the approved geolocating method.

All third-party information used by the SWZ system software and used within SWZ system data reports shall include the geolocation(s) associated with the information provided.

(4) SWZ Field Device Power Supply:

All SWZ system field devices shall be independently powered and shall be powered for operation continuously during all deployment periods within the SWZ area and shall be provided with a means for alerting remote system users and operators of a low power or loss of power condition.

The SWZ system shall have the ability to archive and generate reports on power condition alert messages received from SWZ system field devices deployed within the SWZ area. This archived data shall include the associated device name and number and shall include the date and time of each alert message.

All power supplies shall have capacity to support at least 72 hours of continuous operation. Examples of acceptable power supplies include:

(a) Battery Powered Devices: The contractor shall replace batteries and equipment as necessary for continuous SWZ system operations in accordance with the approved SWZ system O&M plan.

(b) Solar Power Distribution Assemblies: The contractor shall clean and adjust the position of solar panels and replace equipment as necessary for continuous SWZ system operations in accordance with the approved SWZ system O&M plan.

(c) Gas and Liquid Fuel Powered Devices: The contractor shall replace fuel and equipment as necessary for continuous SWZ system operations in accordance with the approved SWZ system O&M plan.

(5) Portable Field Device Trailers:

When SWZ system field devices are mounted to portable trailers deployed within the SWZ area the portable trailers shall meet the following requirements:

(a) Trailer Number: All trailers deployed within the SWZ area shall have a trailer number that is easily visible from the first vehicle travel lane adjacent to the deployed trailer. All trailers deployed in the SWZ area shall have different numbers to uniquely identify and differentiate one trailer from another.

(b) Towing Support: The trailers shall be street legal, have functioning brake lights when being towed, support driving speeds up to 65-mph when being towed, and be equipped with a standard size trailer hitch.

(c) Leveling Legs: The trailers shall have adjustable leveling legs that can support the weight of a fully loaded trailer with the tires removed. The adjustable height of the legs should be able to raise the trailer wheels a minimum of four inches between the bottom of the wheels and a flat/level surface that the trailer is standing on. Each leg shall be independently adjustable to support leveling the base of the trailer when deployed on a sloped area.

(d) Wind Loading: With all stabilizing devices in place, the fully loaded trailer shall be capable of withstanding wind gusts up to 80-mph without overturning or changing orientation.

(e) Display Tile Angle Adjustments: When mounting brackets are provided for CMBs and VSLSs, they shall be provided with the ability to adjust the tilt angle of the display board in accordance with the display board manufacturer’s recommendations for the optimal viewing angle.

(f) Pole Rotating Adjustments: When fixed-height or telescoping poles are provided to increase the mounting height of cameras and traffic detection devices, they shall be provided with the ability to rotate the pole, from ground level, in support of adjusting the horizontal viewing/detection angle of the device(s) mounted towards the top of the pole.

(g) Equipment Enclosures: When equipment enclosures are provided to house electronic communications, geolocating devices, local processing devices, batteries, and other PDA components, they shall be provided with security provisions to deter and delay theft of equipment inside the housing.

(6) Static Traffic Control Devices for SWZ Field Equipment:

Static traffic control devices for SWZ field equipment shall consist of furnishing, installing, maintaining, moving and removing barricades, warning signs, cones, and other traffic control devices, per the approved traffic control plans, through or around the SWZ system field device locations deployed in or adjacent to the work zone. The static traffic control devices for SWZ field equipment shall be provided in accordance with the requirements of Part VI of the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and the current edition of the associated ADOT MUTCD supplement.

710-2.02 SWZ Traffic Data Collection (TDC) Location:

Each TDC location shall be equipped with all detecting, processing, and disseminating equipment and functionality needed to deliver real-time traffic information. The traffic data collected, shall be practicable for the SWZ subsystem identified such as vehicle speeds, traffic volumes, and occupancy within an area of the roadway that provides a single direction of travel with one or more travel lanes for that location. If required in the project plans or special provisions, additional traffic data shall be collected for vehicle classification and all data shall be collected “per lane”. Each TDC location shall include all of the equipment necessary to provide a fully functional component of the SWZ system.

A minimum of two TDC locations shall be provided to generate the required travel time and travel delay traffic information; unless a third-party traveler information system is used to provide the travel time/delay for the location (i.e. a single route between two or more points).

All TDC locations shall provide the SWZ system software the following information:

(A) Vehicle speeds averaged together within a maximum time interval of one-minute.

(B) Traffic volume count for each one-minute time interval.

(C) Travel time and delay information for each one-minute time interval, computed by the TDC locations, or computed by the SWZ system software based on the per minute data provided by the TDC location(s).

(D) For each location that has multiple travel lanes, the traveler information provided shall be a representative sample of all travel lanes combined as one for the same direction of travel.

(E) All real-time traffic information provided to the SWZ system shall be time stamped with the actual date and time, with a tenth of a second accuracy, for each one-minute time interval sent to the SWZ system software.

Each TDC location deployed within the SWZ area shall have a number to uniquely identify that location and differentiate it from all other TCD locations. When the TDC location is comprised of field traffic sensor(s) the location number shall be displayed within the SWZ system software and shall be easily visible by field personnel at the location were the device(s) are mounted. When the field traffic sensors are mounted on a portable field device trailer the TDC location number used shall be the same number that is visible on the trailer.

When third-party data is used to collect the traffic data, the location number only needs to be displayed within the SWZ system software to identify each location where the data is being collected. When third-party data is used to collect travel-times between two locations, a unique route number shall be used to identify the location of each different route.

All TDC locations shall provide additional traveler information, as necessary, to achieve the functionality of other SWZ subsystems required by the project plans and specifications.

710-2.03 SWZ Changeable Message Board (CMB) Assembly:

Each SWZ CMB assembly shall be equipped with a changeable message display board and all processing and disseminating equipment, and have the functionality required to deliver automated messages generated by the SWZ system software to the travelling public via the message display boards of the SWZ CMB assembly. Each SWZ CMB assembly shall include all of the equipment necessary to provide a fully functional component of the SWZ system.

Each SWZ CMB assembly shall be provided and deployed in accordance with the MUTCD requirements for portable changeable message signs (MUTCD Section 6F.60) and the following:

(A) The SWZ CMB shall support the display of three lines of eight characters per line or should consist of a full matrix display.

(B) The letter height used for SWZ CMB messages should be a minimum of 18 inches, unless deployed on low speed facilities (40-mph or less). Shorter letter sizes may be used for SWZ CMB messages when deployed on low speed facilities provided that the message is legible from at least 650 feet.

(C) Under low light level conditions, the SWZ CMB shall automatically adjust its light source to meet the MUTCD legibility requirements and not impair the driver’s vision.

(D) The SWZ CMB shall be provided with a default message state that is used when communications with the SWZ system software are lost for a predetermined amount of time. The default message state shall support the following options:

(1) A blank display with no message,
(2) A pre-approved message for the project and location, and
(3) Continue to display the last message received from the SWZ system software.

(E) The SWZ CMB shall be provided with local manual override controls. When the local manual override controls are used, the SWZ CMB shall:

(1) Display only traffic operational, warning, and guidance information, and shall not be used for advertising messages.

(2) Display messages that consist of no more than two phases, and a phase should consist of no more than three lines of text. Each phase should be capable of being understood by itself, regardless of the order in which it is read. Messages should be centered within each line of the legend. If more than one portable SWZ CMB is simultaneously legible to road users, then only one of the signs should display a sequential message at any given time. Each phase shall have a display time of at least two seconds and the sum of the display times for both of the phases should be a maximum of eight seconds.

Each SWZ CMB assembly deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other SWZ CMB locations. When the SWZ CMB assembly is mounted on a portable field device trailer the SWZ CMB assembly number used shall be the same number that is visible on the trailer.

710-2.04 SWZ Traffic Monitoring Camera Assembly:

Each traffic monitoring camera assembly shall be provided with all cameras, video processing and disseminating equipment, and functionality needed to provide real-time viewing of traffic and roadway conditions, from a remote location and through the SWZ system software. Each SWZ traffic monitoring camera assembly shall provide the ability to view all approaching directions of the roadway, relative to the camera assembly deployment location, using one or more cameras mounted at an appropriate mounting height for viewing the roadway and traffic conditions. Each SWZ traffic monitoring camera assembly shall include all of the equipment necessary to provide a fully functional component of the SWZ system.

All SWZ traffic monitoring camera assembly locations shall provide the following camera functionality:

(A) Ability to provide a video stream from each camera that can be viewed remotely from the SWZ system software GUI interface display window.

(B) Ability to adjust the field of view (i.e., pan, tile, and zoom) of each camera, remotely from the SWZ system software, locally at the camera assembly location, or both.

(C) Ability to support both daytime and nighttime operations. During daytime operations a color video stream shall be provided. During nighttime operations the camera shall function in low light conditions and support color, black-and-white, or both types of video streams.

(D) Ability to adjust the camera iris and focus manually, via auto-Iris and auto-focus functionality, or both.

(E) Ability to set and select camera pre-set positions, one for each approaching direction of the roadway, relative to the camera assembly deployment location, when a pan-tile-zoom functionality is provided for remote operations.

(F) Ability to adjust the mounting height of each camera.

Each traffic monitoring camera assembly location deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other traffic monitoring camera assembly locations. When the traffic monitoring camera assembly is mounted on a portable field device trailer the traffic monitoring camera assembly location number used shall be the same number that is visible on the trailer.

710-2.05 SWZ Variable Speed Limit Sign (VSLS) Assembly:

Each VSLS assembly shall be provided with a changeable message display board for posting regulatory speed limits and all processing and disseminating equipment and functionality needed to deliver SWZ system software generated speed limits to the traveling public via the changeable message display board of the VSLS assembly. Each VSLS assembly shall include all equipment necessary to provide a fully functional component of the SWZ system.

Each VSLS assembly shall be provided and deployed in accordance with the MUTCD requirements for Regulatory Speed Limit Signs (MUTCD Section 2B.13) and the following:

(A) The VSLS display shall be the R2-1 sign type, per the MUTCD, with white colored lighted pixels that display the speed limit message on a black background.

(B) The speed limits shall be displayed in multiples of 5 mph.

(C) Under low light level conditions, the VSLS display shall automatically adjust its light source to meet the MUTCD legibility requirements and not impair the driver’s vision.

(D) The VSLS display shall be provided with a default message state that is used when communications with the SWZ system software is lost for a predetermined amount of time. The default message state shall support the following options:

(1) Blank display with no speed limit message,

(2) Pre-approved speed limit message for the project and location, and

(3) Continue to display last speed limit message received from the SWZ system software.

(E) The VSLS assembly shall be provided with local manual override controls. When the local manual override controls are used, the VSLS display shall:

(1) Only display speed limits in multiples of 5 mph, and

(2) Provide a blank display with no speed limit message when moving the sign to a new deployment area.

(F) A “VARIABLE SPEED ZONE AHEAD” warning sign shall be used in advance of the first VSLS location deployed to inform road users of a variable speed limit zone where the speed limit may be reduced by more than 10 mph. The Variable Speed Zone Ahead warning sign shall be a similar shape, size, and color to the Reduced Speed Limit Ahead (W3-5) or XX MPH Speed Zone Ahead (W3-5a) sign type of the MUTCD.

(G) An “END OF VARIABLE SPEED ZONE” sign shall be used after the last VSLS location deployed to inform road users that the variable speed limit zone has ended. The End of Variable Speed Zone warning sign shall be a similar size and color to the Reduced Speed Limit Ahead (W3-5) or XX MPH Speed Zone Ahead (W3-5a) sign type of the MUTCD.

(H) A warning beacon shall be used in combination with a “VARIABLE SPEED ZONE AHEAD” warning sign and the “END OF VARIABLE SPEED ZONE” warning sign when required in the project plans and specifications. When required, warning beacons shall comply with the MUTCD (Section 4L.03).

Each VSLS assembly deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other VSLS locations. When the VSLS assembly is mounted on a portable field device trailer the VSLS assembly number used shall be the same number that is visible on the trailer.

710-2.06 Smart Arrow Board (SAB) Assembly:

Each SAB assembly shall be provided with an arrow board for indicating lane closures all processing and disseminating equipment and functionality needed to SWZ system software generated arrow, chevron symbols and patterns as described in the MUTCD and these specifications. Each SAB assembly shall include all equipment necessary to provide a fully functional component of the SWZ system.

Each SAB assembly shall be provided and deployed in accordance with MUTCD Section 6F.61 and the following:

(A) The SAB assembly shall provide the functionality for the user to identify the GPS coordinates of the SAB assembly through the SWZ system software GUI. Changes in the GPS coordinates of the SAB shall be logged within the SWZ system software with a timestamp.

(B) The SAB assembly shall provide the functionality for the user to identify the display state of the SAB assembly through the SWZ system software GUI. Changes in the display state of the SAB shall be logged within the SWZ system software with a timestamp.

(C) The SAB display shall be provided with a default display state that is used when communications with the SWZ system software is lost for a predetermined amount of time. The default message state shall support the following options:

(1) Blank display with no chevron, arrow, or other pattern,

(2) Sequential chevron pattern, and

(3) Continue to display the last display state received from the SWZ system software.

(D) The SAB assembly shall be provided with local manual override controls. When the local manual override controls are used, the SAB display state shall conform to the MUTCD and these specifications.

Each SAB assembly deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other SAB locations.

710-2.07 Speed Feedback Sign (SFS) Assembly:

Each SFS assembly shall be provided with a static speed limit sign, a changeable message display, and all processing and disseminating equipment and functionality needed to detect and display the speed of approaching vehicles. Each SFS assembly shall include all equipment necessary to provide a fully functional component of the SWZ system.

Each SFS assembly shall be provided and deployed in accordance with the MUTCD requirements for Regulatory Speed Limit Signs (MUTCD Section 2B.13) and the following:

(A) The static sign display shall be the R2-1 sign type, per the MUTCD, with white background and black legend. The pixels of the changeable message display shall be white on a black background.

(B) The changeable message display shall be two digits displayed in miles per hour with character height of 24 inches at a minimum.

(C) The changeable message display shall have the ability to:

(1) Continuously show the speed of an approaching vehicle and not flash regardless of speed limit or preset thresholds

(2) Display a blank message if the detected vehicle speed is between 0% and 50% of the predetermined speed limit setting.

(3) Display the speed of the approaching vehicle if the speed is greater than 50% of the predetermined speed limit setting.

(D) The SFS assembly shall provide the functionality for the user to identify the GPS coordinates of the SFS assembly through the SWZ system software GUI. Changes in GPS coordinates of the SFS shall be logged in the SWZ system software with a timestamp.

(E) Each SFS assembly deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other SFS locations.

710-2.08 GPS Location Sensor (GPSLS) Assembly:

Each GPSLS assembly shall be provided with all processing and disseminating equipment and functionality needed to determine the GPS location of the GPSLS and communicate that location to the SWZ system software. Each GPSLS assembly shall include all equipment necessary to provide a fully functional component of the SWZ system.

The GPSLS assemblies are intended to be standalone intelligent devices used to mark a specific location of interest within the work zone. The following are some examples for how the GPSLS assemblies are intended to be used:

(A) The SAB includes an auxiliary GPS location device that marks the beginning of a lane restriction within the work zone, but the SWZ system software and operator doesn’t know where the end of the lane restriction is located, so a standalone GPSLS assembly is placed at the end of the lane restriction to inform the SWZ system software logic of where the lane restriction ends.

(B) In some work zones it may be desired to know where the Road Work Ahead, End of Work Zone, or other static construction signs are located, so a standalone GPSLS assembly will be placed at each of these static sign locations to inform the SWZ system software logic of where the work zone starts and ends.

Each GPSLS assembly shall be provided in accordance with the following:

(A) The GPSLS assembly shall provide the functionality for the user to identify the GPS coordinates of the GPSLS assembly through the SWZ system software GUI. Changes in GPS coordinates of the GPSLS shall be logged in the SWZ system software with a timestamp.

(B) Each GPSLS assembly deployed within the SWZ area shall have a unique number to identify that location and differentiate it from other GPSLS assembly locations.

710-2.09 SWZ System Software:

The SWZ system software shall receive, store, analyze, and display real-time information from each TDC location, SWZ CMB assembly, VSLS assembly, traffic monitoring camera assembly, SAB assembly, SFS assembly, GPSLS assembly, and the associated auxiliary SWZ equipment deployed within the project SWZ area. The software shall provide the control logic, system configurations, automation, and commands for the SWZ CMB and VSLS display messages and speed limits.

The SWZ system software shall be furnished with all hardware, device drivers, and auxiliary SWZ equipment necessary to provide a fully functional component of the SWZ system that is accessed remotely by system operators, users, and Department representatives via the internet and by utilizing the software's client interface provided for use during the project.

The SWZ system software and services shall include setting limits and controls on the types of messages that can be displayed on SWZ CMB assemblies in accordance with Subsection 710-2.03 of the specifications

The SWZ system software and services shall include an option to create a "Message Library" of project specific and Engineer approved messages that can be displayed on the SWZ CMBs within the SWZ area.

The SWZ system client interface shall:

Not have a limit to the number of Department representatives that can access the SWZ system software independently from different locations throughout the State of Arizona using an internet link and web browser. The SWZ system software shall be configured to limit the level of access granted to different users to help protect against accidental and malicious acts that can impact the integrity of system performance, configurations, CMB display messages, and posted VSLS speed limits.

Be a vendor hosted web site or software application(s) downloadable from one or more internet locations identified by the SWZ system software vendor(s).

Be accessible using personal computers (PC) running a Windows operating system and mobile devices running an Apple or Android operating system. The version of Windows used shall be compatible with the versions supported by the Engineer and TOC.

Include a GUI that displays the location of each TDC location, SWZ CMB assembly, VSLS assembly, traffic monitoring camera assembly, SAB assembly, SFS assembly, and GPSLS assembly deployed within the project SWZ area on a map and provides the associated unique numbers that identifies each location. The SWZ system software

shall be configured to use the same unique numbers that have been imprinted on the actual devices in the SWZ area.

Provide the ability for Department representatives to see the current status of each TDC location, SWZ CMB assembly, VSLS assembly, and traffic monitoring camera assembly deployed within the project SWZ area, view all recorded data received from these field devices and the archived results of manual and system processed commands sent to field devices which display messages and speed limits to the traveling public.

The SWZ system software shall include a data exchange compliant with the WZDx Specification. The data exchange provided by the contractor shall update as the conditions of the work zone are changed, work zones are added, and work zones are removed through the SWZ system software.

The SWZ system software shall be comprised of the following subsystems integrated together as one complete system, as multiple separate software platforms, or any combination thereof, as required by the project plans and special provisions:

(A) Traffic Data Collection Subsystem (TDCS):

The TDCS shall be integrated with each TDC location deployed within the SWZ area to receive, archive, process, and disseminate the real-time traffic information for use by the other SWZ subsystems and by the Department for historical information, documentation, and future analyses.

The SWZ system GUI shall be configured to display each TDC location deployed within the SWZ area and the TDCS shall provide the following:

(1) Traffic volume counts for each direction of travel impacted by construction activities within every one-minute time interval for data archiving.

(2) Vehicle speeds for each direction of travel impacted by construction activities averaged together within a maximum time interval of one-minute for data archiving.

(3) The actual posted speed limit for each direction of travel impacted by construction activities and a speed limit compliance value based on the actual vehicle speed value compared to the posted speed limit value within every one-minute time interval for data archiving.

(4) Travel time between two points, one at near the beginning of the work zone and one at the end, averaged together within a maximum time interval of one-minute for data archiving for each direction of travel impacted by construction activities.

(5) Travel delay between two points, one at near the beginning of the work zone and one at the end, averaged together within a maximum time interval of one-minute for data archiving for each direction of travel impacted by

construction activities. The travel delay values shall be based on the SWZ system generated real-time travel time data compared to a contractor provided “baseline set travel time data” that represents the typical travel time between the same two points, for each one-minute interval with each day of the week, when there was no construction or incident that would cause a travel delay.

(6) Queue lengths in locations when construction activities are causing or anticipated to cause traffic queuing for each direction of travel. The contractor proposed maximum time interval for data archiving and the methods used to determine queue lengths shall be approved by the Engineer prior to SWZ system deployment within the work zone.

(7) Traffic volume counts, vehicle speeds, speed limit compliance, travel time, travel delay, and queue length values based on longer time intervals, as selected by the Department representative through the SWZ system client interface, for generating the associated traffic information reports.

(8) Traffic volume counts, vehicle speeds, speed limit compliance, travel time, travel delay, and queue length values based on longer time intervals and associated alert message thresholds approved by the Engineer to send SWZ system generated alert messages to Department representatives via email or text messages.

(9) Crash occurrence data for each incident that occurred within the SWZ area based on the following data generated by the SWZ system or input into the SWZ system, by the contractor, using the SWZ system client interface:

(a) Geolocation coordinates of the crash
(b) Direction of travel the crash occurred in
(c) Approximate time the crash occurred
(d) Approximate time the crash was cleared from the travel lanes
(e) Approximate time the crash was cleared from the site
(f) Description of the crash

The TDCS shall be integrated with other required SWZ subsystems and receive, process, and disseminate additional types of the real-time traffic information that may be required by these other SWZ subsystems.

(B) Queue Warning Subsystems (QWS):

The QWS shall be integrated with the TDCS and the SWZ CMB assemblies to determine traffic queue lengths and warn approaching travelers of slowed or stopped traffic conditions.

The SWZ system GUI shall be configured to display each SWZ CMB assembly and TDC location associated with the QWS and the QWS component of the SWZ system and services shall provide the following:

(1) The ability to set and change real-time traffic information thresholds, within ranges approved by the Engineer, for the QWS automation logic that decides which queue warning message to display on each associated SWZ CMB location.

(2) The ability to set and change which messages from the “Message Library” can be used by the QWS for each of the different logic threshold scenarios.

(3) The ability to set a minimum time, within ranges approved by the Engineer, that a QWS generated message should be displayed on each SWZ CMB, before the QWS can change the message.

(4) When a queue begins to form, the QWS shall automate the process of displaying warning messages on the associated SWZ CMB assemblies located in advance of the anticipated queueing areas.

(5) The ability to send alert messages to Department representatives via email and text messages when the QWS displays and removes warning messages on the associated SWZ CMB assemblies

(6) The ability to send request messages to the Department’s TOC operators via email and text messages asking them to consider displaying and removing queue warning related messages on specific FMS DMS locations in advance of the queueing area.

(C) Dynamic Lane Merge Subsystems (DLMS):

The DLMS shall be integrated with the TDCS and the SWZ CMB assemblies to determine traffic volumes and queueing conditions in advance of a lane or shoulder closure and instruct approaching travelers of when they should merge.

The SWZ system GUI shall be configured to display each SWZ CMB assembly and TDC locations associated with the DLMS. The DLMS components of the SWZ system and services shall provide the following:

(1) The ability to set and change real-time traffic information thresholds, within ranges approved by the Engineer, for the DLMS automation logic that decides which merge message to display on each associated SWZ CMB location.

(2) The ability to set and change which messages from the “Message Library” can be used by the DLMS for each of the different logic threshold scenarios.

(3) The ability to set a minimum time, within ranges approved by the Engineer, that a DLMS generated message should be displayed on each SWZ CMB, before the DLMS can change the message.

(4) When traffic volumes are high, or a potential queueing condition is detected by the DLMS, the DLMS shall automate the process of displaying pre-

approved messages on the associated SWZ CMB assemblies that instruct drivers to merge later.

(5) When traffic volumes are low, and a potential queueing condition is not detected by the DLMS, the DLMS shall automate the process of displaying pre-approved messages on the associated SWZ CMB assemblies that instruct drivers to merge earlier.

(6) The ability to send alert email or text messages to Department representatives when the DLMS automatically changes messages on the associated SWZ CMB assemblies.

(7) The ability to send request messages to the Department's TOC operators via email or text messages asking them to consider adding or removing merge instructions displayed on specific FMS DMS locations in advance of the closure.

(D) Travel Time Subsystems (TTS):

The TTS shall be integrated with the TDCS and the SWZ CMB assemblies to determine real time travel times and travel delays between each associated SWZ CMB assembly and an Engineer approved end destination point within the SWZ area. The TTS shall also provide display messages on each respective SWZ CMB with the travel time and travel delay information.

The SWZ system GUI shall be configured to display each SWZ CMB assembly and TDC route associated with the TTS. The TTS component of the SWZ system and services shall provide the following:

(1) The ability to set and change real-time traffic information thresholds, within ranges approved by the Engineer, for the TTS automation logic that decides which travel time or travel delay message to display on each respective SWZ CMB.

(2) The ability to set and change which messages from the "Message Library" can be used by the TTS for each of the different logic threshold scenarios.

(3) The ability to set a minimum time, within ranges approved by the Engineer, that a TTS generated message should be displayed on each SWZ CMB, before the TTS can change the message.

(4) The ability to set the following types of Engineer approved rules for how the travel times and travel delay values will be displayed with the respective SWZ CMB display messages:

(a) Round the time value to the nearest multiple of five or ten, or round-up to the nearest multiple of five or ten.

(b) Display the time as greater than or less than a fixed time period when the real-time value exceeds or is below this value respectively.

(5) The ability to send alert email or text messages to Department representatives when the TTS displays a specific type of message on one of the respective SWZ CMB, or if the travel times and travel delay values exceed a predetermined threshold.

(E) Traffic Monitoring Camera Subsystem (TMCS):

The TMCS shall be integrated with all the SWZ traffic monitoring camera assembly locations within the SWZ area and provide real-time viewing of the associated camera video streams for field personnel using mobile display devices and remotely by the Engineer, the TOC operators, and the District to monitor real-time roadway traffic conditions within the work zone.

The SWZ system GUI shall be configured to display the location of each SWZ traffic monitoring camera assembly and the TMCS component of the SWZ system and services shall provide the following:

(1) The ability to view the real-time video stream of SWZ traffic monitoring camera assembly location when selected from within the SWZ system GUI.

(2) Ability to adjust the field of view (i.e., pan, tilt, and zoom) of each SWZ traffic monitoring camera assembly.

(3) Ability to select between daytime and nighttime operations for each SWZ traffic monitoring camera assembly.

(4) Ability to adjust the iris and focus of each SWZ traffic monitoring camera assembly.

(5) Ability to set and select pre-set field of view positions of each SWZ traffic monitoring camera assembly, when PTZ cameras are deployed.

(F) Variable Speed Limit (VSL) Subsystem:

The VSL subsystem shall be integrated with the TDCS and the VSLS assemblies located in the SWZ area to reduce regulatory speed limits within the area(s) of the work zone that has the largest concentration of construction personnel exposed to the danger of an errant vehicle and raises the speed limit when construction workers are not present.

The configuration of the VSL subsystem shall include the unique number of a TDC location that is deployed near the center of the Active Work Space and this field device location shall be referred to as the Active Work Space TDC location. The VSL subsystem shall provide system automation logic that changes the posted speed limits based on the real-time traffic information it receives from the Active Work Space TDC location.

The VSL subsystem shall include a variable that represents the length of the Active Work Space and the ability to set a maximum value for this variable. This maximum value which

represents the maximum allowable Active Work Space length shall be set to two-miles, unless otherwise approved by the Engineer.

The SWZ system GUI shall be configured to display the Active Work Space TDC location, the length of the Active Work Space, the location of each SWZ VSLS deployed within the work zone, and the real-time speed limit posted on each SWZ VSLS. The VSL subsystem component of the SWZ system and services shall provide the following:

(1) The ability to only post speed limits in multiples of 5 mph on a VSLS.

(2) The ability to set a minimum and maximum speed limit value that can be posted on a VSLS for each direction of travel within the project limits.

(3) The ability to set a minimum time frame or minimum frequency between changes that a VSL subsystem generated speed limit should be displayed on each VSLS, before the VSL subsystem can change the speed limit.

(4) The ability to set a maximum value that can be used for lowering speed limits between any two consecutive VSLS locations within the same direction of travel.

(5) The intelligence needed to dynamically know which SWZ VSLS are in advance of the Active Work Space, within the Active Work Space, and subsequent to the Active Work Space, each time the contractor moves the Active Work Space TDC location within the project limits.

(6) The intelligence needed to dynamically lower the posted speed limits within the Active Work Space and on the VSLS directly in advance of the Active Work Space, while dynamically raising the speed limits on the other VSLS devices to the maximum allowable speed limit for the work zone.

(7) The ability to set and change VSL subsystem logic and Active Work Space TDC real-time traffic information thresholds, within ranges approved by the Engineer, for the VSL subsystem automation logic that decides which speed limits to post each respective SWZ CMB.

(8) The ability to dynamically raise the speed limits posted on all the VSLS to the maximum speed limit value or other user selectable lower value based on the time-of-day and day-of-week scheduler and manual overrides to the schedule.

(9) The ability to only allow the speed limit message displayed on each VSLS to be in accordance with an R2-1 sign type, per the MUTCD, with white colored lighted pixels for displaying the speed limit message on a black background.

(10) The ability to send alert email and text messages to Department representatives when the speed limit messages on the associated VSLS contain a user selectable speed limit value.

(G) Truck Entry/Exit Subsystem (TEES):

The TEES shall be integrated with the TDCS and either a SWZ CMB assembly or a static sign with attached flashing warning lights and GPSLS assembly to determine when construction vehicles are entering the roadway from the work area and warn approaching travelers of slow-moving vehicles ahead.

The SWZ system GUI shall be configured to display each SWZ CMB assembly or static sign with attached flashing warning lights and GPSLS assembly and all TDC locations associated with the TEES. The TEES components of the SWZ system and services shall provide the following:

(1) When construction vehicles leave the work area and enter the roadway, the TEES shall automate the process of displaying either pre-approved messages on the associated SWZ CMB assemblies or illuminating the flashing warning lights on the associated static sign with GPSLS assembly that warn drivers of slow-moving vehicles ahead.

(2) The ability to set and change the time, within ranges approved by the Engineer, that a TEES generated warning should be displayed on either the associated SWZ CMB assembly or the associated static sign with attached warning lights and GPSLS assembly, before the TEES can change or remove the warning.

(3) The ability to send alert email or text messages to Department representatives when the TEES automatically changes messages on the associated SWZ CMB assemblies or illuminates the flashing warning lights on the associated static sign with GPSLS assembly .

710-2.10 Data Submittal:

The SWZ system software shall record all loss of communications, low power, and loss of power alerts for the project duration.

The SWZ system software vendor shall also record the following data before final project acceptance:

(1) All real-time traffic information received by the SWZ system software from all TDC locations deployed in the SWZ area and received by third-party sources, and all real-time traffic information generated by the SWZ system software within every one-minute time interval.

(2) All messages posted on all SWZ CMB assemblies deployed in the SWZ area.

(3) All speed limits on all VSLS assemblies deployed in the SWZ area.

(4) All geolocation data associated with these devices and the required device data.

(5) A date and time stamp that the data pertains to each data set.

This data shall be submitted electronically to the Engineer in a format compatible with the Work Zone Data Exchange Common Core Data Specification version available at the time of the project's bid opening date.

710-3 Construction Requirements:

The contractor shall coordinate with the Engineer and provide the SWZ software user training to the Department representatives. The contractor shall provide the Department representatives with SWZ software user access privileges including alert messages.

The SWZ system shall be deployed in accordance with the approved TCP, communications site assessment, system configuration plan, and subsystem acceptance testing procedures and provide the required certificate of analysis.

The contractor shall operate and maintain the SWZ system in accordance with the approved SWZ system O&M plan, relocate TDC locations, SWZ CMB assemblies, VSLS assemblies, traffic monitoring camera assemblies, SAB assemblies, SFS assemblies, and GPSLS assemblies and the associated auxiliary SWZ equipment deployed within the project SWZ area as necessary to achieve the SWZ system operational objectives. The required certificate of analysis shall be submitted to the Engineer each time one of the field device locations is moved.

During deployment in the SWZ area, the contractor shall submit the required SWZ system data reports to the Engineer for approval within the Engineer approval time frames.

Any deficiencies in the communications site assessment, SWZ system configuration plan, O&M plan, devices, equipment, services, or other elements of work listed herein will be brought to the attention of the contractor by the Engineer and all deficiencies shall be corrected before the close of that work shift, unless otherwise specified.

710-4 Method of Measurement:

SWZ system will be measured on a lump sum basis for a fully functional complete in place system.

TDC location, SWZ CMB assembly, traffic monitoring assembly, VSLS assembly, SAB assembly, SFS assembly, and GPSLS assembly will be measured by the day for each 24-hour day that the SWZ is in place and functional for the in-use condition, with no loss of communications or power failures for 98 percent of the calendar day or 98 percent of the portion of the calendar day that the system is in place.

Measurement for payment of the TDC location, SWZ CMB assembly, traffic monitoring assembly, VSLS assembly, SAB assembly, SFS assembly, and GPSLS assembly will begin on the day they are installed in place and fully functional. When the elements are not needed,

they shall be removed or covered and will not be measured unless they are required to stay on site in anticipation of future use or emergency use as determined by the Engineer. Should devices be required on site for these purposes, they will be measured and paid for at the contract unit prices. During non-working periods such as holidays and weekends, the elements in place will be measured for payment. During these non-working periods the contractor shall conduct a minimum of one check per day to verify that the elements are in place and in satisfactory condition.

Elements of work which are lost, stolen, destroyed, or are deemed unacceptable by the Engineer, while in use on a project shall be replaced by the contractor at no additional cost to the Department.

710-5 Basis of Payment:

SWZ system, measured as provided above, will be paid for at the contract lump sum price, which price shall be full compensation for the work, complete in place, as specified herein and shown on the plans, including all materials, equipment, and labor necessary to facilitate the SWZ system mobilization; obtain the Engineer's approval of required submittal documentation; provide SWZ system software, the SWZ client interface and user training, initial system configurations and associated acceptance testing, SWZ software user access privileges, alert messages, and SWZ system data reports; provide system and equipment operations and maintenance, deployment location changes, and support services as needed to maintain a fully functional and operational SWZ system for the duration of the project; and removal of all SWZ equipment. Documentation of all lessons learned as a result of the SWZ installation, deployment, and removal shall also be included in the lump sum payment.

The accepted quantities of TDC locations, SWZ CMB assemblies, traffic monitoring camera assemblies, VSLS assemblies, SAB assemblies, SFS assemblies and GPSLS assemblies measured as provided above, will be paid for at the contract unit price each for the type of location or assembly designated in the bidding schedule, fully deployed and in operation in the SWZ area, which price shall be full compensation for the work described and specified herein and on the plans, and all other components necessary to provide a complete functional assembly for monitoring the SWZ area traffic conditions and controlling the SWZ operations.

Eighty percent of the contract lump sum price for the SWZ system will be paid upon satisfactory installation of a fully functional system, system, and operating, maintaining and servicing the SWZ system.

Twenty percent of the contract lump sum price for the SWZ system will be paid upon final removal.

Measurement and payment of static traffic control devices as shown on the TCP that are used in conjunction with the SWZ field equipment shall be paid for under their respective bid items.

No payment will be made for relocation of work elements and SWZ system configuration changes.

No payment will be made for setting up or relocating the necessary elements of work and associated protective devices that are moved concurrently with the advancing operation or removal at the end of a shift.

No payment will be made for the elements of work listed herein for non-working periods resulting from a suspension of work that, in the opinion of the Engineer, is due to the fault of the contractor. In any case, the contractor shall continue to be responsible for maintaining all SWZ system components in proper functioning condition at all times.

ITEM 7350005 – LOOP DETECTOR (COUNTER)
ITEM 7350021 – LOOP DETECTOR (SPEED/CLASSIFICATION)
ITEM 7350039 – LOOP DETECTOR (WEIGH IN MOTION) (PARTIAL REPLACEMENT)

735-2.01 Vehicle Detectors: of the Standard Specifications is revised to read:

(A) General:

Detectors shall conform to the minimum acceptable design and operating requirements of these specifications for detecting the presence, passage, speed, weight, and classification of vehicles.

Except as specified in Subsection 735-2.01(F) of the specifications, all materials shall be furnished by the contractor. The contractor shall submit a complete list of all required project material for approval, as specified in Subsection 730-4 of the specifications.

All materials shall conform to the manufacturer's specifications and requirements.

(B) Loop Detectors:

The detector loop dimensions shall be as specified on the Standard Drawings and as indicated on the project plans.

Loop detector wire shall be 14 AWG HDPE polyethylene insulated conductors conforming to IMSA 51-7, as shown on the Standard Drawings.

(C) Lead-in Cable:

For Type SA and SB speed/classification detectors specified in Subsection 735-3.02(D) of the specifications, lead-in cable from the pull box to the cabinet shall conform to IMSA specification 50-2, except as modified on the Standard Drawings.

(D) **Conduit**:

Conduit shall be rigid nonmetallic PVC conforming to the requirements of Subsection 732-2.02 of the specifications. Conduit shall be large enough to contain the number of wires required, but not less than the diameters shown on the Standard Drawings.

(E) **Cabinets**:

Traffic monitoring site cabinets for Type SA and SB speed/classification and WIM detectors shall be pole-mounted Type MPD control cabinets as shown on the Standard Drawings, and as specified in Subsection 734- 2.03 of the specifications, except that no pre-wiring for AC or DC electric, police panel, or provisions for fan or light shall be required.

Warranties shall comply with Subsection 106.13 of the specifications.

(F) **Department Furnished Materials**:

When required, the Department will furnish detectors for speed/classification systems (piezoelectric sensors-Class 2) and weigh-in-motion systems (piezoelectric sensors–Class1, or quartz piezoelectric sensors) with pre-attached lead-in cables. For such installations, the Department will also furnish the piezo grout sealant for the sensor portion of speed/classification and weigh-in-motion detectors.

The contractor shall furnish all other sealants. The contractor shall notify the Traffic Monitoring Team of the Multimodal Planning Division (MPD) at (602) 712-8598 a minimum of 15 working days prior to scheduled installation of the Department-furnished piezoelectric sensors. The required sensors and grout will be provided at the Department's central Phoenix location, at 2501 W. Georgia, Phoenix, AZ 85017, or at the appropriate District Office, as specified by the Department at the time of contact.

735-3.02 Traffic Data Detectors: of the Standard Specifications is revised to read:

(A) General:

Counter (Type C), speed/classification (Types SA and SB), and weigh-in-motion (WIM) detector systems shall be installed in accordance with the Standard Drawings, vendor's shop drawings, and as specified herein.

The contractor shall use a 3/4-inch wide saw blade to cut the channel for piezoelectric sensors in pavement. Multiple passes using a thinner blade will not be acceptable.

When new conduit is required under any existing pavement, the contractor shall install conduit beneath the roadway using horizontal directional drilling methods approved by the Engineer.

Pull boxes shall be as shown on the Standard Drawings.

As specified above in Subsection 735-3.01(D) of the specifications, the contractor shall provide GPS latitude and longitude coordinates, ± 5 feet, for all pull boxes installed with each traffic data detector loop system.

(B) Installation of Piezoelectric Sensors:

The contractor shall install the Department-furnished piezoelectric or quartz piezoelectric sensors, and piezo grout, as specified herein and shown on the plans. A traffic signal

technician from the Department must be present during all elements of the piezoelectric sensor installation (to the point where the pre-attached lead-in cable begins), including layout, groove saw-cutting, sensor placement, and application of piezo grout. The contractor shall notify the Engineer at least 15 working days prior to its scheduled installation of any piezoelectric sensors. Any piezoelectric sensor installation work performed without full time inspection by the Department's traffic signal technician may not be eligible for payment.

Lead-in runs of cable from all piezoelectric sensors and quartz piezoelectric sensors to the controller cabinet shall be continuous; splices will not be acceptable.

(C) Traffic Counter Detectors:

When a replacement of an existing traffic counter system (Type C) is indicated on the plans and bidding schedule, the contractor shall remove the existing loops and furnish and install new loops and lead-in cables. The contractor shall protect in place the existing pull boxes and all conduit connections under the roadway and from pull boxes to the cabinet.

The total number of loops for each complete traffic counter system specified above (new or full replacement) shall be the number of loops required for all traffic lanes in both travel directions at the specified location.

(D) Speed/Classification Detectors:

A complete new speed/classification system (Type SA or Type SB) shall include all loops, pull boxes, control cabinet, A-pole, pole foundation, the necessary conduits under the roadway and from pull boxes to control cabinets, and Department-furnished piezoelectric sensors with attached lead-in cables, all as shown on the Standard Drawings. When shown on the plans, an additional control cabinet, pull box, A-pole, and pole foundation shall be required.

The contractor shall provide trenches and install conduits from the edge of pavement to the pull box and from the pull box to the control cabinet. Wiring, conduit, and pull box installation shall be in accordance with Subsections 732-3.01 and 732-3.02 of the specifications.

Installation of Department-furnished piezoelectric sensors shall be in accordance with Subsection 735-3.02(B) of the specifications.

The cabinet(s) shall be grounded in accordance with the requirements of Subsections 732-3.03 and 734-3.03 of the specifications. The contractor shall keep the ground wire from the cabinet ground bus bar to the ground rod assembly or array as short as possible.

The total number of loops for each complete speed/classification system specified above (new, full replacement, or partial replacement) shall be the number of loops required for all traffic lanes in both travel directions at a specified location.

(E) Weigh-in-Motion (WIM) Detectors:

When a partial replacement of an existing WIM system is indicated on the plans and bidding schedule, the contractor shall furnish and install new loops and new Department-furnished

piezoelectric sensors with attached lead-in cables. The contractor shall protect in place the existing pull boxes, cabinet(s), A-pole(s) and foundation(s), and all conduit connections under the roadway and from pull boxes to the cabinet.

The total number of sensors for each complete new WIM system specified above (new, full replacement, or partial replacement) shall be the number of sensors required for all traffic lanes at a specified location.

The new inductive loops, piezoelectric sensors, and lead-in cables will be installed in accordance with the manufacturer's specifications and shall be installed while an International Road Dynamics Inc. (IRD) representative is on site. The new loops and sensors will be connected to the existing pull boxes and cabinets at the two locations shown on the plans by an IRD representative.

The contractor shall call two weeks in advance to schedule an IRD representative:

Richard Maynard
International Road Dynamics Inc.
E-mail: rmaynard@quarterhill.com

735-4 Method of Measurement: of the Standard Specifications is revised to read:

Traffic data detectors consisting of counter loop detectors (Type C) and speed/classification detectors (Type SA or Type SB), will be measured as a complete system for each type of traffic data detector furnished and installed, including all loops and lead-in cables required for both directions of traffic. Counter detectors will be measured as a new system or full system replacement, as specified herein and indicated on the bidding schedule. Speed/classification detectors, regardless of type, will be measured as a new system, full system replacement, or partial replacement, as specified herein and indicated on the bidding schedule.

Weigh-in-motion detectors will be measured as partial replacement, including all loops and lead-in cables for a single direction of traffic, as specified herein and indicated on the bidding schedule.

735-5 Basis of Payment: of the Standard Specifications is revised to read:

Traffic data detectors, measured as provided above, will be paid for at the contract unit price for each complete type of data detector system designated in the bidding schedule, complete-in-place, regardless of the number of loops, including all wiring and piezoelectric sensors, which price shall be full compensation for the work described and specified herein and on the plans.

No measurement or payment will be made for horizontal directional drilling, the cost being considered as included in contract items.

No measurement or payment will be made for the removal of the existing loops and sensors as the cost is considered to be included in the pavement removal.

ITEM 8050003 - SEEDING (CLASS II):

The work under this item shall consist of furnishing all materials, preparing the soil, applying Class II seed, establishing, and maintaining the seeded areas along with final mulch cover.

Areas to be seeded are those disturbed or unvegetated areas listed herein, shown on the plans, called for in the contractor's erosion/sediment control plan, Nonpoint Source (NPS) pollution control plan, Stormwater Quality Protection Plan (SQPP), Stormwater Runoff Pollution Control Plan, Decentralized Stormwater Management Plan, Stormwater Runoff Mitigation Plan, Stormwater Management Plan (SWMP), Biotechnical Erosion Control Plan, Post-Construction Stormwater Management Plan (PCSMP), Integrated Vegetation Management Plan (IVMP), Functional Landscape Ecological Restoration Plan, Assisted Migration Plan (AMP), or designated by the Engineer. All construction support activities disturbed unpaved temporary construction access, unpaved on-site staging, unpaved on-site material storage, and unpaved on-site stockpiling areas shall ultimately be seeded unless otherwise stabilized by equivalent permanent stabilization measures. If not seeded, the equivalent permanent stabilization measures shall be evaluated by a Construction Professional Landscape Architect (PLA) and approved by the Engineer. Unless otherwise prohibited by environmental permit, seeding is required to stabilize the unpaved disturbed dry area within the Waters of the U.S. Seeding area below the Ordinary High-Water Mark (OHWM) shall exclude any definable low flow channel(s). The seeding area below the OHWM shall also exclude the area directly under bridge(s).

Seeding may be included as part of a landscape project as specified in Section 807 or used for erosion control as part of a Storm Water Pollution Prevention Plan (SWPPP) as specified in Subsection 104.09 of the specifications, or both.

In either case, seeding shall be accomplished in two (2) stages. The first stage shall consist of tillage; furnishing and applying compost, chemical fertilizer, and sulfur; furnishing and planting the contract-specified seed mix; and furnishing, applying, and affixing final mulch cover. The second stage, beginning after the first stage has been accepted by the Engineer, shall be a 45-calendar-day period during which time the contractor shall be responsible for maintaining and stabilizing the seeded and mulched areas, and restoring damaged or eroded areas.

Seeding construction shall be completed before Substantial Completion. The 45-calendar-day seeding maintenance period, including any re-seeding work if required after Initial Seeding Construction Acceptance, shall be completed before project Final Acceptance.

Seeding used as part of a SWPPP shall be completed before Substantial Completion, or sooner as required in the SWPPP. The 45-calendar-day seeding maintenance period, including any re-seeding work if required after Initial Seeding Construction Acceptance, shall be completed before project Final Acceptance.

No time extension will be granted for seeding not completed as specified herein.

Seeding areas below the OHWM shall be exempted from the 45-calendar-day maintenance period requirement.

An on-site pre-activity seeding construction meeting shall be coordinated by Construction PLA. The necessity of half-acre (0.5 acre) sample demonstrative area of Class II Seeding shall be verified for the seeded areas greater than five (> 5) acres excluding shoulder build-up areas (edge of pavement build-up areas). The contractor shall guarantee in writing to furnish all suitable equipment for soil tillage, seeding, and mulching during pre-activity seeding construction meeting as evaluated by a Construction PLA, as well as approved by the Engineer.

2.0 Materials:

2.01 General:

The contractor shall avoid persistent herbicide residues contamination in the soil. Soil sterilant herbicides, especially bare-ground herbicides with long-lasting soil persistence, shall be prohibited for use in all unpaved project areas that will be seeded. Pre-emergence herbicides shall be prohibited from unpaved project areas that will eventually be seeded.

Appropriate documentation, as specified below, shall be submitted to the Engineer a minimum of 30 calendar days before the start of a scheduled seeding activity. No materials shall be delivered to the site until the documentation has been approved by the Engineer.

Unless otherwise specified, Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be provided for all materials.

The contractor shall also provide tests from accredited laboratories for all materials, as specified herein. Should the contractor perform its own testing, such test results shall also be provided to the Engineer.

2.02 Seed:

(A) General Requirements:

The species, variety, and strain of seed (designated elsewhere herein as contract-specified seed) shall be as shown on the plans or as specified herein. The contract-specified seed shall be obtained from seed suppliers through harvesting of wildland collections, or field-grown seeds grown prior to or during the contract period.

A Certificate of Analysis for each seed species shall be furnished to the Engineer at least four (4) weeks prior to the seeding construction. No seed shall be furnished to, or delivered to, the project until approved by the Engineer and Roadside Development. The Certificates of Analysis shall contain the following information for each seed sample: the test results of the Fifty States Noxious Weed list, all seeds including weed seeds listed, purity and germination, tetrazolium test results, when used and any pathology found to be present. The sample testing, when available for the native plant species, shall use the rules for testing seeds published by the “Association of Official Seed Analysts” or the “Society of Commercial Seed Technologists.”

If the samples indicate species listed as noxious, restricted, or invasive, the lot will be rejected or evaluated for use on the project. The list of noxious, restricted, or invasive species is located at Roadside Development and linked to the following website:

http://www.azdot.gov/business/engineering-and-construction/roadway-engineering/roadside-development

Within 30 calendar days after the award of contract, the contractor shall submit the name of the seeding subcontractor to be used, along with written confirmation from seed suppliers and/or collectors, on their letterhead, that the source(s) for the contract-specified seed has been secured. A minimum of three (3) separate confirmation letters from seed suppliers, providers, and/or collectors shall be presented through the Engineer for a Construction PLA's evaluation within the context of reliable sources. If any of the contract-specified seed is expected to be unavailable prior to the time specified for seeding, in accordance with Subsection 2.02(B) below, the contractor shall notify the Engineer at this same time.

The seed shall be delivered to the project site unmixed in standard, sealed, undamaged containers for each seed species. Each container shall be labeled in accordance with the appropriate provisions of the Arizona Revised Statutes and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Labels shall indicate the scientific genus, species, subspecies/varieties or strains of seed, the percentage of germination, purity, weed content, and testing information. Unless otherwise approved by Roadside Development Section through the Engineer, the date of analysis for Tetrazolium Test **(**TZ**)** shall not be more than 15 months prior to the delivery date from a seed provider/supplier. A Certificate of Analysis from an accredited seed-testing laboratory, and conforming to Subsection 106.05 of the specifications, shall accompany each container of seed.

Unless otherwise approved by Roadside Development through the Engineer, weed content of the contract-specified seed mix shall not exceed 0.5 percent (≤ 0.5%).

In addition to Federal Seed Act Regulations, unless otherwise approved by Roadside Development through the Engineer, the contamination of seed lots from the following noxious / invasive plant species shall not be permitted.

NOXIOUS / INVASIVE WEEDS WATCH LIST FOR THE CONTAMINATED SEED LOTS	
SCIENTIFIC NAME	**COMMON NAME**
Amaranthus retroflexus	Redroot Amaranth / Redroot Pigweed / Red-Rooted Pigweed / Rough Pigweed
Bassia scoparia **(syn.** *Kochia scoparia***)**	Kochia / Fireweed
Bothriochloa bladhii **(syn.** *Andropogon bladhii / Andropogon caucasicus / Andropogon intermedius / Bothriochloa caucasica / Bothriochloa intermedia***)**	Caucasian Bluestem
Bothriochloa ischaemum	Yellow Bluestem
Brassica tournefortii	Sahara Mustard / Mediterranean Mustard / Mediterranean Turnip / Prickly Turnip

NOXIOUS / INVASIVE WEEDS WATCH LIST FOR THE CONTAMINATED SEED LOTS	
SCIENTIFIC NAME	**COMMON NAME**
Bromus tectorum	Cheatgrass / Downy Brome / Broncograss / Downy Chess / Soft Chess / Drooping Brome
Cynodon dactylon **(syn.** *Capriola dactylon***)**	Bermudagrass / Devilgrass
Centaurea melitensis	Malta Star-thistle / Napa Star Thistle / Tocalote
Cenchrus spinifex **(syn.** *Cenchrus incertus / Cenchrus pauciflorus / Cenchrus parviceps***)**	Field Sandbur / Coastal Sandbur / Common Sandbur
Chorispora tenella	Crossflower / Purple Mustard / Blue Mustard / Musk Mustard / Beanpodded Mustard / Tenella Mustard
Cuscuta spp**.**	Dodder / Angel Hair / Devil's Hair / Devil's Ringlet / Goldthread / Hairweed / Lady's Laces / Strangleweed / Witch's Hair / Amarbel
Eragrostis lehmanniana	Lehmann Lovegrass
Euphorbia esula	Leafy Spurge / Green Spurge / Wolf's Milk
Euphorbia prostrata **(syn.** *Chamaesyce prostrata / Euphorbia chamaesyce***)**	Prostrate Spurge / Prostrate Sandmat / Ground Spurge / Blue Weed
Onopordum acanthium	Scotch Thistle / Cotton Thistle
Pennisetum ciliare **(syn.** *Cenchrus ciliaris***)**	Buffelgrass / African Foxtail Grass
Physalis spp**.**	Ground Cherry / Jerusalem Cherry / Strawberry Tomato
Salsola kali subsp**.** *tragus* **(syn.** *Salsola iberica***)**	Russian Thistle / Tumbleweed
Setaria faberi	Japanese Bristlegrass / Giant Foxtail
Setaria pumila **(syn.** *Chaetochloa glauca / Chaetochloa lutescens / Panicum glaucum / Setaria glauca***)**	Yellow Foxtail / Pigeon Grass / Yellow Bristlegrass
Setaria viridis	Green Bristlegrass / Pigeon Grass / Wild Millet / Green Foxtail
Solanum physalifolium **(syn.** *Solanum physalifolium / Solanum sarachoides / Solanum villosum***)**	Hoe Nightshade / Argentine Nightshade / Green Nightshade / Hairy Nightshade

The contractor shall provide all seed tag labels to the Engineer. No payment will be made for seeds until tag labels and Certificates of Analysis from all seeds to be used on the project have been submitted as specified.

Both the contractor and the seed supplier shall store seed under dry conditions, at temperatures of between 35 °F and 120 °F, and out of direct sunlight. Prior to using the seed,

the contractor, as well as seed supplier, shall both provide a certification letter to the Engineer verifying that the seed was stored as specified herein.

Legume seed shall be inoculated with appropriate bacteria cultures approved by the Engineer, in accordance with the culture manufacturer's instructions.

Tetrazolium staining shall be acceptable to test for germination and hard seed. Cut or fill testing will not be allowed. As directed by the Engineer, seeds with an expiration date past the acceptable test date or not meeting the specified conditions for storage shall be retested by the contractor. The Engineer may perform random sampling of seeds throughout the project. Mixing of the specified seed at the project site shall be under the supervision of the Engineer.

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

Diversified seed mix species and the PLS rates are shown in Table 1 below**:**

TABLE 1			
DIVERSIFIED SEED MIX—for All Unpaved Disturbed Areas, Unvegetated Areas, Receiving Pervious Areas (RPA), Decentralized Stormwater Management Areas, and/or Designated Areas			
Botanical Name	**Common Name**	**PLS Rate (Pounds Per Acre)**	**Per Pound Value for Substitution (see text)**
Astragalus canadensis	Canadian Milkvetch	1	$80
Artemisia frigida	Fringed Sagebrush	0.1	$100
Asclepias speciosa	Showy Milkweed	2	$150
Asclepias tuberosa	Butterfly Milkweed	1	$250
Aster tanacetifolius	Purple Prairie Aster	1	$40
Bothriochloa barbinodis	Cane Beardgrass	1	$45
Bouteloua curtipendula cv. Vaughn *	Sideoats Grama	2	$17
Bouteloua eriopoda	Black Grama	0.5	$130
Bouteloua gracilis cv. Hachita	Blue Grama	1	$15
Coreopsis tinctoria	Plains Coreopsis	1.5	$20
Distichlis stricta **(syn.** Distichlis spicata**)**	Desert Saltgrass	1	$70
Dalea purpurea	Violet Prairie Clover	3	$50
Encelia farinosa	Incienso Brittlebush	4	$40
Gaillardia aristata	Blanket Flower	2	$20

Gaillardia pulchella	Firewheel	0.5	$20
Hedysarum boreale	Boreal Sweet-Vetch	2	$100
Hilaria jamesii	Galleta Grass	3	$40
Koeleria macrantha	Prairie Junegrass	0.5	$40
Lupinus bicolor	Miniature Lupine	1	$60
Lupinus argenteus	Silvery Lupine	1	$75
Linum lewisii	Blue Flax	2	$10
Oryzopsis hymenoides **(syn.** Achnatherum hymenoides**)**	Indian Ricegrass	3	$10
Phacelia crenulata	Notch-leaf Phacelia	1	$50
Penstemon palmeri	Palmer Penstemon	2	$80
Pascopyrum smithii	Western Wheatgrass	3	$15
Sporobolus airoides	Alkali Sacaton	0.5	$26
Stipa comata	Needle And Thread	0.5	$60
Sporobolus cryptandrus	Sand Dropseed	0.3	$10
Senna covesii	Coues' Cassia	3	$50
Sitanion hystrix **(syn.** Elymus elymoides**)**	Squirrel-tail Grass	2	$45
Verbesina encelioides	Golden Crownbeard / Cowpen Daisy	1	$100
Vulpia microstachys	Small Fescue	0.5	$40
Zinnia acerosa	Dwarf White Zinnia	1	$150
Estimated Per Acre Subtotal Value for Seeds Only			**$ 2,635.00**

***** Niner may be furnished if Vaughn is determined by Roadside Development as unavailable from seed sources.

(B) Seed Substitution:

No substitution of the contract-specified seed will be allowed unless evidence is submitted documenting that the contractor has made a diligent effort to obtain the contract-specified seed from either seed suppliers or collectors, and that the contract-specified seed will not become available prior to the time specified for seeding in the contractor's approved construction schedule.

The contractor may also request a substitution if the lowest price available for the contract-specified seed is greater than two (2.0) times the value shown in Table 1. The contractor shall provide documentation from a minimum of three (3) seed suppliers or collectors supporting such a request. Documentation shall include copies of the invoices from each supplier or collector. Only those invoices obtained within three (3) weeks of the time specified for seeding in the contractor's approved construction schedule will be acceptable.

Should a substitution of the contract-specified seed be requested for one of the two (2) reasons specified above, and the contractor's documentation is approved by the Engineer, the Department's Roadside Development Section will specify an alternate seed within five (5) working days of the Engineer's approval of the contractor's documentation. The alternate seed will only be allowed when there is an insufficient quantity of the contract-specified seed, as determined in the previous two (2) paragraphs, for the areas to be seeded as called for herein or as required for erosion control. The contractor shall obtain and apply the alternate seed, as required, to all such remaining areas. Unless otherwise approved by the Engineer, the approved alternate seed will only be allowed until such time that contract-specified seed meeting the availability and price requirements specified herein can be provided.

For each pound of contract-specified seed not provided by the contractor, the value indicated in Table 1 will be deducted from the contract amount. The price per pound for the alternate seed selected by the Department, as specified above, will be determined in accordance with Subsection 109.04(D)(2) of the specifications. No additional adjustments will be made for substituting the alternate seed, the costs being considered as included in the contract item for seeding.

No payment will be made for areas seeded with unapproved seed. No payment will be made for areas seeded until the entire approved seed mix (including all authorized seed substitutions/adjustments) is executed.

2.03 Tacking Agent:

Tacking agent shall be a naturally occurring organic compound and shall be non-toxic. The tacking agent shall be a product typically used for binding soil and mulch in seeding or erosion control operations. Approved types shall consist of mucilage or gum by dry weight as active ingredient obtained from guar or plantago. The tacking agent shall be labeled indicating the type and mucilage purity.

The contractor shall have the tacking agent swell volume tested by an approved testing laboratory using the USP method. The standard swell volume shall be considered as 30 milliliters per gram. Material shall have a swell volume of at least 24 milliliters per gram. Certified laboratory test results for homogenous consistency shall be furnished to the Engineer for each shipment of tacking agent to be used on project areas. Tacking agent rates shall be adjusted to compensate for swell volume variation. Material tested with lesser swell volume shall have the tacking agent rate increased by the same percentage of decrease in swell volume from the standard 30 milliliters per gram. Material tested with greater volume may reduce tacking agent rates by the same percentage of increase in swell volume from the standard 30 milliliters per gram. Tacking agent shall be pure material without starches, bentonite, or other compounds that would alter the swell volume test results of mucilage, or the effectiveness of the tacking.

2.04 Thermally-Refined Wood Fiber:

Wood cellulose fiber mulch shall conform to the requirements of Subsection 805-2.03 of the Standard Specifications, except as modified herein, and shall be from thermo-mechanically processed wood, processed to contain no growth germination inhibiting factors. The mulch shall be from virgin wood, manufactured, and processed so the fibers will remain in uniform

suspension in water under agitation to form homogenous slurry. Paper products will not be considered as virgin wood. The thermally-refined wood fiber mulch shall have the properties shown in Table 2 below:

TABLE 2	
Virgin Wood Cellulose Fiber	90% min.
Recycled Cellulose Fiber	10% max.
Ash Content	0.8% +/-0.3%
pH	4.5 +/-1.0
Water Holding Capacity	10 : 1 (water : fiber) Min.

2.05 Weed Free Straw Mulch:

(A) General:

Straw mulch including barley straw shall conform to the requirements of Subsection 805-2.03 of the Standard Specifications, except as modified herein, and shall be from the current season's crop. A letter of certification from the supplier shall be required stating that the straw was baled less than twelve (12) months from the delivery date. Additionally, a bill of sale for straw material shall be presented for a Construction PLA's evaluation within context from reliable sources through the Engineer.

All straw, including hydraulically applied straw, shall be free from noxious weeds in compliance with the standards and procedures of the North American Weed Management Association (NAWMA) or the Arizona Crop Improvement Association (ACIA). The contractor shall provide documentation, including a transit certificate, and appropriate labels and/or marking twine, from the ACIA or NAWMA that straw materials to be used for mulch are free of noxious weeds. The straw shall be accompanied by the certification, labels and/or marking twine at the time of delivery to the project site. Straw delivered to the project without such information will be rejected and promptly removed from the project.

Rye straw and oat straw will not be acceptable.

(B) Weed Free Straw Mulch for Hydraulic Application:

Hydraulically applied straw mulch shall be wheat, barley, or rice straw processed into various particle sizes, mixed with water and tacking material, and applied as a non-clogging slurry using a hydroseeder. A minimum of 70 percent (70%) of wheat, barley, or rice straw in the mix shall be not less than 1/2 inch ± 1/4 inch in length. Straw particles may be longer provided that the particles can be used with the selected hydroseeder without clogging. Hydraulically applied straw mulch, as furnished by the manufacturer, may contain up to ten (10) percent paper or cotton materials in dry weight. Hydraulically applied straw mulch shall also contain 20 percent (20%) of wood fiber in dry weight. The combined dry weight percentage of paper, cotton, and wood fiber materials together shall be not less than 15 percent (15%) nor more than 30 percent (30%) of the hydraulically applied straw mulch. The date of installation of hydraulically applied straw mulch cover shall be less than twelve (12) months from the date of production. The date of production of hydraulically applied straw mulch material shall be presented for a Construction PLA's verification through the Engineer. All hydraulically applied

straw mulch material shall also meet the requirements of Subsection 805-2.05 (A) stated above.

2.06 Slow-release Chemical Fertilizer and Sulfur:

Chemical fertilizer shall conform to the requirements of Subsection 805-2.06 of the specifications and shall be the kind hereafter specified. Fertilizer shall be composed of a mixture of one part sulfur-coated urea 25-4-8, one-part monoammonium phosphate 11-52-0-, and one-part methylene urea 38-0-0. The sulfur-coated urea, a blended fertilizer 25-4-8, shall have approximately 80 percent (80%) of the nitrogen defined as slow release, and contain five percent (5%) Iron, ten percent (10%) sulfur and trace amounts of zinc and manganese. The result shall be a 24-18-2 chemical blended fertilizer, as specified herein.

In addition to the fertilizer mixture, agricultural sulfur compounds, comprised of between 80 percent (80%) and 96 percent (96%) sulfur, shall be applied at the rate specified in Section 3.02. Chemical fertilizer and sulfur shall not be applied to the seeding area below the OHWM.

2.07 Water:

Water shall be free of oil, acid, salts, or other substances which are harmful to plants. All non-potable water shall be tested for its suitability for seeding/planting with the water quality-related concerns of salinity, pathogens, and contaminants. The water quality testing result shall be presented for a Construction PLA's evaluation through the Engineer. An Arizona Guide to Water Quality and Uses (web link: ***https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1610.pdf***) Figure 8, Water Quality and Uses Triangle shall be considered as reference for testing result evaluation and approval.

Water Quality Standards for seeding on construction projects that reach or exceed one-contiguous-acre (≥ 1 contiguous acre) permit threshold soil/ground disturbance defined under current Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit (CGP) and/or National Pollutant Discharge Elimination System (NPDES) CGP:

(A) On Arizona Non-Native Americans Land **(Non-Tribal)**, water quality for seeding construction within 0.25-mile buffer zones of Impaired and/or Outstanding Arizona Waters (OAWs) shall meet the standards of current AZPDES CGP, as well as requirements of these Special Provisions.

The web link of ADEQ's eMaps within the State of Arizona:
https://www.azdeq.gov/emaps

(B) Water quality for seeding construction within Arizona Native Americans Land **(Tribal)** shall meet the standards of EPA-established or approved Total Maximum Daily Loads (TMDLs) under current NPDES CGP, as well as requirements of these Special Provisions.

The web link of EPA-established or approved TMDLs within the State of Arizona:
https://www.epa.gov/npdes/epas-stormwater-discharge-mapping-tools

The source of water shall be approved by a Construction PLA through the Engineer prior to use.

2.08 Compost:

Compost in bulk or furnished in containers or bags, shall consist of composted organic vegetative materials, and may contain worm castings. No animal manures or city biosolids shall be used in the composting or added to the compost. Prior to being furnished on the project, compost samples shall be tested for the specified microbiological and nutrient conditions, including maturity and stability, by a testing laboratory approved for testing organic materials. During pre-activity seeding construction meeting, compost test written results submitted to the Engineer for approval shall be within nine (9) months from the date of the official lab test.

Compost material shall be dark brown in color with the parent material composted and no longer visible. The structure shall be a mixture of fine and medium size particles and humus crumbs. The maximum particle size shall be within the capacity of the contractor's equipment for application to the constructed slopes. The odor shall be that of rich humus with no ammonia or anaerobic odors.

Bulk Compost shall also meet the requirements of Table 3:

TABLE 3	
Cation Exchange Capacity (CEC)	Greater than 45 meq/100 g
Carbon : Nitrogen Ratio (C : N)	Less than 20 : 1
pH (of extract)	5.0 – 8.5
Organic Matter Content	Greater than 30%
Total Nitrogen (not added)	Greater than 1%
Micronutrients (added)	S, Ca, Mg, Na, Fe, Al, Mn, Cu, Zn, B
Maturity Index	Greater than 50% on Maturity Index at a 10 : 1 ratio
Stability Indicator, CO_2 Evolution: Biologically Available C (BAC)	Less than 4mg CO_2-C/g OM/day is desirable. From 4 through 8mg CO_2-C/g OM/day is acceptable. Greater than 8mg CO_2-C/g OM/day is not acceptable.
The CEC lab testing method shall refer to EPA9081 at the web link: *http://epa.gov/osw/hazard/testmethods/sw846/pdfs/9081.pdf*	

Bulk compost is preferred and shall be applied to areas designated for seeding at the specified rate of 15 cubic yards per acre prior to final tillage for incorporation into the soil seedbed. Unless otherwise approved by the Engineer, bulk compost shall be engaged to all areas where equipment can be operated for final tillage in order to incorporate into the soil seedbed. Bulk compost may be substituted with hydraulically applied compost for small sized projects

that cover less than five (< 5) acres of Class II Seeding as evaluated by a Construction PLA, as well as approved by the Engineer.

The volume of bulk compost shall be measured and documented for Construction PLA's verification and approval through the Engineer.

In areas where bulk compost cannot be applied by broadcast methods, compost shall be applied hydraulically as per the approval of the Engineer. Hydraulically applied compost shall be applied at the rate of 5 cubic yards (or 135 cubic feet) per acre to mini-benched slopes or on other approved areas for incorporation into the soil seedbed. For seeding areas 3:1 and flatter where bulk compost cannot be employed, hydraulically applied compost shall be utilized at the rate of 5 cubic yards (or 135 cubic feet) per acre as per the approval of the Engineer. Hydraulically applied compost may also be combined with seed, soil amendments, and fertilizer in the same slurry prior to the final mulch cover with the approval of the Engineer.

The volume of hydraulically applied compost shall be measured and documented for Construction PLA's verification and approval through the Engineer.

Hydraulically applied compost shall meet the requirements of Table 4 below:

TABLE 4	
Cation Exchange Capacity (CEC)	Greater than 40 meq/100 g *
Carbon : Nitrogen Ratio (C : N)	Less than 20 : 1
pH (of extract)	5.0 – 8.5
Organic Matter Content	Greater than 35%
Total Nitrogen (not added)	Greater than 1%
Micronutrients (added)	S, Ca, Mg, Na, Fe, Al, Mn, Cu, Zn, B
Stability Indicator, CO_2 Evolution: Biologically Available C (BAC)	Less than 4mg CO_2-C/g OM/day is desirable. From 4 through 8mg CO_2-C/g OM/day is acceptable. Greater than 8mg CO_2-C/g OM/day is not acceptable.
Moisture Content by Weight	From 15% through 25%
The CEC lab testing method shall refer to EPA9081 at the web link: *http://epa.gov/osw/hazard/testmethods/sw846/pdfs/9081.pdf*	

* When CEC is from 50 meq/100 g through 55 meq/100 g, in order to be approved, the contractor may add 100 pounds additional Hydraulically Applied Compost per acre to compensate for the lower-than-standard CEC value.

Compost shall not be applied to the seeding area below the OHWM. The choice between bulk compost and hydraulically applied compost shall be evaluated, as well as coordinated by a Construction PLA according to specific project conditions with the approval of the Engineer.

2.09 Soil Conditioners:

Soil conditioners, when required, will be as shown in the Special Provisions.

3.0 Construction Requirements:

3.01 General:

Seeding Operations:

At least two (2) weeks prior to beginning seeding, the contractor shall complete and submit a batch mix and seed application form to the Engineer for approval. The batch mix form will be supplied by the Engineer.

After acceptance of the form stated above, the Engineer and contractor in coordination with Construction PLA shall determine a half-acre (0.5 acre) sample demonstrative area to be seeded and mulched prior to applying seed to the remainder of the project. Both regular straw mulch and hydraulically applied straw mulch shall be applied to the sample demonstrative area, as determined during on-site pre-activity seeding construction meeting. Both straw mulches shall be representative of the materials proposed for use on the project. If the seeding and mulching procedures, as well as outcomes, are acceptable by Construction PLA, the contractor shall begin seeding operations as specified herein. Photographic Documentation of half-acre (0.5 acre) sample demonstrative seeded/mulched area shall be recorded and submitted to a Construction PLA, as comparative standard representation (mandatory visual reference) for Seeding Acceptance under Subsection 3.07 stated below.

The contractor shall notify the Engineer at least two (2) days prior to commencing any phase of seeding operations for the remainder of the project.

The equipment and methods used to distribute seeding materials shall provide an even and uniform application of seed, mulch, and other materials at the specified rates.

It is the contractor's responsibility to furnish all suitable equipment for soil tillage, seeding, and mulching at no additional cost to the Department.

Unless specified otherwise in the Special Provisions, seeding operations shall not be performed on undisturbed soil outside the clearing and grubbing limits of the project or on steep rock cuts.

The contractor shall coordinate the seeding operations with the grading operations to determine mobilization frequency as embankment and cut slopes are finished throughout the duration of the project. Seeding shall be done during suitable weather and soil conditions (soil–water and soil–temperature regimes) for tillage and placement of materials. Seeding operations shall not be performed below 35 degrees Fahrenheit (°F). Seeding operations shall not be performed when wind exceeds ten (10) miles per hour or, in the opinion of the Engineer, conditions would prevent uniform application of materials or would carry seeding materials into areas not designated for seeding. If wind exceeds ten (10) miles per hour, the seeding operation shall be evaluated by a Construction PLA and approved by the Engineer. If approved, the contractor shall perform seeding operation close to the ground surface with a

hydro-seeding hose and hand-held hose-end sprayer nozzle or other equivalently effective seeding methods to guarantee all seeding materials are applied on the target area without being blown away by wind. The contractor is responsible for protecting ambient air and water quality during the seeding operation.

The contractor shall not expose an area greater than 750,000 square feet (≤17.22 acre) at any one location within the project limits until the seeding proposed for that portion of the project has been installed and accepted by the Engineer. Seeding shall be accomplished within 14 days after slopes and disturbed areas have been completed. Seeding operations shall comply with Subsection 104.09 and the applicable portions of Section 203 of the specifications, and as directed by the Engineer.

Frequent mobilizations may be required to accomplish seeding as specified herein. The Department will consider the cost of such multiple mobilizations to be included in the price bid for the seeding. No adjustments will be made to the contract for the number of seeding mobilization activities. Should the contractor fail to provide seeding for a sub-area as specified herein, the Engineer will immediately notify the contractor of such non-compliance. Should the contractor fail to immediately remedy the unstabilized area, the Engineer may suspend work until such seeding stabilization has been completed or proceed to provide the necessary seeding stabilization. The entire cost of such work will be deducted from the monies due or to become due to the contractor. In addition, no adjustment to the contract time will be made for suspensions resulting from the contractor's failure to provide seeding for a sub-area within the time periods specified herein.

3.02 Tillage:

Where equipment can operate, the area to be seeded shall be prepared with a ripper bar, chisel plow, or with other devices to provide thorough soil cultivation to the depth specified below. It is the contractor's responsibility to furnish all suitable equipment for soil tillage at no additional cost to the Department.

Where equipment is not suitable for operation, hand tillage and/or other manual methods shall be utilized as approved by the Engineer. Tillage depth shall follow the requirements specified herein in accordance with assessment/measurement from a Construction PLA, as well as acceptance by the Engineer.

For areas too steep to be prepared for seeding after the slope has been completed, as determined by the Engineer, tillage shall be accomplished with appropriate equipment as the slope is being constructed. On slope areas, all tillage shall be horizontal and parallel to the contours of the areas involved in order to create a roughened surface condition to reduce stormwater runoff velocity and volume. All seeding areas suitable for tillage shall be pre-tilled to promote on-site stormwater infiltration and alleviate stormwater surface runoffs, as a part of stormwater peak flow and Volume Reduction Approaches (VRAs). All seeding areas suitable for tillage shall be adequately pre-tilled to minimize pollutant loads anticipated in nonpoint source stormwater runoffs. All project areas eroded shall be restored to the specified condition, grade, and slope as directed prior to seeding.

Cut slopes shall be prepared with ridges and deep tillage or shall be mini-benched so as to detain rainwater/moisture close to its source. On fill slopes, the operations shall be conducted

in such a manner as to form minor ridges thereon to assist in retarding runoff associated erosion/pollution and favor germination of the seed through detaining rainwater/moisture close to its source.

Except as specified herein, slopes shall be constructed in accordance with Subsection 203-3.03(B) of the specifications. Cut slopes flatter than 3:1 (horizontal to vertical) shall be tilled a minimum of 12 inches in depth, and fill slopes flatter than 3:1 shall be tilled to a six-inch minimum depth. All slopes steeper than 3:1, and areas which could potentially be affected by underground utilities, shall be tilled to a minimum six (6) inches in depth, and left in a roughened surface condition as they are constructed.

Track-walking or imprinting of rocky new fill slopes through mechanical methods in lieu of tillage may be allowable if accepted by a Construction PLA, through the Engineer. All final impression marks generated by track-walking or imprinting shall be horizontal and parallel to the contours of slope areas involved in order to create a roughened surface condition and reduce stormwater runoff velocity, enhance erosion/sediment control, as well as energy/velocity dissipation.

Tillage shall be a minimum of two (2) inches in depth for the first ten (10) feet from the toe of AC wedge including shoulder build-up areas (edge of pavement build-up areas) or from the outside edge of curb and gutter.

Care shall be taken during the seeding operations to prevent damage to existing trees and shrubs in the seeding area in accordance with the requirements of Subsection 107.11 of the specifications.

Tillage may require passing the equipment over the area several times to provide thorough soil cultivation. Furrows from the village shall be no more than 12 inches apart. No work shall be done when the moisture content of the soil is unfavorable to tillage.

All competitive vegetation shall be uprooted prior to seeding and the soil shall be left in a friable roughened surface condition free of clods or large stones over four (4) inches in any dimension, and other foreign material that would interfere with the seeding operation. Exposed stones larger than four (4) inches shall be removed and disposed of in an approved manner prior to grading and seeding. Invasive and non-native weed species shall be eradicated according to the MISCELLANEOUS WORK (CONTROL OF NOXIOUS PLANTS) of these Special Provisions whenever applicable.

All disturbed soil areas covered with existing chipped wood materials and/or native plant residues, which will not interfere with the tillage operation, shall be tilled for incorporation into the soil along with chemical fertilizer, as well as soil amendments (sulfur and compost) prior to final tillage and seeding.

Regardless of the method of seeding application, all areas prepared with tilling shall have chemical fertilizer and soil amendments (sulfur and compost) uniformly applied and incorporated (disked) into the soil prior to final tillage and seeding.

Chemical fertilizer and sulfur shall be applied at the rate of 200 pounds each per acre. Bulk compost shall be applied at the rate of 15 cubic yards per acre.

Unless otherwise approved by the Engineer, bulk compost shall be applied using broadcast methods to all areas where equipment can be operated. For areas where bulk compost cannot be applied by broadcast methods, as evaluated by a Construction PLA and determined by the Engineer, compost shall be applied hydraulically at the rate specified in Section 2.08 above. Hydraulically applied compost shall not be combined with final mulch cover in the same slurry. However, seed, sulfur and fertilizer may be utilized together with hydraulically applied compost in the same slurry with the approval of the Engineer. Final mulch cover shall be installed on top of all seeded areas as a separate construction sub-phase.

Slopes 3:1 and flatter shall have fertilizer, sulfur, and compost tilled/disked into a minimum of the top four (4) inches of the surface. Slopes steeper than 3:1 shall have fertilizer, sulfur, and compost uniformly broadcast for incorporation into the soil as directed by the Engineer. Unless otherwise operated together with hydraulically applied compost for the approved locations, fertilizer and sulfur shall not be applied hydraulically to areas for seeding.

Tillage shall not be applied for the seeding area below the OHWM.

For mini-benched slopes, fertilizer, compost, and sulfur shall be applied at the specified rates with no tillage or incorporation.

Seeding shall not initiate until all tillage areas and/or mini-benched slopes are accomplished as approved by a Construction PLA through the Engineer.

3.03 Seeding:

(A) General:

Drill seeding with straw mulch shall be considered as the preferred method of seed application when practicable. Unless otherwise approved by the Engineer, drill seeding shall be used for all areas with slopes of 3:1 or less.

Hydroseeding shall be the alternative method for seed distribution for slopes in excess of 3:1, and where drill seeding is not practicable or suitable for soil conditions and seed types, as determined by the Engineer.

Seeds not suitable for drill seeding and hydroseeding methods shall be broadcast manually. Areas to be seeded manually shall be completed after the final soil tillage and prior to any drill or hydroseeding.

Regardless of the seeding method(s), the contractor is responsible to guarantee intimate seed-soil contact. Seed application on top of straw mulch cover or hydraulically applied straw mulch cover shall be rejected. To guarantee intimate seed-soil contact, seed application on top of existing exposed chipped wood materials and/or plant residues ground cover shall be rejected.

Final straw mulch cover or hydraulically applied straw mulch cover shall be applied on all seeded areas, as specified in Sections 3.04 and/or 3.05, within 24 hours of seed application. The seeding application shall be accomplished prior to installation of straw mulch cover or

hydraulically applied straw mulch cover. Combining the seed application process with the mulching process will not be acceptable. By implementing Low Impact Development (LID) source-control measure, the contractor shall install a final straw mulch cover or hydraulically applied final straw mulch cover to minimize raindrop splash erosion and wind erosion/dust, as close as possible at the source of disturbance to protect all seeded areas. Thermally-refined wood fiber shall not be utilized solely as final mulch cover to protect all seeded areas. Seeds shall be neither exposed nor visible after the installation of straw mulch cover or hydraulically applied straw mulch cover.

Unless otherwise specified in the Special Provisions, Class II seeding areas shall not be watered after planting.

(B) Drill Method:

After the tillage and incorporation of fertilizer, sulfur, and compost is completed and accepted by the Engineer, seed shall be planted with a drill seeder capable of accurately metering the specific seed mix. Use of a drill seeder shall not damage the prepared seedbed and shall provide a soil cover over the planted seed.

Seed shall be planted approximately 1/4 inch deep, with a maximum depth of 1/2 inch. The distance between the furrows produced using the drill process shall not be more than eight (8) inches. If the furrow openers on the drill exceed eight (8) inches, the area shall be drilled twice. Seeding shall be done with grass seeding equipment with double disc openers, depth bands, packer wheels or drag chains, rate control attachments, seed boxes with agitators and separate boxes for small seeds. Seed of different sizes shall be sowed from at least two (2) separate boxes adjusted or set to provide the planting rate as specified.

(C) Hydroseed Method:

Areas and seed types not suitable for drill-seeding, as determined by the Engineer, shall be hydroseeded. The contract-specified seed shall be applied in a slurry containing 200 pounds of thermally-refined wood fiber and a minimum of 40 pounds tacking agent per acre. Seed shall not be in the slurry for more than 30 minutes. Hydroseeded areas shall have 100 percent (100%) coverage from all directions as evaluated by a Construction PLA, as well as approved by the Engineer. Hydroseeded areas shall also be mulched, as specified in Sections 3.04 or 3.05, within 24 hours of application of the seed.

(D) Manual Application:

Manually applied seeds shall be broadcast evenly to produce uniform distribution over the seeded areas.

3.04 Applying Straw Mulch as Final Mulch Cover on Top of Seeded Areas:

(A) General:

Within 24 hours after each area is planted, straw mulch shall be uniformly applied at the minimum rate of 2 1/2 tons per acre for areas to be crimped and tacked, and minimum two

(2) tons per acre for tacked-only areas. Except for edge of pavement build-up areas, and unless otherwise specified by the Engineer, straw mulch shall be applied to all seeded areas. Areas to receive hydraulically applied straw mulch, if directed by the Engineer, shall be mulched in accordance with Section 3.05.

During seeding and mulching operations, care shall be exercised to prevent drifting and displacement of materials. Mulch material, which is placed upon trees and shrubs, roadways, structures, and upon any areas where mulching is not specified, or which is placed in excessive depths on mulching areas, shall be removed as directed. Mulch materials which are deposited in matted condition shall be loosened and uniformly spread to the specified depth over the mulching areas. Any unevenness in materials shall be immediately corrected by the contractor. In addition, the contractor shall minimize production of dust or other airborne particulate matter during application of straw mulch, either by moistening the straw, modifying equipment with misters, or through other means approved by the Engineer.

Except as specified in the next paragraph, straw mulch applied to seeded areas shall be immediately affixed by crimping and tacking after application. No mulch shall be applied to seeding areas which cannot be crimped and/or tacked by the end of each day. Any drifting or displacement of mulch before crimping and/or tacking shall be corrected by the contractor at no additional cost to the Department.

Crimping shall not be required for areas that are steeper than 3:1. Crimping may also be waived, when specifically directed by the Engineer, for drill seeded or hydroseeded areas with rocky conditions or other areas deemed unsuitable by the Engineer for crimping. Straw mulch applied to such areas shall only be tacked, as specified in Subsection 3.04(C) below.

Prior to the application of a tacking agent, protective covering shall be placed on all structures and objects where stains would be objectionable. All necessary precautions shall be taken to protect the traveling public and vehicles from damage due to drifting spray.

(B) Anchorage by Crimping:

Except as specified above in 3.04(A), crimping shall be required for all straw mulched areas. Straw mulch shall be anchored into the soil with a heavy disc. Discs shall be flat and serrated, with at least 1/4-inch thickness having dull edges, and spaced no more than nine (9) inches apart. Straw mulch shall be anchored to a depth of at least two (2) inches and shall not be covered with an excessive amount of soil. Anchoring operations shall be across the slopes where practical, with no more than two (2) passes of the anchoring equipment. Immediately following the crimping operation, the crimped area shall be tacked as specified in Subsection 3.04(C) below.

(C) Anchorage by Tacking:

Straw mulch shall be anchored by tacking, using a slurry consisting of a minimum of 150 pounds of tacking agent, 500 pounds of thermally refined wood fiber mulch, and 300 gallons of water per acre. The contractor may increase the quantities of components to ensure the stability of the straw mulch to provide erosion control during the 45-calendar-day maintenance period at no additional cost to the Department.

3.05 Hydraulically Applied Straw Mulch with Tacking Agent as Final Mulch Cover on Top of Seeded Areas:

Areas seeded but not practical for straw mulch, as determined by the Engineer, shall have hydraulically applied straw mulch with tacking agent applied at the variable rates shown in Table 5 below.

TABLE 5

Slope (H:V)	Hydraulically Applied Straw Mulch (pounds per acre – dry weight)	Tacking Agent (pounds pure mucilage per acre – dry weight)	Thermally-Refined Wood Fiber (pounds per acre – dry weight)
Flat to 6:1	2,000	150	400
From greater than 6:1 to 3:1	2,500	150	500
Greater than 3:1	3,000	200	600
Erosive Soil Slopes or Highly Erosive Areas*	3,500	250	700
* As determined by Engineer			

The contractor shall submit a batch (tank) mix quantity schedule for mulch application to the Engineer for approval prior to mixing hydraulically applied straw mulch, thermally-refined wood fiber, and tacking agent in a slurry. Batch mixing and coverage will be monitored throughout the seeding operations. The contractor shall coordinate the mixing and application operations with the Engineer in advance of all mixing. Fertilizer or seed shall not be mixed into any slurry for temporary erosion control mulch application. To guarantee intimate seed-soil contact, seed shall not be mixed into any slurry with hydraulically applied straw mulch as final mulch cover.

3.06 Shoulder Build-up Areas — Edge of Pavement Build-up Areas:

Seeding shall be applied to all new earthen and milled asphaltic concrete edge of pavement build-up areas. Edge of pavement build-up areas shall be tilled two (2) inches deep from the toe of AC wedge to the toe of the edge of pavement build-up area prior to seeding.

After the two-inch tillage is complete, compost, fertilizer, seeding, and mulching shall be done in three (3) separate steps. For the first step, fertilizer and compost shall be broadcast evenly over both types of edge of pavement build-up areas. For the next step, seed shall be applied by hydroseeding for both types of areas. For the third step, seeded edge of pavement build-ups comprised of milled asphaltic concrete shall have hydraulically applied straw mulch and tacking agent applied, and earthen edge of pavement build-up areas shall have straw mulch or hydraulically applied straw mulch applied, with a tacking agent in either case. No crimping shall be required.

The application rate of hydraulically applied straw mulch and tacking agent shall be as specified in Table 5 above.

3.07 Seeding Acceptance:

After application, the Engineer will inspect seeded areas or sub-areas for conformance to the contract requirements. The contractor shall correct, to the satisfaction of the Engineer, any areas not conforming to the specifications. The 45-calendar-day seeding maintenance period will begin upon Initial Seeding Construction Acceptance of an area by a Construction PLA through the Engineer.

The contractor shall maintain and stabilize each area or sub-area, including edge of pavement build-up area(s), for a minimum period of 45 calendar days, after Initial Seeding Construction Acceptance, as evaluated by a Construction PLA, as well as approved by the Engineer. Any areas damaged from erosion, or those that have less than 90 percent (**<** 90**%**) of the remaining final mulch cover, shall be re-seeded, re-mulched, and re-tacked at no additional cost to the Department. The Construction PLA shall assess the seeded area in comparison to the pre-established half-acre (0.5 acre) sample demonstrative area for Class II Seeding to determine the necessity of re-seeding, re-mulching, and re-tacking.

A new 45-calendar-day maintenance period for an area is not required after re-seeding work, however the initial or original period remains in effect.

4.0 Method of Measurement:

Seeding (Class II) will be measured by the acre, to the nearest one acre of ground surface seeded. Measurements will be along the ground surface for the areas seeded and mulched, as approved by the Engineer.

5.0 Basis of Payment:

During pre-activity construction meeting, the contractor in conjunction with Engineer shall verify and be in agreement with the quantity of seeding areas as evaluated by a Construction PLA. The quantity of areas to be seeded shall be in compliance with environmental requirements.

The accepted quantities for Seeding (Class II), measured as provided above, will be paid in two (2) phases corresponding to the application stage and the 45-calendar-day maintenance stage.

Upon completion of the application stage through evaluation by a Construction PLA and acceptance by the Engineer in the presence of contractor, the contractor will be paid 70 percent (70**%**) of the contract bid price per acre for the completed work. Such price will be considered full compensation for furnishing and applying the contract-specified seed mix, fertilizers, soil amendments, tillage, mulch materials, and tacking agent, all required testing, as well as all equipment and labor required to complete the work as specified herein.

Upon completion of the 45-calendar-day seeding maintenance stage, and acceptance by a Construction PLA through the Engineer, the contractor will be paid the remaining 30 percent (30**%**) of the contract bid price per acre for the completed work. Such price will be considered full compensation for seeding maintenance, including all equipment, labor, and materials required to correct deficiencies in seeded, mulched areas, as specified herein.

No measurement or payment will be made for any of the mobilizations required to apply and stabilize the seeding for each area or sub-area, as specified herein, the cost being considered as included in the contract price for Seeding (Class II).

No measurement or payment will be made for traffic control for work during the 45-calendar-day seeding maintenance period.

An adjustment to the contract will be made if a contractor-requested seed substitution is approved as specified in Subsection 2.02(B) above.

SECTION 903 WIRE FENCE:

903-3 Construction Requirements:

903-3.01 General: of the Standard Specifications is modified to add:

Within designated cultural restricted work areas, the contractor shall not operate vehicles or heavy equipment. All fencing work in cultural restricted work areas shall be completed on foot using hand tools. The cultural restricted work areas are as indicated in the table below:

Area No.	Mileposts	Side of Road
Restricted Area 1	329.9 - 329.98	N side of eastbound onramp
Restricted Area 2	330.05 - 330.17	N side of northernmost frontage; N side of westbound offramp
Restricted Area 3	330.17 - 331.28	N side of northern frontage; westbound traffic frontage
Restricted Area 4	331.28 - 331.70	Both N and S sides of westbound traffic frontage road
Restricted Area 5	331.70 - 332.15	N side of westbound road
Restricted Area 6	332.71 - 333.15	N side of westbound frontage road
Restricted Area 7	333.15 - 333.33	N side of westbound frontage road and southside median
Restricted Area 8	333.52 - 333.63	N side of westbound offramp and median separating off ramp and frontage road
Restricted Area 9	333.63 - 333.75	N and S sides of westbound frontage road
Restricted Area 10	333.75 - 333.86	N side of westbound frontage and N side of westbound
Restricted Area 11	333.86 - 334.08	N side of westbound
Restricted Area 12	336.86 - 339.29	N side of westbound frontage road

(910CBARR, 05/16/24)

SECTION 910 CONCRETE BARRIERS:

910-2 Materials: of the Standard Specifications is revised to read:

Unless otherwise shown on the plans, concrete shall be Class S Portland cement concrete conforming to the requirements of Section 1006 of the specifications with a compressive strength of at least 4,000 pounds per square inch at 28 days.

Reinforcing steel shall be in accordance with the requirements of Section 1003 of the specifications.

Dowels shall be corrosion resistant coated dowel bars conforming to the requirements of AASHTO M 254, Type A.

Grout for pressure grouting the joints of precast barriers shall conform to the requirements of Subsection 602-2.03 of the specifications.

Grout for the bedding of precast barriers shall conform to the requirements of Subsection 913-2.01(D) of the specifications.

Joint sealant shall be a latex sealing compound conforming to the requirements of ASTM C834, applied as recommended in ASTM C1193.

910-3.01 General: of the Standard Specifications is revised to read:

Unless otherwise required by the project plans or Special Provisions, concrete barrier shall be constructed by any of the following methods or combinations thereof, at the contractor's option:

(A) Cast-in-place by slip-form;

(B) Cast-in-place by fixed forms; and/or

(C) Precast

Concrete barriers shall have a smooth, uniform appearance in their final position, conforming to the horizontal and vertical lines shown on the project plans or as ordered by the Engineer.

When concrete barriers are to be constructed on recently completed bridges, the barriers shall be placed after falsework has been released and as long after superstructure construction as the progress of the work will permit, unless otherwise ordered by the Engineer.

Concrete barriers and concrete barrier transitions which are constructed on bridge structures, approach slabs and anchor slabs shall be constructed by cast-in-place, fixed-form methods. Precast or slip-form methods will not be allowed.

When a concrete barrier is not placed on pavement, the supporting material shall be shaped and finished in reasonably close conformity to the lines, grades and dimensions established by the Engineer or shown on the project plans.

The material shall be compacted to at least 95 percent of the maximum density determined in accordance with the requirements of the applicable test methods of the ADOT Materials Testing Manual, as directed and approved by the Engineer.

All exposed surfaces shall be given a Class II finish and shall be in accordance with the requirements of Subsection 601-3.05 of the specifications. Curing of concrete shall be in accordance with the requirements of Subsection 1006-6 of the specifications.

Construction of barrier reinforcement shall conform to the requirements of Subsection 605-3 of the specifications.

Concrete placement shall not be conducted over live traffic.

Barrier markers shall be installed in accordance with the details shown on the plans.

910-3.02 Cast-In-Place by Slip-Form or Extrusion: the title and the text of the Standard Specifications are revised to read:

910-3.02 Cast-In-Place by Slip-Form:

(A) General:

Concrete barriers constructed by using a slip-form machine or similar equipment shall be of well compacted, dense concrete. At the option of the contractor, concrete may be made with materials continuously batched by volume and mixed in a continuous mixer in accordance with the requirements of ASTM C685, except that sampling, testing, and acceptance of the concrete will be in accordance with the requirements of Section 1006 of the specifications.

The contractor may be required to furnish evidence of successful operation of the slip-form machine or other related equipment prior to beginning work. Slip-forming equipment shall be controlled by guidelines or wireless controls set from survey marks shown on the project plans or established by the Engineer. The slip-forming equipment shall be readily adjustable to conform to the proposed grade lines and vertically during the forward motion of the machine to conform to the pre-determined grade line during operations. A grade line gauge or pointer shall be attached to the machine in such a manner that a continual comparison can be made between the barrier being placed and the established grade line as indicated by the offset guide line.

In lieu of the above method for maintaining the barrier grade, the slip-form machine may be operated on rails, forms, or on an existing pavement.

Slip-form barrier will be considered to not require additional finishing if the surface meets the requirements of a Class II finish as described in Subsection 601-3.05 of the specifications and the alignment is satisfactory. If the barrier does not meet these requirements, operations shall

be stopped until adjustments are made to the equipment or the concrete mix that will result in an acceptable product. Barriers that cannot be refinished to meet the specifications for a Class II finish shall be removed and replaced at the contractor's expense. Barriers that have unsatisfactory alignment and straightedge tolerance shall be penalized or replaced in accordance with these specifications.

Concrete shall be placed and consolidated by methods that do not cause harmful segregation. To produce the required consolidation, the equipment shall be operated under sufficient speed and uniform restraint to the forward motion.

The concrete shall be of such consistency that after slip-forming operations it will maintain the shape of the barrier without support. The contractor shall ensure the integrity and positioning of all barrier steel reinforcement and conduit throughout slip-forming operations, maintaining adequate clear cover and spacing requirements as shown in the project plans. At the contractor's option, additional barrier steel reinforcement may be added at no additional cost to the Department.

Unless otherwise specified in the Special Provisions, the contractor shall construct a confirmation section of concrete barrier to demonstrate to the Engineer successful slip-forming operations during concrete barrier placement. Confirmation sections of concrete barrier may be waived if approved by the Engineer in writing. The confirmation section shall be a minimum of 100 feet to 300 feet in length and constructed in accordance with the requirements of the contract documents. The confirmation section will be evaluated for conformance to the requirements of the contract documents by the Engineer. If the confirmation section is determined to be non-compliant, those sections of concrete barrier not in conformance, shall be removed and replaced at no additional cost to the department. In addition, a revised plan for placement of the concrete barrier shall be submitted to the Engineer for approval. A maximum of two confirmation sections may be constructed to demonstrate successful slip-forming operations. If the contractor fails to demonstrate compliance with the contract requirements after 2 completed confirmation sections, the Engineer may disallow use of the slip-form method.

If at any time during concrete barrier placement the Engineer determines the slip-forming operations to be non-compliant with the contract requirements, the contractor may be required to construct additional confirmation sections and/or revise the plan for placement of the concrete barrier in order to demonstrate to the Engineer conformity of slip-forming operations.

(B) Dimensional Tolerances:

(1) The top of exposed faces of the barrier shall comply with the following tolerances to be accepted at 100 percent of the unit price bid per linear foot.

(a) When a 10-foot long straightedge is placed on the top surface of the barrier, it shall not vary by more than 1/4 inch from the straightedge.

(b) When a 10-foot straightedge is placed along the face of the barrier, it shall not vary by more than 1/2 inch from the straightedge.

(c) The horizontal alignment shall not deviate by more than that allowed in Section 401 of the specifications when placed adjacent to Portland Cement Concrete Pavement.

All other barrier dimensions shall not deviate by more than 1/2 inch from plan alignment.

(2) The top and exposed faces of the barrier shall comply with the following tolerances to be accepted at 75 percent of the unit price bid per linear foot.

(a) When a 10-foot long straightedge is placed on the top surface of the barrier, it shall not vary by more than 1/2 inch from the straightedge.

(b) When a 10-foot straightedge is placed along the face of the barrier, it shall not vary by more than 3/4 inch from the straightedge.

(c) The horizontal alignment shall not deviate by more than that allowed in Section 401 of the specifications when placed adjacent to Portland Cement Concrete Pavement.

All other barrier dimensions shall not deviate by more than 3/4 inch from plan alignment.

Those portions of the barrier not in compliance with the minimum requirements specified in in this subsection shall be removed and replaced at no additional cost to the Department.

910-3.04 **Precast:** The first paragraph of the Standard Specifications is revised to read:

Precast concrete barriers shall be cast in accordance with the requirements of Section 601 of the specifications.

(912FIBER, 06/16/22)

SECTION 912 SHOTCRETE:

912-1 **Description:** of the Standard Specifications is revised to read:

The work under this section shall consist of furnishing all materials and applying shotcrete on prepared surfaces at the locations and in accordance with the details shown on the plans and the requirements of the specifications.

Shotcrete shall be mortar or concrete conveyed through a hose and pneumatically applied using the wet mix process.

The wet mix process shall consist of premixing by mechanical methods a proportional combination of Portland cement, supplementary cementitious material, aggregate, and water

required to produce mortar or concrete; conveying the mortar or concrete through the delivery hose to the special nozzle where additional compressed air is added at the nozzle prior to its discharge.

912-2.03 Admixtures: of the Standard Specifications is revised to read:

Admixtures shall conform to the requirements of Subsection 1006-2.04 of the specifications.

Air-entraining admixtures will be required for shotcrete placed at an elevation of 3,000 feet or above and the air content shall be 7 percent plus or minus 2 percent, when measured prior to pumping. At other elevations, air entraining admixtures may be used at the discretion of the contractor/mix designer and shall conform to the approved mix design. Air content will be measured in accordance with AASHTO T 152.

912-2 Materials and Equipment: of the Standard Specifications is modified to add:

912-2.07 Synthetic Fiber:

Microfiber may be used for control of plastic shrinkage. Macrofiber may be used to provide the residual strength. The dosage rate of either product shall be as specified by the mix design.

Fibers shown on the Department's Approved Product List (APL) and meeting the requirements specified herein shall be used as reinforcement. Copies of the most current version of the APL are available on the internet from the ADOT Research Center through its Product Evaluation Program. Fibers other than those listed on the APL that meet with the requirements specified herein may be considered for use as specified in Subsection 106.14 of the specifications, upon Engineer's approval.

Fiber reinforcement shall conform to the requirements of ASTM C1116 and ASTM D7508. Fiber reinforcement shall be polymeric, made from 100 percent virgin materials, non-corrosive, non-magnetic, and 100 percent alkali free.

Microfiber shall have a diameter of less than 0.012 in. (0.3 mm) and be clearly defined as a microfiber on the manufacturers technical data sheets.

Macrofiber shall have a minimum diameter of 0.012 in. (0.3 mm) and be clearly defined as a macrofiber on the manufacturers technical data sheets

The specific type, size, and quantity of fiber shall be determined by the mix designer and approved by the Engineer.

912-3.01 Proportioning and Mixing: of the Standard Specifications is revised to read:

(A) Wet Mix Process:

(1) Premixed Mortar:

Premixed mortar shall consist of not less than 564 pounds of combined Portland cement and supplementary cementitious material per cubic yard, fine aggregate, chemical and/or air-entraining admixtures, and water mixed to a desired consistency, generally to a slump in the range of 1-1/4 to 4 inches.

The material may be mixed at a central mixing plant or at the project site. If mixing is done at the project site, the mixer shall be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous placing of the mortar.

(2) Concrete:

The contractor shall determine the mix proportions and shall furnish concrete for pneumatic placement which contains a minimum of 658 pounds of combined Portland cement and supplementary cementitious material per cubic yard of concrete and which attains a minimum 28-day compressive strength of 3,000 pounds per square inch, unless otherwise specified. Fine aggregate and coarse aggregate shall conform to the requirements of Subsection 912-2.02. The total mix shall contain 15 to 20 percent coarse aggregate, by weight. The water/cementitious material ratio shall not exceed 0.50. In no case shall the slump be greater than 4 inches.

If ready-mixed concrete is used, it shall conform to the requirements of ASTM C 94.

If microfiber is used in the mix design, the dosage rate shall be determined to provide a minimum of 40% reduction in plastic shrinkage cracking when tested in accordance with ASTM C1579.

If macrofiber is used in the mix design, the dosage rate shall be determined to meet either the average equivalent flexural strength, or residual strength at a deflection of L/150, fd150 determined in accordance with ASTM C1609, using a load support apparatus compliant with the requirements of ASTM C1812

912-3.04 Steel Reinforcement: of the Standard Specifications is revised to read:

Reinforcement shown on the plans shall consist of continuous steel reinforcement conforming to the requirements of Section 605 of the specifications or synthetic fiber reinforcement meeting requirements of Subsection 912-3.01 of the specifications which meet or exceed the performance of the steel required in Section 605 of the specifications.

912-3.08 Finishing: of the Standard Specifications is revised to read:

The shotcrete shall be placed as nearly as practicable to the required thickness and shape outlined by forms and ground wires. Unless otherwise specified, the surface of the shotcrete shall have a natural gun finish.

(913BKPRT, 02/18/21)

SECTION 913 - BANK PROTECTION: of the Standard Specifications is revised to read:

913-1 Description:

The work under this section shall consist of furnishing all materials and constructing bank protection in accordance with the details shown on the plans and the requirements of the specifications.

Bank protection shall be dumped riprap, grouted riprap, wire tied riprap, riprap in wire baskets or gabions, soil-cement, and other types of bank protection and shall be constructed at the locations and as shown on the plans.

913-2 Materials:

913-2.01 Riprap Bank Protection:

(A) Rock:

Rock shall be sound and durable, free from clay or shale seams, cracks or other structural defects.

The bulk (SSD) specific gravity of the rock shall be a minimum of 2.4 as determined in accordance with the requirements of Arizona Test Method 210.

Rock used to construct dumped riprap shall be angular in shape. Rock used to construct other types of bank protection may be rounded stones or boulders. Rock shall have a least dimension not less than one-third of its greatest dimension and a gradation in reasonable conformity with that shown herein for the various types of bank protection. Control of the gradation will be by visual inspection.

When a source of rock is designated by the Department, it shall be the contractor's responsibility to negotiate for the material, obtain the right-of-way, and pay all royalties and damages.

The acceptability of the rock will be determined by the Engineer by visual inspection and/or testing. If testing is required, suitable samples of rock shall be taken in the presence of the Engineer at least 25 days in advance of its expected use. The approval of some rock fragments from a particular quarry site shall not be construed as constituting the approval of all rock fragments taken from that quarry.

During construction of the bank protection, the contractor shall provide two samples of rock for the intended use. The amount of each sample for dumped riprap and riprap (slope mattress) shall be at least five tons. The amount of each sample for grouted riprap, wire tied riprap, gabions, and rail bank protection shall be at least 500 pounds. One sample shall be provided at the construction site and may be a part of the finished bank protection. The other sample shall be provided at the quarry. These samples will be used as a frequent reference for judging the gradation of the rock supplied. Any difference of opinion between the Engineer and the contractor shall be resolved by checking the gradation of two random samples of the rock.

Material that is deemed unacceptable by the Engineer shall be replaced with acceptable material at no additional cost to the Department.

(1) Grouted Riprap:

Gradation of the rock for grouted riprap shall be as specified in the Special Provisions or as shown on the plans.

(2) Wire Tied Riprap:

Rock for wire tied riprap shall be well graded with at least 95 percent exceeding the least dimension of the wire mesh opening. The maximum size rock, measured normal to the mat, shall not exceed the mat thickness.

(3) Dumped Riprap:

Gradation of the rock for dumped riprap shall be as shown on the plans or as specified in the Special Provisions.

All equipment, sorting sites, and labor needed to check gradation shall be provided by the contractor at no additional cost to the Department.

(4) Gabions:

Rock for gabions shall be well graded, varying in size from 4 to 8 inches.

(5) Riprap (Slope Mattress):

Rock for slope mattress shall be well graded with 70 percent exceeding three inches. The maximum dimension of a single rock shall not exceed the least dimension of the gabion.

(6) Rail Bank Protection:

Rail bank protection rock shall be well graded, varying in size from 4 to 12 inches.

(B) Metal Items:

(1) Wire Fabric:

Welded wire fabric shall be galvanized and shall conform to the requirements of AASHTO M 336, except that the minimum weight of the zinc coating shall be 0.15 ounces per square foot of actual surface.

Woven wire fabric shall be galvanized and shall conform to the requirements of ASTM A116, except that the minimum weight of the zinc coating shall conform to the requirements of ASTM A641, Class 3.

Wire fabric shall be of the diameter, spacing, pattern, and dimensions shown on the plans. The selvage on each sheet of mesh shall be galvanized steel wire with a minimum diameter 25 percent larger than that used in the body of the mesh.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted to the Engineer.

(2) Miscellaneous Fittings and Hardware:

Miscellaneous fittings and hardware shall be of the type and size provided by the manufacturer of the major item to which they apply and shall be galvanized in accordance with the requirements of AASHTO M 232.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted to the Engineer.

(3) Tie Wires:

Tie wires shall be of good commercial quality and the size shall be as shown on the plans, except that the minimum weight of the zinc coating shall conform to the requirements of ASTM A641, Class 3. The contractor may use approved wire fasteners on gabions, slope mattresses, or wire fabric in lieu of tie wires.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted to the Engineer.

(4) Steel Cable:

Steel cable shall be zinc-coated steel structural wire rope conforming to the requirements of ASTM A475, seven-wire strand, Class A, for the diameter shown on the plans.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted to the Engineer.

(5) Railroad Rail:

Railroad rails may be new or used. If used rails are furnished, they shall be free from rust and equal to at least 95 percent of the original section.

(6) Soil Anchor Stakes:

Soil anchor stakes shall be made of steel and of the length shown on the plans. When not specified to be railroad rails, the following items may be used: crane rails with a weight of at least 40 pounds per linear foot, 2-inch diameter steel pipe conforming to the requirements of ASTM A53, or 3-inch by 3-inch by 3/8-inch structural steel angles conforming to the requirements of ASTM A36. Used rails, pipes or angles may be used provided the material is not rusted or damaged to the extent that the strength of the item is reduced to less than 90 percent of a new item of the same type and size.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted to the Engineer.

(C) Bedding Material:

Bedding material shall consist of granular material having a maximum dimension of 2 inches and shall be free of clay or organic material.

(D) Grout:

Grout shall consist of Portland cement, aggregate, and water. It may also contain supplementary cementitious material. Portland cement, aggregate, water, and supplementary cementitious material shall conform to the requirements of Section 1006 of the specifications. Chemical admixtures may be used and shall conform to the requirements of Subsection 1006-2.04 of the specifications, except no admixtures containing chlorides or nitrates shall be used. Air-entraining admixtures, conforming to the requirements of Subsections 1006-2.04 and 1006-3.01(E) of the specifications, shall be required for grout placed at elevations of 3000 feet or above.

The grout shall meet the requirements shown in table 1:

Table 1			
Minimum Cementitious Material Content: Lbs per CY (See Note 1)	**Maximum Water/Cementitious Material Ratio (w/cm): Lb./Lb.**	**Slump: Inches** (See Note 2)	**Air Content: Percent** (See Note 3)
850	0.60	9 ± 2	0 – 8

Notes:

(1) A maximum of 25 percent of the cementitious material, by weight, may consist of an approved Class F fly ash, conforming to the requirements of ASTM C618.

(2) The slump shall be in the appropriate range to permit gravity flow into the interstices with limited spading and brooming. The consistency of the grout shall be as approved by the Engineer.

(3) For placement of grout at elevations of 3000 feet or above, the air content shall be a minimum of 4 percent and a maximum of 8 percent.

The mix shall consist of fine aggregate; however, the contractor may use No. 8 coarse aggregate in the grout. If No. 8 coarse aggregate is used, the volume shall be a maximum of 35 percent of the total aggregate volume.

For plant-mixed grout, the proportioning, mixing, and placing shall be in accordance with the applicable requirements in Section 1006 of the specifications.

For on-site mixing, grout that has been mixed more than one hour shall not be used.

Retempering of grout will not be permitted.

(E) Bank Protection Fabric:

Fabric shall be supplied in accordance with and conform to the material requirements of Subsections 1014-1 and 1014-5 of the specifications, respectively. Special attention shall be given to the required survivability of the fabric.

The identification, packaging, handling, and storage of the geotextile fabric shall be in accordance with ASTM D4873. Fabric rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled or tagged to provide product identification sufficient to determine the product type, manufacturer, quantity, lot number, roll number, date of manufacture, shipping date, and the project number and name to which it is assigned. Rolls shall be stored on-site or at another storage location in a manner which protects them from the elements. If stored

outdoors, rolls shall be elevated and protected with a waterproof, light colored, opaque cover. At no time, shall the fabric be exposed to sunlight for a period exceeding 14 days.

(F) Sacked Concrete:

Sacked concrete shall be utility concrete conforming to the requirements of Section 922 of the specifications, except that the minimum cement content shall be 376 pounds per cubic yard; the slump shall be from 3 to 5 inches; and the aggregate shall conform to the gradation requirements shown in table 2 when tested in accordance with the requirements of Arizona Test Method 201:

Table 2	
Sieve Size	**Percent Passing**
2 inch	100
1/4 inch	45 - 89
No. 200	0 -12

Sacks for sacked concrete riprap shall be made of at least AASHTO M 182, Class 3, burlap and shall be approximately 19-1/2 by 36 inches measured inside the seams when the sack is laid flat, with an approximate capacity of 1-1/4 cubic feet. Sound, reclaimed sacks may be used.

913-2.02 Soil-Cement Bank Protection:

(A) Hydraulic Cement, Fly Ash, and Water:

Hydraulic cement, fly ash, and water shall conform to the requirements of Subsection 1006-2 of the specifications.

(B) Soil-Aggregate:

The source of soil-aggregate materials shall be the responsibility of the contractor. The contractor shall be solely responsible for the construction of the stockpile(s), including monitoring for quality and uniformity of the material placed therein. The soil-aggregate used in the soil-cement mixture shall consist of stones, gravel or other approved inert material of similar characteristics, and shall be clean and free from vegetable matter and other deleterious substances. Soil-cement aggregate shall conform to the gradation requirements shown in table 3 when tested in accordance with Arizona Test Method 201:

Table 3	
Soil-Cement Aggregate	
Sieve Size	**Percent Passing**
1-1/2 in	98 - 100
No. 4	60 - 90
No. 200	5 - 15

Class 2 ABC may be used in-lieu of aggregate meeting the requirements of the table 3. The contractor may submit a request to use alternate material to the Engineer for review and approval.

The Plasticity Index shall be a maximum of seven when tested in accordance with the requirements of AASHTO T 90.

Clay lumps larger than 1 inch shall be removed.

When soil-aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and level. The bottom six inch layer of aggregate stored on the ground shall not be disturbed or used.

The debris or waste material resulting from the clearing and preparing of the site shall be disposed of in accordance with Subsection 201-3.02 of the specifications.

(C) Mix Design Requirements for Soil-Cement Bank Protection:

Utilizing soil-aggregate, cementitious material, and water, a mix design conforming to the requirements specified herein shall be formulated and submitted by the contractor to the Engineer for approval prior to incorporating any of the material into the work.

The amount of cement shall be determined by laboratory testing by the contractor in accordance with Arizona Test Method 220. For mix design purposes only, the cement content of the soil-cement mixture shall be determined as the cement content which yields a seven day compressive strength of 1250 psi for the soil-cement mixture.

The percent of cement to be used in the mix shall be calculated to be the weight of cement divided by the total weight of the dry compacted soil-cement.

Included in the mix design data shall be the grade of cement, brand of fly ash, and the source of aggregate. A new mix design shall be submitted for approval any time the contractor requests a change in soil-aggregate source from that given in the approved mix designs.

913-3 Construction Requirements:

913-3.01 Riprap Bank Protection:

Areas on which bank protection is to be constructed shall be cleared, grubbed, and excavated or backfilled in accordance with the requirements of the appropriate sections of Division II to produce a ground surface in reasonable conformance with the lines and grades shown on the plans or established by the Engineer.

Placement through water will not be permitted unless otherwise approved by the Engineer.

Areas which are excavated for installation of rail bank protection shall be backfilled to original ground or to the lines and grades shown on the plans.

(A) Bank Protection Fabric:

When fabric is required, it shall be placed in the manner and at the locations shown on the plans. The surface to receive the fabric shall be free of obstructions, depressions and debris. The fabric shall be loosely laid and not placed in a stretched condition.

The strips shall be placed to provide a minimum 24 inches of overlap for each joint. On horizontal joints, the uphill strip shall overlap the downhill strip. On vertical joints, the upstream strip shall overlap the downstream strip. The fabric shall be protected at all times during construction from extensive exposure to sunlight.

When the maximum size of the rock to be placed on fabric exceeds 18 inches, the fabric shall be protected during the placement of the rock by a layer of bedding material. The bedding material shall be spread uniformly on the fabric to a depth of 4 inches and shall be free of mounds, dips or windrows. Compaction of the bedding material will not be required.

Rock shall be carefully placed on the bedding material and fabric in such a manner as not to damage the fabric. If, in the opinion of the Engineer, the fabric is damaged or displaced to the extent that it cannot function as intended, the contractor shall remove the rock, regrade the area if necessary, and replace the fabric.

(B) Dumped Riprap:

The rock shall be placed to its specified thickness in one operation and in a manner which will produce a reasonably well graded mass with a minimum amount of voids and with the larger rock evenly distributed throughout the mass.

No method of placing the rock that will cause segregation will be allowed. Hand placing or rearranging of individual rock may be necessary to obtain the specified results.

(C) Wire Tied Riprap:

After installation of the lower portion of the wire mesh, rock shall be placed in accordance with the requirements of Subsection 913-3.01(B) of the specifications.

After placement of the rock, the upper portion of the wire mesh shall be placed, laced, and tied in accordance with the details shown on the plans.

(D) Grouted Riprap:

Rock for grouted riprap shall be placed in accordance with the requirements of Subsection 913-3.01(B). The stones shall be thoroughly moistened and any excess of fines shall be sluiced to the underside of the stone blanket before grouting.

The grout may be delivered to the place of final deposit by any means that will ensure uniformity and prevent segregation of the grout. If penetration of grout is not obtained by gravity flow into the interstices, the grout shall be spaded or rodded to completely fill the voids in the stone blanket. Pressure grouting shall not unseat the stones, and during placing by this method, the grout shall be spaded or rodded into the voids.

Penetration of the grout shall be to the depth specified on the plans. When a rough surface is specified, stones shall be brushed until 25 to 50 percent of the depth of the maximum size stone is exposed. For a smooth surface, grout shall fill the interstices to within 1/2 inch of the surface.

Grout shall not be placed when the descending air temperature falls below 40 degrees Fahrenheit nor until the ascending air temperature rises above 35 degrees Fahrenheit. Temperatures shall be taken in the shade away from artificial heat.

Curing of the grout shall be in accordance with the requirements of Subsection 912-3.09 of the specifications.

The contractor may use shotcrete conforming to the requirements of Section 912 of the specifications in lieu of grout.

(E) Slope Mattress Riprap:

The mattress bed shall be excavated to the width, line and grade as shown on the plans. The mattress shall be founded on this bed and laid to the lines and dimensions required.

Excavation for toe or cut-off walls shall be made to the neat lines of the wall.

Mattresses shall be fabricated in such a manner that the sides, ends, lid and diaphragms can be assembled at the construction site into rectangular units of the specified sizes. Mattresses are to be of single unit construction, the base, ends and sides either to be woven into a single unit or one edge of these members connected to the base section of the unit in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

All perimeter edges of the mattresses are to be securely selvaged or bound so that the joints formed by tying the selvages have at least the same strength as the body of the mesh.

Mattresses shall be placed to conform to the details shown on the plans. Stones shall be placed in close contact within the unit so that maximum fill is obtained. The units may be filled by machine with sufficient hand work to accomplish the requirements of this specification.

Broken concrete shall not be used in slope mattresses.

Before the mattress units are filled, the longitudinal and lateral edge surfaces of adjoining units shall be tightly connected by means of wire ties placed every four inches or by a spiral tie having a complete loop every four inches. The lid edges of each unit shall be connected in a similar manner to adjacent units. The slope mattress shall be anchored as shown on the plans. Each anchor stake shall be fastened to the cover mesh with a tie wire.

(F) Gabions:

The gabion bed shall be excavated to the width, line and grade as shown on the plans. The gabions shall be founded on this bed and laid to the lines and dimensions required.

Excavation for toe or cut-off walls shall be made to the neat lines of the wall.

Gabions shall be fabricated in such a manner that the sides, ends, lid and diaphragms can be assembled at the construction site into rectangular units of the specified sizes. Gabions are to be of single unit construction, the base, ends and sides either to be woven into a single unit or one edge of these members connected to the base section of the unit in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Where the length of the gabion exceeds its horizontal width, the gabion is to be equally divided by diaphragms, of the same mesh type as the body of the gabions, into cells whose length does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges of gabions are to be securely selvaged or bound so that the joints formed by tying the selvages have at least the same strength as the body of the mesh.

Gabions shall be placed to conform to the details shown on the plans. Stones shall be placed in close contact in the unit so that maximum fill is obtained. The units may be filled by machine with sufficient hand work to accomplish requirements of this specification.

The exposed face or faces shall be hand-placed using selected stones to prevent bulging of the gabion cell and to improve appearance. Each cell shall be filled in three lifts.

Two connecting tie wires shall be placed as shown on the plans between each lift in each cell.

Care shall be taken to protect the vertical panels and diaphragms from being bent during filling operations.

The last lift of stones in each cell shall be level with the top of the gabion in order to properly close the lid and provide an even surface for the next course.

All gabion units shall be tied together each to its neighbor along all contacting edges in order to form a continuous connecting structure.

Empty gabions stacked on filled gabions shall be laced to the filled gabion at the front, side and back.

(G) Sacked Concrete Riprap:

The sacks shall be filled with concrete, loosely packed so as to leave room for folding or tying at the top. Approximately one cubic foot of concrete shall be placed in each sack. Immediately after filling, the sacks shall be placed according to the details shown on the plans and lightly trampled to cause them to conform with the earth face and to adjacent sacks in place.

The first two courses shall provide a foundation of double thickness. The first foundation course shall consist of a double row of stretchers laid level and adjacent to each other in a neatly trimmed trench. The trench shall be cut back into the slope a sufficient distance to

enable proper subsequent placement of the riprap. The second foundation course shall consist of a row of headers placed directly above the double row of stretchers. The third and remaining courses shall consist of a double row of stretchers and shall be placed in such a manner that joints in succeeding courses are staggered.

All dirt and debris shall be removed from the top of the sacks before the next course is laid thereon. Stretchers shall be placed so that the folded ends will not be adjacent. Headers shall be placed with the folds toward the earth face. Not more than four vertical courses of sacks shall be placed in any tier until initial set has taken place in the first course of any such tier.

When there will not be proper bearing or bond for the concrete because of delays in placing succeeding layers of sacks, a small trench shall be excavated back of the row of sacks already in place, and the trench shall be filled with fresh concrete before the next layer of sacks is laid. The size of the trench and the concrete used for this purpose shall be approved by the Engineer. The Engineer may require header courses at any level to provide additional stability to the riprap.

Sacked concrete riprap shall be cured by being covered with a blanket of wet earth or by being sprinkled with a fine spray of water every two hours during the daytime for a period of four days.

(H) Rail Bank Protection:

Excavation, where required for rock fill, shall be performed in reasonably close conformity to the lines and grades established or shown on the plans.

Rails shall be driven at the locations and to the minimum penetrations shown on the plans. Driving equipment shall be capable of developing sufficient energy to drive the rails to the specified minimum penetration and be approved by the Engineer.

If hard material is encountered during driving before minimum penetration is reached and it has been demonstrated to the satisfaction of the Engineer that additional attempts at driving would result in damage to the rails, the Engineer may order additional work to be performed, such as jetting or drilling, in order that minimum penetration may be obtained or the Engineer may order the minimum penetration to be reduced as required by the conditions encountered.

Wire fabric shall be securely fastened to the rails, placed in the trenches and laid on the slopes. The rock backfill shall then be carefully placed so as not to displace the wire fabric or rails. The wire fabric shall entirely enclose the rock backfill.

The completed rock fill shall be backfilled as necessary and the waste material disposed of as directed by the Engineer.

913-3.02 Soil-Cement Bank Protection:

Soil-cement bank protection construction shall include excavating, backfilling, and grading the wash bed and banks to the lines, grades and cross sections shown on the plans or established

by the Engineer; furnishing and mixing aggregate, cement, fly ash and water; and spreading, compacting, and curing the mixture.

The contractor shall investigate for ground water as soon as possible. If there is a need for dewatering, the contractor shall provide to the Engineer for review a comprehensive dewatering plan a minimum of two weeks before construction starts. The dewatering plan shall address any water quality requirements of the Corps of Engineers permit and ADEQ certification. Dewatering activities shall not begin until the Engineer has approved the plan.

The dewatering shall comply with all laws and permit requirements.

If changes to the approved dewatering plan are required, the contractor shall submit a revised plan to the Engineer for approval.

For soil-cement bank protection, the contractor shall be responsible for quality control as necessary to meet the requirements established herein. The contractor shall monitor the complete mix during construction of soil-cement, including the amounts of cement and fly ash used.

(A) Required Contractor Submittals:

Two weeks prior to the start of the soil-cement bank protection construction, the contractor shall submit in writing to the Engineer for approval, the following items:

(1) The type of spreading and compaction equipment to be used.

(2) The number and type of watering equipment to be used.

(3) The method used to keep surfaces continuously moist until subsequent layers of soil-cement are placed.

(4) The method used to cure permanently exposed surfaces.

(5) The proposed source of soil-aggregate.

(6) The proposed source(s) of Portland cement and fly ash (if used).

(7) The approximate length of soil-cement bank protection or area of soil-cement to be placed each day prior to starting placement and compaction operations, on a daily basis.

(8) The soil-cement mix design.

Such submittals shall not relieve the contractor of the responsibility for achieving the desired result of constructing sound soil-cement, free from defects, according to the specifications and plans, or as directed by the Engineer. Changes in the source(s) of cement or fly ash will not be permitted without the prior approval of the Engineer.

(B) Preparation of Subgrade:

Before placement of the soil-cement, the area to be treated shall be graded and shaped to the lines and grades as shown on the plans. The subgrade shall be compacted to a minimum of 95 percent of the maximum dry density determined in accordance with Arizona Test Method 225. The subgrade shall be compacted at a moisture content within two percentage points of the optimum moisture content determined in accordance with Arizona Test Method 225.

When the embankment material is composed predominantly of rock such that these compaction control procedures will not indicate the density achieved, the Engineer will determine the amount of compaction required and the adequacy of equipment used in obtaining the required compaction. Immediately prior to placement of the soil-cement mixture, the subgrade within the lines and grades of the plans shall be moistened and any soft or yielding subgrade shall be corrected and made stable before construction proceeds in accordance with requirements of Subsection 203-5.03(A) of the specifications. Any additional subgrade reparations required outside of the lines and grades shown on the plans, as determined by the Engineer, shall be repaired by the contractor and paid for by Force Account.

(C) Mixing Plant:

Aggregate and cementitious materials for the soil-cement shall be proportioned and mixed in a central mixing plant. The mixing plant shall be either of the batch-mixing type using revolving blade, rotary drum mixers, or of the continuous mixing type using a stationary twin shaft pug mill mixer. The aggregate, fly ash, and cement shall be proportioned by weight. The mixing plant shall be designed, coordinated, and operated to produce a soil-cement mixture of the proportions specified within required tolerances.

If the soil-cement temperatures measured at the mixer are 85 degrees Fahrenheit or less, the placing and compaction shall be completed within 1-1/2 hours of the batch time. If soil-cement temperatures measured at the mixer are greater than 85 degrees Fahrenheit but less than 96 degrees Fahrenheit, placing and compaction shall be completed within 1 hour of the batch time. If soil-cement temperatures are 96 degrees Fahrenheit or greater when measured at the mixer, the contractor shall take immediate steps to lower the batch plant mix temperature to 95 degrees Fahrenheit or below, and follow the above time limits as mix temperature dictates, prior to further placement and compaction of soil-cement materials.

The water shall be proportioned by weight or volume and there shall be means by which the Engineer may readily verify the amount of water utilized per batch or the rate of water flow utilized for continuous mixing.

(1) Measuring Devices:

The mixing plant shall record the quantity of the material, shall have a digital readout, and shall provide daily printed record such that the total discharged quantity per hour and the cumulative total quantity are displayed.

Measuring devices shall be calibrated and approved by the Engineer.

Each weight measuring device shall be calibrated to an accuracy of 0.2 percent and shall be inspected and calibrated as often as the Engineer deems necessary to assure their accuracy.

Each volume measuring device shall be calibrated to an accuracy of ± 1.5 percent and shall be inspected and calibrated as often as the Engineer deems necessary to assure their accuracy.

(2) Batch Mixing:

The mixer shall be equipped with a sufficient number of paddles of a type and arrangement to produce a uniformly mixed batch. The mixer shall be equipped with a timing device which will indicate, by a definite audible or visual signal, the expiration of the mixing period. The device shall be accurate to within two seconds. The allowable tolerance for weight batching of aggregates and cementitious material shall be two percent and 0.5 percent, respectively, for each batch.

The batch mixing plants shall provide sampling facilities which are satisfactory to the Engineer and which allow representative samples of the soil-aggregate mixture prior to the addition of water and cementitious material to be obtained easily and safely. Samples of the soil-aggregate will be taken at this point to determine conformance to the gradation and plasticity requirements listed in Subsection 913-2.02(B) of the specifications.

(3) Continuous Mixing:

Aggregates shall be drawn from the storage facility by a feeder or feeders which will continuously supply the correct amount of soil-aggregate in proportion to the cementitious material.

A control system shall be provided that will automatically close down the plant when material in any storage facility approaches the strike off capacity of the feed gate. The plant will not be permitted to operate unless this automatic control system is in good working condition. The feeder for the soil-aggregate shall be mechanically or electrically driven.

Continuous mix plants shall provide sampling facilities which are satisfactory to the Engineer and which allow representative samples of the soil-aggregate mixture prior to the addition of water and cementitious material to be obtained easily and safely. Samples of the soil-aggregate will be taken at this point to determine conformance to the gradation and plasticity requirements listed in Subsection 913-2.02(B) of the specifications.

(4) Blending of Cement and Fly Ash:

The blending procedure shall be sufficient to provide a uniform, thorough, and consistent blend of cement and fly ash. The blending method and operation shall be approved by the Engineer prior to the commencement of soil-cement production. During blending of the cementitious materials, the percent of fly ash content shall not vary by more than ± 0.5 percent of the content approved by the Engineer.

Weight measuring devices are required at both the cement and fly ash feeds. At the direction of the Engineer, an additional measuring device may also be required when the cement and

fly ash are pre-blended at the site. In the production of the soil-cement mixture, the percent of cementitious material shall not vary by more than ± 0.5 percent of the contents approved by the Engineer.

Silos and feeders shall be equipped and operated so as to provide uniform rates of feed and prevent caking. The charge in the batch mixer or rate of feed to the continuous mixer shall not exceed that which will permit complete mixing of all the mix material. Provisions shall be made to allow for ready sampling of the cementitious materials.

(D) Transporting, Spreading, and Compaction:

The soil-cement mixture shall be transported from the mixing plant to the construction site in clean hauling equipment vehicles outfitted with suitable covers to protect the mixture in unfavorable weather.

Spreading of the soil-cement mixture shall be accomplished using equipment that will produce uniform layers of the width and thickness necessary to provide for adequate compaction in conformance with the required dimensions shown on the plans for completed soil-cement layers. Where the soil-cement is to be placed in confined areas, the lifts may be spread by other methods as approved by the Engineer.

The layers of soil-cement shall not exceed 12 inches after compaction, or be less than four inches thick after compaction, unless the contractor can demonstrate the ability to place thicker layers with the equipment being utilized in the control strip. If potholing is performed to allow testing of each lift, the recompacted material used to repair the pothole shall also be tested and meet the requirements of this specification. Each successive layer shall be placed as soon as practicable after the preceding layer is completed, and approved by the Engineer. The maximum depth of compacted soil-cement that shall be placed per day in each location is four feet, unless approved by the Engineer.

Prior to spreading new material on a previously compacted lift which has cured for more than 1-1/2 hours, or if the surface has dried due to temperature and/or wind effects, scarification of the lift shall be performed parallel with the direction of placement using equipment approved by the Engineer. The scarification shall be performed to a depth of at least two inches, spaced between 18 and 24 inches. The Engineer may waive requirements for scarification if compaction is performed by means which provide an appropriate surface for bonding with the subsequent layer.

All construction equipment, including water spray trucks, shall be restricted from entering scarified surface areas during the interim between spreading and compaction operations.

If the surface cannot be scarified, the surface shall have cement grout slurry applied to ensure a proper bonding between lifts. The cement slurry shall have a water/cement ratio between 0.70 and 0.80 and be approved for use by the Engineer prior to placement of any additional soil-cement mixture.

All soil-cement surfaces that will be in contact with succeeding layers of soil-cement shall be kept continuously moist by fog spraying until placement of the subsequent layer, provided that the contractor will not be required to keep such surfaces continuously moist for a period longer

than seven days. Mixing and placing shall not proceed when the soil-aggregate or the area on which the soil-cement is to be placed is frozen. Soil-cement shall be mixed and placed when the air is at least 40 degrees Fahrenheit and rising.

(E) Monitoring Moisture Content in the Field:

Control of water content by the contractor in the field shall be accomplished in two ways:

(1) The moisture-density relationship for the soil-cement mixture shall be determined in accordance with Arizona Test Method 221 on a routine basis, or when any significant gradation shift or rock content change occurs.

(2) The actual moisture content of the mixture at the time of compaction, or shortly thereafter, shall be determined in accordance with Arizona Test Method 235 to determine if the optimum moisture content as determined by Arizona Test Method 221 is being maintained. The water content in the soil-cement mixture is to be continuously monitored, and the mixing water shall be adjusted at the plant as necessary to achieve the compressive strength and compaction requirements specified herein.

(F) Quality Control Compaction Testing:

Soil-cement shall be uniformly compacted to a minimum of 98 percent of the maximum dry density determined in accordance with Arizona Test Method 221. A running average of five consecutive in place density tests shall not be less than 100 percent of maximum density as monitored by nuclear density tests in accordance with Arizona Test Method 235. Compaction shall be performed within 2 percentage points of the optimum moisture content as determined in accordance with Arizona Test Method 221. Quality control density and moisture tests shall be performed in accordance with Arizona Test Method 235 at a minimum frequency as specified in table 4:

Table 4	
Quality Control Minimum Requirements for Compaction	
Moisture/Density	1 test / 500 sy/lift

(G) Control Strips:

A control strip shall be constructed at the beginning of work on the soil-cement to be compacted. The control strip construction shall be required to establish equipment and procedures required to attain densities for the specified course.

Each control strip, constructed to acceptable density and surface tolerances shall remain in place and become a section of the completed embankment. Once control strip is complete and accepted, production may begin on the same shift for the remainder of project.

Unacceptable control strips shall be corrected or removed and replaced at the contractor's expense. A control strip shall have an area of approximately 100 square yards and shall be of the same depth specified for the construction of the course which it represents.

The materials used in the construction of the control strip shall conform to the specification requirements. They shall be furnished from the same source and shall be of the same type used in the remainder of the course represented by the control strip. The underlying surface upon which a control strip is to be constructed shall have prior approval of the Engineer.

The equipment used in the construction of the control strip shall be approved by the Engineer and shall be of the same type and weight to be used on the remainder of the course represented by the control strip.

Compaction of control strips shall commence immediately after the course has been placed to the specified thickness, and shall be continuous and uniform over the entire surface. Compaction of the control strip shall be continued until no discernable increase in density can be obtained by additional compaction effort.

Upon completion of the compaction, the mean density of the control strip will be determined by averaging the results of ten nuclear density tests taken at randomly selected sites within the control strip.

If the mean density of the control strip is less than 100 percent of the density of laboratory compacted specimens as determined by testing procedures appropriate for the material being placed, the Engineer may order the construction of another control strip.

A new control strip may also be ordered by the Engineer or requested by the contractor when:

(1) A change in the material or mix design is made.

(2) A control strip density is not representative of the material being placed.

(H) Power Tampers and Small Vibratory Rollers:

Small vibratory rollers which are capable of operating within 6 inches of a vertical face shall be used for compaction adjacent to the guide banks, next to the utilities and drainage conduit; at transitions to constructed levee protection, and at other areas where larger vibratory rollers cannot maneuver. The amount of rolling and tamping required shall be whatever is necessary for the particular equipment to provide the same degree of compaction as would be attained with larger self-propelled vibratory rollers. Standby replacement equipment shall be available within 1 hour if needed.

(I) Finishing/Trimming:

After compaction, the soil-cement shall be further shaped, if necessary, to the required lines, grades, and cross-sections and rolled to a reasonably smooth surface. Shaping of the face of the soil-cement bank protection shall be conducted daily at the completion of each day’s production.

The exposed face of the soil-cement bank protection shall be trimmed to a neat line as shown on the plans. The resulting soil-cement bank protection width shall not be less than 8 feet after trimming unless specified on the plans.

(J) Curing:

Whenever the atmospheric temperatures are expected to drop below 30 degree Fahrenheit, the soil-cement shall be protected from freezing for seven days, after its construction by a covering of straw, earth, or other suitable material approved by the Engineer.

Temporarily exposed surfaces shall be kept moist as previously set forth. Care must be exercised to ensure that no curing material other than water is applied to the soil-cement surface that will be in contact with succeeding layers.

Permanently exposed surfaces shall be kept in a moist condition for seven days, or they may be covered with bituminous curing material, subject to the Engineer's approval. Any damage to the protective covering within seven days shall be repaired to the satisfaction of the Engineer at no additional cost to the Department.

Regardless of the curing material used, the permanently exposed surfaces shall be kept moist until the protective cover is applied. Such protective cover is to be applied as soon as practicable, with a maximum time limit of 24 hours between the finishing of the surface and the application of the protective cover or membrane.

(K) Backfill:

Backfill shall not be placed against the soil-cement until the contractor has achieved the compaction requirement.

(L) Maintenance:

The contractor shall maintain and protect the soil-cement in good condition until all work is completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done at no cost to the Department and repeated as often as necessary. Faulty work shall be replaced for the full depth of the layer. The contractor shall take all necessary precautions to avoid damage to the completed soil-cement by equipment, and to avoid the deposition of raw earth or foreign materials between layers of soil-cement. Where ramps are constructed over soil-cement layers which are not to grade, all foreign materials and the uppermost one inch of the previously placed soil-cement mixture must be removed prior to continuation of the soil-cement construction.

(M) Construction Joints:

Construction joints are to be provided at the end of each day's work or when work is to be halted for 90 minutes or more. The joints shall be trimmed to a 15 degree minimum skew, transverse construction joint shall be formed by cutting back into the completed work to form a vertical face to the full depth of the previous lift. Before resuming placement of new material, the joints shall be roughened and loose material shall be removed by power broom.

(N) Acceptance of Soil-Cement:

The Engineer will cast, transport, cure, and test specimens in accordance with Arizona Test Method 241 for each 1,500 cubic yards of soil cement placed. Three cylinders will be tested at seven days. The average compressive strength of the three cylinders shall achieve a minimum compressive strength of 750 psi.

Any early strength testing for the purpose of correlating seven day strength results to provide an early indicator of potentially low strength material shall be the responsibility of the contractor.

913-4 Method of Measurement:

Riprap, except gabions and sacked concrete, will be measured by the cubic yard of protection constructed by computing the surface area measured parallel to the protection surface and the total thickness of the riprap measured normal to the protection surface.

Riprap (gabions) will be measured by the cubic yard by computing the volume of the rock-filled wire baskets used.

Riprap (sacked concrete) will be measured by the cubic yard of concrete placed in the completed work. The measurement will be based on mixer volumes.

Rail bank protection will be measured by the linear foot. Measurement will be made from top of rail to top of rail (longest rail where rails of two or more lengths are used) and the distance measured will be from end rail to end rail.

Where two parallel rows of vertical rails are used, the measurement for payment will be the average of the distance along the two rows. Rail bank protection will be measured along the bank protection control line from end rail to end rail.

Soil-cement will be measured per cubic yard of soil-cement furnished and placed per the specified lines, grades, and cross-sections shown on the plans.

913-5 Basis of Payment:

The accepted quantities of riprap and rail bank protection, measured as provided above, will be paid for at the contract unit price per cubic yard or linear foot, which price shall be full compensation for the work, complete in place, including excavation; preparing the ground area; furnishing and installing the rock, filter fabric, bedding material, metal items, concrete, sacks and grout; and backfilling as required.

Materials, labor and equipment necessary to perform additional work such as jetting or drilling, as specified under Subsection 913-3.01(H) of the specifications, will be paid for in accordance with the provisions of Subsection 109.04 of the specifications.

The accepted quantities of soil-cement, measured as provided above, will be paid for at the contract unit price per cubic yard of soil-cement bank protection. Such payment shall

constitute full reimbursement for all work necessary to complete the soil-cement bank protection including:

(1) Surface Preparation;
(2) Providing and Stockpiling Soil-Aggregate;
(3) Cementitious Material, Watering, Mixing;
(4) Placing;
(5) Compacting;
(6) Shaping and Finishing;
(7) Curing;
(8) Quality Control Testing; and
(9) Other Incidental Operations.

Any waste and non-compacted soil-cement material not used on the final soil-cement bank protection will not be measured for payment.

Excavation and backfill associated with the soil-cement construction will be measured and paid under the Structural Excavation and Structure Backfill items respectively.

Construction of Gabion Mattress associated with the soil-cement work will be measured and paid under the Riprap (Gabion Mattress) item.

Payment for additional excavation, where determined by the Engineer to remove unsuitable material, per the requirements of Subsection 203-5.03(A) of the specifications, will be made in accordance with the provisions of Subsection 109.04 of the specifications.

Payment for Dewatering will be made on a Force Account basis in accordance with the requirements of Subsection 109.04 of the specifications.

ITEM 9240111 – MISCELLANEOUS WORK (SEAL BOX/WINGWALL JOINT

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment necessary to seal or repair the joint between the reinforced concrete box culvert (RCBC) and the wingwall, as shown on the plans or as directed by the Engineer. Work shall include removal of unsound or loose material, surface preparation, and placement of joint seal material to restore watertightness and durability. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

Materials for spall and chipped area repair shall be specifically manufactured for use in

reinforced concrete structures and installed per manufacturer's recommendations. Acceptable materials include:

- Epoxy adhesives and crack repair resins conforming to ASTM C881 for filling or sealing joints
- Non-shrink cementitious grouts or patching mortars conforming to ASTM C1107 for filling cracks or patching deteriorated areas.
- Bituminous joint fillers or sealants per ADOT Approved Product List
- Concrete patching materials suitable for structural or non-structural repairs.

Ancillary materials (bonding agents, primers, curing compounds, etc.) shall be compatible with the primary repair product. Only potable water shall be used for cleaning or mixing.

Construction Requirements:

- Remove deteriorated joint filler, loose concrete, or debris to expose sound joint surfaces.
- Prepare the joint to receive the selected repair material by cleaning, routing, or other approved methods.
- Place epoxy, non-shrink grout, bituminous filler, or concrete patching material as directed by the Engineer and in accordance with manufacturer's instructions.
- Finish the joint repair flush with adjacent concrete surfaces and free of excess material.
- Protect and cure the repair as required by the manufacturer.
- Construction methods may vary provided the completed repair is durable, watertight, and acceptable to the Engineer.

Method of Measurement:

Sealing of the box/wingwall joint will be measured by the linear foot along the centerline of the joint after completion and acceptance.

Basis of Payment:

The accepted quantities of box/wingwall joint sealing, measured as provided above, will be paid for at the contract unit price per linear foot. This price shall be full compensation for furnishing all labor, materials, tools, and equipment; removal of existing filler; surface preparation; placement of epoxy, grout, bituminous filler, or patching material; finishing; curing; and all incidentals necessary to complete the work.

No separate payment will be made for cleaning, access, or protection of the repair area during construction; such costs shall be considered incidental to the work.

ITEM 9240112 – MISCELLANEOUS WORK (RECONSTUCT BOX/WINGWALL JOINT):

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment required to reconstruct the structural joint between the reinforced concrete box culvert (RCBC) and the wingwall, as shown on the plans or as directed by the Engineer. Work shall include excavation, demolition of deteriorated concrete, preparation of reinforcing steel, installation of new reinforcement, dowels, formwork, placement of structural concrete, backfilling, curing, and finishing in accordance with ADOT standards. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

- Portland Cement Concrete: Conforming to ADOT Standard Specifications, Section 1006.
- Reinforcing Steel: Conforming to ADOT Standard Specifications, Section 1003.
- Epoxy Adhesive for Dowels: ASTM C881, for securing dowels or supplemental reinforcing bars.
- Formwork Materials: Conforming to ADOT Standard Specifications, Section 601.

Construction Requirements:

- Removal: Remove existing joint material, unsound or deteriorated concrete, and debris to the limits shown on the plans or as directed by the Engineer.
- Reinforcement: Prepare and clean existing reinforcing steel. Install additional dowels or reinforcement as shown on the plans or as directed. Secure dowels using epoxy adhesive where required.
- Formwork: Construct and brace forms to maintain correct line, grade, and dimensions of the reconstructed joint.
- Concrete Placement: Place concrete in accordance with ADOT Standard Specifications, Section 601. Consolidate to eliminate voids and ensure bond with existing surfaces and reinforcement.
- Finishing: Finish exposed surfaces to match adjacent concrete.
- Curing: Cure concrete in accordance with ADOT Standard Specifications, Section 601.
- Protection: Protect reconstructed joint from traffic, vibration, debris, and water flow until the repair is accepted.

Method of Measurement:

Reconstruction of the box/wingwall joint will be measured by the linear foot along the centerline of the reconstructed joint after completion and acceptance.

Basis of Payment:

The accepted quantities of reconstructed box/wingwall joint, measured as provided above, will be paid for at the contract unit price per linear foot. This price shall be full compensation for demolition, surface preparation, reinforcing steel furnishing and placement, dowels, epoxy anchorage, formwork, concrete materials, placement, consolidation, finishing, curing, and protection, including all labor, tools, equipment, and incidentals necessary to complete the work as specified.

No separate payment will be made for demolition, reinforcement anchorage, or formwork; such costs shall be considered incidental to the work.

ITEM 9240113 – MISCELLANEOUS WORK (EDGE BEAM RECONSTRUCTION):

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment to remove and reconstruct the reinforced concrete edge beam or curb located at the top of the reinforced concrete box culvert (RCBC), as shown on the plans or as directed by the Engineer. Work shall include demolition and removal of the existing edge beam/curb, preparation of reinforcement, installation of new reinforcing steel, formwork, placement of structural concrete, finishing, and curing in accordance with ADOT standards. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

- Portland Cement Concrete: Conforming to ADOT Standard Specifications, Section 1006.
- Reinforcing Steel: Conforming to ADOT Standard Specifications, Section 1003.
- Epoxy Adhesive for Dowels: ASTM C881, for securing dowels or supplemental reinforcing bars.
- Formwork Materials: Conforming to ADOT Standard Specifications, Section 601.

Construction Requirements:

- Removal: Remove the existing edge beam/curb in its entirety, including deteriorated concrete and joint material, to the limits shown on the plans or as directed by the Engineer.

- Reinforcement: Prepare and clean existing reinforcing steel. Install additional dowels or reinforcement as shown on the plans or as directed. Secure dowels using epoxy adhesive where required.
- Formwork: Construct and brace forms to maintain the required line, grade, shape, and dimensions of the reconstructed edge beam/curb.
- Concrete Placement: Place concrete in accordance with ADOT Standard Specifications, Section 601. Consolidate to eliminate voids and ensure bond with existing surfaces and reinforcement.
- Finishing: Finish the exposed surface of the beam/curb to match adjacent concrete.
- Curing: Cure concrete in accordance with ADOT Standard Specifications, Section 601.
- Protection: Protect reconstructed joint from traffic, vibration, debris, and water flow until the repair is accepted.

Method of Measurement:

Reconstruction of the RCBC edge beam/curb will be measured by the linear foot along the centerline of the beam/curb after completion and acceptance.

Basis of Payment:

The accepted quantities of RCBC edge beam/curb reconstruction, measured as provided above, will be paid for at the contract unit price per linear foot. This price shall be full compensation for demolition and removal of the existing beam/curb; surface preparation; reinforcing steel furnishing and placement; dowels and epoxy anchorage; formwork; concrete materials; placement; consolidation; finishing; curing; and all incidentals necessary to complete the work as specified.

No separate payment will be made for demolition, reinforcement anchorage, or formwork; such costs shall be considered incidental to the work.

ITEM 9240014 – FORCE ACCOUNT WORK (BRIDGE DECK REPAIR)

Description:

The work under this item shall consist of the removal and disposal of existing damaged concrete, thoroughly cleaning all repair areas, and furnishing and placing High Molecular Weight Methacrylate (HMWM) resin primer and Polyester Polymer Concrete (PPC) patch material to the repair areas.

Materials:

Materials shall be in accordance with Item 6010506 of these special provisions.

Construction Requirements:

In the presence of the Engineer, the contractor shall identify, remove, and dispose of any unsound epoxy concrete patches, all asphalt concrete patches, and any unsound, delaminated, or damaged concrete exposed during the bridge deck milling operation. Spalled and delaminated areas of the bridge deck shall be removed down to sound concrete. The contractor shall submit a deck repair plan showing removal locations and limits to the engineer for review and approval prior to the start of any deck repair work.

The patch work shall take place prior to the application of the HMWM resin primer for the bridge PPC bridge deck overlay system. All removal areas shall be patched to provide uniform overlay thickness. HMWM resin primer and PPC application requirements for repair work shall be the same as those specified for the PPC deck overlay system in accordance with these Special Provisions.

Equipment and tools shall not be used to remove damaged concrete, which, in the opinion of the Engineer, causes the removal of excess quantities of sound concrete along with the damaged concrete. Equipment used shall be fitted with suitable traps, filters, drip pans, or other devices to prevent oil or other deleterious matter from being deposited on the deck.

Exposed reinforcing steel shall be cleaned of deleterious materials, such as rust and corrosive products including oil, dirt, concrete fragments, loose scale and other coating, of any character, which would destroy or reduce the bond with the HMWM resin primer or PPC.

The finishing of newly patched areas of deck shall be completed using hand finishing tools to make it flush with the top of the existing deck surface.

Repair shall be in accordance with the applicable requirements of Section 402-2.03 of the ADOT Standard Specifications and manufacturer’s recommendations.

Measurement and Payment:

Bridge Deck Repair will be measured and paid for on a Force Account basis in accordance with the requirements of Subsection 109.04(D) of the ADOT Standard Specifications.

ITEM 9240117 – MISCELLANEOUS WORK (REPAIR SPALLED/CHIPPED AREAS)

Description:

The work under this item shall consist of furnishing all labor, materials, and equipment required to repair spalled or chipped areas of the reinforced concrete box culvert (RCBC) as shown on the plans or as directed by the Engineer. Work shall include removal of unsound concrete, surface preparation, placement of cementitious patching materials, finishing, and curing/protection. All debris, waste concrete, and removed materials generated by the work shall be collected and properly disposed of offsite.

Materials:

Materials for spall and chipped area repair shall be specifically manufactured for use in reinforced concrete structures and installed per manufacturer's recommendations. Acceptable materials include:

- Epoxy adhesives and crack repair resins conforming to ASTM C881 for dowel anchorage and crack sealing.
- Non-shrink cementitious grouts or patching mortars conforming to ASTM C1107 for filling cracks, dowel holes, or patching deteriorated areas.

All products shall be non-metallic (unless reinforcing steel), non-corrosive, and compatible with each other. Only potable water shall be used for cleaning or mixing.

Construction Requirements:

- Remove unsound or deteriorated concrete as required to reach sound material.
- Clean spall or chipped area, surfaces, and drilled holes of dust, debris, and contaminants by a method suitable for the repair material being used.
- Where directed, install reinforcing dowels at the size, spacing, and embedment shown on the plans or as approved by the Engineer. Secure dowels with epoxy adhesive.
- Place and consolidate patching material in accordance with manufacturer's recommendations.
- Finish repairs flush with adjacent surfaces and free of voids, ridges, or feather edges.
- Cure and protect repairs per manufacturer's requirements.
- Construction methods may vary provided the completed repairs are structurally sound, watertight, and acceptable to the Engineer.

Method of Measurement:

Repair of spalled or chipped areas of the reinforced concrete box culvert will be measured by the square foot of repaired surface area, measured after completion and acceptance.

Basis of Payment:

The accepted quantities of RCBC spall/chip repair, measured as provided above, will be paid for at the contract unit price per square foot. This price shall be full compensation for furnishing all labor, materials, tools, and equipment; removal of unsound concrete; reinforcing replacement or dowels if required; surface preparation; patching material placement; finishing; curing; protection; and all incidentals necessary to complete the work.

No separate payment will be made for cleaning, leak control, access, or protection of repaired areas during construction; such costs shall be considered incidental to the work.

ITEM 9240050 – MISCELLANEOUS WORK (PARTIALLY REPLACE PIER PROTECTION BARRIER)

Description:

The work under this item shall consist of the partial replacement of the pier protection barrier at Pier #3 of the Ortega Road overpass bridge.

Materials:

Materials shall be as specified in drawing C-10.50 and specification 601.

Construction Requirements:

Perform work as shown in the plans and described below.

1. The damaged portion of the barrier is at the trailing (northeast) end of the Pier #3 protection barrier. The damage extends over approximately 5’-0” from the end of the barrier. The Contractor shall inspect the barrier and determine the extent of removal required with the approval of the Engineer.
2. Sawcut the barrier to a 1” depth at the established removal line, salvaging the existing longitudinal reinforcing. Remove the damaged portion of the barrier.
3. Construct new barrier matching the limits of the damaged portion of the existing barrier. Construct the barrier in contact with the remaining portion of the existing barrier (do not add an expansion joint). The new barrier will be constructed according to the requirements of drawing C-10.50 and specification 601.

Measurement and Payment:

Miscellaneous Work (Partially Replace Pier Protection Barrier) will be measured and paid for per on a lump sum basis. The cost of determining the repair areas, access, material, labor, and equipment necessary to complete the work as described are incidental to the cost of the repair.

ITEM 9240129 – MISCELLANEOUS WORK (COMPACTED MILLED AC TREATMENT)

Description:

The work under this item shall include furnishing and placing Milled AC on median crossovers at the locations shown on the project plans.

Materials:

Milled AC shall be obtained from the project site. AC millings shall have 100% of the material passing the 1½ inch sieve, unless otherwise directed by the Engineer.

Emulsified recycling agent (CSS-1) shall conform to the requirement of section 1005 of the Standard Specifications and these Special Provisions. The CSS-1 shall be diluted 1:1 with water.

Construction Requirements:

The AC milling shall be placed in one lift to a depth of 4″. Prior to placing the new milled AC materials for the construction of a new crossover, the contractor shall scarify, regrade and compact the existing materials/subgrade as directed by the Engineer.

The final depth of compacted AC millings may vary to match the finished elevation of the mainline pavement. Prior to compaction, the contractor shall apply CSS-1 at 0.20 gallons per square yard on each lift (4″). The millings shall be compacted to the satisfaction of the Engineer.

Method of Measurement:

Miscellaneous Work (Place Milling on Median Crossover) will be measured by the square yard.

CSS-1 will be measured by the ton.

Basis of Payment:

The accepted quantities of Miscellaneous Work (Place Milling on Median Crossover), measured as provided above, will be paid for at the contract unit price per square yard, which price shall be full compensation for the work, complete in place including excavating, grading, furnishing, placing, shaping, and compacting of milling material.

CSS-1 shall be paid for by the ton.

(924SMA, 01/15/26)

ITEM 9240140 - MISCELLANEOUS WORK (STONE MATRIX ASPHALTIC CONCRETE):
ITEM 9240141 - MISCELLANEOUS WORK (STABILIZING ADDITIVE):

STONE MATRIX ASPHALTIC CONCRETE:

1.0 Description:

The work under these items shall consist of constructing Asphaltic Concrete Stone Matrix Asphalt (SMA), hereinafter asphaltic concrete, by furnishing all materials, mixing at a plant,

hauling and placing a mixture of aggregate materials, mineral admixture, and bituminous material (asphalt cement) to form a pavement course or to be used for other specified purposes, in accordance with the details shown on the project plans and the requirements of the special provisions.

All stone matrix asphaltic concrete shall be placed as a surface course. Surface courses are defined as courses placed to serve either as the traffic course or as a surface upon which a finishing course is to be placed. Recycled Asphalt Pavement (RAP) shall not be allowed in Stone Matrix Asphalt (SMA).

The contractor shall acquire and make all arrangements for a source or sources of material, furnish a mix design which will meet the design criteria specified hereinafter, and provide all the equipment, materials, and labor necessary to complete the work.

The type of asphaltic concrete shall be 3/8-inch mix.

2.0 Asphaltic Concrete Mix Design Criteria:

The Department will follow the Stone Matrix Asphalt mix design procedure contained in the AASHTO R 46, and the AASHTO M 325 except as revised herein.

Mix designs shall be developed by the contractor. Each mix design shall meet the criteria in Table 1 and the grading requirements in Table 2 when tested in accordance with Arizona Test Method 815, with the noted exceptions.

TABLE 1 ASPHALTIC CONCRETE MIX DESIGN CRITERIA	
Criteria	Requirements
Voids in Mineral Aggregate: %	17.0 Minimum
Effective Voids: %	4.0 +/-0.1
Absorbed Asphalt: %, Range	0 - 1.0
Asphalt Binder Content: %	6.0% Minimum (Lower Limit)
Draindown at Production Temperature,%	0.3 Maximum
VCA_{MIX} ,%	Less than VCA_{DRC}
TSR	0.8 Minimum
Dust to Binder Ratio	0.8 to 1.5

Where:

VCA_{MIX} = Voids in Coarse Aggregate
VCA_{DRC}= Dry-Rodded Voids in Coarse Aggregate
TSR = Tensile strength ratio per T283

Notes:

(1) Mix design laboratory compacted test specimens shall be prepared using a gyratory compactor in accordance with AASHTO T 312, except the mix design shall be determined at the Ndesign gyrations of 75 using the Superpave gyratory compactor. Ninitial and Nmax are not required for SMA design.

(2) Refer to AASHTO R 46 for instructions on calculating VCA_{MIX} and VCA_{DRC}. The dry- rodded VCA of the coarse aggregate is determined per AASHTO T 19.

(3) The tensile strength ratio (TSR) of the SMA shall be at least 0.80, at 6.0 ± 1.0 percent air voids, when tested in accordance with AASHTO T 283.

(4) Draindown sensitivity shall be determined on the SMA mixture in accordance with AASHTO T 305 at the anticipated plant-production temperature and shall not exceed 0.3 percent.

TABLE 2 MIX DESIGN GRADING LIMITS		
Sieve Size	**1/2 inch**	**3/8 inch**
3/4 inch	100	100
1/2 inch	85 - 100	100
3/8 inch	45 - 78	90 - 100
No. 4	20 - 28	26 - 50
No. 8	16 - 24	20 - 28
No. 30	12 - 18	12 - 18
No. 50	11 - 14	12 - 15
No. 200	7 - 9	8 - 10

3.0 Materials:

For comparative/estimating purposes, quantities shown in the bidding schedule have been calculated based on the following data:

	3/8" MIX
Unit Weight, (lb./cu. ft.)	144
Asphalt Cement, %	6.0
Stabilizing Additive, %	0.4

3.01 Mineral Aggregate:

(A) General:

The contractor shall provide a source in accordance with the requirements of Section 1001 of the specifications.

Coarse mineral aggregate shall be 100% crushed gravel, crushed rock, or other approved inert material with similar characteristics, or a combination thereof, conforming to the requirements of this special provision.

Fine mineral aggregate shall be 100% crushed gravel or crushed rock. All uncrushed material passing the No. 4 sieve shall be removed prior to the crushing, screening, and washing operations necessary to produce the specified gradation. The liquid limit for fine aggregate shall not exceed 25 and the fine aggregate shall conform to all the requirements of this special provision.

The contractor shall notify the Engineer a minimum of 48 hours in advance of crushing the material to be used as virgin mineral aggregate, so all crushing operations can be inspected. Existing stockpile material which has not been inspected during crushing will not be permitted for use unless the contractor is able to document to the Engineer's satisfaction that the virgin mineral aggregate has been crushed. Any material inspected by the Department as crushed material shall be separated from the contractor's other stockpiles and reserved for use throughout the project duration.

Should the contractor modify the method of producing either the uncrushed or crushed fine aggregate, the Engineer shall be immediately notified and the materials sampled and tested for determination of uncompacted void content.

The mineral admixture shall be added and thoroughly mixed with the mineral aggregate by means of a mechanical mixing device prior to the mineral aggregate and mineral admixture entering the dryer. The moisture content of the combined mineral aggregate shall be a minimum of 3 percent by weight of the aggregate during the mixing process

(B) Mineral Aggregate Characteristics:

Aggregates shall be free of deleterious materials, clay balls, and adhering films or other material that prevent the thorough coating with the asphalt cement.

Mineral aggregate shall conform to the following requirements when tested in accordance with the applicable test methods:

MINERAL AGGREGATE CHARACTERISTICS	TEST METHOD	REQUIREMENT
Combined Bulk Oven Dry Specific Gravity	Arizona Test Method 251	2.350 - 2.850
Combined Water Absorption	Arizona Test Method 251	0 - 2%
Sand Equivalent	AASHTO T 176 (After thoroughly sieving the sample, no additional cleaning of the fines from the plus No. 4 material is required.)	Minimum 50
Abrasion	AASHTO T 96	100 Rev., Maximum 9% 500 Rev., Maximum 30%
Fractured Coarse Aggregate Particles	AASHTO T 335	Minimum 95% with at least two fractured faces and 100% with at one fractured face (plus No. 4 material)
Flat and Elongated Particles	ASTM D4791 (except test shall be performed on plus No. 4 material)	Maximum 10% (of the plus No. 4 material) 5:1
Uncompacted Void Content	AASHTO T 304 Method A	Minimum 45.0%
Flakiness Index	Arizona Test Method 233	Maximum 20%
Carbonates	Arizona Test Method 238	Maximum 20%
Soundness (Sodium Sulfate)	AASHTO T 104	Maximum 10% loss with five cycles
Plasticity Index	AASHTO T 90	Non-Plastic

Notes:

(1) Abrasion shall be performed separately on materials from each source of mineral aggregate. All sources shall meet the requirements for abrasion.

(2) Testing for carbonates only applies if either of the following conditions exist:

(a) The asphaltic concrete is the designed final pavement surface normally used by traffic.

(b) The asphaltic concrete, temporary or otherwise, will be subject to traffic for more than 60 days.

Tests on aggregates outlined above, except for abrasion, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation.

3.02 Mineral Admixture:

Mineral admixture will be required. The amount used shall be minimum 1.0 percent, by weight of the mineral aggregate, unless testing demonstrates that additional admixture is required in order to meet the mix design criteria. A maximum of 2.0 percent admixture will be permitted. The exact amount of admixture required shall be specified in the mix design. Mineral admixture shall be either Portland cement, blended hydraulic cement, or hydrated lime conforming to the following requirements:

MATERIAL	REQUIREMENT
Portland Cement, Type I or II	ASTM C150
Blended Hydraulic Cement, Type IP	ASTM C595
Hydrated Lime	ASTM C1097

The certification and acceptance of Portland cement, blended hydraulic cement, and hydrated lime shall be in accordance with ADOT Materials Practice and Procedure Directive No. 13, "Certification and Acceptance of Hydraulic Cement, Fly Ash, Natural Pozzolan, Silica Fume, and Lime".

3.03 Bituminous Material:

Asphalt cement shall be a performance grade (PG) asphalt binder, conforming to the requirements of Section 1005 of the specifications. The type of asphalt binder shall be PG 70-28 PM.

The contractor shall follow the recommendations of the supplier for laboratory mixing and compaction temperatures for mix design purposes.

3.04 Mineral Filler:

Mineral filler shall consist of finely divided mineral matter such as crusher fines, rock dust, Class F fly ash, or Class N natural pozzolan meeting the requirements of ASTM C618. At the time of use, it should be sufficiently dry to flow freely and essentially free from agglomerations. Filler shall be free from organic impurities and have a plasticity index not greater than four. The mineral filler shall be added at the same point the asphalt cement is added to the aggregate.

Mineral filler shall meet the following grading requirements:

SIEVE SIZE	PERCENT PASSING
No. 30	100
No. 50	95 - 100
No. 200	55 - 100

3.05 Stabilizing Additive:

Stabilizing additives shall be made from virgin basalt, diabase, slag, or cellulose treated with a cationic sizing agent to enhance disbursement of the fiber as well as increase adhesion of the fiber surface with the asphalt binder and control draindown. The stabilizing additive shall conform to the requirements of AASHTO M 325.

A certificate of analysis meeting the requirements of Subsection 106.05 of the specifications with the manufacturer’s most recent test data conforming to the requirements shown in the table below shall be submitted along with mix design submittal. Certificate of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted for each shipment of stabilizing additive.

Mineral Fiber	
Property Description:	**Requirement**
Dosage Rate:	0.3 – 0.6% by weight of total mix
Average Fiber Length (Max.):	0.25 inch
Average Fiber Thickness (Max.):	0.0002 inch
Shot Content (ASTM C612)	
Passing No. 60 Sieve:	90 - 100%
Passing No. 230 Sieve:	65 - 100%
Cellulose Fiber	
Property Description:	**Requirement**
Dosage Rate:	0.2 – 0.4% by weight of total mix
Using Alpine Sieve Analysis, Fiber Length (Max.):	0.25 inch
Passing No. 100 Sieve:	60 - 80%
Using a Mesh Screen Analysis	
Ash Content:	13 - 23%
Oil Absorption:	4.0 - 6.0%
Moisture Content (Max.):	5%

3.06 Warm Mix Asphalt Technologies:

Warm Mix Asphalt (WMA) technologies include plant water foaming processes, mineral additives, and chemical additives. WMA technologies shall be approved prior to their use in accordance with Materials Practice and Procedure Directive No. 23, “Requirements for the Use of Warm Mix Asphalt (WMA) Technologies in Asphaltic Concrete”. Only ADOT approved Warm Mix Asphalt (WMA) technologies will be allowed. Refer to ADOT Approved Warm Mix Asphalt (WMA) Technologies List.

4.0 Mix Design:

Utilizing mineral aggregate which has been crushed, processed, separated, and stockpiled, a mix design shall be formulated and submitted by the contractor to the Engineer. The mineral aggregate samples used for mix design purposes shall be representative of materials to be used during production.

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

The mix design shall be prepared by or under the direct supervision of a professional engineer experienced in the development of mix designs and mix design testing. The mix design engineer shall meet the requirements given in ADOT Materials Practice and Procedure Directive No. 4, “Asphaltic Concrete Mix Design Proposals and Submittals”. The mix design shall be provided in a format that clearly indicates all the mix design requirements and shall be sealed, signed, and dated by the mix design engineer.

The mix design shall be prepared by a mix design laboratory that has met the requirements of ADOT Materials Practice and Procedure Directive No. 19, “ADOT System for the Evaluation of Testing Laboratories”.

The mix design shall contain as a minimum:

(A) The name and address of the testing organization and the person responsible for the mix design testing.

(B) The specific location(s) of the source(s) of mineral aggregate.

(C) The supplier, refinery, type of asphalt cement and any modifiers including polymers. The source and type of mineral admixture. The percentage of asphalt cement and mineral admixture to be used.

(D) The anticipated mineral aggregate gradation in each stockpile.

(E) Mix design gradation and mix test results from all trial gradations. The mix design shall contain the mineral aggregate gradation, and also the gradation with mineral admixture.

(F) The results of all testing, determinations, etc., such as: specific gravity of each component, water absorption, sand equivalent, loss on abrasion, fractured coarse aggregate particles, flat and elongated particles, uncompacted void content, percent carbonates (if required), immersion compression results (Index of Retained Strength, wet and dry strengths), asphalt absorption, percent air voids, voids in mineral aggregate, and bulk density.

(G) Viscosity-temperature curve along with the laboratory mixing and compaction temperature ranges, as well as the actual laboratory mixing and compaction temperatures used. For modified binders follow the recommendations of the supplier.

When Warm Mix Asphalt (WMA) technologies are used in the mixture, the additional mix design requirements specified in Materials Practice and Procedure Directive No. 23, “Requirements for the Use of Warm Mix Asphalt (WMA) Technologies in Asphaltic Concrete”, shall also be included in the mix design.

Test results used in the formulation of the mix design shall be from testing performed no earlier than 45 days prior to the date the mix design is signed by the mix design engineer. Historical abrasion values may be supplied on sources provided the testing was conducted within the past two years.

The mix design shall be submitted to the Engineer under a cover letter signed by an authorized representative of the contractor.

A copy of the mix design and representative samples of the materials used in the mix design shall be submitted to the Engineer for calibration of the ignition furnace, and for the determination of the sand equivalent, Abrasion, Fractured Coarse Aggregate Particles, Flat and Elongated Particles, Flakiness Index, Uncompacted Void Content and VCA_{DRC}. Approximately 400 pounds of mineral aggregate and mineral filler (proportional to the mix design gradation), stabilizing additives, 2 gallons of asphalt cement, and 1 gallon of mineral admixture shall be submitted. The Engineer shall witness the sampling of the mineral aggregate. The mix design and samples shall be submitted to the Engineer at least five working days prior to the start of asphaltic concrete production.

The mineral aggregate shall meet the requirements specified in Subsection 3.01 of this specification.

If the mineral aggregate fails to meet the requirements specified herein, asphaltic concrete production shall not commence, and the contractor shall either submit a revised mix design which is representative of the materials produced or correct the deficiencies in the aggregate stockpiles.

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

If the contractor elects to change its source(s) of mineral aggregate or mineral filler or stabilizing additives, or adds or deletes the use of a stockpile(s) regardless of source, the contractor shall furnish the Engineer with a new mix design which meets the requirements specified hereinbefore.

If changes are made in the source or type of bituminous material, type of mineral admixture, stabilizing additives or mineral filler the contractor shall provide verification testing results. Verification testing shall be performed at the original mix design asphalt content using the original mineral aggregate, the proposed bituminous material, and/or the proposed mineral admixture. Three specimens shall be fabricated and tested for VCA_{MIX}, bulk density, maximum theoretical density, and effective voids. The percent effective voids shall be within ± 0.2 of the percent effective voids in the original design and also be within the current effective voids mix design specification limits. Verification testing results shall not replace target values shown in the original mix design. All target values from the original design shall be used in future production with the exception of any self-directed target value changes that are requested. The verification process does not ensure that the contractor can meet the target values during production.

In addition to the verification testing specified above, verification testing for TSR is also required. If there is a change in the type of mineral admixture or mineral filler, TSR testing is required.

The contractor may make self-directed target changes to the approved mix design within the limits shown below. Requests for self-directed target changes shall be made in writing and acknowledged by the Engineer prior to start of production for a lot. Self-directed target changes shall meet contract requirements for mix design criteria and grading limits.

MEASURED CHARACTERISTICS	ALLOWABLE SELF-DIRECTED TARGET CHANGES
Gradation (Sieve Size):	
3/8 inch	± 4% from mix design target value
No. 4	± 3% from mix design target value
No. 8	± 3% from mix design target value
No. 50	± 2% from mix design target value
No. 200	± 0.5% from mix design target value
Asphalt Cement Content	± 0.5% from mix design target value
Effective Voids	None

The contractor may propose target changes to the approved mix design for the Engineer's approval. The Engineer will determine if the proposed target change will result in mix production that meets the contract requirements for mix design criteria and grading limits. For acceptance purposes, target changes will not be retroactive.

In no case shall the approval of mix design changes relieve the contractor of the responsibility for the results obtained by the use of such approved changes.

Should a mix design prove unsatisfactory to the contractor during production, the contractor shall furnish the Engineer with a revised mix design. For acceptance purposes, the revised mix design will not be retroactive.

The contractor shall not change its methods of crushing, screening, washing, or stockpiling from those used during production of material used for mix design purposes without approval of the Engineer or without preparing a new mix design.

5.0 Contractor Quality Control:

The contractor shall perform the quality control measures described in Subsection 106.04(C) of the specifications. At the weekly meeting, the contractor shall be prepared to explain and discuss how the following processes will be employed.

(A) Aggregate production, including crusher methods, pit extraction, and washing.

(B) Stockpile management, including stacking methods, separation technique, plant feed technique, stockpile pad thickness, and segregation prevention.

(C) Proportioning and plant control, including plant scale calibration, mix temperature control, storing method, and addition of admixture.

(D) Transporting and placing, including hauling distance and temperature control, segregation and non-uniform placement control, and joint placement and technique.

(E) Compaction, including types and weight of rollers, establishing and monitoring of roller patterns, and temperature controls.

(F) Feeding of mineral filler and fibers into the mix.

The contractor shall obtain samples and perform the tests specified in the following table:

CONTRACTOR QUALITY CONTROL TESTING REQUIREMENTS			
TYPE OF TEST	TEST METHOD	SAMPLING POINT	MINIMUM TESTING FREQUENCY
Virgin Mineral Aggregate			
Gradation	AASHTO T 11, T 27	Crusher Belt or Stockpile	1 per stockpile per day
Sand Equivalent	AASHTO T 176		1 per 2000 Tons of total virgin aggregate (1)
Fractured Coarse Aggregate Particles	AASHTO T 335		
Uncompacted Void Content	AASHTO T 304 Method A		
Asphaltic Concrete			
Gradation	AASHTO T 11, T 27 or T 308	Cold Feed, Hot Bins, Roadway, or Plant	1 per 1000 Tons
Asphalt Content	AASHTO T 287, T 308	Roadway or Plant	1 per 1000 Tons
Voids	AASHTO T 312, T 166, T 209, T 269	Roadway or Plant	1 per 1000 Tons each day. Maximum of 4 per day.
Compaction	AASHTO T 355	Roadway	1 per 300 tons
VCA_{MIX} less than VCA_{DRC}	AASHTO T 19	Cold Feed and Roadway	1 per 1000 Tons

Notes:

(1) Prior to the completion of the mix design, quality control tests on mineral aggregate shall be performed based on the anticipated percent use of each stockpile. Samples taken from individual stockpiles may be composited prior to performing the required tests, or testing may be performed on material from each stockpile and the composite test result for each required test determined mathematically.

6.0 Construction Requirements:

The contractor shall be responsible for the proportioning of all materials, for the hauling, placing, loading, spreading, and finishing of asphaltic concrete, and for the applying of bituminous material, such as tack coats, prime coats, and provisional seals, all in accordance with the appropriate portions of the specifications.

The asphaltic concrete hot plant shall conform to the requirements of Section 403 of the Specifications.

The temperature of asphaltic concrete or mineral aggregate upon discharge from the drier shall not exceed 350 degrees F unless a higher temperature is recommended in writing by the asphalt binder supplier and approved by the Engineer.

A Material Transfer Vehicle (MTV) shall be used for placing the SMA on all travel lanes and may be used at the contractor's option in other areas. The contractor shall not place more than one truckload of hot mix in a windrow in front of the MTV at any time. The contractor shall use a MTV with storage and remixing capabilities on all mainline construction. The MTV will independently remix and deliver mixture from the hauling Equipment to the paving Equipment.

The contractor shall furnish an MTV with the following capabilities:

- An unloading system to receive mixtures from the hauling Equipment.
- A minimum storage capacity of 13 tons with a remixing system in the MTV storage bin.
- A discharge conveyor to deliver the mixture to the paver hopper.
- The MTV system cannot exceed maximum legal loading on Structures.
- Pick-up machines, hopper inserts and Material transfer devices are not considered MTVs.

In the event the MTV malfunctions during paving operations, the contractor may finish the Day without the MTV. The Contractor shall not resume further mainline mix placement until the MTV is operational.

All courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines except under certain conditions or at certain locations where the Engineer deems the use of self-propelled paving machines impractical.

Self-propelled paving machines shall spread the mixture within the specified tolerances, without segregation or tearing, true to the line, grade, and crown indicated on the project plans. Pavers shall be equipped with hoppers and augers which shall distribute the mixture uniformly in front of adjustable screeds.

Pavers shall be equipped with a screed for the full width being paved, heated if necessary, and capable of spreading and finishing all courses of asphaltic concrete.

Pavers shall be equipped with automatic screed controls with sensors for either or both sides of the paver, capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing the automatic signals which operate the screed to maintain the desired grade and transverse slope.

Failure of the control system to function properly shall be cause for the suspension of the placing of asphaltic concrete.

The base or subgrade upon which asphaltic concrete is to be placed shall be prepared and maintained in a firm condition until asphaltic concrete is placed. Asphalt paving mixtures shall not be placed when surfaces are wet or when the surface temperature is 55 degrees F or lower. When the surface temperature is between 40°F and 55°F, the contractor may elect to place asphaltic concrete mixture, at no additional cost to the Department, provided an approved warm-mix additive is used as a compaction aid. Placement of asphaltic concrete shall not be allowed when the surface temperature is below 40°F.

The contractor shall utilize an approved warm-mix additive, regardless of surface temperature, when the haul distance exceeds 50 miles.

At any time, the Engineer may require that the work cease or that the work day be reduced in the event that weather conditions, either existing or expected, are anticipated to have an adverse effect upon the asphaltic concrete.

All wheels and tires of compactors shall be wetted with water, or if necessary soapy water, or a release agent in order to prevent the sticking of asphaltic concrete. All other equipment surfaces shall be treated when necessary with a release agent. Only release agents evaluated through AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) are acceptable for use. The results from AASHTO Product Evaluation & Audit Solutions (formerly NTPEP) testing, when tested in accordance with AASHTO TP 102, shall conform to the requirements shown in the table below:

RELEASE AGENT TEST	REQUIREMENT
Asphalt Stripping Test Diluted Non-Diluted (Full Strength)	 No stripping No stripping
Asphalt Performance Test	Less than or equal to 10.0% after the third cycle

Release agents which degrade, dissolve, or in any way damage the bituminous material shall not be used. Diesel fuel shall not be used as a release agent.

Longitudinal joints of each course shall be staggered a minimum of 1 foot with relation to the longitudinal joint of any immediate underlying course.

When surfacing courses are placed on 10 foot or wider shoulders which are to receive rumble strips, the contractor shall place any longitudinal joints approximately 1 foot away from the travel lane side of the rumble strip.

Longitudinal joints shall be located within 1 foot of the center of a lane or within 1 foot of the centerline between two adjacent lanes. Joints shall be formed by a slope shoe or hot-lapped, and shall result in an even, uniform surface.

Before a surface course is placed in contact with a cold transverse construction joint, the cold existing asphaltic concrete shall be trimmed to a vertical face by cutting the existing asphaltic concrete back for its full depth of the lift and exposing a fresh face. After placement and finishing of the new asphaltic concrete, both sides of the joint shall be dense and the joint shall be well sealed. The surface in the area of the joint shall conform to the requirements hereinafter specified for surface tolerances when tested with the straightedge placed across the joint.

All holes where cores are taken shall be repaired within 48 hours after coring using a material approved by the Engineer. All holes shall be in a dry condition prior to repair. The patching material shall be thoroughly compacted in the holes by the contractor.

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

Before asphaltic concrete is placed, the surface to be paved shall be cleaned of all objectionable material and tacked in accordance with the requirements of Section 404. The cleaning of the surface, the tacking of the surface, and the type of bituminous material used shall be acceptable to the Engineer. The amount of bituminous material used shall be as directed by the Engineer.

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

The contractor shall schedule its paving operations to minimize exposed longitudinal edges. Unless otherwise approved by the Engineer, the contractor shall limit the placement of asphaltic concrete courses, in advance of adjacent courses, to one shift of asphaltic concrete production. The contractor shall schedule its paving operations in such a manner to eliminate exposed longitudinal edges over weekends or holidays.

The moisture content of the asphaltic concrete immediately behind the paver shall not exceed 0.5 percent. The moisture content will be determined in accordance with AASHTO T 329.

When Warm Mix Asphalt (WMA) technologies are used, the contractor shall comply with the manufacturer’s recommendations for incorporating additives and WMA technologies into the

mixture. The contractor shall comply with the manufacturer's recommendations regarding transporting, storage, and delivery of additives and water foaming processes. The contractor shall maintain a copy of the manufacturer's recommendations on file at the asphalt mixing plant and make those recommendations available for reference while using WMA technologies.

7.0 Acceptance:

7.01 General:

In addition to the random acceptance samples taken from each lot, the Engineer may sample and reject material which appears to be defective. Such rejected material shall not be used in the work. The results of tests run on rejected material will not be included with the lot acceptance tests.

Acceptance will be on the basis of the following:

(A) Sand Equivalent;
(B) Fractured Coarse Aggregate Particles;
(C) Flakiness Index;
(D) Flat and Elongated Particles;
(E) Uncompacted Void Content;
(F) Material Spread;
(G) Plastic Index (PI) for Mineral Filler;
(H) Smoothness;
(I) VCA_{MIX};
(J) Gradation;
(K) Asphalt Cement Content;
(L) Effective Voids; and
(M) Compaction

7.02 Sand Equivalent, Fractured Coarse Aggregate Particles, Flakiness Index, Flat and Elongated Particles, and Uncompacted Void Content of Mineral Aggregate:

During asphaltic concrete production, the Engineer will obtain and test samples of material for the determination of the sand equivalent, fractured coarse aggregate particles, flat and elongated particles, flakiness index and uncompacted void content of mineral aggregate. Samples shall be obtained from the cold feed belt prior to the addition of mineral admixture, or from the stockpiles when sampling from the cold feed belt is not possible.

Mineral aggregate will be accepted if it meets the minimum requirements specified in Subsection 3.01 of this specification.

The plastic index (PI) for the mineral filler shall be determined in accordance with the requirements of AASHTO T 89 & T 90.

If the mineral aggregate fails to meet these requirements, operations shall cease and the contractor shall have the option of submitting a revised mix design conforming to the

requirements of Subsection 4.0 of this specification or correcting deficiencies in the aggregate stockpiles.

7.03 Material Spread:

A spread lot shall be considered to be one-half shift of production. Lots encompassing more than one project shall be separated in accordance with Subsection 9(D) of this specification.

The contractor shall record information pertaining to each spread lot on forms provided by the Engineer. Information shall include the project number, date and period of time that each spread lot was placed, the spread lot number, beginning and ending station, the plans thickness, and tons placed in each lot. Completed spread lot forms shall be signed by the contractor and given to the Engineer at the end of each shift.

The Engineer will calculate the quantity required in each spread lot using the mix design bulk density unless a request is made by the contractor to use a production bulk density. If a request is made to use production bulk density, the first three non-rejected lots following the test lot will be used to determine the average production bulk density. All lots placed prior to establishing the average production bulk density shall be calculated using the mix design bulk density. For each new mix design used on the project, a new production bulk density may be requested by the contractor. In addition, if conditions warrant during asphalt production, the contractor may request establishment of a new average production bulk density. All requests to use a production bulk density shall be made in writing and approved by the Engineer prior to use. The same procedure will be used for determining average production bulk density in all cases. Changes to the bulk density for calculating spread quantities will not be retroactive.

The calculated quantity required in each spread lot will be compared to the actual quantity placed. A lot will be considered to be acceptable, with a zero pay factor, if the actual quantity placed varies by no more than -2.0 to +5.0 percent from the required quantity.

If the quantity in a lot is found to vary from the required quantity by -2.1 to -12.0 percent, the appropriate pay factor will be determined in accordance with Table 3. This pay factor will be utilized in determining the pay adjustment as outlined in Subsection 9.0 of this specification.

7.04 Gradation, Asphalt Cement Content, Effective Voids, and VCA_{MIX}:

(A) General:

A mixture properties lot shall be considered to be one shift's production. In the event a shift's production is less than 1200 tons, multiple shifts may be combined to form a lot. When a lot consists of production from more than one shift, the following conditions apply: at least one sample shall be taken each shift, at least one sample shall be taken every 500 tons, and no mix design or target value changes shall be made within the lot. If changes are made in the mix design or target values, new lots will be established.

Four samples of the asphaltic concrete shall be taken for each lot by the contractor, under the observation of the Engineer, at random locations designated by the Engineer. Samples shall be collected by the contractor, under observation by the Engineer, in accordance with AASHTO R97 from windrows on the ground at the jobsite or from the back of trucks at the

plant from an elevated rack. Samples shall be delivered to the Engineer immediately after being taken. The minimum weight of the sample shall be 130 pounds. The Engineer will split the sample and save one-half for 15 days after written notification to the contractor of test results for that lot has been made. The material will be tested by the Engineer for the following properties:

TEST PROPERTY	TEST METHOD
Asphalt Cement Content Gradation	AASHTO T 308 (See Note)
Gyratory Density	AASHTO T 312
Maximum Theoretical Density	AASTHO T 209
Effective Voids	AASHTO T 269
VCA_{MIX}	AASHTO T 19 (Refer to AASHTO R 46 for guidance)
Note: A new calibration of the ignition furnace shall be performed for each mix design, and at any other time the Engineer directs.	

Acceptance testing results will be furnished to the contractor within four working days of receipt of samples by the Engineer.

The target values for gradation, asphalt cement content, and effective voids are given in the contractor's mix design. The Upper Limits (UL) and Lower Limits (LL) of acceptable production of each of the measured characteristics are as follows:

MEASURED CHARACTERISTICS FOR 1/2" AND 3/8" MIXES		
Gradation (Sieve Sizes)	LL	UL
3/8 inch	TV – 5.0	TV + 5.0
No. 4	TV – 4.0	TV + 4.0
No. 8	TV – 3.0	TV + 3.0
No. 50	TV – 3.0	TV + 3.0
No. 200	TV – 2.0	TV + 1.5
Asphalt Cement Content	TV – 0.5	TV + 0.5
Effective Voids	TV –2.0	TV + 2.0
Note: The limits are used in the statistical calculations for Quality Index. Acceptance is controlled by the variability of the produced material and every effort should be made to strive for the center of the applicable Target Valve (TV).		

The Engineer will determine the PT for each measured characteristic in accordance with Subsection 9(I) of this specification and utilizing Table 3 will determine the pay factor for each measured characteristic.

In the event the contractor elects to question the mixture property test results, the contractor may request referee testing in accordance with Subsection 9(J) of this specification.

(B) Ignition Furnace Correction:

Ignition furnace corrections shall be made in accordance with the requirements of AASHTO T 308.

7.05 Compaction:

Compaction control shall be the responsibility of the contractor. The number and types of rollers shall be the contractor's responsibility and shall be sufficient to meet the requirements specified herein.

Pneumatic-tired rollers will not be permitted.

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

Steel wheel compactors shall weigh not less than 12 tons.

A compaction lot shall be identical to the mixture properties lot described in Subsection 7.04 of this specification. Lots encompassing more than one project shall be separated in accordance with Subsection 9 (D) of this specification. Each lot shall be tested for acceptance.

Twenty cores shall be taken for each lot by the contractor, under the observation of the Engineer. The Engineer will designate 10 random locations within the lot, and the contractor shall take two cores at each location; however, if more than one shift constitutes a lot, two cores shall be taken from a minimum of two random locations each shift, or as directed by the Engineer. The Engineer will save one core from each location for 15 days after written notification to the contractor of test results for the lot has been made. Randomly selected locations will be determined to the nearest 0.5 foot in the transverse direction and to the nearest foot in the longitudinal direction of the pavement course; however, the outside 1 foot of the unconfined pavement course will be excluded from testing as shown in ADOT Materials Practice and Procedure Directive (P.P.D.) No. 18, “Determining Sample Times and Locations for End Product Asphaltic Concrete”. P.P.D. No. 18 also addresses areas to be excluded relative to longitudinal joints. Cores shall be taken utilizing mechanical coring equipment in accordance with the requirements of AASHTO R 97. Cores shall be a minimum of 4 inches in diameter and shall be taken not later than two working days after placement of the asphaltic concrete. The cores shall be delivered to the Engineer immediately upon being taken. The bulk density of each core will be determined by the Engineer in accordance with the requirements of AASHTO T 166. The test results will be furnished to the contractor within four working days of receipt of cores by the Engineer. In areas where more than one lift is placed in the same lot, coring shall be accomplished through the full depth of the lifts after the final lift is placed, and the compaction density shall be based on the full depth of the lifts.

The target value for compaction shall be 5.0 percent in-place air voids. In-place air voids shall be determined in accordance with AASHTO T 269. The maximum theoretical density used in the determination of air voids will be the average of the four maximum theoretical densities determined for the lot in Subsection 7.04 of this specification.

The Upper Limit (UL) is 8.0 percent in-place air voids and the Lower Limit (LL) is 2.5 percent in-place air voids. The Engineer will determine the PT for compaction in accordance with Subsection 9(I) of this specification, and utilizing Table 3 will determine the compaction pay factor.

In the event the contractor elects to question the core test results, the contractor may request referee testing in accordance with Subsection 9(J) of this specification.

7.06 Smoothness and Surface Tolerances:

Asphaltic concrete shall be compacted as required, smooth and true to the required lines, grades, and dimensions.

The Special Provisions may require the smoothness of the final pavement surface to be tested in accordance with Subsection 109.13 of the specifications.

Regardless of whether testing in accordance with Subsection 109.13 of the specifications is specified or not, the following requirements shall be met:

(A) The surface of the final lift of asphaltic concrete placed under this section of the specifications shall be tested and shall not vary by more than 1/8 inch from the lower edge of a 10-foot straightedge when it is placed in the longitudinal direction (including across transverse joints), and when it is placed in the transverse direction across longitudinal joints.

(B) The surface of any lift of asphaltic concrete placed under this section of the specifications, other than the final lift, shall be tested and shall not vary by more than 1/4 inch from the lower edge of a 10-foot straightedge when it is placed in the longitudinal direction (including across transverse joints), and when it is placed in the transverse direction across longitudinal joints.

(C) All deviations exceeding the specified tolerances above shall be corrected by the contractor, to the satisfaction of the Engineer.

8.0 Method of Measurement:

(A) Asphaltic Concrete:

Asphaltic concrete will be measured by the ton for the asphaltic concrete actually used, which will include the weight of mineral aggregate, asphalt cement, and mineral admixture. Measurement will include any quantity used in construction of intersections, turnouts, or other miscellaneous items or surfaces.

(B) Stabilizing additives:

Stabilizing additives (Cellulose or Mineral fibers) will be measured by the ton.

(C) Asphalt Cement:

Asphalt cement will be measured by the ton on the basis of the asphalt cement content determined in accordance with Subsections 7.04(B) of this specification for each lot of asphaltic concrete accepted. The average asphalt cement content will be multiplied by the number of tons of asphaltic concrete in that lot to determine the amount of asphalt cement. If the contractor has requested referee testing, the average asphalt cement content will come from the independent testing laboratory results. At the discretion of the Engineer, asphalt cement may be measured by invoice quantities, adjusted as necessary for waste. Waste generated from startup of the asphalt plant will be considered to have a binder content of 5.0 percent. In no case shall the measured amount of asphalt cement for payment be greater than the total of the invoice quantities, adjusted for waste.

9.0 Basis of Payment:

The accepted quantities of asphaltic concrete, measured as provided above, will be paid for at the contract unit price adjusted by the appropriate pay factors as hereinafter provided.

When Warm Mix Asphalt (WMA) technologies are used in the mixture, no separate payment will be made for WMA additives or technologies, necessary hot plant modifications, or other associated costs.

For the purpose of determining acceptability and appropriate pay factors, each unit of asphaltic concrete will be included in three separate lots: a “spread lot,” a “mixture properties lot,” and a “compaction lot.” The total unit price for any unit of accepted asphaltic concrete will be the contract unit price, adjusted by the applicable spread lot pay factor, mixture properties lot pay factor, and compaction lot pay factor.

The contractor may request to place the first lot of each mix type as a test strip. Requests to place a test strip shall be made in writing and acknowledged by the Engineer prior to start of production. A test strip shall be limited to 1,000 tons and may only be placed on shoulders, ramps, cross roads, or other areas approved by the Engineer. A test strip shall be excluded from the mixture properties lot pay factor and the compaction lot pay factor; however, all other provisions of Subsection 9.0 specified herein shall still apply to such areas.

The Engineer may exclude asphaltic concrete from the spread lot and from the spread lot pay factor calculations if the Engineer determines that the proposed use of the material or the existing surface conditions are not conducive to the use of spread lots.

The Engineer may exclude certain locations from the mixture properties lot and/or the compaction lot and from the random sampling used in determining the mixture properties lot pay factor and/or the compaction lot pay factor should the Engineer determine that the location of the work precludes normal construction operations.

(A) Spread Lot Pay Factor:

The spread lot pay factor will be determined in accordance with Subsection 7.03 of this specification. If the quantity in a spread lot is found to vary by more than + 5.0 percent from the required quantity, no payment will be made for the material which exceeds + 5.0 percent,

including asphalt cement and mineral admixture. If the quantity is found to vary by more than - 12.0 percent from the required quantity, the spread lot will be rejected.

(B) Mixture Properties Lot Pay Factor:

The mixture properties lot pay factor shall be determined in accordance with the following procedure:

(A) The individual PT values and pay factors for Gradation, Asphalt Cement Content, and Effective Voids shall be determined as set forth in Subsection 7.04 of this specification.

(B) A single pay factor shall be determined for Gradation and Asphalt Cement Content. That pay factor shall be the lowest pay factor for the individual measured characteristics for Gradation and Asphalt Cement Content.

(C) If no individual PT value in (1) above is less than 50, the mixture properties lot pay factor shall be the sum of the pay factor determined in (2) above and the Effective Voids pay factor. The negative pay factor for mixture properties shall not exceed $3.00 per ton. If any individual PT value is less than 50, the lot is in reject and the provisions in Subsection 9(E) of this specification shall apply.

(C) Compaction Lot Pay Factor:

The compaction lot pay factor shall be determined as set forth in Subsection 7.05 of this specification.

(D) Determination of Lot Pay Factors on Contracts Involving Multiple Projects:

When more than one project is included in a single contract, placement during a shift or half shift of production may encompass more than one project. In such case, the applicable spread lot pay factor, mixture properties lot pay factor, and compaction lot pay factor for each project shall be determined as follows:

Spread lot pay factors will be determined separately for each project utilizing the procedure set forth in Subsection 7.03 of this specification.

(A) The individual PT values and pay factors for Gradation, Asphalt Cement Content, and Effective Voids will be determined from the results of the random samples taken and tested in accordance with Subsection 7.04 of this specification, regardless of which project(s) the samples fall within.

(B) PT values and pay factors for compaction, for those areas subject to Subsection 7.05(B) of this specification, shall be determined from separate sets of core samples for each project utilizing the procedure set forth in that Subsection.

(C) The mixture properties lot pay factor shall be determined separately for each project in accordance with Subsection 9(B) specified herein, utilizing the individual pay factors determined in (B) above.

(D) The compaction lot pay factor shall be determined separately for each project in accordance with Subsection 9(C) specified herein, utilizing the pay factor determined in (C) above.

(E) Acceptability:

Asphaltic concrete included in any mixture properties lot possessing an individual PT value lower than 50 for Gradation, Asphalt Cement Content, or Effective Voids will be rejected. Asphaltic concrete included in any compaction lot possessing a PT value lower than 50 will be rejected.

The contractor may request that a sample with a failing test result(s) on gradation and/or asphalt cement content be allowed to remain in place without the completion of an engineering analysis if the application of a self-directed target value change as outlined in section 4.0 of this specification would have brought the failing test result(s) to within the specified tolerances. This proposal shall be made to the Engineer in writing with justification. Once accepted, the material will be allowed to remain in place at the maximum negative pay factor(s). Maximum negative are defined as a minus $3.00 per ton for mixture properties lots in reject for gradation only, minus $5.00 per ton for mixture properties lots in reject for asphalt cement content and/or effective voids only, and minus $5.00 per ton for mixture properties lots in reject for asphalt cement content and/or effective voids and also gradation.

Within 25 days after receiving notice that a spread lot, mixture properties lot, or compaction lot of asphaltic concrete has been rejected by the Engineer, the contractor may submit a written proposal to accept the material in place at the applicable maximum negative pay factor(s). Maximum negative pay factors are defined as a minus $1.00 per ton for spread lots, minus $5.00 per ton for compaction lots, minus $3.00 per ton for mixture properties lots in reject for gradation only, minus $5.00 per ton for mixture properties lots in reject for asphalt cement content and/or effective voids only, and minus $5.00 per ton for mixture properties lots in reject for asphalt cement content and/or effective voids and also gradation. Positive mixture properties lot pay factors become zero when the compaction lot is in reject and the material is allowed to be left in place.

The proposal shall contain an engineering analysis of the anticipated performance of the asphaltic concrete if left in place. The engineering analysis shall also detail any proposed corrective action, and the anticipated effect of such corrective action on the performance. The engineering analysis shall be performed by an independent professional engineer experienced in asphaltic concrete testing and the development of asphaltic concrete mix designs. If a rejected mixture properties lot or a rejected compaction lot is submitted for referee testing by the contractor, the 25 days allowed to prepare an engineering analysis will begin upon notification of referee test results.

Within three working days, the Engineer will determine whether or not to accept the contractor’s proposal. If the proposal is not accepted, the asphaltic concrete shall be removed at no additional cost to the Department and replaced with asphaltic concrete meeting the

requirements of these specifications. If the proposal is accepted, the asphaltic concrete shall remain in place at the applicable maximum negative pay factor(s), and any necessary corrective action shall be performed at no additional cost to the Department.

The Department reserves the right to suspend the work should any of the following conditions occur:

(A) The occurrence of two or more rejected lots within any 10 consecutive production lots.

(B) The occurrence of three consecutive negative mixture properties lot pay factors or three consecutive negative compaction lot pay factors.

(C) The occurrence of five or more pay factors that are negative either for a mixture properties lot or for a compaction lot within any 10 consecutive production lots.

If the Department elects to suspend the work for any of these conditions, the contractor shall either submit a revised mix design in accordance with Subsection 4, or submit for the Engineer's approval a written engineering analysis. The engineering analysis shall detail the course of action necessary to correct deficiencies in the contractor's present production methods such that further production can be accomplished without excessive amounts of asphaltic concrete in penalty or rejection. If approved by the Engineer, the revised mix design or the course of action proposed in the engineering analysis, shall be implemented and the work may continue. Costs or delays due to the provisions of this subsection are not compensable.

(F) Asphalt Cement:

The accepted quantity of the asphalt binder, measured as provided above, will be paid for under the respective contract item for asphalt binder shown on the bidding schedule at the contract unit price per ton, which price shall be full compensation for the work, complete in place, as specified herein. Adjustments in payment will be made in accordance with the requirements of Subsection 1005-3.01 of the specifications.

(G) Mineral Admixture:

No separate measurement or payment will be made for mineral admixture, the cost being considered as included in the cost of the asphaltic concrete.

(H) Smoothness:

When required in the Special Provisions, payment for smoothness will be made in accordance with the requirements of Subsection 109.13 of the specifications.

(I) Statistical Acceptance:

The "Total Percentage of Lot within UL and LL (PT)" will be determined in accordance with Subsection 109.11 of the specifications.

Pay Factors (PF) will be determined by entering Table 3 with PT.

TABLE 3
PAY FACTORS

Material Spread		Mixture Properties and Compaction			
			Pay Factors (Dollars per Ton)		
Negative Variance %	Pay Factor (Dollars per Ton)	PT	Gradation and Asphalt Cement Content	Effective Voids	Compaction
2.1 - 3.0	- 0.10	100	0.00	+ 2.00	+ 2.00
3.1 - 4.0	- 0.20	95 - 99	0.00	+ 0.50	+ 0.50
4.1 - 5.0	- 0.30	90 - 94	0.00	0.00	0.00
5.1 - 6.0	- 0.40	85 - 89	0.00	- 0.25	- 0.25
6.1 - 7.0	- 0.50	80 - 84	- 0.25	- 0.50	- 0.50
7.1 - 8.0	- 0.60	75 - 79	- 0.50	- 0.75	- 0.75
8.1 - 9.0	- 0.70	70 - 74	- 0.75	- 1.00	- 1.00
9.1 - 10.0	- 0.80	65 - 69	- 1.00	- 1.25	- 1.25
10.1 - 11.0	- 0.90	60 - 64	- 1.50	- 1.50	- 1.75
11.1 - 12.0	- 1.00	55 - 59	- 2.00	- 2.00	- 2.25
More than 12.0	Reject	50 - 54	- 2.50	- 2.50	- 3.00
See Subsections 9 (A) and (E)		Less than 50	Reject-See Subsection 9 (E)		

(J) Referee Testing:

(1) Referee Testing Performed for Mixture Properties Only:

Within 15 days after written notification to the contractor of test results for a particular mixture properties lot, the contractor may make a written request for referee testing. The referee testing shall be performed by an independent approved laboratory designated by the Department. The testing of the samples will be performed by the independent testing laboratory without knowledge of the specific project conditions such as the identity of the contractor or mix design laboratory, the test results by the Department, or the mix design targets for gradation and effective voids. The asphaltic concrete samples previously saved will be tested for the following properties:

Test Property	Test Method
Asphalt Cement Content (See Note 1 Below)	AASHTO T 308
Gradation	
Gyratory Density	AASHTO T 312 (See Note 2 Below)
Maximum Theoretical Density	AASHTO T 209
Effective Voids	AASHTO T 269

Notes:

(1) Correction to the asphalt cement content by ignition furnace testing is made in accordance with Subsection 7.04(B) of this specification.

(2) Except compaction shall be performed to the number of gyrations specified in Table 1.

The results of the referee testing will be binding on both the contractor and the Department.

Using the referee testing results, the Engineer will determine new PT's for all characteristics.

When referee testing is performed on a mixture properties lot, the referee test result for the average maximum theoretical density will be used to determine a new PT for compaction.

The Department will pay for the referee testing; however, if the combined pay factor of the lot (Mixture Properties plus Compaction) does not improve or is reduced, or if either the mixture properties lot or compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete shall be reduced by the amount of the cost of the referee testing for the mixture properties of that particular lot.

(2) Referee Testing Performed for Compaction Only:

Within 15 days after written notification to the contractor of test results for a particular compaction lot, the contractor may make a written request for referee testing. The bulk density of each of the cores previously saved will be determined in accordance with the requirements of AASHTO T 166 by an independent testing laboratory designated by the Department. The testing of the cores will be performed by the independent testing laboratory without knowledge of the specific project conditions, such as the identity of the contractor or mix design laboratory, or the test results by the Department. The percent air voids will be determined in accordance with AASHTO T 269. The maximum theoretical density used in the determination of air voids will be the average of the four maximum theoretical densities determined for the lot in Subsection 7.04 of this specification.

The results of the referee testing will be binding on both the contractor and the Department.

When referee testing is performed on a compaction lot, the Engineer will determine a new PT for compaction using the referee testing results.

The Department will pay for the referee testing; however, if the pay factor of the compaction lot does not improve or is reduced, or the compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete will be reduced by the amount of the cost of referee testing for the compaction of that particular lot.

(3) Referee Testing Performed for Both Mixture Properties and Compaction:

When referee testing is performed, as described above, for both the mixture properties lot and the compaction lot, the Engineer will use the referee test results to determine new PT's as specified herein in Subsections 9(J)(1) and 9(J)(2).

The Department will pay for the referee testing; however, if the combined pay factor of the lot (Mixture Properties plus Compaction) does not improve or is reduced, or if either the mixture properties lot or compaction lot remains in reject or is placed in reject, payment to the contractor for asphaltic concrete will be reduced by the amount of the cost of the referee testing for the mixture properties and compaction of that particular lot.

(K) Stabilizing Additives:

The accepted quantity of the stabilizing additives, measured as provided above, will be paid for at the contract unit price per ton, which price shall be full compensation for the work, complete in place, as specified herein.

(924CQC, 09/17/20)

ITEM 9240170 - CONTRACTOR QUALITY CONTROL:

Description:

The work under this item shall consist of furnishing all personnel, materials, supplies, facilities and equipment necessary to perform all certification of test equipment, sampling, testing, and other control actions. The work shall also include the preparation of linear control charts, Weekly Quality Control Reports, and other reports and records as described in Subsection 106.04(C) of the Specifications.

Method of Measurement:

Contractor quality control will be measured for payment on a lump sum basis as a single unit of work.

Basis of Payment:

(A) General:

The accepted quantities of contractor quality control, measured as provided above, will be paid at the contract lump sum price, which price shall be full compensation for the work, complete, as described and specified herein.

Partial payments under this item will be made in accordance with the following provisions:

(1) The first partial payment price will be the lesser of 25 percent of the contract lump sum price for contractor quality control, or 1 percent of the original total contract bid amount.

(2) The remaining portion of the lump sum price will be prorated over the duration of the original contract on a monthly basis, and monthly progress payments will be made.

If adjustments to pay items covered under Contractor Quality Control are approved by supplemental agreement, an equitable adjustment to the lump sum amount for Contractor Quality Control may be made. Any adjustment to Contractor Quality Control shall be included in the supplemental agreement and the adjusted amount, less previous payments, will be prorated equally over the remaining contract period, including any related time extensions.

(B) Delinquent Reports:

Failure of the contractor to submit complete and accurate Weekly Quality Control Reports, current to the most recent Wednesday submittal date, will be grounds for the Engineer to deduct monies from the contractor's progress payment.

For each Weekly Quality Control Report that is not complete and accurate, and not submitted to the Engineer by the Wednesday submittal date specified in Subsection 106.04(C)(6), the Department will deduct $2,500.00 from the progress payment for the current month.

For each delinquent Weekly Quality Control Report submitted to the Engineer within 10 days, excluding weekends and holidays, of the original Wednesday due date, $2,000.00 will be returned on the next regular estimate, provided all of the requirements specified herein and in Subsection 106.04(C)(6) have been met, and the report is complete and accurate. No deducted monies will be returned for reports submitted more than 10 days, excluding weekends and holidays, beyond the original Wednesday due date.

All deducted monies which are retained by the Department, as specified above, are liquidated damages.

ITEM 9240181 – MISCELLANEOUS WORK (CONTROL OF NOXIOUS PLANTS) (MANUAL/MECH. METHODS)
ITEM 9240182 – MISCELLANEOUS WORK (CONTROL OF NOXIOUS PLANTS) (HERBICIDE)

Description:

The work under these items shall consist of surveying, as well as controlling noxious and invasive plant species manually / mechanically and/or with the application of herbicides, in the areas designated by the Engineer, and throughout the duration of the contract, as required in a Noxious Species Control Plan (NSCP) prepared by the contractor as specified herein. When noxious or invasive plant species are determined to be present within the project limits or all anticipated construction zones, the control procedures in the NSCP shall be implemented with the approved weed management measures achieved prior to earth moving activities of infested areas.

Weed control procedures in the NSCP shall also be implemented during all stages of construction and in advance of seeding. Control of Noxious Plants through herbicide methods shall be accomplished between fourteen (14) and twenty-one (21) calendar days prior to Clearing and Grubbing, as well as construction excavations. Control of Noxious Plants through manual / mechanical methods shall be accomplished within seven (7) calendar days prior to Clearing and Grubbing, as well as construction excavations. Repeated treatments shall resume after Clearing and Grubbing when noxious/invasive plants occur during construction. In addition, all construction-related equipment, materials, and personnel moving in and/or out of the project site shall be inspected and cleaned of noxious and invasive plant species (seeds, seed heads / pods) at no additional cost to the Department.

For projects that include Landscape Establishment, as specified in Section 807 of the Standard Specifications and these Special Provisions, control of noxious and invasive plant species will also be required throughout the Landscape Establishment phase, and shall be included in the contractor's NSCP.

The contractor shall conduct repeated applications for Control of Noxious Plants throughout the entire contract time including the Landscape Establishment phase when noxious/invasive plants occur. Successive treatments along with multiple mobilizations for Control of Noxious Plants shall be conducted in accordance with invasive weeds' growing seasons at no additional cost to the Department.

The control of plant species not on the State or Federal Noxious or Invasive lists – especially Forest Service Regional/BLM lists noted below will be paid only when control is directed by the Engineer based on the original or amended NSCP approved by an ADOT construction Professional Landscape Architect (PLA) licensed in the State of Arizona.

The areas to be designated by the Engineer for Control of Noxious Plants shall be coordinated with an ADOT construction PLA. Unless the project site presents sizable monocultures or pure stands of high-density noxious and invasive plant species, the contractor shall not perform broadcast applications of glyphosate and/or other broad spectrum non-selective herbicides within the project limits. Spot-treating of identified noxious and invasive plant species patches with appropriate selective herbicides shall be conducted.

For unpaved project areas that will ultimately be seeded with desirable native plant species, the contractor shall avoid persistent herbicide residues contamination in the soil. The application of plant growth regulator (PGR) herbicides including Pyridine Carboxylic Acid (PCA) herbicides, which do not break down easily, shall be approved by the Engineer in accordance with an ADOT construction PLA's evaluation. Soil sterilant herbicides, especially bare-ground herbicides with long-lasting Soil Persistence, shall be prohibited to use for all unpaved project areas that will be seeded. Soil sterilant herbicides including bare-ground herbicides shall be prohibited to use for all unpaved and/or unstabilized project areas that are prone to soil erosion and/or dust emission. Pre-emergence herbicides shall be prohibited to be used for unpaved project areas that will eventually be seeded.

All glyphosate, as well as formulations of glyphosate-based herbicides and/or such products under the brand name / trade name of Roundup shall be cautiously evaluated for use by an ADOT construction PLA and approved by the Engineer in accordance with environmental commitments, along with site specific concerns of sensitive biological resources for native species and habitats.

The selection of appropriate treatment method(s) between herbicide versus manual/mechanical or in combination shall be proposed by the contractor within NSCP and approved by an ADOT construction PLA through the Engineer consistent with type(s), life stage(s), growing season(s), and existing condition(s) of plant species, as well as environmental commitments. The contractor may apply the herbicide method to exterminate noxious plants first and remove the dead noxious plants by using the manual / mechanical method after herbicide treatment is successful. Clearing and Grubbing shall not be applied to remove the dead noxious/invasive plants, as well as contaminated soil seed bank if the method will spread the reproducible components of noxious/ invasive plants. Manual / mechanical method shall be applied instead. The reproducible components of noxious/ invasive plants shall include, but are not limited to roots, stems, seeds, seed heads, or seed pods according to various types and life stages of plant species.

Materials:

General

The contractor shall accurately follow all applicable herbicide label requirements and prevent adverse environmental effects. The herbicides to be used and the methods of application shall conform to U. S. Environmental Protection Agency (EPA), Arizona Department of Agriculture, and/or Arizona Department of Environmental Quality (ADEQ) requirements, and the product's label instructions, as approved by the Engineer. If herbicides are to be applied to potential or delineated Waters of the US as defined under Section 404 of the Clean Water Act, the contractor shall file a Notice of Intent (NOI) and Notice of Termination (NOT) to EPA and/or ADEQ for compliance with the National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit and/or Arizona Pollutant Discharge Elimination System (AZPDES) Pesticide General Permit (PGP).

All herbicides used on the project, including stump treatment herbicide(s), shall be in compliance with NPDES and/or AZPDES PGP(s). The PGP NOI(s) shall be filed for

herbicide(s) utilized within the Ordinary High-Water Mark (OHWM) of Jurisdictional Waters of the U.S.

All materials to be used shall be listed and protocol information provided in the Noxious Species Control Plan, as specified below. The contractor shall provide the herbicides container with the original chemical label for inspection and confirmation of the chemicals used. All containers shall be disposed of as recommended by the manufacturer.

Herbicides proposed in the plan for use on projects within transportation easements on BLM and/or USFS Lands shall be in conformance with the following current environmental documents including: "Environmental Assessment for ADOT Herbicide Treatment Program on Bureau of Land Management Lands in Arizona", which is available at ***https://eplanning.blm.gov/eplanning-ui/project/34810/510*** or the "Environmental Assessment for Management of Noxious Weeds and Hazardous Vegetation on Public Roads on National Forest System Lands in Arizona" which is available at: ***http://www.fs.usda.gov/main/r3/landmanagement/projects*** . The Environmental Documents include a list of approved Herbicides, Mitigations and Best Management Practices (BMPs), which shall be included, as appropriate, by the contractor in the submitted NSCP.

Web links to environmental documents for noxious weeds and invasive plant species treatment for the six (6) National Forests within Arizona:

(1) Final EIS (Environmental Impact Statement) and Record of Decision for Noxious Weed Treatment on the Coconino, Kaibab, and Prescott National Forests:
http://www.fs.usda.gov/project/?project=30

(2) Coronado National Forest EA (Environmental Assessment) for Noxious Weed Treatments:
http://www.fs.usda.gov/detail/coronado/landmanagement/resourcemanagement/?cid=stelprdb5123160

(3) Apache-Sitgreaves National Forest Integrated Forest-Wide Noxious Terrestrial and Aquatic Weed Management Plan:
https://www.fs.usda.gov/project/?project=4967

(4) Tonto National Forest Integrated Treatment of Noxious and Invasive Weeds:
https://www.fs.usda.gov/project/?project=4454;
Additional information on invasive species requirements for the Tonto National Forest is available at:
http://www.fs.usda.gov/detail/tonto/landmanagement/resourcemanagement/?cid=fsbdev3_018789 .

Arizona Department of Agriculture NOXIOUS WEEDS (under the authority of Arizona Revised Statutes, Administrative Code R3-4-244 Regulated and Restricted Noxious Weeds, as well as R3-4-245 Prohibited Noxious Weeds) web link:
https://agriculture.az.gov/pestspest-control/agriculture-pests/noxious-weeds

Furthermore, the USDA Southwestern Region Weed Field Guides web link is accessible below:
https://www.fs.usda.gov/detail/r3/forest-grasslandhealth/invasivespecies/?cid=stelprd3813522

The USDA New Invaders of the Southwest is attainable within the web link below:
https://docslib.org/doc/7815112/new-invaders-of-the-southwest

The USDA Field Guide for Managing Buffelgrass in the Southwest is obtainable through the web link below:
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd563017.pdf

All materials used shall be in accordance with the approved NSCP and Pesticide Use Proposal **(**PUP**)**.

Construction Requirements:

The contractor shall develop a NSCP for state and federal listed noxious and invasive plant species, and other undesirable plant species shown on the list posted on the Roadside Development web site **(*https://azdot.gov/node/5372*)**, for approval by an ADOT construction PLA. Four (4) copies of the proposed NSCP in standard three (3) ring binders shall be submitted to the Engineer within seven (7) calendar days after the Execution of Contract. The ADOT construction PLA shall review and respond to the proposed NSCP within ten (10) calendar days upon receiving the submittal. If requested, additional copies may be submitted for review and comments by Native American Community governing body designated representative as approved by the Engineer. Native American Community governing body designated representative shall also review and comment the proposed NSCP within thirty (30) calendar days upon receiving the submittal. The contractor proposed NSCP shall include as minimum the following information applicable to the project area, location and conditions listed below:

(1) A list of Noxious and Invasive Species and other Roadside Development approved plant species that would be anticipated for control based on existing vegetation and the project biotic communities. The weed species shall include but not be limited to the TABLE **–** I listed below**:**

TABLE – I	
Scientific Name	**Common Name**
Alhagi maurorum **(syn.** *Alhagi pseudalhagi / Alhagi camelorum***)**	Camelthorn / Camelthorn-bush / Persian Mannaplant
Bromus rubens **(syn.** *Bromus madritensis* ssp**.** *rubens***)**	Red Brome / Foxtail Chess / Foxtail Brome
Baccharis sarothroides	Desertbroom / Greasewood / Broom Baccharis / Rosin Bush
Bassia scoparia **(syn.** *Kochia scoparia***)**	Kochia / Fireweed

TABLE – I	
Scientific Name	**Common Name**
Helianthus annuus	Common Sunflower / Mirasol
Solanum elaeagnifolium	Silverleaf Horsenettle / White Nightshade / Silverleaf Nightshade
Sorghum halepense **(syn.** *Holcus halepensis / Sorghum miliaceum***)**	Johnsongrass / Egyptian Millet / Morocco Millet
Salsola kali subsp. *tragus* **(syn.** *Salsola iberica***)**	Russian Thistle / Tumbleweed

(2) The methods of control of noxious and invasive plant species including herbicide stump treatment shall be determined based on the species present within the project limits prior to earth moving activities as well as subsequent project construction phases before seeding. Pre-emergent herbicide shall NOT be applied to all project seeding areas. The contractor shall provide information / methods on how the application of herbicides will NOT harm the expected desirable seed species germination and establishment as specified in Section 805 of these Special Provisions.

(3) The proposed method(s) of control and extermination treatment between herbicide versus manual/mechanical or in combination to be utilized for each anticipated plant species suitable for the specific stage of plant development.

(4) The herbicides, method and frequency of application, and rates to be used for each listed plant species.

(5) Copies of herbicide and surfactant labels and Safety Data Sheet (SDS) for all chemicals proposed for use.

(6) Procedure for collection, removal, containment, and disposal of noxious and invasive plants. All components of noxious and invasive plants such as roots, stems, leaves, flowers, seeds, seed heads, or seed pods shall be subject to collection, removal, containment, and disposal at no additional cost to the Department.

(7) Methods and procedures to be followed to protect existing, transplanted, and new emerging vegetation in seeded areas.

(8) Responsible Applicator and required Arizona Department of Agriculture Pest Management Division Licensing information, as specified in Section 806.

(9) Record procedures to be followed to document control work completed.

(10) Record procedures to be followed for reporting all chemicals used annually within transportation easements on BLM or USFS Lands within two (2) months or September 30th of each calendar year (whichever is sooner) to an ADOT construction PLA.

(11) Projects on transportation easements on BLM or USFS Lands shall include a completed Pesticide Use Proposal (PUP) form for all proposed herbicide uses prepared for submittal to the appropriate BLM Field Office or National Forest for approval. An example of a completed PUP for the project area will be provided to the contractor for use in preparing their PUP upon request to the ADOT construction PLA.

(12) Projects on transportation easements within Native Americans (Tribal) Land shall include a completed PUP form for all proposed herbicide uses prepared for submittal to the appropriate representative of tribal government (governing body) for approval. An example of a completed PUP for the project area will be provided to the contractor for use in preparing their PUP upon request to the ADOT construction PLA.

(13) When applicable, other information and explanations are required in the PUP or to implement the NSCP.

(14) Process to be used for amending the NSCP to add additional plants or treatments that may be required as the project progresses.

(15) A copy of the original Special Provisions for Control of Noxious Plants that the contractor bid on shall be attached to the NSCP.

(16) Plans and methods to protect Threatened and Endangered Species in accordance with the Environmental Mitigations section of the contract documents.

(17) Plans and methods for controlling of noxious/invasive plants in riparian and aquatic areas:

I – Prevention of herbicide drifted by wind onto non-target native plants or nearby wetlands/watercourses by using low pressure systems and coarse-spray nozzles.

II – Safe and effective use of herbicide chemicals labeled for the vicinity of wetlands/watercourses in prevention of water quality contamination.

The NSCP submitted to the Engineer shall not be implemented until it is approved by an ADOT construction PLA, and the contractor is so directed by the Engineer.

The contractor shall keep a copy of the approved NSCP and furnish the Engineer a copy of the approved NSCP for record keeping. The NSCP copy of the contractor and Engineer shall be maintained up to date with the contractor providing submittals of completed work activities within five (5) working days following completion of the work for each area directed by the Engineer for control. The NSCP shall be maintained up to date with submittals of the above completed NSCP information for the duration of the project.

The Engineer in consultation with an ADOT construction PLA shall designate/approve the location of the areas to be treated, and when required the frequency of treatment as per the NSCP. Payment will be made for the initial treatment of each area, whether with manual / mechanical methods or using herbicides, and for each subsequent treatment ordered and approved by the Engineer.

The contractor shall document the location and size of the project treatment areas, as well as noxious and invasive plant species that have been treated by the end of each working day. Furthermore, the contractor shall mark up the project layout plans (engineering drawings) with location and size of the project treatment areas, as well as noxious and invasive plant species that have been treated. Such documentation shall be submitted to an ADOT construction PLA for inspection/evaluation through the Engineer.

The contractor shall begin control of the designated areas within ten (10) working days of the Engineer's notice and complete the treatment within fifteen (15) working days of the notice approved by the Engineer.

If other plant species listed in the Arizona Noxious Weed List, the Forest Service Regional/BLM lists, or the ADOT Invasive and Noxious Plant Species Lists (available electronically at the following Roadside Development web address**:** ***https://apps.azdot.gov/files/roadway-engineering/roadside-dev/adot-invasive-noxious-plant-species-list-for-construction-projects.pdf***) occur within the project area that are not included in the NSCP, the contractor shall modify the Noxious Species Control Plan to add such species, including acceptable control measures and where applicable a PUP, and submit this information as an amendment of the NSCP to the Engineer and ADOT construction PLA for acceptance. No herbicide Control of Noxious Plants work shall be commenced on Federal lands until the PUP has been entirely completed and approved.

The project areas will be surveyed by an ADOT construction PLA, with the approval of the Engineer, prior to earthmoving activities and following rainfall events and during plant germination and growth periods for listed noxious and invasive plant species. To update NSCP, the contractor shall also furnish field inspection/observation reports for new growth of noxious/invasive plant species between four (4) weeks to six (6) weeks after each rainfall event of 0.5 inches (≥ 12.7 mm) or more. When surveys determine that noxious, invasive, or other designated plants species listed in the NSCP for control are found to be present within the project right-of-way, the contractor shall treat the areas designated by the Engineer in accordance with the approved NSCP. Such treatments shall be completed and approved by the Engineer before ground disturbing or earthmoving activities occur from those areas.

The contractor shall mark those areas receiving manual / mechanical control with an application of a photosensitive dye. Herbicides shall be mixed with a photosensitive dye which will produce a contrasting color when sprayed upon the ground. The color shall disappear between three (3) and five (5) days after being applied. The dye shall not stain any surfaces nor injure non-target plant or animal species when applied at the manufacturer's recommended application rate.

Application of herbicide shall be in accordance with the manufacturer's instructions and the approved NSCP. Responsible herbicide applicators shall be licensed under the appropriate category as required by State Law.

Mowing shall be allowed if it is proven to be a successful permanent control method of annual noxious / invasive plant species as approved by the Engineer. If approved, mowing shall be performed before the annual noxious / invasive plant species are able to set seed. Mowing shall NOT be operated in areas where there are perennial noxious / invasive plant species. Mowing shall NOT be utilized for noxious / invasive plant species that carry existing seeds

(seed heads / pods). All project areas and plant species to be mowed shall be carefully evaluated / identified by an ADOT construction PLA with approval from the Engineer.

Unless otherwise called out in the plans/details specified in these Special Provisions, or as directed by the Engineer, the contractor shall remove the identified noxious / invasive woody vegetation to the finished grade level without uprooting it (flush cutting). In order to stop stump regrowth, the applicable remaining stumps shall be promptly treated with suitable herbicide so the identified noxious / invasive woody vegetation will not sprout new growth from the stumps. Herbicide stump treatment shall NOT be conducted to plant species such as common evergreen coniferous shrubs and trees, which will unlikely generate stump regrowth. Manual / mechanical removal of remaining woody vegetation stumps and rootballs in erosive areas shall be avoided to maximum extent practicable (MEP). The removal method and process shall be evaluated by an ADOT construction PLA with approval from the Engineer.

Removal of soil seed bank that has been contaminated by the natural storage of seeds from noxious / invasive plant species shall be required for projects involving soil / ground disturbance from construction excavations or as designated by the Engineer. The contractor shall remove the top three (3) inches of the existing undisturbed surface soil from the project areas infested with noxious / invasive plant species as evaluated / identified by an ADOT construction PLA with approval from the Engineer. All removed contaminated soil seed bank shall be properly disposed of or placed (buried) below the top two feet (2'-0") of the final finished grade as directed by the Engineer. The removal, stockpile, burial, or disposal of contaminated soil seed banks shall be well contained / concealed during construction. The contractor shall then return all soil-seed-bank removal disturbed areas, to an acceptable surface condition (finished grade), as approved by the Engineer.

No earthmoving activities to the treated areas shall be approved until the employed weed management measures have been inspected to be successfully achieved with the approval of the Engineer.

For projects within transportation easements on BLM, USFS, or Tribal Lands, PUPs shall be prepared and submitted to the Engineer and ADOT construction PLA as required in the NSCP. The PUPs will be submitted by the Department to the appropriate BLM Field Office, National Forest, or appropriate representative of tribal government (governing body) and must be approved by the BLM, National Forest, or tribal government (governing body) before being approved by the Engineer.

The contractor shall keep records of all herbicide applications. A copy of this record shall be added to the NSCP and also submitted to the Engineer after each application. The contractor shall be responsible for the proper transport, storage, and application of all materials necessary for herbicide control treatments.

As a part of the integrated management approach, all areas to be treated for noxious and invasive plant species shall ultimately be seeded, landscaped, or permanently stabilized to minimize and prevent weed re-invasion / re-infestation, as specified in these Special Provisions.

Method of Measurement:

Control of noxious and invasive plant species, either manually **(**mechanically**)** or with herbicides, will be measured by the square yard (SQ**.**YD**.**) of each treated area, as directed and approved by the Engineer.

Basis of Payment:

Listed bid quantities for CONTROL OF NOXIOUS PLANTS are for estimating and bidding purposes. They shall not be guaranteed to the contractor. The intensity for scope of work, project-specific present conditions, particular stages of noxious and invasive plant development, as well as annual rainfall patterns shall be considered / evaluated by the construction PLA and approved by the Engineer in determining final quantities and unit costs to be paid for.

During pre-construction meeting, the contractor in conjunction with Engineer shall verify and be in agreement with the quantity of areas to be treated as evaluated by an ADOT construction PLA. The quantity of areas to be treated shall be in compliance with environmental requirements.

The accepted quantities of control of noxious and invasive plant species, either manually **(**mechanically**)** or with herbicides measured as provided above, will be paid for at the contract unit price for each soil treatment directed and approved by the Engineer. Such price will be considered to include all labor, materials, equipment, and multiple mobilization costs required to complete the work as specified herein. Such price shall also cover collection, removal, containment, and disposal of noxious and invasive plant species. Up to four (4) mobilizations may be required to accomplish control of noxious and invasive plant species as specified herein. The Department will consider the cost of such multiple mobilizations to be included in the price bid for control of noxious and invasive plant species. Adjustments may be made to the contract through negotiation for more than four (**>** 4) mobilization activities as per the approval of the Engineer.

No measurement or payment will be made for treatment of those areas, manually / mechanically or with herbicides, not authorized and approved by the Engineer. No payment will be made for treatment areas <u>not</u> in compliance with the approved PUP/NSCP. No payment will be made for areas treated by herbicide products <u>not</u> in compliance with the approved PUP/NSCP. No measurement or payment will be made for the removal and proper disposal of waste materials; the cost being considered is included in contract items.

No measurement or payment will be made for preparation of the NSCP and, when applicable, the PUP, including the initial submittal and modifications, or for monitoring, the costs being considered are included in contract items.

No separate measurement or direct payment will be made for Control of Noxious Plants under Landscape Establishment as specified in Section 807 of the Standard Specifications and these Special Provisions; the cost being considered is included in the respective contract item of Landscape Establishment.

For projects engaging extensive excavations/backfills, no separate measurement or direct payment will be made for the removal, stockpile, burial, or disposal of contaminated soil seed banks, as well as returning all soil-seed-bank removal areas to an acceptable surface condition (finished grade); the cost being considered is included in the respective contract item(s) of excavations/backfills.

(924GRV, 07/01/14)

ITEM 9240210 - SAWCUT GROOVE FOR STRIPING (DIAMOND BLADE):

Description:

The work under these items consists of constructing a sawcut groove in asphalt concrete pavement for inlaid placement of striping, in accordance with the details shown on the plans, the requirements of the specifications, and as approved or directed by the Engineer.

Construction Requirements:

When the plans require long line or short line markings to be inlaid into a cut-out groove, the contractor shall construct the sawcut groove in the pavement as specified below, or in accordance with the stripe manufacturer's recommendations, as approved by the Engineer.

The groove cutting equipment shall utilize gang stacked cutting blades. Grooves shall be constructed with either diamond tipped blades or carbide blades, as indicated on the bidding schedule. The groove-cutting equipment for either method shall include a vacuum debris recovery system.

Grooves shall not be sawcut into new pavement for a minimum of 10 days after the pavement has been placed. A total curing time of up to 30 days may be required if directed by the Engineer.

Prior to construction of the grooves the contractor shall supply the Engineer with a copy of the stripe manufacturer's recommendations, if any, for constructing the groove.

For preformed and thermoplastic markings, the depth of the sawcut groove shall be 125 mils with a tolerance of ± 10 mils. For dual component epoxy markings, the depth of the sawcut groove shall be 60 mils with a tolerance of ± 10 mils.

The width of the sawcut groove for all markings shall be a total of 1-inch wider than the stripe, with a total tolerance of ± 0.5 inch. Different widths may be allowed if recommended by the manufacturer and approved in advance by the Engineer. For all materials, the groove shall extend 6 inches longitudinally beyond the end of the pavement markings.

The finished surface shall be cleaned as required by the manufacturer, and the contractor shall protect the grooves from traffic and re-clean as necessary prior to application of the pavement markings. The contractor shall obtain the Engineer's approval of the grooved areas before placing markings.

If carbide blades are used to construct the groove, the contractor shall also use high pressure air to remove any millings and debris remaining after the use of the equipment's vacuum recovery system. Such debris shall be removed to the shoulder and disposed of in a manner approved by the Engineer.

Method of Measurement:

Sawcut Groove for Striping will be measured by the linear foot along the center line of the pavement line, and will be based on 4 inch increments, using the specified groove width, as follows:

$$\frac{\text{Specified width of Groove (inches)} \times \text{Linear Feet}}{4 \text{ (inches)}}$$

For the purposes of this measurement, the nominal value of the groove width, not including tolerance values, will be used.

The measurement of groove length will include the 6-inch longitudinal extensions on each end beyond the striping material.

No measurement will be made for the number of linear feet of gaps in grooves for dashed lines.

Basis of Payment:

The accepted quantities of Sawcut Groove for Striping, measured as provided above, will be paid for at the contract unit price per linear foot for the type specified in the bidding schedule, which price shall be full compensation for the item, complete in place, regardless of depth, and shall include cleaning and protection of the grooves from traffic.

ITEM 9240900 – AVOIDANCE AREA PROTECTION PLAN AND MONITORING:

Description:

The work under this item shall consist of preparing the Archeological and Cultural Site Protection Plan and furnishing Cultural Compliance Inspectors to monitor and implement the Plan as specified herein.

Construction Requirements:

The contractor shall prepare and submit the Plan to the Engineer in accordance with Subsection 104.17(B)(1) of the specifications. The contractor shall staff the Cultural Compliance Inspector(s) in accordance with Subsection 104.17(B)(2) of the specifications.

Method of Measurement:

Avoidance Area Protection Plans and Monitoring will be measured as a single complete unit of work.

Basis of Payment:

Payment for Avoidance Area Protection Plan and Monitoring, measured as provided above, will be paid for at the contract lump sum price, which price shall be full compensation for the work, complete in place.

(925SRVY, 08/16/19)

SECTION 925 CONSTRUCTION SURVEYING AND LAYOUT:

925-5 Basis of Payment: the fourth paragraph of the Standard Specifications is revised to read:

If additional staking and layout are required as a result of additional work ordered by the Engineer, such work will be paid under items listed in the table below.

ITEM	PREDETERMINED RATE
9250101-ONE-PERSON SURVEY PARTY	$110 per hour
9250102-TWO-PERSON SURVEY PARTY	$150 per hour
9250103-THREE-PERSON SURVEY PARTY	$190 per hour
9250106-SURVEY MANAGER	$175 per hour
9250105–OFFICE SURVEY TECHNICIAN	$85 per hour

(928LONG, 09/16/21)

SECTION 928 GROUND-IN RUMBLE STRIP: the title and text of the Standard Specifications are revised to read:

SECTION 928 LONGITUDINAL GROUND-IN RUMBLE STRIP:

928-1 Description:

The work under this item shall include furnishing all tools, equipment and labor necessary to install longitudinal ground-in rumble strips of the size and at the locations specified on the project plans or as directed by the Engineer.

928-2 Blank:

928-3 Construction Requirements:

Longitudinal ground-in rumble strips shall be constructed by mechanically milling or grinding grooves into new or existing asphalt concrete pavements. The grooves shall be constructed with a cylindrical configuration in the direction of the traffic flow, and shall be placed in accordance with the details shown on the project plans. Exceptions in longitudinal ground-in rumble strips not shown on the plans will be designated by the Engineer.

The grooves shall be constructed with equipment specifically designed to remove such material by means of grinding to a controlled line and grade. The equipment used shall be capable of removing the existing asphaltic concrete to the dimensions and tolerances specified on the plans. The removals shall be accomplished in a manner which does not scar the surface of the adjacent pavement. Grooves shall not be constructed in new asphaltic concrete pavements for a minimum of three days after placement, or 10 days after placement of new asphaltic concrete pavements with asphalt-rubber. Construction of the grooves may be allowed in less time if the contractor can demonstrate that the pavements are sufficiently cured.

The contractor shall place a continuous control line as a guide for installation. The milling machine shall also be equipped with an approved guide that is clearly visible to the operator so that proper alignment of the grooves will be obtained. Lateral deviation of the milled rumble strips shall not exceed one inch in any 100 foot interval.

The contractor shall also use high pressure air to remove any millings and debris remaining after the use of the equipment's vacuum recovery system. Such debris shall be removed to the shoulder and disposed of in a manner approved by the engineer.

928-4 Method of Measurement:

Longitudinal ground-in rumble strips will be measured by linear foot at the locations shown in the project plans and in accordance with the specifications.

Gaps in the pattern and exceptions in the longitudinal ground-in rumble strips will not be included in the measurement.

No measurement will be made for the removal and disposal of milling and debris.

928-5 Basis of Payment:

The accepted quantities of longitudinal ground-in rumble strips, 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 as shown on the project plans and as specified herein.

No additional payment will be made for the removal and disposal of milling and debris, the cost being considered as included in the price of the contract item.

(1001MATL, 06/17/21)

SECTION 1001 MATERIAL SOURCES: of the Standard Specifications is revised to read:

1001-1 Description:

The work under this section shall consist of the procuring of borrow, topsoil, subbase and base materials, mineral aggregates for concrete structures, surfacing, and landscape plating, from sources either designated on the project plans or in the Special Provisions or from other sources.

1001-2 General:

The contractor shall determine for itself the type of equipment and work required to produce a material meeting the requirements of the specifications.

Sites from which material has been removed shall, upon completion of the work, be left in a neat and presentable condition. Where practicable, borrow pits, gravel pits, and quarry sites shall be located so that they will not be visible from the highway.

The contractor shall provide an environmental analysis, as specified in Subsection 104.12 of the specifications, for any source proposed for use regardless of whether a previously approved environmental analysis exists for the site.

In accordance with Subsection 104.12 of the specifications, the contractor may utilize an existing environmental analysis approved after January 1, 1999, provided that the analysis is updated as necessary to be in compliance with current regulations and with the contractor's planned activities.

It shall be the responsibility of the contractor to conduct any necessary investigations, explorations, and research, on-site and otherwise, before and after submitting the bid proposal, to satisfy itself that the specified quantity and/or quality of material exists in any proposed material source.

The contractor shall not produce material for the project, mobilize crushing equipment or clear a worksite prior to approval of the environmental analysis.

The contractor shall comply with the requirements of the landowner or agency having jurisdiction over the land.

The Department makes no representation regarding quality or quantity of materials in any source.

1001-2.01 Information Available:

The Department maintains a listing of materials sources for which a completed environmental analysis is available and the landowner has allowed the source to be placed on the list. Further information on material sources is available at https://azdot.gov/business/environmental-planning/material-source-guidance.

1001-2.02 Material Sources in Floodplains:

Any development of a material source that is determined to be in a flood plain must meet the requirements of the appropriate local, state, and federal agencies, including as applicable, the U.S. Army Corps of Engineers, Section 404 of the Clean Water Act, ADEQ or Tribal 401 Water Quality Certification, and the National or Arizona Pollutant Discharge Elimination System (NPDES/AZPDES).

If the contractor wishes to procure a material source within a floodplain, the contractor or material supplier shall submit a Floodplain Use Permit application to the appropriate floodplain management agency. The contractor shall submit to the Department documentation that the Floodplain Use Permit for the material source was approved and signed by the appropriate agency's Floodplain Administrator. The contractor or material supplier shall comply with all the requirements of the Floodplain Use Permit, including renewal of the Permit as needed or required.

The Department will require an engineering report if the material source is situated in the 100 year floodplain of any stream or watercourse, and located within one mile upstream and two miles downstream of any highway structure or surfaced roadway crossing. The engineering report shall be prepared by a professional engineer with expertise in hydrology, hydraulics, river mechanics, and fluvial geomorphology. The engineering report shall address the effects of the potential for structural damages following a 100 year flood event.

All other permits required to obtain a material source shall be furnished to the Department upon request.

Surplus material from agency administered flood control management projects may be used as borrow material only if the contractor submits written evidence to the Engineer that the flood control agency project was fully designed and funded.

Material sources in floodplains located on Native American Tribal Lands will be considered for use on an individual analysis. The analysis shall include a review of applicable land use plans, floodplain management plans, environmental plans, applicable laws and regulations pertaining to Native American Tribal Lands, and an engineering analysis of the effects on any highway facility or structure. The contractor shall obtain from the Bureau of Indian Affairs (BIA) and the Native American Tribal Council all permits, licenses, and approvals for the Department to review.

1001-2.03 Protection and Restoration:

The contractor shall comply with the requirements of Subsections 107.11 and 107.12 of the specifications for protecting and restoring the material source. The contractor shall assume full responsibility to protect and rehabilitate the material source to the satisfaction of the Department and in compliance with the requirements of the Federal Land Management Agency (FLMA) having jurisdiction or by the owner of the material source.

1001-3 Proposed Source:

1001-3.01 Approval Requirements:

(A) General:

The contractor shall notify the Engineer prior to or at the preconstruction conference as to the source that it proposes to use.

The contractor acknowledges that all the conditions set forth in this subsection shall be met prior to the source being approved for use.

Other than sampling and testing, the requirements of this subsection shall be completed prior to initiation of any activities that disturb the existing conditions at the proposed source.

Regulatory changes, specification changes, or other reasons may preclude the approval of a materials source. The contractor acknowledges that the Department may refuse to approve a material source even if the Department had approved the source for other projects.

(B) Specific Conditions for Approval:

The use of a source will require written approval by the Engineer. No approval will be given until the contractor has complied with the following conditions:

(1) The contractor has submitted an environmental analysis, as specified in Subsection 104.12 of the specifications, of the source proposed for use and the Department has reviewed the analysis and satisfied itself that the use of such source will not have an adverse social, economic or environmental impact. The requirements of Subsection 1001-3.01 of the specifications shall be completed prior to initiation of any activities that disturb the existing conditions at the proposed source.

(2) The contractor has furnished the Engineer with evidence that he has secured the rights to the source, including ingress and egress.

(C) Historical and Cultural Resources:

The archaeological survey report of the proposed material source shall be prepared by the contractor’s archaeological consultant and shall conform to the requirements of Subsection 104.12 of the specifications.

In the event that prehistoric or historic structures and prehistoric or historic artifacts are encountered during any activity related to the construction of the material source, the contractor shall immediately cease operations within a 50 foot radius of the discovery location and notify the Engineer. In the event that an unmarked human burial and/or funerary remains are encountered during any activity related to the construction of the material source, the contractor shall immediately cease operations within a 100 foot radius of the discovery

location and notify the Engineer. The Engineer will contact the Environmental Planning – Historic Preservation Team so that appropriate notification of the discovery is made per state and federal regulations.

After notifying the Engineer, the contractor shall, within good faith, secure the area and take all reasonable measures to protect the historical and cultural resources. No activity shall resume unless authorized by the Engineer. The Engineer will not authorize resumption of any activity until receiving confirmation from the Environmental Planning – Historic Preservation Team that the contractor may commence work.

If the Department determines that the proposed use will have major adverse impact on cultural or historic resources, the Department will not allow the use of the source.

(D) Permit from Navajo Nation:

For projects located on the Navajo Reservation, the Navajo Nation has adopted a permitting system for any sources, regardless of whether on or off the Navajo reservation, which are to supply material for projects located within its boundaries. No material source will be approved until the contractor submits a copy of the permit from the Navajo Nation allowing materials from the proposed source to be used on the project. For information concerning the permit, the contractor shall contact the Navajo Nation Historic Preservation Office.

(E) Bureau of Land Management Material Sources:

If the contractor elects to pursue the use of material sources on BLM land under Title 30 Code of Federal Regulations, it is at the contractor's sole risk, and the Department bears no responsibility for any delays or costs associated with the request to use material sources on BLM Land.

The Department will not request or pursue any "free-use permit" under Title 23 Code of Federal Regulations or any other arrangement with BLM on this project.

1001-4 Special Access within Right Of Way:

The contractor may submit a request to the District Engineer to approve special access to a controlled access highway if special access is not shown on the project plans.

The request by the contractor shall be accompanied by an environmental analysis and by documents which specify the point(s) of access, the acquisition of right of way, the manner in which access will be attained, the traffic control plan, and crossovers, along with all other appropriate data which will allow the District Engineer to evaluate its request. If the request is approved, a supplemental agreement shall be entered into.

All costs associated with the special access requested by the contractor shall be borne by the contractor, including, but not limited to, cattle guards, fences, gates and restoration work.

When access is not being utilized, gates shall be closed and locked. Upon completion of all operations, the area within the right of way that has been disturbed shall be restored to the

condition existing prior to the contractor's operations.

The decision by the District Engineer to deny a request by the contractor will be considered to be final.

1001-5 Fences and Cattle Guards:

Where the haul roads to material sources cross existing fence lines in areas where there is livestock of any kind, temporary cattle guards shall be installed by the contractor at each crossing.

The livestock operator or owner shall be contacted prior to the beginning of any operations and effective measures shall be taken and means provided by the contractor to prevent livestock from straying.

In operations where conditions will exist that are dangerous to livestock of any kind, temporary cattle guards and fence shall be installed around the pit area by the contractor to protect livestock.

Temporary cattle guards and fence installed by the contractor shall be removed and existing fence disturbed shall be replaced or reconstructed and all fence shall be left in as good condition as it was prior to the beginning of work.

(1002PAINT, 06/19/25)

SECTION 1002 PAINT: of the Standard Specifications is revised to read:

1002-1 General Requirements:

All paints specified herein shall be ready-mixed at the manufacturer's plant, except for inorganic zinc rich primer, which shall be mixed by the fabricator or at the project site just prior to application. All paints shall be standard paint products of the manufacturer with published product data sheets and shall comply in all details with the specifications.

Ready-mixed paint shall be homogeneous, free of contaminants, and shall be of a consistency suitable for the use for which it is specified. The pigment shall be finely ground and properly dispersed in the vehicle, according to the requirements for the type of paint, and this dispersion shall be such that the pigment does not settle appreciably, does not cake or thicken in the paint container, and does not become granular, jelled, or curdled. Any settlement of pigment in the paint shall be easily dispersed with a paddle so as to produce a smooth uniform paint of the proper consistency. The manufacturer shall include in the paint the necessary additives for control of sagging, leveling, drying, drier absorption, and skinning.

Lead, lead compounds, soluble barium compounds, or hexavalent chromium compounds shall not be used as raw materials in the paint formulas specified under this section, and shall not be added to any paint formulas specified under this section.

The use of halogenated solvents is not permitted.

Paint shall be furnished in new, unopened air-tight containers, which are clearly labeled with the exact title of the paint, Federal Specification number when applicable, name and address of the manufacturer, product code, date of paint manufacture, and the lot or batch number. The containers shall meet U.S. Department of Transportation Hazardous Materials Shipping Regulations. Precautions concerning the handling and the application of the paint shall be shown on the label of the paint containers.

All of the paints of any coating system consisting of individual paints (such as a primer, intermediate coat, and topcoat), shall be made by the same manufacturer, and shall be designed and sold to be used together as a system.

Only paints and paint systems approved in accordance with Subsection 1002-3 of the specifications and shown on the Department's Approved Products List (APL) will be allowed for use. Copies of the most current version of the APL are available on the Department's website from the ADOT Research Center, through its Product Evaluation Program. Paint supplied by an approved manufacturer with a different product code from that which was previously evaluated and approved will require evaluation to determine if it is acceptable.

The contractor shall submit to the Engineer a Certificate of Compliance for each lot or batch of paint supplied, in accordance with Subsection 106.05 of the specifications, prior to its use. Product data sheets listing the paint constituents and their proportions as well as Materials Safety Data Sheets (MSDS) are required for each paint material supplied prior to its use.

All applicable governmental environmental regulations shall be adhered to during cleanup and for the disposal of unused paint.

1002-2 Paint Types:

1002-2.01 Three-Paint Coating System:

(A) General:

A three-paint coating system shall be for use on metallic surfaces, and shall include a primer (Paint Number 1), intermediate coat (Paint Number 2), and topcoat (Paint Number 3) from the same system. All three paints shall be water-based, 100 percent acrylic (acrylic latex) paints, unless a non water-based primer is specified, in which case, the topcoat and intermediate coat must be a water-based acrylic paint.

Each individual paint shall conform to all of the chemical and physical characteristics and properties as declared on the manufacturer's product data sheet. In addition, the paint color shall be as specified in the project plans, and the consistency shall be in accordance with the manufacturer's recommendations. The contractor shall use the checking and calibration procedures found in ASTM D4212 and verify the paint consistency with the Engineer prior to each application.

Each coating is intended for spray application. Limited application can be made by brushing or rolling if approved by the Engineer.

(B) Paint Number 1 - Primer:

This paint shall be used on blast cleaned steel surfaces for the first coat of a three-paint coating which must include Paint Number 2 and Paint Number 3 from the same system.

(C) Paint Number 2 - Intermediate Coat:

This paint for intermediate coats shall be used on primed steel surfaces as the second coat of a three-paint coating system which must include Paint Number 1 and Paint Number 3 from the same system. The paint shall be appropriately tinted to contrast with the prime coat.

(D) Paint Number 3 - Topcoat:

Paint for topcoats shall be used as the third coat of a three-paint coating system which must include Paint Number 1 and Paint Number 2 from the same system.

For topcoats, the gloss shall be as specified on the project plans. The available colors for topcoats shall provide visual matches to the colors given in the Federal Standard No. 595. The colors shall be available in high-gloss enamels, if required.

1002-2.02 Zinc Rich Primer:

Zinc-rich primer shall be a solvent based, one-part, epoxy ester, zinc-rich coating made to contain no less than 89 percent by weight of zinc dust in the dried film. Zinc-rich primer is suitable for limited use on cuts, welds, or damaged galvanized surfaces, as needed to restore the continuity of cathodic protection. Zinc-rich primer shall be certified by the manufacturer to be compatible with any suitable water-based acrylic finish paint.

Zinc-rich primer shall be used where zinc paint is called for elsewhere in the specifications.

1002-2.03 Inorganic Zinc-Rich Primer:

Inorganic zinc-rich primer shall be a solvent-based three-component, inorganic, ethyl silicate, zinc-rich coating for use on steel surfaces which will be exposed to severely corrosive environments. The primer shall be mixed in accordance with the manufacturer’s directions by the fabricator or at the project site just prior to application. Inorganic zinc-rich primer shall be made to contain no less than 80 percent by weight of zinc dust in the dried film, and shall be certified by the manufacturer to form a strong bond to properly cleaned and prepared steel surfaces, either sandblasted or galvanized. This primer shall also be certified by the manufacturer to be compatible with any suitable water-based acrylic finish paint.

1002-2.04 Alkyd Primer:

Alkyd primer shall be solvent-based, and shall be designed for ferrous metal surfaces where there are rusting issues which rule out the use of a water-based primer. Such surfaces may include ornamental iron, tanks, fabricated parts, handrails, and objects referred to as “black steel.” Alkyd primer shall be certified by the manufacturer to be compatible with any suitable water-based acrylic finish paint.

1002-2.05 Direct-to-Metal (DTM) Combination Primer and Finish Paint:

This paint shall be a water-based acrylic paint specially designed for use as a direct-to-metal (DTM) primer or combination primer and finish. The product shall be certified by the manufacturer to form a strong bond to properly cleaned and prepared surfaces of structural steel and other metallic products such as metal buildings, tanks, and pipes. It shall also be certified to bond with other properly cleaned and prepared surfaces such as galvanized steel, oil-based paints, and alkyd enamels. When used on ferrous metal surfaces where there are rusting issues, the paint shall be rust-inhibitive. Direct-to-metal combination primer and finish paints shall be designed to be usable as a complete two or three coat system. When used as a primer only, the paint shall be certified by the manufacturer to be compatible with any suitable water-based acrylic finish paint.

1002-2.06 Acrylic Emulsion Paint:

Acrylic emulsion paint shall be used on concrete and masonry surfaces, and shall be a water-based, 100 percent acrylic (acrylic latex) paint.

This paint may be tinted by using “Universal” or “all purpose” concentrates.

The color of the final coat of paint shall be as indicated on the project plans. If no color is specified on the plans, the paint color shall approximate that of paint color chip No. 30318, as specified by Federal Test Standard Number 595, when applied to either a concrete test specimen measuring 2 feet by 2 feet, or to the surface of the concrete structure to be painted.

The Engineer will determine color acceptance by visual inspection.

1002-3 Sampling and Testing:

(A) General:

Any lot or batch of paint may, at any time, be sampled and tested for conformance to the specifications and the chemical and physical characteristics and properties as declared by the manufacturer on the product data sheets submitted with the original samples used in the evaluation and approval of the product. Also, complete coating system samples may be required at any time for follow-up evaluation using the performance test method employed in the original evaluation for approval of the system.

(B) Coating Systems for Structural Steel and Other Metallic Surfaces :

Coating systems composed of the paints specified in Subsections 1002-2.01 through 1002-2.05 of the specifications will be tested as complete systems applied to steel panels and weathered in accordance with ASTM G154, and exposure cycle number 4 of ASTM D4587, in the Q-U-V Accelerated Weathering Tester, utilizing UVB 313 lamps. Each system shall have an evaluation rating of 100 or greater after 2000 hours of weathering. The procedure is as follows:

(1) Paint coatings will be applied to cold rolled steel panels (ASTM D609, Type 3, ASTM A366). The paint will be thinned to 75 ± 2 Ku consistency using

demineralized water. Three coats, each approximately 2 mils thickness are applied to each of four panels according to ASTM D823. The fourth coated panel from each set will be inscribed with an “X” cut to the steel substrate and extending across the entire coated area;

(2) The exposure cycle used with the weathering tester shall be D = 8 h UV/60 degree C followed by 4 h CON/45 degree C. One panel from each set of four shall be removed at 1000 hours and another at 1500 hours. The last two panels shall be removed at 2000 hours;

(3) Paint systems will be evaluated on the basis of six measures of degradation which may be found to occur under the conditions of exposure. For each measure, a rating scale of one to five points will be applied. A rating of one point indicates the poorest performance and five points indicate the best performance. The rating from each measure is multiplied by a weighting factor which represents the relative importance of that measure. The product is a score for that measure. The sum of the scores for all measures is the overall score for the system. To be acceptable, paint systems shall have an overall score of 100 or higher;

(a) Cracking/Flaking: ASTM D660, ASTM D661, and ASTM D772 are used in combination to determine the rating scale. A weighting factor of three will be applied to the results of these tests;

(b) Blistering/Flaking: ASTM D714 and ASTM D772 are used in combination to determine the rating scale. A weighting factor of three will be applied to the results of these tests;

(c) Corrosion: A rating scale is derived from ASTM D610 for evaluating the degree of rusting. A weighting factor of three will be applied to the results of this test;

(d) Chalking/Erosion: ASTM D4214 and ASTM D662 are used in combination to determine the rating scale. A weighting factor of three will be applied to the results of these tests;

(e) Adhesion: The tape test is based on ASTM D3359 and the rating scale is from the Classification of Adhesion Test Results under Test Method B. A weighting factor of five will be applied to the results of this test; and

(f) Flexibility: ASTM D522, using a 1-1/4 inch mandrel, is employed to determine flexibility. The degree of cracking observed after bending is used to

determine the rating scale. A weighting factor of five will be applied to the results of this test.

(C) Paint for Concrete and Masonry Surfaces:

Paint for concrete and masonry surfaces will be tested in accordance with the following procedures:

(D) Resistance to Accelerated Weathering:

The paint will be applied to concrete mortar panels and weathered in a Q-U-V accelerated weathering tester, according to ASTM G154, for 2000 hours utilizing UVB-313 lamps, and exposure cycle number 4 of ASTM D4587. The paint weathered in this manner shall show no appreciable change in color or appearance due to fading, chalking, or material reaction.

(E) Adhesion:

The paint shall be applied to a concrete or masonry test surface approved by the Engineer, in accordance with the application plan specified in Subsection 610-3.03 of the specifications. After a minimum period of 30 days of outdoor exposure, the adhesion of the paint will be measured. Testing will be performed in accordance with the requirements of ASTM D4541, Method E, with a strength of at least 100 pounds per square inch being required. In addition, testing will also be performed in accordance with the requirements of ASTM D3359, Method A, with a rating of 3A or higher being required.

(1003REBAR,12/17/20)

SECTION 1003 REINFORCING STEEL: of the Standard Specifications is revised to read:

1003-1 General Requirements:

Reinforcing steel shall be furnished in the sizes, shapes, and lengths shown on the plans and in conformance with the requirements of the specifications.

Certificates of Compliance conforming to the requirements of Subsection 106.05 of the specifications shall be submitted for epoxy coated reinforcing bars, as well as uncoated reinforcing bars, wire, and welded wire fabric. In addition, for epoxy coated reinforcing bars, Certificates of Compliance shall be submitted from the coating manufacturer and Certificates of Analysis shall be submitted from the coating applicator.

When reinforcing steel is delivered to the project site, the contractor shall furnish the Engineer with a copy of all shipping documents. Each shipping document shall show the sizes, lengths, and weights of the reinforcing steel separately for each structure.

Reinforcing steel shall be free of dirt, oil, paint and grease and shall conform to the requirements of Section 605 of the specifications. Reinforcing steel shall be protected at all times from damage. All reinforcing steel shall be free of dirt, oil, paint and grease. Rust,

surface irregularities, or mill scale will not be the cause for rejection, provided the weight, dimensions, cross-sectional area, and tensile properties of a manually wire brushed test specimen are not less than the requirements of the specifications.

1003-2 Reinforcing Bars:

Except when used for wire ties or spirals, steel bars used as reinforcement in concrete shall be deformed and shall conform to the requirements of ASTM A615 for Grade 60 steel. Unless otherwise specified, steel bars meeting the requirements of ASTM A706 may be substituted for ASTM A615 steel bars. When ASTM A706 bars are used, tack welding of the reinforcement will not be permitted unless approved by the Engineer.

Samples of reinforcing bars taken at the supplier's or fabricator's place of business shall be defined as pre-shipment samples, while those samples obtained from stockpile or shipment at the project shall be defined as project samples. A shipment shall be considered any amount of reinforcing bars delivered to a project on any given day, of one transported load.

Reinforcing bars sizes No. 4, No. 5, and No. 6 will be accepted with the submission of a Certificate of Compliance. All other reinforcing bar sizes shall be subject to pre-shipment and project sampling as outlined below.

1003-2.01 Pre-Shipment Sampling:

Prior to shipment of reinforcing bars to the project, the supplier or contractor shall contact Materials Group, Structural Materials Testing Section to obtain a laboratory number referenced to the project number. A random sample shall be taken at the supplier’s place of business and delivered to the Structural Materials Testing Section. For bar size No. 14, the sample shall be one piece not less than 42 inches in length, selected at random for each shipment up to 30 tons. For bar size No. 18, the sample shall be one piece not be less than 42 inches in length, selected at random for each shipment up to 50 tons. For all other bar sizes, the sample shall be one piece not less than seven feet in length, selected at random for each shipment up to 20 tons. Samples shall be submitted for each bar size, grade, heat number, and manufacturer in the shipment. The pre-shipment bars that are obtained from the supplier or fabricator must be accompanied by a Certificate of Compliance. The information shown on the certificate must match the bar identification marks. If no Certificate of Compliance is available or the information shown on the certificate is incomplete or inaccurate, the bars will not be accepted for testing.

When the supplier or fabricator makes a shipment to a project, a Certificate of Compliance shall be furnished stating that the material in the shipment is from the same stock as the pre-shipment sample covered by the laboratory number assigned by the Structural Materials Testing Section. Reinforcing bars represented by the pre-shipment sample failing to comply with the specification requirements shall not be used on any project.

1003-2.02 Project Sampling:

The Engineer reserves the right to sample reinforcing bars at any time. Project samples shall consist of one sample bar not less than seven feet in length for all bar sizes. Placement of the reinforcing bars shall not be delayed while the contractor is awaiting test results.

Concrete placement operations shall not begin until satisfactory test results of the project sample bars are obtained.

When the supplier or fabricator makes a shipment to a project from outside the Phoenix or Tucson areas, or not otherwise subjected to pre-shipment sampling, the shipment shall be accompanied by a Certification of Compliance. Before any reinforcing bars from a shipment is to be incorporated into the project work, a project sample shall be taken, tested, and approved by the Structural Materials Testing Section. A project sample shall be taken as soon as practical upon arrival at the job site. A different project sample that is representative of each bar size, grade, heat number, and manufacturer from that shipment will be required. The sampling requirements described for pre-shipment sampling for the Phoenix or Tucson areas shall be used.

1003-3 Wire:

Steel wire used as spirals or ties for reinforcement in concrete shall conform to the requirements of AASHTO M 336. Wire shall be deformed or cold drawn (smooth).

1003-4 Welded Wire Fabric:

Welded wire fabric for concrete reinforcement shall conform to the requirements of AASHTO M 336.

1003-5 Epoxy Coated Reinforcing Bars:

1003-5.01 Steel:

Reinforcing bars shall conform to the requirements of Subsection 1003-2 of the specifications.

Epoxy coated reinforcing bars will be sampled and tested in the same manner as uncoated reinforcing bars. The coating and flexibility of the epoxy coated reinforcing bars will also be tested by the Department for acceptance.

1003-5.02 Epoxy for Coating:

A list of powdered epoxy resins which have passed prequalification tests, as described in ASTM A775, “Epoxy Coated Steel Reinforcing Bars”, is maintained on the Department’s Approved Products List (APL). The powdered epoxy resins selected by the contractor and furnished by the manufacturer shall be of the same material and quality as the resins listed on the APL, and shall be applied and cured in the same manner used to coat the test bars in

the original powder prequalification test. Copies of the most current version of the APL are available on the internet from the ADOT Research Center through its Product Evaluation Program.

Prequalification testing may be performed by the National Bureau of Standards, State laboratories, or qualified private laboratories.

The Certificate of Compliance from the coating manufacturer shall properly identify the batch and/or lot number, material, quantity of batch, date of manufacture, name and address of manufacturer, and a statement that the material is the same composition as the initial sample prequalified for use. The certificate shall also state that production bars and prequalification bars have been identically prepared and applied with epoxy powders.

Patching or repair material, compatible with the coating and inert in concrete shall be made available by the epoxy coating manufacturer. This material shall be suitable to repair areas of the coating which were damaged during fabrication or handling in the field.

1003-5.03 Application of Coating:

The coating applicator's facility shall be subject to approval by the Department. Applications for approval of facilities shall be made to the Department by the coating applicator.

The surface to be coated shall be blast cleaned in accordance with the requirements of the Society for Protective Coatings, Surface Preparation Standard SSPC-SP10, Near White Blast Cleaning.

The powdered epoxy resin coating shall be applied to the cleaned surface as soon as possible after cleaning and before visible oxidation occurs. In no case shall more than eight hours elapse between cleaning and coating.

The protective epoxy coatings shall be applied by the electrostatic spray method or the electrostatic fluidized bed method in accordance with the recommendations of the coating manufacturer. The epoxy coating may be applied before or after fabrication of the reinforcing bars.

The epoxy coating shall be applied as a smooth uniform coat. After curing, the coating thickness shall be in accordance with the requirements of ASTM A775. Coating thickness shall be controlled by taking measurements on a representative number of bars from each production lot. Coating thickness measurements shall be conducted by the method outlined in the Society for Protective Coatings Paint Application Standard SSPC-PA2.

The coating shall be checked visually after cure for continuity. It shall be free from holes, voids, contamination, cracks and damaged areas.

The coating shall not have more than two holidays (pinholes not visible to the naked eye) in any linear foot of the coated item. A holiday detector shall be used, in accordance with the manufacturer's instructions, to check the coating for holidays.

The flexibility of the coating shall be evaluated on a representative number of bars selected from each production lot. The coated bar shall be bent 120 degrees (after rebound) around a six-inch diameter mandrel. The bend shall be done at a uniform rate and may take up to one minute to complete. The test specimens shall be at thermal equilibrium between 68 and 85 degrees F at the time of testing. No cracking of the coating shall be visible to the naked eye on the outside radius of the bent bar.

The contractor shall furnish a Certificate of Analysis from the coating applicator with each shipment of coated steel. In addition to the requirements of Subsection 106.05 of the specifications, the Certificate of Analysis shall state that the coated items and coating material have been tested in accordance with the requirements of this subsection and that the entire lot is in a fully cured condition.

The coating applicator shall be responsible for performing quality control and tests. This will include inspection and testing to determine compliance with the requirements of this subsection for the coating thickness, continuity of coating, coating cure, and flexibility of coating.

The Department reserves the right to have its authorized representative observe the preparation, coating, and testing of the reinforcing bars. The representative shall have free access to the plant, and any work done when access has been denied will be automatically rejected.

If the representative elects, lengths of coated bars may be taken from the production run on a random basis for test, evaluation, and check purposes by the Department.

1003-5.04 Shop Repair:

Epoxy coated reinforcing bars which do not meet the requirements for coating thickness, continuity of coating, coating cure, or flexibility of coating shall not be repaired.

Reinforcing bars with these defects shall be replaced, or alternately stripped of epoxy coating, recleaned and recoated in accordance with the requirements of this specification.

Coating breaks due to fabrication and handling shall be repaired with patching material if the defective area exceeds 2 percent of the surface area of the bar in a one-foot length and the damaged spot is larger than 1/4 inch by 1/4 inch.

The repair of coating breaks shall be limited to bars on which the total of the defective coating areas does not exceed 5 percent of the surface area of the reinforcing bar. Bars with greater than 5 percent damage shall be replaced, or alternately stripped of epoxy coating, recleaned and recoated in accordance with the requirements of this specification.

1003-6 Prestressing Reinforcing Steel:

Prestressing reinforcing steel shall conform to the requirements of Section 602-2.01 of the specifications.

Prestressing steel shall be high-tensile steel wire, high-tensile seven-wire strand or high-tensile alloy bars, as shown in the plans.

High-tensile steel wire shall conform to the requirements of AASHTO M 204.

High-tensile seven-wire strand shall conform to the requirements of AASHTO M 203 for Grade 270. In addition to the 0.5-inch diameter prestressing steel typically shown on the plans, 0.6-inch diameter seven-wire strand may be used for cast-in-place prestressed structures.

High-tensile alloy bars shall conform to the requirements of AASHTO M 275.

All prestressing steel shall be satisfactorily protected from damage by abrasion, moisture, rust, or corrosion and shall be free of dirt, rust, oil, grease, or other deleterious substances.

For every five reels of prestressing steel furnished, one sample not less than six feet long, will be tested by the Engineer. Samples of the furnished reels with the manufacturer’s Certificate of Compliance, a mill certificate, and a test report may be shipped directly by the manufacturer to the Engineer.

1003-7 Dowel Bars for Portland Cement Concrete Pavement:

Dowel bars shall be round, plain steel bars of the dimensions shown on the plans conforming to the requirements of AASHTO M 254 with Type B coating. The core material shall conform to the requirements of ASTM A615, Grade 60.

Epoxy coated dowel bars shall also conform to the requirements of Subsection 1003-5 of the specifications.

The Contractor shall furnish a Certificate of Compliance that properly identifies the coating material, the number of each batch of coating material used, quantity represented, date of manufacture, name and address of manufacturer, and a statement that the supplied coating material meets the requirements of AASHTO M 254 with Type B coating.

(1005PG, 06/19/25)

SECTION 1005 BITUMINOUS MATERIALS:

1005-3 Bituminous Material Requirements:

1005-3.01 Asphalt Cement: of the Standard Specifications is revised to read:

Asphalt cement shall be a performance grade (PG) asphalt binder conforming to the requirements of AASHTO M 320. Air blown/oxidized asphalt, Polyphosphoric acid (PPA) modification and re-refined/recycled engine oil bottom (REOB) will not be accepted. The pressure aging temperature for all binders, including Terminal Blend rubberized binder and Polymer modified asphalt binder shall be as specified below:

PG Asphalt Binder	Pressure Aging Temperature
PG 70-XX and above	110 ºC
PG 64-XX and below	100 ºC

If Terminal Blend rubberized binder (XX-XXTR+) is used, it shall conform to the requirements of Table 1005-1 and 1005-1a.

If Polymer modified asphalt binder (XX-XXPM) is used, it shall conform to the requirements of Table 1005-1 and 1005-1b.

If, during asphaltic concrete production, it is determined by testing that asphalt cement fails to meet the requirements for the specified grade, the asphaltic concrete represented by the corresponding test results shall be evaluated for acceptance. Should the asphaltic concrete be allowed to remain in place, the contract unit price for asphaltic concrete will be adjusted by the percentage shown in Table 1005-1. Should the asphalt cement be in reject status, the contractor may, within 25 days of receiving notice of the reject status, supply an engineering analysis of the expected performance of the asphaltic concrete in which the asphalt cement is incorporated. The engineering analysis shall detail any proposed corrective action and the anticipated effect of such corrective action on the performance. Within three working days, the Engineer will determine whether or not to accept the contractor's proposal. If the proposal is rejected, the asphaltic concrete shall be removed and replaced with asphaltic concrete meeting the requirements of the specifications at no additional expense to the Department. If the contractor's proposal is accepted, the asphaltic concrete shall remain in place at the applicable percent of contract unit price allowed, and any necessary corrective action shall be performed at no additional cost to the Department.

1005-3.03 Emulsified Asphalt: the fourth paragraph of the Standard Specifications is revised to read:

Emulsified asphalts shall be homogeneous. If emulsified asphalt has separated, it shall be thoroughly mixed to insure homogeneity. If emulsified asphalt has separated due to freezing, it shall not be used. Emulsified asphalt shall not be used after 30 days from production.

1005-3.04 Emulsified Asphalt (Special Type): of the Standard Specifications is revised to read:

Emulsified asphalt (special type) shall consist of Type SS-1 or CSS-1 diluted with water to provide an asphalt content not less than 26 percent. The water used shall be potable. Potable water obtained from public utility distribution lines will be acceptable. The water used shall be free of injurious amounts of oil, acid, alkali, clay, vegetable matter, silt, or other harmful matter. The material shall not be diluted in the field.

1005-3.07 Other Requirements: the tables 1005-1, 1005-1a, and 1005-1b of the Standard Specifications are revised to read:

TABLE 1005-1
ASPHALT BINDER ADJUSTMENT TABLE

Test Property	AASHTO Test Method	Test Result	Percent of Contract Unit Price Allowed
Dynamic Shear of Original Binder: G*/Sin δ, kPa	T 315	≥ 1.00 0.90-0.99 0.70-0.89 < 0.70	100 98 95 88 (1)
Dynamic Shear of RTFO Binder: G*/Sin δ, kPa	T 315	≥ 2.20 2.00-2.19 1.60-1.99 < 1.60	100 98 95 88 (1)
Dynamic Shear of PAV Binder: G*Sin δ, kPa	T 315	≤ 5000 5001-5500 5501-7000 7001-8000 > 8000	100 98 95 89 87 (1)
Creep Stiffness of PAV Binder: S, Mpa	T 313	≤ 300 301-330 331-450 451-600 > 600	100 98 95 89 87 (1)
m-value at 60 sec.	T 313	≥ 0.300 0.270-0.299 0.230-0.269 < 0.230	100 98 90 87 (1)

Notes:

Reject Status: The pay adjustment applies if allowed to remain in place.

Specified properties in AASHTO M 320 for flash point, viscosity at 135 °C, and mass loss are not considered performance related. Specification deficiencies for these properties shall be cause for a work stoppage until specification properties are met, but will not be cause for a pay adjustment.

Should the bituminous material be deficient on more than one property, the pay adjustment will be the greatest reduction to the contract unit price specified considering individual test results.

The information presented in this table does not apply to asphalt cement used for tack coats.

TABLE 1005-1a
Terminal Blend rubberized binder (XX-XXTR+)

Test Property	Test Method	Requirement	Test Result	Percent of Contract Unit Price Allowed
Solubility, %, minimum	ASTM D7553 or ASTM 2042	98	-----	-----
Elastic Recovery, @ 10 ºC, %, minimum	AASHTO T 301	75	75 70 - 74 < 70	100 89 87 (1)

(1) Reject Status: The pay adjustment applies if allowed to remain in place.

Notes:

In case of dispute, ASTM D2042 shall be used to determine the Solubility.

The asphalt binder shall contain a minimum of 8 percent crumb rubber and a minimum of 3 percent SBS (styrene-butadiene-styrene) polymer.

The crumb rubber shall be derived from processing whole scrap tires or shredded tire materials. The tires from which the crumb rubber is produced shall be taken from automobiles, trucks, or other equipment owned and operated in the United States. The processing shall not produce, as a waste product, casings or other round tire material that can retain moisture when stored or disposed of above ground.

Modified binders shall be blended at the source of supply and delivered as a homogenous mixture to the job site.

Modified Binders stored at the asphalt concrete mixing plant for more than two weeks or beyond the supplier recommended shelf life, whichever is less, shall be sampled and tested.

TABLE 1005-1b
Polymer Modified Asphalt Binder (XX-XXPM)

Test Property	Test Method	Requirement	Test Result	Percent of Contract Unit Price Allowed
Solubility, %, minimum	ASTM D7553 or ASTM D2042	98	-----	-------
Elastic Recovery @ 10°C, %, minimum	AASHTO T 301	75	≥ 75 70 - 74 < 70	100 89 87 (1)

(1) Reject Status: The pay adjustment applies if allowed to remain in place.

Notes:

In case of dispute, ASTM D2042 shall be used to determine the Solubility.

Asphalt binder shall contain a minimum of 3 percent SBS (styrene-butadiene-styrene) polymer.

Modified binders shall be blended at the source of supply and delivered as a homogenous mixture to the job site.

Modified Binders stored at the asphalt concrete mixing plant for more than two weeks or beyond the supplier recommended shelf life, whichever is less, shall be sampled and tested.

1005-3.07 **Other Requirements:** the table 1005-1c of the Standard Specifications is hereby deleted.

1005-3.07 **Other Requirements:** the table 1005-3 of the Standard Specifications is revised to read:

TABLE 1005-3

EMULSIFIED ASPHALTS

Tests On Emulsion	Test Method	Requirement					
		RS-1	CRS-1	RS-2	CRS-2	SS-1	CSS-1
Viscosity: Saybolt Furol, seconds, range 77 °F 122 °F	AASHTO T 59	20-100	20-100	50-400	50-400	20-100	20-100
Settlement: 5 days, %, maximum	AASHTO T 59	5	5	5	5	5	5
Sieve: Retained on No. 20, %, maximum	AASHTO T 59 (1)	0.10	0.10	0.10		0.10	0.10
Particle Charge	AASHTOT 59		Pos.		Pos.		Pos. (2)
Demulsiability: 35 mL, 0.02 N calcium chloride %, minimum	AASHTO T 59	60		60			
Classification: Uncoated particles, %, minimum	Arizona Test Method 502				55		
Residue: (3) Residue, %, minimum (4)		55	60	63	65	57	57

Notes:

(1) Distilled water shall be used. Two percent sodium oleate solution will not be accepted.

(2) If the Particle Charge Test result is inconclusive, material having a maximum PH value of 6.7 will be acceptable.

(3) Residue will be obtained in accordance with the requirements of Arizona Test Method 504 and shall conform to all the requirements of AASHTO M 320 for PG 64-16, except that for CRS-2 the dynamic shear ($G^*/\sin\delta$) on the original residue shall be a minimum of 1.00 kPa and a maximum of 1.50 kPa.

(4) Residue by evaporation may be determined in accordance with the requirements of Arizona Test Method 512; however, in case of dispute, AASHTO T 59 will be used.

1005-3.07 **Other Requirements:** the note (2) of Table 1005-3a of the Standard Specifications is revised to read:

(2) Testing shall be performed on residue by distillation. Testing on residue by oven evaporation will not be accepted.

1005-3.07 **Other Requirements:** the table 1005-5 of the Standard Specifications is revised to read:

TABLE 1005-5

EMULSIFIED RECYCLING AGENTS

Tests on Emulsified Recycling Agent	Test Method	Requirement			
		ERA-1	ERA-5	ERA-25	ERA-75
Viscosity: Saybolt Furol, 77 °F, seconds range	AASHTO T 59	15 - 40	15 - 100	15 - 100	15 - 100
Miscibility	AASHTO T 59	Passes	Passes	Passes	Passes
Sieve Test: %, maximum	AASHTO T 59 (1)	0.10	0.10	0.10	0.10
Particle Charge	AASHTO T 59	Positive	Positive	Positive	Positive
Residue: (2) Residue, %, minimum	(3)	60	60	60	60

Notes:

(1) Distilled water shall be used. Two percent sodium oleate solution will not be accepted.

(2) Residue will be obtained in accordance with the requirements of Arizona Test Method 504 and shall conform to the requirements specified in Table 1005-4.

(3) Residue by evaporation may be determined in accordance with the requirements of Arizona Test Method 512; however, in case of dispute, AASHTO T 59 will be used.

1005-3.07 Other Requirements: the Paving Asphalt row of the table 1005-6 of the Standard Specifications is modified to add:

TABLE 1005-6 OTHER REQUIREMENTS			
Grade of Asphalt Specification Designation	**Range of Temperatures for Application by Spraying, °F (Not applicable for Plant Mixing)**	**Range of Aggregate Temperatures for Plant Mixing, °F**	**Basis of Conversion, Average Gallons Per Ton at 60 °F**
Paving Asphalt	275 - 400	------	
PG 76-22 PM 229 PG 70-22 PM 230 PG 64-28 PM			231 232 233

(1006PCC, 09/21/23)

SECTION 1006 PORTLAND CEMENT CONCRETE:

1006-2.01(A) General: of the Standard Specifications is revised to read:

Cementitious material is defined as an inorganic material or a mixture of inorganic materials that sets and develops strength by chemical reaction with water by formation of hydrates and is capable of doing so under water. In this specification, cementitious materials are defined as hydraulic cement (Portland cement, Portland-pozzolan cement or Portland-limestone cement) and supplementary cementitious materials (fly ash, natural pozzolan, or silica fume).

1006-2.01(B) Hydraulic Cement: the first paragraph of the Standard Specifications is revised to read:

Hydraulic cement shall consist of Portland cement, Portland-pozzolan cement or Portland-limestone cement.

1006-2.01(B) Hydraulic Cement: of the Standard Specifications is modified to add:

Portland-limestone cement shall conform to the requirements of ASTM C595 for blended hydraulic cement with moderate sulfate resistance, Type IL (MS).

1006-2.01(C)(2) Flyash and Natural Pozzolan: of the Standard Specifications is revised to read:

Fly ash and natural pozzolan shall conform to the requirements of ASTM C618 for Class C, F, or N.

TABLE 1006-5 Design Criteria: the column heading of the third column of the Standard Specifications is revised to read:

		Cementitious Material Content: Lbs. per Cu Yd. Minimum - Maximum		

1006-3.02(C) Mix Design Submittal Requirements: the items (16) and (18) of the Standard Specifications are revised to read:

(16) Volume of each material measured to the nearest hundredth of a cubic foot;

(18) Total volume measured to the nearest hundredth of a cubic foot;

1006-7.02(A) General: the fifth paragraph of the Standard Specifications is revised to read:

Concrete shall be sampled in accordance with ASTM C172 for acceptance testing of temperature, slump, unit weight and yield (when required) and air content (when required) as well as for fabrication of test cylinders for compressive strength determination at 28 days except that the concrete shall be sampled once during discharge at the middle portion of the batch. ASTM C172 includes sampling from stationary, paving and truck mixers, and from agitating and non-agitating equipment used to transport central-mixed concrete and from continuous mixing equipment as described in Specification ASTM C685/C685M. Sampling shall be at the point of discharge from truck mixers. Sufficient care shall be taken to obtain a representative sample by diverting the entire stream of the concrete to prevent segregation. Samples shall be of sufficient size to perform all the required tests and fabricate the necessary test cylinders but in no case less than 1 cubic foot.

1006-7.02(B) Class S and Class B Concrete: of the Standard Specifications is revised to read:

For Class S concrete with a compressive strength requirement less than 4000 psi, or Class B concrete, a strength test will consist of the average strength of two test cylinders. However, if the compressive strengths of the two test cylinders differ by more than 10 percent from the average of the two, the strength test result shall be the cylinder with the highest compressive strength.

For Class S concrete with a compressive strength requirement equal to or greater than 4000 psi, or Class P concrete, the compressive strength of each sample shall be determined by averaging the results of the three test cylinders. However, if the compressive strength of any one of the three test cylinders differs by more than 10 percent from the average of the three, its result shall be discarded and the compressive strength shall be the average of the remaining two cylinders. Should the individual compressive strength of any two of the three remaining cylinders differ by more than 10 percent from the average of the three, the results will be discarded and the compressive strength shall be the strength of the remaining cylinder.

1006-7.03(A)(3) Consistency: the third paragraph of the Standard Specifications is revised to read:

When the concrete is pumped, samples for consistency will be taken as the concrete leaves the mixer.

TABLE 1006-10 Air Entrainment Requirements: the table of the Standard Specifications is revised to read:

TABLE 1006-10
Air Entrainment Requirements

Elevation	Air Entrainment Required	Required Air Content by Volume (%)
3000 feet or above	Yes	4 to 7
Below 3000 feet	Contractor's Option	≤ 7

(1013BRPD, 01/20/22)

SECTION 1013 BEARING PADS: of the Standard Specifications is revised to read:

1013-1 Preformed Fabric Pads:

Preformed fabric pads shall be composed of multiple layers of 8-ounce cotton duck impregnated and bound with high quality natural rubber or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness. The number of plies shall be such as to produce the specified thickness, after compression and vulcanizing. The finished pads shall withstand compression loads perpendicular to the plane of the laminations of not less than 10,000 pounds per square inch without detrimental reduction in thickness or extrusion.

Preformed fabric pad samples will be tested by the Department.

The manufacturer certification and sampling shall conform to the requirements of Subsection 1013-3 of the specifications.

1013-2 Elastomeric Bearing Pads:

1013-2.01 General:

The work shall consist of furnishing and installing elastomeric bearing pads. Bearings shall be constructed in accordance with the details shown on the plans and as specified in these specifications.

Prior to shipment from the point of manufacture, bearings shall be packaged in such manner to ensure that during shipment and storage the bearings will be protected against damage from handling, weather, or any normal hazard. All bearings shall be stored at the work site in an area that provides protection from environmental and physical damage. When installed, bearings shall be clean and free of all foreign substances.

Bearings shall be installed to the positions and orientations shown on the plans. Bearings shall be set level, in exact positions, and must have full and even bearing on all bearing planes. Bearings surfaces located at improper elevations or set not level and true to plane shall be corrected prior to placement of bearings. Elastomeric bearing pads shall be set directly on properly prepared concrete surfaces without bedding material.

Elastomeric bearing pads shall include unreinforced pads (consisting of elastomer only) and reinforced bearings with steel or fabric laminates.

Bearings shall be furnished with the dimensions, material properties and elastomer grade required by the plans. Unless otherwise specified on the plans, bearings which have thicknesses greater than 1/2 inch shall be reinforced with steel or fabric laminates. The design method (A or B) and the design load shall also be shown on the plans, and testing shall be performed accordingly. In the absence of more specific information, bearings shall be Grade 3, shall be an elastomer with 130 pounds per square inch shear modulus (55 durometer hardness).

1013-2.02 Material Properties:

The sole polymer in the elastomeric compound shall be neoprene and shall be not less than 60 percent, by volume, of the total compound. The elastomer compound shall be classified as being of low temperature Grade 0, 2, or 3. The grades are defined by the testing requirements in Table 1013-1. A higher grade of elastomer, signified by a larger grade number, may be substituted for a lower one.

The elastomer compound shall meet the minimum requirements of Table 1013-1, except as otherwise specified by the Engineer. Test requirements may be interpolated for intermediate hardness. The material will be specified by its shear modulus whose measured value shall lie within 15 percent of the specified value. A consistent value of hardness shall also be supplied for the purpose of defining limits for the tests in Table 1013-1. Laminated bearings shall have a shear modulus not greater than 200 pounds per square inch. When test specimens are cut from the finished product, the physical properties shall be permitted to vary by 10 percent from those specified in Table 1013-1. All material tests shall be carried out at 73 ± 4 degrees F, unless otherwise noted. Shear modulus tests shall be carried out using the apparatus and procedures described in Annex A1 of ASTM D4014.

Certification, sampling, and testing shall conform to the requirements of Subsection 1013-3 of the specifications.

Table 1013-1 ELASTOMERIC COMPOUND REQUIREMENTS				
Note that ASTM D1043 refers to "modulus of rigidity" while ASTM D4014 refers to "shear modulus." The word "stiffness" is used here to cover both terms.				
Physical Properties				
D2240	Hardness: Shore A Durometer	45 to 75		
		45 to 55	56 to 65	66 to 75
D412	Ultimate Elongation: min. %	400	350	300
	Tensile Strength: min. psi	2250		
Heat Resistance				
D573: 70 hours at 212 °F	Change in Durometer Hardness: maximum points	15		
	Change in Tensile Strength: maximum %	-15		
	Change in Ultimate Elongation: maximum %	-40		
Compression Set				
ASTM D395, Method B	22 hr at 212°F: maximum %	35		
Ozone				
ASTM D1149	100 pphm ozone in air by vol., 20 % strain, 100 ± 2°F, 100 hr, mounting IAW ASTM D1149 (Procedure A)	No Cracks		
Low Temperature Brittleness				
D746 Procedure B	Grade 0: No Test Required Grade 2: No Test Required Grade 3: Brittleness at -40°F	- - No Failure		
Instantaneous Low Temperature Thermal Stiffening				
ASTM D1043	Grade 0: Tested at -25°F Grade 2: Tested at -25°F Grade 3: Tested at -40°F	(1) (1) (1)		
Low Temperature Crystallization				
ASTM D4014 Quad Shear Test As Described in Annex A	Grade 0: No Test Required Grade 2: 7 Days at 0°F Grade 3: 14 Days at -15°F	(2) (2) (2)		

Notes:
Stiffness at test temperature shall not exceed four times the stiffness measured at 73 °F.
Stiffness at test time and temperature shall not exceed four times the stiffness measured at 73°F with no time delay. The stiffness shall be measured with a quad shear test rig in an enclosed freezer unit. The test specimens shall be taken from a randomly selected bearing. A ± 25 % strain cycle shall be used, and a complete cycle of strain shall be applied with a period of 100 seconds. The first 3/4 cycle of strain shall be discarded, and the stiffness shall be determined by the slope of the force deflection curve for the next 1/2 cycle of loading.

1013-2.03 Plain and Fabric-Reinforced Elastomeric Bearing Pads:

Pads less than or equal to 1/2 inch in thickness shall be all elastomer. Pads greater than 1/2 inch thick shall be laminated.

Laminated pads shall consist of alternate layers of elastomer and fabric reinforcement bonded together. The top and bottom layers of reinforcement shall be uniformly covered with a layer of elastomer. The thickness of elastomer cover shall be allowed per tolerances listed in Table 1013-2.

Laminated pads shall have reinforcement every 1/2 inch through the entire thickness. Fabric reinforcement shall be single-ply at top and bottom surfaces of the pad and double-ply within the pad. Fabric shall be free of folds and ripples and shall be parallel to the top and bottom surfaces. Variations in the location of the reinforcement from its theoretical location in excess of the specified Fabrication Tolerances will be cause for rejection.

Pads of all-elastomer or with fabric reinforcement may be cut from large sheets. Cutting shall be performed in such a manner as to avoid heating of the material, to produce a smooth edge with no tears or other jagged areas, and to cause as little damage to the material as possible. The cutting method shall not cause any separation of the fabric from the elastomer for laminated bearings.

Flash tolerance, finish, and appearance shall meet the requirements of the latest edition of the Rubber Handbook published by the Rubber Manufacturers Association, Inc., RMA F3 and T.063 for molded bearings and RMA F2 for extruded bearings.

The bond between elastomer and fabric shall be such that when a sample is tested for separation, it shall have a minimum peel strength of 30 pounds per inch of width.

Fabric reinforcement shall be woven from 100 percent glass fibers of E-type yarn with continuous fibers. The minimum thread count in either direction shall be 25 threads per inch. The fabric shall have either a crowfoot or an 8 Harness Satin weave. Each ply of fabric shall have a breaking strength of not less than 800 pounds per inch of width in each thread direction

when 3 inch by 36 inch samples are tested on split drum grips. The bond between double plies shall have a minimum peel strength of 20 pounds per inch of width. Holes in the fabric will not be permitted.

At the contractor's option, steel-reinforced elastomeric bearing pads may be furnished in lieu of fabric-reinforced elastomeric bearing pads that are 1/2 inch and over in thickness.

1013-2.04 Steel Reinforced Elastomeric Bearing Pads:

For steel-reinforced elastomeric bearings, the edges of the steel shall be protected at all times from corrosion. Steel-reinforced elastomeric bearing pads shall conform to the requirements for steel-laminated elastomeric bearings as specified in ASTM D4014 and the following:

The thickness of each bearing pad shall be as shown on the project plans. The bearings shall consist of (N-1) internal elastomer laminates and N steel laminates, where N is equal to the bearing pad thickness in inches shown on the project plans divided by 1/2 inch. The steel laminates shall be 11 gage and shall be spaced every 1/2 inch, center-to-center. The top and bottom steel laminates shall have 1/4 inch of elastomer cover as measured from the center of the steel laminate to the pad surface;

The elastomer clear cover thickness from the surface to the steel laminates at the sides of the bearings shall be 1/8 inch. If guide pins or other devices are used to control the side cover over the steel laminates, any exposed portions of the steel laminates shall be sealed by vulcanized patching;

Steel laminates used for reinforcement shall be made from rolled mild steel conforming to ASTM A36, ASTM A1011, or ASTM A1008, Grade 40. Holes in plates for manufacturing purposes will not be permitted unless they have been accounted for in the design, as shown on the plans;

Bearings with steel laminates shall be cast as a unit in a mold and shall be bonded and vulcanized under heat and pressure. The mold finish shall conform to standard shop practice. The internal steel laminates shall be sandblasted and cleaned of all surface coatings, rust, mill scale, and dirt before bonding, and shall be free of sharp edges and burrs. External load plates (sole plates) shall be protected from rusting by the manufacturer, and, preferably, shall be hot bonded to the bearing during vulcanization. Bearings that are designed to act as a single unit with a given shape factor must be manufactured as a single unit; and

Steel laminated bearings shall develop a minimum peel strength of 40 pounds per inch of width.

1013-2.05 Fabrication Tolerances:

Plain and laminated bearing pads shall be built to the specified dimension within the tolerances listed in Table 1013-2.

Table 1013-2 FABRICATION TOLERANCES		
Parameters	**Tolerances**	
	Minus	**Plus**
1. Overall Height: Design Thickness 1-1/4 inch or less Design Thickness over 1-1/4 inch	 0 0	 +1/8 inch +1/4 inch
2. Overall Horizontal Dimensions: 36 inches or Less Over 36 inches	 0 0	 +1/4 inch +1/2 inch
3. Thickness of Individual Layers of Elastomer at any Point within the Bearing	± 20 % of Design Value but no more than ± 1/8 inch	
4. Parallelism with Opposite Face: Top and Bottom Sides	 0.005 Radians 0.02 Radians	
5. Position of Exposed Connection Members, Holes, Slots, or Inserts	± 1/8 inch	
6. Edge Cover: Embedded Laminates or Connection Members	0	+1/8 inch
7. Thickness: Top and Bottom Cover Layer (if required)	0	+1/8 inch
8. Size: Holes, Slots, or Inserts	± 1/8 inch	

1013-3 Certification and Testing:

1013-3.01 General Requirements:

(A) General:

A lot shall consist of a single type of bearing of the same design, material and thickness, delivered to the project site at the same time. Unless otherwise specified on the plans, certification and testing shall be as described in Subsections 1013-3.01(B) and (C) of the specifications.

(B) Quality Control Testing by Manufacturer:

The contractor shall furnish the Engineer with Certificates of Analysis from the manufacturer, conforming to the requirements of Subsection 106.05 of the specifications.

Each reinforced bearing shall be marked in indelible ink or flexible paint. The marking shall consist of the order number, lot number, bearing identification number, and elastomer type and grade number. The marking shall be on the face that is visible after erection of the bridge structures.

The ambient temperature tests on the elastomer described in Subsection 1013-3.02(A) of the specifications shall be conducted for the materials used in each lot of bearings. In lieu of performing a shear modulus test for each batch of material, the manufacturer may elect to provide certificates from tests performed within the preceding year on identical formulations.

All three low temperature tests described in Subsection 1013-3.02(C) of the specifications shall be conducted on Grade 3 material used in each lot of bearings, with the following exception. In lieu of the low temperature crystallization tests on each lot of bearings to be used, the manufacturer may choose to provide Certificates of Analysis from low-temperature crystallization tests performed within the preceding year on identical Grade 3 material.

Every finished bearing shall be visually inspected in accordance with Subsection 1013-3.02(C) of the specifications.

Every steel reinforced bearing shall be subjected to the short-term load test described in Subsection 1013-3.02(D) of the specifications.

From each lot of bearings designed by Method B of AASHTO LRFD Bridge Specifications Article 14.7.5, a random sample shall be subjected to the long-term load test described in Subsection 1013-3.02(E) of the specifications. The sample shall consist of at least one bearing chosen randomly from each size and material batch and shall comprise at least 10 percent of the lot. If one bearing of the sample fails, all the bearings of that lot shall be rejected, unless the manufacturer elects to test each bearing of the lot at no additional cost to the Department. In lieu of this random sampling procedure, the Engineer may require every bearing of the lot to be tested.

(C) Acceptance Testing:

A minimum of two sample pads from every 100 pads furnished, or portion thereof, will be selected at random by the Engineer at the project site for testing. A minimum of one sample pad will be selected from each lot. Bearing pads marked or otherwise presented to the Department as being test pads shall not be tested. Samples shall consist of complete pads as detailed on the project plans and as specified herein. The contractor shall furnish additional complete pads to replace those taken for testing. Pads shall be available for testing at least three weeks in advance of intended use.

Acceptance testing shall be performed by a laboratory listed in the ADOT Directory of Approved Testing Laboratories on the Department’s website.

The contractor shall, at no additional cost to the Department, have the elastomeric bearing pad samples tested by an approved testing laboratory. The testing laboratory shall be approved by the Engineer, shall not be affiliated with the bearing pad manufacturer, and shall be under the supervision of a registered professional engineer.

The contractor shall furnish the Engineer with Certificates of Analysis, conforming to the requirements of Subsection 106.05 of the specifications, from the approved testing laboratory certifying that the bearings tested conform to the specified requirements for dimensional tolerances and material properties. The following tests shall be performed as appropriate and be supported with Certificates of Analysis:

Ambient temperature test;
Heat resistance test;
Visual inspection;
Shear modulus test; and
Bond and peel strength tests

The heat resistance tests shall be performed in accordance with Subsection 1013-3.02(B) of the specifications.

Shear stiffness tests shall be performed on material from a random sample of the finished bearings in accordance with Subsection 1013-3.02(F) of the specifications.

1013-3.02 Testing Requirements:

(A) Ambient Temperature Tests on the Elastomer:

The elastomer used shall satisfy the limits prescribed in Table 1013-1 for durometer hardness, tensile strength, and ultimate elongation. The bond to the reinforcement, if any, shall also satisfy the bond requirements in Subsection 1013-2.03 or 1013-2.04 of the specifications and shall be tested in accordance with ASTM D429, Method B. The shear modulus of the material shall be tested at 73 degrees F using the apparatus and procedure described in Annex A1 of ASTM D4014. The shear modulus shall fall within 15 percent of the specified value.

(B) Heat Resistance Tests on the Elastomer:

The elastomer shall satisfy the limits prescribed in Table 1013-1 for the change in durometer hardness, change in tensile strength, and change in ultimate elongation, as well as for compression set and ozone.

(C) Visual Inspection of the Finished Bearing:

Every finished bearing shall be inspected for compliance with dimensional tolerances and for overall quality of manufacturing.

(D) Short-Duration Compression Tests on Bearings:

The bearing shall be loaded in compression to 1.5 times its maximum design load. That load shall be held constant for five minutes, removed, and reapplied for another five minutes. The bearing shall be examined visually while under the second loading. If the bulging pattern suggests layer thickness or parallelism outside the specified tolerances or a poor laminate bond, the bearing shall be rejected. If there are three or more separate surface cracks greater than 0.08 inches wide and 0.08 inches deep, the bearing shall be rejected.

(E) Long-Duration Compression Tests on Bearings:

The bearing shall be loaded in compression to 1.5 times its maximum design load for a minimum period of 15 hours. If, during the test, the load falls below 1.3 times the maximum design load, the test duration shall be increased by the period of time for which the load is

below this limit. The bearing shall be examined visually at the end of the test while it is still under load. If the bulging pattern suggests layer thickness or parallelism outside the specified tolerances or a poor laminate bond, the bearing shall be rejected. If there are three or more separate surface cracks greater than 0.08 inches wide and 0.08 inches deep, the bearing shall be rejected.

(F) Shear Modulus Tests on Material From Bearings:

The shear modulus of the material in the finished bearing shall be evaluated by testing a specimen cut from it using the apparatus and procedures described in Annex A1 of ASTM D4014, or, if directed by the Engineer, a comparable nondestructive stiffness test may be conducted on a pair of finished bearings. The shear modulus shall fall within 15 percent of the specified value. If the test is conducted on finished bearings, the material shear modulus shall be computed from the measured shear stiffness of the bearings, taking account of the influence on shear stiffness of bearing geometry and compressive load.

(G) Bond and Peel Strength Tests:

Cold bonding between individual laminated pads, if used, shall be tested in accordance with the requirements of California Test Method 663.

The peel strength test shall be performed in accordance with ASTM D429, Method B, for both fabric and steel reinforced pads.

1013-4 Installation:

Bearings shall be placed on surfaces that are plane to within 1/16 inch and horizontal to within 0.01 radians. Exterior plates of the bearing shall not be welded unless at least 1-1/2 inches of steel exists between the weld and the elastomer. In no case shall the elastomer or the bond be subjected to temperatures higher than 400 degrees F.

(1015EPOX, 02/16/23)

SECTION 1015 EPOXY MATERIALS: the title and text of the Standard Specifications is revised to read:

SECTION 1015 EPOXY RESIN ADHESIVES:

1015-1 General Requirements:

Certificates of Compliance, conforming to the requirements of Subsection 106.05 of the specifications, shall be submitted to the Engineer by the contractor for any epoxy resin adhesives used on a specific project. Only those epoxy resin adhesives shown on the Department's Approved Products List (APL), or equal, will be allowed for use. Approved products may only be used in accordance with the limitations stated in the manufacturer's instructions, the APL, and the International Code Council Evaluation Service (ICC-ES) evaluation report for the product, if applicable. Copies of the most current version of the APL

are available on the internet from the ADOT Research Center, through its Product Evaluation Program.

Epoxy resin adhesives shall be a two-component system that meets the requirements of ASTM C881, shall be furnished in the type, grade, and class specified, and shall meet all the requirements specified herein. For pre-packaged cartridge kits, the epoxy resin adhesive shall meet the requirements of ASTM C881 when mixed according to the manufacturer's instructions, utilizing the manufacturer's mixing nozzle. When a grade or class is not specified, an appropriate grade and class shall be selected for the particular application and approved by the Engineer. Epoxy resin adhesives for patching external concrete shall be gray in color.

All epoxy resin adhesives shall be resistant to the action of weathering, moisture, acids, alkalis, and other environmental factors.

The contractor shall submit product literature and Safety Data Sheets (SDS). The literature shall identify the recommended product use or applications for which it is intended, and the directions for use.

1015-1.01 Packaging, Labeling, and Storing:

Each component of epoxy resin adhesive shall be packaged in containers of size proportional to the amount of that component in the mix so that one container of each component is used in mixing one batch of epoxy resin adhesive.

The containers shall be of such design that all of the contents may be readily removed, and shall be well sealed to prevent leakage. The containers and labeling shall meet U.S. Department of Transportation Hazardous Material Shipping Regulations, and the containers shall be of a material, or lined with a material, of such character as to resist any action or breakdown by the components.

Each container shall be clearly labeled with the product type and identification code, component designation (A or B), manufacturer's name, date of manufacture, batch or lot number, all directions for use, and such warnings or precautions concerning the contents as may be required by State or Federal Laws and Regulations.

Epoxy resin adhesives shall be stored in accordance with the manufacturer's recommendations at all times. Attention is directed to the characteristic of some epoxy resin components to crystallize or thicken excessively prior to use when stored at temperatures below 35 degrees F. Any material which shows evidence of crystallization or a permanent increase in viscosity or settling of pigments which cannot be readily dispersed with a paddle shall not be used.

1015-1.02 Directions for Use:

Use of epoxy resin adhesives shall be in accordance with the manufacturer's recommendations unless otherwise specified by the Engineer. Use of epoxy resin adhesives shall be allowed for only those uses as shown on the ADOT Approved Products List.

At the time of mixing, the two components of the epoxy resin adhesive shall be at a temperature between 60 and 85 degrees F, unless otherwise specified or approved by the Engineer. Any heating of the epoxy resin components shall be done by application of indirect heat.

Immediately prior to mixing, each component shall be thoroughly mixed with a paddle, unless otherwise specified. Separate paddles shall be used to stir each component.

Immediately prior to use, the components of the epoxy resin adhesive shall be mixed together in the specified ratios according to the manufacturer's recommendations. When mixed, all epoxy resin adhesive shall have a uniform color without streaks. No solvent shall be added to any epoxy resin adhesive.

Surfaces on which the epoxy resin adhesive is to be placed shall be free of rust, paint, grease, asphalt and loose or otherwise deleterious materials. The surface shall be dry unless otherwise allowed according to the manufacturer's recommendations for use. Any overlay or inserted material which is to be bonded to the underlying surface shall be placed before thickening of the epoxy resin adhesive has begun.

When epoxy resin adhesive is used as a binder to make mortar, the components of the epoxy resin adhesive shall be thoroughly mixed together before the sand or fine aggregate is added. The type, gradation, and proportion of sand or fine aggregate added and mixed with the epoxy resin adhesive to make mortar shall be as specified or recommended by the manufacturer. The sand or fine aggregate moisture content shall not be more than 0.5 percent as determined in accordance with AASHTO T 265. All surfaces against which mortar is to be placed shall be primed with a coat of the epoxy resin adhesive just prior to placing the mortar.

1015-2 Anchoring Adhesives - Steel to Concrete:

Epoxy resin adhesive anchoring systems shall be used for bonding anchors and rebar dowels into hardened concrete or masonry. Applications shall be limited to horizontal and down hole orientations. Epoxy resin adhesives shall not be used in any overhead vertical application, or permanently sustained purely axial tension application.

The anchoring adhesive shall consist of a two component epoxy resin adhesive formula that is packaged in a dual-cylinder cartridge that can automatically combine the constituents in the proper proportions. Manual proportioning of the components shall not be used for anchoring applications. The adhesive shall not be used beyond the expiration date shown on the packaging.

For horizontal applications where flow out of the anchoring hole is a problem, high viscosity or non-sag anchoring adhesives shall be used. Low and medium viscosity anchoring adhesives may be utilized in down holes which open upward. The product shall only be used for the application and limitations for which it was designed according to the manufacturer’s product literature. Post-installed anchoring adhesives shall be installed in accordance with the manufacturer’s printed installation instructions (MPII). Installation of adhesive anchors shall be performed by personnel trained to install adhesive anchors.

(A) Structural Applications:

Structural applications are defined as those requiring the anchoring adhesive system to develop a minimum tensile and shear strength resistance to an applied load. Post-installed anchoring adhesives shall have been tested in accordance with ICC-ES Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete (AC308), which incorporates the requirements found in ACI 355.4. A current ICC-ES evaluation report for the anchoring adhesive shall be submitted to the Engineer, who will review the conditions of use listed in the report before it is approved for use on a project. The conditions of use include limitations on base material temperature since higher temperatures affect adhesive bond tension and shear load strength. The anchoring adhesive shall only be used for the broad category (un-cracked concrete, cracked concrete, or masonry) for which it has been designated in the ICC-ES report.

Horizontal applications where a component of the applied load will be in sustained tension shall be installed by an individual who has a current ACI/CRSI Adhesive Anchor Installer Certification.

(B) Load Transfer Dowel and Tie-Bar Applications:

Applications for load transfer dowels and tie-bars are defined as those required to transfer load across joints in concrete slabs, walls and other concrete and masonry members. Epoxy resin adhesive shall meet the requirements of ASTM C881 Type IV. The anchors shall be installed, using the anchoring adhesive in the concrete or masonry member in strict accordance with the manufacturer’s instructions. The anchoring adhesive shall only be used for the broad category (un-cracked concrete, cracked concrete, or masonry) for which it has been designated in the manufacturer’s product literature.

1015-3 Concrete to Concrete Bonding Adhesives:

(A) General

The grade of the epoxy resin adhesive system shall match the proposed use as identified in the product literature provided by the manufacturer. The product shall specifically be designed for this application according to the manufacturer's product literature. The pot life of the material shall be determined in accordance with AASHTO T 237, Part I.

(B) Hardened Concrete to Hardened Concrete

Epoxy resin base adhesive to be used for adhering or bonding hardened concrete to hardened concrete and other materials shall conform to the requirements of ASTM C881, Type I for non-load bearing applications and Type IV for load bearing applications.

(C) Hardened Concrete to Fresh Concrete

Epoxy resin base materials to be utilized for adhering or bonding freshly mixed concrete materials to hardened concrete, shall conform to the requirements of ASTM C881, Type II, for non-load bearing applications and Type V for load bearing applications.

1015-4 Epoxy Resin Adhesive for Mortar:

Epoxy resin adhesive to be used for binder in mortar, shall conform to the requirements of ASTM C881, Type I, for non-load bearing applications and Type IV for load bearing applications. The grade of the epoxy resin adhesive system shall match the proposed use as identified in the product literature provided by the manufacturer. The product shall specifically be designed for this application according to the manufacturer's product literature.

When epoxy resin adhesive is used as a binder to make mortar, the components of the epoxy resin adhesive shall be thoroughly mixed together before the sand or fine aggregate is added. The type, gradation, and proportion of sand or fine aggregate added and mixed with the epoxy resin adhesive to make mortar shall be as specified or recommended by the manufacturer. The sand or fine aggregate moisture content shall not be more than 0.5 percent as determined in accordance with AASHTO T 265. All surfaces against which mortar is to be placed shall be primed with a coat of the epoxy resin adhesive just prior to placing the mortar.

1015-5 Epoxy Resin Adhesive for Crack Repair:

Epoxy resin adhesive to be used for crack repair in concrete, shall be furnished as two components which shall be mixed together at or just before the point of injection.

The epoxy resin adhesive shall conform to the requirements of ASTM C881, Type I, for use in non-load bearing applications and Type IV for use in load bearing applications. The grade of the epoxy resin adhesive system shall normally be Grade 1, low viscosity. Grade 2, medium viscosity epoxy adhesive systems may be used in larger width cracks. The product shall specifically be designed for this application according to the manufacturer's product literature.

Immediately prior to injection, usually at or near the injection tip, the two components shall be brought together as part of the injection process. The injection equipment and process utilized shall be in accordance with the manufacturer's recommendations. No solvents shall be utilized to thin the material.

(1016PDCM, 12/18/25)

SECTION 1016 PACKAGED DRY CONCRETE AND MORTAR MATERIALS:

1016-1 General Requirements: the second paragraph of the Standard Specifications is modified to add:

Aqueous solutions, emulsions, or dispersions may be included as components of the packaged materials. The manufacturer may specify that these liquids are to replace some or

all the mixing water. If the material contains soluble chlorides or other ingredients in sufficient quantity to cause corrosion to steel reinforcements, the material will not be acceptable.

1016-5 **Packaged Dry Rapid-Hardening Concrete:** the second and the third paragraphs of the Standard Specifications are hereby deleted:

1016-6 **Packaged Dry Very Rapid-Hardening Concrete:** the second and the third paragraphs of the Standard Specifications are hereby deleted

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS
EXECUTIVE ORDER 11246, July 1, 1978

(Revised November 3, 1980)

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted:

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority:

c. "Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin):

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless or race):

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands): and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership or participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown plan. Each Contractor or Subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment ad training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has collective bargaining agreement , to refer either minorities or women shall excuse the Contractor's obligations under these specifications. Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such site or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or women sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on the job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations: by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and

Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative actions obligations (7a through p). The efforts of a contractor association, joint contractor- union, contractor community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a seperate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government Contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as al imitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

ADOT

TITLE VI / NON-DISCRIMINATION ASSURANCES
APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, the *Federal Highway Administration,* as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performance by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the *Federal Highway Administration* to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the *Federal Highway Administration,* as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the *Federal Highway Administration* ,may determine to be appropriate, including, but not limited to:

   a. withholding payments to the contractor under the contract until the contractor complies; and/or
   b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with request to any subcontract or procurement as the Recipient or the *Federal Highway Administration* may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

ADOT

TITLE VI / NON-DISCRIMINATION ASSURANCES
APPENDIX E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.,* 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin): and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.*), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1687 et. seq).

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246)

JULY 1, 1978 (Revised November 3, 1980)

(Revised April 15, 1981)

1. The bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

	Minority	Female
Tucson and balance of Pima County	24.1	6.9
Cochise, Graham, Greenlee and Santa Cruz Counties	27.0	6.9
Phoenix and balance of Maricopa County	15.8	6.9
Apache, Coconino, Gila, Mohave, Navajo, Pinal, Yavapai and Yuma Counties	19.6	6.9

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in all areas where he has Federal or federally assisted work.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

*** EXECUTIVE ORDER 2009-09 ***
PROHIBITION OF DISCRIMINATION IN STATE CONTRACTS
NONDISCRIMINATION IN EMPLOYMENT BY
GOVERNMENT CONTRACTORS AND SUBCONTRACTORS
(Superseding Executive Order 99-4 and Amending Executive Order 75-5)

[M09-395]

WHEREAS, Executive Order 99-4 was effectuated to assure that persons or entities contracting with the State of Arizona or its political subdivisions comply with the provisions of Title VII of the Civil Rights Act of 1964 (42 U.S.C. § 2000e, et. seq.) and with Arizona's Civil Rights Act (Title 41, Chapter 9, Article 4);

WHEREAS, Executive Order 99-4 correctly states that various religious organizations are exempted from Arizona's Civil Rights Act;

WHEREAS, Executive Order 99-4 does not expressly state the federal and state exemptions for Indian tribes under both the federal and State Civil Rights Acts;

WHEREAS, 42 U.S.C. § 200e(b)(1) exempts tribes from the definition of employer;

WHEREAS, A.R.S. § 41-1461 4 (b)(i) also exempts Indian tribes from the definition of employers to whom the Arizona Civil Rights Act applies;

WHEREAS, Indian tribes across the State have recently begun to experience difficulty contracting with the State, often for money or services to which they are lawfully entitled, as a result of their exclusion from specified exemptions within Executive Order 99-4;

WHEREAS, the Attorney General's Office has in some cases interpreted the existing provisions as requiring tribes to waive rights guaranteed by both federal and State law;

WHEREAS, a modification is necessary to expressly provide that the exemptions found in federal and State law continue in full force and effect;

NOW, THEREFORE, I, Janice K. Brewer, Governor of the State of Arizona, by virtue of the authority vested in me by the Constitution and laws of this State, hereby order and direct as follows:

1. Executive Order 75-5 is hereby amended as follows:

PART I - Non-discrimination in employment by government contractors and subcontractors.

Unless otherwise exempted by federal or state civil rights laws, all government contracting agencies shall include in every government contract hereinafter entered into the following provisions:

During the performance of this contract, the contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, age, color, religion, sex, or national origin. The contractor will take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, age, color, religion, sex or national origin. Such action shall include, but is not limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeship. The contractor agrees to post in conspicuous

places available to employees and applicants for employment notices to be provided by the contracting officer setting forth the provisions of this non-discrimination clause.

A continued Executive Order No. 75-5 is hereby amended to permit government contractors and subcontractors that are exempted from compliance under Title 41, chapter 9, article 4, Arizona Revised Statutes or 42 U.S.C. § 200e(b)(1), to provide employment preferences consistently with federal and state statutes;

Therefore, Executive Order 75-5 does not apply to Indian tribes. It likewise does not apply to religious organizations with respect to the employment of individuals of a particular religion to perform work connected with the activities of the employer. It also provides that religious organizations may provide employment preferences based upon religion when dealing with a bona fide occupational qualification reasonably necessary to the operation of the religious organization. This is consistent with the provisions of the Civil Rights Act of 1964 (42 U.S.C. 2000e, et seq.). In addition, in the Personal Responsibility and Work Opportunity Reconciliation Act, P.L. 104-193, Congress provided that religious organizations are eligible for the receipt of federal funds on the same basis as other private organizations.

Executive Order No. 75-5 prohibits all other government contractors and subcontractors from discriminating against any employee or applicant for employment because of race, age, color, religion, sex or national origin. Executive Order No. 75-5 further requires all government contractors and subcontractors to take action to insure that applicants are employed and employees are treated during employment without regard to their race, age, color, religion, sex or national origin.

B. The contractor will in all solicitations or advertisement for employees placed by or on behalf of the contractor state that all qualified applicants will receive consideration for employment without regard of race, age, color, religion, sex or national origin.

C. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided by the agency contracting officer advising the labor union or workers' representative of the contractor's commitments under the Executive Order and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

D. The contractor will furnish all information and reports required by the contracting agency and will permit access to his books, records. and accounts by the contracting agency and the Civil Rights Division for purposes of investigation to ascertain compliance with such rules, regulations and orders.

E. In the event of the contractor's noncompliance with the nondiscrimination clauses of the contract or with any such rules, regulations or orders of the Arizona Civil Rights Division said noncompliance will be considered a material breach of the contract and this contract may be cancelled, terminated or suspended, in whole or in part, and the contractor may be declared ineligible for future government contracts until said contractor has been found to be in compliance with the provisions of this order and the rules and regulations of the Arizona Civil Rights Division, and such sanctions may be imposed and remedies invoked as provided in Part II of this order, and the rules and regulations of the Arizona Civil Rights Division.

F. The contractor will include the provisions of paragraphs A through E in every subcontractor purchase order so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to the subcontract or purchase orders the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance, provided, however, that in the event the contractor becomes involved in or is threatened with litigation with a subcontractor or vender as a result of such direction by the contracting agency, the contractor may request the State of Arizona to enter into such litigation to protect the interest of the Sate of Arizona.

G. Each contractor having a contract containing the provisions prescribed in this section shall file and shall cause each of his subcontractors to file compliance reports with the contracting agency or the Civil Rights Division, as may be directed. Compliance reports shall be filed within such times and shall contain such information as the practices, policies, programs and employment policies, programs and employment statistics of the contractor and each subcontract and shall be in form as the Arizona Civil Rights Division may prescribe.

H. Bidders or prospective contractors of subcontractors shall be required to state whether they have participated in any previous contract subject to the provisions of this order or any preceding similar Executive Order and in such event to submit on behalf of themselves and the proposed subcontractors compliance reports prior to, or as an initial part of negotiation of a contract.

I. Whenever the contractor or subcontractor has a collective bargaining agreement or other contract or understanding with a labor union or an agency referring workers of providing or supervising apprenticeship or training for

such workers, the compliance report shall include such information from such labor unions or agency practices an policies affecting compliance as the contracting agency or Civil Rights Division may prescribe: provided that, to the extent such information is within the exclusive possession of a labor union or an agency referring workers or providing or supervising apprenticeship or training and such labor union or agency shall refuse to furnish such information to the contractor, the contractor shall so certify the contracting agency as part of its compliance report and shall set forth what efforts he has made to obtain such information.

J. The contracting agency or the Civil Rights Division shall require that the bidder or prospector contractor or subcontractor shall submit as part of his compliance report a statement in writing signed by an authorized officer or agent on behalf of any labor union or any agency referring workers or providing or supervising apprenticeship or other training with which the bidder or prospective contractor deals with supporting information to the effect that the signer's practices and policies do not discriminate on the grounds of race, color, religion, sex or national origin, and that the signer either will affirmatively cooperate in the implementation of the policy and provisions of this order or that it consents and agrees that recruitment, employment, and the terms and conditions of employment under the proposed contract shall be in accordance with the purpose and provisions of this order. In the event that the union or the agency shall refuse to execute such a statement, the compliance shall so certify and set forth what efforts have been made to secure such a statement and such additional factual material as the contracting agency or the Civil Rights Division may require.

PART II - Enforcement

A. Each contracting agency shall be primarily responsible for obtaining compliance with this Executive Order with respect to contracts entered into by such agency or its contractors. All contracting agencies shall comply with the rules of the Civil Rights Division in discharging their primary responsibility for securing compliance with the provisions of contracts and otherwise with the terms of this order and the rules and regulations and orders of the Civil Rights Division issued pursuant to this order. They are directed to cooperate with the Civil Rights Division and to furnish the Division such information and assistance as it may require in the performance of the Division's functions under this order. They are further directed to appoint or designate from among the agency personnel compliance officers. It shall be the duty of such officers to first seek compliance with the objective of this order by conference, conciliation, mediation or persuasion.

B. The Civil Rights Division may investigate the employment practices of any government contractor if subcontractor of initiate such investigation by the appropriate contracting agency or determine whether or not the contractual provisions specified in this order have been violated. Such investigations shall be conducted in accordance with the procedures established by the Civil Rights Division and the investigating agencies shall report to the Civil Rights Division any action taken or recommended. The Civil Rights Division may receive and investigate or cause to be investigated complaints by employees or prospective employees of a government contractor or subcontractor which alleges discrimination contrary to the contractual provisions specified in Part I of this order. If the investigation is conducted for the Civil Rights Division by a contracting agency, that agency shall report to the Civil Rights Division what action has been taken or it's recommendation with regard to such complaint.

C. The Civil Rights Division shall use its best efforts directly and through contracting agencies, other interested state and local agencies, contractors and all other available instrumentalities to cause any labor union engaged in work under government contracts or any agency referring workers or providing or supervising apprenticeship or training for it in the course of such work or cooperate in the implementation of the purposes of this order.

D. The Civil Rights Division or any agency, officer or employee in the executive branch of the government designated by rule, regulation or order of the Civil Rights Division may hold such hearings, public or private, as the Division may deem advisable for compliance, enforcement of educational purposes. The Civil Rights Division may hold or cause to be held hearings in accordance with rules and regulations issued by the Civil Rights Division prior to imposing, ordering or recommending the imposition of penalties and sanctions under this order.

E. No order for debarment of any contractor from further government contracts under this order shall be made without affording the contractor an opportunity for a hearing.

F. Sanctions and Penalties. In accordance with such rules, regulations or orders as the Civil Rights Division may issue or adopt, the Civil Rights Division or the appropriate contracting agency may publish or cause to be published the names of contractors or unions which it has concluded have complied or have failed to comply with the provisions of this order and with the rules, regulations and orders of the Civil Rights Division.

1. Contracts may be cancelled, in whole or in part, terminated, or suspended absolutely, or continuation of contracts may be conditioned upon a program for future compliance approved by the contracting agency or the Civil Rights Division: provided that any contracting agency shall refrain from entering into further contracts, extensions or

other modifications of existing contracts with any noncomplying contractor until such contractor has established and will carry out personnel and employment policies in compliance with the provisions of this order.

2. Under rules and regulations prescribed by the Civil Rights Division, each contracting agency shall make reasonable efforts within a reasonable time limitation to secure compliance with the contract provisions of this order by methods of conference, conciliation, mediation and persuasion before proceedings shall be instituted under this order of before a contract shall be cancelled or terminated in whole or in part under this order for failure of a contractor or subcontractor to comply with the contract provisions of this order.

G. This Executive Order shall become effective immediately of its issuance.

IN WITNESS WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of the State of Arizona

Janice K. Brewer
G O V E R N O R

DONE at the Capitol in Phoenix, Arizona this 20th day of October in the year Two Thousand and Nine and of the Independence of the United States of America the Two Hundred and Thirty-fourth.

ATTEST:
Ken Bennett
Secretary of State

ARIZONA DEPARTMENT OF TRANSPORTATION
PROJECT DELIVERY AND OPERATIONS DIVISION
CONTRACTS AND SPECIFICATIONS GROUP

BID SCHEDULE

CONTRACT # 2025059

TRACS No.	Project No.	Item	County	District	Gross Length	Net Length	Prepared By:
040 AP 330 F075401C	040-E-(230)T	104407	APACHE	NORTHEAST	12		Rene Teran

Highway Termini	Location	Work Description
• HOLBROOK - LUPTON HIGHWAY (I-40)	• McCarrell Rd to Querino	• System Preservation (Restoration/Rehab/Resurface)

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
2020019	REMOVAL OF EMBANKMENT CURB	L.FT.	429		
2020027	REMOVAL OF CONCRETE BARRIER	L.FT.	240		
2020037	REMOVE AND SALVAGE CATTLE GUARDS	EACH	4		
2020041	REMOVAL OF PIPE	L.FT.	66		
2020047	REMOVAL OF SIGNS	EACH	1		
2020052	REMOVE (SPILLWAY, OUTLET, INLET)	L.FT.	22		
2020053	REMOVE (GUARD RAIL END TERMINAL)	EACH	23		
2020054	REMOVE (GUARD RAIL END ANCHOR)	EACH	21		
2020071	REMOVE GUARD RAIL	L.FT.	15,538		
2020083	REMOVE BITUMINOUS PAVEMENT (MILLING) (2")	SQ.YD.	23,749		
2020084	REMOVE BITUMINOUS PAVEMENT (MILLING) (2 1/2")	SQ.YD.	12,092		
2020087	REMOVE BITUMINOUS PAVEMENT (MILLING) (4")	SQ.YD.	567,455		
2020089	REMOVE BITUMINOUS PAVEMENT (MILLING) (6 1/2" TO 8")	SQ.YD.	20,056		
2020101	REMOVE FENCE	L.FT.	36,879		
2020115	REMOVE (SIGN PANEL)	EACH	4		

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
2020116	REMOVE (GUARDRAIL TRANSITION)	EACH	16		
2020252	REMOVE BRIDGE DECK SURFACE (MECHANICAL MILLING)	SQ.YD.	840		
2020366	REMOVE LEAD-BASED PAINT MATERIALS	L.SUM	1		
2020370	DISPOSE OF LEAD-BASED PAINT MATERIALS (FORCE ACCOUNT)	L.SUM	1	$10,000.00	$10,000.00
2030112	SHOULDER BUILD-UP (MILLED AC)	L.FT.	246,137		
2030113	SHOULDER BUILD-UP (COMPACTION)	HOUR	224		
4040111	BITUMINOUS TACK COAT	TON	419		
4040116	APPLY BITUMINOUS TACK COAT	HOUR	838		
4040125	FOG COAT	TON	6		
4040165	BLOTTER MATERIAL	SQ.YD.	15,140		
4040230	ASPHALT BINDER (PG 70-28 PM)(FOR SMA)	TON	3,010		
4090003	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL)	TON	852		
4160024	ASPHALTIC CONCRETE MIX (3/4")(END PRODUCT)(SPECIAL)	TON	90,045		
5010007	PIPE, CORRUGATED METAL, 18"	L.FT.	21		

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	30		
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	15		
5014518	FLARED END SECTION, 18" (C-13.20 OR C-13.25)	EACH	3		
5014530	FLARED END SECTION, 30" (C-13.20 OR C-13.25)	EACH	1		
5014536	FLARED END SECTION, 36" (C-13.20 OR C-13.25)	EACH	2		
6010505	BRIDGE REPAIR (SLOPE PAVING)	SQ.YD.	12		
6010506	BRIDGE REPAIR (POLYESTER POLYNMER CONCRETE)	SQ.YD.	840		
6010510	BRIDGE REPAIR (BLAST AND RECOAT EXPOSED REINFORCING)	SQ.FT.	195		
6010511	BRIDGE REPAIR (SEAL JOINTS AND CRACKS IN SLOPE PAVING)	L.FT.	1,100		
6010603	PENETRATING DECK SEALER (METHACRYLATE)	SQ.YD.	927		
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	130		
6018101	REINFORCED CONCRETE BOX CULVERT (SEAL CRACKS)	L.FT.	138		
6018102	REINFORCED CONCRETE BOX CULVERT (REPAIR CRACKS)	L.FT.	34		
6070038	SLIP BASE	EACH	11		

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
6070048	FOUNDATION FOR SQUARE TUBE POST	EACH	11		
6070057	SIGN POST (PERFORATED) (2 1/2 T)	L.FT.	147		
6080005	REGULATORY, WARNING, OR MARKER SIGN PANEL	SQ.FT.	31		
6080110	REMOVE AND REINSTALL SIGN	EACH	5		
6100026	PAINT STRUCTURE (FULLY REPAINT STEEL SUPERSTRUCTURE)	SQ.FT.	11,000		
7010005	MAINTENANCE AND PROTECTION OF TRAFFIC	L.SUM	1		
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	8,800		
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAL)	EACH	8		
7015052	OBLITERATE PAVEMENT MARKING (STRIPE)	L.FT.	1,521		
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT.-DAY	96,800		
7016021	TEMPORARY IMPACT ATTENUATORS (IN USE)	EACH-DAY	88		
7016050	TRUCK-MOUNTED ATTENUATOR	EACH-DAY	591		
7016067	CHANGEABLE MESSAGE BOARD (CONTRACTOR FURNISHED)	EACH-DAY	605		
7016075	FLAGGING SERVICES (CIVILIAN)	HOUR	396		

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
7016081	FLAGGING SERVICES (DPS)	HOUR	2,977		
7030026	DELINEATOR ASSEMBLY (FLEXIBLE) (CONCRETE FOUNDATION)	EACH	473		
7030027	DELINEATOR ASSEMBLY (FLEXIBLE) (SURFACE-MOUNTED)	EACH	60		
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	302,812		
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	202,242		
7050056	PAVEMENT MARKING, PREFORMED, SYMBOL, TYPE I/IV	EACH	20		
7050057	PAVEMENT MARKING, PREFORMED, LEGEND, TYPE I/IV	EACH	4		
7050069	PAVEMENT MARKING, PREFORMED, TRANSVERSE, TYPE IV	L.FT.	1,422		
7060013	PAVEMENT MARKER, RAISED, TYPE C	EACH	30		
7080201	WATERBORNE-TYPE I PAVEMENT MARKING (PAINTED) (WHITE)	L.FT.	203,628		
7080202	WATERBORNE-TYPE I PAVEMENT MARKING (PAINTED) (YELLOW)	L.FT.	134,570		

BID SCHEDULE

040 AP 330 F075401C

Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
7080206	WATERBORNE-TYPE I PAVEMENT MARKING (PAINTED SYMBOL) (ARROW)	EACH	20		
7080208	WATERBORNE-TYPE I PAVEMENT MARKING (PAINTED LEGEND) (ONLY)	EACH	4		
7090001	DUAL COMPONENT PAVEMENT MARKING (WHITE EPOXY)	L.FT.	3,380		
7090002	DUAL COMPONENT PAVEMENT MARKING (YELLOW EPOXY)	L.FT.	1,184		
7100001	SWZ SYSTEM	L.SUM	1		
7100100	SWZ TDC LOCATION (IN USE)	EACH-DAY	3,714		
7100200	SWZ CMB ASSEMBLY (IN USE)	EACH-DAY	1,841		
7100300	SWZ TRAFFIC MONITORING CAMERA ASSEMBLY (IN USE)	EACH-DAY	2,492		
7100500	SWZ SMART ARROW BOARD	EACH-DAY	820		
7350005	LOOP DETECTOR (COUNTER)	EACH	2		
7350021	LOOP DETECTOR (SPEED/CLASSIFICATION)	EACH	1		
7350039	LOOP DETECTOR (WEIGH-IN-MOTION) (PARTIAL REPLACEMENT)	EACH	2		
8050003	SEEDING (CLASS II)	ACRE	57		

BID SCHEDULE

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Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
8101016	EROSION CONTROL (ROCK MULCH)	CU.YD.	30		
8101021	EROSION CONTROL (WATTLES) (9")	L.FT.	16,030		
9010001	MOBILIZATION	L.SUM	1		
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	16,030		
9030002	WOVEN WIRE FENCE, TYPE 2	L.FT.	34,812		
9030012	BARBED WIRE FENCE, TYPE 2	L.FT.	437		
9050002	GUARD RAIL, W-BEAM, SINGLE FACE, SHOP CURVED	L.FT.	363		
9050006	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	15,088		
9050027	GUARD RAIL TERMINAL (TANGENT TYPE) (CURB/GUTTER ALT.)	EACH	16		
9050028	GUARD RAIL TERMINAL (FLARE TYPE)	EACH	13		
9050036	GUARD RAIL, ANCHOR ASSEMBLY	EACH	15		
9050419	GUARD RAIL TRANSITION (THRIE-BEAM GR TRANS. SYSTEM)	EACH	16		
9060041	CATTLE GUARD (4 UNIT)	EACH	3		
9060061	CATTLE GUARD (6 UNIT)	EACH	1		

BID SCHEDULE

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Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
9100111	CONCRETE HALF BARRIER TRANSITION	EACH	12		
9130001	RIPRAP (DUMPED)	CU.YD.	111		
9130007	RIPRAP (DUMPED) (D50 = 6")	CU.YD.	11		
9130030	RIPRAP (GABIONS) (EROSION PROTECTION)	CU.YD.	49		
9160001	EMBANKMENT CURB	L.FT.	389		
9170001	EMBANKMENT SPILLWAY (C-4.10)	L.FT.	20		
9170021	INLET (C-4.10) (SINGLE)	EACH	1		
9240014	FORCE ACCOUNT WORK (BRIDGE DECK REPAIR)	L.SUM	1	$15,000.00	$15,000.00
9240050	MISCELLANEOUS WORK (BRIDGE REPAIR, PARTIALLY REPAIR PIER PROTECTION BARRIER)	L.SUM	1		
9240111	MISCELLANEOUS WORK (SEAL BOX/WINGWALL JOINT)	L.FT.	37		
9240112	MISCELLANEOUS WORK (RECONSTRUCT BOX/WINGWALL JOINT)	L.FT.	49		
9240113	MISCELLANEOUS WORK (EDGE BEAM RECONSTUCT)	L.FT.	130		
9240117	MISCELLANEOUS WORK (REPAIR SPALLED/CHIPPED AREAS)	SQ.FT.	27		
9240129	MISCELLANEOUS WORK (COMPACTED MILLED AC TREATMENT)	SQ.YD.	3,048		

BID SCHEDULE

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Item No.	Item Description	Unit	Quantity	Unit Price	Extended Amount
9240140	MISCELLANEOUS WORK (STONE MATRIX ASPHALTIC CONCRETE)	TON	50,154		
9240141	MISCELLANEOUS WORK (STABILIZING ADDITIVE)	TON	237		
9240170	CONTRACTOR QUALITY CONTROL	L.SUM	1		
9240181	MISCELLANEOUS WORK (CONTROL OF NOXIOUS PLANTS)(MANUAL/MECHANICAL METHODS)	SQ.YD.	110,000		
9240182	MISCELLANEOUS WORK (CONTROL OF NOXIOUS PLANTS)(HERBICIDE)	SQ.YD.	140,000		
9240210	SAWCUT GROOVE FOR STRIPING (DIAMOND BLADE)	L.FT.	424,181		
9240900	AVOIDANCE AREA PROTECTION PLAN AND MONITORING	L.SUM	1		
9250001	CONSTRUCTION SURVEYING AND LAYOUT	L.SUM	1		
9280037	GROUND-IN RUMBLE STRIP (12 INCH)	L.FT.	211,033		

BID TOTAL :

BID SCHEDULE

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PROPOSAL

TO THE ARIZONA DEPARTMENT OF TRANSPORTATION:

Gentlemen:

The following Proposal is made for constructing project

040 AP 330 F075401C 040-E-NFA
HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

in the State of Arizona.

The following Proposal is made on behalf of _____

_____ and no others.
(NAME OF COMPANY, FIRM, OR CORPORATION)

The undersigned hereby certifies that (s)he has been duly authorized to submit a proposal on behalf of the company, firm, or corporation mentioned above; and further certifies, pursuant to Subsection 112(c) of Title 23, United States Code and Title 44, Chapter 10, Article 1 of the Arizona Revised Statutes, that neither (s)he nor anyone associated with the company, firm, or corporation mentioned above has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such project and furthermore that no member or employee of the Arizona Department of Transportation is personally or financially interested, directly or indirectly, in the Proposal, or in any purchase or sale of any materials or supplies for the work to which it relates, or in any portion of the profits thereof.

The undersigned certifies that the approved Plans, Standard Specifications, Special Provisions and forms of Contract and Bond authorized by the Arizona Department of Transportation and constituting essential parts of this proposal, have been carefully examined, and also that the site of the work has been personally inspected. The undersigned declares that the amount and nature of the work to be done is understood and that at no time will misunderstanding of the Plans, Specifications, Special Provisions, or conditions to be overcome, be plead. On the basis of Plans, Specifications, Special Provisions, and the forms of Contract and Bond proposed for use, the undersigned proposes to furnish all the necessary equipment, materials, machinery, tools, apparatus, and other means of construction, and labor to do all the work in the manner specified, and to accept, as full compensation therefor, the sum of the various products obtained by multiplying each unit price, herein bid for the work or materials, by the quantity thereof actually incorporated in the complete project, as determined by the State Engineer. The undersigned understands that the quantities mentioned herein are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work as either increased or decreased, in accordance with the provisions of the Specifications, at the unit price bid in the Bidding Schedule.

The undersigned further proposes to perform all extra work that may be required on the basis provided in the Specifications and to give such work personal attention and to secure economical performance.

The undersigned further proposes to execute the Contract Agreement and furnish satisfactory Bond within ten calendar days from the date of Notice of Award, time being of the essence. The undersigned further proposes to begin work as specified in the contract attached hereto, and to complete the work on or before expiration of the contract time as defined in the Specifications, and maintain at all times a Payment Bond and a Performance Bond, approved by the State Engineer, in an amount equal to one hundred (100) percent of the total bid. These bonds shall serve not only to guarantee the completion of the work on the part of the undersigned, but also to guarantee the excellence of both workmanship and material and the payment of all obligations incurred, until the work is finally accepted and the provisions of the Plans, Standard Specifications and Special Provisions fulfilled.

The undersigned hereby agrees to provide an electronic Proposal Guaranty in the amount and character named in the Advertisement for Bids. The Proposal Guaranty is submitted as a guaranty of the good faith of the bidder, and that the bidder will enter into written contract, as provided, to do the work, if successful in securing the award thereof, and it is hereby agreed that if at any time other than as provided in the Proposal there should be failure on the part of the undersigned to execute the Contract and furnish satisfactory Bond as herein provided, the State of Arizona, in either of such events, shall be entitled and is hereby given the right to retain the said Proposal Guaranty as liquidated damages.

If by a Corporation:

(Seal)

Corporate Name: _____

Corporate Mailing Address: _____ Zip Code: _____

Incorporated under the laws of the State of: _____

By (Signature): _____ Date: _____

President: _____

Secretary: _____

Treasurer: _____

If by a Firm or Partnership:

Firm or Partnership Mailing Name: _____

Firm or Partnership Address: _____

By (Signature): _____ Date: _____

Name and Address of Each Member: _____

_____

_____

_____

_____

If by an Individual:

Signature: _____ Date: _____

Mailing Address: _____

ARIZONA DEPARTMENT OF TRANSPORTATION

SURETY (BID) BOND

(Penalty of this bond must not be less than 10% of the bid amount)

KNOW ALL MEN BY THESE PRESENTS, THAT _____

_____

as Principal, hereinafter called the Principal, and _____

_____

a corporation duly organized under the laws of the state of _____ hereinafter called the Surety, holding a certificate of authority to transact surety business in this State issued by the Director of the Department of Insurance, are held and firmly bound unto the Arizona Department of Transportation, as Obligee, hereinafter called the Obligee, in the sum of Ten Percent (10%) of the amount of the bid of Principal, submitted by Principal to the Arizona Department of Transportation for the work described below, for the payment of which sum well and truly to be made, the said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is herewith submitting its proposal for TRACS/Project No.

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HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

NOW THEREFORE, if the Obligee, acting by and through its Transportation board, shall accept the proposal of the Principal and the Principal shall enter into contract with the Obligee in accordance with the terms of such proposal, and give such bonds and certificates of insurance as may be specified in the contract documents with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter into such contract and give such bonds and certificates of insurance, if the Principal shall pay to the Obligee the difference not to exceed the penalty of the bond between the amount specified in the proposal and such larger amount for which the obligee may in good faith contract with another party to perform the work covered by the proposal then this obligation is void. Otherwise it remains in full force and effect.

IN WITNESS WHEREOF, we hereunto set our hands and seals:

_____
Principal

_____
By

_____
Title

_____
Surety

_____
By Attorney-in-Fact

_____
Address Attorney-in-Fact

Subscribed and sworn before me
this _____ day of _____, 20 _____.

My Commission expires: _____

_____
Notary Public

R9/13

CERTIFICATION WITH REGARD TO THE

PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE

OF EXECUTIVE ORDER NO. 99-4 AND THE FILING OF REPORTS

AUGUST 1, 2000

The undersigned contractor or subcontractor, as appropriate, hereby certifies that he either has or has not, as indicated, participated in a previous contract or subcontract subject to the equal opportunity clause in Executive Order No. 99-4 of March 26, 1999, and furthermore that he either has or has not, as indicated, filed with the Highways Division, Arizona Department of Transportation, or the Arizona Civil Rights Division, all reports due under the filing requirements of the regulations of the Arizona Civil Rights Division.

Participated in previous contracts: Yes ☐ No. ☐

Filed Required reports: Yes ☐ No. ☐

_____

Print Contractor Name

_____

Signature

_____

Title

_____

Date

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HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

REVISED 05/02

CERTIFICATION WITH RESPECT TO THE

RECEIPT OF ADDENDA

In the submission of a bid and by the signing of the Proposal, this will certify that the following numbered addenda issued on this project have been brought to my personal attention and furthermore that I understand and agree that those will be made a part of the Contract.

Addendum No. _____, _____, _____, _____, _____

_____
PRINT NAME OF CONTRACTOR

_____
SIGNATURE

_____
TITLE

_____
DATE

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HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

REVISED 05/02

ARIZONA DEPARTMENT OF TRANSPORTATION

PARTICIPATION IN BOYCOTT OF ISRAEL CERTIFICATION FORM

Unless and until the District Court's injunction in Jordahl is stayed or lifted, the Anti-Israel Boycott Provision (A.R.S. § 35-393.0l(A)) is unenforceable and the State will take no action to enforce it. This attachment (Participation in Boycott of Israel) is no longer a mandatory part of the offer. Offers will not be evaluated based on whether this certification has been completed.

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HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

This Certification is required in response to legislation enacted to prohibit the State from contracting with companies currently engaged in a boycott of Israel. To ensure compliance with A.R.S. §35-393.01, this form must be completed and returned with the bid. The bidder understands that this response will become public record and may be subject to publicinspection.

As defined by A.R.S. §35-393.01:

1. "Boycott" means engaging in a refusal to deal, terminating business activities or performing other actions that are intended to limit commercial relations with Israel or with persons or entities doing business in Israel or in territories controlled by Israel, if those actions are taken either:
   (a) In compliance with or adherence to calls for a boycott of Israel other than those boycotts to which 50 United States Code section 4607(c) applies.
   (b) In a manner that discriminates on the basis of nationality, national origin or religion and that is not based on a valid business reason.
2. "Company" means a sole proprietorship, organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, Limited Liability Company or other entity or business association, and includes a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate.
3. "Direct holdings" means all publicly traded securities of a company that are held directly by the state treasurer or a retirement system in an actively managed account or fund in which the retirement system owns all shares or interests.
4. "Indirect holdings" means all securities of a company that are held in an account or fund, including a mutual fund, that is managed by one or more persons who are not employed by the state treasurer or a retirement system, if the state treasurer or retirement system owns shares or interests either:
   (a) Together with other investors that are not subject to this section.
   (b) That are held in an index fund.
5. “Public entity" means this State, a political subdivision of this STATE or an agency, board, commission or department of this state or a political subdivision of this state.
6. “Public fund" means the state treasurer or a retirement system.
7. "Restricted companies" means companies that boycott Israel.
8. "Retirement system" means a retirement plan or system that is established by or pursuant to title38.

All Bidders must select one of thefollowing:

_____**The bidder does not participate in, and agrees not to participate in during the term of the contract a boycott of Israel in accordance with A.R.S. §35-393.01.**

_____The bidder **does** participate in a boycott of Israel as defined by A.R.S. §35-393.01.

By submitting this response, the bidder agrees to indemnify and hold the State, its agents and employees, harmless from any claims or causes of action relating to the State’s action based upon reliance on the above representations, including the payment of all costs and attorney fees incurred by the State in defending such an action.

Company Name	Signature of Person Authorized to Sign
Address	Printed Name
City State Zip	Title

ARIZONA DEPARTMENT OF TRANSPORTATION

Forced Labor of Ethnic Uyghurs Ban Certification Form

Forced Labor of Ethnic Uyghurs Ban

Please note that if any of the following apply to the Contractor, then the bidder shall select the "Exempt Contractor" option below:

- Contractor is a sole proprietorship;
- Contractor has fewer than ten (10) employees; OR
- Contractor is a non-profit organization.

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HOLBROOK-LUPTON HIGHWAY (I-40)
(MCCARRELL-QUERINO)

Pursuant to A.R.S. § 35-394, written certification is required to show that the company entering into a contract with a public entity does not use the forced labor, or use any contractors, subcontractors or suppliers that use the forced labor or any goods or services produced by the forced labor, of ethnic Uyghurs in the People's Republic of China.

Under A.R.S. §35-394:

1. "Company" means an organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, limited liability company or other entity or business association, including a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate, that engages in for-profit activity and that has ten or more full-time employees.

2. "Public entity" means this State, a political subdivision of this State or an agency, board, commission or department of this State or a political subdivision of this State.

In compliance with A.R.S. §§ 35-394 et seq., all bidders must select <u>one</u> of the following:

☐	The bidder **<u>does not</u>** use, and agrees not to use during the term of the contract, any of the following: • Forced labor of ethnic Uyghurs in the People's Republic of China; • Any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China; or • Any Contractors, Subcontractors, or suppliers that use the forced labor or any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China.
☐	The bidder **<u>does</u>** participate in use of Forced Uyghurs Labor as described in A.R.S. § 35-394.
☐	**Exempt Contractor.** Select all statements that applies to this Contractor: ☐ Contractor is a sole proprietorship; ☐ Contractor has fewer than ten (10) employees; and/or ☐ Contractor is a non-profit organization.

Company Name

Address

City State Zip

Signature of Person Authorized to Sign

Printed Name

Title